Prepared for

CG Roxane, LLC
1210 South Highway 395
Olancha, California 93549

SITE INVESTIGATION WORK PLAN

Olancha Spring Water Bottling Facility
1210 South U.S. Highway 395
Olancha, California

Prepared by

Geosyntec consultants

engineers | scientists | innovators

924 Anacapa Street, Suite 4A
Santa Barbara, California 93105

Project Number SB0367

October 17, 2014

SITE INVESTIGATION WORK PLAN

Olancha Spring Water Bottling Facility

1210 South U.S. Highway 395
Olancha, California

Prepared for

Crystal Geyser Roxane

October 17, 2014

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1.0 INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec), on behalf of Crystal Geyser Roxane (CGR), is submitting the following Site Investigation Work Plan (Plan) for the CGR Spring Water Bottling Facility (Site) located at 1210 South U.S. Highway 395, near Olancha, California. The Plan presents the proposed methodology for an environmental groundwater investigation in response to the Lahonton Regional Water Quality Control Board (RWQCB) Investigative Order Number R6V-2014-0063 (Order) dated July 24, 2014.

CGR operates a spring water bottling facility at the Site using groundwater production wells for the bottled water supply and for domestic and industrial purposes. The Order was issued by the RWQCB based on waste water discharges that CGR generates as part of their business operations. As required in the Order, CGR is preparing a *Facility Waste Generation and Discharge Systems Report* which will be submitted separately. That report will describe the facility operations that produce waste water and characterize waste water discharges from the Site facility. As part of the Order, the RWQCB requires that an investigation be conducted to assess if the Site's historical and current waste water discharges have affected surface or groundwater quality and beneficial uses. This Plan is designed to address the current investigation work plan requirements of the RWQCB Order. The Plan is organized as follows:

- Section 1. – *Introduction*.
- Section 2.0. – *General Site Information*. This section includes a general description of the Site location, Site topography and Site features such as creeks, structures, and wells.
- Section 3.0 – *Previous Hydrogeologic Site Studies*. A summary of the previous investigations is presented including a listing of reports submitted for the Site.
- Section 4.0. – *Site Geology and Hydrogeology*. This section includes a description of the regional hydrogeology including regional watershed information.
- Section 5.0. – *Investigation Objectives and Design*. Provides the investigation objectives and a basis for the phased approach to the Site investigation.
- Section 6.0. – *Field Methodology*. Procedural information on drilling and well installation, flume installation, piezometer installation, aquifer testing, and water sampling is presented.

- Section 7.0. –Schedule and Report Preparation. A schedule of the proposed investigation activities and reporting is presented.

2.0 GENERAL SITE INFORMATION

2.1 General Site Information

The Site is an irregularly-shaped property that consists of approximately 170 acres adjacent to Highway 395 approximately 3 miles north of Olancha, California (**Figure 1**). Though not part of the Site, CGR recently purchased the Cabin Bar Ranch, a former cattle ranch of approximately 382 acres, located adjacent and to the north of the current bottling facility property. Hydrogeologic data collected on and near the Cabin Bar Ranch are relevant to the description of the hydrogeology presented in this workplan. Currently, there is no water being produced from the Cabin Bar Ranch.

CGR operates a spring water bottling facility using groundwater production wells for bottled water supply and for domestic and industrial purposes. The facility consists of two large bottling-production and warehouse buildings, CGR North and CGR South, containing a total of six main bottling production lines. A complete description of the bottling facility processes will be submitted in the *Facility Waste Generation and Discharge Systems Report.* The facility pumps groundwater from production wells located on the property for water bottling and domestic/industrial uses.

Regionally, the Site is located in the southern portion of the Owens Valley. Owens Lake (dry lake bed) is located east of the Site, and the base of the Sierra Nevada Mountains is located 1 mile west of the Site. Highway 395, which runs north-south, crosses the western portion of the Site (**Figure 1**). The Los Angeles Aqueduct is located approximately ½-milewest of the Site.

The town of Cartago is located to the north of the Cabin Bar Ranch. The Cartago Mutual Water Company (CMW) owns two wells, CMW-1 and CMW-2, located approximately 3,500 feet north of the northern Site boundary in the town of Cartago. CMW-1 was installed to a depth of approximately to 250 or 325 feet, but apparently sand has infiltrated into the well to approximately 180 feet (Dustin Hardwick, personnel communication, 2014). CMW reports that CMW-2 is currently used to supply water to 43 residences in the town of Cartago. Based on a Driller's Well Report CMW-2 is installed to a depth of approximately 160 feet and is screened or perforated between depths of 115 to 150 feet. Current static groundwater levels in CMW-2 are reported to be at approximately 16 to 17 ft bgs and dynamic pumping levels in the well are reported to be at approximately 30 ft bgs.

There are numerous other private domestic wells located in the town of Cartago. Based on a survey conducted by CGR in which available County files were reviewed (by permission of the individual residences) and a private residence survey was completed, it is estimated that there are currently 14 active private wells in Cartago. The pumping in the CMW wells and the 14 active private wells is the only known significant groundwater withdrawals in the area surrounding the Site. **Figure 2** shows the location of the active domestic wells in Cartago (Geosyntec, 2014). These wells are all located a minimum of approximately 3.500 feet north of the Site.

2.2 Summary of Site Groundwater Wells

Production wells and observation wells for the Site and are shown on **Figure 2**. CGR has installed a total of 7 groundwater production wells at the Site (CGR-1 through CGR-7) and four groundwater observation wells (OW-7U, OW-7M, OW-8U and OW-8D). Wells CGR-2 and CGR-7 are used for bottled water production, and wells CGR-3 and CGR-4 are used for domestic or industrial purposes. Other production wells are currently inactive.

CGR installed three production wells (CGR-8 through CGR-10) on the Cabin Bar Ranch property. Additionally, there are five inactive production wells, 15 piezometers, and three monitoring wells previously installed at the Cabin Bar Ranch. Eight wells (EW-1 through EW-8) were installed at the Site prior to CGR starting operations at the Site. These previous eight wells are currently inactive. As summarized in Dames & Moore *Phase II – Water Resources Investigation, Crystal Geyser-Roxane, Bottling Facility* (1991), there are very little data available for these eight wells.

Available completion depth and screen interval information for the production wells and observation wells is taken from the U*pdated Hydrogeologic Evaluation for Crystal Geyser Roxane*, *Cabin Bar Ranch*, (RCS, 2012) and is presented in **Appendix A**.

3.0 PREVIOUS HYDROGEOLOGIC SITE STUDIES

There have been five hydrogeological Site studies relating to the CGR spring water bottling operations. A listing of the report references in chronological order is found below. Additionally, electronic copies of these reports (excepting the first listed report) are provided on compact disc with this Plan and are included in **Appendix B**.

- *Phase I – Water Resources Investigation, Crystal Geyser-Roxane, Bottling Facility*, Inyo County, California, February 19, 1990. Completed by Dames and Moore. Report is referenced in subsequent reports, but a copy of the report is not available.

- *Phase II – Water Resources Investigation*, *Crystal Geyser-Roxane*, *Bottling Facility*, Inyo County, California, January 20, 1991. Completed by Dames and Moore.

- *Report – Water Supply Well CGR-2, Crystal Geyser Roxane,* Olancha, California, March 31, 1993. Completed by Dames and Moore.

- *Report – Water Supply Wells CGR-4, CGR-5 and CGR-6 Crystal Geyser-Roxane,* Olancha, California, April 21, 1995. Completed by Dames and Moore.

- *Test Well Installation and Hydrogeology Report,* Cabin Bar Ranch, Olancha, California. February 7, 2011. Completed by Geosyntec Consultants.

4.0 SITE GEOLOGY AND HYDROGEOLOGY

4.1 Regional Geology and Hydrogeology

The Site is located in the southern portion of the Owens Valley which has a length of 150 miles and width of generally less than 8 miles. The Owens Valley is the westernmost valley of the Basin Range Province and is formed by the Sierra Nevada Mountains to the west and the White/Inyo Mountains to the east. The Sierra Nevada Mountains are generally composed of Mesozoic age igneous rocks of granodiorite-granite composition whereas the White/Inyo Mountains, to the east, consist of Pre-Cambrian to Triassic sedimentary rock locally intruded with Mesozoic granitic rocks.

Structurally, the Owens Valley is a graben bounded by the Sierra Nevada Frontal fault and the Inyo Mountain Frontal fault. These faults are considered active and the offset on these faults is the cause of the dramatic relief in the Owens Valley area. The Site is located on the valley floor at an elevation of approximately 3,640 feet, while Olancha peak, to the west of the Site in the Sierra Nevada Mountains, stands at an elevation of over 12,000 feet. The Inyo Mountains east of the Site have an elevation greater than 8,000 feet.

The California Department of Water Resources (2003) shows the Site to be located in the southern portion of the Owens Valley Groundwater Basin. The groundwater basin has a surface area of 1,030 square miles and includes valleys in both Mono and Inyo County. The basin, as defined by the Department of Water Resources, is bounded to the south by the Coso Range, the Sierra Nevada to the west, the White/Inyo Mountains to the east, and the Benton Range to the north. Groundwater occurs in the sediments that fill the valley.

4.2 Site Geohydrology

Based on the previous investigations of the geohydrology of the Site as listed in Section 3.0, the following description provides the basis of understanding for the Site geohydrology.

The most important water bearing formation in the vicinity of the Site is alluvium consisting of sands and gravels derived from erosion of the surrounding mountains. The upper zone of the alluvial aquifer, in which the Site wells are installed, is unconfined. Deeper zones of water bearing alluvium beneath the Site are thought to be under semi-confined conditions. The sandy and gravelly alluvium is locally interbedded or interfingered with fine-grained lacustrine (lake) deposits. Fine-grained lacustrine deposits increase in occurrence and thickness moving to the east towards Owens Lake (GSI, 1983). The thickness of the alluvial and lacustrine sequence is thought to be several thousand feet thick and up to 6,000 feet or more in the middle of the Owens Lake (Pakiser et. al., 1964).

The primary source of groundwater recharge in the Owens Valley Groundwater basin is from percolation of stream flow from the Sierra Nevada range. In the case of the Site and the Cartago area, the main aquifer is thought to recharge primarily by flow in Olancha Creek, Cartago Creek, and Walker Creek that have watersheds to the west of the Site in the Sierra Nevada Mountains. Stream flow in these creeks is derived from precipitation in the mountains and infiltrates through relatively permeable alluvium closer to the valley floor. There is also thought to be some recharge of the alluvium from underflow of groundwater in fractures in the mountain bedrock, although the volume of such recharge is not known. Recharge of direct precipitation into the alluvium may also contribute a relatively small component of recharge into the groundwater basin.

Groundwater in the shallow unconfined aquifer is the source of water that issues from numerous springs and seeps that collectively form along a north-south trending fault (a part of the Sierra Nevada Frontal fault system) (**Figure 2**). The north-south trending fault is known locally as the "spring line fault". The fault is inferred to cause a "damming" effect and the subsequent rise of groundwater to the surface creates the large spring areas or spring seeps (Dames and Moore, 1991). Wells that have been installed by CGR draw water from the shallow unconfined aquifer in hydraulic connection with the spring water. These wells are all located west of the north-south trending fault.

The static depth to groundwater at the Site ranges from between 10 – 15 feet below ground surface (ft bgs) in the western portions of the Site, to 4 – 10 ft bgs in production wells found near the spring line fault. The groundwater table is very shallow close to the spring line fault based on static groundwater elevations measured in piezometers and monitoring wells located near the spring line fault (Geosyntec 2011). The area east of the spring line fault is also assumed to be underlain by shallow groundwater (i.e. less than 5 ft bgs), although there has been limited exploration of groundwater east of the spring line fault, including the areas surrounding the Arsenic Pond and East Pond (**Figure 2**). Two monitoring wells, OW-8U and OW-8D are installed east of the spring line fault. These wells are screened between 190 – 230 ft bgs, and 582 – 642 ft bgs, respectively. The groundwater conditions in both wells are artesian and the well screens were not installed in the upper-most aquifer, and therefore the groundwater from these wells is not representative of the conditions of the upper-most aquifer.

Based on an extensive hydrogeological investigation conducted at the Site in 1991 by Dames and Moore, the groundwater gradient in the Site vicinity was calculated to be to the northeast towards Owens Lake at a gradient of approximately 0.007 (see Figures 3 and 4 in Dames and Moore, 1991 in Appendix B). More recently the groundwater gradient in the central portion of the Cabin Bar Ranch was calculated to be 0.015 to the east (Geosyntec, 2011). There is one shallow piezometer (P-15) east of the spring line fault on the Cabin Bar Ranch property. The groundwater gradient east of the spring line fault appears to be towards the east or northeast based on the groundwater measurements collected at the Cabin Bar Ranch in 2010 (see Figure 7 of Geosyntec, 2011 in Appendix

B). The gradient direction is consistent with the gradient for the aquifer west of the spring line fault. Therefore, it is anticipated that the groundwater gradient east of the spring line fault in the vicinity of the Site will also be similar as the gradient direction west of the spring line fault which is essentially toward Owens Dry Lake. This direction is expected given that Owens Dry Lake is the natural discharge point for groundwater in the area. Again, there is no use of groundwater down-gradient of the Site. Pumping wells in the Cartago area do not produce groundwater which originates on the Site down-gradient of the ponds.

