

FINAL REPORT

Verification Monitoring for In Situ Chemical Reduction Using
Zero-Valent Zinc, A Novel Technology for Remediation of
Chlorinated Alkanes

ESTCP Project ER-201628

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14. ABSTRACT <p>The reactivity profile of "lesser chlorinated" aliphatic hydrocarbons such as 1,2,3-trichloropropane (TCP) is understood less well relative to highly chlorinated aliphatic compounds and is not systematically considered when developing remedial approaches for these compounds. TCP was identified as number three in a list of primary emerging contaminants at a recent SERDP/ESTCP workshop on long-term management of contaminated sites. To date, TCP has been observed at more than 45 installations. The median detected concentrations (approximately 1 µg/L) have been low but are nonetheless high relative to regulatory levels for TCP.</p> <p>Remediation options for TCP are limited, particularly at current and anticipated future regulatory levels. One treatment process that produces promising rates of TCP degradation is in situ chemical reduction (ISCR) with zero-valent zinc (ZVZ). In 2014, the Navy implemented a pilot study to evaluate the feasibility and performance of in situ ZVZ remediation of TCP in groundwater. The pilot study results showed evidence of TCP degradation, but the pilot study monitoring was not designed to evaluate efficacy of the ZVZ injections or long-term performance of the zinc media with respect to degradation of TCP.</p> <p>This study included follow-on monitoring within the pilot study area designed to collect data to demonstrate and validate the use of ZVZ to promote abiotic ISCR of TCP in groundwater. Key findings suggest that TCP reductions continue to be maintained within and down-gradients of the pilot study area 5 years after ZVZ emplacement. However, ZVZ delivery performance was variable and should be optimized for future injections to improve the distribution of ZVZ within the subsurface.</p>		

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In Situ Chemical Reduction, Zero-Valent Zinc, Remediation of Chlorinated Alkanes, 1,2,3-trichloropropane, TCP, groundwater, pilot study

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/L	micrograms per liter
1,2-DCP	1,2-dichloropropane
1,3-DCP	1,3-dichloropropane
AC/S ES	Assistant Chief of Staff, Environmental Security
AIS	American Integrated Services, Inc.
bgs	below ground surface
Blaine Tech	Blaine Tech Services, Inc.
Calscience	Eurofins Calscience, Inc.
CCL 4	Contaminant Candidate List 4
CDPH	California Department of Public Health
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
DPT	direct-push technology
ELAP	Environmental Laboratory Accreditation Program
ESTCP	Environmental Security Technology Certification Program
ft/day	foot per day
ft/ft	feet per foot
ft ²	square feet
ft ³	cubic feet
GAC	granular activated carbon
Geosyntec	Geosyntec Consultants, Inc.
HASP	health and safety plan
HDPE	high-density polyethylene
IDW	investigation-derived waste
IPR	In-Progress Review
IR	Installation Restoration
ISCO	<i>in situ</i> chemical oxidation
ISCR	<i>in situ</i> chemical reduction
ITRC	Interstate Technology and Regulatory Council
Kehoe	Kehoe Testing & Engineering, Inc.
LODs	limits of detection

MCBCP	Marine Corps Base Camp Pendleton
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliters
ml/min	milliliters per minute
msl	mean sea level
mV	millivolts
NESDI	Navy Environmental Sustainability Development to Integration
NTU	Nephelometric turbidity units
OHSU	Oregon Health and Science University
ORP	oxidation-reduction potential
PID	portable photoionization detector
PPE	personal protective equipment
ppmv	parts per million by volume
PRBs	permeable reactive barriers
PSLs	project-specific screening levels
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RBA	Richard Brady & Associates
ROI	radius of influence
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
SERDP	Strategic Environmental Research and Development Program
TCP	1,2,3-trichloropropane
TPH	total petroleum hydrocarbons
UCMR 4	Fourth Unregulated Contaminant Monitoring Rule
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOAs	volatile organic analytes
VOCs	volatile organic compounds
XRF	x-ray fluorescent
ZVI	zero-valent iron
ZVM	zero-valent metals
ZVZ	zero-valent zinc

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ABSTRACT

INTRODUCTION AND OBJECTIVES

The reactivity profile of “lesser chlorinated” aliphatic hydrocarbons such as 1,2-dichloroethane and 1,2-dichloropropane is relatively less understood and has not been systematically considered when developing remedial approaches for these compounds. The lesser chlorinated hydrocarbon 1,2,3-trichloropropane (TCP) has been identified as an emerging contaminant at more than 45 Department of Defense (DoD) facilities to date. The median detected concentrations have been low but are nonetheless high relative to regulatory levels for TCP.

One treatment process that produces promising rates of TCP degradation is in situ chemical reduction (ISCR) with zero-valent zinc (ZVZ). In 2014, the Navy implemented a pilot study to evaluate the feasibility and performance of in situ ZVZ remediation of TCP in groundwater. The pilot study results showed evidence of TCP degradation, but the pilot study monitoring was not designed to evaluate ZVZ distribution following injections or long-term performance of the zinc media with respect to degradation of TCP. The objective of this project was to collect data to further demonstrate and validate ZVZ, including providing supporting information for engineering design and performance assessment.

TECHNOLOGY DESCRIPTION

Evaluation of ZVZ as a remedial technology for TCP has been ongoing for several years. Proof-of-concept bench-scale testing and field-scale column testing demonstrated that chemical reduction using ZVZ is relatively promising for remediation of TCP. The first field application of ZVZ to remediate TCP in groundwater included pilot-scale injections completed at Marine Corps Base Camp Pendleton (MCBCP) in 2014 to create a permeable treatment zone. The pilot-scale injections included the direct injection of ZVZ into the subsurface via pneumatic fracturing, followed by monitoring for TCP, dissolved zinc, and geochemical parameters in intergrid and downgradient performance monitoring wells. Post-injection results showed evidence of TCP degradation of up to 97% within the pilot study area with no impacts to secondary groundwater quality.

PERFORMANCE AND COST ASSESSMENT

This project was designed to complement and leverage previous Navy-funded ZVZ injection work at MCBCP and provide information to guide the use of this technology at other DoD sites. The project included the collection of soil and groundwater samples within the pilot study area to evaluate the distribution of ZVZ achieved by the pilot study injections and the long-term efficacy of the ZVZ. Major findings include the following:

- Post-treatment groundwater monitoring results from within and downgradient of the ZVZ injection area indicate that TCP reductions exceeding 90% were achieved and maintained for at least four years post-injection.
- Reduced geochemical conditions favorable to ISCR of TCP, including low dissolved oxygen, negative oxidation reduction potential, and decreased sulfate concentrations relative to baseline conditions were secondary indicators of the continued efficacy of the pilot study injections.

- Injected zinc was present in some soil samples at high mass loadings (greater than 0.5%) but not in other samples, suggesting that ZVZ can be delivered to the subsurface but was not delivered in a predictable manner during the pilot study.

Most costs to implement this technology are comparable to implementing a zero valent iron (ZVI) remedy. The primary difference is the higher cost of ZVZ relative to ZVI. Use of ZVZ is most favorable when a stronger reductant is required, either due to the recalcitrant nature of the compound being treated or site-specific conditions which may limit residence time within the treatment area.

IMPLEMENTATION ISSUES AND LESSONS LEARNED

The limited number of soil samples within the injection area with elevated zinc concentrations suggest that the ZVZ was not delivered to the subsurface in a predictable manner during the July 2014 pilot study. This is consistent with observed surfacing of ZVZ material during the injections. As such, the project team has developed recommendations for optimizing ZVZ delivery for future injections, including the following:

- Selecting ZVZ material more amenable to subsurface injections; and
- Optimizing injection approaches to improve predictability of material delivery.

While optimal ZVZ delivery may not have been achieved during the pilot study, the observed trends in TCP concentration within and downgradient of the ZVZ injection area during post-injection performance monitoring and as part of this verification project demonstrate that the pilot study was successful in terms of achieving targeted TCP concentration reductions. Based on the TCP concentration trends and the findings of this verification project, the pilot study was considered a success by the Navy and the Navy elected to move forward with optimized ZVZ injections at two areas of MCBCP. Follow-on injections implementing these recommendations were implemented at MCBCP in early 2019. Preliminary results suggest that the optimized injections more predictably distributed ZVZ within the subsurface and that reductions in TCP concentrations are being achieved.

The primary objective of this project was to conduct verification monitoring of the previously-funded ISCR pilot study using ZVZ, a novel technology for the remediation of chlorinated alkanes. Verification monitoring results clearly demonstrate the importance of verification monitoring in assessing long term viability and performance of the technology. Lessons learned from this work were used to inform the design and implementation of two ongoing full-scale applications of this technology at MCBCP.

PUBLICATIONS

19-01 Merrill, J.P., E. Suchomel, S. Varadhan, M. Asher, L. Kane, E. Hawley, and R. Deeb, 2019. Development and Validation of Technologies for Remediation of 1,2,3-Trichloropropane in Groundwater. *Current Pollution Reports* (5):228–237. <https://doi.org/10.1007/s40726-019-00122-7>

EXECUTIVE SUMMARY

INTRODUCTION

The reactivity profile of “lesser chlorinated” aliphatic hydrocarbons such as 1,2-dichloroethane and 1,2-dichloropropane is relatively less understood and has not been systematically considered when developing remedial approaches for these compounds. The lesser chlorinated hydrocarbon 1,2,3-trichloropropane (TCP) has been identified as an emerging contaminant at more than 45 Department of Defense (DoD) facilities to date. The median detected concentrations have been low but are nonetheless high relative to regulatory levels for TCP.

Remediation options for TCP in groundwater are still being developed, particularly those that may be able to achieve current and anticipated future regulatory levels for the compound. Efficient in situ degradation of TCP is difficult to achieve with many natural and engineered remediation processes, including biodegradation at low TCP concentrations, hydrolysis, and reduction by common reductants including sulfide, ferrous iron adsorbed to iron oxides, zero-valent iron (ZVI), and nano-ZVI. TCP is less volatile than other chlorinated solvents, making it less amenable to air stripping. In situ treatment with activated persulfate is effective but has been rejected by at least one regulatory agency in the State of California due to concerns over potential secondary water quality impacts from the addition of sulfate to the groundwater at concentrations exceeding the secondary Maximum Contaminant Level (MCL) of 250 milligrams per liter (mg/L). TCP extraction and treatment with granular activated carbon (GAC) is feasible; however, TCP has a low to moderate adsorption capacity for GAC, making treatment expensive.

One treatment process that produces promising rates of TCP degradation is in situ chemical reduction (ISCR) with zero-valent zinc (ZVZ). Evaluation of ZVZ as a remediation technology for TCP has been ongoing for several years, including a pilot-scale ZVZ injection program that was completed in July 2014 at Marine Corps Base Camp Pendleton (MCBCP), California.

OBJECTIVES

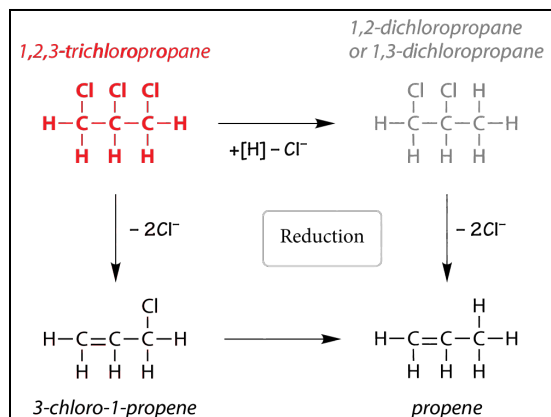
The objective of this demonstration was to collect data to further demonstrate and validate the use of ZVZ to promote abiotic in situ chemical reduction of TCP in groundwater. TCP is both a primary emerging contaminant at DoD facilities as well as a potential model compound for assessing ZVZ as a technology for remediating other lesser chlorinated aliphatic hydrocarbons. Pilot-scale ZVZ injections have been completed at a Navy installation (MCBCP), representing the first field implementation of this technology. The scope of work described in this report was designed to complement and leverage previous DoD-funded work on this technology and provide information to guide use of this technology at other DoD sites.

TECHNOLOGY DESCRIPTION

Similar to other zero-valent metals (ZVMs), ZVZ chemically reduces organic contaminants. When TCP in groundwater contacts ZVZ, it is predominantly reduced via a dihaloelimination reaction to 3-chloro-1-propene, which is subsequently converted to propene through hydrogenolysis (see figure below). As described by Salter-Blanc et al. (2011), propene has been identified as the main product of TCP reduction by ZVZ. During bench-scale testing by Salter-Blanc et al. (2011),

detected concentrations of 3-chloro-1-propene were low relative to initial TCP concentration and transient, and analysis of overall reaction rates of TCP conversion to propene suggest that 3-chloro-1-propene is the only reaction intermediate reduced quickly enough to produce the observed rates of TCP reduction by ZVZ.

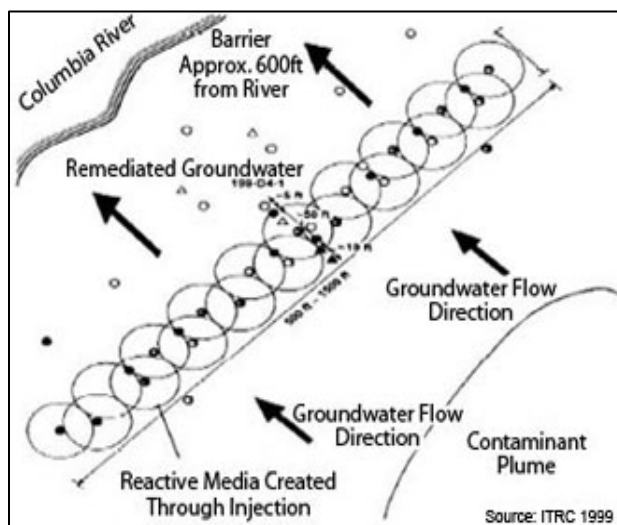
Reaction Pathway for Conversion of TCP to Propene via Dihaloelimination Reaction



Evaluation of ZVZ as a remedial technology for TCP has been ongoing for several years. Proof-of-concept batch and column testing demonstrated that chemical reduction using ZVZ is relatively promising for remediation of TCP. The first field application of ZVZ to remediate TCP in groundwater was completed at MCBCP in 2014 and included pilot-scale injections to create a permeable treatment zone (see figure below).

Conceptual Diagram of Permeable Treatment Zones

(Interstate Technology and Regulatory Council [ITRC], 1999).



The pilot study included direct injection of ZVZ into the subsurface, followed by monitoring for TCP, dissolved zinc, and geochemical parameters in intergrid and downgradient performance monitoring wells. Post-injection monitoring showed evidence of TCP degradation of up to 97% within the pilot study area with no impacts to secondary groundwater quality.

PERFORMANCE ASSESSMENT

This project included collection of soil and groundwater samples within the 2014 pilot study area to evaluate the distribution of ZVZ achieved by the pilot study injections and the long-term efficacy of the ZVZ. Performance objectives for this project and data collected to evaluate the performance objectives are as follows:

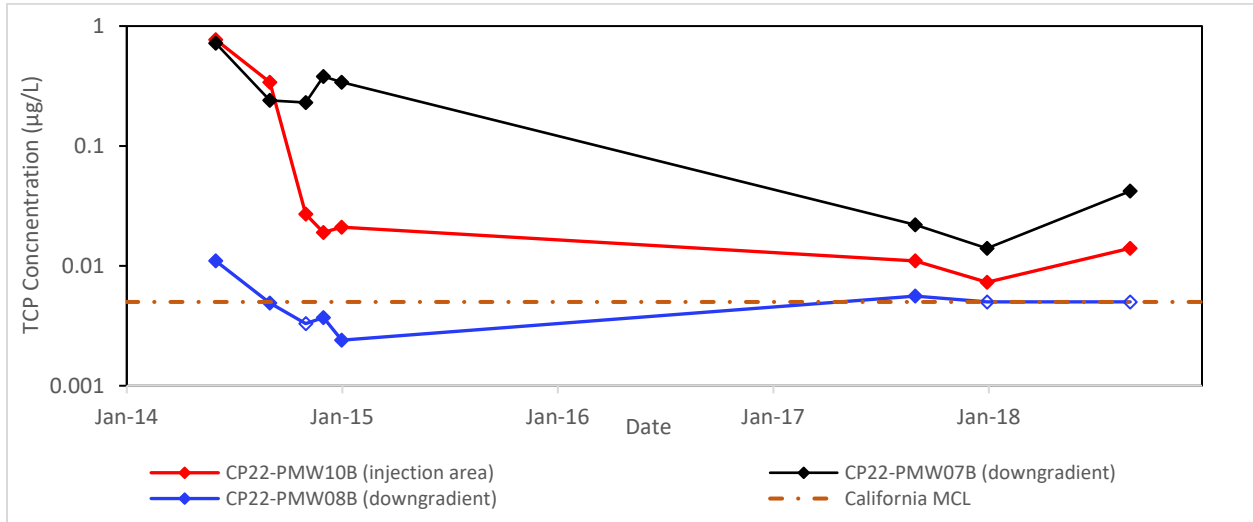
Performance Objective	Data Collected
Evaluate long-term TCP concentrations and ZVZ longevity.	TCP concentrations in groundwater pre-treatment (collected during previously completed pilot study) and post-treatment (collected during previously completed pilot study and as part of this project). Groundwater geochemistry data to evaluate secondary indicators of pilot study injection efficacy.
Evaluate ZVZ distribution in soil.	Zinc concentrations in bulk soil samples from soil cores collected post-treatment.

Long Term TCP Concentrations and ZVZ Longevity

Groundwater samples collected as part of the 2014 pilot study and in 2017 and 2018 as part of this demonstration indicate the following:

- The pilot study was effective in decreasing TCP concentrations within and downgradient of the injection area by up to 99% (see figure below).
- Samples collected in 2017 and 2018 indicate that TCP reductions were maintained, and in some cases, reductions increased over time.
- Localized TCP concentration increases were observed in 2018, potentially due to seasonal or other temporal changes in groundwater quality or groundwater flow direction. Additional assessment of groundwater flow and sampling may be appropriate to further assess short- and long-term temporal trends.
- Propene was detected in multiple samples, consistent with the abiotic degradation pathway for TCP, but the higher concentrations of propene relative to TCP may indicate potential secondary sources of propene in groundwater (e.g., biological degradation of organic carbon).
- Reducing conditions (e.g., low sulfate concentrations, low dissolved oxygen, and negative oxidation reduction potential) were observed in locations throughout the treatment area, suggesting that the ZVZ continues to effectively reduce groundwater.

TCP Concentrations over Time – Selected Monitoring Wells



Note: Open symbols represent the laboratory reporting limit for non-detect samples.

ZVZ Distribution

The distribution of ZVZ in soil was evaluated based on zinc concentration in bulk soil samples collected from borings advanced radially at approximately 2-foot intervals from selected injection locations.

Zinc was observed at concentrations as high as 2% (20,000 mg/kg) in one soil boring but was either not observed above background levels or was only modestly above background in the other borings. These observations suggest that ZVZ can be delivered to the subsurface but was not delivered in a predictable manner during the pilot study.

Although the soil sampling results suggest that ZVZ delivery may have been limited and variable within the pilot study injection zone, observed trends in TCP concentration within and downgradient of the ZVZ injection area and secondary geochemical lines of evidence for reduced groundwater within the injection area demonstrate that the pilot study was nonetheless successful in terms of reducing TCP concentrations in groundwater.

Advantages and Limitations of ZVZ Relative to Alternative Remedial Technologies

The potential advantages and limitations of ZVZ as a remedial technology for TCP and other lesser chlorinated hydrocarbons are summarized below, along with a comparison to alternative technologies. In general, the key advantages of ZVZ are its ability to effectively degrade TCP at low concentrations and higher reaction rates relative to ZVI. Key limitations include higher cost relative to ZVI and current knowledge gaps with respect to the ability to distribute ZVZ in the subsurface.

Advantages and Limitations of ZVZ Relative to Alternative Technologies

Technology	Advantages	Limitations
ZVZ	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Fast reaction rates relative to ZVI. • Material is readily available. 	<ul style="list-style-type: none"> • Higher cost relative to ZVI. • Ability to distribute ZVZ <i>in situ</i> to target ROIs is still being evaluated.
Groundwater Extraction and Treatment	<ul style="list-style-type: none"> • Ability to more cost-effectively capture and treat large, dilute groundwater plumes relative to <i>in situ</i> technologies. • Well understood and widely applied technology. 	<ul style="list-style-type: none"> • Requires construction of aboveground treatment infrastructure. • TCP treatment by typical technologies (e.g., GAC) may be expensive due to treatment inefficiencies.
ZVI	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Lower cost relative to ZVZ. • Material is readily available. 	<ul style="list-style-type: none"> • Lower reactivity relative to ZVZ may require higher ZVI mass loadings or thicker PRBs for <i>in situ</i> applications.
<i>In Situ</i> Chemical Oxidation (ISCO)	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Approaches to distribute amendments <i>in situ</i> are well understood. • Materials are readily available. 	<ul style="list-style-type: none"> • Most effective oxidants (e.g., base- or heat-activated persulfate) are relatively complex to implement. • Generation of secondary water quality impacts (e.g., high pH, sulfate, hexavalent chromium) may limit ability to implement.
<i>In Situ</i> Bioremediation	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at moderate to high concentrations. • Approaches to distribute amendments <i>in situ</i> are well understood. • Materials are readily available and inexpensive. 	<ul style="list-style-type: none"> • Ability to degrade TCP at very low concentrations relevant to regulatory compliance levels is still being evaluated. • Slower reaction rates relative to ZVZ and ISCO.

COST ASSESSMENT

Broader applications of ZVZ as a remedial technology are expected to be similar to those of other widely applied ZVMs, such as ZVI. Applications may include the following:

- Use in permeable reactive barriers (PRBs) or permeable treatment zones for *in situ* treatment of groundwater plumes, either by trench-style installation or injection/fracturing techniques;
- Direct injection into relatively high concentration contaminant source areas for *in situ* treatment of soil and groundwater sources; and
- *Ex situ* use in reactors to treat contaminated groundwater following extraction.

Most costs to implement ZVZ as a remedial technology are comparable to implementing a ZVI remedy. The primary difference is the higher cost of ZVZ (\$1.85 to \$3.00 per pound) relative to ZVI (\$0.60 per pound). Based on this cost different, use of ZVZ would be most favorable when a stronger reductant is required, either due to the recalcitrant nature of the compound being treated or site-specific conditions which may limit residence time within the treatment area and therefore necessitate a prohibitively wide ZVI treatment area.

IMPLEMENTATION ISSUES AND LESSONS LEARNED

The limited number of soil samples with elevated zinc concentrations within the injection area suggests that the ZVZ was not delivered to the subsurface in a predictable manner during the pilot study. This is consistent with observed surfacing of ZVZ material during the injections. As such, the project team developed recommendations for optimizing ZVZ delivery for future injections, including the following:

- Selecting ZVZ material more amenable to subsurface injections; and
- Optimizing injection approach to improve predictability of material delivery.

While optimal ZVZ delivery may not have been achieved during the 2014 pilot study, the observed trends in TCP concentration within and downgradient of the ZVZ injection area during post-injection performance monitoring and as part of this verification project demonstrate that the pilot study was successful in terms of achieving targeted TCP concentration reductions. Based on the TCP concentration trends and the findings of this verification project, the pilot study was considered a success by the Navy and the Navy elected to move forward with optimized ZVZ injections at two areas of MCBCP. Follow-on injections implementing these recommendations were implemented at MCBCP in early 2019. Preliminary results suggest that the optimized injections more predictably distributed ZVZ within the subsurface and that reductions in TCP concentrations are being achieved.

1.0 INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) has prepared this Final Report for Environmental Security Technology Certification Program (ESTCP) project number ER-201628, “*Verification Monitoring for In Situ Chemical Reduction Using Zero-Valent Zinc, A Novel Technology for Remediation of Chlorinated Alkanes.*”

1.1 BACKGROUND

The reactivity profile of highly halogenated aliphatic hydrocarbons such as tetrachloroethene and trichloroethene is widely understood and informs the selection of successful remedies for these compounds in groundwater. In contrast, the reactivity profile of “lesser chlorinated” aliphatic hydrocarbons such as 1,2-dichloroethane and 1,2-dichloropropane is understood less well and to date has not been systematically considered when developing remedial approaches for these compounds.

One lesser chlorinated hydrocarbon, 1,2,3-trichloropropane (TCP), was identified as number three in a list of primary emerging contaminants at a recent Strategic Environmental Research and Development Program (SERDP)/ESTCP workshop on long-term management of contaminated sites (SERDP/ESTCP, 2013). Due to its historical uses, TCP occurs as both point and non-point source contamination in soil and groundwater. As a result, the 2013 SERDP/ESTCP workshop characterized potential TCP impacts at Department of Defense (DoD) facilities by stating that “*while 1,2,3-TCP is not a contaminant of concern at a large number of DoD sites, the intensity of contamination at a small number of sites is of significant concern.*” To date, TCP has been observed at more than 45 DoD installations. The median detected concentrations (approximately 1 microgram per liter [$\mu\text{g/L}$]) have been low but are nonetheless high relative to regulatory levels for TCP (Section 1.3).

Remediation options for TCP in groundwater are still being developed, particularly those that may be able to achieve current and anticipated future regulatory levels for the compound. Efficient *in situ* degradation of TCP is difficult to achieve with many natural and engineered remediation processes, including biodegradation at low TCP concentrations; hydrolysis; and reduction by common reductants including sulfide, ferrous iron adsorbed to iron oxides, zero-valent iron (ZVI), and nano-ZVI. TCP is less volatile than other chlorinated solvents, making it less amenable to air stripping. *In situ* treatment with activated persulfate is effective but has been rejected by at least one regulatory agency in the State of California due to concerns over potential secondary water quality impacts from the addition of sulfate to the groundwater at concentrations exceeding the secondary Maximum Contaminant Level (MCL) of 250 milligrams per liter (mg/L). Some work has been done using extraction and treatment with granular activated carbon (GAC); however, TCP has a low to moderate adsorption capacity for GAC, making treatment expensive.

One treatment process that produces promising rates of TCP degradation is reduction with zero-valent zinc (ZVZ). As discussed in Section 2, evaluation of ZVZ as a remediation technology for TCP has been ongoing for several years, culminating in a pilot-scale ZVZ injection program that was completed in July 2014 at Marine Corps Base Camp Pendleton (MCBCP), Oceanside, California.

1.2 OBJECTIVE OF THE DEMONSTRATION

The objective of this demonstration was to collect data to further demonstrate and validate the use of ZVZ to promote abiotic *in situ* chemical reduction (ISCR) of TCP in groundwater.

TCP is both a primary emerging contaminant at DoD facilities and a potential model compound for assessing ZVZ as a technology for remediating other lesser chlorinated aliphatic hydrocarbons. Pilot-scale ZVZ injections have been completed at a Navy installation (MCBCP), representing the first field implementation of this technology. The scope of work described in this report was designed to complement and leverage previous DoD-funded work on this technology and provide information to guide use of this technology at other DoD sites.

1.3 REGULATORY DRIVERS

TCP has been used in a variety of chemical production processes, in agricultural chemicals, and as a solvent. Because its toxicity to humans appears to be high relative to other chlorinated solvents, even low-level exposures to TCP may pose a significant human health risk. TCP is currently designated as “reasonably anticipated to be a human carcinogen.” Federal and state regulatory drivers include the following:

- Federal: TCP was previously listed on the United States Environmental Protection Agency’s (USEPA) drinking water Contaminant Candidate List 4 (CCL 4), which may result in future federal regulation of the compound under the Safe Drinking Water Act (SDWA). More information on the CCL 4 is available at: <https://www.epa.gov/ccl/contaminant-candidate-list-4-ccl-4-0>. Despite its listing on the CCL 4, TCP was not included in the assessment monitoring program for the Fourth Unregulated Contaminant Monitoring Rule (UCMR 4), which began in March 2018. The UCMR program is intended to provide a basis for future regulatory actions to protect public health. Development of CCL 5 began in late 2018; it is currently unknown whether TCP will again be listed.
- Alaska: A groundwater cleanup standard of 0.0075 µg/L has been established (Alaska Department of Environmental Conservation, 2016).
- California: California adopted an MCL of 0.005 µg/L for TCP on 18 July 2017 based on technical and economic feasibility considerations (California State Water Resources Control Board, 2017).
- Florida: A target cleanup level of 0.02 µg/L has been established (Florida Administrative Code, 2018).
- Hawaii: An MCL of 0.6 µg/L has been established (Hawaii Department of Health, 2009).
- Minnesota: A guidance value of 0.003 µg/L has been established (Minnesota Department of Health, 2011).
- Missouri: A health advisory level of 40 µg/L has been established (Missouri Code of State Regulations, 2018).
- New Jersey: An MCL of 0.03 µg/L has been established (New Jersey Department of Environmental Protection, 2018).

The regulation of TCP is expected to continue evolving in the future; however, it is probable that established regulatory drivers will be low relative to other contaminants. Thus, validation of ZVZ as a technology capable of effectively treating TCP and other lesser chlorinated aliphatic hydrocarbons at low concentrations is beneficial to DoD remedial practitioners and related DoD contractors.

2.0 TECHNOLOGY

The following section provides an overview of prior work conducted to evaluate ZVZ as a remediation technology for TCP.

2.1 TECHNOLOGY DESCRIPTION

Overview and Application of Technology. Similar to other zero-valent metals (ZVMs), ZVZ chemically reduces organic contaminants. When TCP in groundwater contacts ZVZ, it is predominantly reduced via a dihaloelimination reaction to 3-chloro-1-propene, which is subsequently converted to propene through hydrogenolysis (**Figure 1**). As described by Salter-Blanc et al. (2011), propene has been identified as the main product of TCP reduction by ZVZ. During bench-scale testing by Salter-Blanc et al. (2011), detections of 3-chloro-1-propene were low in concentration (relative to initial TCP concentration) and transient, and analysis of overall reaction rates of TCP conversion to propene suggest that 3-chloro-1-propene is the only reaction intermediate reduced quickly enough to produce the observed rates of TCP reduction by ZVZ.

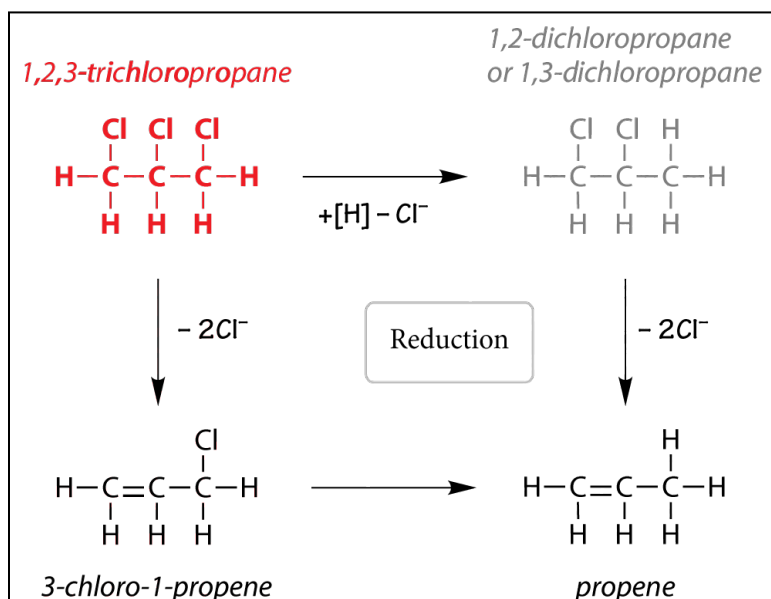


Figure 1. Reaction Pathway for Conversion of TCP to Propene via Dihaloelemination Reaction.

As described below and in Section 4, field application of ZVZ to date has been limited to pilot-scale injections at MCBCP to create a permeable treatment zone. **Figure 2** presents a conceptual diagram of an injection-based permeable treatment zone.

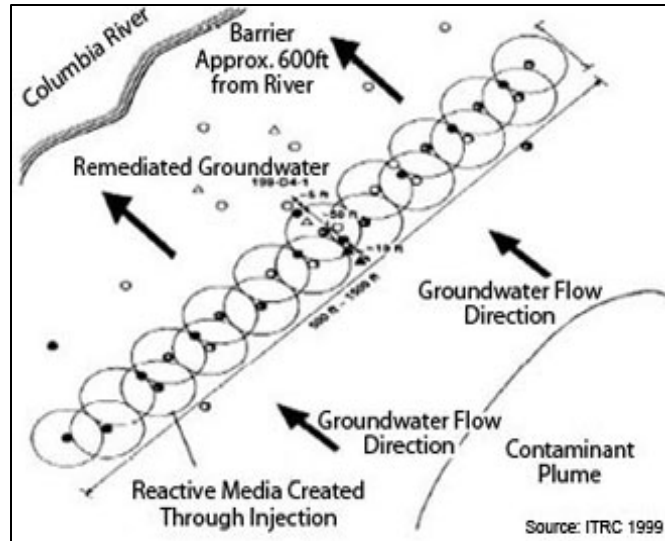


Figure 2. Conceptual Diagram of Permeable Treatment Zones

(Interstate Technology and Regulatory Council [ITRC], 1999).

Broader applications of ZVZ as a remedial technology are expected to be similar to those of other widely-applied ZVMs, such as ZVI. Applications may include:

- Use in permeable reactive barriers (PRBs) or permeable treatment zones for *in situ* treatment of groundwater plumes, either by trench-style installation or injection/fracturing techniques;
- Direct injection into relatively high concentration contaminant source areas for *in situ* treatment of soil and groundwater sources; and
- *Ex situ* use in reactors to treat contaminated groundwater following extraction.

General information on these applications is available from the Contaminated Site Clean-Up Information website maintained by the USEPA (<https://clu-in.org/>).

Chronology of Technology Development. Initial work to develop ZVZ as a remedial technology for TCP was conducted under the lead of Dr. Paul Tratnyek at Oregon Health and Science University (OHSU) as part of SERDP Project No. ER-1457, which assessed the potential for TCP remediation by a range of chemical oxidation and reduction processes. Many of the results of this study have been reported in the literature (e.g., Tratnyek et al., 2010; Sarathy et al., 2010).

The scope of ER-1457 included bench-scale proof-of-concept testing to evaluate the following:

- TCP degradation reaction rates for ZVI, other iron species, and ZVZ;
- TCP degradation rates for typical *in situ* chemical oxidation (ISCO) amendments, including peroxide, ozone, persulfate, and permanganate;
- Optimization of ZVZ material selection for remedial applications; and
- Optimization of the ZVZ degradation process for TCP.

A key conclusion of the bench-scale testing conducted as part of ER-1457 was that TCP is considerably more recalcitrant than most chlorinated solvents, although both highly aggressive types of chemical oxidation as well as chemical reduction using ZVMs (particularly ZVZ) were identified as relatively promising for remediation of TCP. The promising results for TCP degradation by ZVZ observed during implementation of ER-1457 further suggested that this technology may have merit for the broader suite of lesser chlorinated hydrocarbons.

Based on the findings of ER-1457, field-scale column testing of ZVZ for remediation of TCP was completed under Navy Environmental Sustainability Development to Integration (NESDI) Program Project 434. The 22/23 Area of MCBCP was selected as a test site for this work due to the presence of TCP in installation groundwater at concentrations of up to 10 µg/L, which is significantly higher than the California MCL of 0.005 µg/L. Specific objectives of the project included:

- Assess the ability of ZVMs (ZVI and/or ZVZ) to effectively degrade TCP in 22/23 Area groundwater;
- Evaluate potential impacts to secondary water quality (e.g., changes in pH or dissolved zinc concentration) that could affect future implementation of a ZVZ or ZVI remedy;
- Identify potential factors that may impact performance of ZVI or ZVZ as a remedy for TCP in groundwater; and
- Conduct a preliminary evaluation of full-scale applicability of ZVI or ZVZ for treatment of TCP in 22/23 Area groundwater.

The scope of NESDI Project 434 included the following:

- Baseline sampling of 22/23 Area groundwater to establish geochemical conditions;
- Laboratory studies to optimize ZVZ material selection for groundwater geochemical conditions at MCBCP, to determine TCP degradation rates in MCBCP groundwater, and to identify factors that could affect field-scale column design; and
- Field-scale column testing to evaluate long-term TCP degradation performance by ZVZ and to generate design parameters for potential scale up of ZVZ as either an *in situ* or *ex situ* treatment technology.

Laboratory and field testing used TCP-impacted groundwater from monitoring wells at the 22/23 Area. Results of the laboratory studies indicated that two types of commercially-available zinc (Zn64 and Zn1210, available from Horsehead Corporation at the time of project implementation)¹ were particularly effective at TCP degradation, without significant impacts to water quality. Field-scale columns were subsequently constructed using these media at mass loadings ranging from 33% zinc mixed with sand to 100% zinc to simulate potential application in a PRB. Results of the field-scale column testing validated the laboratory-scale results, with TCP degradation of up to 95% maintained after 12 weeks of column operation. Although Zn64 was observed to have a very high reactivity with TCP, results over the 12-week study duration suggested that Zn1210 was more suitable for use in a PRB application due to material handling characteristics and TCP removal efficiency. A major outcome of the laboratory- and field-scale column testing was development of site-specific degradation rate constants for TCP and the tested media.

¹ Horsehead Corporation declared bankruptcy in February 2016. It has since been acquired by a capital management company and rebranded as American Zinc Recycling.

NESDI Project 434 was completed in 2010; a final report was submitted to NESDI in 2011 (Geosyntec, 2011) and the results published elsewhere (e.g., Salter-Blanc and Tratnyek, 2011; Salter-Blanc et al., 2012). The final report concluded that ZVZ can effectively treat groundwater impacted by TCP. *Ex situ* application was determined to be economically infeasible at the flow rates evaluated due to the large reactor volumes and corresponding mass of ZVZ that would be required for treatment (although *ex situ* treatment could be viable at lower extraction rates). *In situ* applications were determined to be feasible provided that the aerial extent of TCP is limited and that groundwater flow velocities are relatively low.

Based on the results reported in ER-1457 and the subsequent findings of NESDI Project 434, the Navy elected to move forward with a pilot study to evaluate the feasibility and performance of *in situ* ZVZ remediation of TCP in groundwater. The pilot study was completed at MCBCP 22/23 Area in 2014 and included the following elements:

- Installation and baseline sampling of pilot study performance monitoring wells;
- Direct injection of ZVZ into the subsurface; and
- Periodic monitoring of TCP, dissolved zinc, and geochemical parameters to evaluate pilot study performance using a network of 10 monitoring well clusters.

Details on the ZVZ injection program and results from the post-injection monitoring were reported in a Pilot Study Report (Richard Brady & Associates [RBA] and Geosyntec, 2015) and are summarized in Section 4.5 of this report. The Pilot Study Report concluded that the Navy met the objectives of the pilot study as specified in the pilot study work plan that was submitted to the regulatory agencies overseeing work at MCBCP, and the approved scope of work has been completed. As a result, there was no requirement for MCBCP to continue work on the pilot study.

Although the pilot study was deemed effective with respect to meeting its project-specific objectives, the monitoring approach for the pilot study was not designed to evaluate efficacy of the ZVZ injections or long-term performance of the zinc media with respect to degradation of lesser chlorinated hydrocarbons such as TCP. This report describes a scope of work that was implemented in 2017 and 2018 to leverage the previously completed pilot study work and collect additional information necessary to further validate ZVZ as a remedial technology for TCP and other lesser chlorinated hydrocarbons.

2.2 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

The potential advantages and limitations of ZVZ as a remedial technology for TCP and other lesser chlorinated hydrocarbons are summarized in **Table 1** below, along with a comparison to alternative technologies. In general, the key advantages of ZVZ are its ability to effectively degrade TCP at low concentrations and higher reaction rates relative to ZVI. Its key limitations are higher cost relative to ZVI and current knowledge gaps with respect to the ability to distribute ZVZ in the subsurface and material longevity once emplaced.

Table 1. Advantages and Limitations of ZVZ Relative to Alternative Technologies.

Technology	Advantages	Limitations
ZVZ	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Fast reaction rates relative to ZVI. • Material is readily available. 	<ul style="list-style-type: none"> • Ability to distribute ZVZ <i>in situ</i> and <i>in situ</i> longevity has not been fully demonstrated to date. • Higher cost relative to ZVI.
Groundwater Extraction and Treatment	<ul style="list-style-type: none"> • Ability to more cost-effectively capture and treat large, dilute groundwater plumes relative to <i>in situ</i> technologies. • Well understood and widely applied technology. 	<ul style="list-style-type: none"> • Requires construction of aboveground treatment infrastructure. • TCP treatment by typical technologies (e.g., GAC) may be expensive due to treatment inefficiencies.
ZVI	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Lower cost relative to ZVZ. • Material is readily available. 	<ul style="list-style-type: none"> • Lower reactivity relative to ZVZ may require higher ZVI mass loadings or thicker PRBs for <i>in situ</i> applications.
ISCO	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at relatively high and low concentrations. • Approaches to distribute amendments <i>in situ</i> are well understood. • Materials are readily available. 	<ul style="list-style-type: none"> • Most effective oxidants (e.g., base- or heat-activated persulfate) are relatively complex to implement. • Generation of secondary water quality impacts (e.g., high pH, sulfate, hexavalent chromium) may limit ability to implement.
<i>In Situ</i> Bioremediation	<ul style="list-style-type: none"> • Demonstrated ability to degrade TCP at moderate to high concentrations. • Approaches to distribute amendments <i>in situ</i> are well understood. • Materials are readily available and inexpensive. 	<ul style="list-style-type: none"> • Ability to degrade TCP at very low concentrations relevant to regulatory compliance levels is still being evaluated. • Slower reaction rates relative to ZVZ and ISCO.

3.0 PERFORMANCE OBJECTIVES

Performance objectives for this project were developed as part of the approved Demonstration Plan (Geosyntec, 2017). The performance objectives are described in this section and summarized in **Table 2**, along with a brief statement as to whether the performance metrics were achieved. Additional details on the evaluation of the performance objectives is presented in Section 6.

Table 2. Performance Objectives.

Performance Objective	Data Requirements	Success Criteria
Quantitative Performance Objectives		
Evaluate TCP concentration reductions in groundwater.	Pre-treatment (collected during previously completed pilot study) and post-treatment (collected during previously completed pilot study and as part of Demonstration Plan) TCP concentrations in groundwater.	<ul style="list-style-type: none"> • >90% concentration reduction of TCP in source area is maintained. • >90% reduction of TCP concentration downgradient – treatment will be considered fully effective. • 50-80% reduction of TCP concentration downgradient – treatment will be considered partly effective.
Evaluate ZVZ longevity.	Pre-treatment (collected during previously completed pilot study) and post-treatment (collected during previously completed pilot study and as part of Demonstration Plan) TCP concentrations in groundwater.	<ul style="list-style-type: none"> • A downward trend in concentration reduction of TCP in the source area is not observed at an 80% confidence level. • A downward trend in concentration reduction of TCP downgradient of the source area is not observed at an 80% confidence level.
Evaluate ZVZ distribution in soil.	ZVZ concentration in bulk soil samples from soil cores collected post-treatment.	<ul style="list-style-type: none"> • >0.5% concentration of zinc by mass is observed at the pilot study target radius of influence of 5 feet.

3.1 PERFORMANCE OBJECTIVE: EVALUATE TCP CONCENTRATION REDUCTIONS IN GROUNDWATER

The objective of groundwater sampling conducted as part of this project was to collect long-term post-injection groundwater data for comparison to baseline sampling data and data from four groundwater sampling events conducted immediately following implementation of the July 2014 ZVZ injection program (RBA and Geosyntec, 2015). The sampling results were compared to previously collected data using the quantitative metrics below to evaluate the efficacy of TCP treatment with ZVZ.

3.1.1 Data Requirements

The efficacy of TCP treatment with ZVZ has been evaluated based on contaminant concentration reductions in groundwater within and downgradient of the zone of treatment. Data collected to assess the remedial effectiveness included pre- and post-treatment contaminant concentrations in groundwater. Groundwater samples were collected prior to and immediately following ZVZ injections and analyzed for TCP as part of the previously implemented pilot study (RBA and Geosyntec, 2015). Additional post-treatment samples were collected as part of this project and compared with initial concentrations to evaluate the extent of TCP degradation and whether TCP treatment was maintained in the three years between pilot study implementation and long-term sample collection.

3.1.2 Success Criteria

TCP concentration reductions were observed in samples collected from monitoring wells located within and downgradient of the ZVZ injection area during the Navy-funded pilot study:

Table 3. Observed Changes in TCP Concentration – 2014 Pilot Study.

Well ID	Location Relative to ZVZ Injection Area	Baseline TCP (µg/L)	Post-Injection TCP (µg/L)	Percent Reduction
CP22-PMW10B	Within	0.77	0.021	97%
CP22-PMW08B	Downgradient	0.011	0.0024	78%
CP22-PMW07B	Downgradient	0.72	0.34	53%

The design objective of the pilot study was a 90% reduction in TCP concentration within the injection area. The design objective was met within the injection area and concentration reductions were noted in the predominant downgradient flow direction immediately following the pilot study. The performance metrics for verification monitoring completed as part of this project were developed based on this design objective and are as follows:

- Injection area treatment of TCP with ZVZ is considered effective if post-treatment groundwater monitoring results indicate that TCP reductions exceeding 90% are maintained.
- Downgradient treatment of TCP with ZVZ is considered most effective if post-treatment groundwater monitoring results indicate that TCP reductions exceeding 90% are achieved. If reductions on the order of the 50% to 80% observed at the conclusion of the pilot study have been maintained over the three years since implementation, downgradient treatment of TCP with ZVZ is considered partially effective.

3.1.3 Evaluation of Objective

The range of TCP concentrations observed at intergrid well CP22-PMW10B and downgradient wells CP22-PMW07B and CP22-PMW08B during sampling conducted as part of this project are summarized in the table below, along with reductions in TCP concentration from baseline levels.

Table 4. Observed Changes in TCP Concentration – 2017/2018 Verification Monitoring.

Well ID	CP22-PMW10B	CP22-PMW07B	CP22-PMW08B
Location Relative to ZVZ Injection Area	Intergrid	Downgradient	Downgradient
Baseline TCP (µg/L)	0.77	0.72	0.011
2014 Post-Injection TCP (µg/L)	0.021	0.34	0.0024
2014 Percent Reduction	97%	53%	78%
2017-2018 Post-Injection TCP Range (µg/L)	0.0073-0.014	0.014-0.042	<0.005-0.0056
2017-2018 Percent Reduction Range	98% - 99%	94% - 98%	49%+ (see below)

Note: TCP was not detected above laboratory reporting limits (0.005 µg/L) in two of the three samples collected between 2017 and 2018 at well CP22-PMW08B.

As shown in the above table, post-treatment groundwater monitoring results from within the ZVZ injection area indicate that TCP reductions exceeding 90% have been maintained and that source treatment of TCP with ZVZ is effective. Downgradient treatment of TCP with ZVZ was effective at well CP22-PMW07B (i.e., a percent reduction over 90%), where baseline concentrations were comparable to those within the ZVZ injection area. At downgradient well CP22-PMW08B, where baseline TCP concentrations were low, TCP concentrations following the pilot study were reduced to close to or below the laboratory reporting limit and California MCL of 0.005 µg/L.

3.2 PERFORMANCE OBJECTIVE: EVALUATE ZVZ LONGEVITY

An additional objective of groundwater sampling conducted as part of this project was to collect long-term post-injection groundwater data to use in conjunction with previously collected data to evaluate the longevity of ZVZ.

3.2.1 Data Requirements

The ZVZ longevity has been evaluated based on changes in TCP concentration reductions within and downgradient of the zone of treatment over time. Data required for the ZVZ longevity assessment include:

- Pre-treatment contaminant concentration in groundwater (RBA and Geosyntec, 2015).
- Short-term post-treatment contaminant concentrations in groundwater (RBA and Geosyntec, 2015).
- Long-term post-treatment samples collected as part of this project.

Post-treatment sampling results have been compared to initial concentrations to assess trends in ZVZ treatment efficacy over the approximately four years since pilot study injections were implemented.

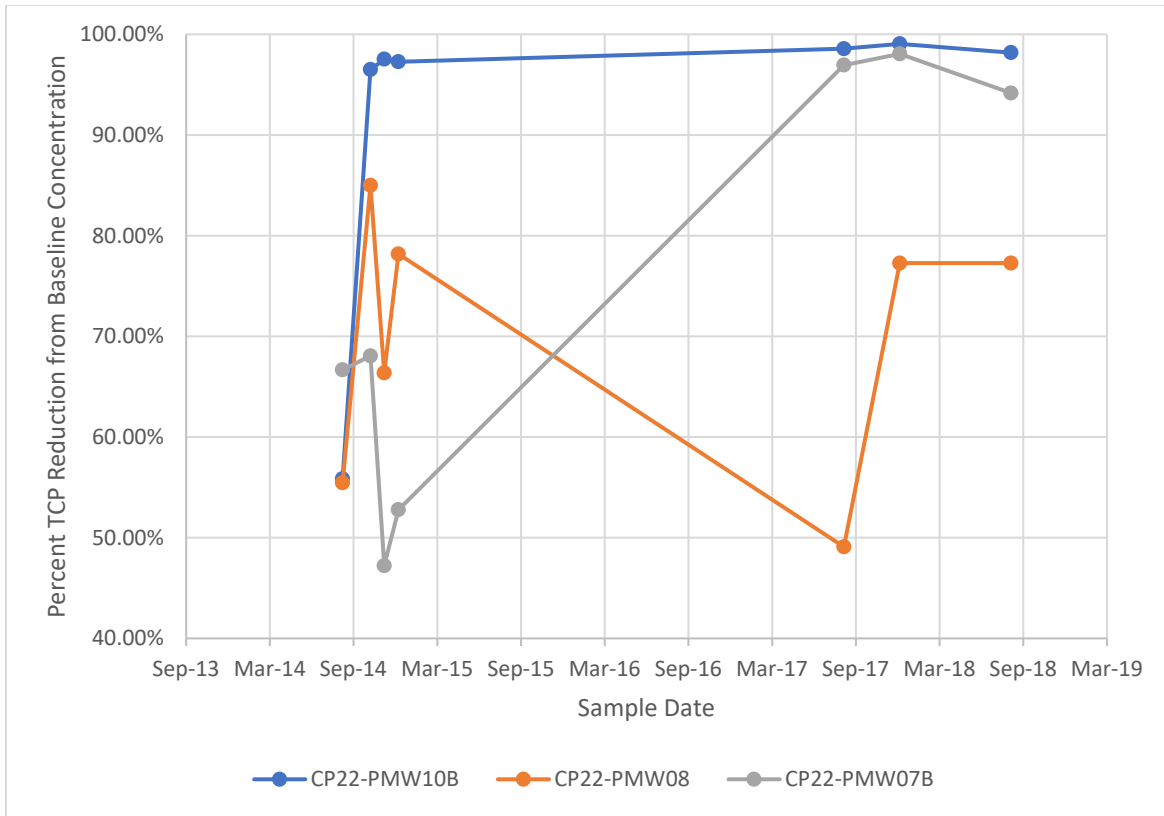
3.2.2 Success Criteria

The performance metrics for the verification monitoring are as follows:

- ZVZ longevity within the source zone is considered adequate if post-treatment groundwater monitoring results indicate that TCP concentrations reductions do not exhibit a decreasing trend at an 80% confidence level.
- ZVZ longevity for treatment of the downgradient plume is considered adequate if post-treatment groundwater monitoring results indicate that TCP concentrations reductions do not exhibit a decreasing trend at an 80% confidence level.

3.2.3 Evaluation of Objective

Reductions in TCP concentrations from baseline levels as a function of time are plotted below for wells CP22-PMW07B, CP22-PMW08B, and CP22-PMW10B.



Note: Concentration reduction for non-detect results estimated using half the detection limit.

Figure 3. Changes in TCP Reduction over Time.

Review of the above chart indicates that observed TCP concentration reductions have not decreased within the ZVZ injection area (i.e., concentrations reductions significantly greater than 90% have been maintained since the injections were completed in 2014). In downgradient well CP22-PMW07B, observed reductions in TCP concentration have increased substantially since 2014 to over 90%, suggesting that the ZVZ continues to effectively degrade TCP. At well CP22-PMW08B where baseline concentrations were low, observed TCP concentration reductions are more variable, but have remained between 50% and 80% since 2014.

3.3 PERFORMANCE OBJECTIVE: EVALUATE ZVZ DISTRIBUTION IN SOIL

The objective of soil sampling conducted as part of this project was to collect post-injection soil data for comparison to the design objective for ZVZ mass loading within the pilot study injection area.

3.3.1 Data Requirements

The distribution of ZVZ in soil has been evaluated based on zinc concentration in bulk soil samples from soil cores collected post-treatment. Since direct injection technologies can result in variable material distribution, ZVZ mass loading data from borings located radially at approximately 2-foot intervals from selected injection locations (multiple borings per interval) were evaluated for comparison to the performance metric.

3.3.2 Success Criteria

The design objective for ZVZ mass loading within the pilot study area was 0.5% zinc mass loading on average, based on site-specific conditions and mass loadings typically achievable using direct injection technology. The performance metrics for the verification monitoring conducted as part of this project have been developed based on this design objective and are as follows:

- The ZVZ delivery approach is considered effective if ZVZ mass loading exceeding 0.5% extends to the target minimum radius of influence for direct injections of 5 feet.

3.3.3 Evaluation of Objective

The distribution of ZVZ in soil is discussed in Section 6 of this report. In general, detection of ZVZ at concentrations significantly exceeding background levels was limited to one soil boring advanced 3 feet from injection point IP-08. The detected zinc concentrations (18,100 milligrams per kilogram [mg/kg] to 20,000 mg/kg) are equivalent to 1.8 to 2.0% zinc mass loading, suggesting that ZVZ injections can achieve localized mass loadings in excess of 0.5% where ZVZ is successfully delivered to the subsurface.

The limited number of zinc detections, however, suggests that the ZVZ was not delivered to the subsurface in a predictable manner during the July 2014 pilot study. This is consistent with (1) observed surfacing of ZVZ material during the July 2014 ZVZ injections; and (2) observed concentrations in samples collected radially from IP-08, where ZVZ was not detected in a sample collected 1 foot from the injection point but was detected at high concentrations 3 feet from the injection point along the same transect.

Although the soil sampling results suggest that ZVZ delivery may have been limited, the observed trends in TCP concentration within and downgradient of the ZVZ injection area demonstrate that the pilot study was nonetheless successful in terms of achieving targeted TCP concentration reductions. As such, the project team has developed recommendations for optimizing ZVZ delivery for future injections, including:

- Selecting ZVZ material more amenable to subsurface injections; and
- Optimizing injection approach to improve predictability of material delivery.

Additional discussion of process optimization is provided in Section 8 of this report.

4.0 SITE DESCRIPTION

The following section presents a brief overview of MCBCP 22/23 Area. Information in this section is presented in additional detail in the Pilot Study Report for the ZVZ injection program (RBA and Geosyntec, 2015).

4.1 SITE SELECTION

A pilot-scale ZVZ injection program was previously completed on behalf of the Navy at MCBCP 22/23 Area (RBA and Geosyntec, 2015) due to the presence of TCP in installation groundwater at concentrations of up to 10 µg/L. As this project was intended to complement the previously completed pilot study, it was also completed within the pilot study area.

4.2 SITE LOCATION AND HISTORY

MCBCP is located along the coast of southern California, between San Clemente and Oceanside, with the 22/23 Area located near the southern boundary of the base (**Figure 4**). Land use within the 22/23 Area consists mainly of industrial buildings, an air station complex, and warehouses. Most of the 22/23 Area is covered by buildings, asphalt roads, or asphalt parking lots. Future land use is expected to remain largely the same with the possible addition of more troop housing.

The location of previously completed ZVZ pilot study is south of, and adjacent to, a large paved warehouse and parking area, with smaller paved parking, vehicle maintenance facilities and office trailers located northwest and northeast of the study site. Located within the study area, and immediately east of well 220505-MWX, is a below-grade sewer pump station that services a barrack facilities south of the study area.

Topography. The regional topography at MCBCP is varied and includes sandy coastal beaches and dunes, sea cliffs, coastal plains, marine and river terraces, hills, canyons, river valleys, and mountains rising to nearly 2,700 feet above mean sea level (msl). The ground surface in developed portions of the 22/23 Area is generally flat and includes various buildings, roads, drainage swales, and unpaved areas. The ground surface generally slopes toward the west, with an average elevation of approximately 60 feet above msl, although ground surface elevations vary from about 50 to 70 feet above msl.

Climate. MCBCP is characterized by warm, dry summers and mild, wet winters typical of a Mediterranean climate. Rainfall averages 10 to 17 inches per year, the majority of which falls between November and March. Rainfall amounts increase inland at higher elevations. Coastal valley temperatures generally range from 35 to 95 degrees Fahrenheit (°F).

4.3 SITE GEOLOGY/HYDROGEOLOGY

The following section summarizes geology and hydrogeology in the vicinity of the ZVZ pilot study area.

4.3.1 Geology

MCBCP is located within the Peninsular Range Geomorphic Province of southern California and lies within the lower Santa Margarita River basin, which extends southward from the confluence of the Santa Margarita River and De Luz Creek. The site lies within the Chappo subbasin. In general, shallow subsurface geology at the site consists primarily of Holocene stream deposited alluvium overlying Santiago Formation bedrock. The Santiago Formation broadly consists of interbedded sandstone, siltstone, and mudstone.

Pilot Study Area Geologic Setting. Geologic logging of discrete soil samples and continuous soil cores collected during the pilot study implementation indicated the presence of interbedded fine-grained sands, silts, and sand-silt mixtures to depth throughout the pilot study area.

Shallow soils identified in approximately the upper 20 feet of the soil column were generally more variable and showed more sand-silt mixtures and evidence of plant materials down to as much as 11 feet below ground surface (bgs). Beneath these surficial materials was the following sequence of sandy, more permeable soils (depth intervals are approximate):

- “A” zone – 20 to 30 feet bgs;
- “B” zone – 35 to as much as 48 feet bgs; and
- “C” zone – 52 to 60 feet bgs.

Each of these permeable zones were separated by lower permeability silt and sandy silt mixtures that tended to differentiate each water-bearing zone from the distinct units above and below. Beneath the “C” zone sands was a more massive silty zone from 60 feet to 65 feet bgs that isolated the “C” zone from sandy materials identified below to a final investigated depth of 70 feet bgs.

4.3.2 Hydrogeology

MCBCP is located within the Lower Santa Margarita River Ground Water Basin. Groundwater within the Lower Santa Margarita River Basin generally flows southwest down the valley toward the ocean and closely follows the path of the Santa Margarita River. The regional groundwater flow direction is generally consistent from season to season, although seasonal variations in groundwater elevation of as much as 5 feet have been reported.

The regional gradient from northeast to southwest across the 22/23 Area is approximately 0.002 feet per foot (ft/ft). Calculated groundwater flow rates across the 22/23 Area vary from 0.27 to 0.54 foot per day (ft/d) (Parsons, 2011).

Pilot Study Area Hydrogeology. Based on historical water level data, the depth to groundwater in the 22/23 Area is approximately 5 to 15 feet bgs. Within the pilot study area, the depth to groundwater ranged from approximately 6 to 9 feet bgs during pilot study baseline and performance monitoring conducted in 2014 and 2015. A review of groundwater elevation data collected during the pilot study indicated the following (RBA and Geosyntec, 2015):

- Groundwater elevations within the pilot study area can vary as much as several feet from season to season.

- Horizontal gradient directions in the “B” zone (the zone targeted by the ZVZ injection program, Section 4.5) vary depending on the season.
- Horizontal groundwater gradients measured in the pilot study area suggest that the three water-bearing zones monitored for the pilot study are likely independent and possibly recharge at differing rates from diverse sources.
- Vertical gradients measured in the pilot study monitoring wells tended to be upward during the drier months of the pilot study monitoring. Vertical gradients gradually shifted in the downward direction during the rainy season due to stormwater recharge.
- The observed variability in groundwater flow directions and gradients could not be correlated to the ZVZ injection program and the pilot study results do not suggest that the presence of ZVZ restricted or redirected groundwater flow.

In general, groundwater elevation data collected during the pilot study are consistent with alluvial stream bed deposits. However, the observed spatial and temporal variations in groundwater elevations indicate that groundwater regime in the study area contains some local elements that should be considered when evaluating pilot study performance.

4.4 CONTAMINANT DISTRIBUTION

Groundwater samples have been collected and analyzed for TCP from various wells within the 22/23 Area since 1996. Historically, TCP has been detected above 0.005 µg/L in 23 groundwater monitoring wells within the 22/23 Area. The highest concentration of TCP historically detected in the 22/23 Area was 18 µg/L in November 1997.

Pilot Study Area. The distribution of TCP within the pilot study area during baseline sampling (June 2014) and four performance monitoring events (September 2014, November 2014, December 2014, January 2015) conducted following completion of ZVZ injections in July 2014 are shown in **Figure 5**.

Groundwater samples were collected from 16 monitoring wells within the pilot study area to establish baseline TCP concentrations prior to injections. Baseline concentrations measured in the “A” zone ranged from 0.0032 µg/L to 0.10 µg/L; baseline concentrations measured in the “B” zone ranged from 0.0053 µg/L to 6.5 µg/L; and baseline concentrations measured in the “C” zone ranged from 0.85 µg/L to 1.6 µg/L. Detected concentrations of TCP within the pilot study area were highest in the “B” zone.

Groundwater samples were collected from 10 monitoring wells within the pilot study area during four performance monitoring events conducted immediately following implementation of the ZVZ injection program. Concentrations of TCP detected during the post injection monitoring events ranged from 0.0023 µg/L to 7.4 µg/L, with reductions in TCP noted in wells CP22-PMW10B (within treatment zone), CP22-PMW08B (downgradient of treatment zone), and PC22PMW-07B (downgradient of treatment zone).

4.5 OVERVIEW OF PILOT SCALE ZVZ INJECTIONS

Based on the findings of SERDP Project ER-1457 and NESDI Project 434 (Section 2.1), the Navy elected to fund a pilot-scale test at MCBCP to evaluate ZVZ as an *in situ* remedial technology for TCP.

The pilot study was implemented in 2014, representing the first field-scale implementation of the technology, and the results of the pilot study have been submitted to the regulatory agencies overseeing work at the installation (RBA and Geosyntec, 2015). The pilot study results based on the performance monitoring completed as part of the approved pilot study work plan were favorable, with observed degradation of TCP suggesting that further validation of the technology was warranted.

The 2014 pilot study ZVZ injections were completed at MCBCP using a direct-push drill rig to advance the injection tooling. The tooling was advanced to a depth of five feet below the target treatment zone to accommodate a lower packer assembly. The injection assembly, which consisted of an injection nozzle and straddle packers located above and below the nozzle on the drill string to isolate and focus the injection, was then lowered to the base of the borehole. Mechanical or inflatable packers were also placed in nearby groundwater monitoring wells mitigate potential surfacing of injected materials at those locations.

ZVZ was mixed with water and a small amount of guar gum, and then injected at a total of 13 injection points at depths ranging from approximately 35 to 45 feet bgs (**Figure 5**). The injected ZVZ was commercially available Zn1210 zinc powder purchased from Horsehead Corporation (formerly, now known as American Zinc Recycling). Equipment that was present onsite and used for the injections included a ZVZ slurry injection trailer, air injection module, and a nitrogen gas tube trailer. Water for preparing the ZVZ slurry was obtained from a nearby watering station and brought to the injection area in a water truck. Once the injection assembly and packers were in place and the injection solution was mixed in the injection trailer, pneumatic fracturing and/or injection activities were initiated.

Pneumatic fracturing was utilized at the first two injection locations (INJ-1 and INJ-2). Surveying equipment was used during pneumatic fracturing to monitor for surface heave at the injection locations. Fracturing initiation pressure, maintenance pressure, and surface heave data at each depth interval for each injection borehole are recorded in **Table 5**. During the injections at INJ-1 and INJ-2, surfacing of injection fluid and ZVZ were observed. The surfacing was attributed in part to the development of vertical flow pathways during the pneumatic fracturing. To decrease the likelihood of injectate surfacing at the remaining injection locations, hydraulic injection was employed at locations INJ-3 through INJ-13.

ZVZ was injected at each injection location at approximate depth intervals of 39-42 feet bgs and 42-45 feet bgs. The injections were completed in a bottom-up manner, with the lower injection interval completed first. Approximately 60 to 250 gallons of water were used at each injection interval, with the mass of injected ZVZ ranging from approximately 250 to 800 pounds at each interval. Approximately 12,300 pounds of ZVZ were injected during the pilot study. Quantities of water and ZVZ injected at each depth interval are presented in **Table 5**.

The pilot-scale ZVZ injections at MCBCP were completed in July 2014, and the ZVZ injections were monitored throughout the remainder of 2014 and into early 2015 using a network of 10 monitoring well clusters. Key findings of the pilot study included the following (RBA and Geosyntec, 2015):

ZVZ Injection Program

- Direction injection of ZVZ into the subsurface at the pilot study area for treatment of TCP could be achieved, although surfacing of ZVZ was observed during the injections through both desiccation cracks and old boring locations. Surfacing was observed to increase as injection depths became shallower.
- Limited soil borings advanced in the vicinity of one ZVZ injection point indicated that ZVZ was present approximately 1 to 3 feet radially from the injection point. Zinc was not evenly distributed directionally around the injection point, however, and additional detailed borings to evaluate ZVZ distribution were not conducted.
- Several grades of ZVZ material are commercially available. Optimization of the ZVZ material for subsurface distribution during injections (focused on grain size and uniformity) was recommended in advance of potential full-scale application.

Post-Injection Performance Monitoring

- Reductions in TCP concentration were observed within the pilot study injection area. One well showed a decrease in TCP from 0.77 µg/L to 0.021 µg/L following injections (**Figure 5**).
- Reductions in TCP concentrations were also noted in wells located predominantly downgradient of the injection area.
- Reductions in sulfate and the presence of sulfide were observed at several monitoring wells across the pilot study injection area. These findings are consistent with the highly reduced geochemical conditions that would be expected following injection of ZVZ and provide a secondary line of evidence that ZVZ was present and active in the subsurface following the injections.
- No secondary water quality impacts were noted. Even within the pilot study injection area where primary and secondary lines of evidence suggested ZVZ was present and effectively reducing TCP in groundwater, concentrations of dissolved zinc above baseline conditions were not observed. The absence of dissolved zinc above baseline conditions may be a function of variations in ZVZ delivery to the subsurface and/or the low solubility of ZVZ.

The Pilot Study Report concluded that the Navy had met the objectives of the pilot study, and no further work was conducted following submittal of the report. The remainder of this report describes and evaluates additional testing that was completed to further validate ZVZ as a remedial technology.

5.0 TEST DESIGN

The following section describes testing conducted as part of this demonstration to address the performance objectives described in Section 3.

5.1 CONCEPTUAL EXPERIMENTAL DESIGN

The demonstration included the following components:

- Groundwater Plume Characterization: Groundwater sampling was conducted to support detailed characterization of the groundwater plume in the vicinity of the ZVZ injection pilot study and evaluate the long-term efficacy of TCP treatment with ZVZ:
 - a. Samples were collected from existing monitoring wells screened within the injection zone.
 - b. Grab-groundwater samples were collected using direct-push technology (DPT) from 12 locations within and immediately downgradient of the injection zone, with samples collected from up to three depth intervals at each location.

Analytical results from the monitoring well groundwater samples were compared to baseline (i.e., pre-injection) conditions, as well as conditions observed in the first year following pilot study implementation. Analytical results from the grab groundwater samples were used to evaluate post-treatment conditions within the pilot study area and identify secondary indicators of ZVZ efficacy.

- Evaluation of ZVZ Distribution and Reactivity: Soil samples were collected for comparison to the design objective for ZVZ mass loading within the pilot study injection area. Soil samples were collected from borings extending radially away from two of the ZVZ pilot study injection locations (IP02 and IP08) at approximate distances of 1, 3, and 5 feet from the injection locations. The soil cores were sectioned into depth-discrete subsamples and field-screened for the presence of zinc using a hand-held x-ray fluorescent (XRF) analyzer. Several samples from each boring were also analyzed for the presence of zinc at an analytical testing laboratory.

5.2 BASELINE CHARACTERIZATION

The 2014 pilot study included baseline groundwater sampling and four groundwater sampling events that were conducted within the first year following injections. Data collected as part of this demonstration were compared to the baseline and post-injection pilot study sampling results to evaluate the performance objectives described in Section 3.

5.3 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

This section summarizes the demonstration sampling locations and describes the equipment used during field implementation. A detailed description of activities conducted during field implementation is provided in Section 5.4.

5.3.1 Monitoring Well Sampling

Three rounds of monitoring well sampling were conducted as part of this demonstration (September 2017, January 2018, and September 2018). Up to seven monitoring wells were sampled as part of each sampling event. Groundwater monitoring wells sampled during the demonstration are shown in **Figure 6** and included the following:

- 220205-MWX (upgradient of injection area);
- CP22-PMW04 (within injection area);
- CP22-PMW06B (cross-gradient to injection area);²
- CP22-PMW07B (downgradient of injection area);
- CP22-PMW08B (downgradient of injection area);
- CP22-PMW09B (cross-gradient to injection area);³ and
- CP22-PMW10B (within injection area).

With the exception of 220205-MWX (construction information unknown), the sampled wells were constructed with 10-foot screens located between approximately 35 to 45 feet bgs to 40 to 50 feet bgs (the “B” zone), consistent with the depth interval where 2014 pilot study injections were completed.

During sampling, depth to groundwater was measured in each well and groundwater samples were collected using low-flow sampling techniques and analyzed for the parameters listed in Section 5.5. Equipment decontamination, collection of duplicate samples and equipment blanks, and other quality assurance protocols were conducted as described in Section 5.5.

Investigation-derived waste (IDW) generated during monitoring well sampling was disposed of following the procedures described in Section 5.4.

5.3.2 Grab-Groundwater Sampling

Three rounds of grab-groundwater sampling were conducted as part of this demonstration (September 2017, January 2018, and September 2018). Grab-groundwater sampling was conducted concurrently with monitoring well sampling. Grab-groundwater samples were collected via DPT from 12 locations to supplement information collected from the groundwater monitoring well network. The samples were collected from three transect lines located upgradient, within, and downgradient of the 2014 pilot study injection area. Grab-groundwater sample locations are presented in **Figure 6**.

Grab-groundwater samples were collected using a Hydropunch[®] groundwater sampler. The groundwater sampler was equipped with a disposable polyvinyl chloride (PVC) screen and an expendable steel tip. The sampler operates by advancing small diameter hollow push rods with the PVC screen and steel tip installed in a closed configuration to the base of the desired sampling interval.

² Well CP22-PMW06B was sampled in September 2017 only.

³ Well CP22-PMW09B was sampled in September 2017 only.

Once at the desired sample depth, the push rods were retracted, exposing the filter screen (approximately 2 feet long) and allowing groundwater to infiltrate from the formation into the screen. Samples were collected from the screened interval using stainless steel check valves and 3/8-inch new polyethylene tubing. Grab-groundwater samples were analyzed for the parameters listed in Section 5.5. Equipment decontamination, collection of duplicate samples and equipment blanks, and other quality assurance protocols were conducted as described in Section 5.5.

IDW generated during monitoring well sampling was disposed of following the procedures described in Section 5.4.

5.3.3 Soil Sampling

Two rounds of soil sampling were conducted as part of this demonstration (January 2018 and September 2018). Continuous-core soil samples were collected via DPT from borings located radially at distances of approximately 1 foot, 3 feet, and 5 feet from two of the 2014 pilot study injection locations (IP02 and IP08).

- During the January 2018 event, soil borings were advanced along one radius for each injection location.
- During the September 2018 event, soil borings were advanced along two radii from IP02 and from three radii from IP08.

The cores were advanced using dual-tube hollow steel direct-push rods fitted with vinyl acetate sleeve liners. Soil sample locations are shown in **Figure 7**.

All soil borings were advanced to a minimum depth of 45 feet bgs, coinciding with the bottom of the 2014 pilot study injection interval. From 35 to 45 feet bgs, the soil cores were sectioned into depth-discrete subsamples at 1-foot intervals and analyzed in the field for the presence of zinc using a Thermo Scientific Niton XL2 GOLDD Series handheld XRF analyzer.⁴ Following field screening, depth-discrete soil subsamples were collected and analyzed at an offsite laboratory for the parameters listed in Section 5.5. Equipment decontamination and other quality assurance protocols were conducted as described in Section 5.5.

IDW generated during soil sampling was disposed of following the procedures described in Section 5.4.

5.4 FIELD TESTING

This section provides a detailed description of the field activities that were conducted as part of this demonstration. The field implementation schedule is summarized in **Table 6**. Field equipment calibration requirements and procedures and analytical methods used to evaluate samples collected during field implementation are detailed in Section 5.5.

⁴ As discussed in Section 5.4 IP08-3 was advanced to 49 feet bgs due to the presence of elevated zinc concentrations from approximately 40 to 45 feet bgs.

Table 6. Field Implementation Schedule.

Activity Description	2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pre-Field								
Permitting and Site Access		X		X		X		
Utility Clearance			X		X		X	
Groundwater Plume Characterization								
Detailed Plume Characterization			X		X		X	
Evaluation of ZVZ Distribution and Reactivity								
Collect Core Samples					X		X	
Evaluation of ZVZ Distribution					X		X	

5.4.1 Pre-Field Activities

5.4.1.1 Access and Notifications

Prior to the start of field activities, notifications were made to the following:

- The Navy Remedial Project Manager (RPM) for the MCBCP 22/23 Area; and
- MCBCP Assistant Chief of Staff, Environmental Security (AC/S ES) Installation Restoration (IR) Branch Head.

5.4.1.2 Health and Safety

All field activities were performed in accordance with the site-specific health and safety plan (HASP) included in the Demonstration Plan (Geosyntec, 2017). The HASP contained procedures for hazard identification and mitigation; emergency response, including a map of the nearest hospital and emergency contact information; incident reporting; use of appropriate personal protective equipment (PPE); and air monitoring procedures using a portable photoionization detector (PID) instrument. The calibration procedure for the PID is described in Section 5.5.

Prior to the start of field activities each day, a safety tailgate meeting was conducted. Each meeting included a discussion of the field activities to be performed, safe work practices, identification of potential hazards, use of PPE, decontamination procedures, and emergency response protocols.

5.4.1.3 Utility Clearance

Prior to intrusive subsurface activities, boring locations were marked with white paint and/or wooden stakes. DigAlert of Southern California was notified of planned intrusive subsurface work a minimum of two working days prior to the start of field activities.

A private utility locator performed a subsurface location survey at the boring locations under the oversight of a Geosyntec field geologist. No subsurface or aboveground utilities were identified within the study area. Prior to advancing the borings, each location was cleared by hand-augering to a depth of approximately 5 feet bgs.

5.4.2 Groundwater Sample Collection

Consistent with the scope of work presented in the Demonstration Plan (Geosyntec, 2017), three groundwater sampling events were conducted in September 2017, January 2018, and September 2018. Groundwater samples were collected from existing monitoring wells and from grab-groundwater borings advanced within the 2014 pilot study injection area. The following sections describe groundwater sample collection procedures.