5.0 INVESTIGATION OBJECTIVES AND DESIGN

The objectives of the field investigation outlined in this work plan are as follows:

- Evaluate groundwater quality up-gradient and down-gradient of the discharge areas including the East Pond (EP), the Fire Pond (FP), and the Arsenic Pond (AP);

- Evaluate lithology in shallow soil in the areas of the EP, FP and AP; and,

- Evaluate depth to groundwater and groundwater gradient in the area east of the spring-line fault.

A phased field investigation approach is proposed to address the objectives of the investigation. The proposed investigation phases are:

Phase 1 – Discharge Stream, Surface Water, Direct Push, and Hydropunch Groundwater Investigation. An initial field mobilization will consist of nine (9) borings using a direct push drill rig, collection of continuous core soil samples for lithology, and groundwater grab samples for laboratory analysis using a Hydropunch groundwater sampling tool. The approximate locations of the proposed direct push groundwater sampling borings are shown on **Figure 3**.

It is anticipated that a total of 6 waste stream discharge samples will also be collected to further characterize the discharge streams. The locations of these samples are:

- Percolation Pond
- Arsenic Pond
- Fire Pond
- Discharge stream going to the Percolation Pond
- Discharge stream going to the Fire Pond
- Overflow from the Fire Pond

Phase 2 – Groundwater Monitoring Well Installation and Groundwater Sampling.

Based on the results of the Phase 1 investigation, locations will be selected for groundwater monitoring wells to further characterize groundwater quality. It is currently anticipated that a minimum of three groundwater wells will be installed, developed, and sampled. The locations and number of the monitoring wells will be selected based on data obtained from the Phase 1 results which will be presented to the RWQCB prior to monitoring well installation.

6.0 FIELD METHODOLOGY

As discussed in the previous section, the investigation is proposed to consist of two phases for the field investigation. The field methodology proposed for the proposed phased investigation is outlined below in Sections 6.2 through 6.5. A Sampling and Analysis Plan (SAP) detailing soil and groundwater sample collection procedures, direct push and hollow stem auger drilling procedures, and well installation, development and sampling procedures is presented in **Appendix C**.

6.1 Pre-field Preparation

A Health & Safety Plan (HASP) will be prepared for field personnel. The HASP will include an analysis of the Site and work hazards, and potential chemical exposures associated with the field work proposed for this Plan. Sub-contractors working on the project will provide their own personnel with Health & Safety Plans. All Site personnel will be required to have forty-hour health and safety training (CFR 1919.120).

Permits for the soil borings are not anticipated to be required for the direct push borings. Permits for the groundwater monitoring wells proposed for Phase 2 of the investigation will be obtained from the County of Inyo as necessary.

6.2 Phase 1 - Direct Push Drilling and Hydropunch Sampling

6.2.1 Discharge Stream and Surface Water Sampling

The discharge streams from CGR north and CGR south buildings will be sampled during Phase 1 work at the 6 locations outlined above. The grab samples will be collected into bottles supplied by the laboratory. The analytical schedule is presented in Section 6.4.

6.2.2 Direct Push Drilling and Hydropunch Sampling

The Phase 1 groundwater investigation will consist of completion of nine (9) direct push borings. The preliminary direct push boring locations are shown on **Figure 3**[1.] Based on previous investigations conducted at the Site and an understanding of the regional hydrogeology, the groundwater gradient is towards the northeast (towards Owens Lake), in the vicinity of the FP, the EP, and the AP. Drilling locations have been selected in areas up-gradient and down-gradient of each waste water discharge location. Specifically, the borings are located in the FP, the EP, and the AP areas. The locations of the borings were selected based on aerial photographs; therefore, the exact location of each boring

[1] Direct push boring locations shown on Figure 2 are preliminary and may be moved slightly based on Site access limitations.

may change slightly depending upon access conditions encountered in the field. The completion of these borings will enable collection of the following data:

- Lithologic data in the shallow soils surrounding the waste water discharge points; and,
- Groundwater quality with the collection of shallow groundwater samples at each boring location using the Hydropunch sampling tool.

A detailed SAP for direct push drilling and Hydropunch groundwater grab sampling is presented in **Appendix C**. A direct push drill rig will be used to core a borehole to approximately 2 feet past the first indication of groundwater. Groundwater is anticipated to be located at a depth of approximately 5 - 10 ft bgs in the investigation areas. The lithology will be logged in general accordance with the Unified Soil Classification System, under the direct supervision of a California Professional Geologist. Soil samples are not anticipated to be collected for laboratory analysis for this phase of investigation. However, the soil cores will be inspected for any obvious signs of contamination (staining, odors, PID), and if signs of contamination are present, the soil core will be retained for analytical testing.

When the soil core indicates the top of the groundwater table has been encountered, the borehole will be advanced approximately two feet into the saturated zone. A Hydropunch groundwater sampling tool will then be fitted onto the direct push drilling rods and driven approximately 1 foot into the saturated soil. The Hydropunch tool will have a stainless steel drill point connected to a 6 inch long stainless steel screen section. The drill rod will be retracted approximately six inches to expose the screen section. Groundwater will flow through the screen section and into the sampling tool. The sampling tool will have a disposable 1-inch diameter PVC blank casing connected to the screen section so that a groundwater sample can be collected using either a disposable bailer or a peristaltic pump with disposable tubing into laboratory supplied containers. The groundwater samples will immediately be placed in a cooler with ice, and will be transported for overnight delivery to a State-certified laboratory under standard Chain-of-Custody documentation.

Following groundwater sampling, the borings will be backfilled using medium bentonite chips poured into the borehole in 1 foot lifts and hydrated with water after each lift to seal the borehole.

6.3 Phase 2 – Groundwater Monitoring Well Installation

The results of the Phase 1 investigation will be used to site wells for the Phase 2 investigation. A brief data transmittal letter summarizing the Phase 1 results will be submitted to the RWQCB. The letter will also show the proposed groundwater monitoring well locations and well construction details. It is anticipated that a minimum of 3 wells will be installed in the Phase 2 investigation.

Monitoring wells will be installed using a hollow-stem auger (HSA) drill rig. A HSA drilling, well installation, well development, and sampling SOP is presented in **Appendix C**. It is preliminarily anticipated that a minimum of three 2-inch diameter Schedule 40 PVC groundwater monitoring wells will be installed. A summary of the anticipated well design is presented below; however, this design may change depending up on the Phase 1 results.

A borehole drilled with an 8-inch hollow stem auger will first be completed to a target depth of approximately 10 feet below the top of the static groundwater table. The monitoring wells will be constructed of 2-inch diameter flush threaded Schedule 40 PVC blank casing and 0.010-inch slotted screen. The shallow wells will have a screen interval of approximately 15 feet (approximately 10 feet screen will be installed below the water table and 5 feet of screen will be installed above the water table). The annulus between the screen interval and the borehole wall will be filled with #2/10 sand that will extend from the bottom of the borehole to approximately two feet above the top of the screen. The remaining borehole will be sealed using hydrated bentonite pellets above the sand filter pack. The bentonite pellets will be hydrated with water at one foot lift intervals to provide a surface seal. The sand and bentonite pellets will be installed through the HSA. If the groundwater table is shallower than 10 ft bgs, a 10 foot long well screen will be installed at a minimum depth of 15 ft bgs, so that a minimum of 5 feet of hydrated bentonite seal material can be installed for a surface seal.

During drilling, soil samples will be collected every five feet bgs using a California Modified split-spoon sampler. The field geologist will prepare a boring log describing lithology. The field geologist will record construction details of each well and of all materials installed in the borehole. The monitoring wells will be completed with three-foot tall monument well boxes set in a concrete pad at the ground surface. The location and elevation of each monitoring well will be surveyed for position and well head elevation by a licensed California land surveyor.

The wells will be developed following installation. Each well will be developed using a surge block, bailer, and submersible pump. The wells will be developed with a 2-inch diameter submersible pump. See **Appendix C** for detailed well development procedures.

Groundwater samples will be collected approximately a minimum of 48 hours after well development. Groundwater samples will be collected from the three monitoring wells. Groundwater samples will be collected using disposable bailers. See **Appendix C** for detailed groundwater sampling procedures.

6.4 Laboratory Analyses

The Phase 1 groundwater samples will be sent to Eaton Environmental Laboratories in Monrovia, California. Shipping packages containing the samples will be delivered to the laboratory via overnight delivery. Phase 1 groundwater samples will be shipped in coolers containing wet ice. All samples will be transferred to the analytical laboratory under proper Chain-of Custody (COC) protocol.

Table 1 provides a summary of the analyses selected for the Phase 1 groundwater samples and waste stream samples. The laboratory analytical schedule for Phase 2 will be evaluated based on the Phase 1 investigation results and proposed as part of the recommendations presented in the Phase 1 data transmittal letter. The following constituents will be analyzed in the Phase 1 investigation samples:

- CAM 17 metals, (total and dissolved);
- Priority Pollutants-Organics;
- Total and Fecal Coliform;
- Methylene Blue Active Substances;
- General Minerals (sodium, calcium, magnesium, chloride, bicarbonate, and sulfate);
- Total Dissolved Solids;
- Residual Chlorine;
- Total phosphate and phosphorus;
- Total nitrogen, nitrate as nitrogen, ammonia, and Total Kjeldahl nitrogen; and
- pH, temperature, electrical conductivity, and dissolved oxygen will be monitored in the field.

A list of the proposed methods for the analytical schedule and associated minimum reporting limits are provided in **Appendix D**.

It is anticipated that one composite soil sample will be collected for waste profiling purposes for the selected disposal facility.

6.5 Investigative Derived Waste

All soil cuttings from Phase 1 and Phase 2 drilling activities will be placed into Department of Transportation (DOT) approved 55-gallon steel drums and clearly labeled. All decontamination water, well development water, and well purge and sampling water will also be placed in DOT approved 55-gallon steel drums, and labeled. The waste drums will be stored on secondary containment pallets at an on-Site location pending profile acceptance. A composite soil sample and composite waste water sample will be collected from the drums and analyzed for a waste profile as required by the selected licensed waste disposal facility.

7.0 SCHEDULE AND REPORT PREPARATION

7.1 Data Evaluation and Reporting

Following approval from the RWQCB, the Phase 1 investigation will be initiated. The Phase 1 groundwater investigation results will be summarized in a data transmittal letter to the RWQCB. The letter report would include a summary of the groundwater quality including data tables, laboratory reports, lithologic logs, groundwater table measurements in direct push borings, and Hydropunch groundwater sampling data. The letter report will also contain a discussion of the water quality results and recommendations for groundwater monitoring well installations, sampling, and laboratory analytical schedule.

Following installation and sampling of the Phase 2 groundwater monitoring wells, a Site Investigation Report will be submitted to the RWQCB. The report will contain a summary of the findings of the Phase 1 and Phase 2 investigations, including a description of the lithology, local hydrogeology including groundwater gradient estimation, boring logs and well completion logs, and groundwater water quality summary. The report will also include recommendations for future groundwater monitoring and potential future investigative efforts to further characterize the potential impacts to groundwater quality or beneficial use surface waters, if warranted.

7.2 Schedule

The Phase 1 field work presented in this Plan will start within approximately three weeks after RWQCB approval. Field work for Phase 1 will require approximately 3 days to complete. The groundwater sample results for Phase 1 will be placed on a standard 14-day report turnaround. The Phase 1 data transmittal letter report will be submitted to the RWQCB within 14 days following receipt of the laboratory analytical data.

The Phase 2 investigation will commence within approximately 2 weeks of RWQCB approval of the Phase 1 report. The field work for Phase 2 is anticipated to take approximately 2 weeks to complete well installations, development, survey, and sampling. The Site Investigation Report will be completed within 30 days following receipt of the groundwater sampling data. The Site Investigation Report will be submitted to the RWQCB on or before March 30, 2015.

8.0 REFERENCES

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Dames and Moore, 1991 Report – Water Supply Wells CGR-4, CGR-5 and CGR-6 Crystal Geyser-Roxane, Olancha

Dames and Moore, 1993, Report – Water Supply Well CGR-2, Crystal Geyser Roxane, Olancha, California, March 31, 1993.