5.4.2.1 Monitoring Well Sample Collection

The groundwater monitoring wells were sampled using low-flow sampling techniques by Blaine Tech Services, Inc. (Blaine Tech) of Carson, California under the oversight of a Geosyntec field geologist.

Prior to purging and sampling each groundwater monitoring well, the static water level was recorded relative to the top of the well casing using a water level meter with 0.01-foot increments.

Groundwater samples were collected from each monitoring well using a submersible bladder pump and clean dedicated tubing. Wells were purged at a rate of 100 milliliters/minute (ml/min) to minimize turbidity and limit drawdown, with a maximum allowable drawdown of less than 0.33 feet during purging. While purging each monitoring well, water level measurements were recorded to monitor for potential excessive drawdown. Sustainable purge rates were maintained for all wells, and the drawdown, purge rate, and other relevant parameters were recorded by Blaine Tech. Water-quality parameters were also monitored and recorded during purging to assess the stabilization and quality of the water within the screened interval. pH, temperature, specific conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity were monitored and recorded using a YSI Professional Plus multi-parameter water quality meter. Stabilization of the sampling interval was determined based on indicator parameters having met the following criteria:

- pH: three successive readings within ± 0.1 pH units;
- Specific conductance: three successive readings within $\pm 3\%$;
- ORP: three successive readings within ± 10 millivolts (mV);
- DO: three successive readings within $\pm 10\%$; and
- Turbidity: less than 5 Nephelometric turbidity units (NTU).

Monitoring well sampling loges are provided in **Appendix A**.

Following stabilization, groundwater samples were collected into laboratory-supplied sample containers and labeled with project identification, sample location, analytical parameters, time and date of sampling, and any preservative added to the sample. Samples were stored in an ice-cooled chest for transport under standard chain-of-custody procedures to Eurofins Calscience, Inc. (Calscience) of Garden Grove, California, a California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) certified analytical laboratory.

5.4.2.2 Grab-Groundwater Sample Collection

Direct-push borings for grab-groundwater sample collection were advanced by Kehoe Testing & Engineering, Inc. (Kehoe) of Huntington Beach, California under the oversight of a Geosyntec field geologist. Grab-groundwater samples were collected using DPT at 12 locations (**Figure 6**).

Up to three depth-discrete samples were collected from each boring location at depths ranging from 31 to 45 feet bgs. A summary of the intervals sampled during each monitoring event is provided in **Table 7**; sample intervals for the second and third events were selected based on analytical results from the prior events.

At each location, grab-groundwater samples were collected using the methodology describe in Section 5.3. Following Hydropunch® deployment, field personnel waited a minimum of 15 minutes to allow for groundwater to infiltrate from the formation into the inlet screen before collecting a sample. If groundwater had not filled the sampling device within 30 minutes of exposing the screen, the sample interval was considered dry and sampling device was advanced to the next deeper interval.⁵

Prior to collecting samples for laboratory analysis, water-quality parameters (pH, temperature, specific conductivity, ORP, and DO) were recorded using a multi-parameter water quality meter. Calibration procedures for the meter are described in Section 5.5. Groundwater samples were then collected into laboratory-supplied sample containers and labeled with project identification, sample location, analytical parameters, time and date of sampling, and any preservative added to the sample. Samples were stored in an ice-cooled chest for transport under standard chain-of-custody procedures to Calscience for analytical testing.

5.4.3 Soil Sample Collection

Direct-push borings for soil sample collection were advanced by Kehoe under the oversight of a Geosyntec field geologist. Soil samples were collected concurrently with the second and third rounds of groundwater sampling (January and September 2018, **Table 6**). As described in Section 5.3, soil samples were collected along transects located radially from two of the 2014 ZVZ pilot study injection locations (IP-02 and IP-08, **Figure 7**).

To document the subsurface lithology near injection points IP-02 and IP-08, continuous soil cores were collected from ground surface to an approximate total depth of 50 feet bgs at one boring for each injection location during each soil sampling event (four borings total):

- January 2018: IP02-1' and IP08-1'; and
- September 2018: IP02E-3' and IP08E-1'.

The four continuous soil cores were visually logged using the Unified Soil Classification System (USCS) by Geosyntec field staff under oversight of a California Professional Geologist. The soil descriptions were recorded in boring logs prepared for each boring (**Appendix B**). At the remaining 17 soil sampling locations, samples were collected via continuous cores advanced within the ZVZ injection interval (approximately 35 to 45 feet bgs). Boring IP08-3 was advanced an additional 4 feet (to approximately 49 feet bgs) due to the presence of elevated zinc concentrations in samples collected from 40 to 45 feet bgs.

⁵ If the sampling device did not fill, Geosyntec also worked with Kehoe to confirm that the screen had been properly exposed before determining the sample interval to be dry. When only a partial sample volume could be collected, sample analyses were prioritized in the order listed in Section 5.5.

At each soil sampling location, the core collected from 35 to 45 feet bgs was sectioned into 1-foot depth-discrete subsamples and field screened for the presence of zinc using a pre-calibrated hand-held XRF. As described above, due to the presence of elevated zinc concentrations at 45 feet bgs, additional samples were collected down to 49 feet bgs at location IP08-3 to delineate the vertical extent of the maximum zinc detections. Additionally, soil samples were collected from 20 feet bgs at the four continuously cored borings and analyzed for zinc with the XRF to establish background zinc concentrations outside of the 2014 pilot study injection interval. Operating procedures for the XRF are included in **Appendix C**.

Based on the results of the field screening, a minimum of three samples from each boring location were collected for additional laboratory analysis. Samples selected for laboratory analysis were generally collected from locations with the highest concentrations of zinc recorded by the XRF. Where zinc was not detected above background levels by the XRF in any of the samples for a given boring, laboratory samples were collected from variable depths along the injection interval. Soil samples were collected into laboratory-supplied sample containers and labeled with project identification, sample location, analytical parameters, time and date of sampling, and any preservative added to the sample. Samples were stored in an ice-cooled chest for transport under standard chain-of-custody procedures to Calscience for analytical testing.

Table 7. Grab-Groundwater Sample Locations and Intervals.

Location	Sampling Date	Interval 1 (feet bgs)	Interval 2 (feet bgs)	Interval 3 (feet bgs)
CP22-HP01	September 2017	35-37	39-41	43-45 ¹
CP22-HP02	September 2017	35-37	39-41 ²	43-45 ²
CP22-HP03	September 2017	35-37	39-41 ²	43-45
CP22-HP04	September 2017	35-37 ²	39-41 ²	43-45
CP22-HP05	September 2017	35-37 ¹	39-41	43-45 ²
CP22-HP06	September 2017	35-37	39-41 ²	43-45
CP22-HP07	September 2017	35-37	39-41	43-45
CP22-HP08	September 2017	35-37	39-41 ²	43-45
CP22-HP09	September 2017	35-37	39-41 ²	43-45
CP22-HP10	September 2017	35-37	39-41	43-45
CP22-HP11	September 2017	35-37	39-41	43-45
CP22-HP12	September 2017	35-37	39-41	43-45 ¹
CP22-HP01	January 2018	35-37	39-41	NS
CP22-HP02	January 2018	35-37	39-41	NS
CP22-HP03	January 2018	35-37	39-41	NS
CP22-HP04	January 2018	35-37	39-41	43-45
CP22-HP05	January 2018	35-37	39-41	43-45
CP22-HP06	January 2018	35-37	39-41	NS
CP22-HP07	January 2018	35-37	39-41	NS
CP22-HP08	January 2018	35-37	39-41	NS
CP22-HP09	January 2018	35-37	39-41	43-45 ²
CP22-HP10	January 2018	35-37	39-41	43-45
CP22-HP11	January 2018	35-37	39-41	NS
CP22-HP12	January 2018	35-37	39-41	NS
CP22-HP01	September 2018	31-33	35-37 ²	39-41
CP22-HP02	September 2018	31-33	35-37	39-41
CP22-HP03	September 2018	31-33	35-37	39-41 ²
CP22-HP04	September 2018	31-33	35-37	39-41
CP22-HP05	September 2018	31-33	35-37	39-41
CP22-HP06	September 2018	31-33 ²	35-37	39-41
CP22-HP07	September 2018	31-33	35-37	39-41
CP22-HP08	September 2018	31-33	35-37	39-41
CP22-HP09	September 2018	31-33 ²	35-37	39-41 ¹
CP22-HP10	September 2018	31-33 ²	35-37	39-41
CP22-HP11	September 2018	31-33 ¹	35-37	39-41
CP22-HP12	September 2018	31-33	35-37 ¹	39-41

Note 1 – Sample attempted but not collected due to insufficient water quantity.

Note 2 – Sample collected but analyzed for subset of target analytes due to limited water quantity. See Section 5.5 for discussion of target analytes and sampling order.

NS – Based on the results of the September 2017 sampling event, the 43-45 feet bgs interval was not sampled at this location in January 2018.

5.4.4 Demobilization

Following completion of sampling activities, borings were grouted to ground surface with cement-bentonite grout. Demobilization consisted of decontamination and removal of drilling equipment, cleaning the project site, and inspection. Equipment was decontaminated using heavy brushes to remove soil and dirt attached to the equipment surfaces. Decontamination wastewater and disposable equipment were collected into 55-gallon drums for transport and disposal, along with waste soil cuttings and groundwater generated during sampling activities.

5.4.5 Investigation-Derived Waste Management and Disposal

Waste generated during field testing was sampled and analyzed for classification purposes prior to transport offsite. The waste profiling (waste classification determination) was based on the results of the soil and water sample analyses as appropriate.

5.4.5.1 Waste Streams

The following waste streams resulted from the field investigation:

- Decontamination wastewater from drilling and sampling equipment;
- Wastewater from groundwater sampling;
- Waste soil cuttings from soil boring advancement;
- Used disposable sampling equipment and PPE; and
- Inert or non-hazardous solid waste (refuse).

The waste streams were handled, characterized, and disposed of as described below. Manifests and final disposal decisions were conducted at the direction of MCBCP Environmental Security.

5.4.5.2 Waste Storage

Soil cuttings, water, and disposable equipment generated during fieldwork was separated by material type and placed in temporary storage containers (Department of Transportation [DOT] 17H 55-gallon drums) pending analysis. Mixing regular trash and/or non-hazardous solid waste with potentially contaminated waste was avoided. Upon completion of field activities, the drums were labeled with respect to contents and were staged onsite.

5.4.5.3 Waste Containerization and Accumulation

At the time of generation, IDW containers were labeled using indelible ink with the following information:

- Source and location;
- Contents and quantity of material in the container;
- Potential health, safety, and environmental hazards;
- Accumulation start date and date container sampled;
- Contact information for the MCBCP AC/S ES IR Branch Head;
- Parameters used for analysis; and
- “ANALYSIS PENDING – POTENTIALLY HAZARDOUS.”

An inventory of the waste containers and quantities was maintained for future reporting and inspection.

5.4.5.4 *Waste Sampling*

Upon completion of field activities, the IDW was sampled for classification purposes. Based on the sampling results, the IDW was profiled prior to arrangements being made for disposal offsite. Waste streams were disposed by American Integrated Services, Inc. (AIS) of Wilmington, California, a licensed waste disposal vendor.

5.4.5.5 *Waste Transportation and Disposal*

Following waste profiling, the IDW was disposed in accordance with federal and state requirements at the appropriate offsite facility. No hazardous materials were generated during the investigation. Manifests were approved, completed by, and signed by the MCBCP Environmental Security department before the waste was transported offsite. Copies of all manifests were retained by Geosyntec and MCBCP Environmental Security; original copies were sent with the transporter.

5.5 SAMPLING METHODS

5.5.1 Samples Collected

Samples collected during each data collection event are summarized below. The number and type of samples collected are presented in **Tables 8a and 8b**, and the analytical methods used are presented in **Table 9**. As described in Section 5.4, sample locations and analyses during the second and third groundwater sampling events and the second soil sampling event were modified based on the results of prior events.

Table 8a. Total Number and Types of Samples Collected – Groundwater

Component	Matrix	Number of Samples	Analyte
September 2017			
Groundwater Monitoring Well Sampling	Groundwater	7 Total One per sampled well	TCP
			3-chloro-1-propene, 1,2-DCP, 1,3-DCP
			Propene
			Dissolved zinc
Direct-Push Groundwater Sampling	Groundwater	33 Total Up to 3 depths per location from 12 grab sample locations	Anionic and cationic species
			TCP
			3-chloro-1-propene, 1,2-DCP, 1,3-DCP
			Propene
Quality Assurance/Quality Control (QA/QC)	Groundwater (Field duplicate) Deionized Water (Equipment, trip, and field blanks)	See Section 5.5 for QA/QC sampling frequency	Dissolved zinc
			Anionic and cationic species
			TCP
			3-chloro-1-propene, 1,2-DCP, 1,3-DCP
January 2018			
Groundwater Monitoring Well Sampling	Groundwater	5 Total One per sampled well	TCP
			Propene
			Dissolved zinc
			Sulfate
Direct-Push Groundwater Sampling	Groundwater	28 Total Up to 3 depths per location from 12 grab sample locations	TCP
			Propene
QA/QC	Groundwater (Field duplicate) Deionized Water (Equipment, trip, and field blanks)	See Section 5.5 for QA/QC sampling frequency	TCP
			Propene
September 2018			
Groundwater Monitoring Well Sampling	Groundwater	5 Total One per sampled well	TCP
			Propene
			Dissolved zinc
			Sulfate
Direct-Push Groundwater Sampling	Groundwater	33 Total Up to 3 depths per location from 12 grab sample locations	TCP
			Propene
			Dissolved zinc
QA/QC	Groundwater (Field duplicate) Deionized Water (Equipment, trip, and field blanks)	See Section 5.5 for QA/QC sampling frequency	TCP
			Propene
			Dissolved zinc

Table 8b. Total Number and Types of Samples Collected – Soil and IDW

Component	Matrix	Number of Samples	Analyte
January 2018			
Direct-Push Soil Sampling	Soil	18 Total 3 samples per boring from 6 soil borings	Total zinc
September 2018			
Direct-Push Soil Sampling	Soil	47 Total 3-4 samples per boring from 15 soil borings	Total zinc
All Sampling Events			
IDW	Water	1 composite sample per event	Volatile Organic Compounds (VOCs)
			Title 22 Metals
			Total Petroleum Hydrocarbons (TPH)
	Soil	1 composite sample per event	VOCs
			Title 22 Metals
			TPH

Table 9. Analytical Methods for Sample Analysis

Matrix	Analyte	Method	Container	Preservative	Holding Time
Groundwater	TCP	SRL 524M-TCP	40-milliliter (mL) volatile organic analytes (VOAs)	HCL	14 days
	3-chloro-1-propene, 1,2-DCP, 1,3-DCP	USEPA 8260B	40-mL VOAs	HCL	14 days
	Propene	RSK-175M	40-mL VOAs	HCL	14 days
	Field parameters (pH, DO, ORP, temperature, specific conductivity)	Field measurement using a multimeter	N/A	None	Immediate
	Anions	USEPA 300.0	125-mL high-density polyethylene (HDPE)	None	48 hours
	Cations species, including dissolved zinc	USEPA 200.7	250-mL HDPE	None; laboratory filtered	180 days
Soil	Total zinc	XRF handheld meter	Plastic Bag	None	Immediate
	Total zinc	USEPA 6010B	4-ounce jar	None	6 months

5.5.1.1 Groundwater Monitoring Well Samples

During groundwater monitoring well sampling, samples were collected in laboratory-provided containers and analyzed at Calscience for the following:

- TCP;
- TCP degradation products 3-chloro-1-propene, 1,2-dichloropropane (1,2-DCP), and 1,3-dichloropropane (1,3-DCP);⁶
- Propene;
- Dissolved zinc; and

Selected anionic and cationic species. Low-flow sampling and field parameters were also recorded during each sampling event. Field parameters measured included pH, DO, ORP, temperature, turbidity, and specific conductivity using a YSI Professional Plus multiparameter water quality meter. Sampling parameters included flow rates, pump depth, total water removed, and depth to water. Monitoring well sampling field sheets are provided in **Appendix A**.

5.5.1.2 Grab-Groundwater Samples

Grab-groundwater samples were collected from 12 locations per event, with samples collected from up to three depth intervals per location (**Table 7**). Grab-groundwater samples were collected in laboratory-provided containers and analyzed at Calscience for the following:⁷

- September 2017 (33 total samples):
 - TCP;
 - TCP degradation products 3-chloro-1-propene, 1,2-DCP, and 1,3-DCP;
 - Propene;
 - Dissolved zinc; and
 - Selected anionic and cationic species.
- January 2018 (28 total samples):
 - TCP; and
 - Propene.
- September 2018 (33 total samples):
 - TCP;
 - Propene; and
 - Dissolved zinc.

Field parameters were measured prior to samples collection using a YSI ProDSS multi-meter. Field parameters measured included pH, DO, ORP, temperature, and specific conductivity.

⁶ September 2017 only.

⁷ When only a partial sample volume could be collected, sample analyses were prioritized in the following order: (1) TCP; (2) propene; (3) selected cationic species including dissolved zinc; (4) TCP degradation products; and (5) selected anionic species.

5.5.1.3 Soil Samples

A total of 21 borings were advanced to collect soil samples to evaluate ZVZ distribution in the subsurface (**Figure 7**). At each boring, soils were collected from approximately 35 to 45 feet bgs and were sectioned into depth-discrete subsamples and analyzed for the presence of zinc using a pre-calibrated hand-held XRF. Based on results from the XRF, a minimum of three samples from each boring were collected and shipped to Calscience for laboratory analysis of total zinc. A total of 65 samples were sent to Calscience for laboratory analysis of total zinc.

5.5.2 Quality Assurance Protocols

5.5.2.1 Calibration of Sampling Equipment

The calibration method for the XRF is included in **Appendix C**. Calibration was performed by the equipment rental company who supplied the instrument and was verified by field personnel prior to use.

The PID used by field personnel for air monitoring was a RAE Systems MiniRAE 3000, equipped with a 10.6-volt lamp. The PID was calibrated and set up at the beginning of each field day, following the procedure below:

1. Connection of a charcoal filter to the PID inlet to remove potential VOCs in ambient air;
2. Zero air calibration;
3. Removal of the charcoal filter and connection of the inlet port to a 100 parts per million by volume (ppmv) isobutylene calibration gas cylinder;
4. Span calibration; and
5. Validation of calibration, removal of the calibration gas connection to the inlet port, and connection of a dust filter to protect the inlet port of the PID during air monitoring.

The temperature, specific conductivity, pH, DO, and ORP probes on the YSI ProDSS multimeter were thoroughly rinsed with distilled water prior to each use. The manufacturers' instructions for calibration and use of the instruments were followed. The multi-meter was calibrated daily for specific conductivity and pH in accordance with the manufacturer's specifications. Other probes were factory calibrated, with a certificate of calibration provided with the device.

- The accuracy of the field thermometer was determined by checking the measured reading against other thermometers, if available.
- The specific conductivity probe was calibrated at the beginning of each field day using standard calibration solutions provided by the equipment rental company.
- The pH probe was calibrated at the beginning of each field day using pH 4 and pH 10 buffered solutions.
- A calibration check of the DO probe was performed by rinsing the probe in distilled water and taking an instrument reading in ambient air to confirm the measured value was approximately 10 mg/L when corrected for temperature and pressure.

5.5.2.2 Quality Assurance Sampling

QA/QC samples were collected as follows:

- One field duplicate sample was collected for every 10 groundwater samples collected during each sampling event. The purpose of the duplicate samples was to assess the precision of field sampling and laboratory analysis techniques. Field duplicate samples were collected as laboratory blind duplicates sent along with original samples to the primary laboratory. A false location identifier was assigned for the sample identifier and recorded on the sample label and chain-of-custody record along with a false sample collection time. The actual sample location, sample time, and corresponding false sample identifier and sample time was recorded in the project field notes.
- One equipment rinseate blank sample was collected for the Hydropunch® groundwater sampler each field day, or for every 10 samples collected, whichever was more frequent. The purpose of the equipment rinseate blank sampling was to confirm that equipment decontamination procedures were sufficient to prevent cross-contamination of samples.
- One field blank sample was collected each field day, or for every 10 samples collected, whichever was more frequent. The purpose of the field blanks was to identify possible contamination associated with sample collection and transport. Sampling personnel prepared the field blanks at a predetermined sample location using organic-free water obtained from the analytical laboratory.
- One trip blank sample containing reagent-free deionized water for analysis of TCP and TCP degradation products accompanied each ice chest that included samples collected for these analyses. The purpose of the trip blanks was to identify possible contamination associated with container preparation and sample transport. The trip blanks were prepared by the analytical laboratory using reagent-free deionized water.

Prior to the start of each sampling event, the project manager determined the sampling locations for field blank preparation and duplicate sample collection.

5.5.2.3 Decontamination Procedures

Non-dedicated downhole equipment was decontaminated between each sampling location using a non-phosphate detergent wash, followed by a potable water rinse and a final, distilled water rinse.

The transfer bottle, flow-through cell, and the probes used for measurement of field parameters were decontaminated before and after each measurement by rinsing with distilled water.

5.5.2.4 Sample Documentation

A record of sample identification numbers was maintained on standardized field data forms. Additional field data include a record of significant events, observations, measurements, personnel, site conditions, sampling procedures, measurement procedures, and calibration records.

All field data entries in the field log were signed, dated, and kept as a permanent record. Erroneous entries were corrected by crossing a line through the error and entering the correct information. Corrections were initialed by the person making the re-entry.

Sample identification documents were prepared so that sample identification and chain-of-custody were maintained and sample disposition is controlled. Standard sample identification labels and chain-of-custody records were used to record all information. Sample documentation forms and labels were completed with waterproof ink. The sample documentation forms accompanied the samples to the laboratory. Copies of the sample documentation forms were retained by the samplers and sent directly to the project manager.

The following information were recorded on the sample label:

- Sample location/identifier;
- Depth at which sample was collected, if applicable;
- Date and time sample was collected;
- Analyses to be performed;
- Preservation instructions;
- Project number;
- Sampler's initials;
- Any other pertinent information; and
- Any special instructions to laboratory personnel.

Official custody of samples was maintained and documented from the time of sample collection until the validation of analytical results. The chain-of-custody record is the document that records the transfer of sample custody. The chain-of-custody record also serves to cross reference the sample identifier assigned by the Project Manager with the sample identifier assigned by the laboratory. The chain-of-custody record includes the following information:

- Sample location/identifier;
- Project number;
- Sampling date;
- Sampling personnel;
- Shipping method;
- Sample description;
- Sample volume;
- Number of containers;
- Sample destination;
- Preservatives used;
- Analyses to be performed;
- Special handling and reporting procedures; and

- The identity of personnel relinquishing and accepting custody of the samples.

The sampling personnel were responsible for the samples and signed the chain-of-custody record to document sample transferal or transport. Samples were packaged in sealed containers for transport and dispatched to the appropriate laboratory for analysis with a separate chain-of-custody record accompanying each shipment. The method of transport, courier name(s), and other pertinent information was entered on the chain-of-custody record. During transport, samples were accompanied by the chain-of-custody record.

5.6 SAMPLING RESULTS

Sampling results for this demonstration plan are summarized in the following tables and figures. Analytical laboratory reports for sampling conducted as part of this demonstration are provided in **Appendix D**. A QA/QC review was completed following each demonstration sampling event; the reviews are summarized in **Appendix E**. The QA/QC reviews indicated that the sampling data were of acceptable quality.

5.6.1 Groundwater Results

- **Table 10** – Groundwater Sampling Results – Field Parameters;
- **Table 11** – Groundwater Analytical Results – Chlorinated Propanes (TCP, 3-chloro-1-propene, 1,2-DCP, 1,3-DCP, and propene);
- **Table 12** – Groundwater Analytical Results – Geochemical Parameters;
- **Figures 8a through 8c** – September 2017 Groundwater Sampling Results;
- **Figures 9a and 9b** – January 2018 Groundwater Sampling Results; and
- **Figures 10a and 10b** – September 2018 Groundwater Sampling Results.

5.6.2 Soil Results

- **Table 13** – Soil XRF Results – Zinc; and
- **Table 14** – Soil Analytical Results – Zinc.

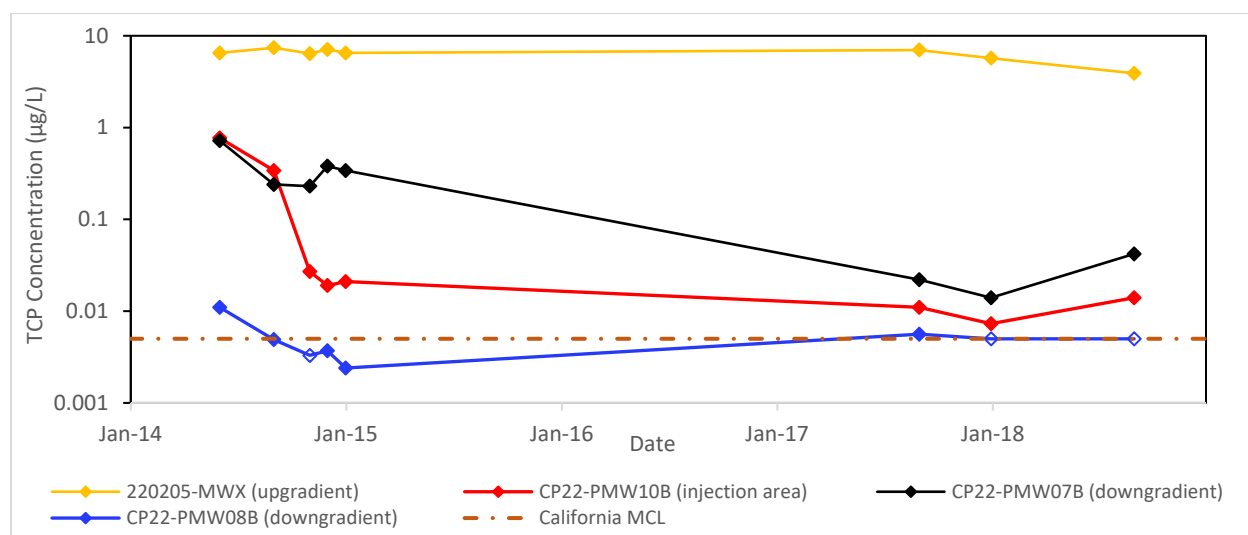
Sampling results are discussed further in the Performance Assessment section of this report (Section 6).

6.0 PERFORMANCE ASSESSMENT

The following section presents an assessment of the performance objectives developed for this demonstration, along with an evaluation of secondary indicators of ZVZ efficacy and additional analyses intended to supplement understanding of the 2014 pilot study injections.

6.1 PERFORMANCE OBJECTIVE 1: TCP CONCENTRATION REDUCTIONS

A summary of historical TCP data and results from demonstration monitoring of selected groundwater monitoring wells is summarized in **Table 11** and presented below. As illustrated below and summarized in **Table 4** (Section 3.1), monitoring well data indicate that the 2014 pilot study ZVZ injections reduced TCP concentrations throughout the injection area and in the predominant groundwater flow direction.



Note: Open symbols represent the laboratory reporting limit for non-detect samples.

Figure 11. TCP Concentrations over Time – Selected Monitoring Wells.

Review of **Table 11** and **Figure 11** indicates the following:

- TCP concentrations in upgradient source area well 220205-MWX have ranged from 3.9 to 7.4 µg/L since 2012, with no significant trend over time. This is consistent with expectations since injections could not be implemented in this area in 2014 due to the presence of overhead and underground utilities.
- TCP concentrations measured in CP22-PMW10B, which is located within the 2014 pilot study injection area, ranged between 0.0073 µg/L and 0.014 µg/L during the 2017 and 2018 sampling events. These concentrations indicate a 98% to 99% concentration reduction from the 2014 baseline concentration of 0.77 µg/L.
- At downgradient well CP22-PMW07B, TCP concentrations during the demonstration ranged from 0.014 µg/L to 0.042 µg/L, indicating concentration reductions between 94% and 98% from the 2014 baseline concentration of 0.72 µg/L.

- At downgradient well CP22-PMW08B, TCP was detected at a concentration of 0.0056 µg/L in September 2017 and was not detected above laboratory reporting limits (0.005 µg/L) during the last two performance monitoring events of the demonstration in January and September 2018.

In addition to the monitoring well results, the depth-discrete groundwater samples (**Figures 8a, 9a, and 10a**) indicate the following:

- The deepest samples, collected from 43 to 45 feet bgs, were all non-detect for TCP except for a detection of 0.017 µg/L at CP22-HP10 in January 2018 (**Figure 8a**).
- Relatively higher concentrations of TCP were observed in the shallower grab-groundwater samples, notably at locations CP22-HP08, CP22-HP09, and CP22-HP10 (**Figures 8a and 9a**).
- TCP concentrations generally decrease with distance downgradient from the 2014 ZVZ pilot study injection area, although this trend was less evident in September 2018 (**Figure 10a**).
- Although long-term decreasing concentration trends are apparent at the monitoring wells, trends in grab-groundwater samples collected between September 2017 and September 2018 were less clear (**Table 11**). In addition to changes in ZVZ efficacy, these observations may be related to the inherent variability of grab sampling relative to well sampling, variations in groundwater elevation, or variation in groundwater flow direction altering the transport of TCP or its ability to contact the injected ZVZ. Additional sampling may be appropriate to further assess short- and long-term temporal trends.

Overall, the demonstration monitoring results indicate that TCP reductions exceeding 90% have been maintained and that source treatment of TCP with ZVZ is effective. Downgradient treatment of TCP with ZVZ was effective at well CP22-PMW07B (i.e., a percent reduction over 90%), where baseline concentrations were comparable to those within the ZVZ injection area. At downgradient well CP22-PMW08B, where baseline TCP concentrations were low, TCP concentrations following the pilot study were reduced to close to or below the laboratory reporting limit and California MCL of 0.005 µg/L.

The spatial and temporal variability of the grab groundwater samples suggest that ZVZ was distributed non-uniformly during pilot study injections, consistent with observations from soil sampling (see Section 6.3). The presence of higher concentrations in the shallowest samples further suggests that ZVZ may have been preferentially distributed within more permeable portions of the subsurface. While the apparent longevity of the injected ZVZ (see Section 6.2) indicates that untreated TCP will be effectively managed as it migrates from the shallower, less permeable portions of the aquifer, approaches to optimize ZVZ delivery to allow for material emplacement into lower permeability zones were also evaluated as part of this Final Report. Injection optimization is discussed further in Section 8.

6.2 PERFORMANCE OBJECTIVE 2: ZVZ LONGEVITY

ZVZ longevity was evaluated based on changes in TCP concentration reductions within and downgradient of the zone of treatment over time. Post-injection sampling results have been compared to initial concentrations to assess trends in ZVZ treatment efficacy over the approximately four years since pilot study injections were implemented.

Reductions in TCP post-injection concentrations from baseline levels as a function of time are plotted in **Figure 3** (Section 3.2) for wells CP22-PMW07B, CP22-PMW08B, and CP22-PMW10B. As shown in **Figure 3**, TCP concentration reductions have not decreased within the ZVZ injection area, with concentrations reductions significantly greater than 90% maintained since the injections were completed in 2014. In downgradient well CP22-PMW07B, observed reductions in TCP concentration have increased substantially since 2014 to over 90%, suggesting that the ZVZ continues to effectively degrade TCP. At well CP22-PMW08B, where baseline concentrations were low, observed TCP concentration reductions are more variable, but have remained between 50% and 80% since 2014.

These results indicate that the injected ZVZ has maintained efficacy with respect to TCP degradation over the four years since pilot study injections were completed. In addition, reduced geochemical conditions within the pilot study injection area have been maintained since 2014 (Section 6.4), providing a secondary line of evidence for long-term ZVZ efficacy. Additional sampling may be appropriate for future evaluation of ZVZ longevity.

6.3 PERFORMANCE OBJECTIVE 3: ZVZ DISTRIBUTION

The distribution of ZVZ in soil was evaluated based on zinc concentration in bulk soil samples collected from soil cores advanced radially at approximately 2-foot intervals from selected injection locations (IP-02 and IP-08). Results from soil core sampling for zinc are summarized in **Table 14**.

At IP-02, zinc concentrations in soil ranged from 36.4 to 122 mg/kg. In general, there were no notable changes in concentration with depth or distance from the injection location, although the shallowest sampled intervals at IP02-3 (38 feet bgs) and IP02E-3 (36 feet bgs) had the two highest concentrations of zinc observed in the vicinity of IP-02.

At IP-08, similar zinc concentrations were generally observed, with two exceptions:

- At location IP08N-3, 272 mg/kg of zinc were detected at 38 feet bgs, suggesting the sample may be in relatively close proximity to the injected ZVZ.
- At location IP08-3, high concentrations of zinc were measured at 43 feet bgs (18,100 mg/kg or 1.8% zinc in soil), at 44 feet bgs (20,000 mg/kg or 2% zinc in soil), and at 45 feet bgs (1,870 mg/kg or 0.02% zinc in soil).

The detected zinc concentrations at IP08-3 exceed the design objective for ZVZ mass loading during the pilot study, suggesting that ZVZ injections can achieve localized mass loadings in excess of 0.5% where ZVZ is successfully delivered to the subsurface.

Although the soil sampling results suggest that ZVZ delivery may have been limited and variable within the pilot study injection zone, the observed trends in TCP concentration within and downgradient of the ZVZ injection area (Sections 6.1 and 6.2) and secondary lines of evidence for ZVZ efficacy (Section 6.4) demonstrate that the pilot study was nonetheless successful in terms of achieving targeted TCP concentration reductions.

6.4 SECONDARY INDICATORS OF ZVZ EFFICACY

Secondary indicators of ZVZ efficacy include the following:

- Generation of TCP degradation products; and
- The presence of reduced geochemical conditions favorable to *in situ* chemical reduction of TCP. Specific indicators of reduced conditions include low DO concentrations, negative ORP measurements, and reductions in sulfate concentration relative to baseline conditions.

In addition, the absence of dissolved zinc or its presence below regulatory limits indicates that injections of ZVZ will not result in secondary impacts to groundwater quality.

Propene – Propene was the only TCP degradation product detected during demonstration sampling.⁸ Propene analytical results are shown in **Figure 8b** (September 2017), **Figure 9b** (January 2018), and **Figure 10b** (September 2018), and are summarized in **Table 11**. Propene was detected in 32 of 116 samples collected in as part of the demonstration, with a maximum concentration of 13.6 µg/L (September 2017 sample at CP22-HP03 from 39 to 41 feet bgs) and a median concentration of 1.80 µg/L. Comparison of the propene and TCP analytical results do not indicate a clear correlation between the two compounds.

pH – Measured pH values were generally circumneutral (between 6.5 and 8.5) with the exception of well CP22-PMW10B, located within the 2014 pilot study injection area. pH values measured at that well ranged from 9.59 to 10.05 standard units. Elevated pH was observed during the ZVZ column studies conducted as part of NESDI project 434 (Section 2), suggesting that ZVZ is likely present near the monitoring well and acting to increase the pH of nearby groundwater.

Dissolved Oxygen – DO measurements were collected during monitoring well and grab-groundwater sampling (**Table 10**). DO concentrations below 0.5 mg/L are indicative of reduced geochemical conditions.

- September 2017 – DO concentrations in grab-groundwater samples were generally high (greater than 1 mg/L) and did not correlate well with ORP measurements at many locations, suggesting that oxygen may have been entrained in the grab samples during measurement of field parameters. DO concentrations were generally much lower in the monitoring wells where a flow-through cell was used for measuring concentrations, with concentrations below 0.5 mg/L observed within and downgradient of the 2014 pilot study injection area.
- January 2018 – DO concentrations in both grab-groundwater and monitoring well samples were generally low.
- September 2018 – As in September 2017, DO concentrations in many of the grab-groundwater samples were generally high (greater than 1 mg/L) and did not correlate well with ORP measurements in some locations. DO concentrations were low (i.e., near or below 0.5 mg/L) in the monitoring wells.

⁸ Other potential TCP degradation products include 1,2-DCP, 1,3-DCP, and allyl chloride (3-chloro-1-propene).

Oxidation-Reduction Potential – ORP measurements were collected during monitoring well and grab-groundwater sampling (Table 10). Negative ORP measurements are indicative of reduced geochemical conditions.

- September 2017 – ORP measurements were variable in the grab-groundwater samples, ranging from -585.1 mV to 150.5 mV, suggesting conditions within the 2014 pilot study injection area are variably reduced. ORP measurements were generally low in the groundwater monitoring wells located within and downgradient of 2014 pilot study injections.
- January 2018 – ORP was generally lower in January 2018 than in September 2017, with most grab-groundwater and monitoring well samples suggesting highly reduced conditions.
- September 2018 – Conditions in September 2018 were generally consistent with those observed in September 2017, with variable ORP measurements in the grab-groundwater samples (-140.4 mV to 65.4 mV). Groundwater in the vicinity of CP22-PMW10B was highly reduced (ORP measurement of -355.9 mV) but was more oxic at the downgradient monitoring wells CP22-PMW07B and CP22-PMW08B.

Sulfate – Reductions in sulfate concentration were evaluated as a secondary line of evidence for reduced conditions due to ZVZ injections. Sulfate concentrations measured since from 2012 in the vicinity of the 2014 pilot study injection area are summarized in Table 12. Historical sulfate concentrations in the upgradient source zone monitoring well 220205-MWX ranged from 88.5 to 103 mg/L. Sulfate concentrations measured as part of this demonstration were within this range (Table 12).

Sulfate trends in two wells showed strongly reducing geochemical conditions immediately following the 2014 ZVZ pilot study injections:

- Sulfate at CP22-PMW10B decreased from 119 mg/L to less than 1 mg/L sulfate; and
- Sulfate at CP22-PMW06B decreased from 70 to less than 10 mg/L.

Sulfate concentrations at both wells remained below baseline levels during demonstration monitoring in 2017 and 2018, suggesting that reduced groundwater conditions have been maintained.

In addition, sulfate concentrations at four depth-discrete samples (CP22-HP07 from 39 to 41 feet bgs; CP22-HP10 from 35 to 37 feet bgs; and CP22-HP12 from 35 to 37 feet bgs and 39 to 41 feet bgs) were also lower than background levels, suggesting locally reduced groundwater conditions.

Dissolved Zinc – During demonstration sampling, dissolved zinc was present at concentrations ranging from below the analytical method detection limit (0.01 mg/L) to 0.38 mg/L, well below the secondary MCL for zinc of 5 mg/L.

Zinc concentrations measured prior to and upgradient of the 2014 pilot study injection area ranged from non-detect (less than 0.01 mg/L) to 0.0267 mg/L. During the demonstration monitoring, the maximum zinc concentration measured at upgradient source area well 220205-MWX was 0.088 (September 2017). Several locations within the 2014 pilot study ZVZ injection area had zinc at concentrations greater than that measured at well 220205-MWX during the demonstration monitoring:

- CP22-PMW04;
- CP22-PMW09B;
- CP22-HP01 from 31 to 33 feet bgs;
- CP22-HP02 from 31 to 33 feet bgs;
- CP22-HP04 from 35 to 37 feet bgs, 39 to 41 feet bgs, and 43 to 45 feet bgs; and
- CP22-HP07 from 39 to 41 feet bgs.

The increased zinc relative to baseline levels at these locations is potentially due to dissolution from the ZVZ. As shown in **Figure 8c**, concentrations of dissolved zinc in groundwater in September 2017 were generally highest in the first transect of grab-groundwater samples collected within the treatment area and attenuated in the downgradient direction.

6.5 SUPPLEMENTAL ANALYSES

In addition to the performance assessment topics described above, several supplemental analyses were requested during the Fall 2017 In-Progress Review (IPR) for this demonstration. These analyses were previously provided as part of the memorandum titled *Analysis to Inform Go/No Go Decision for Additional Field Tasks* (Geosyntec, 2018) and are included here for completeness.

6.5.1 Explanation of 2014 Pilot Study ZVZ Injection Dosage Estimates

The 2014 pilot study injection dosage was determined based on a target average mass loading of 0.5% ZVZ in soils throughout the treatment zone. An assessment of results from column study tests conducted as part of NESDI project 434 were used to estimate the TCP degradation rate (0.030 hr^{-1}) that corresponded to 0.5% ZVZ mass loading and verify degradation rates at the target loading would be sufficient to reduce TCP concentrations to the pilot study objective concentration (RBA and Geosyntec, 2015).

Based on this target mass loading, the design ZVZ injection mass for the pilot study was approximately 14,000 pounds based on the following:

$$ZVZ \text{ Mass} = ml_{z vz} \times n_L \times \pi \times R_I^2 \times T \times \rho_b$$

- Where:
 1. $ml_{z vz}$ = ZVZ mass loading (0.005);
 2. n_L = number of injection points (10);
 3. R_I = assumed radius of influence (10 feet);
 4. T = vertical treatment interval (9 feet); and
 5. ρ_b = soil bulk density (100 pounds per cubic foot).

Additional design calculations are provided in Section 4.3 of the pilot study report (RBA and Geosyntec, 2015).

The design ZVZ mass loading was selected to correspond with mass loadings typically achieved using direct injection technology. Significantly higher mass loading rates may be difficult to achieve unless other emplacement methods (e.g., trenching, hydraulic fracturing) are employed. Sites with a significantly higher demand from natural electron acceptors (e.g., dissolved oxygen, nitrate, ferric iron, sulfate) may need to consider alternative ZVZ injection strategies (e.g., multiple injections, barrier configuration) or alternative emplacement methods. Site-specific column studies are recommended as a basis for estimating TCP degradation rates at other sites if groundwater geochemical conditions are substantially different from those at the MCBCP demonstration location.

6.5.2 Groundwater Displacement Fraction with Injection Volumes

During the Fall 2017 IPR, the demonstration team was asked whether groundwater displacement outside of the target treatment zone may have occurred during the July 2014 ZVZ injections. Water and amendments injected at INJ-3 through INJ-13 are tabulated in Table 3-1 of the pilot study implementation report (RBA and Geosyntec, 2015) and total approximately 4,900 gallons. The estimated pore volume of the target treatment zone is 63,400 gallons based on the following calculation:

$$Pore\ Volume = n_L \times \pi \times R_I^2 \times T \times n_e \times \frac{7.48\ gal}{ft^3}$$

- Where:
 1. n_L = number of injection points (10);
 2. R_I = assumed radius of influence (10 feet);
 3. T = vertical treatment interval (9 feet); and
 4. n_e = effective porosity (0.30).

Based on these assumptions, approximately 8% of one pore volume was injected into the target treatment zone, suggesting groundwater displacement was limited. In addition, concentrations of TCP in cross-gradient monitoring wells CP22-PMW06B and CP22-PMW09B did not increase following the 2014 injections, supporting a conclusion that significant groundwater displacement did not occur.

6.5.3 Estimates of the Injection Pore Volumes of the Amendments

The estimated pore volume of fluids injected during the 2014 ZVZ pilot study is summarized above. The fluid injected into the target treatment zone included ZVZ and other additives to promote distribution in the subsurface (e.g., guar gum). A total of 160 pounds of additives were injected during the 2014 pilot study.

Summing the estimated quantity of ZVZ injected into INJ-3 through INJ-13, as tabulated in Table 3-1 of the pilot study implementation report (RBA and Geosyntec, 2015), results in a total of 11,000 pounds of ZVZ injected during the pilot study. The estimated soil mass within the target treatment zone is 2,826,000 pounds based on the following calculation:

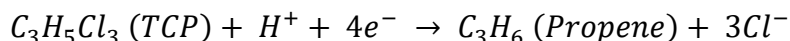
$$\text{Soil Mass} = n_L \times \pi \times R_I^2 \times T \times \rho_b$$

- Where:
 1. n_L = number of injection points (10);
 2. R_I = assumed radius of influence (10 feet);
 3. T = vertical treatment interval (9 feet); and
 4. ρ_b = soil bulk density (100 pounds per cubic foot).

Based on the estimated mass of ZVZ injected and total soil mass, the estimated average mass loading of ZVZ in soil throughout the target treatment zone is 0.39%.

6.5.4 Propene Mass Balance Stoichiometry

As discussed in Section 2 and illustrated in **Figure 1**, TCP is degraded by ZVZ via dichloroelimination to form propene:



Reaction stoichiometry predicts a 1:1 molar ratio of TCP degradation to propene production.

Where detected, propene concentrations ranging from 1.05 µg/L to 13.6 µg/L were observed during grab-groundwater sampling (**Table 11**), suggesting potential degradation of to up to 3.86 µg/L to 47.7 µg/L TCP. Observed TCP concentrations within the pilot study injection area are generally below that concentration range, suggesting that other sources may be contributing to some of the propene detections. Potential sources of propene in the environment include industrial sources as well as degradation of soil and forest debris (Morgott, 2018).

6.5.5 Limits of Detection

Project-specific screening levels (PSLs) were established for each analyte evaluated as part of the demonstration. Analytical limits of detection (LODs)⁹ were compared with PSLs to ensure that LODs were typically below PSLs. For TCP, a PSL of 0.5 µg/L (California's drinking water response level at that time) was specified during the 2014 pilot study. The typical LOD is at or below 0.005 µg/L, equivalent to the current California MCL and well below the PSL. Theoretically, LODs could be elevated for TCP due to sample dilution. However, during the demonstration sampling events, no TCP analytical results were reported with elevated LODs above the California MCL.

6.6 SUMMARY

Groundwater monitoring results collected as part of the 2014 ZVZ injection pilot study and in 2017 and 2018 as part of this demonstration indicate the following:

⁹ The LOD is defined as the smallest amount of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate is 1%.

- The pilot study was effective in decreasing TCP concentrations within and downgradient of the injection area by up to 99%.
- Samples collected in 2017 and 2018 indicate that TCP reductions are continuing, and in some cases increasing.
- Localized TCP concentration increases were observed in 2018, potentially due to seasonal or other short-term temporal changes in groundwater quality or groundwater flow direction. Additional sampling may be appropriate to further assess short- and long-term temporal trends.
- Propene was detected in multiple samples, consistent with the TCP transformation pathway of abiotic degradation via dichloroelimination, but the higher concentrations of propene relative to TCP may indicate potential secondary sources of propene in site groundwater.
- Reducing conditions (e.g., low sulfate concentrations, low DO, and negative ORP) were observed in several locations throughout the treatment area, suggesting that the ZVZ continues to effectively reduce site groundwater.

Zinc was observed at concentrations as high as 2% (20,000 mg/kg) in one of the soil borings advanced but either not observed above background levels or was only modestly above background in the other borings. These observations suggest that ZVZ can be delivered to the subsurface but was not delivered in a predictable manner during the July 2014 pilot study. As such, the project team has developed recommendations for optimizing ZVZ delivery for future injections, including:

- Selecting ZVZ material more amenable to subsurface injections; and
- Optimizing injection approach to improve predictability of material delivery.

Additional discussion of process optimization is provided in Section 8 of this report.

7.0 COST ASSESSMENT

The following section presents cost information for *in situ* applications of ZVZ.

7.1 COST MODEL

A simple cost model for *in situ* applications of ZVZ is presented in **Table 15**. Several cost elements were not part of this demonstration, but data for these elements was tracked and costs were developed from prior and ongoing studies on remediation of TCP by *in situ* ZVZ applications.

Table 15. Cost Model for In Situ ZVZ Applications.

Cost Element	Data Tracked	Costs	
Treatability Study ¹	<ul style="list-style-type: none"> Personnel required and associated labor Materials Analytical laboratory costs 	Project 1	
		<ul style="list-style-type: none"> Labor Materials Analytical 	\$11,000 \$500 \$5,000
		Project 2	
		<ul style="list-style-type: none"> Lump Sum 	\$30,000
		Project 3	
		<ul style="list-style-type: none"> Labor Materials Analytical 	\$72,000 \$40,000 \$62,000
Baseline Characterization ¹	<ul style="list-style-type: none"> Standard contaminant and hydrogeology assessment, no cost tracking 	N/A	
ZVZ Cost ¹	Unit: \$ per pound for ZVZ Data tracked: <ul style="list-style-type: none"> Mass of ZVZ required based on placement design (e.g., width and depth of PRB; average mass loading within injection area, etc.) Estimated material longevity 	\$1.85-\$3.00 per pound, plus shipping.	
ZVZ Placement ¹	Unit: \$ per cross-sectional square foot (PRB), \$ per day (injections), or \$ per fracture (injections) Data requirements: <ul style="list-style-type: none"> Installation method Mobilization cost Implementation approach unit cost 	Pneumatic Fracturing	
		<ul style="list-style-type: none"> Mobilization Unit Cost (\$/day) 	\$12,500 \$9,500
		Jet Injections	
		<ul style="list-style-type: none"> Mobilization Unit Cost (\$/fracture) 	\$10,000 \$1,500
		Trenched PRB	
		<ul style="list-style-type: none"> Unit Cost (\$/square foot) 	\$25-50
Waste Disposal ¹	Standard soil disposal, no cost tracking	N/A	
Operation and Maintenance Costs ¹	No unique requirements	N/A	
Long-Term Monitoring	<ul style="list-style-type: none"> Standard groundwater monitoring, no cost tracking 	N/A	

¹ – Not part of demonstration.

Additional discussion of the cost model elements is provided below.

7.1.1 Cost Element: Treatability Study

At most sites, a treatability study will be required to determine the site-specific requirements for implementation of the technology. Site-specific requirements may include, but are not limited to:

- ZVZ compatibility with site groundwater;
- Contaminant reaction rates with ZVZ and estimated mass loading requirements; and
- Assessment of ZVZ remediation end products.

The scope of a treatability study could range from simple laboratory batch tests to demonstrate contaminant reactivity with ZVZ to more complex column testing to estimate reaction rates and supply design parameters for *in situ* ZVZ application. Depending on the testing laboratory performing the treatability study, cost parameters associated with a study may include labor, materials, and analytical testing or a lump-sum cost to complete the study scope.

Although a treatability study was not performed as part of this demonstration, information on costs can be estimated from the following:

- Cost estimates obtained by Geosyntec for bench testing ZVM (ZVZ and ZVI) efficacy as part of prior projects.
 - Project 1: Laboratory batch and column evaluation of ZVM (ZVZ and ZVI) for treatment of TCP.
 - Project 2: Column-scale evaluation of ZVI of trichloroethene. Project 2 was included in this assessment because treatability study costs are expected to be relatively insensitive to contaminant and material selection.
- Information on costs associated with NESDI Project 434 (laboratory- and field-scale column testing of ZVZ as a remedial technology).

Based on these example projects, the cost of a treatability study can be very broad (\$16,500 to \$174,000). However, it is unlikely that most sites will require the detailed proof-of-concept testing completed as part of NESDI Project 434. The cost range of \$16,500 to \$30,000 indicated by Project 1 and Project 2 would be appropriate when estimating treatability study costs for most projects.

7.1.2 Cost Element: Baseline Characterization

Baseline characterization to support *in situ* ZVZ applications includes standard contaminant and hydrogeology assessment activities, including but not limited to:

- Monitoring well installations;
- Groundwater sampling and analysis;
- Soil logging to assess site hydrogeology;
- Collection and evaluation of groundwater elevation data; and
- Slug or aquifer testing to assess hydraulic conductivity.

These activities are not unique to ZVZ as a remediation technology and costs associated with the activities were not tracked as part of this demonstration. However, as with all *in situ* remedies, the success of *in situ* ZVZ applications depends on adequate characterization to support remedy design. Thus, while these costs are not unique to ZVZ, it is important to recognize that baseline characterization costs may increase significantly with site scale, complexity, or if prior characterization is inadequate for remedy design.

7.1.3 Cost Element: ZVZ Cost

The cost of ZVZ material depends on the bulk material cost (\$ per pound). Bulk ZVZ costs are available as part of ZVZ injection programs completed at MCBCP in July 2014 and February 2019:

- July 2014: \$3.00 per pound, plus shipping (14,000-pound order).
- February 2019: \$1.85 per pound, plus shipping (86,000-pound order).

Based on the above information, the bulk cost of ZVZ can vary substantially depending on the market rate for zinc (prices are set based on commodity prices for zinc) and quantity of material purchased.

In addition to the unit cost, ZVZ cost will depend on the total mass required based on the design of the *in situ* application and the expected longevity of the material once emplaced. Total mass requirements and expected material lifetime will be project specific; Section 7.3 includes a cost analysis based on an example site that incorporates these factors into a life-cycle cost for ZVZ as a remedial technology.

7.1.4 Cost Element: ZVZ Placement

The cost of ZVZ placement will depend on the technology selected (e.g., a traditional PRB configuration or placement by direct injection), mobilization costs, and the time required to implement the placement scope of work.

Costs for direction injection of ZVZ is available as part of ZVZ injection programs completed at MCBCP in July 2014 and February 2019:

- July 2014 (pneumatic fracturing injections): 10 injection points, three injection intervals per point (30 injection intervals total). Unit costs for the July 2014 scope were incurred on a daily rate, assuming an injection rate of one point with three injection intervals per day. The daily rate for injections includes drilling services, injection services, nitrogen supply, equipment rental, and consumable materials.
- February 2019 (jet injections): 12 injection points, eight injection intervals per point (96 injections intervals total). Unit costs for the February 2019 scope were incurred on a per-injection interval (fracture) rate. The unit rate for injections includes drilling services, injection services, equipment rental, and consumable materials.

Costs associated with a traditional PRB configuration are expected to be consistent with those for a ZVI application. A review of available literature suggests that PRB construction costs may range from \$25 to \$50 per cross-sectional square foot of barrier (Battelle Memorial Institute, 2012).

7.1.5 Cost Element: Waste Disposal

Waste soil, waste groundwater, and surfaced ZVZ material may be generated during ZVZ placement. Disposal of waste is not an activity unique to ZVZ as a remediation technology and costs associated with waste disposal were not tracked as part of this demonstration. However, waste material generation may be significant if ZVZ is being employed in certain configurations (e.g., as a PRB installed by trenching). Thus, disposal costs may be relevant when evaluating ZVZ PRBs against alternatives that generate less waste material.

7.1.6 Cost Element: Operation and Maintenance Costs

Operation and maintenance costs associated with *in situ* ZVZ applications are minimal (e.g., monitoring well maintenance, maintaining site access, etc.). These activities are not unique to ZVZ as a remediation technology and costs associated with the activities were not tracked as part of this demonstration.

7.1.7 Cost Element: Long-Term Monitoring

Monitoring costs associated with *in situ* ZVZ applications are consistent with those associated with other *in situ* ZVM applications. These activities are not unique to ZVZ as a remediation technology and costs associated with the activities were not tracked as part of this demonstration.

7.2 COST DRIVERS

The primary cost drivers for *in situ* applications of ZVZ relative to other remedial technologies are:

1. Mass of ZVZ required. The mass of ZVZ required for remedy implementation at a specific site may be influenced by the following factors:
 - a. Site-specific degradation rates.
 - b. Site-specific geochemical conditions that suggest ZVZ may passivate over time, potentially requiring multiple applications of ZVZ.

The mass of ZVZ required (and associated cost) for remedy implementation may become a significant cost driver relative to other technologies if site-specific treatability testing suggests that larger amounts of ZVZ mass are required to achieve desired degradation rates or that rapid passivation of ZVZ is likely to occur following implementation.

2. Scope of ZVZ placement. The scope of ZVZ placement activities may be influenced by the following factors:
 - a. Spatial extent of contamination.
 - b. Vertical extent of contamination.

- c. Ability to reach vertical extent of contamination using conventional drilling methods (for injection-based approaches) or trenching methods (for traditional PRB configurations).
- d. Achievable radius of influence (for injection-based approaches).
- e. Required PRB thickness and ZVZ mass loading based on groundwater and contaminant flux (for traditional PRB configurations).

The cost of ZVZ placement may increase and become less favorable relative to other technologies if:

- a. The spatial or vertical extent of contamination is large.
- b. Injection-based technologies would require unconventional drilling methods (e.g., rotosonic drilling) or are likely to only achieve a limited radius of influence given site-specific lithology.
- c. Flux of contaminated groundwater is sufficiently high that a traditional PRB application would require either very high ZVZ mass loading or PRB thickness to achieve remedial objectives.

7.3 COST ANALYSIS

An ongoing ZVZ injection program at MCBCP was used as the basis for estimating cost to implement this technology. A site description for MCBCP is provided in Section 4 of this report; assumptions used to scope the ongoing ZVZ injection program are provided below. A detailed description of the ongoing injection program is provided in the Final Work Plan, Zero-Valent Zinc Injections for 1,2,3-Trichloropropane, 12 Area Site 13 and 22/23 Area Groundwater (Brady-GCE II and Geosyntec, 2018).

7.3.1 Design Assumptions

The ZVZ injection design for 22/23 Area groundwater involves jet injection of ZVZ into the subsurface as a PRB configuration. A PRB was selected as the most effective configuration to degrade TCP mass as it migrates from the vicinity of well 220205-MWX and other wells with elevated TCP concentrations, thereby reducing or eliminating 1,2,3-TCP mass flux to the downgradient plume. ZVZ injections are assumed to occur along a 150-foot transect perpendicular to the estimated groundwater flow direction (**Figure 12**). The assumed achievable radius of influence (ROI) is 10 feet, resulting in a total of 14 planned injection locations along the length of the barrier.

Groundwater monitoring data collected from the 22/23 Area as part of this project and the July 2014 ZVZ pilot study indicate that TCP is present in groundwater from approximately 35 to 45 feet bgs and from 50 to 60 feet bgs. The vertical profile of ZVZ injections along the barrier was assumed to extend from 35 to 45 feet bgs and from 50 to 60 feet bgs. A total of eight injection intervals were assumed to occur over the 20-foot vertical profile.

The mass of ZVZ required for the injection program was estimated based on the proposed treatment volume and an assumed target ZVZ application rate of 0.5% by dry weight of soil within the target treatment zone.

1. Approximate treatment area: 160 feet x 30 feet (4,800 square feet [ft²]);
2. Vertical treatment interval: 35 to 45 feet bgs and 50 to 60 feet bgs (20 feet total);
 - a. Treatment volume: 96,000 cubic feet (ft³);
3. Assumed soil density: 110 pounds per ft³;
 - a. Estimated soil mass: 10,560,000 pounds;
4. ZVZ application rate: 0.005 pounds/pound soil;
5. ZVZ quantity: 52,800 pounds.

For this cost analysis, the injected ZVZ is assumed to passivate after 15 years, at which time a second maintenance injection will be required. The maintenance injection is assumed to be half the scope of the initial injection (7 points, 8 injection intervals per point, 26,400 pounds of ZVZ injected).

For the purpose of this evaluation, installation of 24 groundwater monitoring wells (12 screened from 35 to 45 feet bgs and 12 screened from 50 to 60 feet bgs) was assumed for baseline and long-term monitoring. An additional five existing monitoring wells were also included in the baseline and long-term monitoring program. The long-term monitoring program assumes annual sampling and analysis of:

- TCP;
- Anions (nitrate, nitrite, and sulfate);
- Dissolved metal cations (calcium, iron, manganese, zinc, cadmium, copper, and lead); and
- Propene.

7.3.2 Life-Cycle Cost Estimate

A life-cycle cost for ZVZ injections was developed in general accordance with USEPA guidelines for feasibility studies (EPA, 2000). The costs for ZVZ material and injections were estimated using the information presented in **Table 15**. The costs for other major components (e.g., monitoring well installation and sampling) were estimated based on previous experience and professional judgment, and information from technology vendors. Some items such as project management, remedial design, construction management, and contingencies were estimated on a percentage basis of expected contractor costs. Future costs were presented in net present value over the lifetime of the cleanup, up to a maximum of 30 years. The discount rate used for the net present value calculation was 3.6%, based on the 2018 30-year nominal interest rate on Treasury notes and bonds, published by the United States Office of Management and Budget (OMB Circular No. A-94, Appendix C).

Using the approach described above, an estimated life-cycle cost for ZVZ injections is presented in **Table 16a**. Under the assumptions described in Section 7.3.1, the estimated 30-year life-cycle cost for ZVZ injections is \$2,220,000.

7.3.3 Comparison to ZVI

For comparison purposes, a life-cycle cost for ZVI injections was also developed. The cost of ZVI was estimated at \$0.60 per pound based on discussions with vendors regarding current pricing. All quantities and other cost assumptions were held constant to the ZVZ life-cycle costs (see Section 7.3.2) to allow for a direct comparison of the two technologies. Using this approach, an estimated life-cycle cost for ZVI injections is presented in **Table 16b**. The estimated 30-year life-cycle cost for ZVI injections is \$2,080,000.

Use of ZVZ for remediation of TCP and potentially other lesser-chlorinated aliphatic compounds is an improvement on treatment of these compounds by traditional ZVMs (e.g., ZVI), due to the more favorable reactivity of ZVZ. In these cases, ZVI may not be reactive or may be reactive at a sufficiently low rate that the lower unit cost of ZVI is offset by the need to emplace a greater amount of ZVI relative to ZVZ. As such, the benefits of this technology are not related to cost avoidance or savings; instead, the primary benefit is improved remedy performance relative to existing technologies.

8.0 IMPLEMENTATION ISSUES

As described in Section 2, general guidance on implementation of ZVM remedies is available from the Contaminated Site Clean-Up Information website maintained by the USEPA (<https://clu-in.org/>). Key guidance documents include, but are not limited to, the following:

- Permeable Reactive Barrier: Technology Update (ITRC, 2011).
- Best Practices for Injection and Distribution of Amendments (Battelle Memorial Institute and Naval Facilities Engineering Command Alternative Restoration Technology Team, 2013).
- Hydraulic Fracturing Technology - Applications Analysis and Technology Evaluation Report (USEPA, 1993).

Information presented in these guidance documents is not repeated herein.

The key technology-specific lesson learned during implementation of the July 2014 pilot study ZVZ injections and subsequent validation monitoring conducted as part of this project is that ZVZ material selection should be made in consideration of implementation methodology. The Zn1210 injected during the July 2014 pilot study was selected primarily for its reactivity profile with TCP. However, significant ZVZ surfacing was noted during the injections, which was attributed in part to the injection method, and in part to the relatively large size (20 to 60 mesh, which equates to 250 to 850 microns) and irregular shape of the injected Zn1210.

While the observed surfacing resulted in limited and unpredictable distribution ZVZ, trends in TCP concentration within and downgradient of the ZVZ injection area observed during post-injection performance monitoring and as part of this verification project demonstrated that the pilot study was nonetheless successful in terms of achieving targeted TCP concentration reductions. Based on the TCP concentration trends and other findings of this verification project, the pilot study was considered a success by the Navy and the Navy elected to move forward with optimized ZVZ injections at two areas of MCBCP.

Additional ZVZ injections were completed at MCBCP in February and March 2019 (Brady-GCE II and Geosyntec, 2018). The scope of work for these injections was developed in consideration of the above lesson learned. Specific changes from the 2014 pilot study scope to optimize the 2019 injection program include the following:

1. Selection of an alternative ZVZ material. As described in Section 2.2, both Zn1210 and Zn64 were capable of effectively degrading TCP. Because Zn64 is smaller and has a more regular shape, it was initially selected for the 2019 injection program. However, Zn64 is no longer available, so a comparable product known as Ultra-Pure TF Granules® was selected for the ongoing injections based on feasibility of injection, similarity in mesh size to Zn64, anticipated product longevity, and cost.
2. Selection of an alternative injection approach. A specialized injection approach called jet injection was used for the 2019 injections. Jet injection combines high pressure jetting and controlled hydraulic fracturing for emplacement of amendments into geologic matrices

where remediation is limited by contact between remediation amendments and contaminants trapped in the matrix. Jet injection involves two primary steps:

- a. “Notching” of the formation at the point of injection; and
- b. Slurry injection under pressure to fracture the formation (USEPA, 1993).

The notching step serves to influence the orientation of the fracture and to reduce the pressure required to initiate the fracture. The high-pressure portion of the DPT jet injection method is limited to the notching step (USEPA, 1993) and does not represent an increased likelihood of surfacing or other injection issues relative to other injection approaches.

Performance monitoring data following implementation of the additional ZVZ injections is not available. However, minimal surfacing was observed during field implementation, suggesting that the process optimization was successful in improving reliability and predictability of ZVZ delivery to the subsurface.

The primary objective of this project was to conduct verification monitoring of the previously-funded ISCR pilot study using ZVZ, a novel technology for the remediation of chlorinated alkanes. Verification monitoring results clearly demonstrate the importance of verification monitoring in assessing long term viability and performance of the technology. Lessons learned from this work were used to inform the design and implementation of two ongoing full-scale applications of this technology at MCBCP.

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TABLES

Table 5: Pilot Study Zero Valent Zinc Injection Summary

22/23 Area

Marine Corps Base Camp Pendleton, CA

Date	Injection Location	Depth Interval (ft bgs)	Initiation Pressure (psi)	Maintenance Pressure (psi)	Surface Heave (Initial/Residual) (inches)	Initial Water Quantity (lbs)	Quantity of ZVZ (lbs)	Quantity of Additive (lbs)	Type of Additive	Injection Pressure (psi)	Injection Flow Rate (gpm)	Injection Duration (minutes)	Total Volume Injected (gallons)	Estimated GW Surfacing (gallons)	Estimated ZVZ Surfacing (gallons)	Estimated Quantity of ZVZ Injected (lbs)	Observed Pressures in Monitoring Wells
7/22/2014	INJ-1*	42-45	300	150	0/0	170	470	0.0	-	20	25	8	200	20	0	100	
7/23/2014	INJ-2	42-45	50	50	0.1/0	470	235	4.5	Guar	45	28	30	840	100	0	235	
		42-45	50	50	0/0	475	200	4.5	Guar	45	28	3	84	84	0	200	
7/24/2014	INJ-2	36-39	50	50	0.2/0	1,040	470	9.0	Guar	30	32	6	192	0	75	286	
		39-42	50	50	0.1/0	1,000	470	9.0	Guar	40	33	6	198	30	0	470	
7/24/2014	INJ-3	39-42	-	-	-	1,000	470	8.5	Guar	50	35	5	175	10	10	443	
		42-45	-	-	-	1,000	470	8.5	Guar	60	30	5	150	5	5	454	
7/24/2014	INJ-4	39-42	-	-	-	1,500	705	12.7	Guar	40	30	8	240	0	15	661	6B = 2 psi
		42-45	-	-	-	1,500	705	12.7	Guar	60	30	8	240	0	0	705	6A = 3 psi; 6B = 10psi; 2 = 2 psi
7/25/2014	INJ-5	39-42	-	-	-	1,500	705	9.0	Guar	45	30	10	300	0	40	611	
		42-45	-	-	-	1,500	705	9.0	Guar	60	33	7	231	18	2	699	
7/25/2014	INJ-6	39-42	-	-	-	1,000	470	6.0	Guar	20	29	7	203	30	30	401	10B = 2 psi
		42-45	-	-	-	1,500	705	9.0	Guar	45	33	10	330	9	1	703	10B = 1 psi
7/25/2014	INJ-7	39-42	-	-	-	1,000	470	6.0	Guar	25	32	6	192	0	40	372	9A = 2 psi; 9B = 1 psi
		42-45	-	-	-	1,500	705	9.0	Guar	45	33	8	264	5	5	692	
7/26/2014	INJ-8	39-42	-	-	-	1,000	500	6.0	Guar	40	33	6	198	0	20	449	
		42-45	-	-	-	1,000	500	6.0	Guar	50	35	6	210	5	0	500	
7/26/2014	INJ-9	39-42	-	-	-	1,000	500	6.0	Guar	45	34	6	204	0	15	463	10B = 6 psi
		42-45	-	-	-	1,000	500	6.0	Guar	55	34	6	204	0	0	500	10B = 14 psi
7/26/2014	INJ-10	39-42	-	-	-	1,000	500	6.0	Guar	35	35	5	175	0	2	494	10B = 6 psi
		42-45	-	-	-	1,000	500	6.0	Guar	50	34	6	204	0	0	500	
7/28/2014	INJ-11	39-42	-	-	-	1,000	500	6.0	Guar	35	35	7	245	2	0	500	
		42-45	-	-	-	1,000	500	6.0	Guar	65	36	6	216	5	0	500	2 = 1 psi; 4 = 1 psi
7/28/2014	INJ-12	39-42	-	-	-	1,080	540	6.0	Veriflo	30	19	12	228	0	100	303	
		42-45	-	-	-	1,000	500	4/2	Guar/Veriflo	50	33	8	264	0	30	443	
7/28/2014	INJ-13	42-45	-	-	-	2,000	810	10.0	Veriflo	40	18	23	414	0	100	614	4 = 1 psi

*Pump clogged 2 times with ZVZ during first injection attempt. Pulled string and installed larger (4.5") casing with larger packers to minimize surfacing. Pump clogged again during 3rd injection. Estimate 100 lbs of ZVZ injected into ground based on amount recovered from pump and hoses.

Table 10: Groundwater Sampling Results - Field Parameters

22/23 Area

Marine Corps Base Camp Pendleton

California

Location	Sample Depth (ft bgs/ ft BTOC)	Field Parameters				
		pH	DO (mg/L)	ORP (mV)	Temp (°C)	Sp. Cond. (mS/cm)
September 2017						
Groundwater Monitoring Wells						
220205-MWX	36	7.32	0.75	39.4	25.2	1.25
CP22-PMW04	42	7.30	0.27	-88.0	22.2	1.103
CP22-PMW06B	43	7.47	1.56	-111	26.1	1.002
CP22-PMW07B	41	7.44	0.35	5.3	24.5	1.19
CP22-PMW08B	45	7.32	0.41	-77.5	23.7	1.228
CP22-PMW09B	45	7.31	0.34	-96.1	27.3	1.22
CP22-PMW10B	41	9.73	0.29	-297.6	24.4	0.763
Hydropunch Samples						
CP22-HP01	35-37	7.77	1.24	-131.2	21.9	1.15
	39-41	7.67	4.55	3.0	23.5	1.146
	43-45	NM	NM	NM	NM	NM
CP22-HP02	35-37	7.91	1.47	13.3	22.6	0.513
	39-41	NM	NM	NM	NM	NM
	43-45	7.99	4.91	-17.2	24.1	1.17
CP22-HP03	35-37	8.71	3.80	-114.8	20.3	1.049
	39-41	7.99	0.70	-585.1	20.6	0.887
	43-45	7.73	2.12	-37.1	20.4	1.156
CP22-HP04	35-37	7.62	7.83	152	30.5	0.014
	39-41	8.01	2.16	124.2	28.2	0.938
	43-45	8.23	8.12	127.4	29.4	0.014
CP22-HP05	35-37	NM	NM	NM	NM	NM
	39-41	7.18	8.19	106.8	26.0	1.142
	43-45	7.98	7.74	150.5	30.2	0.025
CP22-HP06	35-37	7.92	3.65	7.8	26.0	1.209
	39-41	7.80	1.46	-191	26.4	1.168
	43-45	7.78	3.10	-45.4	25.1	1.097
CP22-HP07	35-37	7.94	6.30	189.4	30.3	0.017
	39-41	8.30	7.47	142	33.2	0.009
	43-45	7.73	7.63	151.2	31.2	0.016
CP22-HP08	35-37	7.81	1.77	-71.2	21.3	1.196
	39-41	NM	NM	NM	NM	NM
	43-45	7.65	1.30	-96.3	23.3	1.115
CP22-HP09	35-37	7.67	1.13	-65.5	24.6	1.223
	39-41	7.79	6.32	16.9	27.2	0.603
	43-45	7.63	0.77	-131.8	25.7	1.137
CP22-HP10	35-37	7.68	3.33	37.2	28.3	1.157
	39-41	7.61	2.48	-41.0	27.1	1.124
	43-45	7.63	3.21	-103	28.6	1.098

Table 10: Groundwater Sampling Results - Field Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton
 California

Location	Sample Depth (ft bgs/ ft BTOC)	Field Parameters				
		pH	DO (mg/L)	ORP (mV)	Temp (°C)	Sp. Cond. (mS/cm)
CP22-HP11	35-37	7.84	2.68	-9.4	21.0	1.218
	39-41	7.77	1.35	-62.1	20.9	1.132
	43-45	7.69	2.14	-79.2	21.5	1.104
CP22-HP12	35-37	7.85	6.07	86.4	31.7	1.169
	39-41	7.96	5.07	-89.4	21.5	1.004
	43-45	NM	NM	NM	NM	NM
January 2018						
Groundwater Monitoring Wells						
220205-MWX	NA	7.19	0.39	-0.8	20.4	1.38
CP22-PMW04	NA	7.17	0.59	25.1	19.5	1.225
CP22-PMW07B	NA	7.30	0.55	-90.1	16.9	1.289
CP22-PMW08B	NA	7.27	0.50	-94.6	18.6	1.369
CP22-PMW10B	NA	10.05	0.25	-284.4	19.6	0.78
Hydropunch Samples						
CP22-HP01	35-37	8.12	6.70	108.3	22.8	1.248
	39-41	7.72	0.76	-83.9	23.6	1.223
CP22-HP02	35-37	7.69	3.27	-30.6	24.6	1.245
	39-41	7.75	0.39	-165.9	25.3	1.216
CP22-HP03	35-37	7.77	11.3	-100.1	24.1	1.158
	39-41	7.63	0.29	-147.8	24.1	1.148
CP22-HP04	35-37	7.29	1.46	-73.7	19.8	0.972
	39-41	7.24	0.10	-188.2	19.3	0.88
	43-45	NM	NM	NM	NM	NM
CP22-HP05	35-37	7.46	0.05	-185.8	21.9	1.195
	39-41	7.37	1.31	-128.1	21.2	1.189
	43-45	7.44	4.00	-174.8	21.8	1.186
CP22-HP06	35-37	7.60	0.07	-278.9	21.6	1.171
	39-41	7.78	0.01	-321.9	16.5	1.102
CP22-HP07	35-37	7.66	0.04	-239.7	22.9	1.022
	39-41	7.76	0.75	-153.6	22.8	0.936
CP22-HP08	35-37	7.62	0.11	-239.6	19.8	1.143
	39-41	7.71	0.22	-261.9	21.1	1.099
CP22-HP09	35-37	7.44	0.17	-183.9	22.3	1.232
	39-41	7.51	1.14	-112.4	21.9	1.033
CP22-HP10	35-37	7.01	3.56	1.10	19.8	1.225
	39-41	7.60	1.38	-112.2	17.4	1.175
	43-45	7.38	0.36	-170	17.6	1.111
CP22-HP11	35-37	7.91	0.52	-173.2	20.7	1.213
	39-41	7.66	0.22	-197.1	21.7	1.159
CP22-HP12	35-37	7.53	0.29	-156.2	18.5	1.152
	39-41	7.81	0.42	-178.2	19.8	1.002

Table 10: Groundwater Sampling Results - Field Parameters

22/23 Area

Marine Corps Base Camp Pendleton

California

Location	Sample Depth (ft bgs/ ft BTOC)	Field Parameters				
		pH	DO (mg/L)	ORP (mV)	Temp (°C)	Sp. Cond. (mS/cm)
September 2018						
Groundwater Monitoring Wells						
220205-MWX	38	7.27	0.33	73.0	27.6	1.328
CP22-PMW04	42	7.31	0.40	37.1	25.7	1.193
CP22-PMW07B	41	7.31	0.59	119.7	25.4	1.233
CP22-PMW08B	45	7.14	0.42	59.3	25.2	1.238
CP22-PMW10B	41	9.59	0.24	-355.9	25.1	0.702
Hydropunch Samples						
CP22-HP01	31-33	7.97	2.72	60.5	27.8	1.38
	35-37	NM	NM	NM	NM	NM
	39-41	7.73	2.91	56.7	26.4	1.322
CP22-HP02	31-33	7.93	4.70	56.4	24.3	1.368
	35-37	7.54	1.26	5.60	26.7	1.244
	39-41	7.51	0.79	-46.5	25.0	1.146
CP22-HP03	31-33	7.25	2.11	-27.0	23.9	1.164
	35-37	7.55	0.95	-31.3	24.3	1.169
	39-41	NM	NM	NM	NM	NM
CP22-HP04	31-33	7.70	0.52	-42.9	21.7	1.118
	35-37	7.60	1.22	-53.4	21.9	0.964
	39-41	7.47	2.38	-31.9	21.9	1.104
CP22-HP05	31-33	7.48	1.40	-83.3	23.1	1.174
	35-37	7.45	2.26	-34.4	24.3	1.194
	39-41	7.67	1.47	-21.3	27.0	1.192
CP22-HP06	31-33	NM	NM	NM	NM	NM
	35-37	7.45	0.86	-87.9	24.4	1.100
	39-41	7.48	5.06	21.0	25.5	1.142
CP22-HP07	31-33	7.59	0.51	-103.3	23.8	0.669
	35-37	7.65	14.0	30.1	24.8	0.826
	39-41	7.53	3.95	65.4	23.2	0.820
CP22-HP08	31-33	7.49	2.21	-39.8	19.8	1.161
	35-37	7.42	3.06	-21.9	19.7	0.957
	39-41	7.39	2.91	-14.7	19.9	0.948
CP22-HP09	31-33	NM	NM	NM	NM	NM
	35-37	7.68	0.76	-139.9	23.1	1.225
	39-41	NM	NM	NM	NM	NM
CP22-HP10	31-33	NM	NM	NM	NM	NM
	35-37	7.68	3.33	-63.7	23.3	1.256
	39-41	8.28	3.10	-74.1	28.3	0.971

Table 10: Groundwater Sampling Results - Field Parameters

22/23 Area

Marine Corps Base Camp Pendleton

California

Location	Sample Depth (ft bgs/ ft BTOC)	Field Parameters				
		pH	DO (mg/L)	ORP (mV)	Temp (°C)	Sp. Cond. (mS/cm)
CP22-HP11	31-33	NM	NM	NM	NM	NM
	35-37	7.65	0.51	-140.4	23.6	1.051
	39-41	7.47	2.14	-36.5	26.0	1.028
CP22-HP12	31-33	NM	NM	NM	NM	NM
	35-37	NM	NM	NM	NM	NM
	39-41	7.57	2.87	28.7	26.4	0.941

Notes:

NM - Not measured due to insufficient sample quantity

DO - dissolved oxygen

ORP - oxidation-reduction potential

Temp - temperature

ft bgs/ft bTOC - feet below ground surface (hydropunch samples) or feet below top of well casing (groundwater monitor well samples)

Sp Cond - specific conductivity

mg/L - milligrams per liter

mV - millivolts

mS/cm - millisiemens per centimeter

Table 11: Groundwater Analytical Results - Chlorinated Propanes

22/23 Area
Marine Corps Base Camp Pendleton,
California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (µg/L)				
			1,2,3-TCP	Allyl Chloride	1,2-DCP	1,3-DCP	Propene
Monitoring Well Samples							
220205-MWX	10-40	2/22/2012	4.6	--	0.42 J	--	--
220205-MWX	10-40	6/17/2014	6.5	--	0.34 J	--	--
220205-MWX	10-40	9/9/2014	7.4	--	0.34 J	--	--
220205-MWX	10-40	11/6/2014	6.4	--	0.36 J	--	--
220205-MWX	10-40	12/15/2014	7.1	--	0.37 J	--	--
220205-MWX	10-40	1/6/2015	6.5	--	0.42 J	--	--
220205-MWX	10-40	9/12/2017	7.0	<1.0	<0.50	<1.0	<1.00
220205-MWX	10-40	1/19/2018	5.7	--	--	--	<1.00
220205-MWX	10-40	9/12/2018	3.9	--	--	--	<1.00
CP22-PMW04	37-47	2/21/2012	--	--	<1.0	--	--
CP22-PMW04	37-47	2/22/2012	1.3	--	--	--	--
CP22-PMW04	37-47	6/18/2014	2.1	--	0.16 J	--	--
CP22-PMW04	37-47	9/10/2014	1.5	--	0.13 J	--	--
CP22-PMW04	37-47	11/6/2014	1.9	--	0.20 J	--	--
CP22-PMW04	37-47	12/15/2014	2.8 J	--	0.28 J	--	--
CP22-PMW04	37-47	1/6/2015	1.7	--	0.20 J	--	--
CP22-PMW04	37-47	9/12/2017	0.054	<1.0	<0.50	<1.0	<1.00
CP22-PMW04-D	37-47	9/12/2017	0.054	<1.0	<0.50	<1.0	<1.00
CP22-PMW04	37-47	1/19/2018	0.037	--	--	--	<1.00
CP22-PMW04	37-47	9/12/2018	0.72	--	--	--	<1.00
CP22-PMW04-D	37-47	9/12/2018	0.60	--	--	--	<1.00
CP22-PMW06B	38-48	6/18/2014	0.0053	--	<0.20	--	--
CP22-PMW06B	38-48	9/10/2014	0.0033 J	--	<0.20	--	--
CP22-PMW06B	38-48	11/6/2014	0.0023 J	--	<0.20	--	--
CP22-PMW06B	38-48	12/18/2014	0.013	--	<0.20	--	--
CP22-PMW06B	38-48	1/7/2015	0.0085	--	<0.20	--	--
CP22-PMW06B	38-48	9/12/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-PMW07B	36-46	6/18/2014	0.72	--	<0.20	--	--
CP22-PMW07B	36-46	9/10/2014	0.24	--	<0.20	--	--
CP22-PMW07B	36-46	11/6/2014	0.23	--	<0.20	--	--
CP22-PMW07B	36-46	12/16/2014	0.38	--	<0.20	--	--
CP22-PMW07B-D	36-46	12/16/2014	0.38	--	<0.20	--	--
CP22-PMW07B	36-46	1/7/2015	0.34	--	<0.20	--	--
CP22-PMW07B	36-46	9/12/2017	0.022	<1.0	<0.50	<1.0	<1.00
CP22-PMW07B	36-46	1/19/2018	0.014	--	--	--	<1.00
CP22-PMW07B	36-46	9/12/2018	0.042	--	--	--	<1.00
CP22-PMW08B	40-50	6/19/2014	0.011	--	<0.20	--	--
CP22-PMW08B	40-50	9/10/2014	0.0049 J	--	<0.20	--	--
CP22-PMW08B	40-50	11/7/2014	<0.0033	--	<0.20	--	--
CP22-PMW08B	40-50	12/16/2014	0.0037 J	--	<0.20	--	--
CP22-PMW08B	40-50	1/7/2015	0.0024 J	--	<0.20	--	--
CP22-PMW08B	40-50	9/12/2017	0.0056	<1.0	<0.50	<1.0	<1.00

Table 11: Groundwater Analytical Results - Chlorinated Propanes
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (µg/L)				
			1,2,3-TCP	Allyl Chloride	1,2-DCP	1,3-DCP	Propene
CP22-PMW08B	40-50	1/19/2018	<0.0050	--	--	--	<1.00
CP22-PMW08B	40-50	9/12/2018	<0.0050	--	--	--	<1.00
CP22-PMW09B	40-50	6/19/2014	0.0075	--	<0.20	--	--
CP22-PMW09B	40-50	9/11/2014	0.0053	--	<0.20	--	--
CP22-PMW09B	40-50	11/7/2014	<0.0086	--	<0.20	--	--
CP22-PMW09B	40-50	12/16/2014	0.024	--	<0.20	--	--
CP22-PMW09B	40-50	1/7/2015	0.0050	--	<0.20	--	--
CP22-PMW09B	40-50	9/12/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-PMW10B	36-46	6/17/2014	0.77	--	<0.20	--	--
CP22-PMW10B	36-46	9/11/2014	0.34	--	<0.20	--	--
CP22-PMW10B	36-46	11/7/2014	0.027	--	0.11 J	--	--
CP22-PMW10B	36-46	12/18/2014	0.019	--	<0.20	--	--
CP22-PMW10B	36-46	1/7/2015	0.021	--	<0.20	--	--
CP22-PMW10B	36-46	9/12/2017	0.011	<1.0	<0.50	<1.0	<1.00
CP22-PMW10B	36-46	1/19/2018	0.0073	--	--	--	<1.00
CP22-PMW10B	36-46	9/12/2018	0.014	--	--	--	<1.00
Grab-Groundwater Samples							
CP22-HP01	31-33	9/12/2018	0.29	--	--	--	<1.00
CP22-HP01-D	31-33	9/12/2018	0.27	--	--	--	<1.00
CP22-HP01	35-37	9/14/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP01	35-37	1/17/2018	0.072	--	--	--	4.10
CP22-HP01	35-37	9/12/2018	0.17	--	--	--	--
CP22-HP01	39-41	9/14/2017	0.054	<1.0	<0.50	<1.0	<1.00
CP22-HP01	39-41	1/17/2018	0.27 J	--	--	--	<1.00
CP22-HP01	39-41	9/12/2018	0.28 J	--	--	--	1.65
CP22-HP02	31-33	9/12/2018	0.089	--	--	--	4.56
CP22-HP02	35-37	9/12/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP02	35-37	1/17/2018	0.086	--	--	--	<1.00
CP22-HP02	35-37	9/12/2018	0.36	--	--	--	2.36
CP22-HP02	39-41	9/12/2017	0.12	--	--	--	--
CP22-HP02	39-41	1/17/2018	0.24	--	--	--	<1.00
CP22-HP02	39-41	9/12/2018	<0.0050	--	--	--	1.57
CP22-HP02	43-45	9/12/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP03	31-33	9/12/2018	0.17	--	--	--	<1.00
CP22-HP03	35-37	9/14/2017	<0.0050	<1.0	<0.50	<1.0	1.63
CP22-HP03	35-37	1/17/2018	0.096	--	--	--	<1.00
CP22-HP03-D	35-37	1/17/2018	0.10	--	--	--	<1.00
CP22-HP03	35-37	9/12/2018	0.027	--	--	--	2.14
CP22-HP03	39-41	9/14/2017	0.041	<1.0	<0.50	<1.0	13.6
CP22-HP03	39-41	1/17/2018	0.036	--	--	--	<1.00
CP22-HP03	39-41	9/12/2018	<0.0050	--	--	--	--
CP22-HP03	43-45	9/14/2017	<0.0050	<1.0	<0.50	<1.0	<1.00

Table 11: Groundwater Analytical Results - Chlorinated Propanes
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (µg/L)				
			1,2,3-TCP	Allyl Chloride	1,2-DCP	1,3-DCP	Propene
CP22-HP04	31-33	9/13/2018	<0.0050	--	--	--	1.06
CP22-HP04	35-37	9/11/2017	0.057	--	--	--	1.60
CP22-HP04	35-37	1/19/2018	0.027	--	--	--	<1.00
CP22-HP04	35-37	9/13/2018	0.016	--	--	--	1.29 J
CP22-HP04-D	35-37	9/13/2018	0.017	--	--	--	<1.00 UJ
CP22-HP04	39-41	9/11/2017	0.043	<1.0	<0.50	<1.0	1.55
CP22-HP04	39-41	1/19/2018	0.021	--	--	--	2.35
CP22-HP04	39-41	9/13/2018	<0.0050	--	--	--	<1.00
CP22-HP04	43-45	9/11/2017	<0.0050	<1.0	<0.50	<1.0	1.40
CP22-HP04	43-45	1/19/2018	<0.0050	--	--	--	<1.00
CP22-HP05	31-33	9/13/2018	0.057	--	--	--	<1.00
CP22-HP05	35-37	1/19/2018	0.20	--	--	--	<1.00
CP22-HP05	35-37	9/13/2018	0.20	--	--	--	1.44
CP22-HP05	39-41	9/11/2017	0.076	<1.0	<0.50	<1.0	<1.00
CP22-HP05	39-41	1/19/2018	0.064	--	--	--	<1.00
CP22-HP05	39-41	9/13/2018	0.055	--	--	--	2.62
CP22-HP05	43-45	9/11/2017	<0.0050	--	--	--	1.31
CP22-HP05	43-45	1/19/2018	<0.0050	--	--	--	1.18
CP22-HP06	31-33	9/13/2018	0.024	--	--	--	6.12
CP22-HP06	35-37	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP06	35-37	1/17/2018	0.23	--	--	--	<1.00
CP22-HP06	35-37	9/13/2018	0.32 J	--	--	--	<1.00
CP22-HP06	39-41	9/13/2017	0.12	--	--	--	1.94
CP22-HP06	39-41	1/18/2018	0.034	--	--	--	<1.00
CP22-HP06	39-41	9/13/2018	<0.0050	--	--	--	9.98
CP22-HP06	43-45	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP07	31-33	9/13/2018	0.062	--	--	--	<1.00
CP22-HP07	35-37	9/11/2017	0.16	<1.0	<0.50	<1.0	<1.00
CP22-HP07	35-37	1/18/2018	0.20	--	--	--	<1.00
CP22-HP07	35-37	9/13/2018	0.17	--	--	--	<1.00
CP22-HP07	39-41	9/11/2017	0.068	--	--	--	2.96
CP22-HP07	39-41	9/12/2017	--	<1.0	<0.50	<1.0	--
CP22-HP07	39-41	1/18/2018	0.052	--	--	--	<1.00
CP22-HP07	39-41	9/13/2018	0.059	--	--	--	<1.00
CP22-HP07	43-45	9/11/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP08	31-33	9/14/2018	0.081	--	--	--	2.28
CP22-HP08	35-37	9/13/2017	0.45	<1.0	<0.50	<1.0	<1.00
CP22-HP08	35-37	1/18/2018	1.2	--	--	--	1.05
CP22-HP08	35-37	9/14/2018	0.43	--	--	--	<1.00
CP22-HP08-D	35-37	9/14/2018	0.55 J	--	--	--	<1.00
CP22-HP08	39-41	9/13/2017	<0.0050	--	--	--	--
CP22-HP08	39-41	1/18/2018	0.050	--	--	--	1.04 J
CP22-HP08-D	39-41	1/18/2018	0.056	--	--	--	2.64 J

Table 11: Groundwater Analytical Results - Chlorinated Propanes
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (µg/L)				
			1,2,3-TCP	Allyl Chloride	1,2-DCP	1,3-DCP	Propene
CP22-HP08	39-41	9/14/2018	0.024	--	--	--	<1.00
CP22-HP08-D	39-41	9/14/2018	0.021	--	--	--	<1.00
CP22-HP08	43-45	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP08-D	43-45	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP09	31-33	9/14/2018	0.32	--	--	--	<1.00
CP22-HP09	35-37	9/12/2017	2.1	<1.0	<0.50	<1.0	<1.00
CP22-HP09	35-37	1/18/2018	3.0	--	--	--	<1.00
CP22-HP09	35-37	9/14/2018	3.2	--	--	--	<1.00
CP22-HP09	39-41	9/12/2017	<0.0050	--	--	--	<1.00
CP22-HP09	39-41	1/18/2018	0.14	--	--	--	1.63
CP22-HP09	43-45	9/12/2017	<0.0050	<1.0	<0.50	<1.0	2.01
CP22-HP09	43-45	1/18/2018	<0.0050	--	--	--	--
CP22-HP10	31-33	9/14/2018	0.037	--	--	--	2.04
CP22-HP10	35-37	9/12/2017	0.88	<1.0	<0.50	<1.0	<1.00
CP22-HP10	35-37	1/18/2018	3.6	--	--	--	<1.00
CP22-HP10	35-37	9/14/2018	5.1	--	--	--	<1.00
CP22-HP10	39-41	9/12/2017	1.3	<1.0	<0.50	<1.0	<1.00
CP22-HP10	39-41	1/19/2018	1.3	--	--	--	<1.00
CP22-HP10	39-41	9/14/2018	0.0095	--	--	--	<1.00
CP22-HP10	43-45	9/12/2017	<0.0050	<1.0	<0.50	<1.0	2.96 J
CP22-HP10-D	43-45	9/12/2017	<0.0050	<1.0	<0.50	<1.0	<1.00 UJ
CP22-HP10	43-45	1/19/2018	0.017	--	--	--	1.23
CP22-HP11	35-37	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP11	35-37	1/18/2018	2.6	--	--	--	<1.00
CP22-HP11	35-37	9/14/2018	0.27 J	--	--	--	<1.00
CP22-HP11	39-41	9/13/2017	0.15	<1.0	<0.50	<1.0	5.46
CP22-HP11	39-41	1/18/2018	0.35	--	--	--	<1.00
CP22-HP11	39-41	9/14/2018	0.092	--	--	--	<1.00
CP22-HP11	43-45	9/13/2017	<0.0050	<1.0	<0.50	<1.0	<1.00
CP22-HP12	31-33	9/14/2018	0.11	--	--	--	<1.00
CP22-HP12	35-37	9/12/2017	0.64	<1.0	<0.50	<1.0	<1.00
CP22-HP12-D	35-37	9/13/2017	0.36	<1.0	<0.50	<1.0	<1.00
CP22-HP12	35-37	1/19/2018	3.3	--	--	--	<1.00
CP22-HP12-D	35-37	1/19/2018	3.2	--	--	--	<1.00
CP22-HP12	39-41	9/13/2017	0.076	<1.0	<0.50	<1.0	<1.00
CP22-HP12-D	39-41	9/13/2017	0.075	<1.0	<0.50	<1.0	<1.00
CP22-HP12	39-41	1/19/2018	0.042	--	--	--	1.39
CP22-HP12	39-41	9/14/2018	0.030	--	--	--	<1.00

Table 11: Groundwater Analytical Results - Chlorinated Propanes

22/23 Area

Marine Corps Base Camp Pendleton,
California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (µg/L)				
			1,2,3-TCP	Allyl Chloride	1,2-DCP	1,3-DCP	Propene

Notes:

µg/L = micrograms per liter

ft bgs = feet below ground surface

1,2,3-TCP = 1,2,3-Trichloropropane

1,2-DCP = 1,2-Dichloropropane

1,3-DCP = 1,3-Dichloropropane

Allyl Chloride = 3-chloro-1-propene

D = duplicate sample

<# - Analyte not detected above the laboratory reporting limit.

Sample depths for monitoring wells represent the length of the well screen.

J = Result is estimated based on data qualification

UJ = Analyte was not detected above the reported sample quantification limit. However, the reported quantification limit is approximate and may or may not represent the actual limit of quantification necessary to accurately and precisely measure the analyte in the sample.

Table 12: Groundwater Analytical Results - Geochemical Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/L)								
			Anions				Cations				
			Nitrite	Nitrate	Sulfate	Chloride	Silicon	Calcium	Iron	Manganese	Zinc
Monitoring Well Samples											
220205-MWX	10-40	2/22/2012	<0.100	0.0946 J	88.5	--	--	78.4	0.0472 J	1.32	<0.0200
220205-MWX	10-40	6/17/2014	<0.0250	0.0954 J	103	--	--	84.2	1.00	1.10	0.0152 J
220205-MWX	10-40	9/9/2014	<0.0250	<0.0435	95.5	--	--	79.2	0.497	1.32	<0.0100
220205-MWX	10-40	11/6/2014	<0.0250	0.0687 J	102	--	--	79.1	0.274	1.26	<0.0100
220205-MWX	10-40	12/15/2014	<0.0250	0.0700 J	93.4	--	--	79.0	0.0370 J	1.31	<0.0100
220205-MWX	10-40	1/6/2015	<0.0250	0.0707 J	92.6	--	--	81.2	<0.0400	1.42	<0.0100
220205-MWX	10-40	9/12/2017	<0.10	<0.10	98	170	16.9	72.7	<0.100	1.45	0.0880
220205-MWX	10-40	1/19/2018	--	--	98	--	--	--	--	--	<0.0100
220205-MWX	10-40	9/12/2018	--	--	96	--	--	--	--	--	<0.0100
CP22-PMW04	37-47	2/22/2012	<0.100	<0.100	112	--	--	70.2	0.450 J	0.744	<0.0200
CP22-PMW04	37-47	6/18/2014	<0.0250	0.102	101	--	--	71.0	1.20	0.726	0.0207
CP22-PMW04	37-47	9/10/2014	<0.0250	<0.0250	102	--	--	68.2	0.453	1.21	<0.0100
CP22-PMW04	37-47	11/6/2014	<0.0250	0.0665 J	95.8	--	--	70.6	0.512	1.21	<0.0100
CP22-PMW04	37-47	12/15/2014	<0.0250	0.0605 J	94.5	--	--	70.1	0.400	1.24	<0.0100
CP22-PMW04	37-47	1/6/2015	<0.0250	0.0648 J	89.3	--	--	69.8	0.596	1.23	<0.0100
CP22-PMW04	37-47	9/12/2017	<0.10	<0.10	87	150	16.0	63.7	<0.100	1.48	0.181 J
CP22-PMW04-D	37-47	9/12/2017	<0.10	<0.10	88	180	16.5	64.0	<0.100	1.49	0.0164 J
CP22-PMW04	37-47	1/19/2018	--	--	87	--	--	--	--	--	<0.0100
CP22-PMW04	37-47	9/12/2018	--	--	86	--	--	--	--	--	<0.0100
CP22-PMW04-D	37-47	9/12/2018	--	--	85	--	--	--	--	--	<0.0100
CP22-PMW06B	38-48	6/18/2014	<0.025 J	0.0444 J	69.7	--	--	60.1	2.46	0.657	<0.0100
CP22-PMW06B	38-48	9/10/2014	<0.0250	<0.0250	6.61	--	--	74.0	2.71	1.37	<0.0100
CP22-PMW06B	38-48	11/6/2014	<0.0250	0.0765 J	8.75	--	--	65.2	2.70	1.32	<0.0100
CP22-PMW06B	38-48	12/18/2014	<0.0250	0.0630 J	7.16	--	--	66.6	0.955	1.39	<0.0100
CP22-PMW06B	38-48	1/7/2015	<0.0250	0.0719 J	7.82	--	--	69.4	2.50	1.43	<0.00790
CP22-PMW06B	38-48	9/12/2017	<0.10	<0.10	38	150	15.2	50.4	<0.100	1.14	0.0459
CP22-PMW07B	36-46	6/18/2014	<0.025 J	0.0471 J	116	--	--	60.4	4.74	0.293	0.00994 J
CP22-PMW07B	36-46	9/10/2014	<0.0250	<0.0250	101	--	--	58.3	0.600	0.289	<0.0100
CP22-PMW07B	36-46	11/6/2014	<0.0250	0.0673 J	105	--	--	55.6	0.480	0.299	0.00719 J

Table 12: Groundwater Analytical Results - Geochemical Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/L)								
			Anions				Cations				
			Nitrite	Nitrate	Sulfate	Chloride	Silicon	Calcium	Iron	Manganese	Zinc
CP22-PMW07B	36-46	12/16/2014	<0.0250	0.0669 J	122	--	--	58.5	0.257	0.282	<0.00707
CP22-PMW07B-D	36-46	12/16/2014	<0.0250	0.0645 J	99.1	--	--	58.4	0.151 J	0.285	<0.00796
CP22-PMW07B	36-46	1/7/2015	<0.0250	0.0741 J	99.4	--	--	57.6	0.460	0.327	<0.00956
CP22-PMW07B	36-46	9/12/2017	<0.10	<0.10	99	160	14.6	45.5	<0.100	0.657	0.0248
CP22-PMW07B	36-46	1/19/2018	--	--	97	--	--	--	--	--	<0.0100
CP22-PMW07B	36-46	9/12/2018	--	--	92	--	--	--	--	--	<0.0100
CP22-PMW08B	40-50	6/19/2014	<0.025 J	0.0468 J	99.1	--	--	69.9	0.912	0.554	0.0113 J
CP22-PMW08B	40-50	9/10/2014	<0.0250	<0.0250	99.2	--	--	74.5	0.624	1.06	<0.0100
CP22-PMW08B	40-50	11/7/2014	<0.0250	0.100	96.4	--	--	74.4	0.335	1.02	<0.0100
CP22-PMW08B	40-50	12/16/2014	<0.0250	0.0613 J	101	--	--	73.1	0.456	0.886	<0.00729
CP22-PMW08B	40-50	1/7/2015	<0.0250	0.0776 J	90.3	--	--	73.2	0.600	1.13	<0.0100
CP22-PMW08B	40-50	9/12/2017	<0.10	<0.10	100	170	15.9	64.0	<0.100	1.49	0.0291
CP22-PMW08B	40-50	1/19/2018	--	--	110	--	--	--	--	--	<0.0100
CP22-PMW08B	40-50	9/12/2018	--	--	99	--	--	--	--	--	<0.0100
CP22-PMW09B	40-50	6/19/2014	<0.025 J	0.0486 J	97.5	--	--	75.6	5.79	0.923	0.012 J
CP22-PMW09B	40-50	9/11/2014	<0.0250	<0.0250	86.6	--	--	68.6	2.02	0.999	<0.0100
CP22-PMW09B	40-50	11/7/2014	<0.0250	0.0952 J	92.5	--	--	75.7	5.26	1.03	<0.00787
CP22-PMW09B	40-50	12/16/2014	<0.0250	0.0651 J	99.1	--	--	73.9	0.968	0.980	<0.0602
CP22-PMW09B	40-50	1/7/2015	<0.0250	0.0771 J	96.3	--	--	75.7	5.08	1.27	<0.00954
CP22-PMW09B	40-50	9/12/2017	<0.10	<0.10	98	170	16.7	68.9	<0.100	1.62	0.0909
CP22-PMW10B	36-46	6/17/2014	<0.0250	0.0510 J	119	--	--	60.7	0.692	0.204	0.0110 J
CP22-PMW10B	36-46	9/11/2014	<0.0250	<0.0250	<1.06	--	--	126	2.12	1.87	0.169
CP22-PMW10B	36-46	11/7/2014	<0.0250	0.134	0.649	--	--	73.4	0.807	0.496	<0.0227
CP22-PMW10B	36-46	12/18/2014	<0.0250	0.0585 J	<0.695	--	--	65.5	0.706	0.563	<0.0151
CP22-PMW10B	36-46	1/7/2015	<0.0250	0.0663 J	<0.605	--	--	63.9	1.51	0.554	<0.0137
CP22-PMW10B	36-46	9/12/2017	<0.10	<0.10	3.3	160	4.12	17.9	<0.100	0.0423	0.0514
CP22-PMW10B	36-46	1/19/2018	--	--	1.6	--	--	--	--	--	<0.0100
CP22-PMW10B	36-46	9/12/2018	--	--	<1.0	--	--	--	--	--	<0.0100
Grab-Groundwater Samples											
CP22-HP01	31-33	9/12/2018	--	--	--	--	--	--	--	--	0.122 J

Table 12: Groundwater Analytical Results - Geochemical Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/L)									
			Anions				Cations					
			Nitrite	Nitrate	Sulfate	Chloride	Silicon	Calcium	Iron	Manganese	Zinc	
CP22-HP01-D	31-33	9/12/2018	--	--	--	--	--	--	--	--	--	<0.0100 UJ
CP22-HP01	35-37	9/14/2017	<0.10	<0.10	93	170	14.4	69.4	<0.100	0.739		<0.0100
CP22-HP01	39-41	9/14/2017	<0.10	<0.10	99	170	9.14	74.3	0.141	0.867		0.0275
CP22-HP01	39-41	9/12/2018	--	--	--	--	--	--	--	--		0.808
CP22-HP02	31-33	9/12/2018	--	--	--	--	--	--	--	--		0.378
CP22-HP02	35-37	9/12/2017	<0.10	<0.10	97	160	13.8	65.9	<0.100	0.792		0.0333
CP22-HP02	35-37	9/12/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP02	39-41	9/12/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP02	43-45	9/12/2017	--	--	--	--	5.87	57.8	<0.100	0.357		0.0310
CP22-HP03	31-33	9/12/2018	--	--	--	--	--	--	--	--		0.0136
CP22-HP03	35-37	9/14/2017	<0.10	<0.10	85	170	8.90	41.2	0.594 J	0.368		0.0520
CP22-HP03	35-37	9/12/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP03	39-41	9/14/2017	<0.10	<0.10	65	180	4.20	58.2	<0.100	0.518		0.0101
CP22-HP03	43-45	9/14/2017	<0.10	<0.10	95	170	12.6	78.4	0.169	1.50		0.0333
CP22-HP04	31-33	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP04	35-37	9/11/2017	--	--	--	--	8.13	34.0	<0.100	0.414		0.340
CP22-HP04	35-37	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP04-D	35-37	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP04	39-41	9/11/2017	--	--	--	--	4.39	36.4	<0.100	0.223		0.0901
CP22-HP04	39-41	9/13/2018	--	--	--	--	--	--	--	--		0.0570
CP22-HP04	43-45	9/11/2017	<0.10	<0.10	92	170	10.5	65.5	<0.100	1.04		0.294
CP22-HP05	31-33	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP05	35-37	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP05	39-41	9/11/2017	<0.10	<0.10	80	170	11.9	68.7	<0.100	1.15		0.0467
CP22-HP05	39-41	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP06	35-37	9/13/2017	<0.10	<0.10	80	170	11.7	35.4	<0.100	0.415		0.0100
CP22-HP06	35-37	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP06	39-41	9/13/2018	--	--	--	--	--	--	--	--		<0.0100
CP22-HP06	43-45	9/13/2017	<0.10	<0.10	93	160	13.2	71.2	<0.100	1.53		0.0170
CP22-HP07	31-33	9/13/2018	--	--	--	--	--	--	--	--		<0.0100

Table 12: Groundwater Analytical Results - Geochemical Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/L)								
			Anions				Cations				
			Nitrite	Nitrate	Sulfate	Chloride	Silicon	Calcium	Iron	Manganese	Zinc
CP22-HP07	35-37	9/11/2017	<0.10	<0.10	91	180	9.23	55.1	<0.100	0.360	0.0400
CP22-HP07	35-37	9/13/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP07	39-41	9/12/2017	<0.10	<0.10	6.5	150	9.78	39.7	<0.100	1.08	0.109
CP22-HP07	39-41	9/13/2018	--	--	--	--	--	--	--	--	0.0104
CP22-HP07	43-45	9/11/2017	<0.10	<0.10	99	170	10.8	65.2	<0.100	0.942	0.0743
CP22-HP08	31-33	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP08	35-37	9/13/2017	<0.10	<0.10	90	160	13.7	56.6	<0.100	0.501	<0.0100
CP22-HP08	35-37	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP08-D	35-37	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP08	39-41	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP08-D	39-41	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP08	43-45	9/13/2017	<0.10	<0.10	95	160	13.7	68.1	<0.100	1.50	<0.0100
CP22-HP08-D	43-45	9/13/2017	<0.10	<0.10	95	160	13.3	63.4	<0.100	1.46	0.0133
CP22-HP09	35-37	9/12/2017	<0.10	<0.10	96	150	12.7	69.9	<0.100	0.708	0.0240
CP22-HP09	35-37	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP09	39-41	9/12/2017	--	--	--	--	4.63	53.1	<0.100	0.326	0.0236
CP22-HP09	43-45	9/12/2017	<0.10	<0.10	85	150	11.5	62.1	<0.100	0.949	0.0411
CP22-HP10	35-37	9/12/2017	<0.10	<0.10	48	160	11.5	66.8	<0.100	0.691	0.0471
CP22-HP10	35-37	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP10	39-41	9/12/2017	<0.10	<0.10	84	150	14.2	67.6	<0.100	1.22	0.0308
CP22-HP10	39-41	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP10	43-45	9/12/2017	<0.10	<0.10	86	150	9.57	58.0	<0.100	0.916	0.0147 J
CP22-HP10-D	43-45	9/12/2017	<0.10	<0.10	84	150	9.61	61.1	<0.100	0.843	0.0286 J
CP22-HP11	35-37	9/13/2017	<0.10	<0.10	75	160	10.3	39.3	<0.100	0.426	<0.0100
CP22-HP11	35-37	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP11	39-41	9/13/2017	<0.10	<0.10	82	150	11.3	62.3	<0.100	1.01	0.0217
CP22-HP11	39-41	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP11	43-45	9/13/2017	<0.10	<0.10	91	150	14.4	67.5	<0.100	1.39	0.0141
CP22-HP12	31-33	9/14/2018	--	--	--	--	--	--	--	--	<0.0100
CP22-HP12	35-37	9/12/2017	<0.10	<0.10	66	160	13.8	57.1	<0.100	0.410	0.0257

Table 12: Groundwater Analytical Results - Geochemical Parameters
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/L)								
			Anions				Cations				
			Nitrite	Nitrate	Sulfate	Chloride	Silicon	Calcium	Iron	Manganese	Zinc
CP22-HP12-D	35-37	9/13/2017	<0.10	<0.10	69	160	9.60	56.5	<0.100	0.518	0.0183
CP22-HP12	39-41	9/13/2017	<0.10	<0.10	61	150	8.56	47.5	<0.100	0.933	0.0110
CP22-HP12-D	39-41	9/13/2017	<0.10	<0.10	60	150	10.4	55.3	<0.100	1.13	0.0127
CP22-HP12	39-41	9/14/2018	--	--	--	--	--	--	--	--	<0.0100

Notes:

ft bgs = feet below ground surface

mg/L = milligrams per liter

D = duplicate sample

NS = Not sampled due to insufficient groundwater quantity

<# - Analyte not detected above the laboratory reporting limit.

Sample depths for monitoring wells represent the length of the well screen.

J = Result is estimated based on data qualification

UJ = Analyte was not detected above the reported sample quantification limit. However, the reported quantification limit is approximate and may or may not represent the actual limit of quantification necessary to accurately and precisely measure the analyte in the sample.

Table 13: Soil XRF Results - Zinc

22/23 Area

Marine Corps Base Camp Pendleton

California

Location		IP02			IP02E			IP02W			IP08			IP08W			IP08E			IP08N		
Lateral Distance from IP		1 ft	3 ft	5 ft	1 ft	3 ft	5 ft	1 ft	3 ft	5 ft	1 ft	3 ft	5 ft	1 ft	3 ft	5 ft	1 ft	3 ft	5 ft	1 ft	3 ft	5 ft
Direction		North			East			West			South			West			East			North		
Date Drilled		Jan-18			Sep-18			Sep-18			Jan-18			Sep-18			Sep-18			Sep-18		
Total Zinc (mg/kg)	BG (~20 ft)	61				73					58						81					
	34 ft bgs																			154	124	
	35 ft bgs	64	38	34	61	80	74	58	57	57	39	38	63	81	64	88	67	63	79	120	144	85
	36 ft bgs	77	31	35	51	83	50	56	60	68	45	42	56	74	61	86	63	56	78	75	88	80
	37 ft bgs	39	37	40	64	73	46	81	63	60	42	41	58	76	61	75	72	69	68	79	72	86
	38 ft bgs	37	85	41	66	58	60	64	68	53	42	50	53	90	84	60	56	107	53	97	332	44
	39 ft bgs	43	44	41	75	59	50	80	63	52	40	234	41	142	73	63	52	83	51	70	117	43
	40 ft bgs	51	45	43	71	50	54	70	67	58	46	561	39	92	72	56	58	85	58	65	81	39
	41 ft bgs	50	38	38	63	52	49	60	80	59	46	2,457	38	66	64	75	60	79	58	47	90	53
	42 ft bgs	55	47	35	53	50	76	55	81	55	53	77	47	57	56	56	63	97	63	46	54	64
	43 ft bgs	63	49	75	51	48	48	64	55	54	53	6,608	35	57	58	51	56	74	52	44	55	55
	44 ft bgs	43	61	59	54	82	58	57	55	49	58	2,766	51	57	51	54	70	65	57	43	46	56
	45 ft bgs	41	63	49	56	57	57	58	58	49	52	6,194	50	52	67	56	63	63	59	44	53	59
	46 ft bgs											44										
	47 ft bgs											43										
48 ft bgs											52											
49 ft bgs											55											

Notes:

ft - feet

ft bgs - feet below ground surface

mg/kg - milligrams per kilogram

BG - background sample, taken from 20 feet below ground surface

IP - injection point

Table 14: Soil Analytical Results - Zinc
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/kg)
			Zinc
IP02-1	35	1/17/2018	82.7
IP02-1	36	1/17/2018	71.7
IP02-1	43	1/17/2018	81.0
IP02-3	38	1/17/2018	122
IP02-3	44	1/17/2018	73.6
IP02-3	45	1/17/2018	69.5
IP02-5	43	1/17/2018	74.4
IP02-5	44	1/17/2018	65.1
IP02-5	45	1/17/2018	53.3
IP02E-1	38	9/17/2018	53.2
IP02E-1	41	9/17/2018	36.6
IP02E-1	45	9/17/2018	42.7
IP02E-3	36	9/17/2018	98.7
IP02E-3	40	9/17/2018	36.4
IP02E-3	44	9/17/2018	59.1
IP02E-5	35	9/17/2018	49.4
IP02E-5	38	9/17/2018	41.5
IP02E-5	42	9/17/2018	66.3
IP02W-1	37	9/18/2018	65.6
IP02W-1	39	9/18/2018	63.4
IP02W-1	43	9/18/2018	46.6
IP02W-3	38	9/18/2018	65.0
IP02W-3	42	9/18/2018	47.4
IP02W-3	45	9/18/2018	46.1
IP02W-5	36	9/17/2018	45.4
IP02W-5	41	9/17/2018	45.6
IP02W-5	45	9/17/2018	41.9
IP08-1	42	1/17/2018	48.9
IP08-1	43	1/17/2018	69.4
IP08-1	44	1/17/2018	71.3
IP08-3	43	1/17/2018	18,100
IP08-3	44	1/17/2018	20,000
IP08-3	45	1/17/2018	1,870
IP08-5	35	1/17/2018	75.6
IP08-5	36	1/17/2018	79.3
IP08-5	37	1/17/2018	69.1
IP08E-1	35	9/19/2018	72.2
IP08E-1	37	9/19/2018	43.1
IP08E-1	44	9/19/2018	44.0
IP08E-3	38	9/18/2018	159
IP08E-3	40	9/18/2018	72.5

Table 14: Soil Analytical Results - Zinc
 22/23 Area
 Marine Corps Base Camp Pendleton,
 California

Sample Location	Sample Depth (ft bgs)	Sample Date	Concentration (mg/kg)
			Zinc
IP08E-3	42	9/18/2018	65.2
IP08E-5	38	9/19/2018	42.6
IP08E-5	40	9/19/2018	44.5
IP08E-5	42	9/19/2018	43.7
IP08N-1	34	9/19/2018	82.2
IP08N-1	36	9/19/2018	75.8
IP08N-1	38	9/19/2018	84.0
IP08N-3	34	9/19/2018	67.4
IP08N-3	35	9/19/2018	59.2
IP08N-3	38	9/19/2018	272
IP08N-3	41	9/19/2018	75.1
IP08N-5	35	9/19/2018	71.2
IP08N-5	37	9/19/2018	68.2
IP08N-5	42	9/19/2018	48.9
IP08W-1	35	9/18/2018	65.0
IP08W-1	39	9/18/2018	117
IP08W-1	40	9/18/2018	67.3
IP08W-3	35	9/18/2018	98.0
IP08W-3	38	9/18/2018	70.1
IP08W-3	40	9/18/2018	53.4
IP08W-3	45	9/18/2018	57.1
IP08W-5	35	9/18/2018	75.4
IP08W-5	36	9/18/2018	75.5
IP08W-5	41	9/18/2018	51.8

Notes:

ft bgs = feet below ground surface
 mg/kg = milligrams per kilogram

Table 16a
Life-Cycle Cost Estimate - Zero Valent Zinc Injections
 ESTCP Project ER-201628

<i>Capital Costs</i>						
I. Capital Costs		Quantity	Unit	Unit Cost	Amount	Notes
I.a	Treatability Study	1	LS	\$30,000	\$30,000	Based on treatability study costs presented in Cost Model.
I.b	Shallow Monitoring Well Installation and Development	12	well	\$10,000	\$120,000	Engineering estimate. ¹ Assumes 10 shallow (35-45 feet below ground surface) monitoring wells will be installed to monitor conditions within and downgradient of injection area.
I.c	Deep Monitoring Well Installation and Development	12	well	\$15,000	\$180,000	Engineering estimate. ¹ Assumes 10 deep (50-60 feet below ground surface) monitoring wells will be installed to monitor conditions within and downgradient of injection area.
I.d	Baseline Monitoring	29	well	\$1,500	\$43,500	Engineering estimate. ¹ Assumes 20 wells will be sampled and analyzed for TCP, anions, cations, and propene. Includes QA/QC samples (one duplicate, one equipment blank, one trip blank).
I.e	Zero Valent Zinc	52,800	pound	\$2	\$105,600	Assumes injection of 52,800 pounds of zero valent zinc. Material cost is \$2.00 per pound, including shipping, based on costs presented in Cost Model.
I.f	Injection Subcontractor Mobilization	1	LS	\$10,000	\$10,000	Based on costs presented in Cost Model.
I.g	Injection Subcontractor Unit Rate	112	injections	\$1,500	\$168,000	Based on costs presented in Cost Model.
I.h	Waste Disposal	1	LS	\$10,000	\$10,000	Engineering estimate. ¹ Assumes waste from well installation and well development will be classified as non-hazardous and minimal surfacing will occur during injections.
I.i	Implementation Report	1	report	\$20,000	\$20,000	Assume baseline monitoring results and field implementation will be documented in one report for submittal to overseeing regulatory agencies.
Subtotal Capital Costs:					\$688,000	
Project Management ²			6%		\$41,000	
Remedial Design ²			12%		\$83,000	
Construction Management ²			8%		\$55,000	
Contingency			10%		\$69,000	
Total Capital Costs:					\$936,000	

Table 16a
Life-Cycle Cost Estimate - Zero Valent Zinc Injections
 ESTCP Project ER-201628

O&M Costs						
2. Maintenance Injections (Year 15)		Quantity	Unit	Unit Cost	Amount	Notes
2.a	Zero Valent Zinc	26,400	pound	\$2	\$52,800	Assumes maintenance injection of 26,400 pounds of zero valent zinc in year 15. Material cost is \$2.00 per pound, including shipping, based on costs presented in Cost Model.
2.b	Injection Subcontractor Mobilization	1	LS	\$10,000	\$10,000	Based on costs presented in Cost Model.
2.c	Injection Subcontractor Unit Rate	56	injections	\$1,500	\$84,000	Based on costs presented in Cost Model.
Subtotal Maintenance Injection Cost (Year 15):					\$147,000	
Project Management ²					8%	\$12,000
Remedial Design ²					15%	\$22,000
Construction Management ²					10%	\$15,000
Contingency					10%	\$15,000
Maintenance Injection Cost (Year 15):						\$211,000
NPV Discount rate ³ :						3.6%
Total Maintenance Injection Cost (Year 15):						\$121,000
3. Annual Monitoring and Reporting (Years 1-30)		Quantity	Unit	Unit Cost	Amount	Notes
3.a	Annual Monitoring	29	well	\$1,500	\$43,500	Engineering estimate. ¹ Assumes 20 wells will be sampled and analyzed for TCP, anions, cations, and propene. Includes QA/QC samples (one duplicate, one equipment blank, one trip blank).
3.b	Analysis and Reporting	1	event/year	\$10,000	\$10,000	Engineering estimate. ¹ Assumes annual reports documenting groundwater remedial activities and results will be submitted.
Subtotal Monitoring Costs:					\$53,500	
Project Management ²					10%	\$5,000
Contingency					10%	\$5,000
O&M Costs Per Year (Years 1-30):						\$63,500
NPV Discount rate ³ :						3.6%
Total Monitoring Costs (Years 1-30):						\$1,154,000
Total O&M Costs:						\$1,275,000
Total costs -30%						\$1,560,000
Total Estimated Life Cycle Cost:						\$2,220,000
Total costs +50%						\$3,330,000

Notes:

- "Engineering estimate" indicates that unit or annual cost is based on engineering judgment or data from a previous engineering project.
- "A Guide to Developing and Documenting Remedial Alternative Cost Estimates During the Feasibility Study", USEPA, 2000, Exhibits 5-6 and 5-8 in Section 5.5, were used to estimate capital costs. Professional and technical services costs for capital costs are shown below.

Capital Cost Element	<\$100K	\$100K-\$500K	\$500K-\$2M	\$2M-\$10M	>\$10M
	(%)	(%)	(%)	(%)	(%)
Project Management	10	8	6	5	5
Remedial Design	20	15	12	8	6
Construction Management	15	10	8	6	6

- "Discount Rates for Cost Effectiveness Analysis of Federal Programs", Federal Office of Management and Budget, 2018, Appendix C of OMB Circular A-94, were used to forecast O&M Costs at net present value.

Abbreviations:

- Cost Model Cost Model for zero-valent zinc injection program included in Table 14 of Final Report.
- LS lump-sum
- NPV net present value
- O&M operation and maintenance
- OMB Office of Management and Budget
- QA/QC quality assurance/quality control
- TCP 1,2,3-trichloropropane
- USEPA United States Environmental Protection Agency

Table 16b
Life-Cycle Cost Estimate - Zero Valent Iron Injections
 ESTCP Project ER-201628

<i>Capital Costs</i>						
I. Capital Costs		Quantity	Unit	Unit Cost	Amount	Notes
I.a	Treatability Study	1	LS	\$30,000	\$30,000	Based on treatability study costs presented in Cost Model.
I.b	Shallow Monitoring Well Installation and Development	12	well	\$10,000	\$120,000	Engineering estimate. ¹ Assumes 10 shallow (35-45 feet below ground surface) monitoring wells will be installed to monitor conditions within and downgradient of injection area.
I.c	Deep Monitoring Well Installation and Development	12	well	\$15,000	\$180,000	Engineering estimate. ¹ Assumes 10 deep (50-60 feet below ground surface) monitoring wells will be installed to monitor conditions within and downgradient of injection area.
I.d	Baseline Monitoring	29	well	\$1,500	\$43,500	Engineering estimate. ¹ Assumes 20 wells will be sampled and analyzed for TCP, anions, cations, and propene. Includes QA/QC samples (one duplicate, one equipment blank, one trip blank).
I.e	Zero Valent Iron	52,800	pound	\$0.60	\$31,680	Assumes injection of 52,800 pounds of zero valent iron. Material cost is \$0.60 per pound, including shipping, based on discussion with vendors.
I.f	Injection Subcontractor Mobilization	1	LS	\$10,000	\$10,000	Based on costs presented in Cost Model.
I.g	Injection Subcontractor Unit Rate	112	injections	\$1,500	\$168,000	Based on costs presented in Cost Model.
I.h	Waste Disposal	1	LS	\$10,000	\$10,000	Engineering estimate. ¹ Assumes waste from well installation and well development will be classified as non-hazardous and minimal surfacing will occur during injections.
I.i	Implementation Report	1	report	\$20,000	\$20,000	Assume baseline monitoring results and field implementation will be documented in one report for submittal to overseeing regulatory agencies.
Subtotal Capital Costs:					\$614,000	
Project Management ²			6%		\$37,000	
Remedial Design ²			12%		\$74,000	
Construction Management ²			8%		\$49,000	
Contingency			10%		\$61,000	
Total Capital Costs:					\$835,000	

Table 16b
Life-Cycle Cost Estimate - Zero Valent Iron Injections
 ESTCP Project ER-201628

O&M Costs						
2. Maintenance Injections (Year 15)		Quantity	Unit	Unit Cost	Amount	Notes
2.a	Zero Valent Zinc	26,400	pound	\$0.60	\$15,840	Assumes maintenance injection of 26,400 pounds of zero valent iron in year 15. Material cost is \$0.60 per pound, including shipping, based on discussion with vendors.
2.b	Injection Subcontractor Mobilization	1	LS	\$10,000	\$10,000	Based on costs presented in Cost Model.
2.c	Injection Subcontractor Unit Rate	56	injections	\$1,500	\$84,000	Based on costs presented in Cost Model.
Subtotal Maintenance Injection Cost (Year 15):					\$110,000	
Project Management ²					8%	\$9,000
Remedial Design ²					15%	\$17,000
Construction Management ²					10%	\$11,000
Contingency					10%	\$11,000
Maintenance Injection Cost (Year 15):						\$158,000
NPV Discount rate ³ :						3.6%
Total Maintenance Injection Cost (Year 15):						\$91,000
3. Annual Monitoring and Reporting (Years 1-30)		Quantity	Unit	Unit Cost	Amount	Notes
3.a	Annual Monitoring	29	well	\$1,500	\$43,500	Engineering estimate. ¹ Assumes 20 wells will be sampled and analyzed for TCP, anions, cations, and propene. Includes QA/QC samples (one duplicate, one equipment blank, one trip blank).
3.b	Analysis and Reporting	1	event/year	\$10,000	\$10,000	Engineering estimate. ¹ Assumes annual reports documenting groundwater remedial activities and results will be submitted.
Subtotal Monitoring Costs:					\$53,500	
Project Management ²					10%	\$5,000
Contingency					10%	\$5,000
O&M Costs Per Year (Years 1-30):						\$63,500
NPV Discount rate ³ :						3.6%
Total Monitoring Costs (Years 1-30):						\$1,154,000
Total O&M Costs:						\$1,245,000
Total costs -30%						\$1,460,000
Total Estimated Life Cycle Cost:						\$2,080,000
Total costs +50%						\$3,120,000

Notes:

- "Engineering estimate" indicates that unit or annual cost is based on engineering judgment or data from a previous engineering project.
- "A Guide to Developing and Documenting Remedial Alternative Cost Estimates During the Feasibility Study", USEPA, 2000, Exhibits 5-6 and 5-8 in Section 5.5, were used to estimate capital costs. Professional and technical services costs for capital costs are shown below.

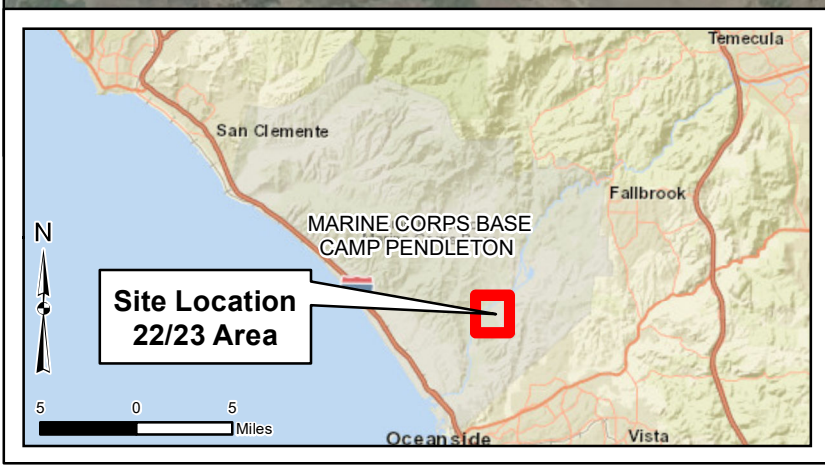
Capital Cost Element	<\$100K	\$100K-\$500K	\$500K-\$2M	\$2M-\$10M	>\$10M
	(%)	(%)	(%)	(%)	(%)
Project Management	10	8	6	5	5
Remedial Design	20	15	12	8	6
Construction Management	15	10	8	6	6

- "Discount Rates for Cost Effectiveness Analysis of Federal Programs", Federal Office of Management and Budget, 2018, Appendix C of OMB Circular A-94, were used to forecast O&M Costs at net present value.

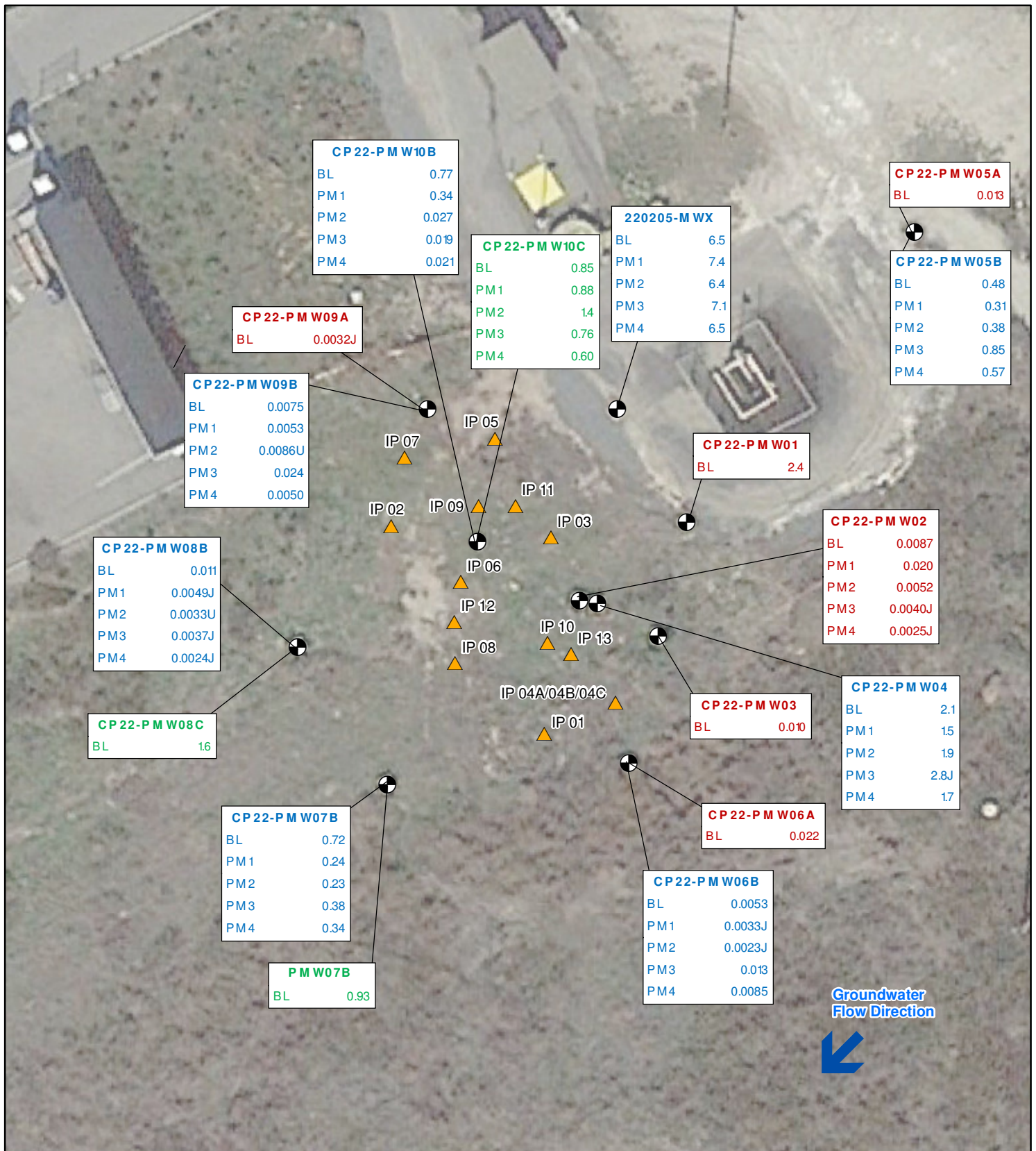
Abbreviations:

- Cost Model Cost Model for zero-valent zinc injection program included in Table 14 of Final Report.
- LS lump-sum
- NPV net present value
- O&M operation and maintenance
- OMB Office of Management and Budget
- QA/QC quality assurance/quality control
- TCP 1,2,3-trichloropropane
- USEPA United States Environmental Protection Agency

FIGURES



Site Location Map 22/23 Area Marine Corps Base Camp Pendleton California		Figure 4
WR2274	May 2019	



Legend

- Monitoring Well Location
- 2014 Injection Point

BL = Baseline
 PM = Performance Monitoring
 U = not detected
 J = estimated concentration
 µg/L = micrograms per liter

A-zone results shown in red.
 B-zone results shown in blue.
 C-zone results shown in green.

Imagery: Google Earth, 2016 February

Event	Date
BL	Jun-14
PM1	Sep-14
PM2	Nov-14
PM3	Dec-14
PM4	Jan-15

0 30 Feet

**1,2,3-Trichloropropane
 Analytical Results Summary - 2014 Pilot Study**

22/23 Area
 Marine Corps Base Camp Pendleton
 California

Geosyntec
 consultants

**Figure
 5**

WR2274	May 2019
--------	----------



Legend

- Grab Groundwater Sample Location
- ⊕ Monitoring Well Location
- ⊖ Well not sampled as part of validation program
- ▲ 2014 Injection Point

Note:
Imagery: Google Earth, 2016 February



Groundwater Sample Locations

22/23 Area
Marine Corps Base Camp Pendleton
California

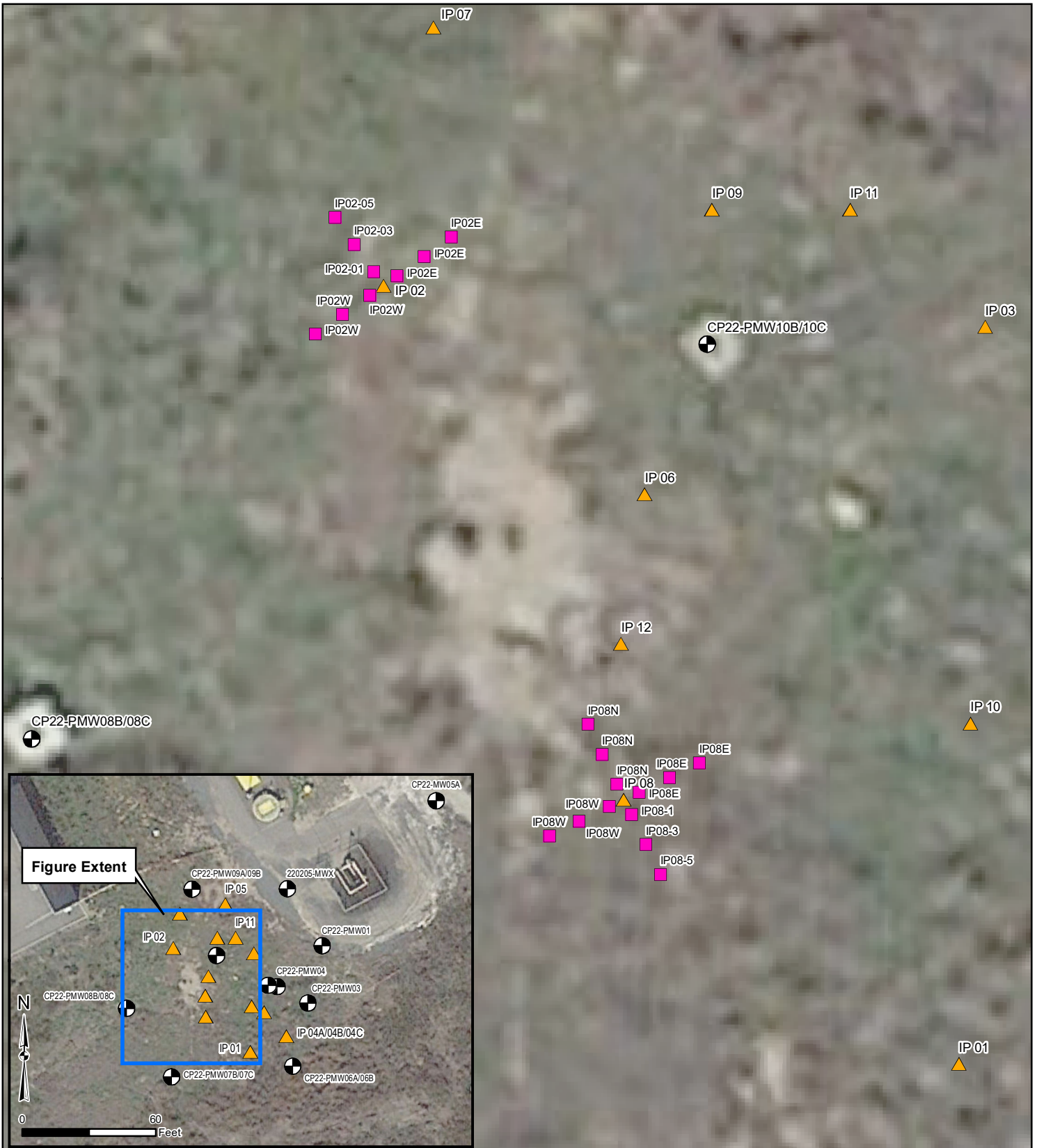
Geosyntec
consultants

Figure




6

WR2274

May 2019



Legend

-  Monitoring Well Location
-  Approximate Soil Boring Location
-  2014 Injection Point

Note:
Imagery: Google Earth, 2016 February



Soil Sample Locations

22/23 Area
Marine Corps Base Camp Pendleton
California

Geosyntec
consultants

Figure

7

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

1,2,3-Trichloropropane concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**September 2017 Groundwater Sampling Results
1,2,3-Trichloropropane**

22/23 Area
 Marine Corps Base Camp Pendleton
 California



Figure

8a

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

Propene concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**September 2017 Groundwater Sampling Results
Propene**

22/23 Area
 Marine Corps Base Camp Pendleton
 California



Figure

8b

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

Zinc concentrations in milligrams per liter (mg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**September 2017 Groundwater Sampling Results
Zinc**

22/23 Area
 Marine Corps Base Camp Pendleton
 California

Geosyntec
 consultants

Figure

8c

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

1,2,3-Trichloropropane concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**January 2018 Groundwater Sampling Results
1,2,3-Trichloropropane**

22/23 Area
Marine Corps Base Camp Pendleton
California

Geosyntec
consultants

Figure

9a

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

Propene concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**January 2018 Groundwater Sampling Results
Propene**

22/23 Area
 Marine Corps Base Camp Pendleton
 California

Geosyntec
 consultants

Figure

9b

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- ⊕ Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

1,2,3-Trichloropropane concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**September 2018 Groundwater Sampling Results
1,2,3-Trichloropropane**

22/23 Area
Marine Corps Base Camp Pendleton
California

Geosyntec
consultants

Figure

10a

WR2274

May 2019



Legend

- Approximate Groundwater Sample Location (2017-2018)
- ⊕ Monitoring Well Location
- ▲ ZVZ Injection Point (July 2014)

Notes:

Propene concentrations in micrograms per liter (µg/L)
 - / - = primary result on the left and duplicate result on the right
 NS = not sampled due to insufficient groundwater quantity
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 February



**September 2018 Groundwater Sampling Results
Propene**

22/23 Area
Marine Corps Base Camp Pendleton
California

Geosyntec
consultants

**Figure
10b**

WR2274

May 2019



Legend

- Existing Monitoring Well, Included in Performance Monitoring Network
- Existing Monitoring Well, Not Included in Performance Monitoring Network
- Proposed Monitoring Well, Baseline and Included in Performance Monitoring Network
- Previous ZVZ Injection Location (2014)
- Proposed ZVZ Injection Location
- Estimated 10-foot Radius of Influence

Notes:
 ZVZ = Zero Valent Zinc
 Imagery: Google Earth, 2016 Feb.



0 30 Feet

Conceptual Layout, ZVZ Injection Program

22/23 Area
 Marine Corps Base Camp Pendleton
 California

Geosyntec
 consultants

Figure

12

WR2274

May 2019

APPENDIX A MONITORING WELL SAMPLING LOGS

WELL GAUGING DATA

Project # 170912-KC1 Date 09-12-17 Client Geosyntec

Site Geosyntec @ Camp Pendleton

Well ID	Time	Well Size (in.)	Sheen / Odor	Depth to Immiscible Liquid (ft.)	Thickness of Immiscible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	Notes
220205-mux	0813	4					4.78	39.92	TOC	
CP22-PMW09B	0836	2					3.90	50.32		
CP22-PMW10B	0843	2					5.00	45.90		
CP22-PMW08B	0820	2					5.13	50.62		
CP22-PMW04	0848	2					5.77	48.23		
CP22-PMW06B	0831	2					4.31	49.01		
CP22-PMW07B	0826	2					4.91	46.73		

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-K01	Client: <u>Geosyntec</u>
Sampler: <u>KC</u>	Gauging Date: <u>09-12-17</u>
Well I.D.: <u>220205-mwx</u>	Well Diameter (in.): 2 3 <u>(4)</u> 6 8 <u> </u>
Total Well Depth (ft.): <u>39.92</u>	Depth to Water (ft.): <u>4.78</u>
Depth to Free Product: <u> </u>	Thickness of Free Product (feet): <u> </u>
Referenced to: <u>PVC</u> Grade	Flow Cell Type: <u>YSI Pro Plus</u>

Purge Method: 2" Grundfos Pump Peristaltic Pump Bladder Pump
 Sampling Method: Dedicated Tubing New Tubing Other
 Start Purge Time: 0913 Flow Rate: 100 ml/min Pump Depth: 36'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or <u>µS/cm</u>)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or <u>mL</u>)	Depth to Water (ft.)
0916	24.0	7.26	1267	5	0.73	158.6	300	5.06
0919	23.9	7.26	1259	5	0.58	134.2	600	5.13
0922	24.0	7.27	1251	4	0.66	101.7	900	5.20
0925	24.4	7.28	1247	4	0.72	82.5	1,200	5.26
0928	24.9	7.31	1247	4	0.76	52.8	1,500	5.29
0931	25.1	7.30	1248	4	0.81	47.2	1,800	5.30
0934	25.1	7.32	1253	4	0.77	41.2	2,100	5.30
0937	25.2	7.32	1250	4	0.75	39.4	2,400	5.30

Did well dewater? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Amount actually evacuated: <u>2,400 ml.</u>
Sampling Time: <u>0940</u>	Sampling Date: <u>09-12-17</u>
Sample I.D.: <u>220205-mwx</u>	Laboratory: <u>CalScienc</u>
Analyzed for: TPH-G BTEX MTBE TPH-D Other: <u>Sec SCS</u>	
Equipment Blank I.D.: @ Time	Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: <u>Greenwater</u>
Sampler: <u>KC</u>	Gauging Date: <u>09-12-17</u>
Well I.D.: <u>CP22-PMW04</u>	Well Diameter (in.): <u>(2)</u> 3 4 6 8 _____
Total Well Depth (ft.): <u>48.23</u>	Depth to Water (ft.): <u>5.77</u>
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: <u>(PVC)</u> Grade	Flow Cell Type: <u>YSI Pro Flow</u>

Purge Method: 2" Grundfos Pump Peristaltic Pump Bladder Pump
 Sampling Method: Dedicated Tubing New Tubing Other _____
 Start Purge Time: 1338 Flow Rate: 100 ml/min Pump Depth: 42'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or µS/cm)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water (ft.)
1341	23.3	7.36	1167	45	0.95	-72.8	300	5.88
1344	23.2	7.35	1114	29	0.63	-77.2	600	5.99
1347	22.4	7.32	1103	21	0.42	-79.5	900	6.10
1350	22.3	7.31	1100	17	0.33	-82.4	1,200	6.21
1353	22.3	7.30	1099	16	0.27	-85.3	1,500	6.29
1356	22.2	7.30	1161	15	0.28	-86.5	1,800	6.36
1359	22.2	7.30	1103	15	0.27	-88.0	2,100	6.42

Did well dewater? Yes <u>(No)</u>	Amount actually evacuated:
Sampling Time: <u>1402</u>	Sampling Date: <u>09-12-17</u>
Sample I.D.: <u>CP22-PMW04</u>	Laboratory: <u>Calcevia</u>
Analyzed for: TPH-G BTEX MTBE TPH-D Other: <u>See Below</u>	
Equipment Blank I.D.: _____ @ _____ Time	Duplicate I.D.: <u>DUP-GW-091217</u> @ <u>1415</u>

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: Geosyntec
Sampler: KC	Gauging Date: 09-12-17
Well I.D.: CP22-PMW06B	Well Diameter (in.): (2) 3 4 6 8 ____
Total Well Depth (ft.): 49.01	Depth to Water (ft.): 4.31
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: (PVC) Grade	Flow Cell Type: PSI Pro Plus

Purge Method: 2" Grundfos Pump Peristaltic Pump (Bladder Pump)
 Sampling Method: (Dedicated Tubing) New Tubing Other _____
 Start Purge Time: 1156 Flow Rate: 100' Pump Depth: 43'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or (µS/cm))	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water (ft.)
1159	25.9	7.43	1000	43	0.89	-112.9	300	5.48
1202	26.2	7.44	1007	38	1.01	-114.6	600	5.60
1205	26.3	7.45	1011	31	1.18	-115.0	900	5.63
1208	25.4	7.45	1005	28	1.27	-112.6	1,200	5.64
1211	25.9	7.45	1001	26	1.44	-112.1	1,500	5.64
1214	26.1	7.46	999	26	1.57	-111.9	1,800	5.64
1217	26.1	7.47	1002	24	1.56	-111.0	2,100	5.64

Did well dewater? Yes (No)	Amount actually evacuated: 2,100 mL
Sampling Time: 1220	Sampling Date: 09-12-17
Sample I.D.: CP22-PMW06B	Laboratory: CalScienc
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: (See See)
Equipment Blank I.D.: @ <small>Time</small>	Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: Geosyntec
Sampler: KC	Gauging Date: 09-12-17
Well I.D.: CP22-PMW07B	Well Diameter (in.): (2) 3 4 6 8
Total Well Depth (ft.): 46.13	Depth to Water (ft.): 4.91
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: (PVC) Grade	Flow Cell Type: YSI Pro Flow

Purge Method: 2" Grundfos Pump Peristaltic Pump (Bladder Pump)
 Sampling Method: (Dedicated Tubing) New Tubing Other _____
 Start Purge Time: 1104 Flow Rate: 100' Pump Depth: 41'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or (µS/cm))	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or (mL))	Depth to Water (ft.)
1107	23.4	7.45	1188	9	0.52	48.4	300	5.65
1110	23.9	7.43	1183	8	0.45	38.5	600	5.90
1113	24.3	7.46	1191	6	0.41	19.5	900	6.20
1116	24.2	7.45	1190	5	0.37	13.3	1,200	6.52
1119	24.1	7.44	1191	4	0.37	11.5	1,500	6.78
1122	24.3	7.44	1186	4	0.36	8.5	1,800	6.96
1125	24.5	7.44	1189	4	0.35	6.5	2,100	7.12
1128	24.5	7.44	1190	4	0.35	5.3	2,400	7.20

Did well dewater? Yes (No)	Amount actually evacuated: 2,400
Sampling Time: 1131	Sampling Date: 09-12-17
Sample I.D.: CP22-PMW07B	Laboratory: Colsonco
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: (See Saw)
Equipment Blank I.D.: @ <small>Time</small>	Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: <u>Geosyntec</u>
Sampler: <u>KC</u>	Gauging Date: <u>09-12-17</u>
Well I.D.: <u>CP22-PMW08B</u>	Well Diameter (in.): <u>2</u> 3 4 6 8 <u> </u>
Total Well Depth (ft.): <u>50.62</u>	Depth to Water (ft.): <u>5.13</u>
Depth to Free Product: <u> </u>	Thickness of Free Product (feet): <u> </u>
Referenced to: <u>PVC</u> Grade	Flow Cell Type: <u>YSI Pro Plus</u>

Purge Method: <u>2" Grundfos Pump</u>	Peristaltic Pump	<u>Bladder Pump</u>
Sampling Method: <u>Dedicated Tubing</u>	New Tubing	Other <u> </u>
Start Purge Time: <u>1010</u>	Flow Rate: <u>100'</u>	Pump Depth: <u>45'</u>

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or <u>μS/cm</u>)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or <u>mL</u>)	Depth to Water (ft.)
1013	23.1	7.42	1292	18	0.69	-77.0	300	5.91
1016	22.8	7.40	1276	13	0.51	-81.9	600	6.28
1019	24.0	7.39	1258	13	0.42	-85.8	900	6.53
1022	23.7	7.39	1262	12	0.39	-85.8	1,200	6.79
1025	24.3	7.36	1239	11	0.37	-82.4	1,500	7.04
1028	24.4	7.36	1239	11	0.37	-81.9	1,800	7.24
1031	23.7	7.34	1235	10	0.38	-80.5	2,100	7.40
1034	23.7	7.35	1227	10	0.42	-78.8	2,400	7.51
1037	23.7	7.32	1228	9	0.41	-77.5	2,700	7.62

Did well dewater? Yes <input type="radio"/> No <input checked="" type="radio"/>	Amount actually evacuated: <u>2,700</u>
Sampling Time: <u>1040</u>	Sampling Date: <u>09-12-17</u>
Sample I.D.: <u>CP22-PMW08B</u>	Laboratory: <u>Calceance</u>
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: <u>See See</u>
Equipment Blank I.D.: @ <small>Time</small>	Duplicate I.D.: <u> </u>

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: Goodyntec
Sampler: KC	Gauging Date: 09-12-17
Well I.D.: CP22-PMW09B	Well Diameter (in.): (2) 3 4 6 8
Total Well Depth (ft.): 50.32	Depth to Water (ft.): 3.90
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: (PVC) Grade	Flow Cell Type: YSI Pro Plus

Purge Method: 2" Grundfos Pump Peristaltic Pump Bladder Pump
 Sampling Method: Dedicated Tubing New Tubing Other _____
 Start Purge Time: 1252 Flow Rate: 100 ml/min Pump Depth: 45'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or <u>µS/cm</u>)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water (ft.)
1255	26.8	7.27	1217	107	0.95	-65.7	300	5.08
1258	26.7	7.22	1219	121	0.70	-75.9	600	5.60
1301	27.4	7.28	1219	119	0.46	-88.4	900	5.90
1304	27.8	7.31	1220	115	0.37	-91.7	1,200	6.14
1307	27.4	7.31	1220	113	0.36	-94.0	1,500	6.30
1310	27.3	7.31	1220	115	0.34	-96.1	1,800	6.43

Did well dewater? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Amount actually evacuated: 1,800 ml
Sampling Time: 1313	Sampling Date: 09-12-17
Sample I.D.: CP22-PMW09B	Laboratory: Calcevia
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: <u>See SW</u>
Equipment Blank I.D.: @ _____	Duplicate I.D.: _____

LOW FLOW WELL MONITORING DATA SHEET

Project #: 170912-KC1	Client: Geosyntec
Sampler: KC	Gauging Date: 09-12-17
Well I.D.: CP22-PMW10B	Well Diameter (in.): (2) 3 4 6 8
Total Well Depth (ft.): 4590	Depth to Water (ft.): 5.00
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: (PVC) Grade	Flow Cell Type: YSI Pro Plus

Purge Method: 2" Grundfos Pump Peristaltic Pump (Bladder Pump)
 Sampling Method: (Dedicated Tubing) New Tubing Other _____
 Start Purge Time: 1430 Flow Rate: 100 ml/min Pump Depth: 41'

Time	Temp. (°C or °F)	pH	Cond. (mS/cm or (µS/cm))	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water (ft.)
1433	24.5	9.98	734	17	0.66	-270.1	300	5.32
1436	24.9	9.85	729	16	0.49	-279.8	600	5.39
1439	24.9	9.77	757	14	0.41	-284.3	1,200	5.48
1442	24.6	9.80	762	13	0.35	-293.5	1,500	5.55
445 1445	24.3	9.77	765	12	0.31	-297.0	1,800	5.57
1448	24.5	9.75	763	12	0.30	-297.3	2,100	5.58
1451	24.4	9.73	763	11	0.29	-297.6	2,400	5.58

Did well dewater? Yes (No)	Amount actually evacuated: 2,400
Sampling Time: 1454	Sampling Date: 09-12-17
Sample I.D.: CP22-PMW10B	Laboratory: Calbiochem
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: _____
Equipment Blank I.D.: * used distilled H ₂ O @ 1515 Time	Duplicate I.D.: _____

WELLHEAD INSPECTION CHECKLIST

Page 1 of 1

Client Geoymtec Date 09-12-17

Site Address Geoymtec @ Camp Pendleton

Job Number 110912-KC1 Technician KC

Well ID	Well Inspected - No Corrective Action Required	WELL IS SECURABLE BY DESIGN (12" or less)	WELL IS CLEARLY MARKED WITH CORRECT IDENTIFICATION	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)	Repair Order Submitted
220205-mux	X	X	X							
CP22-PMW09B	X	X	X							
CP22-PMW10B	X	X	X							
CP22-PMW08B	X	X	X							
CP22-PMW04	X	X	X							
CP22-PMW06B	X	X	X							
CP22-PMW07B	X	X	X							

NOTES:

WELL GAUGING DATA

Project # 180119-KC1 Date 01-19-18 Client Geosyntec

Site Geosyntec @ Camp Pendleton

Well ID	Time	Well Size (in.)	Sheen / Odor	Depth to Immiscible Liquid (ft.)	Thickness of Immiscible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	Notes
220205-mux	0744	4					3.71	39.94	TOC	
CP22-PMW10B	0740	2					4.43	45.90		
CP22-PMW04	0749	2				4.61	48.32			
CP22-PMW07B	0753	2				3.90	46.71			
CP22-PMW08B	0735	2				4.61	50.72			

LOW FLOW WELL MONITORING DATA SHEET

Project #: 180119-KC1	Station #: Geosyntec @ Camp Parrelleton
Sampler: KC	Start Date: 01-19-18
Well I.D.: 220205-mwx	Well Diameter: 2 3 (4) 6 8
Total Well Depth: 39.94	Depth to Water: 3.71
Depth to Free Product: —	Thickness of Free Product (feet): —
Screen Interval:	Pump Depth: 38'
Referenced to: (PVC) Grade	DO Meter: YSI Pro Plus

Purge Method:

Sampling Method:

Instruments Used:

Peristaltic

Dedicated Tubing

Myron L Ultrameter

HACH Turbidimeter

Bladder Pump

New Tubing

Durham Geoslope Indicator YSI 556 Flow-Thru Cell

GeoTech Interface Probe

YSI 550 DO Meter

Electric Submersible

MMC Interface Probe

Other: _____

Flow Rate: 100 ml/min

start purge @ 0952

Time	Temp. (°C or °F)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water
0955	20.0	7.22	1373	5	0.55	14.6	300	3.74
0958	20.1	7.22	1375	5	0.50	9.7	600	3.82
1001	20.2	7.22	1373	4	0.48	8.7	900	3.91
1004	22.02	7.20	1380	3	0.41	3.4	1200	3.93
1007	20.3	7.20	1380	3	0.40	1.2	1500	3.95
1010	20.4	7.19	1380	3	0.39	-0.8	1800	3.98

Did well dewater? Yes (No)

Amount actually evacuated: 1,800

Sampling Time: 1013

Sampling Date: 01-19-18

Sample I.D.: 220205-mwx

Laboratory: Test America

Analyzed for: TPH-G BTEX MTBE TPH-D

Other: Se. Sec.