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TABLES

Table 1
Proposed Sample Analyses
Crystal Geyser Roxane - Spring Water Bottling Facility
Olancha, California

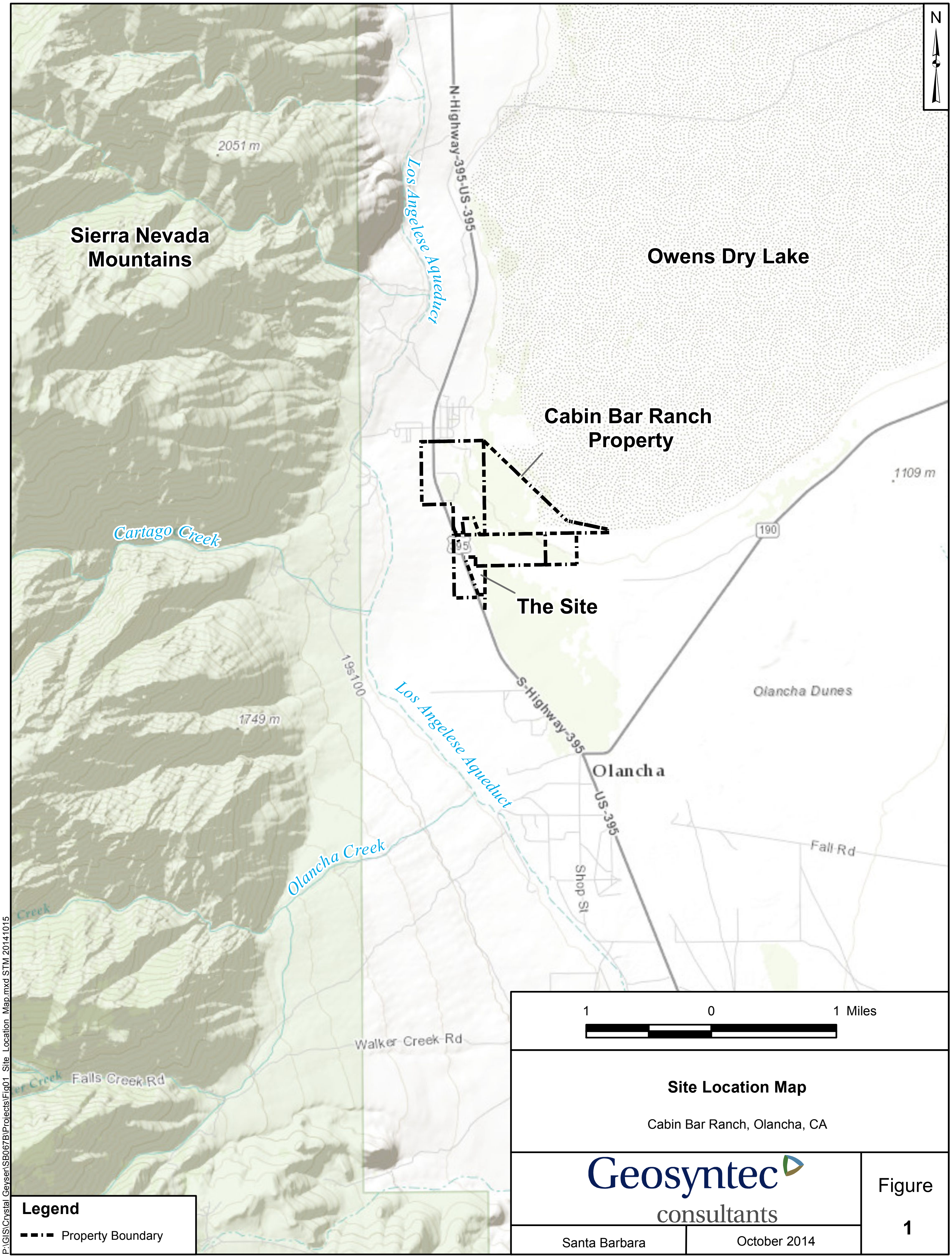
Borehole ID	**Analytical Constituent**								
	CAM Metals	**Priority Pollutant Organics**	**Total and Fecal Coliform**	**MBAS**	**General Minerals**	**TDS**	**Residual Chlorine**	**Total Phosphate and Phosphorus**	**Total Nitrogen, Nitrate as Nitrogen, and TKN**
Phase 1 Groundwater Hydropunch Samples									
FP-1	X	X	X	X	X	X	X	X	X
FP-2	X	X	X	X	X	X	X	X	X
FP-3	X	X	X	X	X	X	X	X	X
EP-1	X	X	X	X	X	X	X	X	X
EP-2	X	X	X	X	X	X	X	X	X
EP-3	X	X	X	X	X	X	X	X	X
AP-1	X	X	X	X	X	X	X	X	X
AP-2	X	X	X	X	X	X	X	X	X
AP-3	X	X	X	X	X	X	X	X	X
AP-3	X	X	X	X	X	X	X	X	X
Waste Stream Samples									
WS-1 through WS-6	X	X	X	X	X	X	X	X	X
Surface Water Samples									
FPW-1	X	X	X	X	X	X	X	X	X
EPW-1	X	X	X	X	X	X	X	X	X
APW-1	X	X	X	X	X	X	X	X	X

Notes:

Eurofins Eaton Analytical, in Monrovia, California will perform analysis
A detailed list of test methods and minimum reporting limits for all constituents provided in Appendix D.
Priority Pollutant Organics includes Volatile Organic Compounds and trihalomethane (total and speciated).

MBAS Methylene blue active substances.
TDS Total dissolved solids.
TKN Total Kjedahl nitrogen.

FIGURES



Site Location Map

Cabin Bar Ranch, Olancha, CA

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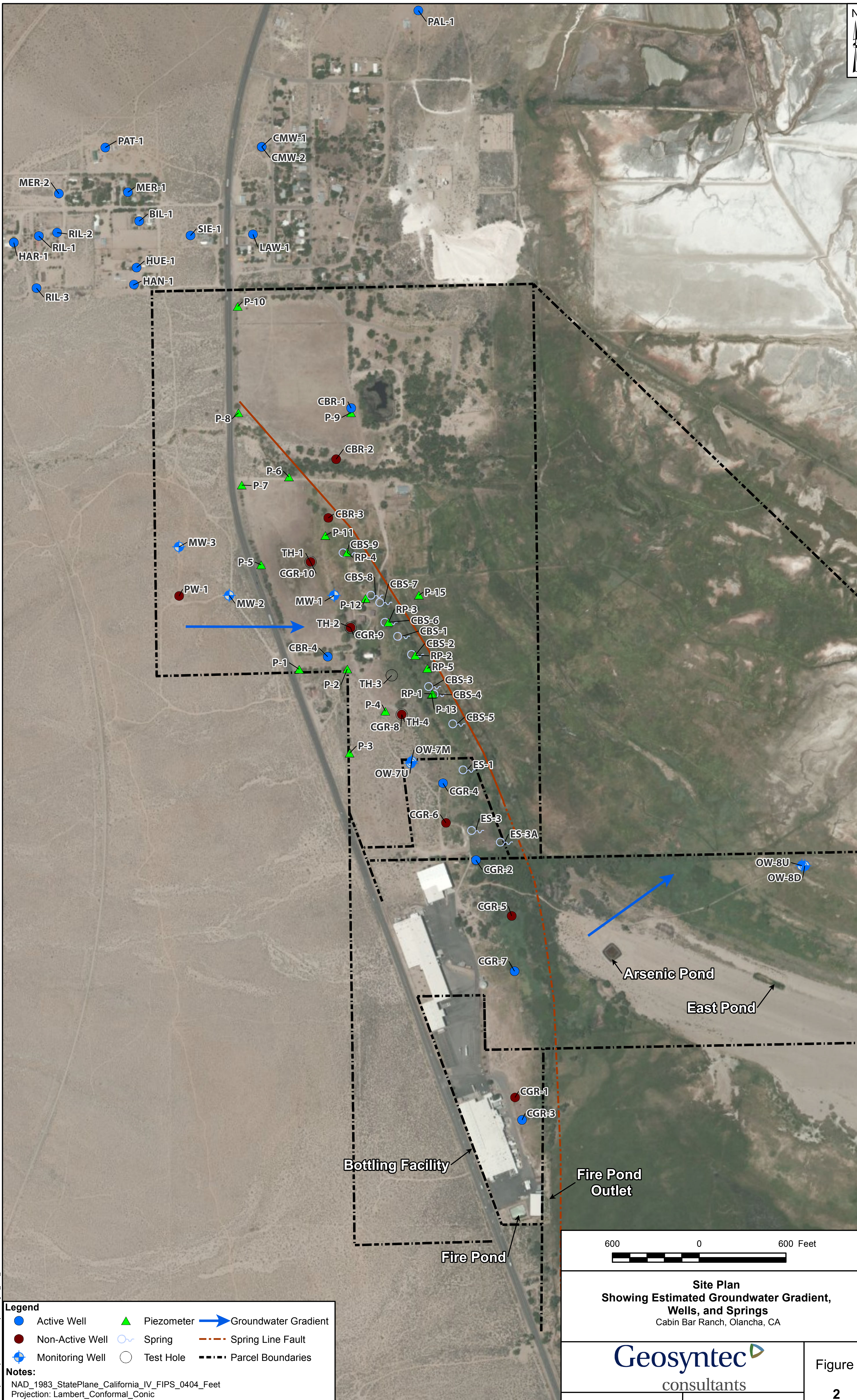
Figure 1



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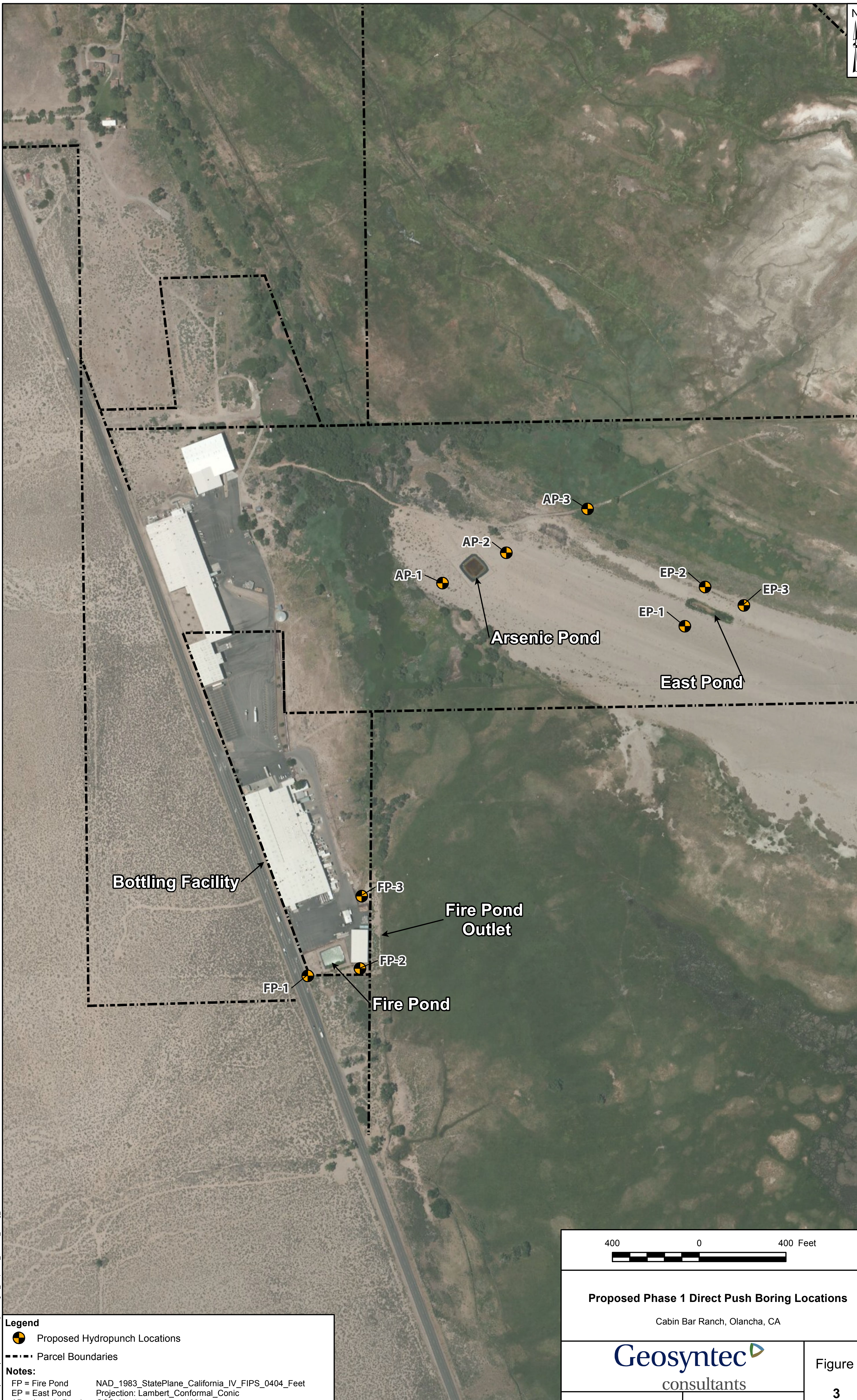

Legend

Proposed Hydropunch Locations

Parcel Boundaries

Notes:

FP = Fire Pond
EP = East Pond
AP = Arsenic Pond

NAD_1983_StatePlane_California_IV_FIPS_0404_Feet
Projection: Lambert_Conformal_Conic
GCS_North_American_1983

Proposed Phase 1 Direct Push Boring Locations

Cabin Bar Ranch, Olancha, CA

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Figure 3

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APPENDIX A

SUMMARY OF WELL CONSTRUCTION DATA, FROM RICHARD SLADE AND ASSOCIATES INC.