Equipment Blank I.D.:

@

Time

Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 180119-KC1	Station #: Geosyntec @ Camp Pendleton
Sampler: KC	Start Date: 01-19-18
Well I.D.: CP22-mw04	Well Diameter: (2) 3 4 6 8
Total Well Depth: 48.32	Depth to Water: 4.61
Depth to Free Product: —	Thickness of Free Product (feet): —
Screen Interval:	Pump Depth:
Referenced to: (PVC) Grade	DO Meter: YSI Pro Plus

Purge Method:

Sampling Method:

Instruments Used:

Peristaltic

Dedicated Tubing

Myron L Ultrameter

HACH Turbidimeter

Bladder Pump

New Tubing

Durham Geoslope Indicator

YSI 556 Flow-Thru Cell

Electric Submersible

GeoTech Interface Probe

YSI 550 DO Meter

MMC Interface Probe

Other: _____

Flow Rate: 100 mL/min

start purge @ 1121

Time	Temp. (°C or °F)	pH	Cond. (mS or μ S)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water
1124	19.5	7.38	1216	28	0.79	25.9	300	4.82
1127	20.1	7.33	1226	26	0.73	24.1	600	4.90
1130	19.9	7.31	1234	28	0.66	24.1	900	4.94
1133	19.5	7.24	1235	29	0.64	25.2	1,200	4.98
1136	19.2	7.20	1233	30	0.61	26.3	1,500	5.01
1139	19.4	7.17	1228	31	0.62	26.6	1,800	5.03
1142	19.5	7.17	1225	30	0.59	25.1	2,100	5.05

Did well dewater? Yes No Amount actually evacuated: 2,100

Sampling Time: 1145 Sampling Date: 01-19-18

Sample I.D.: CP22-mw04 Laboratory: Test America (Calsovine)

Analyzed for: TPH-G BTEX MTBE TPH-D Other: See Data

Equipment Blank I.D.: EB-BT-20180119 @ 0900 Duplicate I.D.: DUP-BT-20180119 @ 0900

LOW FLOW WELL MONITORING DATA SHEET

Project #: 180119-KC1	Station #: Geosyntec @ Camp Pendleton
Sampler: KC	Start Date: 01-19-18
Well I.D.: CP22-PMW07B	Well Diameter: (2) 3 4 6 8
Total Well Depth: 46.71	Depth to Water: 3.90
Depth to Free Product: —	Thickness of Free Product (feet): —
Screen Interval:	Pump Depth: 45'
Referenced to: (PVC) Grade	DO Meter: YSI Pro Plus

Purge Method:

Sampling Method:

Instruments Used:

Peristaltic

Dedicated Tubing

Myron L Ultrameter

HACH Turbidimeter

Bladder Pump

New Tubing

Durham Geoslope Indicator

YSI 556 Flow-Thru Cell

Electric Submersible

GeoTech Interface Probe

YSI 550 DO Meter

MMC Interface Probe

Other: _____

Flow Rate: 100 mL/min

start purge @ 0808

Time	Temp. (°C or °F)	pH	Cond. (mS or μ S)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water
0811	18.2	7.17	1288	4	0.62	-35.8	300	4.31
0814	18.3	7.28	1293	4	0.43	-75.7	600	4.60
0817	17.3	7.30	1294	4	0.47	-82.7	900	4.64
0820	17.0	7.28	1291	3	0.53	-85.5	1200	4.68
0823	16.9	7.29	1290	3	0.54	-87.8	1500	4.71
0826	16.9	7.30	1289	3	0.55	-90.1	1800	4.73

Did well dewater? Yes No

Amount actually evacuated: 1,800

Sampling Time: 0829

Sampling Date: 01-19-18

Sample I.D.: CP22-PMW07B

Laboratory: Test America

Analyzed for: TPH-G BTEX MTBE TPH-D

Other: Geo Syntec

Equipment Blank I.D.: @ Time

Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 180119-KC1	Station #: Geosyntec @ Camp Pendleton
Sampler: KC	Start Date: 01-19-18
Well I.D.: CP22-PMW08	Well Diameter: (2) 3 4 6 8
Total Well Depth: 50.72	Depth to Water: 4.61
Depth to Free Product: —	Thickness of Free Product (feet): —
Screen Interval:	Pump Depth: 59'
Referenced to: PVC Grade	DO Meter: YSI Pro Plus

Purge Method: Peristaltic Bladder Pump Electric Submersible
Sampling Method: Dedicated Tubing New Tubing
Instruments Used: Myron L Ultrameter, HACH Turbidimeter, Durham Geoslope Indicator, YSI 556 Flow-Thru Cell, GeoTech Interface Probe, YSI 550 DO Meter, MMC Interface Probe, Other: _____

Flow Rate: 100 ml/min start purge @ 0902

Time	Temp. (°C or °F)	pH	Cond. (mS or μ S)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Depth to Water
0905	18.8	7.42	1317	18	1.51	-50.2	300	4.72
0908	18.6	7.41	1401	16	0.98	-80.1	600	4.93 4.93
0911	18.8	7.37	1413	14	0.74	-92.5	1200 900	5.06
0914	18.8	7.37	1413	14	0.67	-94.6	1,200	5.11
0917	18.6	7.36	1416	13	0.64	-97.3	1,500	5.14 5.14
0920	18.5	7.31	1390	12	0.56	-95.8	1,800	5.17
0923	18.5	7.29	1381	11	0.52	-94.8	2,100	5.20
0926	18.6	7.27	1369	11	0.50	-94.6	2,400	5.22

Did well dewater? Yes No Amount actually evacuated: 2,400

Sampling Time: 0929 Sampling Date: 01-19-18

Sample I.D.: CP22-PMW08 Laboratory: Test America

Analyzed for: TPH-G BTEX MTBE TPH-D Other: Geo Tech

Equipment Blank I.D.: @ Time Duplicate I.D.:

LOW FLOW WELL MONITORING DATA SHEET

Project #: 180119-KC1	Station #: Geosyntec @ Camp Pendleton
Sampler: KC	Start Date: 01-19-18
Well I.D.: CP22-PMW10B	Well Diameter: (2) 3 4 6 8
Total Well Depth: 50.72	Depth to Water: 4.61
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Screen Interval:	Pump Depth: 49'
Referenced to: (PVC) Grade	DO Meter: YSI Pro Plus

Purge Method:

Sampling Method:

Instruments Used:

Peristaltic

Dedicated Tubing

Myron L Ultrameter

HACH Turbidimeter

Bladder Pump

New Tubing

Durham Geoslope Indicator

YSI 556 Flow-Thru Cell

GeoTech Interface Probe

YSI 550 DO Meter

Electric Submersible

MMC Interface Probe

Other: _____

Flow Rate: 100 ml/min

start purge @ 1035

Time	Temp. (°C or °F)	pH	Cond. (mS or μ S)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or gal)	Depth to Water
1038	19.3	9.90	771	25	0.77	-242.4	300	4.20
1041	19.4	10.08	769	17	0.42	-269.7	600	4.31
1044	19.4	10.11	770	12	0.34	-275.1	900	4.33
1047	19.4	10.14	771	10	0.32	-279.8	1,200	4.34
1050	19.6	10.11	768	9	0.28	-285.2	1,500	4.34
1053	19.5	10.08	780	8	0.25	-285.8	1,800	4.35
1056	19.6	10.05	780	8	0.25	-284.4	2,100	4.35

Did well dewater? Yes No

Amount actually evacuated: 2,100

Sampling Time: 1059

Sampling Date: 01-19-18

Sample I.D.: CP22-PMW10B

Laboratory: Test America

Analyzed for: TPH-G BTEX MTBE TPH-D

Other: Geo Geo

Equipment Blank I.D.: @ Time

Duplicate I.D.:

WELLHEAD INSPECTION CHECKLIST

Page 1 of 1

Client Greasyntec Date 01-19-18

Site Address Greasyntec @ Camp Pinedalen

Job Number 180119-KC1 Technician KC

Well ID	Well Inspected - No Corrective Action Required	WELL IS SECURABLE BY DESIGN (12" or less)	WELL IS CLEARLY MARKED WITH THE WORDS "MONITORING WELL" (12" or less)	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)	Repair Order Submitted
220205-MWX	X	X	X							
EP22-PMW10B	X	X	X							
EP22-PMW04	X	X	X							
EP22-PMW07B	X	X	X							
EP22-PMW08B	X	X	X							

NOTES: _____

WELL GAUGING DATA

Project # 180912-KCI Date 09-12-18 Client Geosyntec

Site Camp Pendleton

Well ID	Time	Well Size (in.)	Sheen / Odor	Depth to Immiscible Liquid (ft.)	of Immiscible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	Notes
220205 -mwx	1327	4					6.21	39.92	TOC	ded. tubing
CP22- PMW04	1243	2					5.66	48.31		
CP22- PMW07B	1013	2					6.20	46.79		
CP22- PMW08B	1057	2					5.84	50.73		
CP22- PMW10B	1147	2					7.10	45.93		

SAN DIEGO COUNTY LOW FLOW WELL MONITORING DATA SHEET

BTS #: 180912-KC1	Date: 09-12-18
Sampler: KC	Project Address: Geosyntec @ Camp Pendleton
Well ID: 220205-mwx	Project Number:
Borehole Diameter: 8 (10) 12	Well Diameter: 2 3 (4) 6 8
Referenced to: PVC Grade	Water Column Height: 33.71
Total Well Depth: 39.92	Depth to Water: 6.21 Time 1327
Depth to Free Product:	Thickness of Free Product (feet):
DTW with 80% Recharge of drawdown [(Maximum Drawdown during purging x 0.20) + DTW]:	
Meter type/ID: Ultrameter YSI 556 YSI 550	ID: 16M100925
Decontamination Method: Steam/High Pressure Wash	3 Stage Rinse Other
Recharge type: Fast <input checked="" type="checkbox"/> Slow	Water Level Indicator Type: GeoSlope Indicator ID: 1537244

Purge Method: Bailer Disposable Bailer Positive Air Displacement Fixed Electric Submersible Variable Electric Submersible

Watterra Peristaltic Extraction Pump Other bladder pump

Bailer Disposable Bailer Extraction Port Dedicated Tubing Other:

Purge Rate: 100 ml/min Start Purge: 1329

Purging Methods
 Method 3, Low-flow install pump at least 2hrs prior to start of purging: Portable Pump Install Date: Time: Dedicated Pump

Time	Temp (°C)	pH	Cond. (mS or (µS))	Turbidity (NTUs)	D.O. (mg/L)	ORP	Depth to Water	Volume Removed (ml)	Observations
1332	27.6	7.32	1359	13	0.51	133.4	6.31	300	
1335	27.6	7.30	1337	9	0.43	116.2	6.42	600	
1338	27.8	7.28	1329	7	0.30	91.4	6.49	900	
1341	27.9	7.28	1329	7	0.29	87.1	6.53	1,200	
1344	27.7	7.28	1328	6	0.30	78.4	6.54	1,500	
1347	27.6	7.27	1328	6	0.33	73.0	6.54	1,800	

Did well dewater? Yes No Volume actually evacuated: 1,800

Sampling Date: 09-12-18 Sampling Time: 1350 Depth to Water: 6.54

Sample I.D.: 220205-mwx Laboratory:

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) See SOW Quantity: 8 Filtered: NY

EB I.D. (if applicable): EB-BT-20180912 Time 1324 Duplicate I.D. (if applicable):

D.O. (if req'd): Pre-purge: mg/L Post-purge: mg/L

O.R.P. (if req'd): Pre-purge: mV Post-purge: mV

Field Sheet Checked by:

SAN DIEGO COUNTY LOW FLOW WELL MONITORING DATA SHEET

BTS #: 180912-KC1	Date: 09-12-18
Sampler: KC	Project Address: Geodyntec @ Camp Pendleton
Well ID: CP22-PMW04 CP22-PMW04	Project Number: _____
Borehole Diameter: (8) 10 12 _____	Well Diameter: (2) 3 4 6 8 _____
Referenced to: (PVC) Grade	Water Column Height: 42.65
Total Well Depth: 48.31	Depth to Water: 5.66 Time 1243
Depth to Free Product: _____	Thickness of Free Product (feet): _____
DTW with 80% Recharge of drawdown [(Maximum Drawdown during purging x 0.20) + DTW]:	
Meter type/ID: Ultrameter (YSI 556) YSI 550	ID: 16M100925
Decontamination Method: (Steam/High Pressure Wash)	3 Stage Rinse Other
Recharge type: Fast <input checked="" type="checkbox"/> Slow _____	Water Level Indicator Type: GeoSlope Indicator ID: 1537244

Purge Method:

Bailer	Watterra	Bailer
Disposable Bailer	Peristaltic	(Disposable Bailer)
Positive Air Displacement	Extraction Pump	Extraction Port
Fixed Electric Submersible	Other (bladder pump)	Dedicated Tubing
Variable Electric Submersible		Other: _____

Purge Rate: 100 mg/min Start Purge: 1243

Purging Methods
 Method 3, Low-flow install pump at least 2hrs prior to start of purging: Portable Pump Install Date: _____ Time: _____ Dedicated Pump

Time	Temp (°C)	pH	Cond. (mS or (µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP	Depth to Water	Volume Removed (ml)	Observations
1246	24.4	7.60	1191	16	1.13	93.8	6.71	300	
1249	25.3	7.40	1174	14	0.57	69.0	6.98	600	
1252	25.5	7.35	1195	12	0.53	49.3	7.18	900	
1255	25.5	7.33	1184	11	0.47	45.6	7.30	1,200	
1258	25.7	7.31	1192	10	0.42	38.2	7.38	1,500	
1301	25.7	7.31	1193	10	0.40	37.1	7.42	1,800	

Did well dewater?	Yes	(No)	Volume actually evacuated: 1,800
Sampling Date: 09-12-18	Sampling Time: 1304	Depth to Water: 7.42	
Sample I.D.: CP22-PMW04	Laboratory:		
Analyzed for: (TPH-G) (BTEX) (MTBE) TPH-D Oxygenates (5) Se SeO	Quantity: 8	Filtered: (N/Y)	
EB I.D. (if applicable):	Time	Duplicate I.D. (if applicable): DOP	
D.O. (if req'd):	Pre-purge:	mg/L	Post-purge: mg/L
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge: mV
Field Sheet Checked by:			

SAN DIEGO COUNTY LOW FLOW WELL MONITORING DATA SHEET

BTS #: 180912-K01		Date: 09-12-18	
Sampler: KC		Project Address: geosyntec @ camp foundation	
Well ID: CP22-PMW07B		Project Number: _____	
Borehole Diameter: (8) 10 12 _____		Well Diameter: (2) 3 4 6 8 _____	
Referenced to: (PVC) Grade		Water Column Height: 40.59	
Total Well Depth: 46.79		Depth to Water: 6.20 Time 1013	
Depth to Free Product: _____		Thickness of Free Product (feet): _____	
DTW with 80% Recharge of drawdown [(Maximum Drawdown during purging x 0.20) + DTW]:			
Meter type/ID: Ultrameter (YSI 556) YSI 550		ID: 16m100925	
Decontamination Method: Steam/High Pressure Wash		3 Stage Rinse Other	
Recharge type: Fast <input checked="" type="checkbox"/> Slow _____		Water Level Indicator Type: GeoSlope Indicator ID: 1537244	

Purge Method: Bailer Waterra Bailer
 Disposable Bailer Peristaltic Disposable Bailer
 Positive Air Displacement Extraction Pump Extraction Port
 Fixed Electric Submersible Other: (Dedicated Pump) (Dedicated Tubing)
 Variable Electric Submersible Other: _____

Purge Rate: 100 ml/min Start Purge: 1017

Purging Methods
 Method 3. Low-flow install pump at least 2hrs prior to start of purging: Portable Pump Install Date: _____ Time: _____ Dedicated Pump

Time	Temp (°C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP	Depth to Water	Volume Removed (ml)	Observations
1020	24.3	7.22	1244	7	0.97	180.3	6.90	300	
1023	25.1	7.28	1231	7	0.69	163.2	7.37	600	
1026	25.4	7.30	1222	6	0.60	148.7	7.79	900	
1029	25.4	7.31	1233	6	0.58	139.1	8.00	1,200	
1032	25.8	7.31	1229	6	0.60	127.0	8.09	1,500	
1035	25.5	7.31	1231	6	0.60	121.4	8.16	1,800	
1038	25.4	7.31	1233	6	0.59	119.7	8.22	2,100	

Did well dewater? Yes (No) Volume actually evacuated: 2,100 ml

Sampling Date: 09-12-18 Sampling Time: 1041 Depth to Water: 8.22

Sample I.D.: CP22-PMW07B Laboratory: _____

Analyzed for: (PH-O) (BTEX) (MTBE) TPH-D (Oxygenates) (5) (See Sec) Quantity: 8 Filterd: (NY)

EB I.D. (if applicable): _____ Duplicate I.D. (if applicable): _____

D.O. (if req'd): Pre-purge: _____ mg/L Post-purge: _____ mg/L

O.R.P. (if req'd): Pre-purge: _____ mV Post-purge: _____ mV

Field Sheet Checked by: _____

SAN DIEGO COUNTY LOW FLOW WELL MONITORING DATA SHEET

BTS #: 180912-KC1		Date: 09-12-18	
Sampler: KC		Project Address: <u>Geosyntec @ Camp Pendleton</u>	
Well ID: CP22-PMW08B CP22-PMW08B		Project Number: _____	
Borehole Diameter: (8) 10 12 _____		Well Diameter: (2) 3 4 6 8 _____	
Referenced to: (PVC) Grade		Water Column Height: 44.89	
Total Well Depth: 50.73		Depth to Water: 5.84 Time <u>1057</u>	
Depth to Free Product: _____		Thickness of Free Product (feet): _____	
DTW with 80% Recharge of drawdown [(Maximum Drawdown during purging x 0.20) + DTW]:			
Meter type/ID: Ultrameter (YSI 556) YSI 550		ID: <u>16M100925</u>	
Decontamination Method: (Steam/High Pressure Wash)		3 Stage Rinse Other	
Recharge type: Fast _____ Slow _____		Water Level Indicator Type: GeoSlope Indicator ID: <u>1537244</u>	

Purge Method: Bailer Waterra Bailer
 Disposable Bailer Peristaltic Disposable Bailer
 Positive Air Displacement Extraction Pump Extraction Port
 Fixed Electric Submersible Other bladder pump (Dedicated Tubing)
 Variable Electric Submersible Other: _____

Purge Rate: 100 ml/min Start Purge: 1100

Purging Methods
 Method 3, Low-flow install pump at least 2hrs prior to start of purging: Portable Pump Install Date: _____ Time: _____ Dedicated Pump

Time	Temp (°C)	pH	Cond. (mS or μ S)	Turbidity (NTUs)	D.O. (mg/L)	ORP	Depth to Water	Volume Removed (ml)	Observations
1103	25.0	7.18	1242	10	1.06	109.1	6.30	300	
1106	24.9	7.15	1236	9	0.69	83.7	6.81	600	
1109	25.1	7.14	1236	9	0.52	74.9	7.43	900	
1112	25.2	7.14	1237	8	0.45	67.8	7.65	1,200	
1115	24.9	7.13	1236	8	0.43	66.4	7.83	1,500	
1118	25.1	7.14	1234	8	0.40	61.2	7.97	1,800	
1121	25.2	7.14	1238	8	0.42	59.3	8.05	2,100	

Did well dewater? Yes (No) Volume actually evacuated: 2,100 ml

Sampling Date: 09-12-18 Sampling Time: 1124 Depth to Water: 8.05

Sample I.D.: CP22-PMW08B Laboratory: _____

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) (Oxygenates (5) See Rec) Quantity: 8 Filtered: N/Y

EB I.D. (if applicable): _____ Time Duplicate I.D. (if applicable): _____

D.O. (if req'd): Pre-purge: _____ mg/L Post-purge: _____ mg/L

O.R.P. (if req'd): Pre-purge: _____ mV Post-purge: _____ mV

Field Sheet Checked by: _____

SAN DIEGO COUNTY LOW FLOW WELL MONITORING DATA SHEET

BTS #: 180912-KC1		Date: 09-12-18	
Sampler: KC		Project Address: Geodyntec @ Camp Pendleton	
Well ID: CP22-PMW10B		Project Number: _____	
Borehole Diameter: (8) 10 12 _____		Well Diameter: (2) 3 4 6 8 _____	
Referenced to: (PVC) Grade		Water Column Height: 38.83	
Total Well Depth: 45.93		Depth to Water: 7.10 Time 1147	
Depth to Free Product: _____		Thickness of Free Product (feet): _____	
DTW with 80% Recharge of drawdown [(Maximum Drawdown during purging x 0.20) + DTW]:			
Meter type/ID: Ultrameter (YSI 556) YSI 550		ID: 116M100925	
Decontamination Method: (Steam/High Pressure) Wash		3 Stage Rinse Other	
Recharge type: Fast <input checked="" type="checkbox"/> Slow _____		Water Level Indicator Type: GeoSlope Indicator ID: 1537244	

Purge Method:	Bailer Disposable Bailer Positive Air Displacement Fixed Electric Submersible Variable Electric Submersible	Waterra Peristaltic Extraction Pump (Other Bladder pump)	Bailer Disposable Bailer Extraction Port (Dedicated Tubing) Other: _____
Purge Rate: 100 ml/min	Start Purge: 1150		

Purging Methods
 Method 3, Low-flow install pump at least 2hrs prior to start of purging: Portable Pump Install Date: _____ Time: _____ Dedicated Pump

Time	Temp (°C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP	Depth to Water	Volume Removed (ml)	Observations
1153	23.9	9.39	702	14	0.41	-294.7	6.92	300	
1156	24.5	9.46	685	15	0.35	-306.9	6.92	600	
1159	25.3	9.53	692	13	0.37	-328.0	6.92	900	
1202	25.4	9.55	692	11	0.31	-334.8	6.92	1,200	
1205	25.6	9.57	693	10	0.27	-346.1	6.92	1,500	
1208	25.0	9.58	700	9	0.26	-352.1	6.92	1,800	
1211	25.1	9.59	702	9	0.24	-355.9	6.92	2,100	

Did well dewater? Yes No Volume actually evacuated: 2,100 ml

Sampling Date: 09-12-18 Sampling Time: 1214 Depth to Water: 6.92

Sample I.D.: CP22-PMW10B Laboratory: _____

Analyzed for: (TPH-G) (BTEX) (MTBE) TPH-D (Oxygenates (5) See Sec) Quantity: 8 Filtered: (N/A)

EB I.D. (if applicable): _____ Time Duplicate I.D. (if applicable): _____

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
------------------	------------	------	-------------	------

O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
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Field Sheet Checked by: _____

WELLHEAD INSPECTION CHECKLIST

Client Geosyntec Date 09-12-18

Site Address Camp Pendleton

Job Number _____ Technician JC

Well ID	Well Inspected - No Corrective Action Required	WELL IS SECURABLE BY DESIGN (12" or less)	WELL IS CLEARLY MARKED WITH CORRECT IDENTIFICATION	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)	Repair Order Submitted
220205-mux	x	x	x							
CP22-PMW04	x	x	x							
CP22-PMW01B	x	x	x							
CP22-PMW08B	x	x	x							
CP22-PMW10B	x	x	x							

NOTES: _____

TEST EQUIPMENT CALIBRATION LOG

PROJECT NAME		PROJECT NUMBER					
180912-KCJ		180912-KCJ					
EQUIPMENT NAME	EQUIPMENT NUMBER	DATE/TIME OF TEST	STANDARDS USED	EQUIPMENT READING	CALIBRATED TO: OR WITHIN 10%:	TEMP.	INITIALS
YSI ProDuo	1100100925	09-12-18 @ 1000	PH --- 4.7, 10 COND --- 3900 DRP --- 230.4 DO? ---	47.10 3900 230.4 99.6%	Y	26.3°C	dlw
					Y	26.3°C	dlw

Geosyntec ©
Camp Dresser & McKee

SPH or Purge Water Drum Log

Client: Gensyntec

Site Address: Camp Pond Station

STATUS OF DRUM(S) UPON ARRIVAL						
Date	09-12-18					
Number of drum(s) empty:	0					
Number of drum(s) 1/4 full:	—					
Number of drum(s) 1/2 full:	—					
Number of drum(s) 3/4 full:	—					
Number of drum(s) full:	—					
Total drum(s) on site:	0					
Are the drum(s) properly labeled?	—					
Drum ID & Contents:	—					
If any drum(s) are partially or totally filled, what is the first use date:	—					

- If you add any SPH to an empty or partially filled drum, drum must have at least 20 gals. of Purge water or DI Water.

- If drum contains SPH, the drum MUST be steel AND labeled with the appropriate label.

- All BTS drums MUST be labeled appropriately.

STATUS OF DRUM(S) UPON DEPARTURE						
Date	09-12-18					
Number of drums empty:	0					
Number of drum(s) 1/4 full:	1					
Number of drum(s) 1/2 full:	0					
Number of drum(s) 3/4 full:	0					
Number of drum(s) full:	0					
Total drum(s) on site:	1					
Are the drum(s) properly labeled?	yes					
Drum ID & Contents:	purge water					

LOCATION OF DRUM(S)

Describe location of drum(s): next to fenced in enclosure

FINAL STATUS

Number of new drum(s) left on site this event	1					
Date of inspection:	09-12-18					
Drum(s) labelled properly:	yes					
Logged by BTS Field Tech:	JLK					
Office reviewed by:						

APPENDIX B BORING LOGS

GS FORM:
BORE_HYDROPUNCH

BOREHOLE RECORD

DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	GROUNDWATER	Sample ID	TYPE	RECOVERY (%)	PID READING (ppm)	TIME	COMMENTS
	Poorly graded SAND with silt [SP-SM]: dark grayish brown [10YR 3/2]; moist; fine to medium sand, fines [0, 90, 10]; micaceous								
5	Silty SAND [SM]: brown [10YR 5/3]; moist; fine to medium sand, fines [0, 80, 20]		▼				1.1		wet after 8'
10							1.2		
15							1.6		
20	becomes olive brown [2.5Y 4/3]; very high mica content						0.8		
25							0.7		20'-discreet sample collected for XRF analysis
30							1.3		
35	Poorly graded SAND with silt [SP-SM]: very dark grayish brown [2.5Y 3/2]; wet; fine to medium sand, fines [0, 90, 10]; high mica content						0.7		
35	Sandy SILT [ML]: very dark gray [2.5Y 3/1]; wet; fine to medium sand, fines [0, 40, 60]; medium plasticity; soft to medium stiff						1.9		
35	Silty SAND [SM]: very dark grayish brown [2.5Y 3/1]; wet; fine to medium sand, fines [0, 40, 60]; medium plasticity; soft to medium stiff						1.6		
40	Silty SAND [SM]: very dark grayish brown [2.5Y 3/2]; wet; fine to medium sand, fines [0, 80, 20]						1.3		
42-46	increased silt content [0, 60, 40]						1.3		35'-45' discreet samples collected for XRF analysis
45							1.5		
45							1.4		
45	Total Depth: 46 ft bgs								
50									
55									

BORE_HYDROPUNCH POS.GPJ GEOSNTEC.GDT 4/23/19

CONTRACTOR Kehoe
EQUIPMENT
DRILL MTHD DPT
DIAMETER 2.75"
LOGGER BR

NORTHING
EASTING
ANGLE Vertical

REVIEWER LK

REMARKS Borehole backfilled with bentonite/cement grout.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

GS FORM:
BORE_HYDROPUNCH

BOREHOLE RECORD

DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	GROUNDWATER	Sample ID	TYPE	RECOVERY (%)	PID READING (ppm)	TIME	COMMENTS
	Well graded SAND [SW]: dark brown [2.5YR 3/2]; dry; fine to coarse sand [0, 100, 0]								0'-4' ~50% sample compression
5	Well graded SAND [SW-SM] with silt: very dark grayish brown [10YR 3/2]; moist; fine to medium sand, fines [0, 90, 10]								
10	SILT [MH]: very dark grayish brown [10YR 3/2]; moist; fine sand, fines [0, 10, 90]; micaceous		▼						wet 12'-14'
	Silty SAND [SM]: very dark grayish brown [10YR 3/2]; wet; fine sand, fines [0, 70, 30]; micaceous								
15	SILT [MH]: very dark grayish brown [10YR 3/2]; moist; fine sand, fines [0, 10, 90]; micaceous								wet 16'-19'
	Silty SAND [SM]: very dark grayish brown [10YR 3/2]; wet; fine sand, fines [0, 70, 30]; micaceous								20'-discreet sample collected for XRF analysis
20	Sandy SILT [MH]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 30, 70]; micaceous								wet 20'-22'
	Silty SAND [SM]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 60, 40]; micaceous								wet 24'-25'
25	SILT [MH]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 10, 90]; micaceous								24'-28' ~25% sample compression
	Silty SAND [SM]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 70, 30]; micaceous								wet 29'-30'
30	Sandy SILT [MH]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 40, 60]; micaceous								wet 32'-33'
	Silty SAND [SM]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 60, 40]; micaceous								wet 36'-37'
35	SILT [MH]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 10, 90]; micaceous								
	Silty SAND [SM]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 80, 20]; micaceous								wet 40'-42'
45	SILT [MH]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 10, 90]; micaceous								35'-45' discreet samples collected for XRF analysis
	Silty SAND [SM]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 80, 20]; micaceous								wet 44'-50'
50	Silty SAND [SM]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 80, 20]; micaceous								
55	Total Depth: 52 ft bgs								

BORE_HYDROPUNCH POS.GPJ GEOSNTEC.GDT 4/23/19

CONTRACTOR Kehoe
EQUIPMENT
DRILL MTHD DPT
DIAMETER 2"
LOGGER BR

NORTHING
EASTING
ANGLE Vertical

REVIEWER LK

REMARKS Borehole backfilled with bentonite/cement grout.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

GS FORM:
BORE_HYDROPUNCH

BOREHOLE RECORD

DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	GROUNDWATER	Sample ID	TYPE	RECOVERY (%)	PID READING (ppm)	TIME	COMMENTS
	Poorly graded SAND with silt [SP-SM]: dark grayish brown [10YR 4/2]; moist; fine to medium sand, fines [0, 90, 10]; high mica content								
5	Silty SAND [SM]: brown [10YR 5/3]; moist; fine to medium sand, fines [0, 80, 20]		▼				2.0		wet after 5'
10	Poorly graded SAND with silt [SP-SM]: very dark grayish brown [10YR 3/2]; wet; fine to medium sand, fines [0, 90, 10]; high mica content						1.4		
15	Silty SAND [SM]: very dark grayish brown [2.5Y 3/2]; wet; fine to medium sand, fines [0, 60, 40]; high mica content						1.5		
20							0.7		
25	decrease in fines [0, 80, 20]						1.0		20'-discreet sample collected for XRF analysis
30	Sandy SILT [ML]: very dark gray [2.5Y 3/1]; wet; fine to medium sand, fines [0, 40, 60]; medium plasticity; stiff						1.6		
35	Silty SAND [SM]: very dark grayish brown [10YR 3/2]; wet; fine to medium sand, fines [0, 70, 30]; high mica content						1.2		
40							2.0		
45	Sandy SILT [ML]: very dark gray [2.5Y 3/1]; wet; fine to medium sand, fines [0, 40, 60]; medium plasticity; soft to medium stiff						1.9		
50							2.1		35'-45' discreet samples collected for XRF analysis
55	Total Depth: 46 ft bgs						2.0		

BORE_HYDROPUNCH POS.GPJ GEOSNTEC.GDT 4/23/19

CONTRACTOR Kehoe
EQUIPMENT
DRILL MTHD DPT
DIAMETER 2.75"
LOGGER BR

NORTHING
EASTING
ANGLE Vertical

REVIEWER LK

REMARKS Borehole backfilled with bentonite/cement grout.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

GS FORM:
BORE_HYDROPUNCH

BOREHOLE RECORD

DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	GROUNDWATER	Sample ID	TYPE	RECOVERY (%)	PID READING (ppm)	TIME	COMMENTS
0	Well graded SAND with silt (SW-SM): dark grayish brown [10YR 4/2]; dry; fine to medium sand, fine to coarse sand, fines [0, 90, 10]								moist after 4'
5	Silty SAND [SM]: very dark grayish brown [10YR 3/2]; moist; fine sand, fines [0, 70, 30]								0'-16' ~ 40-50% compression
10	SILT [MH]: very dark grayish brown [10YR 3/2]; moist; fine sand, fines [0, 10, 90]								
15	Silty SAND [SM]: very dark grayish brown [10YR 3/2]; moist; fine sand, fines [0, 60, 40]								
20	SILT [MH]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 10, 90]								wet 21'-24'
25	Silty SAND [SM]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 70, 30]; micaceous		▼						20'-discreet sample collected for XRF analysis
30	Sandy SILT [MH]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 30, 70]; micaceous								24'-28' ~60% compression
35	Silty SAND [SM]: very dark gray [10YR 3/1]; moist; fine sand, fines [0, 70, 30]; micaceous								wet 28'-30'
35	SILT with sand [MH]: very dark gray [10YR 3/1]; wet; fine sand, fines [0, 20, 80]								wet 32.5'-35'
35	Silty SAND [SM]: grayish brown [10YR 5/2]; wet; fine sand, fines [0, 60, 40]; micaceous								wet 37'-48'
40									
45									
50	Total Depth: 48 ft bgs								35'-45' discreet samples collected for XRF analysis
55									

BORE_HYDROPUNCH POS.GPJ GEOSNTEC.GDT 4/23/19

CONTRACTOR Kehoe
EQUIPMENT
DRILL MTHD DPT
DIAMETER 2"
LOGGER BR

NORTHING
EASTING
ANGLE Vertical

REVIEWER LK

REMARKS Borehole backfilled with bentonite/cement grout.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

APPENDIX C X-RAY FLUORESCENT ANALYZER OPERATING PROCEDURES

Appendix C

X-Ray Fluorescent (XRF) Analyzer Operating Procedures

1. **Order Equipment:** Rent Innov-X Delta from Olympus (or similar supplier) along with sample table. Confirm that the equipment rental will include one NIST standard and an SiO₂ blank for calibration checks. Order radiation badges from Landauer for each member of the field team who will operate the XRF unit.
2. **Health and Safety:** The primary safety concern when using the XRF is due to accidental radiation exposure, and the primary mitigation measures for this risk consist of proper instrument use including distance and shielding. Details of the safety protocol for this instrument are listed in the project-specific Health and Safety Plan (HASP, Appendix A).
3. **Test:** Turn on equipment before heading to the field to check that the battery is charged and the equipment is running properly. Download the data import software “Innov-X Delta Advanced PC Software”, which should be included with the XRF meter.
4. **Setup/Materials:** Prepare test and sample materials including a) XRF meter, b) XRF sample table (rented), c) NIST samples, d) disposable zip-top bags to hold soil samples, e) disposable plastic spoons to remove large rocks/debris from samples f) Sharpie for labeling samples, g) container for organizing field-screening samples (e.g. muffin tin), h) all set up at a folding table test station or back of field vehicle. Put on radiation badge before commencing XRF handling; badges are uniquely-assigned and should not change hands.
5. **Display/Sample Analysis Configuration:**
 - a. The display of the Innov-X Delta can be configured to show all of the Title 22 metals that are measurable by the instrument (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, vanadium, and zinc; molybdenum, silver, and thorium are unlikely to be measurable), and Zn can be configured to appear at the top of the display sort-order.
 - b. Note that high concentrations (>10,000 ppm) will show as %.
6. **Daily Startup:** Before starting every day, run internal calibration check and analyze NIST standard.
 - a. Turn on XRF with green button on top. The meter is always safe to handle when the red light is not flashing. A solid red light means that the meter is ready to emit X-rays, but is not currently doing so. The trigger on the instrument is not locked – if possible, do not use the trigger.
 - b. Insert the XRF meter into the Workstation table and use thumb screws to fix in place.

- c. XRF instrument will be allowed to warm up for 15 to 30 minutes daily before analysis of samples to alleviate drift or energy calibration problems
7. **Initial Calibration:** Run calibrations per the Innov-X user manual:
 - a. Instrument Blank - Place SiO₂ blank (supplied with the instrument) over the meter lens in the Workstation. Close the cover and run meter. The purpose of this test is to verify there is no contamination on the analyzer window
 - b. Calibration Verification - Next, place NIST standard for Zn (supplied with the instrument), with the labeled cap face up, over the meter lens in the Workstation. Close the cover and perform a 2 minute test on the NIST standard.
 - c. If the meter is working correctly, there will be no reported metals during the blank analysis and the NIST standards will be accurate within 20% of the listed values.
 8. **Additional Calibration:** After every 20 samples, re-run internal calibration check and re-analyze NIST standard.
 9. **Field Screening:** Perform XRF field screening for soil samples as follows:
 - a. Place a golf ball sized sample in zip-top bag, remove rocks or other large debris, label with boring ID and depth, and seal.
 - b. Break the soil into smaller pieces and massage bag to facilitate homogeneity.
 - c. The sample will be positioned in front of the plastic film measurement window of the probe, and the instrument will be triggered to expose the sample to the source radiation for a minimum exposure count time of 30 seconds.
 - d. The XRF instrument will process the data from the sample. The concentrations of target analytes shown on the display will be recorded in field forms, and/or the instrument will be programmed to record numerical analytical results files which will be downloaded periodically.
 - e. Steps c and d will be repeated to collect a total of three readings per sample. If one or more of the three values is anomalous, an attempt may be made to homogenize the sample and repeat steps c through e, discarding the previous results. The average of the three values will be used as the sample concentration.
 - f. Following analysis, a minimum of three soil samples per boring will be saved in a labeled jar for submittal to the analytical laboratory (see details in the work plan).
 10. **Daily Shutdown:** Remove XRF meter from Workstation and click the power button on the top right of the screen. Charge the meter and spare battery overnight.
 11. **File Download:** Data will store automatically on the XRF meter. At the end of the field effort, connect the XRF to a computer and export the analytical results.
 12. **Radiation Badge:** After the field effort is completed, radiation badges will be collected and sent to Landauer for analysis. See HASP for details.

APPENDIX D ANALYTICAL LABORATORY REPORTS



Calscience



WORK ORDER NUMBER: 17-09-0693

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: WR2274 / ESTCP Pendleton

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/22/2017 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 17-09-0693

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/11/17. They were assigned to Work Order 17-09-0693.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 17-09-0693
595 Market Street, Suite 610	Project Name: WR2274 / ESTCP Pendleton
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/11/17 18:05
	Number of Containers: 75

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-HP05-39-41	17-09-0693-1	09/11/17 09:00	11	Aqueous
CP22-HP05-43-45	17-09-0693-2	09/11/17 12:00	5	Aqueous
CP22-HP04-35-37	17-09-0693-3	09/11/17 11:45	7	Aqueous
CP22-HP04-39-41	17-09-0693-4	09/11/17 13:00	10	Aqueous
CP22-HP04-43-45	17-09-0693-5	09/11/17 13:15	11	Aqueous
CP22-HP07-35-37	17-09-0693-6	09/11/17 14:15	11	Aqueous
CP22-HP07-39-41	17-09-0693-7	09/11/17 15:15	6	Aqueous
CP22-HP07-43-45	17-09-0693-8	09/11/17 14:45	11	Aqueous
TRIP BLANK	17-09-0693-9	09/11/17 00:00	3	Aqueous



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0693
Project Name: WR2274 / ESTCP Pendleton
Received: 09/11/17

Attn: Lea Kane

Page 1 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP05-39-41 (17-09-0693-1)						
Zinc	0.0467		0.0100	mg/L	EPA 200.7	Filtered
Calcium	68.7		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.15		0.00500	mg/L	EPA 200.7	Filtered
Silicon	11.9		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	80		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.076		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-43-45 (17-09-0693-2)						
Propene	1.31		1.00	ug/L	RSK-175M	N/A
CP22-HP04-35-37 (17-09-0693-3)						
Zinc	0.340		0.0100	mg/L	EPA 200.7	Filtered
Calcium	34.0		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.414		0.00500	mg/L	EPA 200.7	Filtered
Silicon	8.13		0.0500	mg/L	EPA 200.7	Filtered
Propene	1.60		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.057		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-39-41 (17-09-0693-4)						
Zinc	0.0901		0.0100	mg/L	EPA 200.7	Filtered
Calcium	36.4		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.223		0.00500	mg/L	EPA 200.7	Filtered
Silicon	4.39		0.0500	mg/L	EPA 200.7	Filtered
Propene	1.55		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.043		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-43-45 (17-09-0693-5)						
Zinc	0.294		0.0100	mg/L	EPA 200.7	Filtered
Calcium	65.5		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.04		0.00500	mg/L	EPA 200.7	Filtered
Silicon	10.5		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	92		1.0	mg/L	EPA 300.0	N/A
Propene	1.40		1.00	ug/L	RSK-175M	N/A


 Return to Contents

* MDL is shown



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Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 17-09-0693
 Project Name: WR2274 / ESTCP Pendleton
 Received: 09/11/17

Attn: Lea Kane

Page 2 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP07-35-37 (17-09-0693-6)						
Zinc	0.0400		0.0100	mg/L	EPA 200.7	Filtered
Calcium	55.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.360		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.23		0.0500	mg/L	EPA 200.7	Filtered
Chloride	180		2.0	mg/L	EPA 300.0	N/A
Sulfate	91		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.16		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-39-41 (17-09-0693-7)						
Propene	2.96		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.068		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-43-45 (17-09-0693-8)						
Zinc	0.0743		0.0100	mg/L	EPA 200.7	Filtered
Calcium	65.2		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.942		0.00500	mg/L	EPA 200.7	Filtered
Silicon	10.8		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	99		1.0	mg/L	EPA 300.0	N/A

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	17-09-0693-1-C	09/11/17 09:00	Aqueous	GC 52	N/A	09/13/17 14:34	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP05-43-45	17-09-0693-2-D	09/11/17 12:00	Aqueous	GC 52	N/A	09/13/17 15:32	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.31	1.00		1.00		
CP22-HP04-35-37	17-09-0693-3-D	09/11/17 11:45	Aqueous	GC 52	N/A	09/13/17 16:04	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.60	1.00		1.00		
CP22-HP04-39-41	17-09-0693-4-G	09/11/17 13:00	Aqueous	GC 52	N/A	09/13/17 17:01	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.55	1.00		1.00		
CP22-HP04-43-45	17-09-0693-5-G	09/11/17 13:15	Aqueous	GC 52	N/A	09/13/17 18:09	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.40	1.00		1.00		
CP22-HP07-35-37	17-09-0693-6-G	09/11/17 14:15	Aqueous	GC 52	N/A	09/13/17 18:36	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP07-39-41	17-09-0693-7-D	09/11/17 15:15	Aqueous	GC 52	N/A	09/13/17 19:31	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.96	1.00		1.00		
CP22-HP07-43-45	17-09-0693-8-D	09/11/17 14:45	Aqueous	GC 52	N/A	09/13/17 20:35	170913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-325-83	N/A	Aqueous	GC 52	N/A	09/13/17 10:48	170913L02

Parameter	Result	RL	DF	Qualifiers
Propene	ND	1.00	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	17-09-0693-1-K	09/11/17 09:00	Aqueous	IC 9	N/A	09/12/17 13:52	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		80	1.0		1.00		
CP22-HP05-39-41	17-09-0693-1-K	09/11/17 09:00	Aqueous	IC 9	N/A	09/12/17 16:26	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
CP22-HP04-43-45	17-09-0693-5-K	09/11/17 13:15	Aqueous	IC 9	N/A	09/12/17 14:11	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		92	1.0		1.00		
CP22-HP04-43-45	17-09-0693-5-K	09/11/17 13:15	Aqueous	IC 9	N/A	09/12/17 16:45	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
CP22-HP07-35-37	17-09-0693-6-K	09/11/17 14:15	Aqueous	IC 9	N/A	09/12/17 14:30	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		91	1.0		1.00		
CP22-HP07-35-37	17-09-0693-6-K	09/11/17 14:15	Aqueous	IC 9	N/A	09/12/17 17:41	170912L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		180	2.0		2.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-43-45	17-09-0693-8-K	09/11/17 14:45	Aqueous	IC 9	N/A	09/12/17 14:49	170912L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		99		1.0		1.00	
CP22-HP07-43-45	17-09-0693-8-K	09/11/17 14:45	Aqueous	IC 9	N/A	09/12/17 18:00	170912L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		170		2.0		2.00	
Method Blank	099-12-906-7899	N/A	Aqueous	IC 9	N/A	09/12/17 11:38	170912L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		ND		1.0		1.00	
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		ND		1.0		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	17-09-0693-1-J	09/11/17 09:00	Aqueous	ICP 7300	09/14/17	09/15/17 13:25	170914LA5F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0467		0.0100		1.00	
Calcium		68.7		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.15		0.00500		1.00	
Silicon		11.9		0.0500		1.00	
CP22-HP04-35-37	17-09-0693-3-J	09/11/17 11:45	Aqueous	ICP 7300	09/14/17	09/15/17 13:28	170914LA5F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.340		0.0100		1.00	
Calcium		34.0		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.414		0.00500		1.00	
Silicon		8.13		0.0500		1.00	
CP22-HP04-39-41	17-09-0693-4-J	09/11/17 13:00	Aqueous	ICP 7300	09/14/17	09/15/17 13:29	170914LA5F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0901		0.0100		1.00	
Calcium		36.4		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.223		0.00500		1.00	
Silicon		4.39		0.0500		1.00	
CP22-HP04-43-45	17-09-0693-5-J	09/11/17 13:15	Aqueous	ICP 7300	09/14/17	09/15/17 13:30	170914LA5F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.294		0.0100		1.00	
Calcium		65.5		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.04		0.00500		1.00	
Silicon		10.5		0.0500		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-35-37	17-09-0693-6-J	09/11/17 14:15	Aqueous	ICP 7300	09/14/17	09/15/17 13:31	170914LA5F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0400	0.0100	1.00	
Calcium	55.1	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.360	0.00500	1.00	
Silicon	9.23	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-43-45	17-09-0693-8-J	09/11/17 14:45	Aqueous	ICP 7300	09/14/17	09/15/17 13:34	170914LA5F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0743	0.0100	1.00	
Calcium	65.2	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.942	0.00500	1.00	
Silicon	10.8	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-304-633	N/A	Aqueous	ICP 7300	09/14/17	09/15/17 12:18	170914LA5F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	17-09-0693-1-A	09/11/17 09:00	Aqueous	GC/MS L	09/12/17	09/12/17 18:18	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	117	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP04-39-41	17-09-0693-4-A	09/11/17 13:00	Aqueous	GC/MS L	09/12/17	09/12/17 18:49	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	89	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP04-43-45	17-09-0693-5-A	09/11/17 13:15	Aqueous	GC/MS L	09/12/17	09/12/17 19:20	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	89	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-35-37	17-09-0693-6-A	09/11/17 14:15	Aqueous	GC/MS L	09/12/17	09/12/17 19:50	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	88	68-120	
Dibromofluoromethane	102	80-127	
1,2-Dichloroethane-d4	112	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-43-45	17-09-0693-8-A	09/11/17 14:45	Aqueous	GC/MS L	09/12/17	09/12/17 20:21	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
TRIP BLANK	17-09-0693-9-A	09/11/17 00:00	Aqueous	GC/MS L	09/12/17	09/12/17 17:47	170912L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	111	80-127	
1,2-Dichloroethane-d4	112	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-239	N/A	Aqueous	GC/MS L	09/12/17	09/12/17 09:57	170912L002

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	89	68-120	
Dibromofluoromethane	98	80-127	
1,2-Dichloroethane-d4	96	80-128	
Toluene-d8	95	80-120	



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	17-09-0693-1-D	09/11/17 09:00	Aqueous	GC/MS M	09/12/17	09/12/17 15:19	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.076		0.0050		1.00	
CP22-HP05-43-45	17-09-0693-2-B	09/11/17 12:00	Aqueous	GC/MS M	09/20/17	09/20/17 12:24	170920L049
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP04-35-37	17-09-0693-3-A	09/11/17 11:45	Aqueous	GC/MS M	09/12/17	09/12/17 16:18	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.057		0.0050		1.00	
CP22-HP04-39-41	17-09-0693-4-D	09/11/17 13:00	Aqueous	GC/MS M	09/12/17	09/12/17 16:47	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.043		0.0050		1.00	
CP22-HP04-43-45	17-09-0693-5-D	09/11/17 13:15	Aqueous	GC/MS M	09/12/17	09/12/17 17:17	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP07-35-37	17-09-0693-6-E	09/11/17 14:15	Aqueous	GC/MS M	09/20/17	09/20/17 13:23	170920L049
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.16		0.010		2.00	
CP22-HP07-39-41	17-09-0693-7-A	09/11/17 15:15	Aqueous	GC/MS M	09/12/17	09/12/17 18:17	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.068		0.0050		1.00	
CP22-HP07-43-45	17-09-0693-8-D	09/11/17 14:45	Aqueous	GC/MS M	09/12/17	09/12/17 18:47	170912L017
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/11/17
 Work Order: 17-09-0693
 Preparation: EPA 5030C
 Method: SRL 524M-TCP
 Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1363	N/A	Aqueous	GC/MS M	09/12/17	09/12/17 12:20	170912L017

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	

Method Blank	099-10-022-1366	N/A	Aqueous	GC/MS M	09/20/17	09/20/17 11:42	170920L049
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0688-18	Sample	Aqueous	IC 9	N/A	09/12/17 13:33	170912S01
17-09-0688-18	Matrix Spike	Aqueous	IC 9	N/A	09/12/17 15:08	170912S01
17-09-0688-18	Matrix Spike Duplicate	Aqueous	IC 9	N/A	09/12/17 15:27	170912S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	130.9	50.00	190.0	118	190.0	118	80-120	0	0-20	
Nitrite (as N)	ND	2.500	4.452	178	4.380	175	80-120	2	0-20	3
Nitrate (as N)	ND	5.000	4.752	95	4.746	95	80-120	0	0-20	
Sulfate	37.38	50.00	98.81	123	99.03	123	80-120	0	0-20	3


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP05-39-41	Sample	Aqueous	ICP 7300	09/14/17	09/15/17 13:25	170914SA5
CP22-HP05-39-41	Matrix Spike	Aqueous	ICP 7300	09/14/17	09/15/17 13:26	170914SA5
CP22-HP05-39-41	Matrix Spike Duplicate	Aqueous	ICP 7300	09/14/17	09/15/17 13:27	170914SA5

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	0.04669	0.5000	0.5897	109	0.6065	112	80-120	3	0-20	
Calcium	68.65	0.5000	69.43	4X	69.08	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.5529	111	0.5746	115	80-120	4	0-20	
Manganese	1.147	0.5000	1.669	104	1.663	103	80-120	0	0-20	
Silicon	11.85	0.5000	12.39	4X	12.09	4X	80-120	4X	0-20	Q


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0680-3	Sample	Aqueous	GC/MS L	09/12/17	09/12/17 10:35	170912S043
17-09-0680-3	Matrix Spike	Aqueous	GC/MS L	09/12/17	09/12/17 13:09	170912S043
17-09-0680-3	Matrix Spike Duplicate	Aqueous	GC/MS L	09/12/17	09/12/17 13:40	170912S043

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	9.444	94	9.281	93	75-125	2	0-20	
1,3-Dichloropropane	ND	10.00	8.978	90	9.154	92	75-125	2	0-20	
Allyl Chloride	ND	10.00	8.155	82	9.034	90	80-120	10	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/11/17
 Work Order: 17-09-0693
 Preparation: EPA 5030C
 Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0280-2	Sample	Aqueous	GC/MS M	09/12/17	09/12/17 12:50	170912S010
17-09-0280-2	Matrix Spike	Aqueous	GC/MS M	09/12/17	09/12/17 13:49	170912S010
17-09-0280-2	Matrix Spike Duplicate	Aqueous	GC/MS M	09/12/17	09/12/17 14:19	170912S010

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	ND	0.02500	0.03300	132	0.02950	118	70-130	11	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP07-35-37	Sample	Aqueous	GC/MS M	09/20/17	09/20/17 13:23	170920S020
CP22-HP07-35-37	Matrix Spike	Aqueous	GC/MS M	09/20/17	09/20/17 14:52	170920S020
CP22-HP07-35-37	Matrix Spike Duplicate	Aqueous	GC/MS M	09/20/17	09/20/17 15:22	170920S020

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.1646	0.01000	0.1934	288	0.1838	192	70-130	5	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

Page 1 of 6

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-83	LCS	Aqueous	GC 52	N/A	09/13/17 09:44	170913L02			
099-14-325-83	LCSD	Aqueous	GC 52	N/A	09/13/17 10:13	170913L02			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	101.5	99	100.6	98	80-120	1	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

Page 2 of 6

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-906-7899	LCS	Aqueous	IC 9	N/A	09/12/17 11:57	170912L01
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Chloride		50.00	50.87	102	90-110	
Nitrite (as N)		2.500	2.573	103	90-110	
Nitrate (as N)		5.000	4.854	97	90-110	
Sulfate		50.00	52.60	105	90-110	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-633	LCS	Aqueous	ICP 7300	09/14/17	09/15/17 12:19	170914LA5F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5509	110	85-115	
Calcium		0.5000	0.4953	99	85-115	
Iron		0.5000	0.5451	109	85-115	
Manganese		0.5000	0.5370	107	85-115	
Silicon		0.5000	0.5239	105	85-115	



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Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/11/17
 Work Order: 17-09-0693
 Preparation: EPA 5030C
 Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

Page 4 of 6

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-239	LCS	Aqueous	GC/MS L	09/12/17	09/12/17 09:15	170912L002

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane	10.00	9.058	91	74-122	
1,3-Dichloropropane	10.00	8.837	88	74-128	
Allyl Chloride	10.00	7.580	76	70-130	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/11/17
Work Order: 17-09-0693
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1363	LCS	Aqueous	GC/MS M	09/12/17	09/12/17 11:42	170912L017
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005200	104	80-120	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/11/17
 Work Order: 17-09-0693
 Preparation: EPA 5030C
 Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

Page 6 of 6

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1366	LCS	Aqueous	GC/MS M	09/20/17	09/20/17 11:10	170920L049

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	0.005000	0.005700	114	80-120	

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RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 17-09-0693

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	834	IC 9	1
EPA 8260B	EPA 5030C	316	GC/MS L	2
RSK-175M	N/A	1078	GC 52	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2


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Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Location 2: 7445 Lampson Avenue, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 17-09-0693

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

17-09-0693

Page 1 of 1

White copy: to accompany samples
Yellow copy: field copy

Project Name	Project Number	Required Analyses				Bottle Type and Volume/Preservative	Number of Containers	Sample Type	Date	Time	Comments	Lab Use Only	Condition of Bottles
		Metals	SVOCs by 8270	TCF by SPL 5277	TPH by BK-195M								
Project Name: C51CP Penetration Samplers Names: B. Brockwell Laboratory Name: Lab Address:	Project Contact: Lea Kane Lab Contact: S. Newark Lab Phone: Carrier/Waybill No.:	VOCs by 8260											
		WA	HCL	WA	HCL	150 mL	125 mL						
1	CP22-HP05-39-41	3		3		1	1	9/11/17	0900				
2	CP22-HP05-43-45	3		3		2			1200				
3	CP22-HP04-35-37	3		3		3	1		1145				
4	CP22-HP04-39-41	3		3		3	1		1300				
5	CP22-HP04-43-45	3		3		3	1		1915				
6	CP22-HP07-35-37	3		3		3	1		1415				
7	CP22-HP07-39-41	3		3		3	1		1515				
8	CP22-HP07-43-45	3		3		3	1		1445				
9	TRIP BLANK												

Special Instructions: Email results to Lkane@geosyntec.com & brockwell@geosyntec.com

1. Relinquished by (Signature/Affiliation)		Date Time	9/11/17 1615	1. Received by (Signature/Affiliation)		Date Time	09/11/17 1615
2. Relinquished by (Signature/Affiliation)		Date Time	09/11/17 1803	2. Received by (Signature/Affiliation)		Date Time	9/11/17 1805
3. Relinquished by (Signature/Affiliation)		Date Time		3. Received by (Signature/Affiliation)		Date Time	



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/11/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3,2 °C (w/ CF): 3,4 °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter Checked by: 671

CUSTODY SEAL:
 Cooler Present and Intact Present but Not Intact Not Present N/A Checked by: 671
 Sample(s) Present and Intact Present but Not Intact Not Present N/A Checked by: 1140

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers <input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input checked="" type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500) <input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (Trip Blank Lot Number: 170830C)
Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{nna} (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____ _____
 Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag
 Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, **s** = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z_{nna}** = Zn (CH₃CO₂)₂ + NaOH Labeled/Checked by: 1140
Reviewed by: 659

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Stephen Nowak

From: Lea Kane <LKane@Geosyntec.com>
Sent: Tuesday, September 12, 2017 9:04 AM
To: Stephen Nowak
Cc: Hoaibao Nguyen; Brian G. Rockwell
Subject: RE: ESTCP Pendleton

Hi Stephen,

Thanks for following up. Please see the full analyte list for this project below:

Analyte	Method
TCP	SRL 524M-TCP
TCP degradation products 3-chloro-1-propene, 1,2-DCP, 1,3-DCP	USEPA 8260B
Propene	RSK-175M
Field parameters (pH, DO, ORP, temperature, specific conductivity)	Field measurement using an integrated instrument
Anions	USEPA 300.0
Cations species, including dissolved zinc	USEPA 200.7

Let me know if you have any other questions.

Thanks,

Lea

From: Stephen Nowak [<mailto:StephenNowak@eurofinsUS.com>]
Sent: Tuesday, September 12, 2017 8:44 AM
To: Lea Kane <LKane@Geosyntec.com>
Cc: Hoaibao Nguyen <HoaibaoNguyen@eurofinsUS.com>
Subject: ESTCP Pendleton

Hi Lea-

I have a question on the attached COC for the ESTCP Pendleton project.
 For EPA 200.7 –what metals do you need reported?
 The container received is unpreserved so it looks like we need to lab filter- is this correct?

Please let me know- thanks.

Stephen Nowak
 Project Manager

Stephen Nowak

From: Lea Kane <LKane@Geosyntec.com>
Sent: Tuesday, September 12, 2017 9:26 AM
To: Stephen Nowak
Cc: Brian G. Rockwell
Subject: RE: ESTCP Pendleton

Yes, thanks!

From: Stephen Nowak [mailto:StephenNowak@eurofinsUS.com]
Sent: Tuesday, September 12, 2017 9:22 AM
To: Lea Kane <LKane@Geosyntec.com>
Cc: Brian G. Rockwell <BRockwell@Geosyntec.com>
Subject: RE: ESTCP Pendleton

Lea-

We quoted Metals (Si, Ca, Fe, Mn) and Zn.
 Is this what you need for 200.7?

Stephen Nowak
 Project Manager



Eurofins Calscience, Inc.
 7440 Lincoln Way
 GARDEN GROVE, CA 92841
 USA
 Phone: +1 714 895 5494

Email: StephenNowak@EurofinsUS.com
 Website: www.eurofinsUS.com/Calscience



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Calscience



WORK ORDER NUMBER: 17-09-0821

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: WR2274 / ESTCP Pendleton

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/26/2017 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 17-09-0821

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/12/17. They were assigned to Work Order 17-09-0821.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 17-09-0821
595 Market Street, Suite 610	Project Name: WR2274 / ESTCP Pendleton
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/12/17 18:30
	Number of Containers: 121

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-HP02-35-37	17-09-0821-1	09/12/17 08:00	11	Aqueous
CP22-HP02-39-41	17-09-0821-2	09/12/17 08:50	2	Aqueous
CP22-HP02-43-45	17-09-0821-3	09/12/17 09:00	9	Aqueous
CP22-HP07-39-41	17-09-0821-4	09/12/17 07:15	5	Aqueous
CP22-HP09-35-37	17-09-0821-5	09/12/17 10:25	11	Aqueous
CP22-HP09-39-41	17-09-0821-6	09/12/17 10:30	7	Aqueous
CP22-HP09-43-45	17-09-0821-7	09/12/17 10:45	11	Aqueous
CP22-HP10-35-37	17-09-0821-8	09/12/17 12:15	11	Aqueous
CP22-HP10-39-41	17-09-0821-9	09/12/17 12:20	11	Aqueous
CP22-HP10-43-45	17-09-0821-10	09/12/17 14:20	11	Aqueous
CP22-DUP1-09122017	17-09-0821-11	09/12/17 14:00	11	Aqueous
CP22-HP12-35-37	17-09-0821-12	09/12/17 14:45	11	Aqueous
EB-09122017	17-09-0821-13	09/12/17 15:30	8	Aqueous
TB-09122017	17-09-0821-14	09/12/17 00:00	2	Aqueous


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Calscience

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0821
Project Name: WR2274 / ESTCP Pendleton
Received: 09/12/17

Attn: Lea Kane

Page 1 of 3

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP02-35-37 (17-09-0821-1)						
Zinc	0.0333		0.0100	mg/L	EPA 200.7	Filtered
Calcium	65.9		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.792		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.8		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	97		1.0	mg/L	EPA 300.0	N/A
CP22-HP02-39-41 (17-09-0821-2)						
1,2,3-Trichloropropane	0.12		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-43-45 (17-09-0821-3)						
Zinc	0.0310		0.0100	mg/L	EPA 200.7	Filtered
Calcium	57.8		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.357		0.00500	mg/L	EPA 200.7	Filtered
Silicon	5.87		0.0500	mg/L	EPA 200.7	Filtered
CP22-HP07-39-41 (17-09-0821-4)						
Zinc	0.109		0.0100	mg/L	EPA 200.7	Filtered
Calcium	39.7		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.08		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.78		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	6.5		1.0	mg/L	EPA 300.0	N/A
CP22-HP09-35-37 (17-09-0821-5)						
Zinc	0.0240		0.0100	mg/L	EPA 200.7	Filtered
Calcium	69.9		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.708		0.00500	mg/L	EPA 200.7	Filtered
Silicon	12.7		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	96		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	2.1		0.12	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP09-39-41 (17-09-0821-6)						
Zinc	0.0236		0.0100	mg/L	EPA 200.7	Filtered
Calcium	53.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.326		0.00500	mg/L	EPA 200.7	Filtered
Silicon	4.63		0.0500	mg/L	EPA 200.7	Filtered

* MDL is shown



Calscience

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0821
Project Name: WR2274 / ESTCP Pendleton
Received: 09/12/17

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP09-43-45 (17-09-0821-7)						
Zinc	0.0411		0.0100	mg/L	EPA 200.7	Filtered
Calcium	62.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.949		0.00500	mg/L	EPA 200.7	Filtered
Silicon	11.5		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	85		1.0	mg/L	EPA 300.0	N/A
Propene	2.01		1.00	ug/L	RSK-175M	N/A
CP22-HP10-35-37 (17-09-0821-8)						
Zinc	0.0471		0.0100	mg/L	EPA 200.7	Filtered
Calcium	66.8		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.691		0.00500	mg/L	EPA 200.7	Filtered
Silicon	11.5		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	48		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.88		0.050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP10-39-41 (17-09-0821-9)						
Zinc	0.0308		0.0100	mg/L	EPA 200.7	Filtered
Calcium	67.6		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.22		0.00500	mg/L	EPA 200.7	Filtered
Silicon	14.2		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	84		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	1.3		0.12	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP10-43-45 (17-09-0821-10)						
Zinc	0.0147		0.0100	mg/L	EPA 200.7	Filtered
Calcium	58.0		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.916		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.57		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	86		1.0	mg/L	EPA 300.0	N/A
Propene	2.96		1.00	ug/L	RSK-175M	N/A
CP22-DUP1-09122017 (17-09-0821-11)						
Zinc	0.0286		0.0100	mg/L	EPA 200.7	Filtered
Calcium	61.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.843		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.61		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	84		1.0	mg/L	EPA 300.0	N/A

* MDL is shown



Calscience

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0821
Project Name: WR2274 / ESTCP Pendleton
Received: 09/12/17

Attn: Lea Kane

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Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
CP22-HP12-35-37 (17-09-0821-12)						
Zinc	0.0257		0.0100	mg/L	EPA 200.7	Filtered
Calcium	57.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.410		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.8		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	66		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.64		0.050	ug/L	SRL 524M-TCP	EPA 5030C
EB-09122017 (17-09-0821-13)						
Calcium	11.5		0.100	mg/L	EPA 200.7	Filtered
Silicon	14.1		0.0500	mg/L	EPA 200.7	Filtered
Chloride	4.8		1.0	mg/L	EPA 300.0	N/A
Sulfate	7.1		1.0	mg/L	EPA 300.0	N/A

Subcontracted analyses, if any, are not included in this summary.

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* MDL is shown



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-H	09/12/17 08:00	Aqueous	GC 52	N/A	09/15/17 12:34	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP02-43-45	17-09-0821-3-H	09/12/17 09:00	Aqueous	GC 52	N/A	09/15/17 13:00	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP09-35-37	17-09-0821-5-G	09/12/17 10:25	Aqueous	GC 52	N/A	09/15/17 13:26	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP09-39-41	17-09-0821-6-F	09/12/17 10:30	Aqueous	GC 52	N/A	09/15/17 13:54	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP09-43-45	17-09-0821-7-G	09/12/17 10:45	Aqueous	GC 52	N/A	09/15/17 14:22	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.01	1.00		1.00		
CP22-HP10-35-37	17-09-0821-8-G	09/12/17 12:15	Aqueous	GC 52	N/A	09/15/17 14:49	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP10-39-41	17-09-0821-9-G	09/12/17 12:20	Aqueous	GC 52	N/A	09/15/17 15:21	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP10-43-45	17-09-0821-10-G	09/12/17 14:20	Aqueous	GC 52	N/A	09/15/17 15:54	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.96	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP1-09122017	17-09-0821-11-G	09/12/17 14:00	Aqueous	GC 52	N/A	09/15/17 16:16	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP12-35-37	17-09-0821-12-G	09/12/17 14:45	Aqueous	GC 52	N/A	09/15/17 17:30	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
EB-09122017	17-09-0821-13-D	09/12/17 15:30	Aqueous	GC 52	N/A	09/15/17 18:41	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-86	N/A	Aqueous	GC 52	N/A	09/15/17 12:05	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-J	09/12/17 08:00	Aqueous	IC 10	N/A	09/13/17 14:36	170913L01

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	97	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-J	09/12/17 08:00	Aqueous	IC 10	N/A	09/14/17 00:00	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	160	2.0	2.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-39-41	17-09-0821-4-D	09/12/17 07:15	Aqueous	IC 10	N/A	09/13/17 14:55	170913L01

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	6.5	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-39-41	17-09-0821-4-J	09/12/17 07:15	Aqueous	IC 10	N/A	09/14/17 00:19	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	150	2.0	2.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-35-37	17-09-0821-5-J	09/12/17 10:25	Aqueous	IC 10	N/A	09/13/17 15:14	170913L01

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	96	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-35-37	17-09-0821-5-J	09/12/17 10:25	Aqueous	IC 10	N/A	09/14/17 00:38	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	150	2.0	2.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-43-45	17-09-0821-7-J	09/12/17 10:45	Aqueous	IC 10	N/A	09/13/17 17:08	170913L01

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	85	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-43-45	17-09-0821-7-J	09/12/17 10:45	Aqueous	IC 10	N/A	09/14/17 00:57	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	150	2.0	2.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-35-37	17-09-0821-8-J	09/12/17 12:15	Aqueous	IC 10	N/A	09/13/17 17:26	170913L01

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	48	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-35-37	17-09-0821-8-J	09/12/17 12:15	Aqueous	IC 10	N/A	09/14/17 01:15	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	160	2.0	2.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-39-41	17-09-0821-9-J	09/12/17 12:20	Aqueous	IC 10	N/A	09/13/17 17:45	170913L01

Parameter	Result	RL	DF	Qualifiers
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	84	1.0	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-39-41	17-09-0821-9-J	09/12/17 12:20	Aqueous	IC 10	N/A	09/14/17 01:34	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	150	2.0	2.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-43-45	17-09-0821-10-J	09/12/17 14:20	Aqueous	IC 10	N/A	09/13/17 18:04	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		86		1.0		1.00	
CP22-HP10-43-45	17-09-0821-10-J	09/12/17 14:20	Aqueous	IC 10	N/A	09/14/17 01:53	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		150		2.0		2.00	
CP22-DUP1-09122017	17-09-0821-11-J	09/12/17 14:00	Aqueous	IC 10	N/A	09/13/17 18:23	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		84		1.0		1.00	
CP22-DUP1-09122017	17-09-0821-11-J	09/12/17 14:00	Aqueous	IC 10	N/A	09/14/17 02:12	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		150		2.0		2.00	
CP22-HP12-35-37	17-09-0821-12-J	09/12/17 14:45	Aqueous	IC 10	N/A	09/13/17 18:42	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		66		1.0		1.00	
CP22-HP12-35-37	17-09-0821-12-J	09/12/17 14:45	Aqueous	IC 10	N/A	09/14/17 02:31	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		2.0		2.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-09122017	17-09-0821-13-G	09/12/17 15:30	Aqueous	IC 10	N/A	09/13/17 16:49	170913L01

Parameter	Result	RL	DF	Qualifiers
Chloride	4.8	1.0	1.00	
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	7.1	1.0	1.00	

Method Blank	099-12-906-7906	N/A	Aqueous	IC 10	N/A	09/13/17 13:47	170913L01
Parameter	Result	RL	DF	Qualifiers			

Parameter	Result	RL	DF	Qualifiers
Chloride	ND	1.0	1.00	
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	ND	1.0	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-K	09/12/17 08:00	Aqueous	ICP 7300	09/15/17	09/19/17 15:33	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0333		0.0100		1.00	
Calcium		65.9		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.792		0.00500		1.00	
Silicon		13.8		0.0500		1.00	
CP22-HP02-43-45	17-09-0821-3-I	09/12/17 09:00	Aqueous	ICP 7300	09/15/17	09/19/17 15:34	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0310		0.0100		1.00	
Calcium		57.8		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.357		0.00500		1.00	
Silicon		5.87		0.0500		1.00	
CP22-HP07-39-41	17-09-0821-4-E	09/12/17 07:15	Aqueous	ICP 7300	09/15/17	09/19/17 15:35	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.109		0.0100		1.00	
Calcium		39.7		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.08		0.00500		1.00	
Silicon		9.78		0.0500		1.00	
CP22-HP09-35-37	17-09-0821-5-K	09/12/17 10:25	Aqueous	ICP 7300	09/15/17	09/19/17 15:38	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0240		0.0100		1.00	
Calcium		69.9		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.708		0.00500		1.00	
Silicon		12.7		0.0500		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-39-41	17-09-0821-6-G	09/12/17 10:30	Aqueous	ICP 7300	09/15/17	09/19/17 15:39	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0236		0.0100	1.00		
Calcium		53.1		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		0.326		0.00500	1.00		
Silicon		4.63		0.0500	1.00		
CP22-HP09-43-45	17-09-0821-7-K	09/12/17 10:45	Aqueous	ICP 7300	09/15/17	09/19/17 15:39	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0411		0.0100	1.00		
Calcium		62.1		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		0.949		0.00500	1.00		
Silicon		11.5		0.0500	1.00		
CP22-HP10-35-37	17-09-0821-8-K	09/12/17 12:15	Aqueous	ICP 7300	09/15/17	09/19/17 15:40	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0471		0.0100	1.00		
Calcium		66.8		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		0.691		0.00500	1.00		
Silicon		11.5		0.0500	1.00		
CP22-HP10-39-41	17-09-0821-9-K	09/12/17 12:20	Aqueous	ICP 7300	09/15/17	09/19/17 15:41	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0308		0.0100	1.00		
Calcium		67.6		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		1.22		0.00500	1.00		
Silicon		14.2		0.0500	1.00		

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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-43-45	17-09-0821-10-K	09/12/17 14:20	Aqueous	ICP 7300	09/15/17	09/19/17 15:42	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0147		0.0100		1.00	
Calcium		58.0		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.916		0.00500		1.00	
Silicon		9.57		0.0500		1.00	
CP22-DUP1-09122017	17-09-0821-11-K	09/12/17 14:00	Aqueous	ICP 7300	09/15/17	09/19/17 15:43	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0286		0.0100		1.00	
Calcium		61.1		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.843		0.00500		1.00	
Silicon		9.61		0.0500		1.00	
CP22-HP12-35-37	17-09-0821-12-K	09/12/17 14:45	Aqueous	ICP 7300	09/15/17	09/19/17 15:44	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0257		0.0100		1.00	
Calcium		57.1		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.410		0.00500		1.00	
Silicon		13.8		0.0500		1.00	
EB-09122017	17-09-0821-13-H	09/12/17 15:30	Aqueous	ICP 7300	09/15/17	09/19/17 15:45	170915LA4F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
Calcium		11.5		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		ND		0.00500		1.00	
Silicon		14.1		0.0500		1.00	

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-304-634	N/A	Aqueous	ICP 7300	09/15/17	09/19/17 12:08	170915LA4F

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	



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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-A	09/12/17 08:00	Aqueous	GC/MS L	09/16/17	09/17/17 00:33	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	88	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	112	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-43-45	17-09-0821-3-A	09/12/17 09:00	Aqueous	GC/MS L	09/16/17	09/17/17 01:04	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP07-39-41	17-09-0821-4-A	09/12/17 07:15	Aqueous	GC/MS L	09/16/17	09/17/17 01:35	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	89	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	101	80-120	

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
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Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-35-37	17-09-0821-5-A	09/12/17 10:25	Aqueous	GC/MS L	09/16/17	09/17/17 02:06	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	83	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-43-45	17-09-0821-7-A	09/12/17 10:45	Aqueous	GC/MS L	09/16/17	09/17/17 02:36	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-35-37	17-09-0821-8-A	09/12/17 12:15	Aqueous	GC/MS L	09/16/17	09/17/17 03:07	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	101	80-120	

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

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Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-39-41	17-09-0821-9-A	09/12/17 12:20	Aqueous	GC/MS L	09/16/17	09/17/17 03:38	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-43-45	17-09-0821-10-A	09/12/17 14:20	Aqueous	GC/MS L	09/16/17	09/17/17 04:09	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	105	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP1-09122017	17-09-0821-11-A	09/12/17 14:00	Aqueous	GC/MS L	09/16/17	09/17/17 04:39	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	101	80-120	

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Geosyntec Consultants
595 Market Street, Suite 610
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Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP12-35-37	17-09-0821-12-A	09/12/17 14:45	Aqueous	GC/MS L	09/16/17	09/17/17 05:10	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	112	80-128	
Toluene-d8	102	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-09122017	17-09-0821-13-A	09/12/17 15:30	Aqueous	GC/MS L	09/16/17	09/16/17 19:56	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	115	80-127	
1,2-Dichloroethane-d4	113	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
TB-09122017	17-09-0821-14-A	09/12/17 00:00	Aqueous	GC/MS L	09/16/17	09/16/17 20:27	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	83	68-120	
Dibromofluoromethane	112	80-127	
1,2-Dichloroethane-d4	107	80-128	
Toluene-d8	101	80-120	

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

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Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-242	N/A	Aqueous	GC/MS L	09/16/17	09/16/17 11:11	170916L005

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	103	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-244	N/A	Aqueous	GC/MS L	09/16/17	09/17/17 00:03	170916L018

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	17-09-0821-1-D	09/12/17 08:00	Aqueous	GC/MS M	09/19/17	09/19/17 20:10	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP02-39-41	17-09-0821-2-B	09/12/17 08:50	Aqueous	GC/MS M	09/20/17	09/20/17 13:53	170920L049
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.12		0.010		2.00	
CP22-HP02-43-45	17-09-0821-3-B	09/12/17 09:00	Aqueous	GC/MS M	09/19/17	09/19/17 20:39	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP09-35-37	17-09-0821-5-F	09/12/17 10:25	Aqueous	GC/MS M	09/21/17	09/21/17 18:25	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		2.1		0.12		25.0	
CP22-HP09-39-41	17-09-0821-6-C	09/12/17 10:30	Aqueous	GC/MS M	09/25/17	09/25/17 12:44	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP09-43-45	17-09-0821-7-D	09/12/17 10:45	Aqueous	GC/MS M	09/19/17	09/19/17 21:09	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP10-35-37	17-09-0821-8-D	09/12/17 12:15	Aqueous	GC/MS M	09/19/17	09/19/17 23:37	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.88		0.050		10.0	
CP22-HP10-39-41	17-09-0821-9-D	09/12/17 12:20	Aqueous	GC/MS M	09/19/17	09/20/17 00:07	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		1.3		0.12		25.0	

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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-43-45	17-09-0821-10-D	09/12/17 14:20	Aqueous	GC/MS M	09/19/17	09/19/17 21:39	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-DUP1-09122017	17-09-0821-11-D	09/12/17 14:00	Aqueous	GC/MS M	09/19/17	09/19/17 22:08	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP12-35-37	17-09-0821-12-D	09/12/17 14:45	Aqueous	GC/MS M	09/19/17	09/20/17 00:36	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.64		0.050		10.0	
EB-09122017	17-09-0821-13-F	09/12/17 15:30	Aqueous	GC/MS M	09/21/17	09/21/17 17:55	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1364	N/A	Aqueous	GC/MS M	09/19/17	09/19/17 19:40	170919L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1366	N/A	Aqueous	GC/MS M	09/20/17	09/20/17 11:42	170920L049
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1367	N/A	Aqueous	GC/MS M	09/21/17	09/21/17 17:25	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1368	N/A	Aqueous	GC/MS M	09/25/17	09/25/17 12:14	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

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Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP07-39-41	Sample	Aqueous	IC 10	N/A	09/14/17 00:19	170913S01				
CP22-HP07-39-41	Matrix Spike	Aqueous	IC 10	N/A	09/13/17 15:33	170913S01				
CP22-HP07-39-41	Matrix Spike Duplicate	Aqueous	IC 10	N/A	09/13/17 15:52	170913S01				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	146.4	50.00	224.2	156	224.0	155	80-120	0	0-20	3
Nitrite (as N)	ND	2.500	3.428	137	3.418	137	80-120	0	0-20	3
Nitrate (as N)	ND	5.000	4.896	98	4.890	98	80-120	0	0-20	
Sulfate	6.485	50.00	58.51	104	58.47	104	80-120	0	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

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595 Market Street, Suite 610
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Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: Filtered
Method: EPA 200.7

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP02-35-37	Sample	Aqueous	ICP 7300	09/15/17	09/19/17 15:33	170915SA4				
CP22-HP02-35-37	Matrix Spike	Aqueous	ICP 7300	09/15/17	09/19/17 15:29	170915SA4				
CP22-HP02-35-37	Matrix Spike Duplicate	Aqueous	ICP 7300	09/15/17	09/19/17 15:30	170915SA4				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	0.03333	0.5000	0.5697	107	0.5799	109	80-120	2	0-20	
Calcium	65.94	0.5000	72.53	4X	75.40	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.5231	105	0.5295	106	80-120	1	0-20	
Manganese	0.7918	0.5000	1.348	111	1.358	113	80-120	1	0-20	
Silicon	13.78	0.5000	14.81	4X	14.94	4X	80-120	4X	0-20	Q

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP12-35-37	Sample	Aqueous	ICP 7300	09/15/17	09/19/17 15:44	170915SA4A				
CP22-HP12-35-37	Matrix Spike	Aqueous	ICP 7300	09/15/17	09/19/17 15:31	170915SA4A				
CP22-HP12-35-37	Matrix Spike Duplicate	Aqueous	ICP 7300	09/15/17	09/19/17 15:32	170915SA4A				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	0.02571	0.5000	0.5764	110	0.5735	110	80-120	1	0-20	
Calcium	57.12	0.5000	56.95	4X	53.79	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.5181	104	0.5017	100	80-120	3	0-20	
Manganese	0.4097	0.5000	0.9176	102	0.8861	95	80-120	3	0-20	
Silicon	13.84	0.5000	13.89	4X	13.32	4X	80-120	4X	0-20	Q

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Quality Control - Spike/Spike Duplicate

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Work Order: 17-09-0821
Preparation: EPA 5030C
Method: EPA 8260B

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0822-4	Sample	Aqueous	GC/MS L	09/16/17	09/16/17 11:44	170916S001
17-09-0822-4	Matrix Spike	Aqueous	GC/MS L	09/16/17	09/16/17 12:15	170916S001
17-09-0822-4	Matrix Spike Duplicate	Aqueous	GC/MS L	09/16/17	09/16/17 12:46	170916S001

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	10.04	100	10.18	102	75-125	1	0-20	
1,3-Dichloropropane	ND	10.00	9.679	97	10.04	100	75-125	4	0-20	
Allyl Chloride	ND	10.00	9.328	93	9.538	95	80-120	2	0-20	


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Method: SRL 524M-TCP

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0693-6	Sample	Aqueous	GC/MS M	09/20/17	09/20/17 13:23	170920S020
17-09-0693-6	Matrix Spike	Aqueous	GC/MS M	09/20/17	09/20/17 14:52	170920S020
17-09-0693-6	Matrix Spike Duplicate	Aqueous	GC/MS M	09/20/17	09/20/17 15:22	170920S020

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.1646	0.01000	0.1934	288	0.1838	192	70-130	5	0-20	3

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1451-10	Sample	Aqueous	GC/MS M	09/25/17	09/25/17 13:44	170925S012
17-09-1451-10	Matrix Spike	Aqueous	GC/MS M	09/25/17	09/25/17 15:13	170925S012
17-09-1451-10	Matrix Spike Duplicate	Aqueous	GC/MS M	09/25/17	09/25/17 15:42	170925S012

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.08910	0.005000	0.1007	232	0.09550	128	70-130	5	0-20	3


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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0821
Preparation: N/A
Method: RSK-175M

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-86	LCS	Aqueous	GC 52	N/A	09/15/17 10:28	170915L01			
099-14-325-86	LCSD	Aqueous	GC 52	N/A	09/15/17 10:50	170915L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	98.32	95	91.91	89	80-120	7	0-20	

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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
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Date Received: 09/12/17
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Method: EPA 300.0

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-906-7906	LCS	Aqueous	IC 10	N/A	09/13/17 14:06	170913L01
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Chloride		50.00	48.10	96	90-110	
Nitrite (as N)		2.500	2.413	97	90-110	
Nitrate (as N)		5.000	4.934	99	90-110	
Sulfate		50.00	50.29	101	90-110	

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Quality Control - LCS

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Preparation: Filtered
Method: EPA 200.7

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-634	LCS	Aqueous	ICP 7300	09/15/17	09/19/17 12:09	170915LA4F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5610	112	85-115	
Calcium		0.5000	0.5411	108	85-115	
Iron		0.5000	0.5203	104	85-115	
Manganese		0.5000	0.5343	107	85-115	
Silicon		0.5000	0.5213	104	85-115	



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Quality Control - LCS

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Preparation: EPA 5030C
Method: EPA 8260B

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-242	LCS	Aqueous	GC/MS L	09/16/17	09/16/17 10:39	170916L005
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	9.742	97	74-122	
1,3-Dichloropropane		10.00	9.674	97	74-128	
Allyl Chloride		10.00	9.189	92	70-130	



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Quality Control - LCS/LCSD

Geosyntec Consultants
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Preparation: EPA 5030C
Method: EPA 8260B

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-16-446-244	LCS	Aqueous	GC/MS L	09/16/17	09/16/17 22:30	170916L018			
099-16-446-244	LCSD	Aqueous	GC/MS L	09/16/17	09/16/17 23:01	170916L018			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	10.00	9.332	93	9.107	91	74-122	2	0-23	
1,3-Dichloropropane	10.00	9.344	93	9.238	92	74-128	1	0-24	
Allyl Chloride	10.00	8.299	83	7.695	77	70-130	8	0-20	

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-10-022-1364	LCS	Aqueous	GC/MS M	09/19/17	09/19/17 18:11	170919L042
099-10-022-1364	LCSD	Aqueous	GC/MS M	09/19/17	09/19/17 18:41	170919L042

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005300	106	0.005000	100	80-120	6	0-20	

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1366	LCS	Aqueous	GC/MS M	09/20/17	09/20/17 11:10	170920L049

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	0.005000	0.005700	114	80-120	

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1367	LCS	Aqueous	GC/MS M	09/21/17	09/21/17 15:56	170921L064			
099-10-022-1367	LCSD	Aqueous	GC/MS M	09/21/17	09/21/17 16:26	170921L064			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004900	98	0.005700	114	80-120	15	0-20	

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1368	LCS	Aqueous	GC/MS M	09/25/17	09/25/17 10:39	170925L030			
099-10-022-1368	LCSD	Aqueous	GC/MS M	09/25/17	09/25/17 11:44	170925L030			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005100	102	0.004600	92	80-120	10	0-20	

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Sample Analysis Summary Report

Work Order: 17-09-0821

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	1027	IC 10	1
EPA 8260B	EPA 5030C	316	GC/MS L	2
RSK-175M	N/A	326	GC 52	2
RSK-175M	N/A	460	GC 52	2
RSK-175M	N/A	1078	GC 52	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 17-09-0821

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Document Number: 10294

Analysis Request and Chain of Custody Record

17-09-0821

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White copy: to accompany samples

Yellow copy: field copy

Project Name <i>CSTEP Penetration</i>	Project Number <i>WR2274</i>	Required Analyses						Bottle Type and Volume/Preservative	Sample Type	Date	Time	Number of Containers	Comments	Lab Use Only	Condition of Bottles		
		Metals	SVOCS by 8270	TPH by SCL 5243-TPH	Papene by BSK-175	EPA 200.7 (Fik)	EPA 300.0										
Project Name <i>CSTEP Penetration</i>	Project Contact <i>Len Kane</i>	VOCS by 8260B (select)	Metals	SVOCS by 8270	TPH by SCL 5243-TPH	Papene by BSK-175	EPA 200.7 (Fik)	EPA 300.0	VOA	VMA	HCL	HCL	HCL	25% ML	10% ML	Lab Use Only	Condition of Bottles
Samplers Names <i>B. Ruckwell</i>	Lab Contact <i>S. Nowak</i>																
Laboratory Name <i>CalSensia</i>	Lab Phone																
Lab Address	Carrier/Waybill No.																
Sample Name	Date	Time	Sample Type	VOA	VMA	HCL	HCL	HCL	25% ML	10% ML	Lab Use Only	Condition of Bottles					
1 CP22-HP02-35-37	9/12/17	0800	Groundwater	3	3	3	3	3	3	3	1	1					
2 CP22-HP02-39-37-39-41		0850		2	2	2	2	2	2	2	1	1					
3 CP22-HP02-43-45		0900		3	3	3	3	3	3	3	1	1					
4 CP22-HP07-39-41		0745		3	3	3	3	3	3	3	1	1					
5 CP22-HP09-35-37		1025		3	3	3	3	3	3	3	1	1					
6 CP22-HP09-39-41		1030		3	3	3	3	3	3	3	1	1					
7 CP22-HP09-43-45		1045		3	3	3	3	3	3	3	1	1					
8 CP22-HP10-35-37		1215		3	3	3	3	3	3	3	1	1					
9 CP22-HP10-39-41		1220		3	3	3	3	3	3	3	1	1					
10 CP22-HP10-43-45		1420		3	3	3	3	3	3	3	1	1					
11 CP22-DUPI-09122017		1400		3	3	3	3	3	3	3	1	1					
12 CP22-HP12-35-37		1445		3	3	3	3	3	3	3	1	1					

Special Instructions: Same analyses as 9/11/2017 samples. (cont.) results to *Lkane@geosyntec.com* & *bruckwell@geosyntec.com*

Turn-around Time: Normal Rush:

1. Relinquished by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>9/12/17</i> <i>1830</i>	1. Received by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>09/12/17</i> <i>1630</i>
2. Relinquished by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>09/12/17</i> <i>1830</i>	2. Received by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>09/12/17</i> <i>1830</i>
3. Relinquished by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>09/12/17</i> <i>1830</i>	3. Received by (Signature/Affiliation)	<i>[Signature]</i>	Date Time	<i>09/12/17</i> <i>1830</i>

Continued from 10294
0824

Analysis Request and Chain of Custody Record

White copy: to accompany samples
Yellow copy: field copy

Project Name ESTCP Pursuant	Project Number WR-2274	Required Analyses						Bottle Type and Volume/Preservative	Sample Type	Date	Time	Comments	Lab Use Only	Condition of Bottles	
		VOCs by 8260B (Methy)	Metals	SVOCs by 8270	TPH by SFL 524M	Form by DSK-175M	CDA 2017								EPA 300.0
Samplers Names B. Lockhart	Project Contact Cecilia Kane														
Laboratory Name Cabrera-L	Lab Contact S. Nozaki														
Lab Address	Lab Phone														
	Carrier/Waybill No.														
Sample Name EB-09122017	Date 9/12/17							water	1530	2	2	1			
Sample Name TB-09122017	Date 9/12/17							water	-	2					

Special Instructions: see page 1

Turn-around Time:
 Normal Rush:

1. Relinquished by (Signature/Affiliation)	Date 9/12/17	Time 1630	1. Received by (Signature/Affiliation)	Date 09/12/17	Time 1630
2. Relinquished by (Signature/Affiliation)	Date 09/12/17	Time 1830	2. Received by (Signature/Affiliation)	Date 09/12/17	Time 1830
3. Relinquished by (Signature/Affiliation)	Date	Time	3. Received by (Signature/Affiliation)	Date	Time



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/12/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.2 °C (w/ CF): 3.4 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: 671

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 1013

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples Yes No N/A

COC document(s) received complete Yes No N/A

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC Yes No N/A

Sample container label(s) consistent with COC Yes No N/A

Sample container(s) intact and in good condition Yes No N/A

Proper containers for analyses requested Yes No N/A

Sufficient volume/mass for analyses requested Yes No N/A

Samples received within holding time Yes No N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH Residual Chlorine Dissolved Sulfide Dissolved Oxygen Yes No N/A

Proper preservation chemical(s) noted on COC and/or sample container Yes No N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range Yes No N/A

Container(s) for certain analysis free of headspace Yes No N/A

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation Yes No N/A

CONTAINER TYPE:

(Trip Blank Lot Number: 170830C)

Aqueous: VOA VOAh VOAna2 100PJ 100PJna2 125AGB 125AGBh 125AGBp 125PB 125PBzanna (pH_9)

250AGB 250CGB 250CGBs (pH_2) 250PB 250PBna (pH_2) 500AGB 500AGJ 500AGJs (pH_2) 500PB

1AGB 1AGBna2 1AGBs (pH_2) 1AGBs (O&G) 1PB 1PBna (pH_12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO3, na = NaOH, na2 = Na2S2O3, p = H3PO4, Labeled/Checked by: 1013

s = H2SO4, u = ultra-pure, x = Na2SO3+NaHSO4.H2O, zanna = Zn (CH3CO2)2 + NaOH Reviewed by: 778

SAMPLE ANOMALY REPORT

DATE: 09/12/2017

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
- Sample(s) received but NOT LISTED on COC
- Holding time expired (list client or ECI sample ID and analysis)
- Insufficient sample amount for requested analysis (list analysis)
- Improper container(s) used (list analysis)
- Improper preservative used (list analysis)
- pH outside acceptable range (list analysis)
- No preservative noted on COC or label (list analysis and notify lab)
- Sample container(s) not labeled
- Client sample label(s) illegible (list container type and analysis)
- Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
- Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
- Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**
2	AB	2			
3	P-H	8			
5	I	9			

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

Reported by: 1013

Reviewed by: 778

** Record the total number of containers (i.e., vials or bottles) for the affected sample.





Calscience



WORK ORDER NUMBER: 17-09-0822

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: WR2274 / ESTCP Pendleton

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/21/2017 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Contents

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 Work Order Number: 17-09-0822

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/12/17. They were assigned to Work Order 17-09-0822.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 17-09-0822
595 Market Street, Suite 610	Project Name: WR2274 / ESTCP Pendleton
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/12/17 18:30
	Number of Containers: 99

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
220205-MWX	17-09-0822-1	09/12/17 09:40	11	Aqueous
CP22-PMW04	17-09-0822-2	09/12/17 14:02	11	Aqueous
CP22-PMW06B	17-09-0822-3	09/12/17 12:20	11	Aqueous
CP22-PMW07B	17-09-0822-4	09/12/17 11:31	11	Aqueous
CP22-PMW08B	17-09-0822-5	09/12/17 10:40	11	Aqueous
CP22-PMW09B	17-09-0822-6	09/12/17 13:13	11	Aqueous
CP22-PMW10B	17-09-0822-7	09/12/17 14:54	11	Aqueous
DUP-GW-091217	17-09-0822-8	09/12/17 14:15	11	Aqueous
EB-GW-091217	17-09-0822-9	09/12/17 14:54	11	Aqueous



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0822
Project Name: WR2274 / ESTCP Pendleton
Received: 09/12/17

Attn: Lea Kane

Page 1 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
220205-MWX (17-09-0822-1)						
Zinc	0.0880		0.0100	mg/L	EPA 200.7	Filtered
Calcium	72.7		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.45		0.00500	mg/L	EPA 200.7	Filtered
Silicon	16.9		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	98		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	7.0		0.50	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW04 (17-09-0822-2)						
Zinc	0.181		0.0100	mg/L	EPA 200.7	Filtered
Calcium	63.7		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.48		0.00500	mg/L	EPA 200.7	Filtered
Silicon	16.0		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	87		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.054		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW06B (17-09-0822-3)						
Zinc	0.0459		0.0100	mg/L	EPA 200.7	Filtered
Calcium	50.4		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.14		0.00500	mg/L	EPA 200.7	Filtered
Silicon	15.2		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	38		1.0	mg/L	EPA 300.0	N/A
CP22-PMW07B (17-09-0822-4)						
Zinc	0.0248		0.0100	mg/L	EPA 200.7	Filtered
Calcium	45.5		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.657		0.00500	mg/L	EPA 200.7	Filtered
Silicon	14.6		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	99		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.022		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW08B (17-09-0822-5)						
Zinc	0.0291		0.0100	mg/L	EPA 200.7	Filtered
Calcium	64.0		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.49		0.00500	mg/L	EPA 200.7	Filtered
Silicon	15.9		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	100		2.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.0056		0.0050	ug/L	SRL 524M-TCP	EPA 5030C

* MDL is shown



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0822
Project Name: WR2274 / ESTCP Pendleton
Received: 09/12/17

Attn: Lea Kane

Page 2 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-PMW09B (17-09-0822-6)						
Zinc	0.0909		0.0100	mg/L	EPA 200.7	Filtered
Calcium	68.9		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.62		0.00500	mg/L	EPA 200.7	Filtered
Silicon	16.7		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	98		2.0	mg/L	EPA 300.0	N/A
CP22-PMW10B (17-09-0822-7)						
Zinc	0.0514		0.0100	mg/L	EPA 200.7	Filtered
Calcium	17.9		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.0423		0.00500	mg/L	EPA 200.7	Filtered
Silicon	4.12		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		5.0	mg/L	EPA 300.0	N/A
Sulfate	3.3		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.011		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
DUP-GW-091217 (17-09-0822-8)						
Zinc	0.0164		0.0100	mg/L	EPA 200.7	Filtered
Calcium	64.0		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.49		0.00500	mg/L	EPA 200.7	Filtered
Silicon	16.5		0.0500	mg/L	EPA 200.7	Filtered
Chloride	180		2.0	mg/L	EPA 300.0	N/A
Sulfate	88		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.054		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
EB-GW-091217 (17-09-0822-9)						
Calcium	12.1		0.100	mg/L	EPA 200.7	Filtered
Silicon	14.4		0.0500	mg/L	EPA 200.7	Filtered
Chloride	4.3		1.0	mg/L	EPA 300.0	N/A
Sulfate	7.0		1.0	mg/L	EPA 300.0	N/A

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	17-09-0822-1-H	09/12/17 09:40	Aqueous	GC 61	N/A	09/14/17 15:01	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW04	17-09-0822-2-H	09/12/17 14:02	Aqueous	GC 61	N/A	09/14/17 15:26	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW06B	17-09-0822-3-H	09/12/17 12:20	Aqueous	GC 61	N/A	09/14/17 16:19	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW07B	17-09-0822-4-H	09/12/17 11:31	Aqueous	GC 61	N/A	09/14/17 17:51	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW08B	17-09-0822-5-H	09/12/17 10:40	Aqueous	GC 61	N/A	09/14/17 18:23	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW09B	17-09-0822-6-H	09/12/17 13:13	Aqueous	GC 61	N/A	09/14/17 18:47	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW10B	17-09-0822-7-H	09/12/17 14:54	Aqueous	GC 61	N/A	09/14/17 19:11	170914L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP-GW-091217	17-09-0822-8-H	09/12/17 14:15	Aqueous	GC 61	N/A	09/15/17 12:42	170915L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-GW-091217	17-09-0822-9-H	09/12/17 14:54	Aqueous	GC 61	N/A	09/15/17 13:04	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Propene		ND		1.00		1.00	
Method Blank	099-14-325-85	N/A	Aqueous	GC 61	N/A	09/14/17 11:20	170914L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Propene		ND		1.00		1.00	
Method Blank	099-14-325-87	N/A	Aqueous	GC 61	N/A	09/15/17 10:49	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Propene		ND		1.00		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	17-09-0822-1-J	09/12/17 09:40	Aqueous	IC 9	N/A	09/13/17 14:53	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		98	1.0		1.00		
220205-MWX	17-09-0822-1-J	09/12/17 09:40	Aqueous	IC 9	N/A	09/13/17 23:55	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
CP22-PMW04	17-09-0822-2-J	09/12/17 14:02	Aqueous	IC 9	N/A	09/13/17 15:12	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		87	1.0		1.00		
CP22-PMW04	17-09-0822-2-J	09/12/17 14:02	Aqueous	IC 9	N/A	09/14/17 00:14	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		150	2.0		2.00		
CP22-PMW06B	17-09-0822-3-J	09/12/17 12:20	Aqueous	IC 9	N/A	09/13/17 17:24	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		38	1.0		1.00		
CP22-PMW06B	17-09-0822-3-J	09/12/17 12:20	Aqueous	IC 9	N/A	09/14/17 00:52	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		150	2.0		2.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	17-09-0822-4-J	09/12/17 11:31	Aqueous	IC 9	N/A	09/13/17 17:43	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		99	1.0		1.00		
CP22-PMW07B	17-09-0822-4-J	09/12/17 11:31	Aqueous	IC 9	N/A	09/14/17 01:11	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		160	2.0		2.00		
CP22-PMW08B	17-09-0822-5-J	09/12/17 10:40	Aqueous	IC 9	N/A	09/13/17 18:02	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
CP22-PMW08B	17-09-0822-5-J	09/12/17 10:40	Aqueous	IC 9	N/A	09/14/17 01:29	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
Sulfate		100	2.0		2.00		
CP22-PMW09B	17-09-0822-6-J	09/12/17 13:13	Aqueous	IC 9	N/A	09/13/17 18:21	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
CP22-PMW09B	17-09-0822-6-J	09/12/17 13:13	Aqueous	IC 9	N/A	09/14/17 01:48	170913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
Sulfate		98	2.0		2.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW10B	17-09-0822-7-J	09/12/17 14:54	Aqueous	IC 9	N/A	09/13/17 15:30	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		3.3		1.0		1.00	
CP22-PMW10B	17-09-0822-7-J	09/12/17 14:54	Aqueous	IC 9	N/A	09/14/17 21:23	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		5.0		5.00	
DUP-GW-091217	17-09-0822-8-J	09/12/17 14:15	Aqueous	IC 9	N/A	09/13/17 18:40	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		88		1.0		1.00	
DUP-GW-091217	17-09-0822-8-J	09/12/17 14:15	Aqueous	IC 9	N/A	09/14/17 02:07	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		180		2.0		2.00	
EB-GW-091217	17-09-0822-9-J	09/12/17 14:54	Aqueous	IC 9	N/A	09/13/17 17:05	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		4.3		1.0		1.00	
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		7.0		1.0		1.00	
Method Blank	099-12-906-7896	N/A	Aqueous	IC 9	N/A	09/13/17 13:47	170913L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		ND		1.0		1.00	
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		ND		1.0		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-906-7901	N/A	Aqueous	IC 9	N/A	09/14/17 12:09	170914L01

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Chloride	ND	1.0	1.00	



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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	17-09-0822-1-K	09/12/17 09:40	Aqueous	ICP 7300	09/15/17	09/19/17 15:46	170915LA6F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0880		0.0100		1.00	
Calcium		72.7		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.45		0.00500		1.00	
Silicon		16.9		0.0500		1.00	
CP22-PMW04	17-09-0822-2-K	09/12/17 14:02	Aqueous	ICP 7300	09/15/17	09/19/17 15:50	170915LA6F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.181		0.0100		1.00	
Calcium		63.7		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.48		0.00500		1.00	
Silicon		16.0		0.0500		1.00	
CP22-PMW06B	17-09-0822-3-K	09/12/17 12:20	Aqueous	ICP 7300	09/15/17	09/19/17 15:51	170915LA6F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0459		0.0100		1.00	
Calcium		50.4		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		1.14		0.00500		1.00	
Silicon		15.2		0.0500		1.00	
CP22-PMW07B	17-09-0822-4-K	09/12/17 11:31	Aqueous	ICP 7300	09/15/17	09/19/17 15:52	170915LA6F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0248		0.0100		1.00	
Calcium		45.5		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.657		0.00500		1.00	
Silicon		14.6		0.0500		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW08B	17-09-0822-5-K	09/12/17 10:40	Aqueous	ICP 7300	09/15/17	09/19/17 15:53	170915LA6F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0291	0.0100	1.00	
Calcium	64.0	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.49	0.00500	1.00	
Silicon	15.9	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW09B	17-09-0822-6-K	09/12/17 13:13	Aqueous	ICP 7300	09/15/17	09/19/17 15:54	170915LA6F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0909	0.0100	1.00	
Calcium	68.9	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.62	0.00500	1.00	
Silicon	16.7	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW10B	17-09-0822-7-K	09/12/17 14:54	Aqueous	ICP 7300	09/15/17	09/19/17 15:55	170915LA6F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0514	0.0100	1.00	
Calcium	17.9	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.0423	0.00500	1.00	
Silicon	4.12	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP-GW-091217	17-09-0822-8-K	09/12/17 14:15	Aqueous	ICP 7300	09/15/17	09/19/17 15:56	170915LA6F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0164	0.0100	1.00	
Calcium	64.0	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.49	0.00500	1.00	
Silicon	16.5	0.0500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-GW-091217	17-09-0822-9-K	09/12/17 14:54	Aqueous	ICP 7300	09/15/17	09/19/17 15:57	170915LA6F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	12.1	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	14.4	0.0500	1.00	

Method Blank	099-14-304-635	N/A	Aqueous	ICP 7300	09/15/17	09/19/17 12:12	170915LA6F
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Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	17-09-0822-1-A	09/12/17 09:40	Aqueous	GC/MS L	09/15/17	09/16/17 06:57	170915L046

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	107	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW04	17-09-0822-2-A	09/12/17 14:02	Aqueous	GC/MS L	09/15/17	09/16/17 07:26	170915L046

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW06B	17-09-0822-3-A	09/12/17 12:20	Aqueous	GC/MS L	09/15/17	09/16/17 07:55	170915L046

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	119	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	102	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	17-09-0822-4-A	09/12/17 11:31	Aqueous	GC/MS L	09/16/17	09/16/17 11:44	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	97	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW08B	17-09-0822-5-A	09/12/17 10:40	Aqueous	GC/MS L	09/16/17	09/16/17 16:21	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	110	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW09B	17-09-0822-6-A	09/12/17 13:13	Aqueous	GC/MS L	09/16/17	09/16/17 16:52	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Geosyntec Consultants
595 Market Street, Suite 610
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Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW10B	17-09-0822-7-A	09/12/17 14:54	Aqueous	GC/MS L	09/16/17	09/16/17 17:23	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	118	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP-GW-091217	17-09-0822-8-A	09/12/17 14:15	Aqueous	GC/MS L	09/16/17	09/16/17 17:53	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	107	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-GW-091217	17-09-0822-9-A	09/12/17 14:54	Aqueous	GC/MS L	09/16/17	09/16/17 18:24	170916L005

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	91	68-120	
Dibromofluoromethane	108	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-243	N/A	Aqueous	GC/MS L	09/15/17	09/15/17 22:13	170915L046

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	105	80-127	
1,2-Dichloroethane-d4	104	80-128	
Toluene-d8	98	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-242	N/A	Aqueous	GC/MS L	09/16/17	09/16/17 11:11	170916L005

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	103	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	17-09-0822-1-F	09/12/17 09:40	Aqueous	GC/MS T	09/19/17	09/20/17 04:09	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		7.0		0.50		100	
CP22-PMW04	17-09-0822-2-F	09/12/17 14:02	Aqueous	GC/MS T	09/19/17	09/20/17 00:57	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.054		0.0050		1.00	
CP22-PMW06B	17-09-0822-3-F	09/12/17 12:20	Aqueous	GC/MS T	09/19/17	09/20/17 01:24	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-PMW07B	17-09-0822-4-F	09/12/17 11:31	Aqueous	GC/MS T	09/19/17	09/20/17 01:52	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.022		0.0050		1.00	
CP22-PMW08B	17-09-0822-5-F	09/12/17 10:40	Aqueous	GC/MS T	09/19/17	09/20/17 02:19	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.0056		0.0050		1.00	
CP22-PMW09B	17-09-0822-6-F	09/12/17 13:13	Aqueous	GC/MS T	09/19/17	09/20/17 02:47	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-PMW10B	17-09-0822-7-F	09/12/17 14:54	Aqueous	GC/MS T	09/19/17	09/20/17 03:14	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.011		0.0050		1.00	
DUP-GW-091217	17-09-0822-8-G	09/12/17 14:15	Aqueous	GC/MS T	09/19/17	09/20/17 03:41	170919L054
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.054		0.0050		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB-GW-091217	17-09-0822-9-G	09/12/17 14:54	Aqueous	GC/MS T	09/19/17	09/20/17 00:30	170919L054

Parameter	Result	RL	DF	Qualifiers
1,2,3-Trichloropropane	ND	0.0050	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1365	N/A	Aqueous	GC/MS T	09/19/17	09/20/17 00:02	170919L054

Parameter	Result	RL	DF	Qualifiers
1,2,3-Trichloropropane	ND	0.0050	1.00	



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-PMW10B	Sample	Aqueous	IC 9	N/A	09/13/17 15:30	170913S01
CP22-PMW10B	Matrix Spike	Aqueous	IC 9	N/A	09/13/17 15:49	170913S01
CP22-PMW10B	Matrix Spike Duplicate	Aqueous	IC 9	N/A	09/13/17 16:08	170913S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	192.7	50.00	253.4	121	254.4	123	80-120	0	0-20	3
Nitrite (as N)	ND	2.500	3.931	157	3.728	149	80-120	5	0-20	3
Nitrate (as N)	ND	5.000	4.571	91	4.634	93	80-120	1	0-20	
Sulfate	3.286	50.00	56.34	106	56.92	107	80-120	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants	Date Received:	09/12/17
595 Market Street, Suite 610	Work Order:	17-09-0822
San Francisco, CA 94105-2811	Preparation:	N/A
Project: WR2274 / ESTCP Pendleton	Method:	EPA 300.0

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0988-10	Sample	Aqueous	IC 9	N/A	09/14/17 16:58	170914S01
17-09-0988-10	Matrix Spike	Aqueous	IC 9	N/A	09/14/17 17:17	170914S01
17-09-0988-10	Matrix Spike Duplicate	Aqueous	IC 9	N/A	09/14/17 17:36	170914S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	47.04	50.00	104.2	114	103.6	113	80-120	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
220205-MWX	Sample	Aqueous	ICP 7300	09/15/17	09/19/17 15:46	170915SA6				
220205-MWX	Matrix Spike	Aqueous	ICP 7300	09/15/17	09/19/17 15:48	170915SA6				
220205-MWX	Matrix Spike Duplicate	Aqueous	ICP 7300	09/15/17	09/19/17 15:49	170915SA6				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	0.08804	0.5000	0.6540	113	0.5524	93	80-120	17	0-20	
Calcium	72.69	0.5000	69.75	4X	71.94	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.4998	100	0.5033	101	80-120	1	0-20	
Manganese	1.450	0.5000	1.845	79	1.881	86	80-120	2	0-20	3
Silicon	16.85	0.5000	16.14	4X	16.50	4X	80-120	4X	0-20	Q


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0816-20	Sample	Aqueous	GC/MS L	09/15/17	09/15/17 22:42	170915S039
17-09-0816-20	Matrix Spike	Aqueous	GC/MS L	09/15/17	09/15/17 23:11	170915S039
17-09-0816-20	Matrix Spike Duplicate	Aqueous	GC/MS L	09/15/17	09/15/17 23:40	170915S039

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	8.549	85	7.500	75	75-125	13	0-20	
1,3-Dichloropropane	ND	10.00	8.190	82	7.615	76	75-125	7	0-20	
Allyl Chloride	ND	10.00	7.856	79	6.860	69	80-120	14	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-PMW07B	Sample	Aqueous	GC/MS L	09/16/17	09/16/17 11:44	170916S001
CP22-PMW07B	Matrix Spike	Aqueous	GC/MS L	09/16/17	09/16/17 12:15	170916S001
CP22-PMW07B	Matrix Spike Duplicate	Aqueous	GC/MS L	09/16/17	09/16/17 12:46	170916S001

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	10.04	100	10.18	102	75-125	1	0-20	
1,3-Dichloropropane	ND	10.00	9.679	97	10.04	100	75-125	4	0-20	
Allyl Chloride	ND	10.00	9.328	93	9.538	95	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-85	LCS	Aqueous	GC 61	N/A	09/14/17 09:56	170914L02			
099-14-325-85	LCSD	Aqueous	GC 61	N/A	09/14/17 10:28	170914L02			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	102.7	100	102.5	100	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants 595 Market Street, Suite 610 San Francisco, CA 94105-2811	Date Received: 09/12/17 Work Order: 17-09-0822 Preparation: N/A Method: RSK-175M
Project: WR2274 / ESTCP Pendleton	Page 2 of 8

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-325-87	LCS	Aqueous	GC 61	N/A	09/15/17 10:02	170915L02
099-14-325-87	LCSD	Aqueous	GC 61	N/A	09/15/17 10:27	170915L02

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	91.27	89	89.58	87	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-906-7896	LCS	Aqueous	IC 9	N/A	09/13/17 14:06	170913L01			
099-12-906-7896	LCSD	Aqueous	IC 9	N/A	09/13/17 20:14	170913L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	50.00	50.22	100	51.14	102	90-110	2	0-15	
Nitrite (as N)	2.500	2.669	107	2.606	104	90-110	2	0-15	
Nitrate (as N)	5.000	4.807	96	4.858	97	90-110	1	0-15	
Sulfate	50.00	52.01	104	52.60	105	90-110	1	0-15	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-906-7901	LCS	Aqueous	IC 9	N/A	09/14/17 12:28	170914L01			
099-12-906-7901	LCSD	Aqueous	IC 9	N/A	09/14/17 21:04	170914L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	50.00	49.82	100	50.12	100	90-110	1	0-15	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-635	LCS	Aqueous	ICP 7300	09/15/17	09/20/17 10:44	170915LA6F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5438	109	85-115	
Calcium		0.5000	0.5369	107	85-115	
Iron		0.5000	0.5389	108	85-115	
Manganese		0.5000	0.5407	108	85-115	
Silicon		0.5000	0.5292	106	85-115	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-243	LCS	Aqueous	GC/MS L	09/15/17	09/15/17 21:44	170915L046
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	9.516	95	74-122	
1,3-Dichloropropane		10.00	9.391	94	74-128	
Allyl Chloride		10.00	9.553	96	70-130	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-242	LCS	Aqueous	GC/MS L	09/16/17	09/16/17 10:39	170916L005
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	9.742	97	74-122	
1,3-Dichloropropane		10.00	9.674	97	74-128	
Allyl Chloride		10.00	9.189	92	70-130	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/17
Work Order: 17-09-0822
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1365	LCS	Aqueous	GC/MS T	09/19/17	09/19/17 22:40	170919L054			
099-10-022-1365	LCSD	Aqueous	GC/MS T	09/19/17	09/19/17 23:08	170919L054			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005400	108	0.005300	106	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 17-09-0822

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	1027	IC 9	1
EPA 8260B	EPA 5030C	316	GC/MS L	2
EPA 8260B	EPA 5030C	996	GC/MS L	2
RSK-175M	N/A	326	GC 61	2
RSK-175M	N/A	1078	GC 61	2
SRL 524M-TCP	EPA 5030C	486	GC/MS T	2


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Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Location 2: 7445 Lampson Avenue, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 17-09-0822

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

17-09-0822

Page 1 of 1

White copy: to accompany samples
Yellow copy: field copy

Project Name ESTCP Penetration	Project Number UP2274	Required Analyses					Bottle Type and Volume/Preservative	Number of Containers	Sample Type	Date	Time	Comments	Lab Use Only	Condition of Bottles
		Metals	SVOCS by 8270	TPH by SFL SWM-78	Propylene by BSK-173M	EPA 200.7 (Lab Filter)								
Samplers Names	Project Contact Len Kane													
Laboratory Name CalScience	Lab Contact S. Nowak													
Lab Address	Lab Phone													
Carrier/Waybill No.														
Sample Name	Date	Time	Bottle Type and Volume/Preservative					Number of Containers	Sample Type	Date	Time	Comments	Lab Use Only	Condition of Bottles
220205-mwx	9-12-16	0940	VWA	HCL	VWA	HCL	150-L	150-L	3	3	1			
CP22-pmw004		1402							3	3	1			
CP22-pmw006B		1220							3	3	1			
CP22-pmw007B		1131							3	3	1			
CP22-pmw008B		1040							3	3	1			
CP22-pmw009B		1313							3	3	1			
CP22-pmw10B		1454							3	3	1			
DUP-GW-091217		1415							3	3	1			
EB-GW-091217		1454							3	3	1			

Special Instructions: Analysis same as 9/11/17 samples. Email results to Kane@geosyntec.com & breakwell@geosyntec.com

Turn-around Time: Normal Rush:

1. Relinquished by	Date 09-12-17	Time 1540	1. Received by	Date 9/12/17	Time 1540
2. Relinquished by	Date 9/12/17	Time 1630	2. Received by	Date 09/12/17	Time 1630
3. Relinquished by	Date 09/12/17	Time 1830	3. Received by	Date 09/12/17	Time 1830

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Geosyntec

DATE: 09/12/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.2 °C (w/ CF): 3.4 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A Checked by: 671

Sample(s) Present and Intact Present but Not Intact Not Present N/A Checked by: 826

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input checked="" type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (a) (Trip Blank Lot Number: _____)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB 125PB_zna (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PB_n (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGB_{na2} 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PB_{na} (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 836

s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, z_{na} = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 778

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SAMPLE ANOMALY REPORT

DATE: 09/12/2017

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
- Sample(s) received but NOT LISTED on COC
- Holding time expired (list client or ECI sample ID and analysis)
- Insufficient sample amount for requested analysis (list analysis)
- Improper container(s) used (list analysis)
- Improper preservative used (list analysis)
- pH outside acceptable range (list analysis)
- No preservative noted on COC or label (list analysis and notify lab)
- Sample container(s) not labeled
- Client sample label(s) illegible (list container type and analysis)
- Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
- Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
- Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

**(-1) to (-9) Collection year per label, 2017.*

MISCELLANEOUS: (Describe)

** year*

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

Reported by: 826
 Reviewed by: 778

** Record the total number of containers (i.e., vials or bottles) for the affected sample.





Calscience



WORK ORDER NUMBER: 17-09-0989

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: WR2274 / ESTCP Pendleton

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/27/2017 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 17-09-0989

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Work Order Narrative

Work Order: 17-09-0989

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/13/17. They were assigned to Work Order 17-09-0989.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 17-09-0989
595 Market Street, Suite 610	Project Name: WR2274 / ESTCP Pendleton
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/13/17 18:30
	Number of Containers: 152

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-DUP2-091317	17-09-0989-1	09/13/17 11:00	11	Aqueous
CP22-DUP3-091317	17-09-0989-2	09/13/17 12:00	11	Aqueous
CP22-DUP4-091317	17-09-0989-3	09/13/17 14:00	11	Aqueous
TB-091317	17-09-0989-4	09/13/17 00:00	2	Aqueous
FB-091317	17-09-0989-5	09/13/17 11:30	2	Aqueous
CP22-HP12-39-41	17-09-0989-6	09/13/17 07:40	11	Aqueous
CP22-HP11-35-37	17-09-0989-7	09/13/17 08:30	11	Aqueous
CP22-HP11-39-41	17-09-0989-8	09/13/17 09:10	11	Aqueous
CP22-HP11-43-45	17-09-0989-9	09/13/17 10:00	11	Aqueous
CP22-HP08-35-37	17-09-0989-10	09/13/17 10:45	11	Aqueous
CP22-HP08-39-41	17-09-0989-11	09/13/17 12:45	3	Aqueous
CP22-HP08-43-45	17-09-0989-12	09/13/17 11:25	11	Aqueous
FB2-091317	17-09-0989-13	09/13/17 15:45	2	Aqueous
EB2-091317	17-09-0989-14	09/13/17 14:30	8	Aqueous
EB3-091317	17-09-0989-15	09/13/17 16:00	8	Aqueous
CP22-HP06-35-37	17-09-0989-16	09/13/17 13:30	11	Aqueous
CP22-HP06-39-41	17-09-0989-17	09/13/17 15:15	6	Aqueous
CP22-HP06-43-45	17-09-0989-18	09/13/17 15:30	11	Aqueous


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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0989
Project Name: WR2274 / ESTCP Pendleton
Received: 09/13/17

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-DUP2-091317 (17-09-0989-1)						
Zinc	0.0183		0.0100	mg/L	EPA 200.7	Filtered
Calcium	56.5		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.518		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.60		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	69		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.36		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-DUP3-091317 (17-09-0989-2)						
Zinc	0.0127		0.0100	mg/L	EPA 200.7	Filtered
Calcium	55.3		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.13		0.00500	mg/L	EPA 200.7	Filtered
Silicon	10.4		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	60		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.075		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-DUP4-091317 (17-09-0989-3)						
Zinc	0.0133		0.0100	mg/L	EPA 200.7	Filtered
Calcium	63.4		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.46		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.3		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	95		1.0	mg/L	EPA 300.0	N/A
CP22-HP12-39-41 (17-09-0989-6)						
Zinc	0.0110		0.0100	mg/L	EPA 200.7	Filtered
Calcium	47.5		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.933		0.00500	mg/L	EPA 200.7	Filtered
Silicon	8.56		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	61		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.076		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP11-35-37 (17-09-0989-7)						
Calcium	39.3		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.426		0.00500	mg/L	EPA 200.7	Filtered
Silicon	10.3		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		5.0	mg/L	EPA 300.0	N/A
Sulfate	75		1.0	mg/L	EPA 300.0	N/A

* MDL is shown



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0989
Project Name: WR2274 / ESTCP Pendleton
Received: 09/13/17

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP11-39-41 (17-09-0989-8)						
Zinc	0.0217		0.0100	mg/L	EPA 200.7	Filtered
Calcium	62.3		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.01		0.00500	mg/L	EPA 200.7	Filtered
Silicon	11.3		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	82		1.0	mg/L	EPA 300.0	N/A
Propene	5.46		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.15		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP11-43-45 (17-09-0989-9)						
Zinc	0.0141		0.0100	mg/L	EPA 200.7	Filtered
Calcium	67.5		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.39		0.00500	mg/L	EPA 200.7	Filtered
Silicon	14.4		0.0500	mg/L	EPA 200.7	Filtered
Chloride	150		2.0	mg/L	EPA 300.0	N/A
Sulfate	91		1.0	mg/L	EPA 300.0	N/A
CP22-HP08-35-37 (17-09-0989-10)						
Calcium	56.6		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.501		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.7		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	90		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.45		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP08-43-45 (17-09-0989-12)						
Calcium	68.1		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.50		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.7		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	95		1.0	mg/L	EPA 300.0	N/A
EB3-091317 (17-09-0989-15)						
Calcium	0.126		0.100	mg/L	EPA 200.7	Filtered
CP22-HP06-35-37 (17-09-0989-16)						
Zinc	0.0100		0.0100	mg/L	EPA 200.7	Filtered
Calcium	35.4		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.415		0.00500	mg/L	EPA 200.7	Filtered
Silicon	11.7		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	80		1.0	mg/L	EPA 300.0	N/A

* MDL is shown



Calscience

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 17-09-0989
Project Name: WR2274 / ESTCP Pendleton
Received: 09/13/17

Attn: Lea Kane

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Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
CP22-HP06-39-41 (17-09-0989-17)						
Propene	1.94		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.12		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP06-43-45 (17-09-0989-18)						
Zinc	0.0170		0.0100	mg/L	EPA 200.7	Filtered
Calcium	71.2		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.53		0.00500	mg/L	EPA 200.7	Filtered
Silicon	13.2		0.0500	mg/L	EPA 200.7	Filtered
Chloride	160		2.0	mg/L	EPA 300.0	N/A
Sulfate	93		2.0	mg/L	EPA 300.0	N/A

Subcontracted analyses, if any, are not included in this summary.

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* MDL is shown



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP2-091317	17-09-0989-1-I	09/13/17 11:00	Aqueous	GC 52	N/A	09/15/17 19:15	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-DUP3-091317	17-09-0989-2-I	09/13/17 12:00	Aqueous	GC 52	N/A	09/16/17 14:30	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-DUP4-091317	17-09-0989-3-I	09/13/17 14:00	Aqueous	GC 52	N/A	09/15/17 19:49	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP12-39-41	17-09-0989-6-I	09/13/17 07:40	Aqueous	GC 52	N/A	09/15/17 20:15	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP11-35-37	17-09-0989-7-I	09/13/17 08:30	Aqueous	GC 52	N/A	09/15/17 21:11	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP11-39-41	17-09-0989-8-I	09/13/17 09:10	Aqueous	GC 52	N/A	09/15/17 21:36	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		5.46	1.00		1.00		
CP22-HP11-43-45	17-09-0989-9-I	09/13/17 10:00	Aqueous	GC 52	N/A	09/15/17 22:03	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP08-35-37	17-09-0989-10-I	09/13/17 10:45	Aqueous	GC 52	N/A	09/15/17 22:29	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP08-43-45	17-09-0989-12-I	09/13/17 11:25	Aqueous	GC 52	N/A	09/16/17 11:17	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
EB2-091317	17-09-0989-14-E	09/13/17 14:30	Aqueous	GC 52	N/A	09/16/17 11:43	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
EB3-091317	17-09-0989-15-E	09/13/17 16:00	Aqueous	GC 52	N/A	09/16/17 12:10	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP06-35-37	17-09-0989-16-I	09/13/17 13:30	Aqueous	GC 52	N/A	09/16/17 12:37	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP06-39-41	17-09-0989-17-I	09/13/17 15:15	Aqueous	GC 52	N/A	09/16/17 13:07	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.94	1.00		1.00		
CP22-HP06-43-45	17-09-0989-18-I	09/13/17 15:30	Aqueous	GC 52	N/A	09/16/17 13:35	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-86	N/A	Aqueous	GC 52	N/A	09/15/17 12:05	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-89	N/A	Aqueous	GC 52	N/A	09/16/17 10:43	170916L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Geosyntec Consultants
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Work Order: 17-09-0989
Preparation: N/A
Method: EPA 300.0
Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP2-091317	17-09-0989-1-J	09/13/17 11:00	Aqueous	IC 15	N/A	09/14/17 19:21	170914L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		69	1.0		1.00		
CP22-DUP2-091317	17-09-0989-1-J	09/13/17 11:00	Aqueous	IC 15	N/A	09/15/17 23:24	170915L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		160	2.0		2.00		
CP22-DUP3-091317	17-09-0989-2-J	09/13/17 12:00	Aqueous	IC 15	N/A	09/14/17 19:40	170914L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		60	1.0		1.00		
CP22-DUP3-091317	17-09-0989-2-J	09/13/17 12:00	Aqueous	IC 15	N/A	09/15/17 23:43	170915L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		150	2.0		2.00		
CP22-DUP4-091317	17-09-0989-3-J	09/13/17 14:00	Aqueous	IC 15	N/A	09/14/17 19:58	170914L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		95	1.0		1.00		
CP22-DUP4-091317	17-09-0989-3-J	09/13/17 14:00	Aqueous	IC 15	N/A	09/16/17 00:01	170915L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		160	2.0		2.00		

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP12-39-41	17-09-0989-6-J	09/13/17 07:40	Aqueous	IC 15	N/A	09/14/17 22:06	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		61		1.0		1.00	
CP22-HP12-39-41	17-09-0989-6-J	09/13/17 07:40	Aqueous	IC 15	N/A	09/16/17 00:19	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		150		2.0		2.00	
CP22-HP11-35-37	17-09-0989-7-J	09/13/17 08:30	Aqueous	IC 15	N/A	09/14/17 22:25	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		75		1.0		1.00	
CP22-HP11-35-37	17-09-0989-7-J	09/13/17 08:30	Aqueous	IC 15	N/A	09/16/17 00:38	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		5.0		5.00	
CP22-HP11-39-41	17-09-0989-8-J	09/13/17 09:10	Aqueous	IC 15	N/A	09/14/17 22:43	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		82		1.0		1.00	
CP22-HP11-39-41	17-09-0989-8-J	09/13/17 09:10	Aqueous	IC 15	N/A	09/16/17 00:56	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		150		2.0		2.00	

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Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-43-45	17-09-0989-9-J	09/13/17 10:00	Aqueous	IC 15	N/A	09/14/17 23:02	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		91		1.0		1.00	
CP22-HP11-43-45	17-09-0989-9-J	09/13/17 10:00	Aqueous	IC 15	N/A	09/16/17 01:15	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		150		2.0		2.00	
CP22-HP08-35-37	17-09-0989-10-J	09/13/17 10:45	Aqueous	IC 15	N/A	09/14/17 23:20	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		90		1.0		1.00	
CP22-HP08-35-37	17-09-0989-10-J	09/13/17 10:45	Aqueous	IC 15	N/A	09/16/17 01:33	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		2.0		2.00	
CP22-HP08-43-45	17-09-0989-12-J	09/13/17 11:25	Aqueous	IC 15	N/A	09/14/17 23:38	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		95		1.0		1.00	
CP22-HP08-43-45	17-09-0989-12-J	09/13/17 11:25	Aqueous	IC 15	N/A	09/16/17 01:51	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		2.0		2.00	

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB2-091317	17-09-0989-14-J	09/13/17 14:30	Aqueous	IC 15	N/A	09/14/17 21:30	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		ND		1.0		1.00	
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		ND		1.0		1.00	
EB3-091317	17-09-0989-15-J	09/13/17 16:00	Aqueous	IC 15	N/A	09/14/17 21:48	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		ND		1.0		1.00	
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		ND		1.0		1.00	
CP22-HP06-35-37	17-09-0989-16-J	09/13/17 13:30	Aqueous	IC 15	N/A	09/14/17 23:57	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
Sulfate		80		1.0		1.00	
CP22-HP06-35-37	17-09-0989-16-J	09/13/17 13:30	Aqueous	IC 15	N/A	09/16/17 02:10	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		170		2.0		2.00	
CP22-HP06-43-45	17-09-0989-18-J	09/13/17 15:30	Aqueous	IC 15	N/A	09/15/17 00:15	170914L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Nitrite (as N)		ND		0.10		1.00	
Nitrate (as N)		ND		0.10		1.00	
CP22-HP06-43-45	17-09-0989-18-J	09/13/17 15:30	Aqueous	IC 15	N/A	09/16/17 03:41	170915L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Chloride		160		2.0		2.00	
Sulfate		93		2.0		2.00	

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 Preparation: N/A
 Method: EPA 300.0
 Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-906-7913	N/A	Aqueous	IC 15	N/A	09/14/17 16:36	170914L01

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Chloride	ND	1.0	1.00	
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	ND	1.0	1.00	

Method Blank	099-12-906-7914	N/A	Aqueous	IC 15	N/A	09/15/17 22:29	170915L02
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Chloride	ND	1.0	1.00	
Sulfate	ND	1.0	1.00	

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Method: EPA 200.7
Units: mg/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP2-091317	17-09-0989-1-K	09/13/17 11:00	Aqueous	ICP 7300	09/16/17	09/19/17 15:59	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0183	0.0100	1.00	
Calcium	56.5	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.518	0.00500	1.00	
Silicon	9.60	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP3-091317	17-09-0989-2-K	09/13/17 12:00	Aqueous	ICP 7300	09/16/17	09/19/17 15:17	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0127	0.0100	1.00	
Calcium	55.3	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.13	0.00500	1.00	
Silicon	10.4	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP4-091317	17-09-0989-3-K	09/13/17 14:00	Aqueous	ICP 7300	09/16/17	09/19/17 15:18	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0133	0.0100	1.00	
Calcium	63.4	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.46	0.00500	1.00	
Silicon	13.3	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP12-39-41	17-09-0989-6-K	09/13/17 07:40	Aqueous	ICP 7300	09/16/17	09/19/17 15:19	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0110	0.0100	1.00	
Calcium	47.5	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.933	0.00500	1.00	
Silicon	8.56	0.0500	1.00	

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-35-37	17-09-0989-7-K	09/13/17 08:30	Aqueous	ICP 7300	09/16/17	09/19/17 15:20	170916LA2F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		ND		0.0100	1.00		
Calcium		39.3		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		0.426		0.00500	1.00		
Silicon		10.3		0.0500	1.00		
CP22-HP11-39-41	17-09-0989-8-K	09/13/17 09:10	Aqueous	ICP 7300	09/16/17	09/19/17 15:21	170916LA2F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0217		0.0100	1.00		
Calcium		62.3		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		1.01		0.00500	1.00		
Silicon		11.3		0.0500	1.00		
CP22-HP11-43-45	17-09-0989-9-K	09/13/17 10:00	Aqueous	ICP 7300	09/16/17	09/19/17 15:22	170916LA2F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0141		0.0100	1.00		
Calcium		67.5		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		1.39		0.00500	1.00		
Silicon		14.4		0.0500	1.00		
CP22-HP08-35-37	17-09-0989-10-K	09/13/17 10:45	Aqueous	ICP 7300	09/16/17	09/19/17 15:23	170916LA2F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>	<u>DF</u>		<u>Qualifiers</u>
Zinc		ND		0.0100	1.00		
Calcium		56.6		0.100	1.00		
Iron		ND		0.100	1.00		
Manganese		0.501		0.00500	1.00		
Silicon		13.7		0.0500	1.00		

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP08-43-45	17-09-0989-12-K	09/13/17 11:25	Aqueous	ICP 7300	09/16/17	09/19/17 15:24	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	68.1	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.50	0.00500	1.00	
Silicon	13.7	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB2-091317	17-09-0989-14-K	09/13/17 14:30	Aqueous	ICP 7300	09/16/17	09/19/17 15:26	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB3-091317	17-09-0989-15-K	09/13/17 16:00	Aqueous	ICP 7300	09/16/17	09/19/17 15:27	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	0.126	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-35-37	17-09-0989-16-K	09/13/17 13:30	Aqueous	ICP 7300	09/16/17	09/19/17 15:28	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0100	0.0100	1.00	
Calcium	35.4	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.415	0.00500	1.00	
Silicon	11.7	0.0500	1.00	

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-43-45	17-09-0989-18-K	09/13/17 15:30	Aqueous	ICP 7300	09/16/17	09/19/17 16:00	170916LA2F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0170	0.0100	1.00	
Calcium	71.2	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	1.53	0.00500	1.00	
Silicon	13.2	0.0500	1.00	

Method Blank	099-14-304-636	N/A	Aqueous	ICP 7300	09/16/17	09/19/17 12:33	170916LA2F
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Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP2-091317	17-09-0989-1-A	09/13/17 11:00	Aqueous	GC/MS L	09/16/17	09/17/17 05:41	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	89	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP3-091317	17-09-0989-2-A	09/13/17 12:00	Aqueous	GC/MS L	09/16/17	09/17/17 06:11	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP4-091317	17-09-0989-3-A	09/13/17 14:00	Aqueous	GC/MS L	09/16/17	09/17/17 06:42	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	102	80-127	
1,2-Dichloroethane-d4	113	80-128	
Toluene-d8	101	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
TB-091317	17-09-0989-4-A	09/13/17 00:00	Aqueous	GC/MS L	09/16/17	09/17/17 07:13	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	113	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	102	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
FB-091317	17-09-0989-5-A	09/13/17 11:30	Aqueous	GC/MS L	09/16/17	09/17/17 07:43	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	83	68-120	
Dibromofluoromethane	110	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	103	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP12-39-41	17-09-0989-6-A	09/13/17 07:40	Aqueous	GC/MS L	09/16/17	09/17/17 08:14	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	88	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	101	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-35-37	17-09-0989-7-A	09/13/17 08:30	Aqueous	GC/MS L	09/16/17	09/17/17 08:45	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	107	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-39-41	17-09-0989-8-A	09/13/17 09:10	Aqueous	GC/MS L	09/16/17	09/17/17 09:16	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-43-45	17-09-0989-9-A	09/13/17 10:00	Aqueous	GC/MS L	09/16/17	09/17/17 09:46	170916L018

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	105	80-127	
1,2-Dichloroethane-d4	111	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP08-35-37	17-09-0989-10-A	09/13/17 10:45	Aqueous	GC/MS L	09/19/17	09/19/17 18:24	170919L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	86	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	114	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP08-43-45	17-09-0989-12-B	09/13/17 11:25	Aqueous	GC/MS L	09/19/17	09/19/17 18:55	170919L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	107	80-127	
1,2-Dichloroethane-d4	113	80-128	
Toluene-d8	101	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
FB2-091317	17-09-0989-13-A	09/13/17 15:45	Aqueous	GC/MS L	09/19/17	09/19/17 19:26	170919L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	83	68-120	
Dibromofluoromethane	114	80-127	
1,2-Dichloroethane-d4	112	80-128	
Toluene-d8	101	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB2-091317	17-09-0989-14-A	09/13/17 14:30	Aqueous	GC/MS L	09/19/17	09/19/17 19:57	170919L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	115	80-127	
1,2-Dichloroethane-d4	114	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB3-091317	17-09-0989-15-A	09/13/17 16:00	Aqueous	GC/MS L	09/19/17	09/19/17 20:27	170919L002

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	115	80-127	
1,2-Dichloroethane-d4	113	80-128	
Toluene-d8	100	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-35-37	17-09-0989-16-A	09/13/17 13:30	Aqueous	GC/MS L	09/19/17	09/20/17 08:14	170919L036

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	101	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-43-45	17-09-0989-18-A	09/13/17 15:30	Aqueous	GC/MS L	09/19/17	09/20/17 08:45	170919L036

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	87	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	113	80-128	
Toluene-d8	98	80-120	

Method Blank	099-16-446-244	N/A	Aqueous	GC/MS L	09/16/17	09/17/17 00:03	170916L018
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Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	84	68-120	
Dibromofluoromethane	109	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

Method Blank	099-16-446-246	N/A	Aqueous	GC/MS L	09/19/17	09/19/17 10:06	170919L002
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Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	85	68-120	
Dibromofluoromethane	105	80-127	
1,2-Dichloroethane-d4	100	80-128	
Toluene-d8	96	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-247	N/A	Aqueous	GC/MS L	09/19/17	09/19/17 22:30	170919L036

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	83	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	101	80-128	
Toluene-d8	97	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-DUP2-091317	17-09-0989-1-E	09/13/17 11:00	Aqueous	GC/MS M	09/21/17	09/22/17 03:18	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.36		0.025		5.00	
CP22-DUP3-091317	17-09-0989-2-E	09/13/17 12:00	Aqueous	GC/MS M	09/21/17	09/21/17 21:22	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.075		0.0050		1.00	
CP22-DUP4-091317	17-09-0989-3-E	09/13/17 14:00	Aqueous	GC/MS M	09/21/17	09/21/17 19:24	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP12-39-41	17-09-0989-6-E	09/13/17 07:40	Aqueous	GC/MS M	09/21/17	09/21/17 21:52	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.076		0.0050		1.00	
CP22-HP11-35-37	17-09-0989-7-E	09/13/17 08:30	Aqueous	GC/MS M	09/21/17	09/21/17 22:21	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP11-39-41	17-09-0989-8-E	09/13/17 09:10	Aqueous	GC/MS M	09/21/17	09/22/17 03:48	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.15		0.025		5.00	
CP22-HP11-43-45	17-09-0989-9-E	09/13/17 10:00	Aqueous	GC/MS M	09/21/17	09/21/17 19:53	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP08-35-37	17-09-0989-10-D	09/13/17 10:45	Aqueous	GC/MS M	09/21/17	09/22/17 04:18	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.45		0.025		5.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP08-39-41	17-09-0989-11-B	09/13/17 12:45	Aqueous	GC/MS M	09/25/17	09/25/17 13:14	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP08-43-45	17-09-0989-12-D	09/13/17 11:25	Aqueous	GC/MS M	09/21/17	09/21/17 22:51	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
EB2-091317	17-09-0989-14-D	09/13/17 14:30	Aqueous	GC/MS M	09/21/17	09/21/17 20:23	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
EB3-091317	17-09-0989-15-C	09/13/17 16:00	Aqueous	GC/MS M	09/21/17	09/21/17 20:53	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP06-35-37	17-09-0989-16-D	09/13/17 13:30	Aqueous	GC/MS M	09/21/17	09/22/17 02:19	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP06-39-41	17-09-0989-17-B	09/13/17 15:15	Aqueous	GC/MS M	09/25/17	09/25/17 14:13	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.12		0.010		2.00	
CP22-HP06-43-45	17-09-0989-18-D	09/13/17 15:30	Aqueous	GC/MS M	09/21/17	09/22/17 02:49	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1367	N/A	Aqueous	GC/MS M	09/21/17	09/21/17 17:25	170921L064
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1368	N/A	Aqueous	GC/MS M	09/25/17	09/25/17 12:14	170925L030

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0972-18	Sample	Aqueous	IC 15	N/A	09/14/17 18:44	170914S01
17-09-0972-18	Matrix Spike	Aqueous	IC 15	N/A	09/14/17 20:16	170914S01
17-09-0972-18	Matrix Spike Duplicate	Aqueous	IC 15	N/A	09/14/17 20:35	170914S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	45.99	50.00	101.9	112	101.9	112	80-120	0	0-20	
Nitrite (as N)	ND	2.500	3.021	121	3.022	121	80-120	0	0-20	3
Nitrate (as N)	12.95	5.000	18.86	118	18.87	118	80-120	0	0-20	
Sulfate	239.6	50.00	306.3	133	306.2	133	80-120	0	0-20	3


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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
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Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP11-35-37	Sample	Aqueous	ICP 7300	09/16/17	09/19/17 15:20	170916SA2				
CP22-HP11-35-37	Matrix Spike	Aqueous	ICP 7300	09/16/17	09/19/17 14:54	170916SA2				
CP22-HP11-35-37	Matrix Spike Duplicate	Aqueous	ICP 7300	09/16/17	09/19/17 14:55	170916SA2				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.6008	120	0.6022	120	80-120	0	0-20	
Calcium	39.25	0.5000	47.26	4X	46.47	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.5607	112	0.5606	112	80-120	0	0-20	
Manganese	0.4259	0.5000	1.020	119	1.017	118	80-120	0	0-20	
Silicon	10.28	0.5000	11.38	4X	11.30	4X	80-120	4X	0-20	Q


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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP08-43-45	Sample	Aqueous	ICP 7300	09/16/17	09/19/17 15:24	170916SA2A
CP22-HP08-43-45	Matrix Spike	Aqueous	ICP 7300	09/16/17	09/19/17 15:15	170916SA2A
CP22-HP08-43-45	Matrix Spike Duplicate	Aqueous	ICP 7300	09/16/17	09/19/17 15:16	170916SA2A

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.5630	113	0.5482	110	80-120	3	0-20	
Calcium	68.07	0.5000	68.28	4X	66.04	4X	80-120	4X	0-20	Q
Iron	ND	0.5000	0.5121	102	0.5100	102	80-120	0	0-20	
Manganese	1.499	0.5000	1.978	96	1.939	88	80-120	2	0-20	
Silicon	13.74	0.5000	13.79	4X	13.50	4X	80-120	4X	0-20	Q

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0959-1	Sample	Aqueous	GC/MS L	09/19/17	09/19/17 10:42	170919S035
17-09-0959-1	Matrix Spike	Aqueous	GC/MS L	09/19/17	09/19/17 12:14	170919S035
17-09-0959-1	Matrix Spike Duplicate	Aqueous	GC/MS L	09/19/17	09/19/17 12:45	170919S035

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	9.521	95	10.08	101	75-125	6	0-20	
1,3-Dichloropropane	ND	10.00	9.369	94	9.883	99	75-125	5	0-20	
Allyl Chloride	ND	10.00	8.878	89	10.79	108	80-120	19	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

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595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-0976-18	Sample	Aqueous	GC/MS L	09/19/17	09/19/17 23:32	170919S036
17-09-0976-18	Matrix Spike	Aqueous	GC/MS L	09/19/17	09/20/17 00:02	170919S036
17-09-0976-18	Matrix Spike Duplicate	Aqueous	GC/MS L	09/19/17	09/20/17 00:33	170919S036

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	8.875	89	8.969	90	75-125	1	0-20	
1,3-Dichloropropane	ND	10.00	9.051	91	9.171	92	75-125	1	0-20	
Allyl Chloride	ND	10.00	9.283	93	9.125	91	80-120	2	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

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San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1451-10	Sample	Aqueous	GC/MS M	09/25/17	09/25/17 13:44	170925S012
17-09-1451-10	Matrix Spike	Aqueous	GC/MS M	09/25/17	09/25/17 15:13	170925S012
17-09-1451-10	Matrix Spike Duplicate	Aqueous	GC/MS M	09/25/17	09/25/17 15:42	170925S012

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.08910	0.005000	0.1007	232	0.09550	128	70-130	5	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-86	LCS	Aqueous	GC 52	N/A	09/15/17 10:28	170915L01			
099-14-325-86	LCSD	Aqueous	GC 52	N/A	09/15/17 10:50	170915L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	98.32	95	91.91	89	80-120	7	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-89	LCS	Aqueous	GC 52	N/A	09/16/17 09:43	170916L01			
099-14-325-89	LCSD	Aqueous	GC 52	N/A	09/16/17 10:09	170916L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	98.79	96	100.1	97	80-120	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-906-7913	LCS	Aqueous	IC 15	N/A	09/14/17 16:54	170914L01
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Chloride		50.00	50.50	101	90-110	
Nitrite (as N)		2.500	2.479	99	90-110	
Nitrate (as N)		5.000	4.996	100	90-110	
Sulfate		50.00	51.13	102	90-110	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants 595 Market Street, Suite 610 San Francisco, CA 94105-2811	Date Received: 09/13/17 Work Order: 17-09-0989 Preparation: N/A Method: EPA 300.0
Project: WR2274 / ESTCP Pendleton	Page 4 of 10

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-906-7914	LCS	Aqueous	IC 15	N/A	09/15/17 22:47	170915L02
099-12-906-7914	LCSD	Aqueous	IC 15	N/A	09/15/17 23:06	170915L02

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	50.00	49.44	99	49.50	99	90-110	0	0-15	
Sulfate	50.00	51.00	102	50.96	102	90-110	0	0-15	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
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Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-636	LCS	Aqueous	ICP 7300	09/16/17	09/19/17 12:34	170916LA2F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5547	111	85-115	
Calcium		0.5000	0.5367	107	85-115	
Iron		0.5000	0.5133	103	85-115	
Manganese		0.5000	0.5280	106	85-115	
Silicon		0.5000	0.5129	103	85-115	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-16-446-244	LCS	Aqueous	GC/MS L	09/16/17	09/16/17 22:30	170916L018			
099-16-446-244	LCSD	Aqueous	GC/MS L	09/16/17	09/16/17 23:01	170916L018			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	10.00	9.332	93	9.107	91	74-122	2	0-23	
1,3-Dichloropropane	10.00	9.344	93	9.238	92	74-128	1	0-24	
Allyl Chloride	10.00	8.299	83	7.695	77	70-130	8	0-20	



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
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Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-246	LCS	Aqueous	GC/MS L	09/19/17	09/19/17 09:20	170919L002
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	10.10	101	74-122	
1,3-Dichloropropane		10.00	9.686	97	74-128	
Allyl Chloride		10.00	9.687	97	70-130	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-247	LCS	Aqueous	GC/MS L	09/19/17	09/19/17 22:00	170919L036
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	9.798	98	74-122	
1,3-Dichloropropane		10.00	9.762	98	74-128	
Allyl Chloride		10.00	9.447	94	70-130	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/17
Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1367	LCS	Aqueous	GC/MS M	09/21/17	09/21/17 15:56	170921L064			
099-10-022-1367	LCSD	Aqueous	GC/MS M	09/21/17	09/21/17 16:26	170921L064			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004900	98	0.005700	114	80-120	15	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

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Work Order: 17-09-0989
Preparation: EPA 5030C
Method: SRL 524M-TCP

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1368	LCS	Aqueous	GC/MS M	09/25/17	09/25/17 10:39	170925L030			
099-10-022-1368	LCSD	Aqueous	GC/MS M	09/25/17	09/25/17 11:44	170925L030			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005100	102	0.004600	92	80-120	10	0-20	

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 17-09-0989

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	1027	IC 15	1
EPA 8260B	EPA 5030C	316	GC/MS L	2
RSK-175M	N/A	460	GC 52	2
RSK-175M	N/A	1078	GC 52	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 17-09-0989

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

17-09-0989



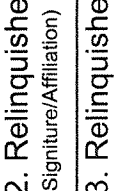
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Project Name ESTP Camp Pendleton	Project Number UR2274	Required Analyses			
Samplers Names B. Reichert	Project Contact La. Kane	VOCs by 8260 B (select)	SVOCs by 8270	TD by SRS274M -TD	EPA 200.7 (Lab Filter)
Laboratory Name CalS&P Inc	Lab Contact S. Movak	Metals	Bottle Type and Volume/Preservative	TPH 300.0	EPA 200.7
Lab Address	Lab Phone	VOCs	Metals	VOCs	EPA 200.7
	Carrier/Waybill No.	Metals	Bottle Type and Volume/Preservative	VOCs	EPA 200.7

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Number of Containers				Comments	Lab Use Only	Condition of Bottles
				Metals	VOCs	TPH	TD			
CP22-DUP2-091317	9/13/17	1100	Water	3	3	3	3		1	
CP22-DUP3-091317		1200		3	3	3	3		2	
CP22-DUP4-091317		1400		3	3	3	3		3	
TB-091317		-		2	2				4	
FB-091317		1130		2	2				5	
CP22-DUP1-091317										
CP22-HP12-39-41		0740		3	3	3	3		6	
CP22-HP11-35-37		0830		3	3	3	3		7	
CP22-HP11-39-41		0910		3	3	3	3		8	
CP22-HP11-43-45		1000		3	3	3	3		9	
CP22-HP08-35-37		1045		3	3	3	3		10	
CP22-HP08-39-41		1245		3	3	3	3		11	

Special Instructions: Some analyses as 9/11/17 samples. Email results to Lkane@geosyntec.com & brockwell@geosyntec.com

1. Relinquished by 	Date	Time	Date	Time
(Signature/Affiliation)	9/13/17	1645	9/13/17	1645
2. Relinquished by 	Date	Time	Date	Time
(Signature/Affiliation)	09/13/17	1830	09/13/17	1830
3. Relinquished by 	Date	Time	Date	Time
(Signature/Affiliation)				

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/13/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.1 °C (w/ CF): 3.3 °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter Checked by: 671

CUSTODY SEAL:
 Cooler Present and Intact Present but Not Intact Not Present N/A Checked by: 671
 Sample(s) Present and Intact Present but Not Intact Not Present N/A Checked by: 1050

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

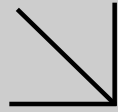
CONTAINER TYPE: 9 (Trip Blank Lot Number: 170830C)
 Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{na} (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
 Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
 Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____
 Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag
 Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 1050
 s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, z_{na} = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 1050



Calscience

Supplemental Report 1

The original report has been revised/corrected.