TABLE 1A
SUMMARY OF AVAILABLE WATER-SUPPLY WELL CONSTRUCTION DATA
CABIN BAR RANCH PROPERTY
INYO COUNTY, CALIFORNIA

Well No.	State Well Completion Report No.	Date Drilled	Method of Drilling	Pilot Hole Depth (ft)	Casing Type & Depth (ft)	Casing Diameter (in)	Borehole Diameter (in)	Sanitary Seal Depth (ft)	Perforation Intervals (ft)	Type of Perforations	Slot Opening of Perforations (in)	Type of Gravel Pack	Pumping Data Reported by Driller at Date of Construction				
													Date	Type of Test	Duration of Test (hrs)	Estimated Test Rate (gpm)	Static Water Level (ft)
CBR-1	ND	ND	direct rotary	198	steel, ND	10	14	ND	60-120	ND	ND	ND	ND	airlift	ND	300	artesian flow @ 60 gpm
CBR-2 (?)	231281 (?)	7/82	direct rotary	187	steel, 186	10	14	20	62-123, 143-186	louvers (?)	0.125	ND	8/4/82	airlift	2	250	artesian flow @ 50 gpm
CBR-3	ND	ND	direct rotary	300	none installed	N/A	6	ND	ND	ND	ND	N/A	ND	ND	ND	N/A	artesian flow at 6 gpm
CBR-4	N/A	ND	ND	60	steel, 60	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CBR-5	575965	10/94	direct rotary	70	PVC to 52; then stainless steel to 67	all 10	17	49	52-67	well screen	0.06	coarse aquarium	10/7/94	ND	ND	ND	2
PW-1 (1989 test production well)	256267 E-logged on 2/9/89	3/89	direct rotary	753	steel 663	16	28	50	200-650	louvers	0.080 (80 slot)	ND	3/89	pumping	ND	2800 by pump	41
CGR-1	Geologic Log by Dames & Moore	4/90	direct rotary	94	PVC to 57; then stainless steel to 88	4 PVC; then 6 stainless steel	ND	52	57-88	well screen	0.020	#3 sand	ND	ND	ND	ND	ND
CGR-2	No E-log performed; Geologic Log by Dames & Moore	11/92	direct rotary	91	PVC to 50; then stainless steel to 65	All 10	22	50	51-65	well screen	0.080	#4 to #12 sand	ND	ND	ND	ND	ND
CGR-3	396391 E-logged on 9/20/03; Geologic Log by Dames & Moore	9/93	direct rotary	86	PVC to 52; then stainless steel to 72	All 10	17	53	56-72	well screen	0.050	#4 to #16 sand	ND	ND	ND	ND	ND
CGR-4	575694 E-logged on 8/2/94; Geologic log by Dames & Moore	8/94	direct rotary	100	PVC to 53; then stainless steel to 67	All 10	20	50	52-67	well screen	0.070	#4 to #12 sand	9/22/94	ND	ND	ND	5

TABLE 1A
SUMMARY OF AVAILABLE WATER-SUPPLY WELL CONSTRUCTION DATA
CABIN BAR RANCH PROPERTY
INYO COUNTY, CALIFORNIA

Well No.	State Well Completion Report No.	Date Drilled	Method of Drilling	Pilot Hole Depth (ft)	Casing Type & Depth (ft)	Casing Diameter (in)	Borehole Diameter (in)	Sanitary Seal Depth (ft)	Perforation Intervals (ft)	Type of Perforations	Slot Opening of Perforations (in)	Type of Gravel Pack	Pumping Data Reported by Driller at Date of Construction				
													Date	Type of Test	Duration of Test (hrs)	Estimated Test Rate (gpm)	Static Water Level (ft)
CGR-5	575695 E-logged on 8/3/94; Geologic log by Dames & Moore	8/94	direct rotary	97	PVC to 52; then stainless steel to 67	All 10	20	49	52-67	well screen	0.060 or 0.070	#4 to #12 sand	10/7/94	ND	ND	ND	2
CGR-6	575966 E-logged on 8/2/94; Geologic Log by Dames & Moore	8/94	direct rotary	100	PVC to 53; then stainless steel to 68	All 10	20	±50	53-68	well screen	0.060	#4 to #12 sand	10/94	ND	ND		3
GCR-7	575967 (log for test hole at site)	9/94	direct rotary	104	PVC to 55; then stainless steel to 70; then PVC to 100	All 10	17	50	55-70	well screen	0.060	coarse aquarium	9/94	ND	ND	ND	artesian flow of 3 to 5 gpm
CGR-8	e0116254; nearby TH-4 borehole E-logged on 5/27/10	8/10	direct rotary	68	stainless steel, 68	10	18	50	53-68	well screen	0.070	#4 to #12	8/16/10	with pump	8	Q=400 s=20 Q/s=20	11
CGR-9	e0116289; nearby TH-2 borehole E-logged on 5/26/10	8/10	direct rotary	73	stainless steel, 73	10	18	50	53-73	well screen	0.070	#4 to #12 sand	8/19/10	with pump	8	Q=400 s=20 Q/s=20	10
CGR-10	e0166312; nearby TH-1 borehole E-logged on 5/25/10	8/10	direct rotary	73	stainless steel, 73	10	18	50	53-73	well screen	0.070	#4 to #12 sand	8/23/10	with pump	8	Q=400 s=20 Q/s=20	5

NOTES: 1. ND = no data; NA = not available
2. Original Data for the CBR Wells 1 through 4 adapted from GSI 1982 report (Table 2).
3. Data shown for CGR-8, -9, and -10 are from official driller's logs of each well and may differ slightly from those data listed on the geologic log of each well. Also, it is not known why driller listed identical test rates and drawdown values on each of his logs for these wells.

TABLE 1B
SUMMARY OF AVAILABLE MONITORING WELL CONSTRUCTION DATA
CABIN BAR RANCH PROPERTY
INYO COUNTY, CALIFORNIA

Well No.	State Well Completion Report No.	Date Drilled	Method of Drilling	Pilot Hole Depth (ft)	Casing Type & Depth (ft)	Casing Diameter (in)	Borehole Diameter (in)	Sanitary Seal Depth (ft)	Perforation Intervals (ft)	Type of Perforations	Slot Opening of Perforations (in)	Type of Gravel Pack
OW-1	Geologic Log by Dames & Moore	8/90	direct rotary	70	PVC 69	4	ND	43	49-69	cut slots	#20	ND
OW-7U	Geologic Log by Dames & Moore	NA	direct rotary	704	NA 74½	5	NA	50	54½-74½	NA	NA	NA
OW-7M	Geologic Log by Dames & Moore	NA	direct rotary	704	NA 252	5	NA	188	212-252	NA	NA	NA
MW-1	256260 E-logged on 3/23/89	3/89	direct rotary	660	PVC 600	4	12	115	150-600	ND	0.060 (60-slot)	ND
MW-2	288949 E-logged on 4/5/89	4/89	direct rotary	700	steel(?) 615	4	12	130	165-615	louvers	0.060 (60-slot)	ND
MW-3	288952 E-logged on 4/18/99	4/89	direct rotary	510	steel 420	4	12	165	200-420	louvers	0.060 (60-slot)	ND
MW-4 (destroyed, 6/1987))	256303	1/89	direct rotary	91	steel 84	6	9	20	20-84	ND	ND	ND

NOTES: 1. ND = no data; NA = not available

TABLE 1C
PIEZOMETER PERFORATION INTERVALS
CABIN BAR RANCH
INYO COUNTY, CALIFORNIA

Piezometer Number	Date Installed	Perforation Interval (ft bgs)
P- 1	April 1988	23 to 28
P- 2		23 to 28
P- 3		24 to 29
P- 4		20 to 25
P- 5		23 to 28
P- 6		23 to 28
P- 7		29 to 34
P- 8		33 to 38
P- 9		20 to 25
P- 10		33 to 38
P- 11		14 to 19
P- 12		14 to 19
P- 13		14 to 19
P- 14		8 to 13
P- 15	April 1989	4 to 9
P- 16		5 to 10
RP- 1	Sept 2010	6 to 8
RP- 2		6 to 8
RP- 3		5 to 7
RP- 4		5 to 7
RP- 5		1 to 3

NOTES: The P series piezometers consist of 2-inch diameter galvanized steel tubes. No data available on the screened type or size. See JMM (1989) and MW (1993) for additional details on these piezometers.

The RP piezometers consisted of a 2-foot section of stainless steel screen with 0.020-inch slots joined with a galvanized steel pipe to ground surface and equipped with steel risers above the ground. See Geosyntec (2011) for additional detail regarding the construction of these piezometers.

APPENDIX B

PREVIOUS HYDROGEOLOGICAL REPORTS
(included as compact disk)

APPENDIX C

SAMPLING AND ANALYSIS PLAN

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TABLE OF CONTENTS (Continued)

C.1 INTRODUCTION

OBJECTIVES:
- To outline the field sampling plan.
- To outline the field analysis plan.

C.1.1 General Information and Objectives

Presented in this appendix is the field Sampling and Analysis Plan (SAP) for conducting the proposed field work described in the Site Investigation Workplan (workplan). The workplan describes the proposed field investigative effort required by the Lahonton Regional Water Quality Control Board Investigative Order R6V-2014-0063. The procedures outlined in this SAP are in general accordance with standard field procedures outlined in the State of California EPA's documents: *Representative Sampling of Groundwater for Hazardous Substances* and *Drilling* (July, 1995), *Drilling, Coring, Sampling and Logging at Hazardous Substance Release Sites* (July, 1995), *Monitoring Well Design and Construction for Hydrogeologic Characterization* (July 1995), and US EPA *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (November 2001). The SAP outlines the work to be conducted, field procedures details, and field quality assurance/quality control (QA/QC) methods.

The SAP has been divided into ten sections (Sections B.1 through B.10) that are as follows:

- Section C.1: Introduction
- Section C.2: Review of Health and Safety Plan (HASP)
- Section C.3: Equipment Decontamination Procedures
- Section C.4: Record Keeping
- Section C.5: Drilling, Lithologic Logging, and Well Installation and Development
- Section C.6: Gauging Plan
- Section C.7: Groundwater Sampling Protocol
- Section C.8. Well Surveying Protocol
- Section C.9: Investigation-Derived Waste Management Plan

C.2 REVIEW OF HEALTH & SAFETY PLAN

OBJECTIVE:

- To present safety protocols to ensure that all operations are conducted in a manner that protects worker safety and meets compliance with all OSHA regulations.

All field activities will be performed by individuals with appropriate training (CFR 1910.120), in accordance with the site-specific HASP. Before field activities commence, the site-specific HASP shall be reviewed and signed by the field personnel. The HASP shall contain information pertaining to site conditions, potential hazards, hazard control, monitoring procedures, personal protective equipment, emergency procedures, and nearest emergency and non-emergency clinic locations.

C.3 EQUIPMENT DECONTAMINATION PROCEDURES

OBJECTIVE:

- To reduce the risk of cross-contamination, drilling and other field equipment will be decontaminated using a standard cleaning procedure.

Decontamination of drilling and groundwater sampling equipment will occur during field activities. All drilling equipment that will encounter formation materials (e.g., augers, drill rods, samplers, tremie pipes, etc.) shall, at a minimum, be decontaminated between boreholes and in the case of samplers, between samples. Groundwater sampling equipment to be used at more than one monitoring point (i.e., non-dedicated) and which will come in contact either with the groundwater directly, or indirectly through contact with other equipment, shall be new, dedicated, or decontaminated prior to use.

The purpose of decontamination is: (1) to eliminate the transfer of contaminants from one groundwater sampling point to another, and (2) to protect the health and safety of personnel who may come in contact with contaminated equipment. Decontamination procedures described in this section shall be performed at the beginning of each day of field work, between each boring and monitoring point, at the end of each day of field work, and whenever the equipment is suspected of having been contaminated.

The procedures described in this section are intended to be broad in scope. Additional site-specific or monitoring point-specific procedures may be developed, as necessary, based on field conditions.

Decontamination of drilling, sampling and gauging equipment, and if necessary, containers and water quality monitors, shall be performed to reduce the potential for cross-contamination between boring and monitoring points. The laboratory is responsible for providing clean, contaminant-free containers for use during the sampling event. Site field personnel shall be responsible for the decontamination of equipment.

Field sampling equipment can generally be decontaminated manually. The following procedure is given as a sequence, which should be modified to be consistent with site conditions or depending on the equipment manufacturer’s specific instructions for decontamination:

1. Wash with potable water and/or hot pressurized potable water to remove particles and residue.
2. Wash with decontamination solution (Alconox™ and water), using both a soft-bristled and hard-bristled brush made of inert materials.
3. For equipment that cannot be adequately cleaned with a brush because of internal mechanisms or tubing, the decontamination solutions shall be circulated though the equipment.
4. Rinse thoroughly with potable water. A double rinsing system, consisting of an initial rinse followed by a second final rinse in a separate container, shall be used.
5. Allow to air dry or use clean towels to dry, if necessary.
6. Package or wrap decontaminated items to reduce the potential for re-contamination.

Large drilling equipment, such as augers and drill bits, will be decontaminated using hot pressurized potable water (i.e., steam cleaner). If necessary, decontamination of highly contaminated equipment will be washed with non-phosphate detergent, as a follow up to the steam cleaner wash, and then washed again with hot potable water. All water used for decontamination purposes will be stored on site pending proper disposal.

C.4 SAMPLE CONTROL, FIELD RECORDS, AND DOCUMENT CONTROL

OBJECTIVES:
- Present standard procedures for sample identification.
- Present standard procedures for chain-of-custody.
- Present standard procedures for maintenance of field records and document control.

C.4.1 Introduction

Sample identification, chain-of-custody records, receipt for sample forms, and field records (with the exception of surveying notes) should be recorded with waterproof, non-erasable ink. If errors are made in any of these documents, corrections should be made by crossing a single line through the error and entering the correct information. All corrections should be initialed and dated. If possible, all corrections should be made by the individual making the error.

C.4.2 Chain-of-Custody Procedures

C.4.2.1 Introduction

Chain-of-custody procedures comprise the following elements: (1) maintaining custody of samples or other evidence, and (2) documentation of the chain-of-custody for evidence. To document chain-of-custody, an accurate record must be maintained to trace the possession of each sample, or other evidence, from the moment of collection to its introduction into evidence.

C.4.2.2 Sample Custody

A sample or other physical evidence is in custody if:

- it is in the actual possession of an investigator;
- it is in the view of an investigator, after being in their physical possession;
- it was in the physical possession of an investigator and then they secured it to prevent tampering; and/or
- it is placed in a designated secure area.

C.4.2.3 Documentation of Chain-of-Custody

Sample Label

A sample label should be completed for each sample using waterproof, non-erasable ink as specified in Section B.4.1.