WORK ORDER NUMBER: 17-09-1116

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: WR2274 / ESTCP Pendleton

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 10/02/2017 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/14/17. They were assigned to Work Order 17-09-1116.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 17-09-1116
595 Market Street, Suite 610	Project Name: WR2274 / ESTCP Pendleton
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/14/17 19:05
	Number of Containers: 78

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
EB4-091417	17-09-1116-1	09/14/17 10:45	8	Aqueous
TB-091417	17-09-1116-2	09/14/17 00:00	2	Aqueous
FB3-091417	17-09-1116-3	09/14/17 08:20	2	Aqueous
FB4-091417	17-09-1116-4	09/14/17 10:00	2	Aqueous
CP22-HP03-35-37	17-09-1116-5	09/14/17 07:40	14	Aqueous
CP22-HP03-39-41	17-09-1116-6	09/14/17 07:20	13	Aqueous
CP22-HP03-43-45	17-09-1116-7	09/14/17 08:10	11	Aqueous
CP22-HP01-35-37	17-09-1116-8	09/14/17 09:00	11	Aqueous
CP22-HP01-39-41	17-09-1116-9	09/14/17 09:45	11	Aqueous
CP22-IDW-091417	17-09-1116-10	09/14/17 10:30	4	Aqueous



Calscience

Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 17-09-1116
 Project Name: WR2274 / ESTCP Pendleton
 Received: 09/14/17

Attn: Lea Kane

Page 1 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
EB4-091417 (17-09-1116-1)						
Zinc	0.0149		0.0100	mg/L	EPA 200.7	Filtered
CP22-HP03-35-37 (17-09-1116-5)						
Zinc	0.0520		0.0100	mg/L	EPA 200.7	Filtered
Calcium	41.2		0.100	mg/L	EPA 200.7	Filtered
Iron	0.594		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.368		0.00500	mg/L	EPA 200.7	Filtered
Silicon	8.90		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	85		1.0	mg/L	EPA 300.0	N/A
Propene	1.63		1.00	ug/L	RSK-175M	N/A
CP22-HP03-39-41 (17-09-1116-6)						
Zinc	0.0101		0.0100	mg/L	EPA 200.7	Filtered
Calcium	58.2		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.518		0.00500	mg/L	EPA 200.7	Filtered
Silicon	4.20		0.0500	mg/L	EPA 200.7	Filtered
Chloride	180		2.0	mg/L	EPA 300.0	N/A
Sulfate	65		1.0	mg/L	EPA 300.0	N/A
Propene	13.6		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.041		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP03-43-45 (17-09-1116-7)						
Zinc	0.0333		0.0100	mg/L	EPA 200.7	Filtered
Calcium	78.4		0.100	mg/L	EPA 200.7	Filtered
Iron	0.169		0.100	mg/L	EPA 200.7	Filtered
Manganese	1.50		0.00500	mg/L	EPA 200.7	Filtered
Silicon	12.6		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	95		2.0	mg/L	EPA 300.0	N/A
CP22-HP01-35-37 (17-09-1116-8)						
Calcium	69.4		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.739		0.00500	mg/L	EPA 200.7	Filtered
Silicon	14.4		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	93		1.0	mg/L	EPA 300.0	N/A

* MDL is shown



Calscience

Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 17-09-1116
 Project Name: WR2274 / ESTCP Pendleton
 Received: 09/14/17

Attn: Lea Kane

Page 2 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP01-39-41 (17-09-1116-9)						
Zinc	0.0275		0.0100	mg/L	EPA 200.7	Filtered
Calcium	74.3		0.100	mg/L	EPA 200.7	Filtered
Iron	0.141		0.100	mg/L	EPA 200.7	Filtered
Manganese	0.867		0.00500	mg/L	EPA 200.7	Filtered
Silicon	9.14		0.0500	mg/L	EPA 200.7	Filtered
Chloride	170		2.0	mg/L	EPA 300.0	N/A
Sulfate	99		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.054		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-IDW-091417 (17-09-1116-10)						
Barium	0.0797		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Copper	0.0240		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Molybdenum	0.0122		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Vanadium	0.0121		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Zinc	0.0715		0.0100	mg/L	EPA 6010B	EPA 3010A Total

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB4-091417	17-09-1116-1-E	09/14/17 10:45	Aqueous	GC 52	N/A	09/18/17 20:35	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP03-35-37	17-09-1116-5-E	09/14/17 07:40	Aqueous	GC 52	N/A	09/18/17 21:01	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.63	1.00		1.00		
CP22-HP03-39-41	17-09-1116-6-L	09/14/17 07:20	Aqueous	GC 52	N/A	09/18/17 21:28	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		13.6	1.00		1.00		
CP22-HP03-43-45	17-09-1116-7-H	09/14/17 08:10	Aqueous	GC 52	N/A	09/19/17 11:45	170919L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP01-35-37	17-09-1116-8-H	09/14/17 09:00	Aqueous	GC 52	N/A	09/19/17 12:24	170919L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP01-39-41	17-09-1116-9-H	09/14/17 09:45	Aqueous	GC 52	N/A	09/19/17 12:56	170919L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-92	N/A	Aqueous	GC 52	N/A	09/18/17 12:33	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-90	N/A	Aqueous	GC 52	N/A	09/19/17 10:45	170919L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB4-091417	17-09-1116-1-G	09/14/17 10:45	Aqueous	IC 9	N/A	09/15/17 14:39	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		ND	1.0		1.00		
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		ND	1.0		1.00		
CP22-HP03-35-37	17-09-1116-5-M	09/14/17 07:40	Aqueous	IC 9	N/A	09/15/17 14:57	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		85	1.0		1.00		
CP22-HP03-35-37	17-09-1116-5-M	09/14/17 07:40	Aqueous	IC 9	N/A	09/15/17 19:03	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
CP22-HP03-39-41	17-09-1116-6-M	09/14/17 07:20	Aqueous	IC 9	N/A	09/18/17 12:01	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		BU
Nitrate (as N)		ND	0.10		1.00		BU
Sulfate		65	1.0		1.00		
CP22-HP03-39-41	17-09-1116-6-M	09/14/17 07:20	Aqueous	IC 9	N/A	09/18/17 16:50	170918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		180	2.0		2.00		
CP22-HP03-43-45	17-09-1116-7-J	09/14/17 08:10	Aqueous	IC 9	N/A	09/15/17 15:16	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: N/A
 Method: EPA 300.0
 Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP03-43-45	17-09-1116-7-J	09/14/17 08:10	Aqueous	IC 9	N/A	09/15/17 19:22	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
Sulfate		95	2.0		2.00		
CP22-HP01-35-37	17-09-1116-8-J	09/14/17 09:00	Aqueous	IC 9	N/A	09/15/17 15:35	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		93	1.0		1.00		
CP22-HP01-35-37	17-09-1116-8-J	09/14/17 09:00	Aqueous	IC 9	N/A	09/15/17 19:41	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
CP22-HP01-39-41	17-09-1116-9-J	09/14/17 09:45	Aqueous	IC 9	N/A	09/15/17 15:54	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		99	1.0		1.00		
CP22-HP01-39-41	17-09-1116-9-J	09/14/17 09:45	Aqueous	IC 9	N/A	09/15/17 20:00	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		170	2.0		2.00		
Method Blank	099-12-906-7917	N/A	Aqueous	IC 9	N/A	09/15/17 11:35	170915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Chloride		ND	1.0		1.00		
Nitrite (as N)		ND	0.10		1.00		
Nitrate (as N)		ND	0.10		1.00		
Sulfate		ND	1.0		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-906-7921	N/A	Aqueous	IC 9	N/A	09/18/17 11:14	170918L01

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Chloride	ND	1.0	1.00	
Nitrite (as N)	ND	0.10	1.00	
Nitrate (as N)	ND	0.10	1.00	
Sulfate	ND	1.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 3510C
Method: EPA 8015B (M)
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-IDW-091417	17-09-1116-10-D	09/14/17 10:30	Aqueous	GC 48	09/19/17	09/19/17 16:06	170919B05

Parameter	Result	RL	DF	Qualifiers
C6	ND	91	1.00	
C7	ND	91	1.00	
C8	ND	91	1.00	
C9-C10	ND	91	1.00	
C11-C12	ND	91	1.00	
C13-C14	ND	91	1.00	
C15-C16	ND	91	1.00	
C17-C18	ND	91	1.00	
C19-C20	ND	91	1.00	
C21-C22	ND	91	1.00	
C23-C24	ND	91	1.00	
C25-C28	ND	91	1.00	
C29-C32	ND	91	1.00	
C33-C36	ND	91	1.00	
C37-C40	ND	91	1.00	
C41-C44	ND	91	1.00	
C6-C44 Total	ND	91	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	93	68-140	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 3510C
 Method: EPA 8015B (M)
 Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-498-536	N/A	Aqueous	GC 48	09/19/17	09/19/17 12:58	170919B05

Parameter	Result	RL	DF	Qualifiers
C6	ND	100	1.00	
C7	ND	100	1.00	
C8	ND	100	1.00	
C9-C10	ND	100	1.00	
C11-C12	ND	100	1.00	
C13-C14	ND	100	1.00	
C15-C16	ND	100	1.00	
C17-C18	ND	100	1.00	
C19-C20	ND	100	1.00	
C21-C22	ND	100	1.00	
C23-C24	ND	100	1.00	
C25-C28	ND	100	1.00	
C29-C32	ND	100	1.00	
C33-C36	ND	100	1.00	
C37-C40	ND	100	1.00	
C41-C44	ND	100	1.00	
C6-C44 Total	ND	100	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	112	68-140	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB4-091417	17-09-1116-1-H	09/14/17 10:45	Aqueous	ICP 7300	09/19/17	09/20/17 14:39	170919LA8F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0149		0.0100		1.00	
Calcium		ND		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		ND		0.00500		1.00	
Silicon		ND		0.0500		1.00	
CP22-HP03-35-37	17-09-1116-5-N	09/14/17 07:40	Aqueous	ICP 7300	09/19/17	09/20/17 14:40	170919LA8F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0520		0.0100		1.00	
Calcium		41.2		0.100		1.00	
Iron		0.594		0.100		1.00	
Manganese		0.368		0.00500		1.00	
Silicon		8.90		0.0500		1.00	
CP22-HP03-39-41	17-09-1116-6-M	09/14/17 07:20	Aqueous	ICP 7300	09/19/17	09/20/17 14:41	170919LA8F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0101		0.0100		1.00	
Calcium		58.2		0.100		1.00	
Iron		ND		0.100		1.00	
Manganese		0.518		0.00500		1.00	
Silicon		4.20		0.0500		1.00	
CP22-HP03-43-45	17-09-1116-7-K	09/14/17 08:10	Aqueous	ICP 7300	09/19/17	09/20/17 14:42	170919LA8F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		0.0333		0.0100		1.00	
Calcium		78.4		0.100		1.00	
Iron		0.169		0.100		1.00	
Manganese		1.50		0.00500		1.00	
Silicon		12.6		0.0500		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP01-35-37	17-09-1116-8-K	09/14/17 09:00	Aqueous	ICP 7300	09/19/17	09/20/17 14:43	170919LA8F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	69.4	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	0.739	0.00500	1.00	
Silicon	14.4	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP01-39-41	17-09-1116-9-K	09/14/17 09:45	Aqueous	ICP 7300	09/19/17	09/20/17 14:44	170919LA8F

Parameter	Result	RL	DF	Qualifiers
Zinc	0.0275	0.0100	1.00	
Calcium	74.3	0.100	1.00	
Iron	0.141	0.100	1.00	
Manganese	0.867	0.00500	1.00	
Silicon	9.14	0.0500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-304-639	N/A	Aqueous	ICP 7300	09/19/17	09/20/17 12:50	170919LA8F

Parameter	Result	RL	DF	Qualifiers
Zinc	ND	0.0100	1.00	
Calcium	ND	0.100	1.00	
Iron	ND	0.100	1.00	
Manganese	ND	0.00500	1.00	
Silicon	ND	0.0500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-IDW-091417	17-09-1116-10-C	09/14/17 10:30	Aqueous	ICP 7300	09/19/17	09/20/17 14:46	170919LA5

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	ND	0.0100	1.00	
Barium	0.0797	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	ND	0.0100	1.00	
Cobalt	ND	0.0100	1.00	
Copper	0.0240	0.0100	1.00	
Lead	ND	0.0100	1.00	
Molybdenum	0.0122	0.0100	1.00	
Nickel	ND	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	ND	0.0150	1.00	
Vanadium	0.0121	0.0100	1.00	
Zinc	0.0715	0.0100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 3010A Total
 Method: EPA 6010B
 Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-003-16615	N/A	Aqueous	ICP 7300	09/19/17	09/20/17 12:41	170919LA5

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	ND	0.0100	1.00	
Barium	ND	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	ND	0.0100	1.00	
Cobalt	ND	0.0100	1.00	
Copper	ND	0.0100	1.00	
Lead	ND	0.0100	1.00	
Molybdenum	ND	0.0100	1.00	
Nickel	ND	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	ND	0.0150	1.00	
Vanadium	ND	0.0100	1.00	
Zinc	ND	0.0100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 7470A Total
Method: EPA 7470A
Units: mg/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-IDW-091417	17-09-1116-10-C	09/14/17 10:30	Aqueous	Mercury 07	09/20/17	09/21/17 15:00	170920LA3

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	

Method Blank	099-04-008-8335	N/A	Aqueous	Mercury 07	09/20/17	09/21/17 11:13	170920LA3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB4-091417	17-09-1116-1-A	09/14/17 10:45	Aqueous	GC/MS UU	09/19/17	09/20/17 00:54	170919L058

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	94	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
TB-091417	17-09-1116-2-A	09/14/17 00:00	Aqueous	GC/MS UU	09/19/17	09/20/17 01:24	170919L058

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	98	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
FB3-091417	17-09-1116-3-A	09/14/17 08:20	Aqueous	GC/MS UU	09/19/17	09/20/17 01:54	170919L058

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	93	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
FB4-091417	17-09-1116-4-A	09/14/17 10:00	Aqueous	GC/MS UU	09/19/17	09/20/17 02:24	170919L058

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	105	80-127	
1,2-Dichloroethane-d4	106	80-128	
Toluene-d8	98	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP03-35-37	17-09-1116-5-A	09/14/17 07:40	Aqueous	GC/MS UU	09/19/17	09/20/17 03:24	170919L058

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	93	68-120	
Dibromofluoromethane	93	80-127	
1,2-Dichloroethane-d4	110	80-128	
Toluene-d8	98	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP03-39-41	17-09-1116-6-F	09/14/17 07:20	Aqueous	GC/MS UU	09/20/17	09/20/17 21:05	170920L052

Parameter	Result	RL	DF	Qualifiers
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	99	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	98	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP03-43-45	17-09-1116-7-A	09/14/17 08:10	Aqueous	GC/MS UU	09/19/17	09/20/17 02:54	170919L058
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane		ND		0.50		1.00	
1,3-Dichloropropane		ND		1.0		1.00	
Allyl Chloride		ND		1.0		1.00	
<u>Surrogate</u>		<u>Rec. (%)</u>		<u>Control Limits</u>		<u>Qualifiers</u>	
1,4-Bromofluorobenzene		91		68-120			
Dibromofluoromethane		99		80-127			
1,2-Dichloroethane-d4		108		80-128			
Toluene-d8		99		80-120			
CP22-HP01-35-37	17-09-1116-8-B	09/14/17 09:00	Aqueous	GC/MS UU	09/20/17	09/20/17 20:35	170920L052
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane		ND		0.50		1.00	
1,3-Dichloropropane		ND		1.0		1.00	
Allyl Chloride		ND		1.0		1.00	
<u>Surrogate</u>		<u>Rec. (%)</u>		<u>Control Limits</u>		<u>Qualifiers</u>	
1,4-Bromofluorobenzene		90		68-120			
Dibromofluoromethane		95		80-127			
1,2-Dichloroethane-d4		112		80-128			
Toluene-d8		99		80-120			
CP22-HP01-39-41	17-09-1116-9-D	09/14/17 09:45	Aqueous	GC/MS UU	09/19/17	09/20/17 03:54	170919L058
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane		ND		0.50		1.00	
1,3-Dichloropropane		ND		1.0		1.00	
Allyl Chloride		ND		1.0		1.00	
<u>Surrogate</u>		<u>Rec. (%)</u>		<u>Control Limits</u>		<u>Qualifiers</u>	
1,4-Bromofluorobenzene		94		68-120			
Dibromofluoromethane		98		80-127			
1,2-Dichloroethane-d4		108		80-128			
Toluene-d8		99		80-120			

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 4 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-248	N/A	Aqueous	GC/MS UU	09/19/17	09/20/17 00:24	170919L058

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	106	80-128	
Toluene-d8	99	80-120	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-250	N/A	Aqueous	GC/MS UU	09/20/17	09/20/17 10:59	170920L052

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	104	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-IDW-091417	17-09-1116-10-A	09/14/17 10:30	Aqueous	GC/MS UU	09/19/17	09/20/17 04:24	170919L058

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	10	1.00	
Benzene	ND	0.50	1.00	
Bromobenzene	ND	0.50	1.00	
Bromochloromethane	ND	1.0	1.00	
Bromodichloromethane	ND	0.50	1.00	
Bromoform	ND	0.50	1.00	
Bromomethane	ND	1.0	1.00	
2-Butanone	ND	5.0	1.00	
n-Butylbenzene	ND	0.50	1.00	
sec-Butylbenzene	ND	0.50	1.00	
tert-Butylbenzene	ND	0.50	1.00	
Carbon Disulfide	ND	1.0	1.00	
Carbon Tetrachloride	ND	0.50	1.00	
Chlorobenzene	ND	0.50	1.00	
Chloroethane	ND	0.50	1.00	
2-Chloroethyl Vinyl Ether	ND	5.0	1.00	
Chloroform	ND	0.50	1.00	
Chloromethane	ND	0.50	1.00	
2-Chlorotoluene	ND	0.50	1.00	
4-Chlorotoluene	ND	0.50	1.00	
Dibromochloromethane	ND	0.50	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	0.50	1.00	
Dibromomethane	ND	0.50	1.00	
1,2-Dichlorobenzene	ND	0.50	1.00	
1,3-Dichlorobenzene	ND	0.50	1.00	
1,4-Dichlorobenzene	ND	0.50	1.00	
Dichlorodifluoromethane	ND	1.0	1.00	
1,1-Dichloroethane	ND	0.50	1.00	
1,2-Dichloroethane	ND	0.50	1.00	
1,1-Dichloroethene	ND	0.50	1.00	
c-1,2-Dichloroethene	ND	0.50	1.00	
t-1,2-Dichloroethene	ND	0.50	1.00	
Acetonitrile	ND	10	1.00	
1,2-Dichloropropane	ND	0.50	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 2 of 6

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Acrolein	ND	20	1.00	
Acrylonitrile	ND	10	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	
1,1-Dichloropropene	ND	0.50	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	0.50	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	0.50	1.00	
p-Isopropyltoluene	ND	0.50	1.00	
Methylene Chloride	ND	1.0	1.00	
4-Methyl-2-Pentanone	ND	5.0	1.00	
Naphthalene	ND	1.0	1.00	
n-Propylbenzene	ND	0.50	1.00	
Styrene	ND	0.50	1.00	
Chloroprene	ND	0.50	1.00	
1,1,1,2-Tetrachloroethane	ND	0.50	1.00	
1,1,1,2,2-Tetrachloroethane	ND	0.50	1.00	
Tetrachloroethene	ND	0.50	1.00	
Toluene	ND	0.50	1.00	
1,2,3-Trichlorobenzene	ND	0.50	1.00	
Ethyl Methacrylate	ND	5.0	1.00	
1,2,4-Trichlorobenzene	ND	0.50	1.00	
1,1,1-Trichloroethane	ND	0.50	1.00	
Hexachloro-1,3-Butadiene	ND	2.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.50	1.00	
1,1,2-Trichloroethane	ND	0.50	1.00	
Iodomethane	ND	10	1.00	
Trichloroethene	ND	0.50	1.00	
Trichlorofluoromethane	ND	0.50	1.00	
Isobutyl Alcohol	ND	10	1.00	
1,2,3-Trichloropropane	ND	1.0	1.00	
1,2,4-Trimethylbenzene	ND	0.50	1.00	
Methacrylonitrile	ND	10	1.00	
Methyl Methacrylate	ND	5.0	1.00	
1,3,5-Trimethylbenzene	ND	0.50	1.00	
Vinyl Acetate	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 5030C
 Method: EPA 8260B
 Units: ug/L

Project: WR2274 / ESTCP Pendleton

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Vinyl Chloride	ND	0.50	1.00	
p/m-Xylene	ND	0.50	1.00	
o-Xylene	ND	0.50	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	0.50	1.00	
t-1,4-Dichloro-2-Butene	ND	5.0	1.00	
Tetrahydrofuran	ND	5.0	1.00	
Propionitrile	ND	10	1.00	
Tert-Butyl Alcohol (TBA)	ND	10	1.00	
Diisopropyl Ether (DIPE)	ND	0.50	1.00	
Ethyl-t-Butyl Ether (ETBE)	ND	0.50	1.00	
Tert-Amyl-Methyl Ether (TAME)	ND	0.50	1.00	
Ethanol	ND	50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	106	80-127	
1,2-Dichloroethane-d4	109	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-248	N/A	Aqueous	GC/MS UU	09/19/17	09/20/17 00:24	170919L058

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	10	1.00	
Benzene	ND	0.50	1.00	
Bromobenzene	ND	0.50	1.00	
Bromochloromethane	ND	1.0	1.00	
Bromodichloromethane	ND	0.50	1.00	
Bromoform	ND	0.50	1.00	
Bromomethane	ND	1.0	1.00	
2-Butanone	ND	5.0	1.00	
n-Butylbenzene	ND	0.50	1.00	
sec-Butylbenzene	ND	0.50	1.00	
tert-Butylbenzene	ND	0.50	1.00	
Carbon Disulfide	ND	1.0	1.00	
Carbon Tetrachloride	ND	0.50	1.00	
Chlorobenzene	ND	0.50	1.00	
Chloroethane	ND	0.50	1.00	
2-Chloroethyl Vinyl Ether	ND	5.0	1.00	
Chloroform	ND	0.50	1.00	
Chloromethane	ND	0.50	1.00	
2-Chlorotoluene	ND	0.50	1.00	
4-Chlorotoluene	ND	0.50	1.00	
Dibromochloromethane	ND	0.50	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	0.50	1.00	
Dibromomethane	ND	0.50	1.00	
1,2-Dichlorobenzene	ND	0.50	1.00	
1,3-Dichlorobenzene	ND	0.50	1.00	
1,4-Dichlorobenzene	ND	0.50	1.00	
Dichlorodifluoromethane	ND	1.0	1.00	
1,1-Dichloroethane	ND	0.50	1.00	
1,2-Dichloroethane	ND	0.50	1.00	
1,1-Dichloroethene	ND	0.50	1.00	
c-1,2-Dichloroethene	ND	0.50	1.00	
t-1,2-Dichloroethene	ND	0.50	1.00	
Acetonitrile	ND	10	1.00	
1,2-Dichloropropane	ND	0.50	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: WR2274 / ESTCP Pendleton

Page 5 of 6

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Acrolein	ND	20	1.00	
Acrylonitrile	ND	10	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	
Allyl Chloride	ND	1.0	1.00	
1,1-Dichloropropene	ND	0.50	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	0.50	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	0.50	1.00	
p-Isopropyltoluene	ND	0.50	1.00	
Methylene Chloride	ND	1.0	1.00	
4-Methyl-2-Pentanone	ND	5.0	1.00	
Naphthalene	ND	1.0	1.00	
n-Propylbenzene	ND	0.50	1.00	
Styrene	ND	0.50	1.00	
Chloroprene	ND	0.50	1.00	
1,1,1,2-Tetrachloroethane	ND	0.50	1.00	
1,1,1,2,2-Tetrachloroethane	ND	0.50	1.00	
Tetrachloroethene	ND	0.50	1.00	
Toluene	ND	0.50	1.00	
1,2,3-Trichlorobenzene	ND	0.50	1.00	
Ethyl Methacrylate	ND	5.0	1.00	
1,2,4-Trichlorobenzene	ND	0.50	1.00	
1,1,1-Trichloroethane	ND	0.50	1.00	
Hexachloro-1,3-Butadiene	ND	2.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.50	1.00	
1,1,2-Trichloroethane	ND	0.50	1.00	
Iodomethane	ND	10	1.00	
Trichloroethene	ND	0.50	1.00	
Trichlorofluoromethane	ND	0.50	1.00	
Isobutyl Alcohol	ND	10	1.00	
1,2,3-Trichloropropane	ND	1.0	1.00	
1,2,4-Trimethylbenzene	ND	0.50	1.00	
Methacrylonitrile	ND	10	1.00	
Methyl Methacrylate	ND	5.0	1.00	
1,3,5-Trimethylbenzene	ND	0.50	1.00	
Vinyl Acetate	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 5030C
 Method: EPA 8260B
 Units: ug/L

Project: WR2274 / ESTCP Pendleton

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Vinyl Chloride	ND	0.50	1.00	
p/m-Xylene	ND	0.50	1.00	
o-Xylene	ND	0.50	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	0.50	1.00	
t-1,4-Dichloro-2-Butene	ND	5.0	1.00	
Tetrahydrofuran	ND	5.0	1.00	
Propionitrile	ND	10	1.00	
Tert-Butyl Alcohol (TBA)	ND	10	1.00	
Diisopropyl Ether (DIPE)	ND	0.50	1.00	
Ethyl-t-Butyl Ether (ETBE)	ND	0.50	1.00	
Tert-Amyl-Methyl Ether (TAME)	ND	0.50	1.00	
Ethanol	ND	50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	92	68-120	
Dibromofluoromethane	103	80-127	
1,2-Dichloroethane-d4	106	80-128	
Toluene-d8	99	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: WR2274 / ESTCP Pendleton

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
EB4-091417	17-09-1116-1-D	09/14/17 10:45	Aqueous	GC/MS M	09/25/17	09/25/17 18:41	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP03-35-37	17-09-1116-5-H	09/14/17 07:40	Aqueous	GC/MS M	09/25/17	09/25/17 19:11	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP03-39-41	17-09-1116-6-J	09/14/17 07:20	Aqueous	GC/MS M	09/26/17	09/26/17 11:49	170926L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.041		0.0050		1.00	
CP22-HP03-43-45	17-09-1116-7-F	09/14/17 08:10	Aqueous	GC/MS M	09/26/17	09/26/17 12:19	170926L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP01-35-37	17-09-1116-8-F	09/14/17 09:00	Aqueous	GC/MS M	09/26/17	09/26/17 12:49	170926L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP01-39-41	17-09-1116-9-F	09/14/17 09:45	Aqueous	GC/MS M	09/26/17	09/26/17 13:18	170926L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.054		0.0050		1.00	
Method Blank	099-10-022-1368	N/A	Aqueous	GC/MS M	09/25/17	09/25/17 12:14	170925L030
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1369	N/A	Aqueous	GC/MS M	09/26/17	09/26/17 11:07	170926L042
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

Page 1 of 8

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
17-09-1105-1	Sample	Aqueous	IC 9	N/A	09/15/17 20:38	170915S01				
17-09-1105-1	Matrix Spike	Aqueous	IC 9	N/A	09/15/17 17:48	170915S01				
17-09-1105-1	Matrix Spike Duplicate	Aqueous	IC 9	N/A	09/15/17 18:07	170915S01				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	4020	50.00	5319	2597	5147	2254	80-120	3	0-20	3
Nitrite (as N)	ND	2.500	34.12	1365	33.33	1333	80-120	2	0-20	3
Nitrate (as N)	ND	5.000	3.520	70	3.440	69	80-120	2	0-20	3
Sulfate	51.03	50.00	132.6	163	130.5	159	80-120	2	0-20	3

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP03-39-41	Sample	Aqueous	IC 9	N/A	09/18/17 16:50	170918S01				
CP22-HP03-39-41	Matrix Spike	Aqueous	IC 9	N/A	09/18/17 12:57	170918S01				
CP22-HP03-39-41	Matrix Spike Duplicate	Aqueous	IC 9	N/A	09/18/17 13:16	170918S01				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	177.2	50.00	249.0	144	255.2	156	80-120	2	0-20	3
Nitrite (as N)	ND	2.500	4.869	195	4.905	196	80-120	1	0-20	3
Nitrate (as N)	ND	5.000	4.552	91	4.652	93	80-120	2	0-20	
Sulfate	65.15	50.00	128.6	127	132.9	135	80-120	3	0-20	3

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: Filtered
Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
CP22-HP03-35-37	Sample	Aqueous	ICP 7300	09/19/17	09/20/17 14:40	170919SA8				
CP22-HP03-35-37	Matrix Spike	Aqueous	ICP 7300	09/19/17	09/20/17 14:37	170919SA8				
CP22-HP03-35-37	Matrix Spike Duplicate	Aqueous	ICP 7300	09/19/17	09/20/17 14:38	170919SA8				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	0.05202	0.5000	0.5604	102	0.6242	114	80-120	11	0-20	
Calcium	41.23	0.5000	39.07	4X	39.48	4X	80-120	4X	0-20	Q
Iron	0.5943	0.5000	0.5236	0	0.5789	0	80-120	10	0-20	3
Manganese	0.3677	0.5000	0.8658	100	0.9011	107	80-120	4	0-20	
Silicon	8.901	0.5000	9.015	4X	9.063	4X	80-120	4X	0-20	Q

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1105-1	Sample	Aqueous	ICP 7300	09/19/17	09/20/17 13:09	170919SA5
17-09-1105-1	Matrix Spike	Aqueous	ICP 7300	09/19/17	09/20/17 13:10	170919SA5
17-09-1105-1	Matrix Spike Duplicate	Aqueous	ICP 7300	09/19/17	09/20/17 13:11	170919SA5

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	0.5000	0.5663	113	0.5528	111	72-132	2	0-10	
Arsenic	ND	0.5000	0.5955	119	0.5706	114	80-140	4	0-11	
Barium	1.200	0.5000	1.676	95	1.637	87	87-123	2	0-6	
Beryllium	ND	0.5000	0.5299	106	0.5159	103	89-119	3	0-8	
Cadmium	ND	0.5000	0.5384	108	0.5252	105	82-124	2	0-7	
Chromium	ND	0.5000	0.5269	105	0.5102	102	86-122	3	0-8	
Cobalt	ND	0.5000	0.5407	108	0.5288	106	83-125	2	0-7	
Copper	ND	0.5000	0.5534	111	0.5386	108	78-126	3	0-7	
Lead	ND	0.5000	0.5238	105	0.5101	102	84-120	3	0-7	
Molybdenum	ND	0.5000	0.5309	106	0.5155	103	78-126	3	0-7	
Nickel	ND	0.5000	0.5175	104	0.5018	100	84-120	3	0-7	
Selenium	ND	0.5000	0.3036	61	0.2779	56	79-127	9	0-9	3
Silver	ND	0.2500	0.2732	109	0.2649	106	86-128	3	0-7	
Thallium	ND	0.5000	0.4914	98	0.4858	97	79-121	1	0-8	
Vanadium	ND	0.5000	0.5235	105	0.5094	102	88-118	3	0-7	
Zinc	0.01431	0.5000	0.6162	120	0.6015	117	89-131	2	0-8	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: WR2274 / ESTCP Pendleton

Page 5 of 8

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1105-1	Sample	Aqueous	Mercury 07	09/20/17	09/21/17 19:50	170920SA3
17-09-1105-1	Matrix Spike	Aqueous	Mercury 07	09/20/17	09/21/17 19:43	170920SA3
17-09-1105-1	Matrix Spike Duplicate	Aqueous	Mercury 07	09/20/17	09/21/17 19:45	170920SA3

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.01000	0.005104	51	0.005523	55	55-133	8	0-20	3

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP03-43-45	Sample	Aqueous	GC/MS UU	09/19/17	09/20/17 02:54	170919S032
CP22-HP03-43-45	Matrix Spike	Aqueous	GC/MS UU	09/19/17	09/19/17 22:54	170919S032
CP22-HP03-43-45	Matrix Spike Duplicate	Aqueous	GC/MS UU	09/19/17	09/19/17 23:24	170919S032

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	10.00	10.78	108	10.27	103	75-125	5	0-20	
1,3-Dichloropropane	ND	10.00	11.14	111	10.85	109	75-125	3	0-20	
Allyl Chloride	ND	10.00	10.63	106	9.720	97	80-120	9	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

Page 1 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP03-43-45	Sample	Aqueous	GC/MS UU	09/19/17	09/20/17 02:54	170919S032
CP22-HP03-43-45	Matrix Spike	Aqueous	GC/MS UU	09/19/17	09/19/17 22:54	170919S032
CP22-HP03-43-45	Matrix Spike Duplicate	Aqueous	GC/MS UU	09/19/17	09/19/17 23:24	170919S032

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	ND	10.00	18.91	189	18.04	180	20-180	5	0-52	3
Benzene	ND	10.00	10.79	108	9.913	99	75-125	8	0-20	
Bromobenzene	ND	10.00	10.67	107	10.20	102	75-125	5	0-20	
Bromochloromethane	ND	10.00	10.59	106	10.00	100	75-128	6	0-20	
Bromodichloromethane	ND	10.00	10.69	107	10.07	101	75-125	6	0-20	
Bromoform	ND	10.00	10.57	106	10.43	104	71-137	1	0-20	
Bromomethane	ND	10.00	11.47	115	11.41	114	37-181	1	0-22	
2-Butanone	ND	10.00	10.14	101	11.26	113	20-180	11	0-40	
n-Butylbenzene	ND	10.00	8.811	88	8.704	87	75-125	1	0-20	
sec-Butylbenzene	ND	10.00	10.30	103	9.874	99	75-129	4	0-20	
tert-Butylbenzene	ND	10.00	10.72	107	10.17	102	75-129	5	0-20	
Carbon Disulfide	ND	10.00	10.91	109	9.729	97	58-136	11	0-20	
Carbon Tetrachloride	ND	10.00	10.50	105	9.562	96	69-135	9	0-20	
Chlorobenzene	ND	10.00	10.68	107	10.02	100	75-125	6	0-20	
Chloroethane	ND	10.00	10.23	102	10.12	101	20-180	1	0-20	
2-Chloroethyl Vinyl Ether	ND	10.00	0	0	0	0	20-120	0	0-40	3
Chloroform	ND	10.00	10.77	108	9.855	99	75-128	9	0-20	
Chloromethane	ND	10.00	10.51	105	10.92	109	41-149	4	0-20	
2-Chlorotoluene	ND	10.00	10.28	103	9.947	99	75-128	3	0-20	
4-Chlorotoluene	ND	10.00	10.35	103	9.749	97	75-125	6	0-20	
Dibromochloromethane	ND	10.00	10.88	109	10.48	105	75-125	4	0-20	
1,2-Dibromo-3-Chloropropane	ND	10.00	10.55	105	10.16	102	75-127	4	0-20	
1,2-Dibromoethane	ND	10.00	10.88	109	10.66	107	75-126	2	0-20	
Dibromomethane	ND	10.00	10.64	106	10.28	103	75-129	3	0-20	
1,2-Dichlorobenzene	ND	10.00	10.53	105	10.16	102	75-125	4	0-20	
1,3-Dichlorobenzene	ND	10.00	10.38	104	9.845	98	75-126	5	0-20	
1,4-Dichlorobenzene	ND	10.00	10.02	100	9.630	96	75-125	4	0-20	
Dichlorodifluoromethane	ND	10.00	8.115	81	8.484	85	28-172	4	0-20	
1,1-Dichloroethane	ND	10.00	11.04	110	10.15	102	68-128	8	0-20	
1,2-Dichloroethane	ND	10.00	10.64	106	10.08	101	75-127	5	0-20	
1,1-Dichloroethene	ND	10.00	10.74	107	9.646	96	66-126	11	0-20	
c-1,2-Dichloroethene	ND	10.00	10.94	109	10.23	102	75-130	7	0-20	
t-1,2-Dichloroethene	ND	10.00	10.82	108	9.920	99	73-133	9	0-20	
Acetonitrile	ND	20.00	21.23	106	19.35	97	80-120	9	0-20	
1,2-Dichloropropane	ND	10.00	10.78	108	10.27	103	75-125	5	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

Page 2 of 3

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acrolein	ND	20.00	24.61	123	26.05	130	80-120	6	0-20	3
Acrylonitrile	ND	10.00	10.31	103	10.82	108	80-120	5	0-20	
1,3-Dichloropropane	ND	10.00	11.14	111	10.85	109	75-125	3	0-20	
2,2-Dichloropropane	ND	10.00	9.057	91	8.131	81	52-160	11	0-20	
Allyl Chloride	ND	10.00	10.63	106	9.720	97	80-120	9	0-20	
1,1-Dichloropropene	ND	10.00	10.77	108	9.679	97	74-134	11	0-20	
c-1,3-Dichloropropene	ND	10.00	10.53	105	9.872	99	75-128	6	0-20	
t-1,3-Dichloropropene	ND	10.00	9.936	99	9.533	95	75-125	4	0-20	
Ethylbenzene	ND	10.00	10.91	109	10.12	101	75-125	8	0-20	
2-Hexanone	ND	10.00	11.13	111	11.43	114	74-122	3	0-20	
Isopropylbenzene	ND	10.00	10.82	108	10.23	102	75-130	6	0-20	
p-Isopropyltoluene	ND	10.00	10.28	103	9.921	99	75-125	4	0-20	
Methylene Chloride	ND	10.00	10.84	108	10.18	102	74-128	6	0-20	
4-Methyl-2-Pentanone	ND	10.00	10.19	102	10.58	106	65-137	4	0-20	
Naphthalene	ND	10.00	9.434	94	9.614	96	75-136	2	0-20	
n-Propylbenzene	ND	10.00	10.78	108	10.28	103	75-129	5	0-20	
Styrene	ND	10.00	10.46	105	10.08	101	28-166	4	0-30	
Chloroprene	ND	10.00	10.53	105	9.530	95	80-120	10	0-20	
1,1,1,2-Tetrachloroethane	ND	10.00	10.93	109	10.57	106	75-127	3	0-20	
1,1,2,2-Tetrachloroethane	ND	10.00	10.51	105	10.56	106	75-132	0	0-20	
Tetrachloroethene	ND	10.00	9.773	98	9.115	91	58-124	7	0-20	
Toluene	ND	10.00	10.80	108	10.03	100	75-125	7	0-20	
1,2,3-Trichlorobenzene	ND	10.00	9.517	95	9.511	95	75-125	0	0-20	
Ethyl Methacrylate	ND	10.00	10.38	104	10.58	106	80-120	2	0-20	
1,2,4-Trichlorobenzene	ND	10.00	9.493	95	9.227	92	75-125	3	0-20	
1,1,1-Trichloroethane	ND	10.00	10.73	107	9.754	98	72-132	10	0-20	
Hexachloro-1,3-Butadiene	ND	10.00	8.597	86	8.906	89	75-129	4	0-20	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	10.00	9.114	91	7.933	79	70-130	14	0-20	
1,1,2-Trichloroethane	ND	10.00	10.81	108	10.47	105	75-125	3	0-20	
Iodomethane	ND	20.00	20.59	103	19.08	95	80-120	8	0-20	
Trichloroethene	ND	10.00	10.44	104	9.723	97	75-125	7	0-20	
Trichlorofluoromethane	ND	10.00	9.370	94	9.356	94	68-134	0	0-20	
Isobutyl Alcohol	ND	20.00	19.16	96	22.25	111	80-120	15	0-20	
1,2,3-Trichloropropane	ND	10.00	9.736	97	9.546	95	75-125	2	0-20	
1,2,4-Trimethylbenzene	ND	10.00	9.338	93	8.874	89	75-125	5	0-20	
Methacrylonitrile	ND	10.00	10.65	107	10.65	106	80-120	0	0-20	
Methyl Methacrylate	ND	10.00	10.69	107	10.48	105	80-120	2	0-20	
1,3,5-Trimethylbenzene	ND	10.00	9.795	98	9.536	95	75-127	3	0-20	
Vinyl Acetate	ND	10.00	8.643	86	8.689	87	65-137	1	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

Page 3 of 3

<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Vinyl Chloride	ND	10.00	10.80	108	10.74	107	52-142	1	0-20	
p/m-Xylene	ND	20.00	21.37	107	20.05	100	75-125	6	0-20	
o-Xylene	ND	10.00	10.87	109	10.28	103	75-127	6	0-20	
Methyl-t-Butyl Ether (MTBE)	ND	10.00	10.85	109	10.57	106	71-131	3	0-20	
t-1,4-Dichloro-2-Butene	ND	10.00	9.399	94	9.227	92	80-120	2	0-20	
Tetrahydrofuran	ND	10.00	11.16	112	10.56	106	75-125	6	0-20	
Propionitrile	ND	10.00	10.57	106	11.11	111	75-125	5	0-20	
Tert-Butyl Alcohol (TBA)	ND	50.00	77.02	154	91.88	184	20-180	18	0-40	3
Diisopropyl Ether (DIPE)	ND	10.00	11.18	112	10.62	106	64-136	5	0-20	
Ethyl-t-Butyl Ether (ETBE)	ND	10.00	10.73	107	10.36	104	73-133	3	0-20	
Tert-Amyl-Methyl Ether (TAME)	ND	10.00	10.71	107	10.48	105	75-125	2	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1302-4	Sample	Aqueous	GC/MS UU	09/20/17	09/20/17 11:37	170920S026
17-09-1302-4	Matrix Spike	Aqueous	GC/MS UU	09/20/17	09/20/17 12:07	170920S026
17-09-1302-4	Matrix Spike Duplicate	Aqueous	GC/MS UU	09/20/17	09/20/17 12:37	170920S026

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2-Dichloropropane	ND	20.00	20.21	101	21.26	106	75-125	5	0-20	
1,3-Dichloropropane	ND	20.00	20.77	104	21.32	107	75-125	3	0-20	
Allyl Chloride	ND	20.00	19.95	100	20.83	104	80-120	4	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-09-1451-10	Sample	Aqueous	GC/MS M	09/25/17	09/25/17 13:44	170925S012
17-09-1451-10	Matrix Spike	Aqueous	GC/MS M	09/25/17	09/25/17 15:13	170925S012
17-09-1451-10	Matrix Spike Duplicate	Aqueous	GC/MS M	09/25/17	09/25/17 15:42	170925S012

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.08910	0.005000	0.1007	232	0.09550	128	70-130	5	0-20	3

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - PDS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
17-09-1105-1	Sample	Aqueous	Mercury 07	09/20/17 00:00	09/21/17 19:50	170920SA3
17-09-1105-1	PDS	Aqueous	Mercury 07	09/20/17 00:00	09/21/17 19:47	170920SA3
<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>PDS Conc.</u>	<u>PDS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury	ND	0.01000	0.005708	57	75-125	5

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-92	LCS	Aqueous	GC 52	N/A	09/18/17 11:40	170918L01			
099-14-325-92	LCSD	Aqueous	GC 52	N/A	09/18/17 12:05	170918L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	90.93	88	88.61	86	80-120	3	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: RSK-175M

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-90	LCS	Aqueous	GC 52	N/A	09/19/17 09:48	170919L02			
099-14-325-90	LCSD	Aqueous	GC 52	N/A	09/19/17 10:15	170919L02			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	101.4	98	101.4	98	80-120	0	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-906-7917	LCS	Aqueous	IC 9	N/A	09/15/17 11:53	170915L01
099-12-906-7917	LCSD	Aqueous	IC 9	N/A	09/15/17 12:12	170915L01

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Chloride	50.00	49.10	98	49.11	98	90-110	0	0-15	
Nitrite (as N)	2.500	2.643	106	2.637	105	90-110	0	0-15	
Nitrate (as N)	5.000	4.779	96	4.753	95	90-110	1	0-15	
Sulfate	50.00	51.16	102	50.81	102	90-110	1	0-15	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: N/A
Method: EPA 300.0

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-906-7921	LCS	Aqueous	IC 9	N/A	09/18/17 11:33	170918L01

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Chloride	50.00	48.56	97	90-110	
Nitrite (as N)	2.500	2.719	109	90-110	
Nitrate (as N)	5.000	4.708	94	90-110	
Sulfate	50.00	50.38	101	90-110	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 3510C
 Method: EPA 8015B (M)

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-498-536	LCS	Aqueous	GC 48	09/19/17	09/19/17 13:18	170919B05
099-15-498-536	LCSD	Aqueous	GC 48	09/19/17	09/19/17 13:39	170919B05

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	4000	4774	119	4538	113	69-123	5	0-30	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: Filtered
 Method: EPA 200.7

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-639	LCS	Aqueous	ICP 7300	09/19/17	09/20/17 12:51	170919LA8F

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc	0.5000	0.5467	109	85-115	
Calcium	0.5000	0.5113	102	85-115	
Iron	0.5000	0.5338	107	85-115	
Manganese	0.5000	0.5268	105	85-115	
Silicon	0.5000	0.5042	101	85-115	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
097-01-003-16615	LCS	Aqueous	ICP 7300	09/19/17	09/20/17 12:42	170919LA5	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		0.5000	0.5170	103	80-120	73-127	
Arsenic		0.5000	0.5072	101	80-120	73-127	
Barium		0.5000	0.5502	110	80-120	73-127	
Beryllium		0.5000	0.5118	102	80-120	73-127	
Cadmium		0.5000	0.5411	108	80-120	73-127	
Chromium		0.5000	0.5537	111	80-120	73-127	
Cobalt		0.5000	0.5721	114	80-120	73-127	
Copper		0.5000	0.5279	106	80-120	73-127	
Lead		0.5000	0.5426	109	80-120	73-127	
Molybdenum		0.5000	0.5249	105	80-120	73-127	
Nickel		0.5000	0.5490	110	80-120	73-127	
Selenium		0.5000	0.4879	98	80-120	73-127	
Silver		0.2500	0.2599	104	80-120	73-127	
Thallium		0.5000	0.5268	105	80-120	73-127	
Vanadium		0.5000	0.5342	107	80-120	73-127	
Zinc		0.5000	0.5506	110	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-04-008-8335	LCS	Aqueous	Mercury 07	09/20/17	09/21/17 11:15	170920LA3
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury		0.01000	0.009561	96	80-120	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-248	LCS	Aqueous	GC/MS UU	09/19/17	09/19/17 22:24	170919L058
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	10.37	104	74-122	
1,3-Dichloropropane		10.00	10.84	108	74-128	
Allyl Chloride		10.00	9.487	95	70-130	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

Page 1 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
099-16-446-248	LCS	Aqueous	GC/MS UU	09/19/17	09/19/17 22:24	170919L058	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Acetone		10.00	9.945	99	51-163	32-182	
Benzene		10.00	10.05	100	77-121	70-128	
Bromobenzene		10.00	10.38	104	78-120	71-127	
Bromochloromethane		10.00	10.19	102	71-135	60-146	
Bromodichloromethane		10.00	10.36	104	72-129	62-138	
Bromoform		10.00	10.41	104	61-140	48-153	
Bromomethane		10.00	10.81	108	63-140	50-153	
2-Butanone		10.00	9.110	91	55-138	41-152	
n-Butylbenzene		10.00	9.013	90	67-127	57-137	
sec-Butylbenzene		10.00	10.04	100	66-122	57-131	
tert-Butylbenzene		10.00	10.01	100	73-120	65-128	
Carbon Disulfide		10.00	9.705	97	27-170	3-194	
Carbon Tetrachloride		10.00	10.10	101	64-135	52-147	
Chlorobenzene		10.00	10.18	102	80-120	73-127	
Chloroethane		10.00	8.868	89	67-131	56-142	
2-Chloroethyl Vinyl Ether		10.00	7.538	75	60-139	47-152	
Chloroform		10.00	10.30	103	75-126	66-134	
Chloromethane		10.00	9.592	96	54-143	39-158	
2-Chlorotoluene		10.00	9.863	99	64-123	54-133	
4-Chlorotoluene		10.00	10.05	101	67-126	57-136	
Dibromochloromethane		10.00	10.78	108	76-132	67-141	
1,2-Dibromo-3-Chloropropane		10.00	9.680	97	65-125	55-135	
1,2-Dibromoethane		10.00	10.70	107	74-130	65-139	
Dibromomethane		10.00	10.37	104	75-127	66-136	
1,2-Dichlorobenzene		10.00	10.36	104	78-120	71-127	
1,3-Dichlorobenzene		10.00	10.16	102	75-120	68-128	
1,4-Dichlorobenzene		10.00	9.872	99	78-120	71-127	
Dichlorodifluoromethane		10.00	9.092	91	25-168	1-192	
1,1-Dichloroethane		10.00	10.57	106	63-144	50-158	
1,2-Dichloroethane		10.00	10.29	103	72-130	62-140	
1,1-Dichloroethene		10.00	9.923	99	66-130	55-141	
c-1,2-Dichloroethene		10.00	10.23	102	76-123	68-131	
t-1,2-Dichloroethene		10.00	10.08	101	67-129	57-139	
Acetonitrile		20.00	19.21	96	70-130	60-140	
1,2-Dichloropropane		10.00	10.37	104	74-122	66-130	
Acrolein		20.00	27.66	138	70-130	60-140	ME
Acrylonitrile		10.00	9.987	100	65-149	51-163	
1,3-Dichloropropane		10.00	10.84	108	74-128	65-137	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
2,2-Dichloropropane	10.00	8.239	82	68-125	58-134	
Allyl Chloride	10.00	9.487	95	70-130	60-140	
1,1-Dichloropropene	10.00	9.970	100	68-119	60-128	
c-1,3-Dichloropropene	10.00	10.03	100	76-126	68-134	
t-1,3-Dichloropropene	10.00	9.591	96	71-127	62-136	
Ethylbenzene	10.00	10.20	102	78-120	71-127	
2-Hexanone	10.00	10.40	104	61-137	48-150	
Isopropylbenzene	10.00	10.15	102	71-123	62-132	
p-Isopropyltoluene	10.00	9.910	99	68-122	59-131	
Methylene Chloride	10.00	10.15	102	71-129	61-139	
4-Methyl-2-Pentanone	10.00	9.474	95	60-136	47-149	
Naphthalene	10.00	10.42	104	55-159	38-176	
n-Propylbenzene	10.00	10.29	103	64-125	54-135	
Styrene	10.00	10.48	105	77-120	70-127	
Chloroprene	10.00	10.09	101	70-130	60-140	
1,1,1,2-Tetrachloroethane	10.00	10.51	105	79-123	72-130	
1,1,2,2-Tetrachloroethane	10.00	10.15	101	67-132	56-143	
Tetrachloroethene	10.00	11.44	114	72-119	64-127	
Toluene	10.00	10.11	101	78-120	71-127	
1,2,3-Trichlorobenzene	10.00	10.51	105	70-129	60-139	
Ethyl Methacrylate	10.00	9.923	99	70-130	60-140	
1,2,4-Trichlorobenzene	10.00	10.16	102	71-128	62-138	
1,1,1-Trichloroethane	10.00	9.951	100	66-130	55-141	
Hexachloro-1,3-Butadiene	10.00	9.549	95	52-128	39-141	
1,1,2-Trichloro-1,2,2-Trifluoroethane	10.00	9.889	99	52-145	36-160	
1,1,2-Trichloroethane	10.00	10.73	107	77-124	69-132	
Iodomethane	20.00	18.75	94	70-130	60-140	
Trichloroethene	10.00	9.820	98	75-116	68-123	
Trichlorofluoromethane	10.00	9.335	93	62-146	48-160	
Isobutyl Alcohol	20.00	17.36	87	70-130	60-140	
1,2,3-Trichloropropane	10.00	9.272	93	80-120	73-127	
1,2,4-Trimethylbenzene	10.00	9.066	91	70-127	60-136	
Methacrylonitrile	10.00	10.28	103	70-130	60-140	
Methyl Methacrylate	10.00	9.991	100	70-130	60-140	
1,3,5-Trimethylbenzene	10.00	9.505	95	72-124	63-133	
Vinyl Acetate	10.00	8.810	88	45-164	25-184	
Vinyl Chloride	10.00	9.626	96	60-141	46-154	
p/m-Xylene	20.00	20.25	101	74-122	66-130	
o-Xylene	10.00	10.27	103	74-122	66-130	
Methyl-t-Butyl Ether (MTBE)	10.00	10.31	103	57-144	42-158	

RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/14/17
 Work Order: 17-09-1116
 Preparation: EPA 5030C
 Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
t-1,4-Dichloro-2-Butene	10.00	8.482	85	70-130	60-140	
Tetrahydrofuran	10.00	10.27	103	70-130	60-140	
Propionitrile	10.00	9.400	94	70-130	60-140	
Tert-Butyl Alcohol (TBA)	50.00	56.86	114	43-170	22-191	
Diisopropyl Ether (DIPE)	10.00	10.58	106	70-130	60-140	
Ethyl-t-Butyl Ether (ETBE)	10.00	10.13	101	70-130	60-140	
Tert-Amyl-Methyl Ether (TAME)	10.00	10.19	102	70-130	60-140	

Total number of LCS compounds: 85

Total number of ME compounds: 1

Total number of ME compounds allowed: 4

LCS ME CL validation result: Pass



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: EPA 8260B

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-446-250	LCS	Aqueous	GC/MS UU	09/20/17	09/20/17 09:59	170920L052
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2-Dichloropropane		10.00	9.958	100	74-122	
1,3-Dichloropropane		10.00	9.987	100	74-128	
Allyl Chloride		10.00	9.780	98	70-130	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1368	LCS	Aqueous	GC/MS M	09/25/17	09/25/17 10:39	170925L030			
099-10-022-1368	LCSD	Aqueous	GC/MS M	09/25/17	09/25/17 11:44	170925L030			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005100	102	0.004600	92	80-120	10	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/14/17
Work Order: 17-09-1116
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: WR2274 / ESTCP Pendleton

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1369	LCS	Aqueous	GC/MS M	09/26/17	09/26/17 09:55	170926L042			
099-10-022-1369	LCSD	Aqueous	GC/MS M	09/26/17	09/26/17 10:25	170926L042			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005000	100	0.004300	86	80-120	15	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Sample Analysis Summary Report

Work Order: 17-09-1116

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	834	IC 9	1
EPA 6010B	EPA 3010A Total	935	ICP 7300	1
EPA 7470A	EPA 7470A Total	868	Mercury 07	1
EPA 8015B (M)	EPA 3510C	972	GC 48	1
EPA 8260B	EPA 5030C	996	GC/MS UU	2
RSK-175M	N/A	460	GC 52	2
RSK-175M	N/A	1078	GC 52	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Location 2: 7445 Lampson Avenue, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 17-09-1116

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

Project Name ESTP Camp Penetration	Project Number WR2274	Required Analyses											
Samplers Names B. Beckwith	Project Contact Lea Kane	Metals VOCs by 8260 (SWT)	SVOCs by 8270	TCP by SLE 524-TCF	Paper by BSC-175A	EPA 200.7 (Lab Filter)	DT 300.0	MS by 4260B (Full 197)	CAM Metals *	TPH			
Laboratory Name CalSci.com	Lab Contact S. Nowalk	Bottle Type and Volume/Preservative										Lab Use Only	
Lab Address	Lab Phone	Number of Containers										Condition of Bottles	
Carrier/Waybill No.	Sample Type	Comments											
	Date Time	Turn-around Time:											
		Normal <input type="checkbox"/> Rush:											

Page 1 of 1
17-09-1116
 White copy: to accompany samples
 Yellow copy: field copy

Special Instructions: Same Analyses as 9/11/17 Samples.
 Email results to Lea.Kane@geosyntec.com & beckwith@geosyntec.com

1. Relinquished by (Signature/Affiliation)	Date Time	1. Received by (Signature/Affiliation)	Date Time
2. Relinquished by (Signature/Affiliation)	Date Time	2. Received by (Signature/Affiliation)	Date Time
3. Relinquished by (Signature/Affiliation)	Date Time	3. Received by (Signature/Affiliation)	Date Time

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/14/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.1 °C (w/ CF): 3.3 °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A Checked by: 671
 Sample(s) Present and Intact Present but Not Intact Not Present N/A Checked by: 1050

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (Trip Blank Lot Number: 170830C)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB 125PB_z (pH_9)
 250AGB 250CGB 250CGBs (pH_2) 250PB 250PB_n (pH_2) 500AGB 500AGJ 500AGJs (pH_2) 500PB
 1AGB 1AGB_{na2} 1AGBs (pH_2) 1AGBs (O&G) 1PB 1PB_{na} (pH_12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, Labeled/Checked by: 1050
s = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z** = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 671

SAMPLE ANOMALY REPORT

DATE: 09/14/2017

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
 - Sample(s) received but NOT LISTED on COC
 - Holding time expired (list client or ECI sample ID and analysis)
 - Insufficient sample amount for requested analysis (list analysis)
 - Improper container(s) used (list analysis)
 - Improper preservative used (list analysis)
 - pH outside acceptable range (list analysis)
 - No preservative noted on COC or label (list analysis and notify lab)
 - Sample container(s) not labeled
 - Client sample label(s) illegible (list container type and analysis)
 - Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
 - Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
 - Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)
- * Transferred at client's request.

Comments

(-6) Received 13 containers
but 20 containers listed
on COC.
Missing (-6 VOA vials for 8260B
9/14/17) -1 125PB for EPA 300.0
not received.

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**
5	D, J-L	12			
6	F-L	12			
9	B, C, I	9			

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

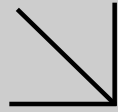
Reported by: 1050

Reviewed by: 617

** Record the total number of containers (i.e., vials or bottles) for the affected sample.



Calscience



WORK ORDER NUMBER: 18-01-1215

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 02/01/2018 by:
Stephen Nowak
Project Manager

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 Work Order Number: 18-01-1215

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 01/17/18. They were assigned to Work Order 18-01-1215.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-01-1215
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 01/17/18 19:45
	Number of Containers: 70

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-HP01-35-37	18-01-1215-1	01/17/18 10:40	4	Aqueous
CP22-HP01-39-41	18-01-1215-2	01/17/18 11:05	6	Aqueous
CP22-HP02-35-37	18-01-1215-3	01/17/18 12:20	6	Aqueous
CP22-HP02-39-41	18-01-1215-4	01/17/18 12:50	6	Aqueous
CP22-HP03-35-37	18-01-1215-5	01/17/18 13:45	6	Aqueous
CP22-HP03-39-41	18-01-1215-6	01/17/18 14:15	6	Aqueous
CP22-HP06-35-37	18-01-1215-7	01/17/18 15:30	6	Aqueous
DUP20180117	18-01-1215-8	01/17/18 17:00	6	Aqueous
Tblank20180117	18-01-1215-9	01/17/18 16:45	2	Aqueous
IP02-1-35	18-01-1215-10	01/17/18 15:30	1	Solid
IP02-1-36	18-01-1215-11	01/17/18 15:31	1	Solid
IP02-1-43	18-01-1215-12	01/17/18 15:32	1	Solid
IP02-3-38	18-01-1215-13	01/17/18 15:33	1	Solid
IP02-3-44	18-01-1215-14	01/17/18 15:34	1	Solid
IP02-3-45	18-01-1215-15	01/17/18 15:35	1	Solid
IP02-5-43	18-01-1215-16	01/17/18 15:36	1	Solid
IP02-5-45	18-01-1215-17	01/17/18 15:38	1	Solid
IP02-5-44	18-01-1215-18	01/17/18 15:37	1	Solid
IP08-1-42	18-01-1215-19	01/17/18 15:39	1	Solid
IP08-1-43	18-01-1215-20	01/17/18 15:40	1	Solid
IP08-1-44	18-01-1215-21	01/17/18 15:41	1	Solid
IP08-3-43	18-01-1215-22	01/17/18 15:42	1	Solid
IP08-3-44	18-01-1215-23	01/17/18 15:43	1	Solid
IP08-3-45	18-01-1215-24	01/17/18 15:44	1	Solid
IP08-5-35	18-01-1215-25	01/17/18 15:45	1	Solid
IP08-5-36	18-01-1215-26	01/17/18 15:46	1	Solid
IP08-5-37	18-01-1215-27	01/17/18 15:47	1	Solid
E-Blank20180117	18-01-1215-28	01/17/18 16:00	2	Aqueous
F-Blank20180117	18-01-1215-29	01/17/18 16:15	2	Aqueous


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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1215
Project Name: ESTCP C. Pendleton WR2274
Received: 01/17/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP01-35-37 (18-01-1215-1)						
Propene	4.10		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.072		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP01-39-41 (18-01-1215-2)						
1,2,3-Trichloropropane	0.27		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-35-37 (18-01-1215-3)						
1,2,3-Trichloropropane	0.086		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-39-41 (18-01-1215-4)						
1,2,3-Trichloropropane	0.24		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP03-35-37 (18-01-1215-5)						
1,2,3-Trichloropropane	0.096		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP03-39-41 (18-01-1215-6)						
1,2,3-Trichloropropane	0.036		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP06-35-37 (18-01-1215-7)						
1,2,3-Trichloropropane	0.23		0.025	ug/L	SRL 524M-TCP	EPA 5030C
DUP20180117 (18-01-1215-8)						
1,2,3-Trichloropropane	0.10		0.010	ug/L	SRL 524M-TCP	EPA 5030C
IP02-1-35 (18-01-1215-10)						
Zinc	82.7		1.03	mg/kg	EPA 6010B	EPA 3050B
IP02-1-36 (18-01-1215-11)						
Zinc	71.7		0.990	mg/kg	EPA 6010B	EPA 3050B
IP02-1-43 (18-01-1215-12)						
Zinc	81.0		1.03	mg/kg	EPA 6010B	EPA 3050B
IP02-3-38 (18-01-1215-13)						
Zinc	122		0.952	mg/kg	EPA 6010B	EPA 3050B
IP02-3-44 (18-01-1215-14)						
Zinc	73.6		0.980	mg/kg	EPA 6010B	EPA 3050B
IP02-3-45 (18-01-1215-15)						
Zinc	69.5		0.985	mg/kg	EPA 6010B	EPA 3050B
IP02-5-43 (18-01-1215-16)						
Zinc	74.4		0.952	mg/kg	EPA 6010B	EPA 3050B
IP02-5-45 (18-01-1215-17)						
Zinc	53.3		0.962	mg/kg	EPA 6010B	EPA 3050B
IP02-5-44 (18-01-1215-18)						
Zinc	65.1		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08-1-42 (18-01-1215-19)						
Zinc	48.9		1.02	mg/kg	EPA 6010B	EPA 3050B
IP08-1-43 (18-01-1215-20)						
Zinc	69.4		1.03	mg/kg	EPA 6010B	EPA 3050B

* MDL is shown

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1215
Project Name: ESTCP C. Pendleton WR2274
Received: 01/17/18

Attn: Lea Kane

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Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
IP08-1-44 (18-01-1215-21) Zinc	71.3		0.976	mg/kg	EPA 6010B	EPA 3050B
IP08-3-43 (18-01-1215-22) Zinc	18100		100	mg/kg	EPA 6010B	EPA 3050B
IP08-3-44 (18-01-1215-23) Zinc	20000		103	mg/kg	EPA 6010B	EPA 3050B
IP08-3-45 (18-01-1215-24) Zinc	1870		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08-5-35 (18-01-1215-25) Zinc	75.6		0.957	mg/kg	EPA 6010B	EPA 3050B
IP08-5-36 (18-01-1215-26) Zinc	79.3		1.03	mg/kg	EPA 6010B	EPA 3050B
IP08-5-37 (18-01-1215-27) Zinc	69.1		0.976	mg/kg	EPA 6010B	EPA 3050B

Subcontracted analyses, if any, are not included in this summary.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP01-35-37	18-01-1215-1-D	01/17/18 10:40	Aqueous	GC 52	N/A	01/18/18 12:24	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		4.10	1.00		1.00		
CP22-HP01-39-41	18-01-1215-2-D	01/17/18 11:05	Aqueous	GC 52	N/A	01/18/18 13:23	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP02-35-37	18-01-1215-3-D	01/17/18 12:20	Aqueous	GC 52	N/A	01/18/18 13:50	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP02-39-41	18-01-1215-4-D	01/17/18 12:50	Aqueous	GC 52	N/A	01/18/18 14:16	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP03-35-37	18-01-1215-5-D	01/17/18 13:45	Aqueous	GC 52	N/A	01/18/18 14:43	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP03-39-41	18-01-1215-6-D	01/17/18 14:15	Aqueous	GC 52	N/A	01/18/18 15:09	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP06-35-37	18-01-1215-7-D	01/17/18 15:30	Aqueous	GC 52	N/A	01/18/18 15:43	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP20180117	18-01-1215-8-D	01/17/18 17:00	Aqueous	GC 52	N/A	01/18/18 16:09	180118L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants	Date Received:	01/17/18
595 Market Street, Suite 610	Work Order:	18-01-1215
San Francisco, CA 94105-2811	Preparation:	N/A
	Method:	RSK-175M
	Units:	ug/L
Project: ESTCP C. Pendleton WR2274		Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-325-96	N/A	Aqueous	GC 52	N/A	01/18/18 11:42	180118L02

Parameter	Result	RL	DF	Qualifiers
Propene	ND	1.00	1.00	

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP02-1-35	18-01-1215-10-A	01/17/18 15:30	Solid	ICP 7300	01/24/18	01/24/18 16:42	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		82.7		1.03		1.03	
IP02-1-36	18-01-1215-11-A	01/17/18 15:31	Solid	ICP 7300	01/24/18	01/24/18 16:44	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		71.7		0.990		0.990	
IP02-1-43	18-01-1215-12-A	01/17/18 15:32	Solid	ICP 7300	01/24/18	01/24/18 16:45	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		81.0		1.03		1.03	
IP02-3-38	18-01-1215-13-A	01/17/18 15:33	Solid	ICP 7300	01/24/18	01/24/18 16:46	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		122		0.952		0.952	
IP02-3-44	18-01-1215-14-A	01/17/18 15:34	Solid	ICP 7300	01/24/18	01/25/18 13:05	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		73.6		0.980		0.980	
IP02-3-45	18-01-1215-15-A	01/17/18 15:35	Solid	ICP 7300	01/24/18	01/25/18 13:06	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		69.5		0.985		0.985	
IP02-5-43	18-01-1215-16-A	01/17/18 15:36	Solid	ICP 7300	01/24/18	01/25/18 13:06	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		74.4		0.952		0.952	
IP02-5-45	18-01-1215-17-A	01/17/18 15:38	Solid	ICP 7300	01/24/18	01/25/18 13:07	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		53.3		0.962		0.962	

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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP02-5-44	18-01-1215-18-A	01/17/18 15:37	Solid	ICP 7300	01/24/18	01/25/18 13:08	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		65.1		1.01		1.01	
IP08-1-42	18-01-1215-19-A	01/17/18 15:39	Solid	ICP 7300	01/24/18	01/25/18 13:08	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		48.9		1.02		1.02	
IP08-1-43	18-01-1215-20-A	01/17/18 15:40	Solid	ICP 7300	01/24/18	01/25/18 13:09	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		69.4		1.03		1.03	
IP08-1-44	18-01-1215-21-A	01/17/18 15:41	Solid	ICP 7300	01/24/18	01/25/18 13:10	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		71.3		0.976		0.976	
IP08-3-43	18-01-1215-22-A	01/17/18 15:42	Solid	ICP 7300	01/24/18	01/26/18 11:17	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		18100		100		100	
IP08-3-44	18-01-1215-23-A	01/17/18 15:43	Solid	ICP 7300	01/24/18	01/25/18 13:12	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		20000		103		103	
IP08-3-45	18-01-1215-24-A	01/17/18 15:44	Solid	ICP 7300	01/24/18	01/25/18 13:16	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		1870		1.01		1.01	
IP08-5-35	18-01-1215-25-A	01/17/18 15:45	Solid	ICP 7300	01/24/18	01/25/18 13:17	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		75.6		0.957		0.957	

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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP08-5-36	18-01-1215-26-A	01/17/18 15:46	Solid	ICP 7300	01/24/18	01/25/18 13:18	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		79.3		1.03		1.03	
IP08-5-37	18-01-1215-27-A	01/17/18 15:47	Solid	ICP 7300	01/24/18	01/25/18 13:18	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		69.1		0.976		0.976	
Method Blank	097-01-002-25813	N/A	Solid	ICP 7300	01/24/18	01/24/18 16:38	180124L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.976		0.976	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP01-35-37	18-01-1215-1-A	01/17/18 10:40	Aqueous	GC/MS M	01/18/18	01/18/18 20:17	180118L015
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.072		0.0050		1.00	
CP22-HP01-39-41	18-01-1215-2-C	01/17/18 11:05	Aqueous	GC/MS M	01/30/18	01/30/18 13:05	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.27		0.025		5.00	
CP22-HP02-35-37	18-01-1215-3-B	01/17/18 12:20	Aqueous	GC/MS M	01/30/18	01/30/18 13:34	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.086		0.0050		1.00	
CP22-HP02-39-41	18-01-1215-4-B	01/17/18 12:50	Aqueous	GC/MS M	01/30/18	01/30/18 14:03	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.24		0.025		5.00	
CP22-HP03-35-37	18-01-1215-5-B	01/17/18 13:45	Aqueous	GC/MS M	01/30/18	01/30/18 14:32	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.096		0.010		2.00	
CP22-HP03-39-41	18-01-1215-6-B	01/17/18 14:15	Aqueous	GC/MS M	01/30/18	01/30/18 15:01	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.036		0.0050		1.00	
CP22-HP06-35-37	18-01-1215-7-B	01/17/18 15:30	Aqueous	GC/MS M	01/30/18	01/30/18 15:30	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.23		0.025		5.00	
DUP20180117	18-01-1215-8-B	01/17/18 17:00	Aqueous	GC/MS M	01/30/18	01/30/18 15:59	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.10		0.010		2.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Tblank20180117	18-01-1215-9-A	01/17/18 16:45	Aqueous	GC/MS M	01/30/18	01/30/18 12:36	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank20180117	18-01-1215-28-B	01/17/18 16:00	Aqueous	GC/MS M	01/30/18	01/30/18 11:38	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
F-Blank20180117	18-01-1215-29-B	01/17/18 16:15	Aqueous	GC/MS M	01/30/18	01/30/18 12:07	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1397	N/A	Aqueous	GC/MS M	01/18/18	01/18/18 11:02	180118L015
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1401	N/A	Aqueous	GC/MS M	01/30/18	01/30/18 11:06	180130L038
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/17/18
 Work Order: 18-01-1215
 Preparation: EPA 3050B
 Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
IP02-1-35	Sample	Solid	ICP 7300	01/24/18	01/24/18 16:42	180124S01
IP02-1-35	Matrix Spike	Solid	ICP 7300	01/24/18	01/24/18 16:43	180124S01
IP02-1-35	Matrix Spike Duplicate	Solid	ICP 7300	01/24/18	01/24/18 16:43	180124S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	82.70	25.00	105.9	93	100.5	71	75-125	5	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: N/A
Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-96	LCS	Aqueous	GC 52	N/A	01/18/18 10:18	180118L02			
099-14-325-96	LCSD	Aqueous	GC 52	N/A	01/18/18 10:49	180118L02			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	103.5	100	103.3	100	80-120	0	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
097-01-002-25813	LCS	Solid	ICP 7300	01/24/18	01/24/18 16:39	180124L01
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		25.00	25.82	103	80-120	



Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1397	LCS	Aqueous	GC/MS M	01/18/18	01/18/18 09:58	180118L015			
099-10-022-1397	LCSD	Aqueous	GC/MS M	01/18/18	01/18/18 10:27	180118L015			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005500	110	0.005500	110	80-120	0	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/17/18
Work Order: 18-01-1215
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1401	LCS	Aqueous	GC/MS M	01/30/18	01/30/18 10:04	180130L038			
099-10-022-1401	LCSD	Aqueous	GC/MS M	01/30/18	01/30/18 10:33	180130L038			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004400	88	0.005400	108	80-120	20	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-01-1215

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 6010B	EPA 3050B	935	ICP 7300	1
RSK-175M	N/A	748	GC 52	2
RSK-175M	N/A	1144	GC 52	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2


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Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Location 2: 7445 Lampson Avenue, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 18-01-1215

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

Page 1 of 2
18-01-1215
 White copy: to accompany samples
 Yellow copy: field copy

Project Name ESTEP C. Penetration	Project Number WR2274	Required Analyses				Bottle Type and Volume/Preservative	Sample Type	Date	Time	Number of Containers	Comments	Lab Use Only	Condition of Bottles
		Metals	SVOCs by 8270	TCF SRL 524M-74	Propene RSL-175M								
Samplers Names B. Kowalski	Project Contact Clea Ferrer (LKane@geosyntec.com)												
Laboratory Name California	Lab Contact S. Nowak												
Lab Address	Lab Phone												
	Carrier/Waybill No.												
Sample Name	Date	Time	Sample Type	Number of Containers	Comments	Lab Use Only	Condition of Bottles						
CP22-HR01-35-37	1/17/18	1040	Water	2									
CP22-HR01-39-41		1105		3									
CP22-HR02-35-37		1220		3									
CP22-HR02-39-41		1250		3									
CP22-HR03-35-37		1345		3									
CP22-HR03-39-41		1415		3									
CP22-HR06-35-37		1530		3									
DUP20180117		1700		3									
THack 20180117		1645		2									

Special Instructions:
 Normal Rush:
 Turn-around Time: Date 01/17/18 Time 1720
 Date 1/17/18 Time 1945
 Date _____ Time _____
 Date _____ Time _____

1. Relinquished by Date 1/17/18 Time 17:20
 (Signature/Affiliation)
 2. Relinquished by Date 1/17/18 Time 1945
 (Signature/Affiliation)
 3. Relinquished by _____ Date _____ Time _____
 (Signature/Affiliation)

1215

Analysis Request and Chain of Custody Record

Page 2 of 2

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Required Analyses						Comments	Lab Use Only	Condition of Bottles				
				VOCS by	Metals total Zn	SVOCs by 8270	Hold remaining soil for pesticide analyses	TCP	SRL 524M-TCP				Bottle Type and Volume/Preservative	Number of Containers		
IP02-1-35	1/17/18	1530	Soil	X						X						
IP02-1-36		1530														
IP02-1-43		1532														
IP02-3-38		1533														
IP02-3-44		1534														
IP02-3-45		1535														
IP02-5-43		1536														
IP02-5-45		1538														
IP02-5-44		1537														
IP08-1-42		1539														
IP08-1-43		1540														
IP08-1-44		1541														
IP08-3-43		1542														
IP08-3-44		1543														
IP08-3-45		1544														
IP08-5-35		1545														
IP08-5-36		1546														
IP08-5-37		1547														
E-Blank 20180117		1600	Water												2	
F-Blank 20180117		1615	Water												2	

Continued from Document Number:

11405

Project Name CS&CP C. Penick

Project Number WR2274

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 01/17/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.1 °C (w/ CF): 3.3 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: 671

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 689

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	-------------------------------------	--------------------------	--------------------------

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---------------------------------------	-------------------------------------	--------------------------	--------------------------

Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	-------------------------------------	--------------------------	--------------------------

Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	-------------------------------------	--------------------------	--------------------------

Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Aqueous samples for certain analyses received within 15-minute holding time

<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
---	--------------------------	--------------------------	-------------------------------------

Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
--	--------------------------	--------------------------	-------------------------------------

Container(s) for certain analysis free of headspace.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
---	--------------------------	--------------------------	-------------------------------------

CONTAINER TYPE:

(Trip Blank Lot Number: 180110A)

Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{na} (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, Labeled/Checked by: 689

s = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z_{na}** = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 1017

SAMPLE ANOMALY REPORT

DATE: 01/17/2018

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
- Sample(s) received but NOT LISTED on COC
- Holding time expired (list client or ECI sample ID and analysis)
- Insufficient sample amount for requested analysis (list analysis)
- Improper container(s) used (list analysis)
- Improper preservative used (list analysis)
- pH outside acceptable range (list analysis)
- No preservative noted on COC or label (list analysis and notify lab)
- Sample container(s) not labeled
- Client sample label(s) illegible (list container type and analysis)
- Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
- Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
- Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**
1	ABCD	4			
5	G, F	6			

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

Reported by: CSG
Reviewed by: 1017

** Record the total number of containers (i.e., vials or bottles) for the affected sample.





Calscience



WORK ORDER NUMBER: 18-01-1334

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 02/02/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.