Chain-of-Custody Record

The field Chain-of-Custody Record is used to record the custody of all samples or other physical evidence collected and maintained by investigators. All physical evidence or sample sets shall be accompanied by a Chain-of-Custody Record. This Chain-of-Custody Record documents transfer of custody of samples from the sample custodian to another person, to the laboratory, or other organizational elements. To simplify the Chain-of-Custody Record and eliminate potential litigation issues, as few people as possible should have custody of the samples or physical evidence during the investigation. The Chain-of-Custody Record also serves as a sample logging mechanism for the laboratory sample custodian. A separate Chain-of-Custody Record should be used for each final destination or laboratory used during the investigation. The following rules apply to Chain-of-Custody Records:

- All information must be supplied in the indicated spaces to complete the field Chain-of-Custody Record.
- All samplers and sampling team leaders (if applicable) must sign in the designated signature block.
- One sample should be entered on each line and not be split among multiple lines.
- The total number of sample containers for each sample must be listed in the appropriate column. The number of individual containers for each analysis must also be listed in the respective column. Required analyses should be circled or entered in the appropriate location as indicated on the Chain-of-Custody Record.
- The sample custodian and subsequent transferee(s) should document the transfer of the samples listed on the Chain-of-Custody Record. The person who originally relinquishes custody should be the sample custodian. Both the person relinquishing the samples and the person receiving them must sign the form. The date and time that this occurs should be documented in the proper space on the Chain-of-Custody Record.

- Usually, the last person receiving the samples or evidence should be the laboratory sample custodian or their designee(s).

The Chain-of-Custody Record is a serialized document. Once the Record is completed, it becomes an accountability document and must be maintained in the project file. The suitability of any other form for chain-of-custody should be evaluated based upon its inclusion of all of the above

C.4.2.4 Transfer of Custody with Shipment

All samples shall be accompanied by the Chain-of-Custody Record. The original and one copy of the Record will be placed in a plastic bag inside the secured shipping container if samples are shipped. When shipping samples via common carrier, the "Relinquished By" box should be filled in, and the shipping agency and tracking number should be filled in with the "Received By" box should be left blank. The laboratory sample custodian is responsible for receiving custody of the samples and will fill in the "Received By" section of the Chain-of-Custody Record. One copy of the Record will be retained by the project leader. The original Chain-of-Custody Record will be transmitted to the project leader after the samples are accepted by the laboratory. This copy will become a part of the project file.

If sent by mail, the package shall be registered with return receipt requested. If sent by common carrier, an Air Bill should be used. Receipts from post offices and Air Bills shall be retained as part of the documentation of the chain-of-custody. The Air Bill number or registered mail serial number shall be recorded in the remarks section of the Chain-of-Custody Record.

C.4.3 Field Records and Document Control

The project leader's name, the sample team leader's name (if appropriate), the project name and location, and the project number should be entered on daily field forms. The written entries should be legible and contain accurate and inclusive documentation of an individual's project activities. At the end of all entries for each day, or at the end of a particular event, if appropriate, the investigator should draw a diagonal line and initial indicating the conclusion of the entry. Since field records are the basis for later written reports, language should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. All aspects of sample collection and handling, as well as visual observations, shall be documented in the field records. The following is a list of information that should be included in the field records:

- sample collection equipment (where appropriate);
- field analytical equipment, and equipment utilized to make physical measurements shall be identified;
- calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment;
- sampling station identification;
- time of sample collection;
- description of the sample location;
- description of the sample;
- who collected the sample;
- how the sample was collected;
- diagrams of processes;
- maps/sketches of sampling locations; and
- weather conditions that may affect the sample (e.g., rain, extreme heat or cold, wind, etc.)

Maintaining an organized and complete set of records is an integral part of field procedures and is a regulatory requirement. This includes completing field data sheets. Field data sheets for this project include:

- Borehole Records;
- Well Records (Construction Diagram);
- Well Development Logs;
- Purge and Sample Field Reports; and
- Aquifer Test Sheets.

The field data sheets shall be filled out in indelible ink with entry errors crossed out with a single line. Corrections shall be dated and initialed. The field records shall be reviewed for completeness and legibility upon completion of field activities and shall be filed according to Geosyntec corporate policy and project-specific requirements upon return to the office.

All field data sheets and chain-of-custody forms shall be included in the final report. In addition, field data sheets, and chain-of-custody forms shall be maintained in a centralized location.

C.5 DRILLING, LITHOLOGIC LOGGING, AND WELL INSTALLATION AND DEVELOPMENT

OBJECTIVE:

- To ensure that the monitoring well will provide high quality samples
- To ensure that the monitoring well will be constructed properly and will be durable
- To ensure that the monitoring well will not serve as a conduit for contamination to migrate between aquifers

C.5.1 Overview and Objectives

A total of nine direct-push borings will be advanced for the collection of soil samples and groundwater grab samples. Based on the results of the direct-push soil and groundwater characterization, a minimum of three monitoring wells will be installed using hollow stem auger (HSA) drilling methodology.

C.5.2 Organization

The remaining sections describing protocol for drilling, lithologic logging (i.e. soil sampling), and well installation and development have been organized in four sections as follows:

- *Pre-work Activities (Section B.5.3)*, presents a description of activities performed prior to drilling including underground utility clearance, equipment decontamination and calibration.
- *Drilling and Lithologic Logging Activities (Section B.5.4)*, presents a description of procedures for drilling, lithologic logging and geophysical logging.
- *Well Installation and Development (Section B.5.5)*, presents a description of procedures for well installation and development.
- *Field QA/QC and Record Keeping (Section B.5.6)*, presents information regarding field quality assurance/quality control (QA/QC) samples and record keeping procedures.

C.5.3 Pre-Work Activities

Prior to the start of the work, the following activities will be performed to prepare for the drilling program:

- Permit and Access Permission Acquisition
- the HASP shall be reviewed;
- subsurface utility clearance will be completed; and
- field equipment and sampling forms shall be assembled.

A description of each of these activities is presented below.

C.5.3.1 Health & Safety

All drilling field work activities will be performed by individuals with appropriate training (CFR 1910.120), in accordance with the site-specific HASP. Before field activities commence, the site-specific HASP shall be reviewed and signed by the field personnel (see Section B.2).*

C.5.3.2 Underground Utility Clearance

Prior to the start of drilling, drill locations will be marked for Underground Service Alert (USA). USA will be notified within two days of the start of field work in order for utility providers to mark their underground utilities in the vicinity of the drilling locations if present.

C.5.3.3 Field Monitoring Equipment and Sampling Forms Organization

Prior to the start of drilling, well installation, and sampling activities, field personnel shall gather the field monitoring equipment and forms. Prior to use, the equipment shall be clean and operational. In summary, the monitoring field equipment consists of the following:

- A water level meter (Solinist 101 Water Level Meter). The instrument will be used for monitoring water levels during well installation and development. The calibration of the Solinist water level indicator will be checked with a tape measure before use.

- A Horiba U-10 or equivalent meter water parameter meter to measure pH, specific conductance, temperature, turbidity, and dissolved oxygen. The instrument will be used for monitoring well development and sampling.

Field forms for drilling will include borehole logs, well completion records (well records), and daily field report forms. Boring logs, and well completion records shall be filled out and signed by the field personnel during drilling and well installation activities.

Drilling, soil sampling equipment, and decontamination equipment will be supplied by the drilling company.

C.5.3.4 Field Equipment Calibration Procedures

Equipment used during drilling, and well installation and development activities will be calibrated. Calibration procedures are as follows.

- The calibration of the electric water level indicators used will be checked with a tape measure.
- The Horiba U-10 water parameter meter (or equivalent) will be used to monitor the development of the wells. The water quality meter shall be calibrated at field temperature a minimum of twice a day: once prior to commencing field work and at the end of day after sampling has been completed. Instrument calibration will be conducted in accordance with manufacturer's instructions. The Horiba instrument shall also be recalibrated at any time during sampling activities if inconsistent readings are suspected.

C.5.4 Drilling and Logging Activities

C.5.4.1 Decontamination Procedures

See Section B.3 for a detailed description of decontamination procedures.

C.5.4.2 Direct-Push Drilling and Soil/Groundwater Sampling

Direct-push drilling will be employed for the collection of soil and groundwater grab samples in nine boring locations. Continuous soil cores will be collected during direct-push drilling using dual tube methodology which allows the collection of subsurface soil samples through an outer casing that is set to maintain the integrity of the boring. Using the direct-push rig, borings are advanced by simultaneously driving an outer stainless steel casing and disposable inner Lexan® tube (approximately 4 feet in length) into the ground. Upon reaching the desired penetration depth, the inner Lexan® tube is extracted to collect the discrete subsurface soil samples, leaving the outer casing in place. To sample the next interval of soil, a new length of Lexan® tubing is then inserted into the outer casing (already in the ground) attached to a length of drive pipe, and another length of outer casing is attached to the top of the outer casing that is already in the ground.

When the soil core indicates the top of the groundwater table has been encountered, the borehole will be advanced two feet into the saturated zone. A Hydropunch®

groundwater sampling tool will then be fitted onto the direct push drilling rods and driven approximately 1 foot into the saturated soil. The Hydropunch tool will have a stainless steel drill point connected to a 6 inch long stainless steel screen section. The drill rod will be retracted approximately six inches to expose the screen section. Groundwater will flow through the screen section and into the sampling tool. The sampling tool will have a disposable 1-inch diameter PVC blank casing connected to the screen section so that a groundwater sample can be collected using either a disposable bailer or a peristaltic pump with disposable tubing into laboratory supplied containers.

Soil cuttings will be temporarily stored on Site in drums or roll-off bins while drilling activities are being conducted. See Section B.8 for a detailed description of investigation derived wastes (IDW) handling procedures.

C.5.4.3 Hollow Stem Auger Drilling

New monitoring wells will be installed using a rotary drill rig equipped with 8-inch hollow stem augers. A California-licensed driller will be contracted to perform drilling and soil sampling operations for all shallow zone monitoring wells.

This type of auger consists of a hollow, steel stem or shaft with a continuous, spiraled steel flight, welded onto the exterior stem. A hollow auger bit, generally with carbide teeth, disturbs soil material when rotated, whereupon the spiral flights transport the cuttings to the surface. This method is best suited in soils that have a tendency to collapse when disturbed. A monitoring well can be installed inside of hollow-stem augers with little or no concern for the caving potential of the soils and/or water table. However, retracting augers in caving sand conditions while installing monitoring wells can be extremely difficult or impossible, especially since the augers have to be extracted without being rotated. If caving sands exist during monitoring well installations, a drilling rig must be used that has enough power to extract the augers from the borehole without having to rotate them. A bottom plug, trap door, or pilot bit assembly can be fastened onto the bottom of the augers to keep out most of the soils and/or water that have a tendency to clog the bottom of the augers during drilling. Potable water may be poured into the augers (where applicable) to equalize pressure so that the inflow of formation materials and water will be held to a minimum when the bottom plug is released. Water-tight center plugs are not acceptable because they create suction when extracted from the augers. This suction forces or pulls cuttings and formation materials into the augers, defeating the purpose of the center plug. Augering without a center plug or pilot bit assembly is permitted, provided that the soil plug, formed in the bottom of the augers, is removed before sampling or installing well casings. Removing the soil plug from the augers can be accomplished by washing out the plug using a side discharge rotary bit, or augering out the plug with a solid-stem auger bit sized to fit inside the hollow-stem auger. The type of bottom plug, trap door, or pilot bit assembly proposed for the drilling activity should be approved by a senior field geologist prior to drilling operations. Boreholes can be augered to depths of 150 feet or more (depending on the auger size), but generally boreholes are augered to depths less than 100 feet.

Soil cuttings will be temporarily stored on Site in drums or roll-off bins while drilling and well installation/development activities are being conducted. See Section B.8 for a detailed description of investigation derived wastes (IDW) handling procedures.

C.5.4.4 HSA Soil Sampling

Soil samples will be collected for inspection and logging purposes. Soil samples will be collected with a California Split Spoon Sampler or similar sampling device. The sampler will be fitted with 2-inch diameter, 3-inch long stainless steel sample sleeves. The sampler will be driven 18-inches with a 140 pound hammer. Samples will be collected under the direct supervision of a licensed California Professional Geologist.

C.5.4.5 Lithologic Logging

For each boring, direct-push and hollow-stem, lithologic boring logs shall be kept. Boring logs will be prepared by or under the direct supervision of a California Professional Geologist. At a minimum, boring logs shall contain the following information:

- Lithology – Soils shall be described using the Unified Soil Classification System (USCS). This will include soil/unconsolidated material/rock type, texture, plasticity, density, and gross petrology;
- Description of stratigraphic and/or lithologic structural features encountered. This will include a description of planar features (e.g. bedding planes, graded bedding), lineations, voids, cementation, nodules, bioturbated zones, root holes and other features related to vegetation, and discontinuities. The orientation of these features will be measured when possible.
- Qualitative moisture content (wet, moist, dry), degree of weathering, color (referenced to Munsell color charts), stain (e.g., presence of mottles, Fe_2O_3, odor, and depth to water-bearing unit(s) and vertical extent of the each water-bearing unit;
- Observations made during drilling. This includes advance rate, water loss, depth to water table or saturation, drilling difficulties; changes in drilling

method or equipment; amounts and types of any drilling fluids used, presence of running sands, cave/hole stability, and depth of borehole and reason for termination of borehole;

- General observations made during sampling (e.g., blow counts, sample recovery); and
- Other remarks including deviations from drilling plan, weather conditions, and possible contamination of soil or groundwater.

C.5.5 Monitoring Well Installation and Well Development

Following drilling of each hollow-stem auger hole, a monitoring well will be installed. All monitoring wells installed shall be installed in general accordance with the Cal-EPA guidance *Monitoring Well Design, and Construction for Hydrogeologic Characterization* (July, 1995). Field logging data will be used in the design of the monitoring wells. The proposed screen intervals will be compared to the logs to verify that appropriate formation materials are present for well completion. The intent will be to include the coarsest grained material possible within the proposed screened interval. If formation materials appear to be fine grained in the proposed screen interval, that interval may be adjusted to include coarser grained materials as appropriate.

The wells will be developed to remove fine grained sediments from the wells and break possible "skin" damage on the wall of the borehole caused during boring advancement and removal of augers from the borehole. The process of development will optimize the hydraulic conductivity between the formation and the well screen and assist in restoring the natural water quality of the aquifer near the well.

C.5.5.1 Decontamination Procedures

All well installation and development equipment shall be decontaminated at the beginning and end of the day and between each well location. Section B.3 provides a detailed description of decontamination procedures.

C.5.5.2 Well Installation and Well Construction Details

The monitoring wells will be installed in accordance with State of California Monitoring Well Standards. Final construction details will be based on field data collected during drilling.

C.5.5.2.1 Monitoring Wells

The monitoring wells will be installed through the hollow stem of the 8-inch diameter augers in the completed borings. The monitoring wells will be constructed of 2-inch diameter flush threaded schedule 40 PVC blank casing and 0.020-inch slotted screen. The wells will have a screen interval of 10 feet.

The annulus between the screen interval and the borehole wall will be filled with #2/10 sand that will extend from the bottom of the borehole to approximately two feet above the top of the screen. The filter sand will be carefully installed through the annulus between the well casing and the inside of the hollow stem augers as the augers are lifted. The sand will be poured slowly and its level will be measured using a weighted tape measure at approximately one-half bag intervals. A surge block will be applied to the well following placement of the filter pack to induce settlement of the filter pack. Additional filter pack material will be added following surging of the well until the filter pack extends approximately four feet above the top of the screen interval. The volume of the annular space and the volume of sand will be compared to verify proper placement of the filter pack. The top of the filter pack will be verified using a weighted tape measure. The remainder of the borehole will be sealed using hydrated bentonite pellets placed above the sand filter pack. The top of the bentonite seal will be verified using a weighted tape measure. The bentonite pellets will be hydrated at one foot lift intervals.

During well construction the field geologist will keep a complete record of the design and construction of each well and of all materials installed in the borehole (i.e., length of screen and casing, volume of sand and bentonite pellets, bags of cement, etc.). The field geologist will record well construction information on the Well Record and/or on the Daily Field Sheets. Construction methods will also be verified and recorded in the field by the field geologist.

The monitoring wells will be completed with well monuments sets in concrete above the ground surface. The wells will be completed with locking caps. The location and elevation of each monitoring well will be surveyed by a licensed California land surveyor.

C.5.5.3 Well Development

The wells will be developed a minimum of 48 hours following the installation. Each well will be developed using a surge block, bailer, and submersible pump. Field data collected during the well development procedure will be recorded on a well development log sheet. Initial procedures for well development include:

- Recording static water depth and total well depth with an electric water level indicator;
- Initially alternate surging and bailing with a surge block and a stainless steel or PVC bailer;
- When sands and silts have diminished in the water coming out of the bailer, pumping should begin in the development process and the following procedures will be implemented.
- Re-record static water depth and total well depth;
- Set the pump at approximately two feet off the bottom of the well;
- Begin pumping;
- Periodically record flow rate, drawdown (water level), and volume of water removed.
- Periodically monitor water quality parameters (pH, temperature, specific conductivity and turbidity) with a Horiba U-10 or equivalent meter.

Well development will be considered complete when field readings of pH, temperature, specific conductivity, and turbidity have stabilized to within 10 percent of the previous reading. A turbidity reading of less than 5 NTU will be attempted. Water generated during development will be temporarily stored on Site in drums or water tanks prior to being profiled and properly disposed of.

C.5.6 Field QA/QC and Record Keeping

Proper field quality assurance and quality control (QA/QC) and record keeping are integral parts of the drilling, well installation, and development procedures. This section outlines methods for evaluating the validity and quality of well installation and development. The topics covered in this section are as follows:

- Field QA/QC for drilling, and well installation and development activities; and
- Record keeping, including field documentation for installation and development.

C.5.6.1 Field QA/QC

Field QA/QC procedures are designed to reduce the potential for cross-contamination among wells from occurring in the field and ensuring data that is of the highest quality.

Decontamination procedures, equipment calibration, and accurate record keeping outlined in this SAP shall be used in the field to maintain the quality of work and data produced.

C.5.6.2 Record Keeping

Maintaining an organized and complete set of records is an integral part of drilling, and well installation and development procedures and is a regulatory requirement. This includes completing field data sheets, maintaining daily field report sheets. General record keeping is discussed in Section B.4.

Record keeping during drilling and soil sampling procedures will include completing boring logs and maintaining daily field report sheets. During drilling activities the field boring log will be completed for each location. The boring log sheet will include at a minimum the following information:

- General: Project (facility) name, boring name, date started and finished, geologist's and driller's names, boring location, rig type, auger size, sampling equipment used, and classification scheme used for soils (USCS);
- Informational columns: depth of borehole, Sample depth/number/type, blow counts, PID readings, percent sample recovery, depth to first observed water; and
- Narrative Description: will contain geologic observations, drilling observations, and other remarks relating to the boring conditions as outlined in the section on lithologic logging (Section B.5.4.6).

Daily field sheets will also be maintained during drilling. The daily field sheet will contain other pertinent information that is not on the boring logs such as observed arrival times and departure times of visitors and subcontractors on the site, drilling problems, break times, etc.

During well installation a well construction record and a well diagram (Attachment B-1) will be completed containing the following information:

- Project (facility) name, well name, date and time of well construction, geologist's and driller's names;
- Well depth (+-0.1 ft), casing length and materials, screened interval, material and slot size/design;
- Filter pack material, size, and volume (calculated and actual);

- Annular sealant composition, placement method, and volume (calculated and actual);
- Surface sealant composition, placement method, and volume (calculated and actual); and
- Type and construction of protective casing (well box), well cap and lock.

During well development the field data sheets will be completed for each well location. The field data sheet will include at a minimum a well development log containing the following information:

- Project (facility) name, well name, date and time of development, geologist's and developer's names
- Depth to static water level, total depth of well, boring and well casing (i.d. and o.d.) diameters, and calculation of well volume; and
- Time, depth to water, volume removed, flow rate, pH, temperature, turbidity, and specific conductance.

C.6 WELL SURVEY

OBJECTIVE:

- To accurately locate the horizontal and vertical position of monitoring wells.
- To establish a reference point elevation for groundwater elevation calculations for each compliance and sentinel monitoring well

A well survey will be performed on all new monitoring wells by a registered State of California Surveyor. A horizontal and vertical position will be determined for each well at the center of the well cover (ground surface elevation) and at the top of casing (reference elevation). Generally, the north side of the casing will be used as the reference point unless the casing already has a reference point marked or notched on the casing.

C.7 GROUNDWATER SAMPLING PROTOCOL

OBJECTIVE:

- To collect samples that are representative of in-situ conditions, and reproducible
- To reliably remove standing water from the monitoring well casing as well as filter pack material;
- To develop a steady and consistent flow regime of groundwater entering the well during purging and sampling;
- To confirm the stabilization of certain physical and chemical parameters indicative of groundwater unaffected by residence within the well; and
- To collect a sufficient volume of groundwater for a specified suite of laboratory analyses.

C.7.1 Overview and Objectives

This sampling protocol describes a method for collecting reproducible and representative groundwater samples from the monitoring wells installed at the site.

C.7.2 Theoretical Consideration

Standing water in a monitoring well may not be representative of nearby groundwater because a monitoring well is generally vented into the atmosphere. Contact with the atmosphere allows the influx of atmospheric oxygen, changing the reduction/oxidation (redox) potential of groundwater, and hence, the solubility of certain dissolved species. Purging is performed to remove the standing water prior to sample collection.

Purging induces stresses that can suspend small particles and draw them into the monitoring well. In addition purging may possibly strip volatile organic compounds (VOCs) from the water. If the pump flow rate is reduced, these stresses are reduced.

To address the concern over sample turbidity and stripping of VOCs, a low-flow sampling procedure will be used to minimize the stresses that might suspend fine particles.

C.7.3 Organization

The remaining sections of this protocol have been organized in three sections as follows:

- *Pre-Sampling Activities (Section B.7.4)*, contains a description of activities performed prior to sampling a well including well data review, equipment decontamination and calibration, measurement of well depth and groundwater levels, and calculation of the purge volumes.
- *Purging and Sampling Activities (Section B.7.5)*, contains a description of procedures for well purging, sample collection, and sample handling.
- *Field QA/QC and Record Keeping (Section B.7.6)*, contains information regarding field quality assurance/quality control (QA/QC) samples and record keeping procedures.

C.7.4 Pre-Sampling Activities

Prior to the start of the sampling event, the following activities shall be performed to prepare for the sampling event:

- the HASP shall be reviewed;
- the field sampling and laboratory testing program shall be reviewed; and
- sampling equipment and sampling forms shall be assembled.

A description of each of these activities is presented below.

C.7.4.1 Health & Safety

All groundwater sampling activities will be performed by individuals with appropriate training (CFR 1910.120), in accordance with the site-specific HASP. Before groundwater sampling activities commence, the site-specific HASP shall be reviewed and signed by the sampling personnel (see Section B.2).

C.7.4.2 Sampling Equipment and Sampling Forms Organization

Prior to the start of sampling activities, the sampling personnel shall gather the sampling equipment, containers and forms. Equivalent equipment may be used, where applicable. Prior to use, the equipment shall be clean and operational. In summary, the field equipment consists of the following:

- A water level meter (Solinist 101 Water Level Meter). The calibration of the Solinist water level indicator will be checked with a tape measure before use.
- A 2” dedicated Grundfos© Redi-Flo2 pump for all new wells (or equivalent).
- Sufficient tubing of appropriate material, diameter and length to be dedicated to each well.
- A Horiba U-10 meter or equivalent fitted with a flow-through cell to measure pH, specific conductance, temperature, turbidity and dissolved oxygen.
- Calibrated containers and drums for directing and collecting water downstream of the flow-through cell, to measure total discharge and contain purge water for appropriate waste management activities.

C.7.4.3 Horiba U-10 Calibration (Equipment Organization)

The Horiba U-10 water parameter meter or equivalent will be used to monitor the purging of the wells. The Horiba U-10 meter shall be calibrated at field temperature a minimum of twice a day: once prior to commencing field work and at the end of day after sampling has been completed. Instrument calibration will be conducted in accordance with manufacturer’s instructions. The Horiba instrument shall also be recalibrated at any time during sampling activities if inconsistent readings are suspected.

C.7.5 Purging and Sampling Activities

As part of the purging and sampling activities, the following tasks will be completed:

- Purging and sampling equipment will be thoroughly cleaned and decontaminated to prevent cross-contamination.
- Water levels will be measured using an electric water level indicator.
- The monitoring locations will be purged by pumping with the low flow 2” submersible Grundfos© Redi-Flo pump until stabilization of water quality parameters has occurred.
- Water samples will be collected with the low flow 2” submersible Grundfos© Redi-Flo pump.
- Samples will be collected in appropriate containers supplied by the laboratory and labeled and transferred to the laboratory under chain-of-custody protocol.

These tasks are described below.

C.7.5.1 Decontamination Procedures

See Section B.3 for decontamination procedures.

C.7.5.2 Water Level Measurements

Prior to commencing purging activities, the depth to water shall be measured. Groundwater depth shall be determined by measuring the vertical distance from a standard reference point on the well casing to the water level within a groundwater well using the following procedure:

1. Measure the depth to water to the nearest ±0.01 ft (0.003 m) using a Solinst Model 101 Flat Tape Water Level Meter consisting of a graduated cable and probe. Calibration of the water level meter will be checked with a measuring tape before use. Decontaminate the water level meter prior to introduction into the well according to the procedures described in Section B.3.

2. Lower the water level meter probe into the well slowly. The water level indicator will create a sound or turn on a light when the probe comes into contact with water.

3. Confirm that the water encountered by the water level indicator probe is the groundwater level by raising and lowering the indicator into and out of the water several times. False indications of water level may be provided by condensation along the well casing or high humidity within the well.

4. Document the reading (in feet) indicated by the graduated cable at the reference point (water level depths will be measured from a surveyed elevation). Subtract this value from the surveyed reference point elevation (in feet above mean sea level) to calculate the water level elevation (in feet above mean sea level). Compare the calculated water level elevation to the value from the previous sampling event and to the current values from other groundwater wells. If the value does not appear to be reasonable, re-measure the depth to or water level or contact the sampling team leader.

5. While extracting the water level indicator cable and probe from the well casing, remove water and particles from the cable by passing the cable through a clean paper towel.

C.7.5.3 Purging Activities

The purpose of well purging is to bring water from the aquifer into the well casing prior to sampling because the water within the well casing may not be representative of the surrounding aquifer. Water purged from the groundwater wells shall be monitored for changes in temperature, pH, specific conductance, turbidity, and dissolved oxygen with a Horiba U-10 meter, or equivalent. Temperature, pH, specific conductance, turbidity and dissolved oxygen are referred to as water quality parameters. Water quality parameter measurement and well purging are described in the following sections.

In preparation for purging the groundwater wells, the purging and monitoring equipment shall be organized and confirmed operational.

A 2” submersible Grundfos© Redi-Flo pump will be lowered into the well and suspended in the upper portion of the screen interval (i.e., adjacent to the upper 3 feet of screen interval in wells with submerged well screens or five feet below the water table in wells with screen intervals intersecting the water table). A cable shall be attached to the pump and will be used to lower the pump into the monitoring wells. The cable shall be measured and marked with a segment of tape to indicate the length of the cable that can be lowered into the well so that the intake of the pump is not lowered past the designated depth. The cable shall be attached to the pump and to the well head so that the location of the pump cannot shift during purging and sampling.

Quarter inch (1/4-inch) nalgene tubing will be used for the discharge tubing. The dedicated tubing shall be connected to the pump at the pump outlet (barbed fitting) with a hose clamp. The discharge from the bladder pump shall be secured to the flow-through cell fitted to the Horiba U-10 water quality parameter meter, or equivalent. The discharge from the flow through cell shall be connected by tubing to a calibrated container to contain waste water. A two way stainless or Teflon valve will be located in the discharge tube immediately upstream (i.e., in front) of the flow-through cell for sampling purposes.

At the beginning of purging, the flow rate shall be adjusted using the variable speed of the pump to generate a flow of about 1 L/min in the 4-inch diameter wells. Water level measurements shall be made to ensure that the drawdown in response to this purging is no more than 0.2 ft. If drawdown exceeds 0.2 ft, the flow rate will be reduced accordingly. The volume of purge water and duration of this first stage of purging should then be recorded. Purging shall continue with measurements of water quality parameters every 4 to 5 minutes until water quality parameters stabilize. Water quality parameters that will be measured are pH, electrical conductivity, temperature, dissolved oxygen, and turbidity. Approximately five sets of water quality parameter measurements shall be collected in each well during purging and at regular intervals (approximately every five minutes). Water quality parameters shall be measured in the field according to the following procedures:

1. During the purging process, groundwater will fill the flow-through cell. The cell should be adjusted until air bubbles are removed. The fittings shall be confirmed to be essentially leak-free or adjusted accordingly. The Horiba U-10 probe will be located in the flow-through-cell and water quality parameters will be collected as water flows through the cell.

2. Document the readings indicated by the measuring devices on the groundwater sampling field sheets. Compare the water parameter measurements from the previous sampling event to the current values. If the values appear to be erratic or unreasonable, re-calibrate the device(s). Measurements shall be repeated approximately every 4 to 5 minutes. At least five sets of measurements will be completed for every well. Visual observations of the clarity and color of the pump discharge shall also be recorded. In addition, water levels in the wells will be periodically measured during purging.

Comparison between successive field parameter measurements shall be used to determine when purging is sufficient and sample collection may proceed. In general, purging will continue until all field parameters and visual observations show no significant fluctuations or trends (increasing or decreasing over time). Stabilization of water quality parameters shall be defined as no consistent increasing or decreasing trend among the previous five readings and/or changes among the previous three readings of no more than:

- ±0.2 unit for pH,
- ±5% for specific conductance,
- ±0.2 ^{o}C for temperature,
- ±10% for turbidity, and
- ±10% for dissolved oxygen.

The purging goal will be to achieve turbidity below 5 NTU and stabilization of the water quality parameters. However, this may not be possible in all wells. The total volume purged will not exceed 3 well volumes. The total volume purged and the time will be recorded at the end of each stage of purging. The volume of purge water removed from each well will be measured using a calibrated container.

Immediately following purging, a sample of groundwater will be collected according to the procedures described in Section B.7.5.4. Groundwater purge water will be stored in accordance with the Waste Management Plan presented in Section B.8

C.7.5.4 Sampling Activities

This section describes the procedures to be followed for the collection of groundwater samples from both the direct-push borings and monitoring wells. The activities for groundwater sample collection are as follows: (1) sample withdrawal; (2) sample handling, and (3) post-sampling confirmation of water quality parameter measurements (monitoring well samples only).

The groundwater sample shall be collected immediately following the purging activities described in Section B.7.5.3. The samples will be collected using the 2” submersible Grundfos© Redi-Flo pump and the discharge tube used for purging. The sample will be collected from a sampling valve or sampling port located immediately upstream of the flow-through cell. The 2” submersible Grundfos© Redi-Flo pump will be operated at a discharge rate of approximately 100 ml/minute for VOC samples. The 1/4 –inch discharge tubing will be cleared at a low pumping rate before samples are collected. In the case of groundwater grab samples collected from the direct-push borings, samples will be collected via a disposable bailer or peristaltic pump with disposable tubing.

Samples will be collected in accordance with the following guidelines:

- Gloves worn during purging or other activities shall be discarded and replaced with clean gloves for sampling;
- Sample containers shall not be opened until immediately prior to filling;
- The insides of sample containers shall not be touched, including with clean gloves;
- Sampling containers shall be filled slowly and with minimal aeration with the pump (see above);
- Sampling containers shall be filled completely, but not overfilled, as this will result in the loss of preservative;
- Sampling containers shall be filled as expeditiously as possible to minimize the time between filling the first sample container and the last; and
- Filled sample containers shall be labeled, prepared for transport, and stored in an ice chest or cooler as described in Section B.7.5.5.

The following table describes the laboratory provided containers that will be used for sample collection.

Analytical Procedure (EPA Method No.)	Type of Container	Preservative
CAM 17 Metals – total and dissolved (EPA 200.8, 6010B)	500 ml Poly/500ml Poly	None/ HNO_3
Priority Pollutants – Organics (624, 4500P-E/365.1, EPA 524.2)	3 VOA, 125 ml Poly,	HCl
Total and Fecal Coliform (SM 8223B)	100 ml Poly sterilized	Thio
Methylene Blue Active Substances (SM 5540C, EPA 425.1)	500 ml Poly	None
General Minerals – Na, Ca, Mg, Cl, HCO_3^-, SO_4^{2-} (EPA 300.0)	125 ml Poly	None
Total Dissolved Solids (160.1)	1-500mL Poly	None
Total Nitrogen (351.2)	1-500mL Poly	None
Nitrate-NO_3 (300.0)	1-500mL Poly	None
Ammonia (EPA 350.1)	250 ml Poly	H_2SO_4
Total Kjeldahl Nitrogen (EPA 351.2)	250 ml Poly	H_2SO_4

Samples collected for dissolved metals will be filtered using a Nalgene© in-line 0.45-µm filter. Approximately 1/10 of a liter of water will be pumped through the filter and disposed of before sample collection. The sample containers for dissolved metals will preserved with HNO_3.

C.7.5.5 Sample Handling, Labeling and Chain-of-Custody Protocol

Each sample container shall be labeled with a distinct and clearly written label. The field sampling personnel shall complete the information on the sample label at the time of sampling using indelible ink.

A note in the field activity report sheet shall be made to correlate the sample ID number to the well ID number. Labels shall be affixed to a clean and dry surface of the sample bottle and double-checked for completeness. Sampling containers shall be stored properly in an ice chest or cooler to reduce the potential for breakage, spillage, or label deterioration. Proper sample storage consists of "bubble wrap" around glass bottles or vials, sealable Zip-Lock®-type bags around sample containers, ice in the cooler, and packing material to occupy remaining voids. Sample containers shall be stored in ice chests immediately following sampling.

The samples shall be maintained in the cooler with wet ice between the time the samples are collected and the time the samples are analyzed in the laboratory. The presence of solid ice and temperature of the ice-cooler will be periodically checked in the field and recorded on daily field sheets. The presence of ice and the temperature of the samples shall be measured and recorded upon receipt by the laboratory. On hot days, the field samplers shall periodically monitor the cooler to remove melted ice and add ice, as needed, to maintain the acceptable volume of ice.

The coolers containing the groundwater sample containers shall be delivered to the laboratory on the same day the samples are collected or the following day by courier. The laboratory for this project will be Eurofins-Eaton Analytical of Monrovia, California. Fresh wet ice shall be added as required. Each set of samples shall be accompanied by a chain-of-custody form, which outlines the contents of the cooler. Information to be included on the chain-of-custody form is described in Section B.4.2.3. The chain-of-custody form shall be completed and signed by the sampler(s) before departing the monitoring point, but after the samples have been packed into the cooler containing ice. The temperature in the sample container will be measured in the field before it is sealed and noted on the chain-of-custody form. The completed chain-of-custody form shall then be sealed in a zip-top bag and placed in the cooler. Whenever the cooler is exchanged from one person to the other (including couriers and laboratory personnel), the persons relinquishing and receiving the cooler shall sign and date the chain-of-custody form.

C.7.6 Field QA/QC, Record Keeping and Chain-of-Custody Forms

Proper field quality assurance and quality control (QA/QC) and record keeping are integral parts of groundwater sampling procedures. This section outlines methods for evaluating the validity and quality of samples and for documenting sampling activities. The topics covered in this section are as follows:

- field QA/QC, including collection/preparation of trip, field and rinsate blanks, and collection of duplicate samples; and
- record keeping, including field documentation and chain-of-custody control procedures.

C.7.6.1 Field QA/QC

Field QA/QC procedures are designed to maintain sample quality. In terms of groundwater monitoring, a high quality sample refers to a sample which is reproducible, representative of in-situ conditions, and which is free of contamination from outside sources. The pre-sampling, sampling, and post-sampling standard operating procedures represent the QC designed to reduce the potential for sample contamination from occurring in the field and/or during transport of the samples to the laboratory. The effectiveness of QC may be monitored using QA testing of equipment rinsate blanks, duplicates, travel blanks, and field blanks.

Equipment Rinsate Blank

An equipment rinsate blank will be collected at the end of the sampling event if purging and sampling of wells is performed with non-dedicated equipment. The rinsate blank sample will be collected following the decontamination of the non-dedicated equipment used for purging/sampling. The equipment will be decontaminated according to the procedures described in Section B.3. Purified water will be passed through the equipment and sampled. The equipment rinsate blank will be analyzed for VOCs.

Duplicate Sample

Two duplicate groundwater samples will be collected (10% of total number of samples), preserved, packaged, labeled, and sealed in a manner identical to that for the other samples. The duplicate groundwater sample will be collected as a split and analyzed for the same analyses as the primary samples.

Trip Blank

Trip blank, consisting of organic-free water, will be transported from the analytical laboratory to the sampling site, and then returned to the laboratory along with the field samples without having been opened in the field. A trip blank will be placed in each cooler that contains water quality samples for VOC analyses for every laboratory shipment. It is expected that approximately 10 laboratory blanks will be analyzed per sampling event.

C.7.6.2 Record Keeping During Purging and Sampling

Maintaining an organized and complete set of records is an integral part of groundwater monitoring procedures and is a regulatory requirement. This includes completing field data sheets, maintaining daily field report sheets, and retaining copies of chain-of-custody forms. Records of past sampling events shall be maintained in a centralized location. General record keeping is discussed in Section B.4.

During purging and sampling activities the Purge and Sampling Field Reports will be completed for each sampling location (see Attachment B-1). The field data sheet will include at a minimum the following information:

- well identification;
- condition of well and surface completion;
- well depth;
- static water level depth and measurement technique;
- presence and thickness of immiscible layers and detection method;
- well purging procedure and equipment;
- purge volume and pumping rate;
- time well purged;
- relative well yield and recovery (high or low);
- water quality parameters and water levels during purging;
- sample withdrawal procedure and equipment;
- date and time of collection;
- well sampling sequence;
- types of sample bottles used and sample identification numbers;
- preservatives and pH verification;
- parameters requested for analysis;
- field observations of sampling event;
- name of collector;
- climatic conditions, including air temperature; and
- internal temperature of field containers.

Completion of chain-of-custody forms is an integral part of record keeping associated with groundwater sampling. An example of the labs chain-of-custody form is presented in Attachment B-1. For each sample shipment, a new chain-of-custody form shall be filled out to accompany the samples from the wells to the laboratory. The chain-of-custody form shall contain the following information:

- sample number;
- the name and signature of the sampler;
- date and time for each sample;
- sample type;

- sample point identification;
- number and types of containers;
- tests to be performed and/or analytes requested;
- preservative information;
- signatures of people involved in the chain of possession with dates and times of possession;
- internal temperatures of shipping container when samples were sealed and when container was opened at the laboratory; and
- other notes or remarks.

The original form shall remain with the samples and a copy shall be stored at the selected centralized location.

C.7.6.3 Laboratory Analyses

Phase 1 groundwater samples collected during the field activities will be analyzed using the following methodology:

- USEPA Method 8260B for volatile organic compounds (VOCs);
- USEPA Method 218.6 for Chromium VI;
- USEPA Method 314 for Perchlorate
- USEPA Method 1625C – modified for NDMA
- USEPA Method 8260 – SIM for 1,4-Dioxane and 1,2,3-Trichloropropane
- USEPA Method 300.0 for Nitrate – NO_3
- USEPA Method 160.1 for total dissolved solids (TDS)
- USEPA Method 200.8 for Manganese

The Phase 2 and any subsequent investigation analyses will be selected based on the sample results from Phase 1.

C.8 INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN

C.8.1 Objectives

In the process of collecting environmental data and samples, potentially contaminated investigation-derived wastes (IDW) will be generated that include the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Soil cuttings
- Drilling mud
- Purge water
- Water and liquids used for decontamination

The EPA's National Contingency Plan (NCP) requires that management of IDW comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan generally followed the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 dated May 1991, which provides the guidance for the management of IDW. In addition, as provided in Section VI paragraph 16 of the CD, EPA approval of IDW receiving facilities will be obtained prior to shipping.

C.8.2 IDW Handling Procedures

The IDW handling procedures are listed below:

- Used PPE and disposable equipment shall be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and shall be sent to a municipal landfill. Any PPE and disposable equipment that could potentially be reused shall be rendered inoperable before disposal in the refuse dumpster.

- Soil cuttings will be placed Department of Transportation (DOT)-approved roll-off bins.

- Decontamination water, drilling mud, purge water, and well development water shall be placed in Department of Transportation (DOT)-approved Baker© Tanks.

- Baker© Tanks and roll-off bins will be sealed prior to transportation.

C.8.3 Record Keeping

Waste soil or water containers associated with the investigation will be labeled with the following information:

- Container identification number;
- Contents of container including designation of wells that produced the soil cuttings, drilling mud or purge water enclosed and if decontamination water is present;
- Contact information for contractor who did the work, i.e. phone number and company name of the contact for questions.
- Name of the Site and generator.
- Date the containers were filled.

An inventory of the containers as they are filled and sealed shall be included in the daily field reports.

C.8.4 Drill Cutting and Water Disposal

Soils contained in containers will be sampled using protocol that meets licensed disposal facility requirements. Generally, soil composite samples are collected and then submitted for laboratory analyses that adequately define the materials as either:

- Non-Hazardous
- California Hazardous (Non-RCRA Hazardous)
- RCRA Hazardous

Soils, drilling muds, and purged groundwater will be sampled and disposed of at a licensed facility before the drill rig mobilizes to the next boring location. Characterization samples will be analyzed with a rushed turn around time to allow for timely disposal.

APPENDIX D

ANALYTICAL METHODS AND DETECTION LIMITS

Profile Information: @VOAPP C

TEST (Testcode) ANALYTE	Method	MRL	MDL	UNITS	LCS QCL (%R)	MS QCL (%R)	CAS #
@624 (1,590)			Volatile Organics by EPA 624				
1,1,1-Trichloroethane	EPA 624	0.5	0.079	ug/L	79 - 121	75 - 144	71-55-6
1,1,2,2-Tetrachloroethane	EPA 624	0.5	0.149	ug/L	77 - 126	79 - 130	79-34-5
1,1,2-Trichloroethane	EPA 624	0.5	0.075	ug/L	79 - 116	76 - 129	79-00-5
1,1-Dichloroethane	EPA 624	0.5	0.133	ug/L	77 - 129	70 - 146	75-34-3
1,1-Dichloroethylene	EPA 624	0.5	0.110	ug/L	77 - 139	75 - 134	75-35-4
1,2-Dichloroethane	EPA 624	0.5	0.119	ug/L	81 - 122	75 - 135	107-06-2
1,2-Dichloropropane	EPA 624	0.5	0.071	ug/L	77 - 118	73 - 132	78-87-5
2-Butanone (MEK)	EPA 624	5.0	1.061	ug/L	65 - 122	59 - 129	78-93-3
2-Hexanone	EPA 624	10	3.335	ug/L	72 - 128	71 - 134	591-78-6
4-Methyl-2-Pentanone (MIBK)	EPA 624	5.0	0.683	ug/L	76 - 130	75 - 136	108-10-1
Acetone	EPA 624	10	4.016	ug/L	47 - 117	37 - 119	67-64-1
Acrolein (Screen)	EPA 624	5.0	1.008	ug/L	50 - 150	50 - 150	107-02-8
Acrylonitrile (Screen)	EPA 624	2.0	0.809	ug/L	50 - 150	50 - 150	107-13-1
Benzene	EPA 624	0.5	0.117	ug/L	60 - 156	76 - 133	71-43-2
Bromodichloromethane	EPA 624	0.5	0.117	ug/L	77 - 113	77 - 130	75-27-4
Bromoform	EPA 624	0.5	0.142	ug/L	54 - 134	51 - 140	75-25-2
Bromomethane (Methyl Bromide)	EPA 624	0.5	0.118	ug/L	67 - 144	55 - 147	74-83-9
Carbon disulfide	EPA 624	0.5	0.085	ug/L	63 - 131	65 - 155	75-15-0
Carbon Tetrachloride	EPA 624	0.5	0.087	ug/L	73 - 127	71 - 151	56-23-5
Chlorobenzene	EPA 624	0.5	0.066	ug/L	57 - 166	77 - 132	108-90-7
Chlorodibromomethane	EPA 624	0.5	0.062	ug/L	77 - 113	68 - 136	124-48-1
Chloroethane	EPA 624	0.5	0.078	ug/L	70 - 133	45 - 180	75-00-3
Chloroform (Trichloromethane)	EPA 624	0.5	0.113	ug/L	78 - 117	76 - 133	67-66-3
Chloromethane(Methyl Chloride)	EPA 624	0.5	0.113	ug/L	78 - 134	58 - 143	74-87-3
cis-1,2-Dichloroethylene	EPA 624	0.5	0.138	ug/L	80 - 114	78 - 133	156-59-2
cis-1,3-Dichloropropene	EPA 624	0.5	0.108	ug/L	68 - 123	65 - 120	10061-01-5
Dichlorodifluoromethane	EPA 624	0.5	0.099	ug/L	46 - 165	30 - 169	75-71-8
Dichloromethane	EPA 624	0.5	0.099	ug/L	77 - 121	75 - 132	75-09-2
Ethyl benzene	EPA 624	0.5	0.112	ug/L	79 - 122	68 - 146	100-41-4
m,p-Xylenes	EPA 624	0.5	0.226	ug/L	82 - 123	79 - 142	179601-23-1
m-Dichlorobenzene (1,3-DCB)	EPA 624	0.5	0.084	ug/L	76 - 124	76 - 139	541-73-1
Methyl Tert-butyl ether (MTBE)	EPA 624	0.5	0.074	ug/L	70 - 130	70 - 130	1634-04-4
o-Dichlorobenzene (1,2-DCB)	EPA 624	0.5	0.076	ug/L	79 - 118	80 - 125	95-50-1

TEST (Testcode) ANALYTE	Method	MRL	MDL	UNITS	LCS QCL (%R)	MS QCL (%R)	CAS #
o-Xylene	EPA 624	0.5	0.072	ug/L	79 - 120	91 - 123	95-47-6
p-Dichlorobenzene (1,4-DCB)	EPA 624	0.5	0.092	ug/L	74 - 130	71 - 145	106-46-7
Styrene	EPA 624	0.5	0.114	ug/L	77 - 125	66 - 142	100-42-5
Tetrachloroethylene (PCE)	EPA 624	0.5	0.085	ug/L	79 - 122	72 - 146	127-18-4
Tetrahydrofuran	EPA 624	10	2.094	ug/L	67 - 130	68 - 134	109-99-9
Toluene	EPA 624	0.5	0.057	ug/L	80 - 118	66 - 143	108-88-3
Total 1,3-Dichloropropene	EPA 624	1.0	0.108	ug/L	64 - 123	61 - 120	542-75-6
trans-1,2-Dichloroethylene	EPA 624	0.5	0.105	ug/L	82 - 122	74 - 138	156-60-5
trans-1,3-Dichloropropene	EPA 624	0.5	0.135	ug/L	64 - 126	61 - 127	10061-02-6
Trichloroethylene (TCE)	EPA 624	0.5	0.097	ug/L	78 - 119	71 - 139	79-01-6
Trichlorofluoromethane	EPA 624	0.5	0.183	ug/L	70 - 145	63 - 161	79-69-4
Vinyl Acetate	EPA 624	10	0.927	ug/L	72 - 136	55 - 146	108-05-4
Vinyl chloride (VC)	EPA 624	0.3	0.077	ug/L	66 - 140	56 - 159	75-01-4

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Date: 10/09/2014

Ammonia Nitrogen

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
Ammonia Nitrogen	EPA 350.1	250ml poly 0.5ml H2SO4 (50%)	28 DAY	0.05	0.003	mg/L	90 - 110	90 - 110	7664-41-7

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Date: 10/09/2014

#CAM17 Metals Dissolved

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
Antimony dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.159	ug/L	85 - 115	70 - 130	7440-36-0
Arsenic dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.060	ug/L	85 - 115	70 - 130	7440-38-2
Barium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	2	0.171	ug/L	85 - 115	70 - 130	7440-39-3
Beryllium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.054	ug/L	85 - 115	70 - 130	7440-41-7
Cadmium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	0.5	0.012	ug/L	85 - 115	70 - 130	7440-43-9
Chromium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.088	ug/L	85 - 115	70 - 130	7440-47-3
Cobalt dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.088	ug/L	85 - 115	70 - 130	7440-48-4
Copper dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	2	0.197	ug/L	85 - 115	70 - 130	7440-50-8
Lead dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	0.5	0.038	ug/L	85 - 115	70 - 130	7439-92-1
Molybdenum dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	2	0.061	ug/L	85 - 115	70 - 130	7439-98-7
Nickel dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	5	0.323	ug/L	85 - 115	70 - 130	7440-02-0
Selenium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	5	0.153	ug/L	85 - 115	70 - 130	7782-49-2
Silver dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	0.5	0.014	ug/L	85 - 115	70 - 130	7440-22-4
Thallium dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	1	0.020	ug/L	85 - 115	70 - 130	7440-28-0
Vanadium Dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	3	0.034	ug/L	85 - 115	70 - 130	7440-62-2
Zinc dissolved ICAP/MS	EPA 200.8	500ml poly no preservative	180 DAY	20	1.235	ug/L	85 - 115	70 - 130	7440-66-6
Mercury dissolved	EPA 245.1	500ml poly no preservative	28 DAY	0.2	0.0424	ug/L	85 - 115	70 - 130	7439-97-6

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Date: 10/09/2014

#CAM17 Metals

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
Antimony Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	1	0.159	ug/L	85 - 115	70 - 130	7440-36-0
Arsenic Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	1	0.060	ug/L	85 - 115	70 - 130	7440-38-2
Barium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	2	0.171	ug/L	85 - 115	70 - 130	7440-39-3
Beryllium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	1	0.054	ug/L	85 - 115	70 - 130	7440-41-7
Cadmium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	0.5	0.012	ug/L	85 - 115	70 - 130	7440-43-9
Chromium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	1	0.088	ug/L	85 - 115	70 - 130	7440-47-3
Cobalt Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	2	0.053	ug/L	85 - 115	70 - 130	7440-48-4
Copper Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	2	0.197	ug/L	85 - 115	70 - 130	7440-50-8
Lead Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	0.5	0.038	ug/L	85 - 115	70 - 130	7439-92-1
Molybdenum Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	2	0.061	ug/L	85 - 115	70 - 130	7439-98-7
Nickel Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	5	0.323	ug/L	85 - 115	70 - 130	7440-02-0
Selenium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	5	0.153	ug/L	85 - 115	70 - 130	7782-49-2
Silver Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	0.5	0.014	ug/L	85 - 115	70 - 130	7440-22-4
Thallium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	1	0.020	ug/L	85 - 115	70 - 130	7440-28-0
Vanadium Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	3	0.034	ug/L	85 - 115	70 - 130	7440-62-2
Zinc Total ICAP/MS	EPA 200.8	500ml acid poly 2ml HNO3 (18%)	180 DAY	20	1.235	ug/L	85 - 115	70 - 130	7440-66-6
Mercury	EPA 245.1	500ml acid poly 2ml HNO3 (18%)	28 DAY	0.2	0.0424	ug/L	85 - 115	70 - 130	7439-97-6

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Date: 10/09/2014

@QUANT2000

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
24 Hour E. Coli Confirmed (Large Wells)	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		PT			
24 Hour E. Coli Confirmed (Small Wells)	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		PT			
24 Hour Total Coliform Confrm (Large W	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		PT			
24 Hour Total Coliform Confrm (Small W	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		PT			
E. Coli Bacteria	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		MPN/100			68583-22-2
Total Coliform Bacteria	SM 9223B	100ml poly sterilized 0.25ml thio (8%)	2 DAY	1		MPN/100			

MWH Laboratories

Date: 06/26/2012

Orthophosphate as PO4

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
Orthophosphate as PO4	4500P-E/365.1	125ml poly OPO4_no preservative	2 DAY	0.031		mg/L			

Profile Information: @THM524

TEST (Testcode) ANALYTE	Method	MRL	MDL	UNITS	LCS QCL (%R)	MS QCL (%R)	CAS #
@VOA (1,051)			Volatile Organics by GCMS				
Bromodichloromethane	EPA 524.2	0.5	0.117	ug/L	70 - 130	70 - 130	75-27-4
Bromoform	EPA 524.2	0.5	0.142	ug/L	70 - 130	70 - 130	75-25-2
Chlorodibromomethane	EPA 524.2	0.5	0.062	ug/L	70 - 130	70 - 130	124-48-1
Chloroform (Trichloromethane)	EPA 524.2	0.5	0.113	ug/L	70 - 130	70 - 130	67-66-3
Total THM	EPA 524.2	0.5	0.062	ug/L	70 - 130	70 - 130	E-14471

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Total Kjeldahl Nitrogen

ANALYTE	METHOD	CONTAINER & PRESERVATIVES	HOLDING TIME	MRL	MDL	UNITS	LCS RANGE	MS RANGE	CAS #
Kjeldahl Nitrogen	EPA 351.2	250ml poly 0.5ml H2SO4 (50%)	28 DAY	0.2	0.0440	mg/L	90 - 110	90 - 110	7727-37-9