Calscience

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Work Order Number: 18-01-1334

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 01/18/18. They were assigned to Work Order 18-01-1334.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 18-01-1334
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 01/18/18 18:30
	Number of Containers: 74

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-HP06-39-41	18-01-1334-1	01/18/18 08:00	6	Aqueous
F-Blank20180118	18-01-1334-2	01/18/18 16:00	2	Aqueous
E-Blank20180118	18-01-1334-3	01/18/18 14:30	2	Aqueous
T-Blank20180118	18-01-1334-4	01/18/18 13:00	2	Aqueous
DUP20180118	18-01-1334-5	01/18/18 12:00	6	Aqueous
CP22-HP08-35-37	18-01-1334-6	01/18/18 08:50	6	Aqueous
CP22-HP08-39-41	18-01-1334-7	01/18/18 09:15	6	Aqueous
CP22-HP11-35-37	18-01-1334-8	01/18/18 10:00	6	Aqueous
CP22-HP11-39-41	18-01-1334-9	01/18/18 10:35	6	Aqueous
CP22-HP07-35-37	18-01-1334-10	01/18/18 11:25	6	Aqueous
CP22-HP07-39-41	18-01-1334-11	01/18/18 11:45	6	Aqueous
CP22-HP09-35-37	18-01-1334-12	01/18/18 13:30	6	Aqueous
CP22-HP09-39-41	18-01-1334-13	01/18/18 14:00	6	Aqueous
CP22-HP09-43-45	18-01-1334-14	01/18/18 14:50	2	Aqueous
CP22-HP10-35-37	18-01-1334-15	01/18/18 15:15	6	Aqueous



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1334
Project Name: ESTCP C. Pendleton WR2274
Received: 01/18/18

Attn: Lea Kane

Page 1 of 1

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP06-39-41 (18-01-1334-1)						
1,2,3-Trichloropropane	0.034		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
DUP20180118 (18-01-1334-5)						
Propene	2.64		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.056		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP08-35-37 (18-01-1334-6)						
Propene	1.05		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	1.2		0.12	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP08-39-41 (18-01-1334-7)						
Propene	1.04		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.050		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP11-35-37 (18-01-1334-8)						
1,2,3-Trichloropropane	2.6		0.25	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP11-39-41 (18-01-1334-9)						
1,2,3-Trichloropropane	0.35		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-35-37 (18-01-1334-10)						
1,2,3-Trichloropropane	0.20		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-39-41 (18-01-1334-11)						
1,2,3-Trichloropropane	0.052		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP09-35-37 (18-01-1334-12)						
1,2,3-Trichloropropane	3.0		0.25	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP09-39-41 (18-01-1334-13)						
Propene	1.63		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.14		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP10-35-37 (18-01-1334-15)						
1,2,3-Trichloropropane	3.6		0.25	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-39-41	18-01-1334-1-D	01/18/18 08:00	Aqueous	GC 52	N/A	01/23/18 11:53	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP20180118	18-01-1334-5-D	01/18/18 12:00	Aqueous	GC 52	N/A	01/23/18 12:22	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.64	1.00		1.00		
CP22-HP08-35-37	18-01-1334-6-D	01/18/18 08:50	Aqueous	GC 52	N/A	01/23/18 14:43	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.05	1.00		1.00		
CP22-HP08-39-41	18-01-1334-7-D	01/18/18 09:15	Aqueous	GC 52	N/A	01/23/18 15:09	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.04	1.00		1.00		
CP22-HP11-35-37	18-01-1334-8-D	01/18/18 10:00	Aqueous	GC 52	N/A	01/23/18 15:37	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP11-39-41	18-01-1334-9-D	01/18/18 10:35	Aqueous	GC 52	N/A	01/23/18 16:06	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP07-35-37	18-01-1334-10-D	01/18/18 11:25	Aqueous	GC 52	N/A	01/23/18 16:39	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP07-39-41	18-01-1334-11-D	01/18/18 11:45	Aqueous	GC 52	N/A	01/23/18 17:09	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP09-35-37	18-01-1334-12-D	01/18/18 13:30	Aqueous	GC 52	N/A	01/23/18 17:49	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP09-39-41	18-01-1334-13-D	01/18/18 14:00	Aqueous	GC 52	N/A	01/23/18 18:18	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.63	1.00		1.00		
CP22-HP10-35-37	18-01-1334-15-D	01/18/18 15:15	Aqueous	GC 52	N/A	01/23/18 18:45	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-97	N/A	Aqueous	GC 52	N/A	01/23/18 10:55	180123L03
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-39-41	18-01-1334-1-C	01/18/18 08:00	Aqueous	GC/MS T	01/30/18	01/30/18 14:39	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.034		0.0050		1.00	
F-Blank20180118	18-01-1334-2-A	01/18/18 16:00	Aqueous	GC/MS T	01/26/18	01/26/18 11:49	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank20180118	18-01-1334-3-A	01/18/18 14:30	Aqueous	GC/MS T	01/26/18	01/26/18 12:24	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
T-Blank20180118	18-01-1334-4-A	01/18/18 13:00	Aqueous	GC/MS T	01/26/18	01/26/18 12:58	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
DUP20180118	18-01-1334-5-C	01/18/18 12:00	Aqueous	GC/MS T	01/30/18	01/30/18 15:14	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.056		0.0050		1.00	
CP22-HP08-35-37	18-01-1334-6-C	01/18/18 08:50	Aqueous	GC/MS T	01/30/18	01/30/18 18:08	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		1.2		0.12		25.0	
CP22-HP08-39-41	18-01-1334-7-A	01/18/18 09:15	Aqueous	GC/MS T	01/26/18	01/26/18 13:33	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.050		0.0050		1.00	
CP22-HP11-35-37	18-01-1334-8-C	01/18/18 10:00	Aqueous	GC/MS T	01/30/18	01/30/18 18:42	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		2.6		0.25		50.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP11-39-41	18-01-1334-9-A	01/18/18 10:35	Aqueous	GC/MS T	01/26/18	01/26/18 20:31	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.35		0.025		5.00	
CP22-HP07-35-37	18-01-1334-10-C	01/18/18 11:25	Aqueous	GC/MS T	01/30/18	01/30/18 19:17	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.20		0.025		5.00	
CP22-HP07-39-41	18-01-1334-11-C	01/18/18 11:45	Aqueous	GC/MS T	01/30/18	01/30/18 16:58	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.052		0.0050		1.00	
CP22-HP09-35-37	18-01-1334-12-C	01/18/18 13:30	Aqueous	GC/MS T	01/30/18	01/30/18 19:52	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		3.0		0.25		50.0	
CP22-HP09-39-41	18-01-1334-13-C	01/18/18 14:00	Aqueous	GC/MS T	01/30/18	01/30/18 20:27	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.14		0.010		2.00	
CP22-HP09-43-45	18-01-1334-14-A	01/18/18 14:50	Aqueous	GC/MS T	01/26/18	01/26/18 18:11	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP10-35-37	18-01-1334-15-C	01/18/18 15:15	Aqueous	GC/MS T	01/31/18	01/31/18 12:56	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		3.6		0.25		50.0	
Method Blank	099-10-022-1398	N/A	Aqueous	GC/MS T	01/26/18	01/26/18 11:14	180126L004
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1400	N/A	Aqueous	GC/MS T	01/30/18	01/30/18 12:16	180130L016

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	

Method Blank	099-10-022-1402	N/A	Aqueous	GC/MS T	01/31/18	01/31/18 12:21	180131L014
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	



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Quality Control - LCS/LCSD

Geosyntec Consultants	Date Received:	01/18/18
595 Market Street, Suite 610	Work Order:	18-01-1334
San Francisco, CA 94105-2811	Preparation:	N/A
Project: ESTCP C. Pendleton WR2274	Method:	RSK-175M

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-325-97	LCS	Aqueous	GC 52	N/A	01/23/18 09:37	180123L03
099-14-325-97	LCSD	Aqueous	GC 52	N/A	01/23/18 10:13	180123L03

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	103.7	101	103.8	101	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1398	LCS	Aqueous	GC/MS T	01/26/18	01/26/18 10:04	180126L004			
099-10-022-1398	LCSD	Aqueous	GC/MS T	01/26/18	01/26/18 10:39	180126L004			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004700	94	0.005200	104	80-120	10	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1400	LCS	Aqueous	GC/MS T	01/30/18	01/30/18 10:59	180130L016			
099-10-022-1400	LCSD	Aqueous	GC/MS T	01/30/18	01/30/18 11:34	180130L016			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004600	92	0.004400	88	80-120	4	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/18/18
Work Order: 18-01-1334
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1402	LCS	Aqueous	GC/MS T	01/31/18	01/31/18 10:26	180131L014			
099-10-022-1402	LCSD	Aqueous	GC/MS T	01/31/18	01/31/18 11:46	180131L014			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004500	90	0.004300	86	80-120	5	0-20	

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-01-1334

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
RSK-175M	N/A	748	GC 52	2
RSK-175M	N/A	1144	GC 52	2
SRL 524M-TCP	EPA 5030C	867	GC/MS T	2

Glossary of Terms and Qualifiers

Work Order: 18-01-1334

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-01-1334

Page 1 of 2

Project Name ESTCP C. Penetration		Project Number UR2274		Required Analyses		
Samplers Names B. Beckwith		Project Contact Leo Kane (lkane@geosyntec.com)		Metals		
Laboratory Name CalScience		Lab Contact S. Nojak		SVOCs by 8270		
Lab Address		Lab Phone		VOCs by		
		Carrier/Waybill No.		Bottle Type and Volume/Preservative		
Sample Name	Date	Time	Sample Type	Number of Containers		
1 CP22-HP06-39-41	1/18/18	0800	Water	3	3	
2 F-Blank 20160119		1600		2		
3 E-Blank 2018 0118		1430		2		
4 T-Blank 2018 0118		1700		2		
5 DVP 2018 0118		1200		3	3	
6 CP22-HP08-35-37		0950		3	3	
7 CP22-HP08-39-41		0915		3	3	
8 CP22-HP11-35-37		1000		3	3	
9 CP22-HP11-39-41		1035		3	3	
10 CP22-HP07-35-37		1125		3	3	
11 CP22-HP07-39-41		1145		3	3	
12 CP22-HP09-35-37		1330		3	3	

White copy: to accompany samples
Yellow copy: field copy

Turn-around Time:
 Normal Rush:

1. Relinquished by (Signature/Affiliation)		Date Time	1/18/18 1600	1. Received by (Signature/Affiliation)		Date Time	01/18/18 1600
2. Relinquished by (Signature/Affiliation)		Date Time	01/18/18 1830	2. Received by (Signature/Affiliation)		Date Time	1/18/18 1830
3. Relinquished by (Signature/Affiliation)		Date Time		3. Received by (Signature/Affiliation)		Date Time	

Special Instructions:



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 01/18/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.1 °C (w/ CF): 3.3 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 671
826

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (Trip Blank Lot Number: 180110A)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB 125PB_{znna} (pH__9)

250AGB 250CGB 250CGB_s (pH__2) 250PB 250PB_n (pH__2) 500AGB 500AGJ 500AGJ_s (pH__2) 500PB

1AGB 1AGB_{na2} 1AGB_s (pH__2) 1AGB_s (O&G) 1PB 1PB_{na} (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 826

s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, znna = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 778



Calscience



WORK ORDER NUMBER: 18-01-1447

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 02/06/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 18-01-1447

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 01/19/18. They were assigned to Work Order 18-01-1447.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-01-1447
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 01/19/18 19:00
	Number of Containers: 50

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
220205-MWX	18-01-1447-1	01/19/18 10:13	8	Aqueous
CP22-MW04	18-01-1447-2	01/19/18 11:45	8	Aqueous
CP22-PMW07B	18-01-1447-3	01/19/18 08:29	8	Aqueous
CP22-PMW08	18-01-1447-4	01/19/18 09:29	8	Aqueous
CP22-PMW10B	18-01-1447-5	01/19/18 10:59	8	Aqueous
DUP-BT-20180119	18-01-1447-6	01/19/18 09:00	8	Aqueous
EB-BT-20180119	18-01-1447-7	01/19/18 11:10	2	Aqueous

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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1447
Project Name: ESTCP C. Pendleton WR2274
Received: 01/19/18

Attn: Lea Kane

Page 1 of 1

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
220205-MWX (18-01-1447-1)						
Sulfate	98		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	5.7		0.50	ug/L	SRL 524M-TCP	EPA 5030C
CP22-MW04 (18-01-1447-2)						
Sulfate	87		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.037		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW07B (18-01-1447-3)						
Sulfate	97		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.014		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW08 (18-01-1447-4)						
Sulfate	110		2.0	mg/L	EPA 300.0	N/A
CP22-PMW10B (18-01-1447-5)						
Sulfate	1.6		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.0073		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
DUP-BT-20180119 (18-01-1447-6)						
Sulfate	87		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.039		0.0050	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	18-01-1447-1-D	01/19/18 10:13	Aqueous	GC 61	N/A	01/24/18 11:33	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-MW04	18-01-1447-2-D	01/19/18 11:45	Aqueous	GC 61	N/A	01/24/18 12:01	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW07B	18-01-1447-3-D	01/19/18 08:29	Aqueous	GC 61	N/A	01/24/18 12:30	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW08	18-01-1447-4-D	01/19/18 09:29	Aqueous	GC 61	N/A	01/24/18 18:24	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW10B	18-01-1447-5-D	01/19/18 10:59	Aqueous	GC 61	N/A	01/24/18 18:51	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP-BT-20180119	18-01-1447-6-D	01/19/18 09:00	Aqueous	GC 61	N/A	01/24/18 19:52	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-98	N/A	Aqueous	GC 61	N/A	01/24/18 10:54	180124L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	18-01-1447-1-G	01/19/18 10:13	Aqueous	IC 15	N/A	01/20/18 17:12	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		98	1.0		1.00		
CP22-MW04	18-01-1447-2-G	01/19/18 11:45	Aqueous	IC 15	N/A	01/20/18 17:30	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		87	1.0		1.00		
CP22-PMW07B	18-01-1447-3-G	01/19/18 08:29	Aqueous	IC 15	N/A	01/20/18 17:48	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		97	1.0		1.00		
CP22-PMW08	18-01-1447-4-G	01/19/18 09:29	Aqueous	IC 15	N/A	01/22/18 11:52	180122L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		110	2.0		2.00		
CP22-PMW10B	18-01-1447-5-G	01/19/18 10:59	Aqueous	IC 15	N/A	01/20/18 18:25	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		1.6	1.0		1.00		
DUP-BT-20180119	18-01-1447-6-G	01/19/18 09:00	Aqueous	IC 15	N/A	01/20/18 18:44	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		87	1.0		1.00		
Method Blank	099-12-906-8195	N/A	Aqueous	IC 15	N/A	01/20/18 11:30	180120L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		ND	1.0		1.00		
Method Blank	099-12-906-8205	N/A	Aqueous	IC 15	N/A	01/22/18 09:59	180122L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		ND	1.0		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	18-01-1447-1-H	01/19/18 10:13	Aqueous	ICP 7300	01/20/18	01/24/18 13:25	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-MW04	18-01-1447-2-H	01/19/18 11:45	Aqueous	ICP 7300	01/20/18	01/24/18 12:46	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW07B	18-01-1447-3-H	01/19/18 08:29	Aqueous	ICP 7300	01/20/18	01/24/18 12:48	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW08	18-01-1447-4-H	01/19/18 09:29	Aqueous	ICP 7300	01/20/18	01/24/18 12:49	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW10B	18-01-1447-5-H	01/19/18 10:59	Aqueous	ICP 7300	01/20/18	01/24/18 12:50	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
DUP-BT-20180119	18-01-1447-6-H	01/19/18 09:00	Aqueous	ICP 7300	01/20/18	01/24/18 12:51	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
Method Blank	099-14-304-686	N/A	Aqueous	ICP 7300	01/23/18	01/24/18 11:45	180123LA4
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
220205-MWX	18-01-1447-1-A	01/19/18 10:13	Aqueous	GC/MS T	01/31/18	02/01/18 03:58	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		5.7		0.50		100	
CP22-MW04	18-01-1447-2-A	01/19/18 11:45	Aqueous	GC/MS T	01/31/18	02/01/18 03:24	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.037		0.0050		1.00	
CP22-PMW07B	18-01-1447-3-A	01/19/18 08:29	Aqueous	GC/MS T	01/31/18	01/31/18 21:36	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.014		0.0050		1.00	
CP22-PMW08	18-01-1447-4-A	01/19/18 09:29	Aqueous	GC/MS T	01/31/18	01/31/18 22:11	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-PMW10B	18-01-1447-5-A	01/19/18 10:59	Aqueous	GC/MS T	01/31/18	01/31/18 22:46	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.0073		0.0050		1.00	
DUP-BT-20180119	18-01-1447-6-B	01/19/18 09:00	Aqueous	GC/MS T	02/01/18	02/01/18 13:45	180201L001
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.039		0.0050		1.00	
EB-BT-20180119	18-01-1447-7-A	01/19/18 11:10	Aqueous	GC/MS T	01/31/18	01/31/18 21:01	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1402	N/A	Aqueous	GC/MS T	01/31/18	01/31/18 12:21	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1403	N/A	Aqueous	GC/MS T	02/01/18	02/01/18 12:33	180201L001

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: N/A
Method: EPA 300.0

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1439-4	Sample	Aqueous	IC 15	N/A	01/20/18 15:11	180120S01
18-01-1439-4	Matrix Spike	Aqueous	IC 15	N/A	01/20/18 15:29	180120S01
18-01-1439-4	Matrix Spike Duplicate	Aqueous	IC 15	N/A	01/20/18 15:48	180120S01

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Sulfate	85.59	50.00	147.0	123	146.4	122	80-120	0	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants	Date Received:	01/19/18
595 Market Street, Suite 610	Work Order:	18-01-1447
San Francisco, CA 94105-2811	Preparation:	Filtered
	Method:	EPA 200.7
Project: ESTCP C. Pendleton WR2274		Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1234-1	Sample	Aqueous	ICP 7300	01/23/18	01/24/18 12:11	180123SA4
18-01-1234-1	Matrix Spike	Aqueous	ICP 7300	01/23/18	01/24/18 12:14	180123SA4
18-01-1234-1	Matrix Spike Duplicate	Aqueous	ICP 7300	01/23/18	01/24/18 12:15	180123SA4

<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Zinc	0.04056	0.5000	0.5382	100	0.5504	102	80-120	2	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1447
 Preparation: N/A
 Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-325-98	LCS	Aqueous	GC 61	N/A	01/24/18 09:45	180124L02
099-14-325-98	LCSD	Aqueous	GC 61	N/A	01/24/18 10:14	180124L02

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	97.51	95	97.86	95	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: N/A
Method: EPA 300.0

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-906-8195	LCS	Aqueous	IC 15	N/A	01/20/18 11:48	180120L01			
099-12-906-8195	LCSD	Aqueous	IC 15	N/A	01/20/18 12:07	180120L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Sulfate	50.00	50.37	101	50.18	100	90-110	0	0-15	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: N/A
Method: EPA 300.0

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-906-8205	LCS	Aqueous	IC 15	N/A	01/22/18 10:17	180122L01			
099-12-906-8205	LCSD	Aqueous	IC 15	N/A	01/22/18 10:35	180122L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Sulfate	50.00	48.88	98	50.08	100	90-110	2	0-15	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1447
 Preparation: Filtered
 Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-686	LCS	Aqueous	ICP 7300	01/23/18	01/24/18 11:46	180123LA4
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5308	106	85-115	



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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1447
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1402	LCS	Aqueous	GC/MS T	01/31/18	01/31/18 10:26	180131L014			
099-10-022-1402	LCSD	Aqueous	GC/MS T	01/31/18	01/31/18 11:46	180131L014			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004500	90	0.004300	86	80-120	5	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1447
 Preparation: EPA 5030C
 Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-10-022-1403	LCS	Aqueous	GC/MS T	02/01/18	02/01/18 11:24	180201L001
099-10-022-1403	LCSD	Aqueous	GC/MS T	02/01/18	02/01/18 11:58	180201L001

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004800	96	0.004300	86	80-120	11	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-01-1447

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	935	ICP 7300	1
EPA 300.0	N/A	834	IC 15	1
RSK-175M	N/A	748	GC 61	2
RSK-175M	N/A	1144	GC 61	2
SRL 524M-TCP	EPA 5030C	867	GC/MS T	2

Glossary of Terms and Qualifiers

Work Order: 18-01-1447

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-01-1447

White copy: to accompany samples
Yellow copy: field copy

Project Name ESTEP C. Penetration	Project Number W022274	Required Analyses				Sample Type	Date	Time	Number of Containers	Comments	Lab Use Only	Condition of Bottles			
		VOCs by 8270	Metals	SVOCs by 8270	TPP by SLL 521m-TP								Paper by RSK-135M	Distilled Zinc by EPA 200.7 (15)	Sulfate by EPA 200.0
Samplers Names Kerry Campbell	Project Contact Lee Kane	Bottle Type and Volume/Preservative													
Laboratory Name CalScience	Lab Contact S. Navak	VOCs by	Metals	SVOCs by 8270	TPP by SLL 521m-TP	Paper by RSK-135M	Distilled Zinc by EPA 200.7 (15)	Sulfate by EPA 200.0	Number of Containers						
Lab Address	Carrier/Waybill No.	VOCs by		Metals		SVOCs by 8270		TPP by SLL 521m-TP		Paper by RSK-135M		Distilled Zinc by EPA 200.7 (15)		Sulfate by EPA 200.0	
220205-mw0x	01-19-18	1013	Various	3	3	1	1	1							
CP22-mw004	1145			3	3	1	1	1							
CP22-PMW07B	0829			3	3	1	1	1							
CP22-PMW08	0929			3	3	1	1	1							
CP22-PMW10B	1059			3	3	1	1	1							
DUP-BT-20180119	0900			3	3	1	1	1							
EB-BT-20180119	1110		Verob	2											

Special Instructions: LAB FILTER FOR EPA 200.7

Turn-around Time:
 Normal Rush:

1. Relinquished by (Signature/Affiliation) <i>[Signature]</i> / Blaine Tech	Date 01-19-18 Time 12:5	1. Received by (Signature/Affiliation) <i>[Signature]</i> / GeoSynce	Date 1/19/18 Time 12:5
2. Relinquished by (Signature/Affiliation) <i>[Signature]</i>	Date 1/19/18 Time 14:47	2. Received by (Signature/Affiliation) <i>[Signature]</i>	Date 01/19/18 Time 14:47
3. Relinquished by (Signature/Affiliation) <i>[Signature]</i>	Date 01/19/18 Time 19:00	3. Received by (Signature/Affiliation) <i>[Signature]</i>	Date 1/19/18 Time 19:00



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Geosyntec

DATE: 01/19/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.1 °C (w/ CF): 3.3 °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter
 Checked by: 671

CUSTODY SEAL:
 Cooler Present and Intact Present but Not Intact Not Present N/A
 Sample(s) Present and Intact Present but Not Intact Not Present N/A
 Checked by: 671
 Checked by: 1140

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input checked="" type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (b) (Trip Blank Lot Number: _____)
 Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{nna} (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
 Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
 Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____
 Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag
 Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 1140
 s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, z_{nna} = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 671



Calscience



WORK ORDER NUMBER: 18-01-1452

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 02/06/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 18-01-1452

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 01/19/18. They were assigned to Work Order 18-01-1452.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 18-01-1452
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 01/19/18 19:00
	Number of Containers: 78

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-HP10-39-41	18-01-1452-1	01/19/18 07:30	6	Aqueous
CP22-HP10-43-45	18-01-1452-2	01/19/18 08:10	6	Aqueous
CP22-HP12-35-37	18-01-1452-3	01/19/18 08:50	6	Aqueous
CP22-HP12-39-41	18-01-1452-4	01/19/18 09:10	6	Aqueous
CP22-HP04-35-37	18-01-1452-5	01/19/18 09:50	6	Aqueous
CP22-HP04-39-41	18-01-1452-6	01/19/18 10:25	6	Aqueous
CP22-HP04-43-45	18-01-1452-7	01/19/18 11:05	6	Aqueous
CP22-HP05-35-37	18-01-1452-8	01/19/18 11:47	6	Aqueous
CP22-HP05-39-41	18-01-1452-9	01/19/18 12:05	6	Aqueous
DUP20180119	18-01-1452-10	01/19/18 12:00	6	Aqueous
CP22-HP05-43-45	18-01-1452-11	01/19/18 12:40	6	Aqueous
T-Blank20180119	18-01-1452-12	01/19/18 10:30	2	Aqueous
E-Blank20180119	18-01-1452-13	01/19/18 12:25	2	Aqueous
F-Blank20180119	18-01-1452-14	01/19/18 10:40	2	Aqueous
IDW-Soil-20180119	18-01-1452-15	01/19/18 11:40	1	Solid
IDW-Water-20180119	18-01-1452-16	01/19/18 12:35	5	Aqueous


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Calscience

Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1452
Project Name: ESTCP C. Pendleton WR2274
Received: 01/19/18

Attn: Lea Kane

Page 1 of 2

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
CP22-HP10-39-41 (18-01-1452-1)						
1,2,3-Trichloropropane	1.3		0.12	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP10-43-45 (18-01-1452-2)						
Propene	1.23		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.017		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP12-35-37 (18-01-1452-3)						
1,2,3-Trichloropropane	3.3		0.25	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP12-39-41 (18-01-1452-4)						
Propene	1.39		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.042		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-35-37 (18-01-1452-5)						
1,2,3-Trichloropropane	0.027		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-39-41 (18-01-1452-6)						
Propene	2.35		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.021		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-35-37 (18-01-1452-8)						
1,2,3-Trichloropropane	0.20		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-39-41 (18-01-1452-9)						
1,2,3-Trichloropropane	0.064		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
DUP20180119 (18-01-1452-10)						
1,2,3-Trichloropropane	3.2		0.25	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-43-45 (18-01-1452-11)						
Propene	1.18		1.00	ug/L	RSK-175M	N/A
IDW-Soil-20180119 (18-01-1452-15)						
Antimony	2.49		0.735	mg/kg	EPA 6010B	EPA 3050B
Arsenic	3.59		0.735	mg/kg	EPA 6010B	EPA 3050B
Barium	256		0.490	mg/kg	EPA 6010B	EPA 3050B
Beryllium	0.453		0.245	mg/kg	EPA 6010B	EPA 3050B
Cadmium	0.555		0.490	mg/kg	EPA 6010B	EPA 3050B
Chromium	32.0		0.245	mg/kg	EPA 6010B	EPA 3050B
Cobalt	13.3		0.245	mg/kg	EPA 6010B	EPA 3050B
Copper	22.9		0.490	mg/kg	EPA 6010B	EPA 3050B
Lead	3.95		0.490	mg/kg	EPA 6010B	EPA 3050B
Molybdenum	0.823		0.245	mg/kg	EPA 6010B	EPA 3050B
Nickel	14.0		0.245	mg/kg	EPA 6010B	EPA 3050B
Vanadium	81.1		0.245	mg/kg	EPA 6010B	EPA 3050B
Zinc	75.2		0.980	mg/kg	EPA 6010B	EPA 3050B

* MDL is shown



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-01-1452
Project Name: ESTCP C. Pendleton WR2274
Received: 01/19/18

Attn: Lea Kane

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Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
IDW-Water-20180119 (18-01-1452-16)						
Arsenic	0.0100		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Barium	0.170		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Chromium	0.0255		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Copper	0.0695		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Molybdenum	0.0138		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Nickel	0.0179		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Vanadium	0.0381		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Zinc	0.117		0.0100	mg/L	EPA 6010B	EPA 3010A Total
C6-C44 Total	170		91	ug/L	EPA 8015B (M)	EPA 3510C
1,1-Dichloroethane	0.50		0.50	ug/L	EPA 8260B	EPA 5030C
1,2-Dichloroethane	2.7		0.50	ug/L	EPA 8260B	EPA 5030C
1,1-Dichloroethene	8.0		0.50	ug/L	EPA 8260B	EPA 5030C
c-1,2-Dichloroethene	22		0.50	ug/L	EPA 8260B	EPA 5030C
t-1,2-Dichloroethene	0.55		0.50	ug/L	EPA 8260B	EPA 5030C
Methylene Chloride	39		1.0	ug/L	EPA 8260B	EPA 5030C
Tetrachloroethene	8.6		0.50	ug/L	EPA 8260B	EPA 5030C
Toluene	0.75		0.50	ug/L	EPA 8260B	EPA 5030C
1,1,1-Trichloroethane	7.0		0.50	ug/L	EPA 8260B	EPA 5030C
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.58		0.50	ug/L	EPA 8260B	EPA 5030C
1,1,2-Trichloroethane	7.9		0.50	ug/L	EPA 8260B	EPA 5030C
Trichloroethene	190		4.0	ug/L	EPA 8260B	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-39-41	18-01-1452-1-D	01/19/18 07:30	Aqueous	GC 52	N/A	01/24/18 12:12	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP10-43-45	18-01-1452-2-D	01/19/18 08:10	Aqueous	GC 52	N/A	01/24/18 12:40	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.23	1.00		1.00		
CP22-HP12-35-37	18-01-1452-3-D	01/19/18 08:50	Aqueous	GC 52	N/A	01/24/18 13:29	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP12-39-41	18-01-1452-4-D	01/19/18 09:10	Aqueous	GC 52	N/A	01/24/18 14:00	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.39	1.00		1.00		
CP22-HP04-35-37	18-01-1452-5-D	01/19/18 09:50	Aqueous	GC 52	N/A	01/24/18 14:28	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP04-39-41	18-01-1452-6-D	01/19/18 10:25	Aqueous	GC 52	N/A	01/24/18 15:01	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.35	1.00		1.00		
CP22-HP04-43-45	18-01-1452-7-D	01/19/18 11:05	Aqueous	GC 52	N/A	01/24/18 15:29	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP05-35-37	18-01-1452-8-D	01/19/18 11:47	Aqueous	GC 52	N/A	01/24/18 15:58	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	18-01-1452-9-D	01/19/18 12:05	Aqueous	GC 52	N/A	01/24/18 16:25	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP20180119	18-01-1452-10-D	01/19/18 12:00	Aqueous	GC 52	N/A	01/24/18 18:40	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP05-43-45	18-01-1452-11-D	01/19/18 12:40	Aqueous	GC 52	N/A	01/24/18 19:07	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.18	1.00		1.00		
Method Blank	099-14-325-99	N/A	Aqueous	GC 52	N/A	01/24/18 11:44	180124L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Soil-20180119	18-01-1452-15-A	01/19/18 11:40	Solid	GC 46	01/22/18	01/23/18 17:13	180122B05B

Parameter	Result	RL	DF	Qualifiers
C6	ND	5.0	1.00	
C7	ND	5.0	1.00	
C8	ND	5.0	1.00	
C9-C10	ND	5.0	1.00	
C11-C12	ND	5.0	1.00	
C13-C14	ND	5.0	1.00	
C15-C16	ND	5.0	1.00	
C17-C18	ND	5.0	1.00	
C19-C20	ND	5.0	1.00	
C21-C22	ND	5.0	1.00	
C23-C24	ND	5.0	1.00	
C25-C28	ND	5.0	1.00	
C29-C32	ND	5.0	1.00	
C33-C36	ND	5.0	1.00	
C37-C40	ND	5.0	1.00	
C41-C44	ND	5.0	1.00	
C6-C44 Total	ND	5.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	97	61-145		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-490-2969	N/A	Solid	GC 46	01/22/18	01/23/18 14:06	180122B05B

Parameter	Result	RL	DF	Qualifiers
C6	ND	5.0	1.00	
C7	ND	5.0	1.00	
C8	ND	5.0	1.00	
C9-C10	ND	5.0	1.00	
C11-C12	ND	5.0	1.00	
C13-C14	ND	5.0	1.00	
C15-C16	ND	5.0	1.00	
C17-C18	ND	5.0	1.00	
C19-C20	ND	5.0	1.00	
C21-C22	ND	5.0	1.00	
C23-C24	ND	5.0	1.00	
C25-C28	ND	5.0	1.00	
C29-C32	ND	5.0	1.00	
C33-C36	ND	5.0	1.00	
C37-C40	ND	5.0	1.00	
C41-C44	ND	5.0	1.00	
C6-C44 Total	ND	5.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	95	61-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3510C
Method: EPA 8015B (M)
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Water-20180119	18-01-1452-16-E	01/19/18 12:35	Aqueous	GC 45	01/23/18	01/25/18 01:48	180123B07A

Comment(s): - The total concentration includes individual carbon range concentrations (estimated), if any, below the RL reported as ND.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
C6	ND	91	1.00	
C7	ND	91	1.00	
C8	ND	91	1.00	
C9-C10	ND	91	1.00	
C11-C12	ND	91	1.00	
C13-C14	ND	91	1.00	
C15-C16	ND	91	1.00	
C17-C18	ND	91	1.00	
C19-C20	ND	91	1.00	
C21-C22	ND	91	1.00	
C23-C24	ND	91	1.00	
C25-C28	ND	91	1.00	
C29-C32	ND	91	1.00	
C33-C36	ND	91	1.00	
C37-C40	ND	91	1.00	
C41-C44	ND	91	1.00	
C6-C44 Total	170	91	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
n-Octacosane	103	68-140		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3510C
Method: EPA 8015B (M)
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-498-573	N/A	Aqueous	GC 45	01/23/18	01/24/18 17:21	180123B07A

Parameter	Result	RL	DF	Qualifiers
C6	ND	100	1.00	
C7	ND	100	1.00	
C8	ND	100	1.00	
C9-C10	ND	100	1.00	
C11-C12	ND	100	1.00	
C13-C14	ND	100	1.00	
C15-C16	ND	100	1.00	
C17-C18	ND	100	1.00	
C19-C20	ND	100	1.00	
C21-C22	ND	100	1.00	
C23-C24	ND	100	1.00	
C25-C28	ND	100	1.00	
C29-C32	ND	100	1.00	
C33-C36	ND	100	1.00	
C37-C40	ND	100	1.00	
C41-C44	ND	100	1.00	
C6-C44 Total	ND	100	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	93	68-140	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Soil-20180119	18-01-1452-15-A	01/19/18 11:40	Solid	ICP 7300	01/27/18	01/29/18 12:51	180127L03

Parameter	Result	RL	DF	Qualifiers
Antimony	2.49	0.735	0.980	
Arsenic	3.59	0.735	0.980	
Barium	256	0.490	0.980	
Beryllium	0.453	0.245	0.980	
Cadmium	0.555	0.490	0.980	
Chromium	32.0	0.245	0.980	
Cobalt	13.3	0.245	0.980	
Copper	22.9	0.490	0.980	
Lead	3.95	0.490	0.980	
Molybdenum	0.823	0.245	0.980	
Nickel	14.0	0.245	0.980	
Selenium	ND	0.735	0.980	
Silver	ND	0.245	0.980	
Thallium	ND	0.735	0.980	
Vanadium	81.1	0.245	0.980	
Zinc	75.2	0.980	0.980	


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-002-25829	N/A	Solid	ICP 7300	01/27/18	01/29/18 11:07	180127L03

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.735	0.980	
Arsenic	ND	0.735	0.980	
Barium	ND	0.490	0.980	
Beryllium	ND	0.245	0.980	
Cadmium	ND	0.490	0.980	
Chromium	ND	0.245	0.980	
Cobalt	ND	0.245	0.980	
Copper	ND	0.490	0.980	
Lead	ND	0.490	0.980	
Molybdenum	ND	0.245	0.980	
Nickel	ND	0.245	0.980	
Selenium	ND	0.735	0.980	
Silver	ND	0.245	0.980	
Thallium	ND	0.735	0.980	
Vanadium	ND	0.245	0.980	
Zinc	ND	0.980	0.980	



Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Water-20180119	18-01-1452-16-D	01/19/18 12:35	Aqueous	ICP 7300	01/24/18	01/26/18 13:56	180124LA2

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	0.0100	0.0100	1.00	
Barium	0.170	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	0.0255	0.0100	1.00	
Cobalt	ND	0.0100	1.00	
Copper	0.0695	0.0100	1.00	
Lead	ND	0.0100	1.00	
Molybdenum	0.0138	0.0100	1.00	
Nickel	0.0179	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	ND	0.0150	1.00	
Vanadium	0.0381	0.0100	1.00	
Zinc	0.117	0.0100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-003-16762	N/A	Aqueous	ICP 7300	01/24/18	01/26/18 13:10	180124LA2

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	ND	0.0100	1.00	
Barium	ND	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	ND	0.0100	1.00	
Cobalt	ND	0.0100	1.00	
Copper	ND	0.0100	1.00	
Lead	ND	0.0100	1.00	
Molybdenum	ND	0.0100	1.00	
Nickel	ND	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	ND	0.0150	1.00	
Vanadium	ND	0.0100	1.00	
Zinc	ND	0.0100	1.00	


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 7470A Total
Method: EPA 7470A
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Water-20180119	18-01-1452-16-D	01/19/18 12:35	Aqueous	Mercury 07	01/24/18	01/25/18 13:53	180124LA1

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	

Method Blank	099-04-008-8449	N/A	Aqueous	Mercury 07	01/24/18	01/24/18 15:05	180124LA1
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 7471A Total
Method: EPA 7471A
Units: mg/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Soil-20180119	18-01-1452-15-A	01/19/18 11:40	Solid	Mercury 07	01/26/18	01/26/18 20:22	180126L04

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0833	1.00	

Method Blank	099-16-272-3609	N/A	Solid	Mercury 07	01/26/18	01/26/18 19:53	180126L04
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0833	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Soil-20180119	18-01-1452-15-A	01/19/18 11:40	Solid	GC/MS R	01/20/18	01/20/18 12:51	180120L011

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	120	1.00	
Benzene	ND	5.0	1.00	
Bromobenzene	ND	5.0	1.00	
Bromochloromethane	ND	5.0	1.00	
Bromodichloromethane	ND	5.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	25	1.00	
2-Butanone	ND	50	1.00	
n-Butylbenzene	ND	5.0	1.00	
sec-Butylbenzene	ND	5.0	1.00	
tert-Butylbenzene	ND	5.0	1.00	
Carbon Disulfide	ND	50	1.00	
Carbon Tetrachloride	ND	5.0	1.00	
Chlorobenzene	ND	5.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	5.0	1.00	
Chloromethane	ND	25	1.00	
2-Chlorotoluene	ND	5.0	1.00	
4-Chlorotoluene	ND	5.0	1.00	
Dibromochloromethane	ND	5.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	10	1.00	
1,2-Dibromoethane	ND	5.0	1.00	
Dibromomethane	ND	5.0	1.00	
1,2-Dichlorobenzene	ND	5.0	1.00	
1,3-Dichlorobenzene	ND	5.0	1.00	
1,4-Dichlorobenzene	ND	5.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	5.0	1.00	
1,2-Dichloroethane	ND	5.0	1.00	
1,1-Dichloroethene	ND	5.0	1.00	
c-1,2-Dichloroethene	ND	5.0	1.00	
t-1,2-Dichloroethene	ND	5.0	1.00	
1,2-Dichloropropane	ND	5.0	1.00	
1,3-Dichloropropane	ND	5.0	1.00	
2,2-Dichloropropane	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton WR2274

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	5.0	1.00	
c-1,3-Dichloropropene	ND	5.0	1.00	
t-1,3-Dichloropropene	ND	5.0	1.00	
Ethylbenzene	ND	5.0	1.00	
2-Hexanone	ND	50	1.00	
Isopropylbenzene	ND	5.0	1.00	
p-Isopropyltoluene	ND	5.0	1.00	
Methylene Chloride	ND	50	1.00	
4-Methyl-2-Pentanone	ND	50	1.00	
Naphthalene	ND	50	1.00	
n-Propylbenzene	ND	5.0	1.00	
Styrene	ND	5.0	1.00	
1,1,1,2-Tetrachloroethane	ND	5.0	1.00	
1,1,2,2-Tetrachloroethane	ND	5.0	1.00	
Tetrachloroethene	ND	5.0	1.00	
Toluene	ND	5.0	1.00	
1,2,3-Trichlorobenzene	ND	10	1.00	
1,2,4-Trichlorobenzene	ND	5.0	1.00	
1,1,1-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50	1.00	
Trichloroethene	ND	5.0	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	5.0	1.00	
Trichlorofluoromethane	ND	50	1.00	
1,3,5-Trimethylbenzene	ND	5.0	1.00	
Vinyl Acetate	ND	50	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	5.0	1.00	
o-Xylene	ND	5.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	97	60-132	
Dibromofluoromethane	105	63-141	
1,2-Dichloroethane-d4	106	62-146	
Toluene-d8	99	70-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-314-868	N/A	Solid	GC/MS R	01/20/18	01/20/18 11:52	180120L011

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Acetone	ND	120	1.00	
Benzene	ND	5.0	1.00	
Bromobenzene	ND	5.0	1.00	
Bromochloromethane	ND	5.0	1.00	
Bromodichloromethane	ND	5.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	25	1.00	
2-Butanone	ND	50	1.00	
n-Butylbenzene	ND	5.0	1.00	
sec-Butylbenzene	ND	5.0	1.00	
tert-Butylbenzene	ND	5.0	1.00	
Carbon Disulfide	ND	50	1.00	
Carbon Tetrachloride	ND	5.0	1.00	
Chlorobenzene	ND	5.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	5.0	1.00	
Chloromethane	ND	25	1.00	
2-Chlorotoluene	ND	5.0	1.00	
4-Chlorotoluene	ND	5.0	1.00	
Dibromochloromethane	ND	5.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	10	1.00	
1,2-Dibromoethane	ND	5.0	1.00	
Dibromomethane	ND	5.0	1.00	
1,2-Dichlorobenzene	ND	5.0	1.00	
1,3-Dichlorobenzene	ND	5.0	1.00	
1,4-Dichlorobenzene	ND	5.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	5.0	1.00	
1,2-Dichloroethane	ND	5.0	1.00	
1,1-Dichloroethene	ND	5.0	1.00	
c-1,2-Dichloroethene	ND	5.0	1.00	
t-1,2-Dichloroethene	ND	5.0	1.00	
1,2-Dichloropropane	ND	5.0	1.00	
1,3-Dichloropropane	ND	5.0	1.00	
2,2-Dichloropropane	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton WR2274

Page 4 of 4

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	5.0	1.00	
c-1,3-Dichloropropene	ND	5.0	1.00	
t-1,3-Dichloropropene	ND	5.0	1.00	
Ethylbenzene	ND	5.0	1.00	
2-Hexanone	ND	50	1.00	
Isopropylbenzene	ND	5.0	1.00	
p-Isopropyltoluene	ND	5.0	1.00	
Methylene Chloride	ND	50	1.00	
4-Methyl-2-Pentanone	ND	50	1.00	
Naphthalene	ND	50	1.00	
n-Propylbenzene	ND	5.0	1.00	
Styrene	ND	5.0	1.00	
1,1,1,2-Tetrachloroethane	ND	5.0	1.00	
1,1,2,2-Tetrachloroethane	ND	5.0	1.00	
Tetrachloroethene	ND	5.0	1.00	
Toluene	ND	5.0	1.00	
1,2,3-Trichlorobenzene	ND	10	1.00	
1,2,4-Trichlorobenzene	ND	5.0	1.00	
1,1,1-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50	1.00	
Trichloroethene	ND	5.0	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	5.0	1.00	
Trichlorofluoromethane	ND	50	1.00	
1,3,5-Trimethylbenzene	ND	5.0	1.00	
Vinyl Acetate	ND	50	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	5.0	1.00	
o-Xylene	ND	5.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	100	60-132	
Dibromofluoromethane	110	63-141	
1,2-Dichloroethane-d4	116	62-146	
Toluene-d8	100	70-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Water-20180119	18-01-1452-16-A	01/19/18 12:35	Aqueous	GC/MS L	01/23/18	01/23/18 22:15	180123L028

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	10	1.00	
Benzene	ND	0.50	1.00	
Bromobenzene	ND	0.50	1.00	
Bromochloromethane	ND	1.0	1.00	
Bromodichloromethane	ND	0.50	1.00	
Bromoform	ND	0.50	1.00	
Bromomethane	ND	1.0	1.00	
2-Butanone	ND	5.0	1.00	
n-Butylbenzene	ND	0.50	1.00	
sec-Butylbenzene	ND	0.50	1.00	
tert-Butylbenzene	ND	0.50	1.00	
Carbon Disulfide	ND	1.0	1.00	
Carbon Tetrachloride	ND	0.50	1.00	
Chlorobenzene	ND	0.50	1.00	
Chloroethane	ND	0.50	1.00	
Chloroform	ND	0.50	1.00	
Chloromethane	ND	0.50	1.00	
2-Chlorotoluene	ND	0.50	1.00	
4-Chlorotoluene	ND	0.50	1.00	
Dibromochloromethane	ND	0.50	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	0.50	1.00	
Dibromomethane	ND	0.50	1.00	
1,2-Dichlorobenzene	ND	0.50	1.00	
1,3-Dichlorobenzene	ND	0.50	1.00	
1,4-Dichlorobenzene	ND	0.50	1.00	
Dichlorodifluoromethane	ND	1.0	1.00	
1,1-Dichloroethane	0.50	0.50	1.00	
1,2-Dichloroethane	2.7	0.50	1.00	
1,1-Dichloroethene	8.0	0.50	1.00	
c-1,2-Dichloroethene	22	0.50	1.00	
t-1,2-Dichloroethene	0.55	0.50	1.00	
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	0.50	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	0.50	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	0.50	1.00	
p-Isopropyltoluene	ND	0.50	1.00	
Methylene Chloride	39	1.0	1.00	
4-Methyl-2-Pentanone	ND	5.0	1.00	
Naphthalene	ND	1.0	1.00	
n-Propylbenzene	ND	0.50	1.00	
Styrene	ND	0.50	1.00	
Chloroprene	ND	0.50	1.00	
1,1,1,2-Tetrachloroethane	ND	0.50	1.00	
1,1,2,2-Tetrachloroethane	ND	0.50	1.00	
Tetrachloroethene	8.6	0.50	1.00	
Toluene	0.75	0.50	1.00	
1,2,3-Trichlorobenzene	ND	0.50	1.00	
1,2,4-Trichlorobenzene	ND	0.50	1.00	
1,1,1-Trichloroethane	7.0	0.50	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.58	0.50	1.00	
1,1,2-Trichloroethane	7.9	0.50	1.00	
Trichlorofluoromethane	ND	0.50	1.00	
1,2,3-Trichloropropane	ND	1.0	1.00	
1,2,4-Trimethylbenzene	ND	0.50	1.00	
1,3,5-Trimethylbenzene	ND	0.50	1.00	
Vinyl Acetate	ND	5.0	1.00	
Vinyl Chloride	ND	0.50	1.00	
p/m-Xylene	ND	0.50	1.00	
o-Xylene	ND	0.50	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	0.50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	100	68-120	
Dibromofluoromethane	101	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	100	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-Water-20180119	18-01-1452-16-C	01/19/18 12:35	Aqueous	GC/MS UU	01/27/18	01/27/18 12:22	180127L001

Parameter	Result	RL	DF	Qualifiers
Trichloroethene	190	4.0	8.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,4-Bromofluorobenzene	96	68-120	
Dibromofluoromethane	107	80-127	
1,2-Dichloroethane-d4	108	80-128	
Toluene-d8	101	80-120	


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 4 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-296	N/A	Aqueous	GC/MS L	01/23/18	01/23/18 17:35	180123L028

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	10	1.00	
Benzene	ND	0.50	1.00	
Bromobenzene	ND	0.50	1.00	
Bromochloromethane	ND	1.0	1.00	
Bromodichloromethane	ND	0.50	1.00	
Bromoform	ND	0.50	1.00	
Bromomethane	ND	1.0	1.00	
2-Butanone	ND	5.0	1.00	
n-Butylbenzene	ND	0.50	1.00	
sec-Butylbenzene	ND	0.50	1.00	
tert-Butylbenzene	ND	0.50	1.00	
Carbon Disulfide	ND	1.0	1.00	
Carbon Tetrachloride	ND	0.50	1.00	
Chlorobenzene	ND	0.50	1.00	
Chloroethane	ND	0.50	1.00	
Chloroform	ND	0.50	1.00	
Chloromethane	ND	0.50	1.00	
2-Chlorotoluene	ND	0.50	1.00	
4-Chlorotoluene	ND	0.50	1.00	
Dibromochloromethane	ND	0.50	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	0.50	1.00	
Dibromomethane	ND	0.50	1.00	
1,2-Dichlorobenzene	ND	0.50	1.00	
1,3-Dichlorobenzene	ND	0.50	1.00	
1,4-Dichlorobenzene	ND	0.50	1.00	
Dichlorodifluoromethane	ND	1.0	1.00	
1,1-Dichloroethane	ND	0.50	1.00	
1,2-Dichloroethane	ND	0.50	1.00	
1,1-Dichloroethene	ND	0.50	1.00	
c-1,2-Dichloroethene	ND	0.50	1.00	
t-1,2-Dichloroethene	ND	0.50	1.00	
1,2-Dichloropropane	ND	0.50	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	0.50	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	0.50	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	0.50	1.00	
p-Isopropyltoluene	ND	0.50	1.00	
Methylene Chloride	ND	1.0	1.00	
4-Methyl-2-Pentanone	ND	5.0	1.00	
Naphthalene	ND	1.0	1.00	
n-Propylbenzene	ND	0.50	1.00	
Styrene	ND	0.50	1.00	
Chloroprene	ND	0.50	1.00	
1,1,1,2-Tetrachloroethane	ND	0.50	1.00	
1,1,2,2-Tetrachloroethane	ND	0.50	1.00	
Tetrachloroethene	ND	0.50	1.00	
Toluene	ND	0.50	1.00	
1,2,3-Trichlorobenzene	ND	0.50	1.00	
1,2,4-Trichlorobenzene	ND	0.50	1.00	
1,1,1-Trichloroethane	ND	0.50	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.50	1.00	
1,1,2-Trichloroethane	ND	0.50	1.00	
Trichlorofluoromethane	ND	0.50	1.00	
1,2,3-Trichloropropane	ND	1.0	1.00	
1,2,4-Trimethylbenzene	ND	0.50	1.00	
1,3,5-Trimethylbenzene	ND	0.50	1.00	
Vinyl Acetate	ND	5.0	1.00	
Vinyl Chloride	ND	0.50	1.00	
p/m-Xylene	ND	0.50	1.00	
o-Xylene	ND	0.50	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	0.50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	98	68-120	
Dibromofluoromethane	97	80-127	
1,2-Dichloroethane-d4	96	80-128	
Toluene-d8	101	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-446-297	N/A	Aqueous	GC/MS UU	01/27/18	01/27/18 11:52	180127L001

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Trichloroethene	ND	0.50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	96	68-120	
Dibromofluoromethane	107	80-127	
1,2-Dichloroethane-d4	104	80-128	
Toluene-d8	102	80-120	


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP10-39-41	18-01-1452-1-B	01/19/18 07:30	Aqueous	GC/MS T	01/30/18	01/30/18 21:36	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		1.3		0.12		25.0	
CP22-HP10-43-45	18-01-1452-2-C	01/19/18 08:10	Aqueous	GC/MS T	01/31/18	01/31/18 14:05	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.017		0.0050		1.00	
CP22-HP12-35-37	18-01-1452-3-B	01/19/18 08:50	Aqueous	GC/MS T	01/30/18	01/30/18 22:11	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		3.3		0.25		50.0	
CP22-HP12-39-41	18-01-1452-4-C	01/19/18 09:10	Aqueous	GC/MS T	01/31/18	01/31/18 14:40	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.042		0.0050		1.00	
CP22-HP04-35-37	18-01-1452-5-C	01/19/18 09:50	Aqueous	GC/MS T	01/31/18	01/31/18 15:14	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.027		0.0050		1.00	
CP22-HP04-39-41	18-01-1452-6-C	01/19/18 10:25	Aqueous	GC/MS T	01/31/18	01/31/18 18:08	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.021		0.0050		1.00	
CP22-HP04-43-45	18-01-1452-7-C	01/19/18 11:05	Aqueous	GC/MS T	01/31/18	01/31/18 16:59	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP05-35-37	18-01-1452-8-C	01/19/18 11:47	Aqueous	GC/MS T	01/31/18	01/31/18 19:18	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.20		0.010		2.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-39-41	18-01-1452-9-C	01/19/18 12:05	Aqueous	GC/MS T	01/31/18	01/31/18 18:43	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.064		0.0050		1.00	
DUP20180119	18-01-1452-10-B	01/19/18 12:00	Aqueous	GC/MS T	01/31/18	01/31/18 19:52	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		3.2		0.25		50.0	
CP22-HP05-43-45	18-01-1452-11-B	01/19/18 12:40	Aqueous	GC/MS T	01/31/18	01/31/18 17:33	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
T-Blank20180119	18-01-1452-12-B	01/19/18 10:30	Aqueous	GC/MS T	01/30/18	01/30/18 12:55	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank20180119	18-01-1452-13-B	01/19/18 12:25	Aqueous	GC/MS T	01/30/18	01/30/18 13:30	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
F-Blank20180119	18-01-1452-14-B	01/19/18 10:40	Aqueous	GC/MS T	01/30/18	01/30/18 14:04	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1400	N/A	Aqueous	GC/MS T	01/30/18	01/30/18 12:16	180130L016
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1402	N/A	Aqueous	GC/MS T	01/31/18	01/31/18 12:21	180131L014
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3550B
Method: EPA 8015B (M)

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
18-01-1393-1	Sample	Solid	GC 46	01/22/18	01/23/18 16:11	180122S05				
18-01-1393-1	Matrix Spike	Solid	GC 46	01/22/18	01/23/18 14:48	180122S05				
18-01-1393-1	Matrix Spike Duplicate	Solid	GC 46	01/22/18	01/23/18 15:09	180122S05				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	31.32	400.0	423.7	98	390.5	90	64-130	8	0-15	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1433-1	Sample	Solid	ICP 7300	01/27/18	01/29/18 12:44	180127S03
18-01-1433-1	Matrix Spike	Solid	ICP 7300	01/27/18	01/29/18 12:45	180127S03
18-01-1433-1	Matrix Spike Duplicate	Solid	ICP 7300	01/27/18	01/29/18 12:46	180127S03

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	2.605	25.00	8.949	25	8.124	22	50-115	10	0-20	3
Arsenic	7.463	25.00	34.25	107	33.91	106	75-125	1	0-20	
Barium	162.4	25.00	180.4	4X	178.3	4X	75-125	4X	0-20	Q
Beryllium	0.8199	25.00	28.43	110	27.93	108	75-125	2	0-20	
Cadmium	0.5421	25.00	27.53	108	27.22	107	75-125	1	0-20	
Chromium	33.68	25.00	59.55	103	58.74	100	75-125	1	0-20	
Cobalt	17.28	25.00	43.44	105	42.83	102	75-125	1	0-20	
Copper	41.80	25.00	69.81	112	68.86	108	75-125	1	0-20	
Lead	9.342	25.00	36.13	107	35.73	106	75-125	1	0-20	
Molybdenum	0.7109	25.00	24.77	96	24.70	96	75-125	0	0-20	
Nickel	30.36	25.00	54.93	98	54.12	95	75-125	1	0-20	
Selenium	ND	25.00	23.55	94	26.18	105	75-125	11	0-20	
Silver	ND	12.50	13.51	108	13.32	107	75-125	1	0-20	
Thallium	ND	25.00	24.06	96	23.07	92	75-125	4	0-20	
Vanadium	64.25	25.00	89.67	102	88.43	97	75-125	1	0-20	
Zinc	73.33	25.00	95.70	89	94.69	85	75-125	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1232-3	Sample	Aqueous	ICP 7300	01/24/18	01/26/18 14:09	180124SA2
18-01-1232-3	Matrix Spike	Aqueous	ICP 7300	01/24/18	01/26/18 14:02	180124SA2
18-01-1232-3	Matrix Spike Duplicate	Aqueous	ICP 7300	01/24/18	01/26/18 14:03	180124SA2

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	0.5000	0.4938	99	0.4855	97	72-132	2	0-10	
Arsenic	0.02388	0.5000	0.5262	100	0.5251	100	80-140	0	0-11	
Barium	0.1097	0.5000	0.6140	101	0.6126	101	87-123	0	0-6	
Beryllium	ND	0.5000	0.5241	105	0.5037	101	89-119	4	0-8	
Cadmium	ND	0.5000	0.4910	98	0.4839	97	82-124	1	0-7	
Chromium	ND	0.5000	0.5088	102	0.5043	101	86-122	1	0-8	
Cobalt	ND	0.5000	0.5058	101	0.4991	100	83-125	1	0-7	
Copper	ND	0.5000	0.5443	109	0.5421	108	78-126	0	0-7	
Lead	ND	0.5000	0.4662	93	0.4656	93	84-120	0	0-7	
Molybdenum	ND	0.5000	0.4863	97	0.4778	96	78-126	2	0-7	
Nickel	0.01126	0.5000	0.5036	98	0.4966	97	84-120	1	0-7	
Selenium	ND	0.5000	0.4954	99	0.4902	98	79-127	1	0-9	
Silver	ND	0.2500	0.2616	105	0.2604	104	86-128	0	0-7	
Thallium	ND	0.5000	0.4525	90	0.4632	93	79-121	2	0-8	
Vanadium	ND	0.5000	0.5230	105	0.5201	104	88-118	1	0-7	
Zinc	0.01545	0.5000	0.5387	105	0.5443	106	89-131	1	0-8	

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1319-2	Sample	Aqueous	Mercury 07	01/24/18	01/24/18 15:15	180124SA1
18-01-1319-2	Matrix Spike	Aqueous	Mercury 07	01/24/18	01/24/18 15:11	180124SA1
18-01-1319-2	Matrix Spike Duplicate	Aqueous	Mercury 07	01/24/18	01/24/18 15:13	180124SA1

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.01000	0.01115	112	0.01048	105	75-120	6	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1452
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-01-1433-1	Sample	Solid	Mercury 07	01/26/18	01/26/18 19:57	180126S04
18-01-1433-1	Matrix Spike	Solid	Mercury 07	01/26/18	01/26/18 20:00	180126S04
18-01-1433-1	Matrix Spike Duplicate	Solid	Mercury 07	01/26/18	01/26/18 20:02	180126S04

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.8350	0.7903	95	0.8045	96	71-137	2	0-14	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
IDW-Soil-20180119	Sample	Solid	GC/MS R	01/20/18	01/20/18 12:51	180120S004
IDW-Soil-20180119	Matrix Spike	Solid	GC/MS R	01/20/18	01/20/18 13:19	180120S004
IDW-Soil-20180119	Matrix Spike Duplicate	Solid	GC/MS R	01/20/18	01/20/18 13:47	180120S004

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	ND	50.00	31.16	62	32.50	65	70-130	4	0-20	3
Benzene	ND	50.00	50.73	101	51.55	103	61-127	2	0-20	
Bromobenzene	ND	50.00	47.81	96	49.01	98	70-130	2	0-20	
Bromochloromethane	ND	50.00	51.25	102	53.53	107	70-130	4	0-20	
Bromodichloromethane	ND	50.00	51.99	104	53.08	106	70-130	2	0-20	
Bromoform	ND	50.00	47.37	95	50.95	102	70-130	7	0-20	
Bromomethane	ND	50.00	46.14	92	51.00	102	70-130	10	0-20	
2-Butanone	ND	50.00	37.08	74	42.98	86	70-130	15	0-20	
n-Butylbenzene	ND	50.00	48.60	97	50.36	101	77-123	4	0-25	
sec-Butylbenzene	ND	50.00	46.89	94	48.94	98	70-130	4	0-20	
tert-Butylbenzene	ND	50.00	43.65	87	44.92	90	70-130	3	0-20	
Carbon Disulfide	ND	50.00	40.44	81	40.82	82	70-130	1	0-20	
Carbon Tetrachloride	ND	50.00	55.17	110	55.72	111	51-135	1	0-29	
Chlorobenzene	ND	50.00	46.39	93	48.20	96	57-123	4	0-20	
Chloroethane	ND	50.00	49.91	100	56.14	112	70-130	12	0-20	
Chloroform	ND	50.00	53.85	108	54.34	109	70-130	1	0-20	
Chloromethane	ND	50.00	48.74	97	55.18	110	70-130	12	0-20	
2-Chlorotoluene	ND	50.00	46.25	92	47.80	96	70-130	3	0-20	
4-Chlorotoluene	ND	50.00	43.97	88	46.50	93	70-130	6	0-20	
Dibromochloromethane	ND	50.00	50.00	100	51.12	102	70-130	2	0-20	
1,2-Dibromo-3-Chloropropane	ND	50.00	44.94	90	48.76	98	70-130	8	0-20	
1,2-Dibromoethane	ND	50.00	49.04	98	51.72	103	64-124	5	0-20	
Dibromomethane	ND	50.00	51.40	103	52.24	104	70-130	2	0-20	
1,2-Dichlorobenzene	ND	50.00	43.88	88	46.03	92	35-131	5	0-25	
1,3-Dichlorobenzene	ND	50.00	45.47	91	47.77	96	70-130	5	0-20	
1,4-Dichlorobenzene	ND	50.00	43.24	86	44.92	90	70-130	4	0-20	
Dichlorodifluoromethane	ND	50.00	52.69	105	58.00	116	70-130	10	0-20	
1,1-Dichloroethane	ND	50.00	51.57	103	52.76	106	70-130	2	0-20	
1,2-Dichloroethane	ND	50.00	50.74	101	51.19	102	70-130	1	0-20	
1,1-Dichloroethene	ND	50.00	39.11	78	41.09	82	47-143	5	0-25	
c-1,2-Dichloroethene	ND	50.00	51.56	103	52.61	105	70-130	2	0-20	
t-1,2-Dichloroethene	ND	50.00	53.53	107	54.34	109	70-130	2	0-20	
1,2-Dichloropropane	ND	50.00	50.22	100	51.08	102	79-115	2	0-25	
1,3-Dichloropropane	ND	50.00	45.92	92	48.31	97	70-130	5	0-20	
2,2-Dichloropropane	ND	50.00	51.52	103	52.21	104	70-130	1	0-20	

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,1-Dichloropropene	ND	50.00	53.11	106	53.89	108	70-130	1	0-20	
c-1,3-Dichloropropene	ND	50.00	51.01	102	51.34	103	70-130	1	0-20	
t-1,3-Dichloropropene	ND	50.00	48.67	97	49.88	100	70-130	2	0-20	
Ethylbenzene	ND	50.00	47.88	96	49.85	100	57-129	4	0-22	
2-Hexanone	ND	50.00	36.93	74	40.03	80	70-130	8	0-20	
Isopropylbenzene	ND	50.00	48.40	97	50.08	100	70-130	3	0-20	
p-Isopropyltoluene	ND	50.00	46.39	93	48.65	97	70-130	5	0-20	
Methylene Chloride	ND	50.00	53.05	106	53.89	108	70-130	2	0-20	
4-Methyl-2-Pentanone	ND	50.00	49.62	99	51.09	102	70-130	3	0-20	
Naphthalene	ND	50.00	44.61	89	46.29	93	70-130	4	0-20	
n-Propylbenzene	ND	50.00	47.55	95	49.23	98	70-130	3	0-20	
Styrene	ND	50.00	47.20	94	49.93	100	70-130	6	0-20	
1,1,1,2-Tetrachloroethane	ND	50.00	47.57	95	49.81	100	70-130	5	0-20	
1,1,2,2-Tetrachloroethane	ND	50.00	42.59	85	45.63	91	70-130	7	0-20	
Tetrachloroethene	ND	50.00	63.47	127	72.55	145	70-130	13	0-20	3
Toluene	ND	50.00	49.79	100	50.17	100	63-123	1	0-20	
1,2,3-Trichlorobenzene	ND	50.00	45.73	91	48.40	97	70-130	6	0-20	
1,2,4-Trichlorobenzene	ND	50.00	48.45	97	49.33	99	70-130	2	0-20	
1,1,1-Trichloroethane	ND	50.00	52.40	105	53.86	108	70-130	3	0-20	
1,1,2-Trichloroethane	ND	50.00	49.22	98	50.38	101	70-130	2	0-20	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50.00	41.36	83	41.67	83	70-130	1	0-20	
Trichloroethene	ND	50.00	53.04	106	54.30	109	44-158	2	0-20	
1,2,3-Trichloropropane	ND	50.00	45.26	91	45.35	91	70-130	0	0-20	
1,2,4-Trimethylbenzene	ND	50.00	45.35	91	48.11	96	70-130	6	0-20	
Trichlorofluoromethane	ND	50.00	51.64	103	57.55	115	70-130	11	0-20	
1,3,5-Trimethylbenzene	ND	50.00	46.47	93	47.64	95	70-130	2	0-20	
Vinyl Acetate	ND	50.00	42.82	86	41.93	84	70-130	2	0-20	
Vinyl Chloride	ND	50.00	52.66	105	57.74	115	49-139	9	0-47	
p/m-Xylene	ND	100.0	95.91	96	98.18	98	70-130	2	0-20	
o-Xylene	ND	50.00	49.50	99	51.38	103	70-130	4	0-20	
Methyl-t-Butyl Ether (MTBE)	ND	50.00	53.20	106	53.97	108	57-123	1	0-21	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - PDS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
18-01-1319-2	Sample	Aqueous	Mercury 07	01/24/18 00:00	01/24/18 15:15	180124SA1
18-01-1319-2	PDS	Aqueous	Mercury 07	01/24/18 00:00	01/24/18 15:47	180124SA1

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Mercury	ND	0.01000	0.01096	110	75-125	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants	Date Received:	01/19/18
595 Market Street, Suite 610	Work Order:	18-01-1452
San Francisco, CA 94105-2811	Preparation:	N/A
Project: ESTCP C. Pendleton WR2274	Method:	RSK-175M

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-325-99	LCS	Aqueous	GC 52	N/A	01/24/18 09:44	180124L01
099-14-325-99	LCSD	Aqueous	GC 52	N/A	01/24/18 10:13	180124L01

Parameter	Spike Added	<u>LCS</u> Conc.	<u>LCS</u> %Rec.	<u>LCSD</u> Conc.	<u>LCSD</u> %Rec.	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Propene	103.0	103.4	100	104.5	101	80-120	1	0-20	



RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1452
 Preparation: EPA 3550B
 Method: EPA 8015B (M)

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-490-2969	LCS	Solid	GC 46	01/22/18	01/23/18 13:05	180122B05B

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
TPH as Diesel	400.0	336.8	84	75-123	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3510C
Method: EPA 8015B (M)

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-15-498-573	LCS	Aqueous	GC 45	01/23/18	01/24/18 17:42	180123B07A			
099-15-498-573	LCSD	Aqueous	GC 45	01/23/18	01/24/18 18:04	180123B07A			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	4000	3229	81	3048	76	69-123	6	0-30	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1452
 Preparation: EPA 3050B
 Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
097-01-002-25829	LCS	Solid	ICP 7300	01/27/18	01/29/18 11:08	180127L03	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		25.00	25.68	103	80-120	73-127	
Arsenic		25.00	24.46	98	80-120	73-127	
Barium		25.00	27.32	109	80-120	73-127	
Beryllium		25.00	24.61	98	80-120	73-127	
Cadmium		25.00	26.88	108	80-120	73-127	
Chromium		25.00	26.41	106	80-120	73-127	
Cobalt		25.00	27.35	109	80-120	73-127	
Copper		25.00	26.72	107	80-120	73-127	
Lead		25.00	27.52	110	80-120	73-127	
Molybdenum		25.00	25.90	104	80-120	73-127	
Nickel		25.00	26.30	105	80-120	73-127	
Selenium		25.00	24.60	98	80-120	73-127	
Silver		12.50	12.88	103	80-120	73-127	
Thallium		25.00	26.32	105	80-120	73-127	
Vanadium		25.00	25.90	104	80-120	73-127	
Zinc		25.00	26.65	107	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass


 Return to Contents



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
097-01-003-16762	LCS	Aqueous	ICP 7300	01/24/18	01/26/18 13:11	180124LA2	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		0.5000	0.5474	109	80-120	73-127	
Arsenic		0.5000	0.5209	104	80-120	73-127	
Barium		0.5000	0.5640	113	80-120	73-127	
Beryllium		0.5000	0.5190	104	80-120	73-127	
Cadmium		0.5000	0.5500	110	80-120	73-127	
Chromium		0.5000	0.5458	109	80-120	73-127	
Cobalt		0.5000	0.5616	112	80-120	73-127	
Copper		0.5000	0.5626	113	80-120	73-127	
Lead		0.5000	0.5667	113	80-120	73-127	
Molybdenum		0.5000	0.5424	108	80-120	73-127	
Nickel		0.5000	0.5554	111	80-120	73-127	
Selenium		0.5000	0.5012	100	80-120	73-127	
Silver		0.2500	0.2667	107	80-120	73-127	
Thallium		0.5000	0.5363	107	80-120	73-127	
Vanadium		0.5000	0.5371	107	80-120	73-127	
Zinc		0.5000	0.5486	110	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1452
 Preparation: EPA 7470A Total
 Method: EPA 7470A

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-04-008-8449	LCS	Aqueous	Mercury 07	01/24/18	01/24/18 15:07	180124LA1

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury	0.01000	0.01010	101	80-120	

Return to Contents 

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-272-3609	LCS	Solid	Mercury 07	01/26/18	01/26/18 19:55	180126L04
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury		0.8350	0.7723	92	85-121	



Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
099-14-314-868	LCS	Solid	GC/MS R	01/20/18	01/20/18 10:55	180120L011	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Acetone		50.00	24.56	49	70-130	60-140	X
Benzene		50.00	47.25	94	78-120	71-127	
Bromobenzene		50.00	44.58	89	70-130	60-140	
Bromochloromethane		50.00	47.64	95	70-130	60-140	
Bromodichloromethane		50.00	49.71	99	70-130	60-140	
Bromoform		50.00	48.59	97	70-130	60-140	
Bromomethane		50.00	45.38	91	70-130	60-140	
2-Butanone		50.00	37.47	75	70-130	60-140	
n-Butylbenzene		50.00	46.92	94	77-123	69-131	
sec-Butylbenzene		50.00	45.20	90	70-130	60-140	
tert-Butylbenzene		50.00	43.18	86	70-130	60-140	
Carbon Disulfide		50.00	34.99	70	70-130	60-140	
Carbon Tetrachloride		50.00	51.92	104	49-139	34-154	
Chlorobenzene		50.00	44.39	89	79-120	72-127	
Chloroethane		50.00	46.82	94	70-130	60-140	
Chloroform		50.00	49.08	98	70-130	60-140	
Chloromethane		50.00	45.08	90	70-130	60-140	
2-Chlorotoluene		50.00	43.99	88	70-130	60-140	
4-Chlorotoluene		50.00	42.66	85	70-130	60-140	
Dibromochloromethane		50.00	47.56	95	70-130	60-140	
1,2-Dibromo-3-Chloropropane		50.00	46.67	93	70-130	60-140	
1,2-Dibromoethane		50.00	46.54	93	70-130	60-140	
Dibromomethane		50.00	47.48	95	70-130	60-140	
1,2-Dichlorobenzene		50.00	42.90	86	75-120	68-128	
1,3-Dichlorobenzene		50.00	44.32	89	70-130	60-140	
1,4-Dichlorobenzene		50.00	42.60	85	70-130	60-140	
Dichlorodifluoromethane		50.00	47.08	94	70-130	60-140	
1,1-Dichloroethane		50.00	47.96	96	70-130	60-140	
1,2-Dichloroethane		50.00	46.63	93	70-130	60-140	
1,1-Dichloroethene		50.00	36.31	73	74-122	66-130	ME
c-1,2-Dichloroethene		50.00	46.72	93	70-130	60-140	
t-1,2-Dichloroethene		50.00	48.05	96	70-130	60-140	
1,2-Dichloropropane		50.00	47.15	94	79-115	73-121	
1,3-Dichloropropane		50.00	43.22	86	70-130	60-140	
2,2-Dichloropropane		50.00	48.19	96	70-130	60-140	
1,1-Dichloropropene		50.00	47.16	94	70-130	60-140	
c-1,3-Dichloropropene		50.00	48.04	96	70-130	60-140	
t-1,3-Dichloropropene		50.00	47.42	95	70-130	60-140	

RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 01/19/18
 Work Order: 18-01-1452
 Preparation: EPA 5030C
 Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Ethylbenzene	50.00	44.65	89	76-120	69-127	
2-Hexanone	50.00	36.08	72	70-130	60-140	
Isopropylbenzene	50.00	45.04	90	70-130	60-140	
p-Isopropyltoluene	50.00	45.22	90	70-130	60-140	
Methylene Chloride	50.00	46.25	92	70-130	60-140	
4-Methyl-2-Pentanone	50.00	45.49	91	70-130	60-140	
Naphthalene	50.00	46.52	93	70-130	60-140	
n-Propylbenzene	50.00	44.70	89	70-130	60-140	
Styrene	50.00	45.07	90	70-130	60-140	
1,1,1,2-Tetrachloroethane	50.00	47.03	94	70-130	60-140	
1,1,2,2-Tetrachloroethane	50.00	43.71	87	70-130	60-140	
Tetrachloroethene	50.00	45.90	92	70-130	60-140	
Toluene	50.00	46.74	93	77-120	70-127	
1,2,3-Trichlorobenzene	50.00	48.05	96	70-130	60-140	
1,2,4-Trichlorobenzene	50.00	49.46	99	70-130	60-140	
1,1,1-Trichloroethane	50.00	49.33	99	70-130	60-140	
1,1,2-Trichloroethane	50.00	45.78	92	70-130	60-140	
1,1,2-Trichloro-1,2,2-Trifluoroethane	50.00	37.30	75	70-130	60-140	
Trichloroethene	50.00	47.92	96	70-130	60-140	
1,2,3-Trichloropropane	50.00	42.01	84	70-130	60-140	
1,2,4-Trimethylbenzene	50.00	44.64	89	70-130	60-140	
Trichlorofluoromethane	50.00	45.97	92	70-130	60-140	
1,3,5-Trimethylbenzene	50.00	44.07	88	70-130	60-140	
Vinyl Acetate	50.00	44.95	90	70-130	60-140	
Vinyl Chloride	50.00	46.99	94	68-122	59-131	
p/m-Xylene	100.0	89.36	89	70-130	60-140	
o-Xylene	50.00	45.99	92	70-130	60-140	
Methyl-t-Butyl Ether (MTBE)	50.00	48.55	97	77-120	70-127	

Total number of LCS compounds: 66

Total number of ME compounds: 1

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number				
099-16-446-296	LCS	Aqueous	GC/MS L	01/23/18	01/23/18 16:03	180123L028				
099-16-446-296	LCSD	Aqueous	GC/MS L	01/23/18	01/23/18 16:34	180123L028				
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Acetone	10.00	6.071	61	7.527	75	51-163	32-182	21	0-30	
Benzene	10.00	10.21	102	9.607	96	77-121	70-128	6	0-22	
Bromobenzene	10.00	10.15	102	9.822	98	78-120	71-127	3	0-22	
Bromochloromethane	10.00	9.606	96	9.538	95	71-135	60-146	1	0-27	
Bromodichloromethane	10.00	10.43	104	10.17	102	72-129	62-138	3	0-29	
Bromoform	10.00	9.066	91	9.328	93	61-140	48-153	3	0-30	
Bromomethane	10.00	13.76	138	13.33	133	63-140	50-153	3	0-30	
2-Butanone	10.00	7.629	76	8.042	80	55-138	41-152	5	0-30	
n-Butylbenzene	10.00	10.92	109	9.984	100	67-127	57-137	9	0-30	
sec-Butylbenzene	10.00	10.67	107	9.798	98	66-122	57-131	8	0-30	
tert-Butylbenzene	10.00	10.59	106	9.896	99	73-120	65-128	7	0-30	
Carbon Disulfide	10.00	10.47	105	10.29	103	27-170	3-194	2	0-34	
Carbon Tetrachloride	10.00	11.25	112	9.969	100	64-135	52-147	12	0-36	
Chlorobenzene	10.00	10.04	100	9.616	96	80-120	73-127	4	0-29	
Chloroethane	10.00	10.14	101	9.761	98	67-131	56-142	4	0-30	
Chloroform	10.00	9.910	99	9.597	96	75-126	66-134	3	0-29	
Chloromethane	10.00	8.683	87	8.444	84	54-143	39-158	3	0-30	
2-Chlorotoluene	10.00	10.34	103	9.755	98	64-123	54-133	6	0-29	
4-Chlorotoluene	10.00	10.02	100	9.654	97	67-126	57-136	4	0-25	
Dibromochloromethane	10.00	9.765	98	9.943	99	76-132	67-141	2	0-30	
1,2-Dibromo-3-Chloropropane	10.00	8.496	85	9.144	91	65-125	55-135	7	0-23	
1,2-Dibromoethane	10.00	9.999	100	9.826	98	74-130	65-139	2	0-32	
Dibromomethane	10.00	9.902	99	9.781	98	75-127	66-136	1	0-30	
1,2-Dichlorobenzene	10.00	9.932	99	9.782	98	78-120	71-127	2	0-30	
1,3-Dichlorobenzene	10.00	9.993	100	9.840	98	75-120	68-128	2	0-30	
1,4-Dichlorobenzene	10.00	9.788	98	9.489	95	78-120	71-127	3	0-20	
Dichlorodifluoromethane	10.00	12.16	122	9.291	93	25-168	1-192	27	0-30	
1,1-Dichloroethane	10.00	10.13	101	9.719	97	63-144	50-158	4	0-30	
1,2-Dichloroethane	10.00	10.06	101	9.714	97	72-130	62-140	4	0-23	
1,1-Dichloroethene	10.00	10.67	107	10.08	101	66-130	55-141	6	0-26	
c-1,2-Dichloroethene	10.00	9.671	97	9.612	96	76-123	68-131	1	0-26	
t-1,2-Dichloroethene	10.00	10.34	103	9.762	98	67-129	57-139	6	0-30	
1,2-Dichloropropane	10.00	10.27	103	9.913	99	74-122	66-130	4	0-23	
1,3-Dichloropropane	10.00	9.661	97	9.663	97	74-128	65-137	0	0-24	
2,2-Dichloropropane	10.00	10.81	108	9.894	99	68-125	58-134	9	0-30	
1,1-Dichloropropene	10.00	11.18	112	9.950	100	68-119	60-128	12	0-24	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
c-1,3-Dichloropropene	10.00	10.02	100	9.975	100	76-126	68-134	0	0-30	
t-1,3-Dichloropropene	10.00	10.20	102	10.10	101	71-127	62-136	1	0-26	
Ethylbenzene	10.00	10.56	106	9.843	98	78-120	71-127	7	0-25	
2-Hexanone	10.00	8.435	84	7.986	80	61-137	48-150	5	0-30	
Isopropylbenzene	10.00	10.57	106	9.726	97	71-123	62-132	8	0-30	
p-Isopropyltoluene	10.00	10.57	106	9.826	98	68-122	59-131	7	0-22	
Methylene Chloride	10.00	9.827	98	9.501	95	71-129	61-139	3	0-24	
4-Methyl-2-Pentanone	10.00	8.950	89	8.928	89	60-136	47-149	0	0-30	
Naphthalene	10.00	9.539	95	9.802	98	55-159	38-176	3	0-30	
n-Propylbenzene	10.00	10.64	106	9.759	98	64-125	54-135	9	0-30	
Styrene	10.00	10.43	104	10.04	100	77-120	70-127	4	0-24	
Chloroprene	10.00	10.42	104	9.553	96	70-130	60-140	9	0-20	
1,1,1,2-Tetrachloroethane	10.00	10.13	101	10.07	101	79-123	72-130	1	0-24	
1,1,2,2-Tetrachloroethane	10.00	9.352	94	9.840	98	67-132	56-143	5	0-30	
Tetrachloroethene	10.00	10.67	107	9.627	96	72-119	64-127	10	0-29	
Toluene	10.00	10.31	103	9.794	98	78-120	71-127	5	0-28	
1,2,3-Trichlorobenzene	10.00	9.566	96	9.511	95	70-129	60-139	1	0-30	
1,2,4-Trichlorobenzene	10.00	10.02	100	9.801	98	71-128	62-138	2	0-24	
1,1,1-Trichloroethane	10.00	10.51	105	9.949	99	66-130	55-141	5	0-23	
1,1,2-Trichloro-1,2,2-Trifluoroethane	10.00	11.44	114	9.332	93	52-145	36-160	20	0-26	
1,1,2-Trichloroethane	10.00	9.966	100	10.07	101	77-124	69-132	1	0-21	
Trichloroethene	10.00	10.37	104	9.720	97	75-116	68-123	6	0-25	
Trichlorofluoromethane	10.00	13.17	132	10.90	109	62-146	48-160	19	0-30	
1,2,3-Trichloropropane	10.00	8.694	87	9.065	91	80-120	73-127	4	0-30	
1,2,4-Trimethylbenzene	10.00	10.25	103	9.829	98	70-127	60-136	4	0-30	
1,3,5-Trimethylbenzene	10.00	10.24	102	9.739	97	72-124	63-133	5	0-30	
Vinyl Acetate	10.00	8.346	83	8.831	88	45-164	25-184	6	0-30	
Vinyl Chloride	10.00	10.67	107	9.667	97	60-141	46-154	10	0-30	
p/m-Xylene	20.00	20.93	105	19.63	98	74-122	66-130	6	0-30	
o-Xylene	10.00	10.40	104	9.952	100	74-122	66-130	4	0-30	
Methyl-t-Butyl Ether (MTBE)	10.00	9.326	93	9.639	96	57-144	42-158	3	0-27	

Total number of LCS compounds: 67

Total number of ME compounds: 0

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number				
099-16-446-297	LCS	Aqueous	GC/MS UU	01/27/18	01/27/18 10:50	180127L001				
099-16-446-297	LCSD	Aqueous	GC/MS UU	01/27/18	01/27/18 11:20	180127L001				
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Acetone	10.00	8.296	83	8.550	85	51-163	32-182	3	0-30	
Benzene	10.00	11.21	112	11.10	111	77-121	70-128	1	0-22	
Bromobenzene	10.00	10.55	105	10.34	103	78-120	71-127	2	0-22	
Bromochloromethane	10.00	11.03	110	11.12	111	71-135	60-146	1	0-27	
Bromodichloromethane	10.00	10.42	104	10.41	104	72-129	62-138	0	0-29	
Bromoform	10.00	7.714	77	7.627	76	61-140	48-153	1	0-30	
Bromomethane	10.00	13.14	131	12.10	121	63-140	50-153	8	0-30	
2-Butanone	10.00	10.30	103	10.64	106	55-138	41-152	3	0-30	
n-Butylbenzene	10.00	11.00	110	11.13	111	67-127	57-137	1	0-30	
sec-Butylbenzene	10.00	11.30	113	11.17	112	66-122	57-131	1	0-30	
tert-Butylbenzene	10.00	11.24	112	11.14	111	73-120	65-128	1	0-30	
Carbon Disulfide	10.00	12.57	126	12.34	123	27-170	3-194	2	0-34	
Carbon Tetrachloride	10.00	10.43	104	10.13	101	64-135	52-147	3	0-36	
Chlorobenzene	10.00	10.99	110	10.91	109	80-120	73-127	1	0-29	
Chloroethane	10.00	12.42	124	12.46	125	67-131	56-142	0	0-30	
Chloroform	10.00	11.31	113	11.09	111	75-126	66-134	2	0-29	
Chloromethane	10.00	10.96	110	11.36	114	54-143	39-158	4	0-30	
2-Chlorotoluene	10.00	10.82	108	10.65	107	64-123	54-133	2	0-29	
4-Chlorotoluene	10.00	10.80	108	10.71	107	67-126	57-136	1	0-25	
Dibromochloromethane	10.00	9.267	93	9.276	93	76-132	67-141	0	0-30	
1,2-Dibromo-3-Chloropropane	10.00	9.031	90	9.730	97	65-125	55-135	7	0-23	
1,2-Dibromoethane	10.00	10.78	108	10.82	108	74-130	65-139	0	0-32	
Dibromomethane	10.00	10.79	108	10.98	110	75-127	66-136	2	0-30	
1,2-Dichlorobenzene	10.00	10.37	104	10.51	105	78-120	71-127	1	0-30	
1,3-Dichlorobenzene	10.00	10.73	107	10.55	105	75-120	68-128	2	0-30	
1,4-Dichlorobenzene	10.00	10.30	103	10.37	104	78-120	71-127	1	0-20	
Dichlorodifluoromethane	10.00	10.03	100	9.872	99	25-168	1-192	2	0-30	
1,1-Dichloroethane	10.00	11.53	115	11.28	113	63-144	50-158	2	0-30	
1,2-Dichloroethane	10.00	10.88	109	10.91	109	72-130	62-140	0	0-23	
1,1-Dichloroethene	10.00	11.97	120	11.70	117	66-130	55-141	2	0-26	
c-1,2-Dichloroethene	10.00	10.93	109	10.89	109	76-123	68-131	0	0-26	
t-1,2-Dichloroethene	10.00	11.63	116	11.28	113	67-129	57-139	3	0-30	
1,2-Dichloropropane	10.00	11.05	111	11.04	110	74-122	66-130	0	0-23	
1,3-Dichloropropane	10.00	10.88	109	10.81	108	74-128	65-137	1	0-24	
2,2-Dichloropropane	10.00	14.33	143	13.64	136	68-125	58-134	5	0-30	X
1,1-Dichloropropene	10.00	12.07	121	11.82	118	68-119	60-128	2	0-24	ME

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton WR2274

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Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
c-1,3-Dichloropropene	10.00	11.05	111	11.13	111	76-126	68-134	1	0-30	
t-1,3-Dichloropropene	10.00	11.05	111	11.01	110	71-127	62-136	0	0-26	
Ethylbenzene	10.00	11.40	114	11.20	112	78-120	71-127	2	0-25	
2-Hexanone	10.00	9.232	92	9.404	94	61-137	48-150	2	0-30	
Isopropylbenzene	10.00	11.14	111	10.79	108	71-123	62-132	3	0-30	
p-Isopropyltoluene	10.00	11.41	114	11.56	116	68-122	59-131	1	0-22	
Methylene Chloride	10.00	11.00	110	10.88	109	71-129	61-139	1	0-24	
4-Methyl-2-Pentanone	10.00	9.958	100	10.53	105	60-136	47-149	6	0-30	
Naphthalene	10.00	9.408	94	9.809	98	55-159	38-176	4	0-30	
n-Propylbenzene	10.00	11.43	114	11.26	113	64-125	54-135	1	0-30	
Styrene	10.00	10.91	109	10.81	108	77-120	70-127	1	0-24	
Chloroprene	10.00	11.14	111	10.91	109	70-130	60-140	2	0-20	
1,1,1,2-Tetrachloroethane	10.00	9.921	99	9.836	98	79-123	72-130	1	0-24	
1,1,2,2-Tetrachloroethane	10.00	10.84	108	11.23	112	67-132	56-143	4	0-30	
Tetrachloroethene	10.00	8.601	86	8.172	82	72-119	64-127	5	0-29	
Toluene	10.00	11.10	111	10.97	110	78-120	71-127	1	0-28	
1,2,3-Trichlorobenzene	10.00	9.616	96	10.22	102	70-129	60-139	6	0-30	
1,2,4-Trichlorobenzene	10.00	9.720	97	10.21	102	71-128	62-138	5	0-24	
1,1,1-Trichloroethane	10.00	11.23	112	10.90	109	66-130	55-141	3	0-23	
1,1,2-Trichloro-1,2,2-Trifluoroethane	10.00	12.58	126	12.32	123	52-145	36-160	2	0-26	
1,1,2-Trichloroethane	10.00	10.69	107	10.73	107	77-124	69-132	0	0-21	
Trichloroethene	10.00	10.78	108	10.85	109	75-116	68-123	1	0-25	
Trichlorofluoromethane	10.00	12.25	123	11.85	118	62-146	48-160	3	0-30	
1,2,3-Trichloropropane	10.00	9.533	95	9.460	95	80-120	73-127	1	0-30	
1,2,4-Trimethylbenzene	10.00	11.22	112	11.24	112	70-127	60-136	0	0-30	
1,3,5-Trimethylbenzene	10.00	11.04	110	10.90	109	72-124	63-133	1	0-30	
Vinyl Acetate	10.00	11.50	115	11.49	115	45-164	25-184	0	0-30	
Vinyl Chloride	10.00	12.06	121	11.74	117	60-141	46-154	3	0-30	
p/m-Xylene	20.00	22.00	110	21.65	108	74-122	66-130	2	0-30	
o-Xylene	10.00	10.89	109	10.75	107	74-122	66-130	1	0-30	
Methyl-t-Butyl Ether (MTBE)	10.00	10.37	104	10.45	104	57-144	42-158	1	0-27	

Total number of LCS compounds: 67

Total number of ME compounds: 1

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1400	LCS	Aqueous	GC/MS T	01/30/18	01/30/18 10:59	180130L016			
099-10-022-1400	LCSD	Aqueous	GC/MS T	01/30/18	01/30/18 11:34	180130L016			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004600	92	0.004400	88	80-120	4	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 01/19/18
Work Order: 18-01-1452
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-10-022-1402	LCS	Aqueous	GC/MS T	01/31/18	01/31/18 10:26	180131L014			
099-10-022-1402	LCSD	Aqueous	GC/MS T	01/31/18	01/31/18 11:46	180131L014			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.004500	90	0.004300	86	80-120	5	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-01-1452

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 6010B	EPA 3010A Total	935	ICP 7300	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 7470A	EPA 7470A Total	868	Mercury 07	1
EPA 7471A	EPA 7471A Total	868	Mercury 07	1
EPA 8015B (M)	EPA 3510C	972	GC 45	1
EPA 8015B (M)	EPA 3550B	682	GC 46	1
EPA 8260B	EPA 5030C	316	GC/MS L	2
EPA 8260B	EPA 5030C	823	GC/MS R	2
EPA 8260B	EPA 5030C	996	GC/MS UU	2
RSK-175M	N/A	748	GC 52	2
RSK-175M	N/A	1144	GC 52	2
RSK-175M	N/A	1145	GC 52	2
SRL 524M-TCP	EPA 5030C	867	GC/MS T	2



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Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Location 2: 7445 Lampson Avenue, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 18-01-1452

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

Project Name ESTER C. Pondichin		Project Number WB2274		Required Analyses			
Samplers Names B. Beckwith		Project Contact Lisa Howe		Metals		SVOCS by 8270	
Laboratory Name GCS/Inhouse		Lab Contact S. M. Monk		VOCs by		TCP by SPL 524M-TCP Prep by RSLK-175M	
Lab Address		Lab Phone		Carrier/Waybill No.		Bottle Type and Volume/Preservative	
Sample Name	Date	Time	Sample Type	Number of Containers			
1 CP22-HP0-39-41	1/19/2018	0730	locks	3	3		
2 CP22-HP0-43-45		0800		3	3		
3 CP22-HP12-35-37		0850		3	3		
4 CP22-HP12-39-41		0900		3	3		
5 CP22-HP04-35-37		0950		3	3		
6 CP22-HP04-39-41		1025		3	2		
7 CP22-HP04-43-45		1105		2	2		
8 CP22-HP05-35-37		1147		3	3		
9 CP22-HP05-39-41		1205		3	3		
10 DUP20180119		1200		3	3		
11 CP22-HP05-43-45		1240		3	3		

White copy: to accompany samples
Yellow copy: field copy

Turn-around Time:

Normal Rush:

1. Relinquished by Date 1/17/2018 Time 1447
 2. Relinquished by Date 1/19/2018 Time 1447
 3. Relinquished by Date 1/19/2018 Time 1900

1. Received by Date 01/19/18 Time 1447
 2. Received by Date 1/19/18 Time 1900
 3. Received by Date _____ Time _____

Special Instructions:

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 01/19/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: +0.2°C); Temperature (w/o CF): 3.0 °C (w/ CF): 3.2 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 671

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 671

Checked by: 778

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE:

(Trip Blank Lot Number: _____)

Aqueous: VOA VOAh VOAn₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{na} (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
 Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
 Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

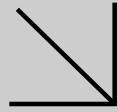
Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 778

s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, zna = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 1050



Calscience



WORK ORDER NUMBER: 18-09-0814

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/26/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 18-09-0814

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/12/18. They were assigned to Work Order 18-09-0814.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-0814
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/12/18 18:30
	Number of Containers: 50

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
CP22-PMW07B	18-09-0814-1	09/12/18 10:41	8	Aqueous
CP22-PMW08B	18-09-0814-2	09/12/18 11:24	8	Aqueous
CP22-PMW10B	18-09-0814-3	09/12/18 12:14	8	Aqueous
CP22-PMW04	18-09-0814-4	09/12/18 13:04	8	Aqueous
DUP	18-09-0814-5	09/12/18 00:00	8	Aqueous
220205-MWX	18-09-0814-6	09/12/18 13:50	8	Aqueous
EB-BT-20180912	18-09-0814-7	09/12/18 13:24	2	Aqueous

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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-09-0814
Project Name: ESTCP C. Pendleton WR2274
Received: 09/12/18

Attn: Lea Kane

Page 1 of 1

Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
CP22-PMW07B (18-09-0814-1)						
Sulfate	92		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.042		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW08B (18-09-0814-2)						
Sulfate	99		1.0	mg/L	EPA 300.0	N/A
CP22-PMW10B (18-09-0814-3)						
1,2,3-Trichloropropane	0.014		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-PMW04 (18-09-0814-4)						
Sulfate	86		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.72		0.050	ug/L	SRL 524M-TCP	EPA 5030C
DUP (18-09-0814-5)						
Sulfate	85		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	0.60		0.050	ug/L	SRL 524M-TCP	EPA 5030C
220205-MWX (18-09-0814-6)						
Sulfate	96		1.0	mg/L	EPA 300.0	N/A
1,2,3-Trichloropropane	3.9		0.25	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	18-09-0814-1-E	09/12/18 10:41	Aqueous	GC 61	N/A	09/13/18 16:46	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW08B	18-09-0814-2-E	09/12/18 11:24	Aqueous	GC 61	N/A	09/13/18 17:10	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW10B	18-09-0814-3-E	09/12/18 12:14	Aqueous	GC 61	N/A	09/13/18 17:38	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-PMW04	18-09-0814-4-E	09/12/18 13:04	Aqueous	GC 61	N/A	09/13/18 18:02	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP	18-09-0814-5-E	09/12/18 00:00	Aqueous	GC 61	N/A	09/13/18 18:29	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
220205-MWX	18-09-0814-6-E	09/12/18 13:50	Aqueous	GC 61	N/A	09/13/18 19:06	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-109	N/A	Aqueous	GC 61	N/A	09/13/18 10:56	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: N/A
Method: EPA 300.0
Units: mg/L

Project: ESTCP C. Pendleton WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	18-09-0814-1-G	09/12/18 10:41	Aqueous	IC 15	N/A	09/14/18 05:46	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		92	1.0		1.00		
CP22-PMW08B	18-09-0814-2-G	09/12/18 11:24	Aqueous	IC 15	N/A	09/14/18 06:09	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		99	1.0		1.00		
CP22-PMW10B	18-09-0814-3-G	09/12/18 12:14	Aqueous	IC 15	N/A	09/14/18 09:39	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		ND	1.0		1.00		
CP22-PMW04	18-09-0814-4-G	09/12/18 13:04	Aqueous	IC 15	N/A	09/14/18 10:00	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		86	1.0		1.00		
DUP	18-09-0814-5-G	09/12/18 00:00	Aqueous	IC 15	N/A	09/14/18 10:20	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		85	1.0		1.00		
220205-MWX	18-09-0814-6-G	09/12/18 13:50	Aqueous	IC 15	N/A	09/14/18 10:40	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		96	1.0		1.00		
Method Blank	099-12-906-8778	N/A	Aqueous	IC 15	N/A	09/14/18 02:23	180913L02
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Sulfate		ND	1.0		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	18-09-0814-1-H	09/12/18 10:41	Aqueous	ICP 8300	09/18/18	09/19/18 20:22	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW08B	18-09-0814-2-H	09/12/18 11:24	Aqueous	ICP 8300	09/18/18	09/19/18 20:27	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW10B	18-09-0814-3-H	09/12/18 12:14	Aqueous	ICP 8300	09/18/18	09/19/18 20:28	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
CP22-PMW04	18-09-0814-4-H	09/12/18 13:04	Aqueous	ICP 8300	09/18/18	09/19/18 20:32	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
DUP	18-09-0814-5-H	09/12/18 00:00	Aqueous	ICP 8300	09/18/18	09/19/18 20:34	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
220205-MWX	18-09-0814-6-H	09/12/18 13:50	Aqueous	ICP 8300	09/18/18	09/19/18 20:35	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	
Method Blank	099-14-304-773	N/A	Aqueous	ICP 8300	09/18/18	09/19/18 19:58	180918LA1F
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.0100		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-PMW07B	18-09-0814-1-A	09/12/18 10:41	Aqueous	GC/MS M	09/17/18	09/17/18 20:08	180917L031
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.042		0.0050		1.00	
CP22-PMW08B	18-09-0814-2-A	09/12/18 11:24	Aqueous	GC/MS M	09/17/18	09/17/18 20:38	180917L031
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-PMW10B	18-09-0814-3-A	09/12/18 12:14	Aqueous	GC/MS M	09/17/18	09/17/18 21:07	180917L031
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.014		0.0050		1.00	
CP22-PMW04	18-09-0814-4-B	09/12/18 13:04	Aqueous	GC/MS M	09/18/18	09/18/18 13:26	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.72		0.050		10.0	
DUP	18-09-0814-5-B	09/12/18 00:00	Aqueous	GC/MS M	09/18/18	09/18/18 15:25	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.60		0.050		10.0	
220205-MWX	18-09-0814-6-B	09/12/18 13:50	Aqueous	GC/MS M	09/18/18	09/18/18 12:57	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		3.9		0.25		50.0	
EB-BT-20180912	18-09-0814-7-A	09/12/18 13:24	Aqueous	GC/MS M	09/17/18	09/17/18 22:06	180917L031
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1470	N/A	Aqueous	GC/MS M	09/17/18	09/17/18 18:39	180917L031
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1471	N/A	Aqueous	GC/MS M	09/18/18	09/18/18 11:20	180918L048

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	ND	0.0050	1.00	



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: N/A
Method: EPA 300.0

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-0820-9	Sample	Aqueous	IC 15	N/A	09/14/18 05:26	180913S02
18-09-0820-9	Matrix Spike	Aqueous	IC 15	N/A	09/14/18 11:01	180913S02
18-09-0820-9	Matrix Spike Duplicate	Aqueous	IC 15	N/A	09/14/18 11:21	180913S02

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Sulfate	ND	50.00	49.86	100	48.58	97	80-120	3	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/12/18
 Work Order: 18-09-0814
 Preparation: Filtered
 Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-PMW07B	Sample	Aqueous	ICP 8300	09/18/18	09/19/18 20:22	180918SA1
CP22-PMW07B	Matrix Spike	Aqueous	ICP 8300	09/18/18	09/19/18 20:24	180918SA1
CP22-PMW07B	Matrix Spike Duplicate	Aqueous	ICP 8300	09/18/18	09/19/18 20:25	180918SA1

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.5046	101	0.4946	99	80-120	2	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants	Date Received:	09/12/18
595 Market Street, Suite 610	Work Order:	18-09-0814
San Francisco, CA 94105-2811	Preparation:	EPA 5030C
	Method:	SRL 524M-TCP
Project: ESTCP C. Pendleton WR2274		Page 3 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
220205-MWX	Sample	Aqueous	GC/MS M	09/18/18	09/18/18 12:57	180918S014
220205-MWX	Matrix Spike	Aqueous	GC/MS M	09/18/18	09/18/18 13:56	180918S014
220205-MWX	Matrix Spike Duplicate	Aqueous	GC/MS M	09/18/18	09/18/18 14:26	180918S014

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	3.895	0.2500	4.085	76	4.030	54	70-130	1	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: N/A
Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-109	LCS	Aqueous	GC 61	N/A	09/13/18 09:44	180913L01			
099-14-325-109	LCSD	Aqueous	GC 61	N/A	09/13/18 10:12	180913L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	95.57	93	95.58	93	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: N/A
Method: EPA 300.0

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-906-8778	LCS	Aqueous	IC 15	N/A	09/14/18 02:43	180913L02

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Sulfate	50.00	48.54	97	90-110	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-773	LCS	Aqueous	ICP 8300	09/18/18	09/19/18 20:00	180918LA1F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5674	113	85-115	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/12/18
 Work Order: 18-09-0814
 Preparation: EPA 5030C
 Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-10-022-1470	LCS	Aqueous	GC/MS M	09/17/18	09/17/18 17:40	180917L031
099-10-022-1470	LCSD	Aqueous	GC/MS M	09/17/18	09/17/18 18:09	180917L031

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.005000	0.005700	114	0.004900	98	80-120	15	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0814
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1471	LCS	Aqueous	GC/MS M	09/18/18	09/18/18 09:59	180918L048
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.004800	96	80-120	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-09-0814

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	110	ICP 8300	1
EPA 300.0	N/A	1037	IC 15	1
RSK-175M	N/A	1158	GC 61	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 18-09-0814

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-09-0814

Page 1 of 1

Project Name ESTEP C. Penetration	Project Number WR 2274	Required Analyses			
Samplers Names Blawiehl	Project Contact Len Kane	SVOCs by 8270	TC by SKL 524-174	Petroleum (ASTM D129)	Metals
Laboratory Name CalScience	Lab Contact Sven Novak				
Lab Address	Lab Phone				
	Carrier/Waybill No.				

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Bottle Type and Volume/Preservative						Comments	Lab Use Only	Condition of Bottles	
				Number of Containers									
CP22-PMW07B	09-12-18	1041	Various	3	3	1	1					1	
CP22-PMW08B		1124		3	3	1	1					2	
CP22-PMW10B		1214		3	3	1	1					3	
CP22-PMW04		1304		3	3	1	1					4	
DUP				3	3	1	1					5	
220205-mwx		1350		3	3	1	1					6	
EB-BT-20180912		1324	Verob	2								7	

Special Instructions: **Total Zinc by EPA 200.7 (250NP Poly) filtered in Lab**

Turn-around Time:

Normal Rush:

1. Relinquished by (Signature/Affiliation)	Date Time	7/12/18 1640	1. Received by (Signature/Affiliation)	Date Time	09/12/18 1640
2. Relinquished by (Signature/Affiliation)	Date Time	09/12/18 1830	2. Received by (Signature/Affiliation)	Date Time	09/12/18 1830
3. Relinquished by (Signature/Affiliation)	Date Time		3. Received by (Signature/Affiliation)	Date Time	

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/12/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.8 °C (w/ CF): 33 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: UBUK

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: UBUK

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: H4MW

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples Yes No N/A

COC document(s) received complete Yes No N/A

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC Yes No N/A

Sample container label(s) consistent with COC Yes No N/A

Sample container(s) intact and in good condition Yes No N/A

Proper containers for analyses requested Yes No N/A

Sufficient volume/mass for analyses requested Yes No N/A

Samples received within holding time Yes No N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH Residual Chlorine Dissolved Sulfide Dissolved Oxygen Yes No N/A

Proper preservation chemical(s) noted on COC and/or sample container Yes No N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range Yes No N/A

Container(s) for certain analysis free of headspace..... Yes No N/A

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation Yes No N/A

CONTAINER TYPE:

(Trip Blank Lot Number: _____)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB 125PB_{zanna} (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PB_n (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGB_{na2} 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PB_{na} (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (__) EnCores® (__) TerraCores® (__) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (_____): _____ _____ _____

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: H4MW

s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, zanna = Zn (CH₃CO₂)₂ + NaOH Reviewed by: ITL



Calscience



WORK ORDER NUMBER: 18-09-0815

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 09/26/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.



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Work Order Number: 18-09-0815

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/12/18. They were assigned to Work Order 18-09-0815.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-0815
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/12/18 18:30
	Number of Containers: 67

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
T-Blank 20180912	18-09-0815-1	09/12/18 08:50	2	Aqueous
E-Blank 20180912	18-09-0815-2	09/12/18 08:55	2	Aqueous
F-Blank 20180912	18-09-0815-3	09/12/18 09:00	2	Aqueous
DUP-20180912	18-09-0815-4	09/12/18 15:00	7	Aqueous
CP22-HP01-31-33	18-09-0815-5	09/12/18 11:05	7	Aqueous
CP22-HP01-35-37	18-09-0815-6	09/12/18 11:15	2	Aqueous
CP22-HP01-39-41	18-09-0815-7	09/12/18 11:10	7	Aqueous
CP22-HP02-31-33	18-09-0815-8	09/12/18 13:35	7	Aqueous
CP22-HP02-35-37	18-09-0815-9	09/12/18 13:20	7	Aqueous
CP22-HP02-39-41	18-09-0815-10	09/12/18 13:25	7	Aqueous
CP22-HP03-31-33	18-09-0815-11	09/12/18 15:45	7	Aqueous
CP22-HP03-35-37	18-09-0815-12	09/12/18 15:30	7	Aqueous
CP22-HP03-39-41	18-09-0815-13	09/12/18 15:55	3	Aqueous



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-09-0815
Project Name: ESTCP C. Pendleton WR2274
Received: 09/12/18

Attn: Lea Kane

Page 1 of 1

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
DUP-20180912 (18-09-0815-4)						
1,2,3-Trichloropropane	0.27		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP01-31-33 (18-09-0815-5)						
Zinc	0.122		0.0100	mg/L	EPA 200.7	Filtered
1,2,3-Trichloropropane	0.29		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP01-35-37 (18-09-0815-6)						
1,2,3-Trichloropropane	0.17		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP01-39-41 (18-09-0815-7)						
Zinc	0.808		0.0100	mg/L	EPA 200.7	Filtered
Propene	1.65		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.28		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-31-33 (18-09-0815-8)						
Zinc	0.378		0.0100	mg/L	EPA 200.7	Filtered
Propene	4.56		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.089		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-35-37 (18-09-0815-9)						
Propene	2.36		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.36		0.050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP02-39-41 (18-09-0815-10)						
Propene	1.57		1.00	ug/L	RSK-175M	N/A
CP22-HP03-31-33 (18-09-0815-11)						
Zinc	0.0136		0.0100	mg/L	EPA 200.7	Filtered
1,2,3-Trichloropropane	0.17		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP03-35-37 (18-09-0815-12)						
Propene	2.14		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.027		0.0050	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP-20180912	18-09-0815-4-E	09/12/18 15:00	Aqueous	GC 61	N/A	09/13/18 13:25	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP01-31-33	18-09-0815-5-E	09/12/18 11:05	Aqueous	GC 61	N/A	09/13/18 13:52	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP01-39-41	18-09-0815-7-E	09/12/18 11:10	Aqueous	GC 61	N/A	09/13/18 14:16	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.65	1.00		1.00		
CP22-HP02-31-33	18-09-0815-8-E	09/12/18 13:35	Aqueous	GC 61	N/A	09/13/18 14:42	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		4.56	1.00		1.00		
CP22-HP02-35-37	18-09-0815-9-E	09/12/18 13:20	Aqueous	GC 61	N/A	09/13/18 15:07	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.36	1.00		1.00		
CP22-HP02-39-41	18-09-0815-10-E	09/12/18 13:25	Aqueous	GC 61	N/A	09/13/18 15:31	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.57	1.00		1.00		
CP22-HP03-31-33	18-09-0815-11-E	09/12/18 15:45	Aqueous	GC 61	N/A	09/13/18 15:56	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP03-35-37	18-09-0815-12-E	09/12/18 15:30	Aqueous	GC 61	N/A	09/13/18 16:22	180913L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.14	1.00		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-325-109	N/A	Aqueous	GC 61	N/A	09/13/18 10:56	180913L01

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Propene	ND	1.00	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP-20180912	18-09-0815-4-G	09/12/18 15:00	Aqueous	ICP 8300	09/18/18	09/19/18 20:36	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP01-31-33	18-09-0815-5-G	09/12/18 11:05	Aqueous	ICP 8300	09/18/18	09/19/18 20:41	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.122	0.0100		1.00		
CP22-HP01-39-41	18-09-0815-7-G	09/12/18 11:10	Aqueous	ICP 8300	09/18/18	09/19/18 20:42	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.808	0.0100		1.00		
CP22-HP02-31-33	18-09-0815-8-G	09/12/18 13:35	Aqueous	ICP 8300	09/18/18	09/19/18 20:44	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.378	0.0100		1.00		
CP22-HP02-35-37	18-09-0815-9-G	09/12/18 13:20	Aqueous	ICP 8300	09/18/18	09/19/18 20:45	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP02-39-41	18-09-0815-10-G	09/12/18 13:25	Aqueous	ICP 8300	09/18/18	09/19/18 20:49	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP03-31-33	18-09-0815-11-G	09/12/18 15:45	Aqueous	ICP 8300	09/18/18	09/19/18 20:51	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0136	0.0100		1.00		
CP22-HP03-35-37	18-09-0815-12-G	09/12/18 15:30	Aqueous	ICP 8300	09/18/18	09/19/18 20:52	180918LA1F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-304-773	N/A	Aqueous	ICP 8300	09/18/18	09/19/18 19:58	180918LA1F

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	ND	0.0100	1.00	



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
T-Blank 20180912	18-09-0815-1-A	09/12/18 08:50	Aqueous	GC/MS M	09/18/18	09/18/18 16:25	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank 20180912	18-09-0815-2-A	09/12/18 08:55	Aqueous	GC/MS M	09/18/18	09/18/18 16:54	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
F-Blank 20180912	18-09-0815-3-A	09/12/18 09:00	Aqueous	GC/MS M	09/18/18	09/18/18 17:24	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
DUP-20180912	18-09-0815-4-B	09/12/18 15:00	Aqueous	GC/MS M	09/19/18	09/19/18 11:16	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.27		0.025		5.00	
CP22-HP01-31-33	18-09-0815-5-B	09/12/18 11:05	Aqueous	GC/MS M	09/19/18	09/19/18 11:45	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.29		0.025		5.00	
CP22-HP01-35-37	18-09-0815-6-B	09/12/18 11:15	Aqueous	GC/MS M	09/24/18	09/24/18 11:33	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.17		0.010		2.00	
CP22-HP01-39-41	18-09-0815-7-B	09/12/18 11:10	Aqueous	GC/MS M	09/24/18	09/24/18 12:02	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.28		0.025		5.00	
CP22-HP02-31-33	18-09-0815-8-B	09/12/18 13:35	Aqueous	GC/MS M	09/24/18	09/24/18 12:32	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.089		0.010		2.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP02-35-37	18-09-0815-9-B	09/12/18 13:20	Aqueous	GC/MS M	09/24/18	09/24/18 13:01	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.36		0.050		10.0	
CP22-HP02-39-41	18-09-0815-10-A	09/12/18 13:25	Aqueous	GC/MS M	09/19/18	09/19/18 15:43	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP03-31-33	18-09-0815-11-B	09/12/18 15:45	Aqueous	GC/MS M	09/24/18	09/24/18 13:31	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.17		0.010		2.00	
CP22-HP03-35-37	18-09-0815-12-A	09/12/18 15:30	Aqueous	GC/MS M	09/19/18	09/19/18 16:42	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.027		0.0050		1.00	
CP22-HP03-39-41	18-09-0815-13-A	09/12/18 15:55	Aqueous	GC/MS M	09/19/18	09/19/18 17:12	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1471	N/A	Aqueous	GC/MS M	09/18/18	09/18/18 11:20	180918L048
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1473	N/A	Aqueous	GC/MS M	09/19/18	09/19/18 10:43	180919L047
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1474	N/A	Aqueous	GC/MS M	09/24/18	09/24/18 11:03	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
DUP-20180912	Sample	Aqueous	ICP 8300	09/18/18	09/19/18 20:36	180918SA1A
DUP-20180912	Matrix Spike	Aqueous	ICP 8300	09/18/18	09/19/18 20:38	180918SA1A
DUP-20180912	Matrix Spike Duplicate	Aqueous	ICP 8300	09/18/18	09/19/18 20:39	180918SA1A

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.3608	72	0.3286	66	80-120	9	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-0814-6	Sample	Aqueous	GC/MS M	09/18/18	09/18/18 12:57	180918S014
18-09-0814-6	Matrix Spike	Aqueous	GC/MS M	09/18/18	09/18/18 13:56	180918S014
18-09-0814-6	Matrix Spike Duplicate	Aqueous	GC/MS M	09/18/18	09/18/18 14:26	180918S014

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	3.895	0.2500	4.085	76	4.030	54	70-130	1	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
DUP-20180912	Sample	Aqueous	GC/MS M	09/19/18	09/19/18 11:16	180919S015				
DUP-20180912	Matrix Spike	Aqueous	GC/MS M	09/19/18	09/19/18 12:15	180919S015				
DUP-20180912	Matrix Spike Duplicate	Aqueous	GC/MS M	09/19/18	09/19/18 12:45	180919S015				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.2655	0.02500	0.3155	200	0.3025	148	70-130	4	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP01-39-41	Sample	Aqueous	GC/MS M	09/24/18	09/24/18 12:02	180924S009
CP22-HP01-39-41	Matrix Spike	Aqueous	GC/MS M	09/24/18	09/24/18 14:01	180924S009
CP22-HP01-39-41	Matrix Spike Duplicate	Aqueous	GC/MS M	09/24/18	09/24/18 14:30	180924S009

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.2815	0.02500	0.3705	356	0.3265	180	70-130	13	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: N/A
Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-109	LCS	Aqueous	GC 61	N/A	09/13/18 09:44	180913L01			
099-14-325-109	LCSD	Aqueous	GC 61	N/A	09/13/18 10:12	180913L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	95.57	93	95.58	93	80-120	0	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-773	LCS	Aqueous	ICP 8300	09/18/18	09/19/18 20:00	180918LA1F

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc	0.5000	0.5674	113	85-115	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1471	LCS	Aqueous	GC/MS M	09/18/18	09/18/18 09:59	180918L048
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.004800	96	80-120	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1473	LCS	Aqueous	GC/MS M	09/19/18	09/19/18 10:08	180919L047
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005600	112	80-120	



Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/12/18
Work Order: 18-09-0815
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1474	LCS	Aqueous	GC/MS M	09/24/18	09/24/18 10:31	180924L019
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005200	104	80-120	



Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-09-0815

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	110	ICP 8300	1
RSK-175M	N/A	1158	GC 61	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 18-09-0815

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-09-0815

Page 1 of 2

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Bottle Type and Volume/Preservative				Number of Containers	Comments	Lab Use	
				Metals	VOCs by	SVOCs by 8270	Pesticides (Lab Filter)			Other	Only
T-Blank 20180912	9/12/2018	0850	Blank					2			
E-Blank 20180912		0855						2			
F-Blank 20180912		0900						2			
DUP - 20180912		1500						3			
CP22-HR01-31-33		1105						3			
CP22-HR01-35-37		1115						3	Significant ephorescence → blue		
CP22-HR01-39-41		1110						3	Mild ephorescence		
CP22-HR02-31-33		1335						3	Moderate ephorescence		
CP22-HR02-35-37		1320						3	Mild ephorescence		
CP22-HR02-39-41		1325						3	Mild ephorescence		
CP22-HR03-31-33		1545						3			
CP22-HR03-35-37		1530						3	Moderate ephorescence		

Special Instructions: Lab Filter to EPA 2017

Turn-around Time:
 Normal Rush:

1. Relinquished by (Signature/Affiliation)	Date 9/12/18	Time 1640	1. Received by (Signature/Affiliation)	Date 09/12/18	Time 1640
2. Relinquished by (Signature/Affiliation)	Date 09/12/18	Time 1830	2. Received by (Signature/Affiliation)	Date 9/2/18	Time 1830
3. Relinquished by (Signature/Affiliation)	Date	Time	3. Received by (Signature/Affiliation)	Date	Time

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/12/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.8 °C (w/ CF): 3.3 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: UBUK

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: UBUK

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 1163

SAMPLE CONDITION:

Yes No N/A

Chain-of-Custody (COC) document(s) received with samples

COC document(s) received complete

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC

Sample container label(s) consistent with COC

Sample container(s) intact and in good condition

Proper containers for analyses requested

Sufficient volume/mass for analyses requested

Samples received within holding time

Aqueous samples for certain analyses received within 15-minute holding time

pH Residual Chlorine Dissolved Sulfide Dissolved Oxygen

Proper preservation chemical(s) noted on COC and/or sample container

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range

Container(s) for certain analysis free of headspace

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation

CONTAINER TYPE:

(Trip Blank Lot Number: 180829c)

Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{nna} (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

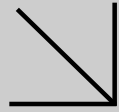
Air: Tedlar™ Canister Sorbent Tube PUF _____ Other Matrix (____): _____ _____ _____

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, Labeled/Checked by: 1163

s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, z_{nna} = Zn (CH₃CO₂)₂ + NaOH

Reviewed by: TTB


WORK ORDER NUMBER: 18-09-0979
The difference is service


AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For
Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
 595 Market Street
 Suite 610
 San Francisco, CA 94105-2811

 Approved for release on 10/01/2018 by:
 Stephen Nowak
 Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 18-09-0979

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/13/18. They were assigned to Work Order 18-09-0979.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-0979
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/13/18 19:15
	Number of Containers: 96

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
T-Blank 20180913	18-09-0979-1	09/13/18 07:15	2	Aqueous
E-Blank 20180913	18-09-0979-2	09/13/18 07:20	2	Aqueous
F-Blank 20180913	18-09-0979-3	09/13/18 07:25	2	Aqueous
DUP 20180913	18-09-0979-4	09/13/18 07:30	7	Aqueous
CP22-HP04-31-33	18-09-0979-5	09/13/18 08:30	7	Aqueous
CP22-HP04-35-37	18-09-0979-6	09/13/18 08:40	7	Aqueous
CP22-HP04-39-41	18-09-0979-7	09/13/18 08:50	7	Aqueous
CP22-HP05-31-33	18-09-0979-8	09/13/18 11:30	7	Aqueous
CP22-HP05-35-37	18-09-0979-9	09/13/18 11:25	7	Aqueous
CP22-HP05-39-41	18-09-0979-10	09/13/18 11:20	7	Aqueous
CP22-HP06-31-33	18-09-0979-11	09/13/18 12:55	6	Aqueous
CP22-HP06-35-37	18-09-0979-12	09/13/18 12:45	7	Aqueous
CP22-HP06-39-41	18-09-0979-13	09/13/18 12:50	7	Aqueous
CP22-HP07-31-33	18-09-0979-14	09/13/18 14:15	7	Aqueous
CP22-HP07-35-37	18-09-0979-15	09/13/18 14:05	7	Aqueous
CP22-HP07-39-41	18-09-0979-16	09/13/18 14:10	7	Aqueous

Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 18-09-0979
 Project Name: ESTCP C. Pendleton WR2274
 Received: 09/13/18

Attn: Lea Kane

Page 1 of 1

Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
DUP 20180913 (18-09-0979-4)						
1,2,3-Trichloropropane	0.017		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-31-33 (18-09-0979-5)						
Propene	1.06		1.00	ug/L	RSK-175M	N/A
CP22-HP04-35-37 (18-09-0979-6)						
Propene	1.29		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.016		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP04-39-41 (18-09-0979-7)						
Zinc	0.0570		0.0100	mg/L	EPA 200.7	Filtered
CP22-HP05-31-33 (18-09-0979-8)						
1,2,3-Trichloropropane	0.057		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-35-37 (18-09-0979-9)						
Propene	1.44		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.20		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP05-39-41 (18-09-0979-10)						
Propene	2.62		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.055		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP06-31-33 (18-09-0979-11)						
Propene	6.12		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.024		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP06-35-37 (18-09-0979-12)						
1,2,3-Trichloropropane	0.32		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP06-39-41 (18-09-0979-13)						
Propene	9.98		1.00	ug/L	RSK-175M	N/A
CP22-HP07-31-33 (18-09-0979-14)						
1,2,3-Trichloropropane	0.062		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-35-37 (18-09-0979-15)						
1,2,3-Trichloropropane	0.17		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP22-HP07-39-41 (18-09-0979-16)						
Zinc	0.0104		0.0100	mg/L	EPA 200.7	Filtered
1,2,3-Trichloropropane	0.059		0.0050	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP 20180913	18-09-0979-4-D	09/13/18 07:30	Aqueous	GC 61	N/A	09/15/18 11:14	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP04-31-33	18-09-0979-5-D	09/13/18 08:30	Aqueous	GC 61	N/A	09/15/18 11:38	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.06	1.00		1.00		
CP22-HP04-35-37	18-09-0979-6-D	09/13/18 08:40	Aqueous	GC 61	N/A	09/15/18 12:03	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.29	1.00		1.00		
CP22-HP04-39-41	18-09-0979-7-D	09/13/18 08:50	Aqueous	GC 61	N/A	09/15/18 12:26	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP05-31-33	18-09-0979-8-D	09/13/18 11:30	Aqueous	GC 61	N/A	09/15/18 12:51	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP05-35-37	18-09-0979-9-D	09/13/18 11:25	Aqueous	GC 61	N/A	09/15/18 13:16	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		1.44	1.00		1.00		
CP22-HP05-39-41	18-09-0979-10-D	09/13/18 11:20	Aqueous	GC 61	N/A	09/15/18 13:40	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.62	1.00		1.00		
CP22-HP06-31-33	18-09-0979-11-D	09/13/18 12:55	Aqueous	GC 61	N/A	09/15/18 14:06	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		6.12	1.00		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-35-37	18-09-0979-12-D	09/13/18 12:45	Aqueous	GC 61	N/A	09/15/18 14:33	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP06-39-41	18-09-0979-13-D	09/13/18 12:50	Aqueous	GC 61	N/A	09/15/18 14:57	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		9.98	1.00		1.00		
CP22-HP07-31-33	18-09-0979-14-D	09/13/18 14:15	Aqueous	GC 61	N/A	09/15/18 15:22	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP07-35-37	18-09-0979-15-D	09/13/18 14:05	Aqueous	GC 61	N/A	09/15/18 15:48	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP22-HP07-39-41	18-09-0979-16-D	09/13/18 14:10	Aqueous	GC 61	N/A	09/15/18 16:13	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-111	N/A	Aqueous	GC 61	N/A	09/15/18 10:45	180915L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP 20180913	18-09-0979-4-G	09/13/18 07:30	Aqueous	ICP 8300	09/19/18	09/21/18 21:56	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP04-31-33	18-09-0979-5-G	09/13/18 08:30	Aqueous	ICP 8300	09/19/18	09/21/18 21:58	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP04-35-37	18-09-0979-6-G	09/13/18 08:40	Aqueous	ICP 8300	09/19/18	09/21/18 21:59	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP04-39-41	18-09-0979-7-G	09/13/18 08:50	Aqueous	ICP 8300	09/19/18	09/21/18 22:00	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0570	0.0100		1.00		
CP22-HP05-31-33	18-09-0979-8-G	09/13/18 11:30	Aqueous	ICP 8300	09/19/18	09/21/18 22:02	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP05-35-37	18-09-0979-9-G	09/13/18 11:25	Aqueous	ICP 8300	09/19/18	09/21/18 22:03	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP05-39-41	18-09-0979-10-G	09/13/18 11:20	Aqueous	ICP 8300	09/19/18	09/21/18 22:08	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP06-35-37	18-09-0979-12-G	09/13/18 12:45	Aqueous	ICP 8300	09/19/18	09/21/18 22:09	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP06-39-41	18-09-0979-13-G	09/13/18 12:50	Aqueous	ICP 8300	09/19/18	09/21/18 22:11	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP07-31-33	18-09-0979-14-G	09/13/18 14:15	Aqueous	ICP 8300	09/19/18	09/21/18 22:12	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP07-35-37	18-09-0979-15-G	09/13/18 14:05	Aqueous	ICP 8300	09/19/18	09/21/18 22:13	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP22-HP07-39-41	18-09-0979-16-G	09/13/18 14:10	Aqueous	ICP 8300	09/19/18	09/21/18 22:18	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		0.0104	0.0100		1.00		
Method Blank	099-14-304-776	N/A	Aqueous	ICP 8300	09/19/18	09/21/18 21:50	180919LA2F
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
T-Blank 20180913	18-09-0979-1-A	09/13/18 07:15	Aqueous	GC/MS M	09/24/18	09/24/18 19:07	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank 20180913	18-09-0979-2-A	09/13/18 07:20	Aqueous	GC/MS M	09/24/18	09/24/18 19:36	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
F-Blank 20180913	18-09-0979-3-A	09/13/18 07:25	Aqueous	GC/MS M	09/24/18	09/24/18 20:06	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
DUP 20180913	18-09-0979-4-A	09/13/18 07:30	Aqueous	GC/MS M	09/24/18	09/24/18 20:35	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.017		0.0050		1.00	
CP22-HP04-31-33	18-09-0979-5-A	09/13/18 08:30	Aqueous	GC/MS M	09/24/18	09/24/18 21:05	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP04-35-37	18-09-0979-6-A	09/13/18 08:40	Aqueous	GC/MS M	09/24/18	09/24/18 21:35	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.016		0.0050		1.00	
CP22-HP04-39-41	18-09-0979-7-A	09/13/18 08:50	Aqueous	GC/MS M	09/24/18	09/24/18 22:04	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP05-31-33	18-09-0979-8-A	09/13/18 11:30	Aqueous	GC/MS M	09/25/18	09/25/18 18:55	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.057		0.0050		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP22-HP05-35-37	18-09-0979-9-A	09/13/18 11:25	Aqueous	GC/MS M	09/25/18	09/25/18 11:00	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.20		0.025		5.00	
CP22-HP05-39-41	18-09-0979-10-A	09/13/18 11:20	Aqueous	GC/MS M	09/25/18	09/25/18 19:24	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.055		0.0050		1.00	
CP22-HP06-31-33	18-09-0979-11-A	09/13/18 12:55	Aqueous	GC/MS M	09/25/18	09/25/18 19:54	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.024		0.0050		1.00	
CP22-HP06-35-37	18-09-0979-12-A	09/13/18 12:45	Aqueous	GC/MS M	09/25/18	09/25/18 11:30	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.32		0.025		5.00	
CP22-HP06-39-41	18-09-0979-13-A	09/13/18 12:50	Aqueous	GC/MS M	09/25/18	09/25/18 20:23	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
CP22-HP07-31-33	18-09-0979-14-A	09/13/18 14:15	Aqueous	GC/MS M	09/25/18	09/25/18 20:53	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.062		0.0050		1.00	
CP22-HP07-35-37	18-09-0979-15-A	09/13/18 14:05	Aqueous	GC/MS M	09/25/18	09/25/18 12:00	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.17		0.025		5.00	
CP22-HP07-39-41	18-09-0979-16-B	09/13/18 14:10	Aqueous	GC/MS M	09/27/18	09/27/18 12:08	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.059		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-10-022-1474	N/A	Aqueous	GC/MS M	09/24/18	09/24/18 11:03	180924L019
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1475	N/A	Aqueous	GC/MS M	09/25/18	09/25/18 10:31	180925L055
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1476	N/A	Aqueous	GC/MS M	09/27/18	09/27/18 11:38	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/13/18
 Work Order: 18-09-0979
 Preparation: Filtered
 Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
DUP 20180913	Sample	Aqueous	ICP 8300	09/19/18	09/21/18 21:56	180919SA2
DUP 20180913	Matrix Spike	Aqueous	ICP 8300	09/19/18	09/21/18 21:53	180919SA2
DUP 20180913	Matrix Spike Duplicate	Aqueous	ICP 8300	09/19/18	09/21/18 21:55	180919SA2

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.5855	117	0.5813	116	80-120	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP07-35-37	Sample	Aqueous	ICP 8300	09/19/18	09/21/18 22:13	180919SA2A
CP22-HP07-35-37	Matrix Spike	Aqueous	ICP 8300	09/19/18	09/21/18 22:15	180919SA2A
CP22-HP07-35-37	Matrix Spike Duplicate	Aqueous	ICP 8300	09/19/18	09/21/18 22:16	180919SA2A

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.6161	123	0.6080	122	80-120	1	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-0815-7	Sample	Aqueous	GC/MS M	09/24/18	09/24/18 12:02	180924S009
18-09-0815-7	Matrix Spike	Aqueous	GC/MS M	09/24/18	09/24/18 14:01	180924S009
18-09-0815-7	Matrix Spike Duplicate	Aqueous	GC/MS M	09/24/18	09/24/18 14:30	180924S009

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.2815	0.02500	0.3705	356	0.3265	180	70-130	13	0-20	3


 Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP22-HP06-35-37	Sample	Aqueous	GC/MS M	09/25/18	09/25/18 11:30	180925S028
CP22-HP06-35-37	Matrix Spike	Aqueous	GC/MS M	09/25/18	09/25/18 12:29	180925S028
CP22-HP06-35-37	Matrix Spike Duplicate	Aqueous	GC/MS M	09/25/18	09/25/18 12:59	180925S028

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.3185	0.02500	0.3505	128	0.3750	226	70-130	7	0-20	3

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1119-5	Sample	Aqueous	GC/MS M	09/27/18	09/27/18 12:37	180927S006
18-09-1119-5	Matrix Spike	Aqueous	GC/MS M	09/27/18	09/27/18 13:07	180927S006
18-09-1119-5	Matrix Spike Duplicate	Aqueous	GC/MS M	09/27/18	09/27/18 13:37	180927S006

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.5480	0.05000	0.6140	132	0.6870	278	70-130	11	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: N/A
Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-111	LCS	Aqueous	GC 61	N/A	09/15/18 09:48	180915L01			
099-14-325-111	LCSD	Aqueous	GC 61	N/A	09/15/18 10:16	180915L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	94.52	92	94.83	92	80-120	0	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-776	LCS	Aqueous	ICP 8300	09/19/18	09/21/18 21:52	180919LA2F
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.5048	101	85-115	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1474	LCS	Aqueous	GC/MS M	09/24/18	09/24/18 10:31	180924L019
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005200	104	80-120	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/13/18
Work Order: 18-09-0979
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1475	LCS	Aqueous	GC/MS M	09/25/18	09/25/18 09:59	180925L055
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005500	110	80-120	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/13/18
 Work Order: 18-09-0979
 Preparation: EPA 5030C
 Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

Page 5 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1476	LCS	Aqueous	GC/MS M	09/27/18	09/27/18 10:38	180927L022

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane	0.005000	0.005500	110	80-120	

Return to Contents 

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-09-0979

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	771	ICP 8300	1
RSK-175M	N/A	1158	GC 61	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 18-09-0979

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-09-0979

Page 1 of 2

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Bottle Type and Volume/Preservative						Comments	Lab Use Only	Condition of Bottles			
				VOCS by	Metals	SVOCs by 8270	TEP by	SPL 5241-72	Paper by RSC1754				On by EM 217 (Lab Ret.)		
T-Blank 2x10713	9/13/18	0715	Water												
E-Blank 2018 0713		0720													
F-Blank 2018 0913		0725													
DUP 2018 0913		0730							3	1					
CP22-4404-31-33		0830							3	1					
CP22-4404-35-37		0840							3	1					Significant ephorescence
CP22-4404-31-41		0850							3	1					min ephorescence
CP22-4405-31-33		1130							3	1					
CP22-4405-35-37		1125							3	1					
CP22-4405-39-41		1120							3	1					Min ephorescence
CP22-4406-31-33		1255							3	1					Medium ephorescence
CP22-4406-35-37		1245							3	1					

Special Instructions:

Turn-around Time: Normal Rush:

1. Relinquished by (Signature/Affiliation)	Date 7/13/18	Time 1630	1. Received by (Signature/Affiliation)	Date 09/13/18	Time 1630
2. Relinquished by (Signature/Affiliation)	Date 9/13/18	Time 1915	2. Received by (Signature/Affiliation)	Date 9/13/18	Time 1915
3. Relinquished by (Signature/Affiliation)	Date	Time	3. Received by (Signature/Affiliation)	Date	Time

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/13/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.8 °C (w/ CF): 3.3 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: UBUK

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: UBUK

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 1165

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input checked="" type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Volatile Organics <input checked="" type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE:

(Trip Blank Lot Number: 180829C)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB 125PB_z (pH__9)

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (__) EnCores® (__) TerraCores® (__) Other Matrix (____):

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag
Preservative: b = buffered, f = filtered, h = HCl, n = HNO₃, na = NaOH, na₂ = Na₂S₂O₃, p = H₃PO₄, s = H₂SO₄, u = ultra-pure, x = Na₂SO₃+NaHSO₄.H₂O, z_{na} = Zn (CH₃CO₂)₂ + NaOH
Labeled/Checked by: 1165
Reviewed by: WPSO



Calscience



WORK ORDER NUMBER: 18-09-1119

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 10/01/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Contents

Client Project Name: ESTCP C. Pendleton WR2274

Work Order Number: 18-09-1119

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/15/18. They were assigned to Work Order 18-09-1119.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of \leq 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-1119
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/15/18 19:30
	Number of Containers: 102

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
T-Blank 20180914	18-09-1119-1	09/14/18 07:00	2	Aqueous
E-Blank 20180914	18-09-1119-2	09/14/18 15:00	2	Aqueous
F-Blank 20180914	18-09-1119-3	09/14/18 13:00	2	Aqueous
DUP01-20180914	18-09-1119-4	09/14/18 15:50	7	Aqueous
DUP02-20180914	18-09-1119-5	09/14/18 16:00	7	Aqueous
CP-22-HP08-31-33	18-09-1119-6	09/14/18 07:50	7	Aqueous
CP-22-HP08-35-37	18-09-1119-7	09/14/18 07:40	7	Aqueous
CP-22-HP08-39-41	18-09-1119-8	09/14/18 07:30	7	Aqueous
CP-22-HP09-31-33	18-09-1119-9	09/14/18 09:05	6	Aqueous
CP-22-HP09-35-37	18-09-1119-10	09/14/18 09:15	7	Aqueous
CP-22-HP10-31-33	18-09-1119-11	09/14/18 10:55	6	Aqueous
CP-22-HP10-35-37	18-09-1119-12	09/14/18 10:50	7	Aqueous
CP-22-HP10-39-41	18-09-1119-13	09/14/18 10:40	7	Aqueous
CP-22-HP11-35-37	18-09-1119-14	09/14/18 12:30	7	Aqueous
CP-22-HP11-39-41	18-09-1119-15	09/14/18 12:20	7	Aqueous
CP-22-HP12-31-33	18-09-1119-16	09/14/18 14:00	7	Aqueous
CP-22-HP12-39-41	18-09-1119-17	09/14/18 13:40	7	Aqueous



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-09-1119
Project Name: ESTCP C. Pendleton WR2274
Received: 09/15/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
DUP01-20180914 (18-09-1119-4)						
1,2,3-Trichloropropane	0.021		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
DUP02-20180914 (18-09-1119-5)						
1,2,3-Trichloropropane	0.55		0.050	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP08-31-33 (18-09-1119-6)						
Propene	2.28		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.081		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP08-35-37 (18-09-1119-7)						
1,2,3-Trichloropropane	0.43		0.050	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP08-39-41 (18-09-1119-8)						
1,2,3-Trichloropropane	0.024		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP09-31-33 (18-09-1119-9)						
1,2,3-Trichloropropane	0.32		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP09-35-37 (18-09-1119-10)						
1,2,3-Trichloropropane	3.2		0.25	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP10-31-33 (18-09-1119-11)						
Propene	2.04		1.00	ug/L	RSK-175M	N/A
1,2,3-Trichloropropane	0.037		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP10-35-37 (18-09-1119-12)						
1,2,3-Trichloropropane	5.1		0.50	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP10-39-41 (18-09-1119-13)						
1,2,3-Trichloropropane	0.0095		0.0050	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP11-35-37 (18-09-1119-14)						
1,2,3-Trichloropropane	0.27		0.025	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP11-39-41 (18-09-1119-15)						
1,2,3-Trichloropropane	0.092		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP12-31-33 (18-09-1119-16)						
1,2,3-Trichloropropane	0.11		0.010	ug/L	SRL 524M-TCP	EPA 5030C
CP-22-HP12-39-41 (18-09-1119-17)						
1,2,3-Trichloropropane	0.030		0.0050	ug/L	SRL 524M-TCP	EPA 5030C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP01-20180914	18-09-1119-4-D	09/14/18 15:50	Aqueous	GC 61	N/A	09/18/18 14:40	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
DUP02-20180914	18-09-1119-5-D	09/14/18 16:00	Aqueous	GC 61	N/A	09/18/18 15:06	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP08-31-33	18-09-1119-6-D	09/14/18 07:50	Aqueous	GC 61	N/A	09/18/18 15:31	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.28	1.00		1.00		
CP-22-HP08-35-37	18-09-1119-7-D	09/14/18 07:40	Aqueous	GC 61	N/A	09/18/18 15:54	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP08-39-41	18-09-1119-8-D	09/14/18 07:30	Aqueous	GC 61	N/A	09/18/18 16:18	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP09-31-33	18-09-1119-9-D	09/14/18 09:05	Aqueous	GC 61	N/A	09/18/18 16:42	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP09-35-37	18-09-1119-10-D	09/14/18 09:15	Aqueous	GC 61	N/A	09/18/18 17:05	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP10-31-33	18-09-1119-11-D	09/14/18 10:55	Aqueous	GC 61	N/A	09/18/18 17:29	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		2.04	1.00		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: N/A
Method: RSK-175M
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP-22-HP10-35-37	18-09-1119-12-D	09/14/18 10:50	Aqueous	GC 61	N/A	09/18/18 17:57	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP10-39-41	18-09-1119-13-D	09/14/18 10:40	Aqueous	GC 61	N/A	09/18/18 18:23	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP11-35-37	18-09-1119-14-D	09/14/18 12:30	Aqueous	GC 61	N/A	09/18/18 18:48	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP11-39-41	18-09-1119-15-D	09/14/18 12:20	Aqueous	GC 61	N/A	09/18/18 19:15	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP12-31-33	18-09-1119-16-D	09/14/18 14:00	Aqueous	GC 61	N/A	09/18/18 19:43	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
CP-22-HP12-39-41	18-09-1119-17-D	09/14/18 13:40	Aqueous	GC 61	N/A	09/18/18 20:07	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		
Method Blank	099-14-325-110	N/A	Aqueous	GC 61	N/A	09/18/18 12:49	180918L01
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Propene		ND	1.00		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DUP01-20180914	18-09-1119-4-G	09/14/18 15:50	Aqueous	ICP 8300	09/20/18	09/24/18 13:36	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
DUP02-20180914	18-09-1119-5-G	09/14/18 16:00	Aqueous	ICP 8300	09/20/18	09/24/18 13:42	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP08-31-33	18-09-1119-6-G	09/14/18 07:50	Aqueous	ICP 8300	09/20/18	09/24/18 13:44	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP08-35-37	18-09-1119-7-G	09/14/18 07:40	Aqueous	ICP 8300	09/20/18	09/24/18 13:45	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP08-39-41	18-09-1119-8-G	09/14/18 07:30	Aqueous	ICP 8300	09/20/18	09/24/18 13:46	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP09-35-37	18-09-1119-10-G	09/14/18 09:15	Aqueous	ICP 8300	09/20/18	09/24/18 13:54	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP10-35-37	18-09-1119-12-G	09/14/18 10:50	Aqueous	ICP 8300	09/20/18	09/22/18 13:22	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP10-39-41	18-09-1119-13-G	09/14/18 10:40	Aqueous	ICP 8300	09/20/18	09/24/18 13:55	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: Filtered
Method: EPA 200.7
Units: mg/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP-22-HP11-35-37	18-09-1119-14-G	09/14/18 12:30	Aqueous	ICP 8300	09/20/18	09/24/18 13:56	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP11-39-41	18-09-1119-15-G	09/14/18 12:20	Aqueous	ICP 8300	09/20/18	09/24/18 13:58	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP12-31-33	18-09-1119-16-G	09/14/18 14:00	Aqueous	ICP 8300	09/20/18	09/24/18 13:59	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
CP-22-HP12-39-41	18-09-1119-17-G	09/14/18 13:40	Aqueous	ICP 8300	09/20/18	09/24/18 14:01	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		
Method Blank	099-14-304-778	N/A	Aqueous	ICP 8300	09/20/18	09/22/18 13:19	180920LA2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Zinc		ND	0.0100		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
T-Blank 20180914	18-09-1119-1-A	09/14/18 07:00	Aqueous	GC/MS M	09/27/18	09/27/18 15:06	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
E-Blank 20180914	18-09-1119-2-A	09/14/18 15:00	Aqueous	GC/MS M	09/27/18	09/27/18 15:36	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
F-Blank 20180914	18-09-1119-3-A	09/14/18 13:00	Aqueous	GC/MS M	09/27/18	09/27/18 16:05	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
DUP01-20180914	18-09-1119-4-B	09/14/18 15:50	Aqueous	GC/MS M	09/27/18	09/27/18 14:36	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.021		0.0050		1.00	
DUP02-20180914	18-09-1119-5-B	09/14/18 16:00	Aqueous	GC/MS M	09/27/18	09/27/18 12:37	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.55		0.050		10.0	
CP-22-HP08-31-33	18-09-1119-6-B	09/14/18 07:50	Aqueous	GC/MS M	09/27/18	09/27/18 14:07	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.081		0.010		2.00	
CP-22-HP08-35-37	18-09-1119-7-B	09/14/18 07:40	Aqueous	GC/MS M	09/27/18	09/27/18 18:34	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.43		0.050		10.0	
CP-22-HP08-39-41	18-09-1119-8-B	09/14/18 07:30	Aqueous	GC/MS M	09/27/18	09/27/18 17:35	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.024		0.0050		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP-22-HP09-31-33	18-09-1119-9-B	09/14/18 09:05	Aqueous	GC/MS M	09/27/18	09/27/18 19:04	180927L022
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.32	0.025		5.00		
CP-22-HP09-35-37	18-09-1119-10-B	09/14/18 09:15	Aqueous	GC/MS M	09/27/18	09/27/18 19:33	180927L022
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		3.2	0.25		50.0		
CP-22-HP10-31-33	18-09-1119-11-B	09/14/18 10:55	Aqueous	GC/MS M	09/27/18	09/27/18 18:04	180927L022
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.037	0.0050		1.00		
CP-22-HP10-35-37	18-09-1119-12-B	09/14/18 10:50	Aqueous	GC/MS M	09/27/18	09/27/18 20:03	180927L022
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		5.1	0.50		100		
CP-22-HP10-39-41	18-09-1119-13-A	09/14/18 10:40	Aqueous	GC/MS M	09/27/18	09/27/18 20:33	180927L022
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.0095	0.0050		1.00		
CP-22-HP11-35-37	18-09-1119-14-B	09/14/18 12:30	Aqueous	GC/MS M	09/28/18	09/28/18 11:27	180928L012
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.27	0.025		5.00		
CP-22-HP11-39-41	18-09-1119-15-B	09/14/18 12:20	Aqueous	GC/MS M	09/28/18	09/28/18 11:57	180928L012
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.092	0.010		2.00		
CP-22-HP12-31-33	18-09-1119-16-B	09/14/18 14:00	Aqueous	GC/MS M	09/28/18	09/28/18 12:27	180928L012
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
1,2,3-Trichloropropane		0.11	0.010		2.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP
Units: ug/L

Project: ESTCP C. Pendleton WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CP-22-HP12-39-41	18-09-1119-17-B	09/14/18 13:40	Aqueous	GC/MS M	09/28/18	09/28/18 10:58	180928L012
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.030		0.0050		1.00	
Method Blank	099-10-022-1476	N/A	Aqueous	GC/MS M	09/27/18	09/27/18 11:38	180927L022
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	
Method Blank	099-10-022-1477	N/A	Aqueous	GC/MS M	09/28/18	09/28/18 10:28	180928L012
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		ND		0.0050		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

Page 1 of 4

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
DUP01-20180914	Sample	Aqueous	ICP 8300	09/20/18	09/24/18 13:36	180920SA2
DUP01-20180914	Matrix Spike	Aqueous	ICP 8300	09/20/18	09/24/18 13:38	180920SA2
DUP01-20180914	Matrix Spike Duplicate	Aqueous	ICP 8300	09/20/18	09/24/18 13:39	180920SA2

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.4289	86	0.4902	98	80-120	13	0-20	


 Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/15/18
 Work Order: 18-09-1119
 Preparation: Filtered
 Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

Page 2 of 4

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP-22-HP10-35-37	Sample	Aqueous	ICP 8300	09/20/18	09/22/18 13:22	180920SA2A
CP-22-HP10-35-37	Matrix Spike	Aqueous	ICP 8300	09/20/18	09/22/18 13:24	180920SA2A
CP-22-HP10-35-37	Matrix Spike Duplicate	Aqueous	ICP 8300	09/20/18	09/22/18 13:25	180920SA2A

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	ND	0.5000	0.5144	103	0.5129	103	80-120	0	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
DUP02-20180914	Sample	Aqueous	GC/MS M	09/27/18	09/27/18 12:37	180927S006
DUP02-20180914	Matrix Spike	Aqueous	GC/MS M	09/27/18	09/27/18 13:07	180927S006
DUP02-20180914	Matrix Spike Duplicate	Aqueous	GC/MS M	09/27/18	09/27/18 13:37	180927S006

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.5480	0.05000	0.6140	132	0.6870	278	70-130	11	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants	Date Received:	09/15/18
595 Market Street, Suite 610	Work Order:	18-09-1119
San Francisco, CA 94105-2811	Preparation:	EPA 5030C
Project: ESTCP C. Pendleton WR2274	Method:	SRL 524M-TCP

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CP-22-HP11-35-37	Sample	Aqueous	GC/MS M	09/28/18	09/28/18 11:27	180928S006
CP-22-HP11-35-37	Matrix Spike	Aqueous	GC/MS M	09/28/18	09/28/18 12:56	180928S006
CP-22-HP11-35-37	Matrix Spike Duplicate	Aqueous	GC/MS M	09/28/18	09/28/18 13:26	180928S006

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,2,3-Trichloropropane	0.2710	0.02500	0.2925	86	0.3190	192	70-130	9	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: N/A
Method: RSK-175M

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-14-325-110	LCS	Aqueous	GC 61	N/A	09/18/18 10:11	180918L01			
099-14-325-110	LCSD	Aqueous	GC 61	N/A	09/18/18 10:38	180918L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Propene	103.0	95.49	93	95.70	93	80-120	0	0-20	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: Filtered
Method: EPA 200.7

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-304-778	LCS	Aqueous	ICP 8300	09/20/18	09/22/18 13:21	180920LA2
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		0.5000	0.4578	92	85-115	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1476	LCS	Aqueous	GC/MS M	09/27/18	09/27/18 10:38	180927L022
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005500	110	80-120	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/15/18
Work Order: 18-09-1119
Preparation: EPA 5030C
Method: SRL 524M-TCP

Project: ESTCP C. Pendleton WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-10-022-1477	LCS	Aqueous	GC/MS M	09/28/18	09/28/18 09:58	180928L012
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
1,2,3-Trichloropropane		0.005000	0.005600	112	80-120	

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RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-09-1119

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 200.7	Filtered	110	ICP 8300	1
RSK-175M	N/A	1158	GC 61	2
SRL 524M-TCP	EPA 5030C	486	GC/MS M	2

Glossary of Terms and Qualifiers

Work Order: 18-09-1119

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-09-1119

Page 1 of 2

Project Name ESTP C. Penetration	Project Number WR22274	Required Analyses						
Sample Names B. Lechore (1)	Project Contact Leanne (Leanne.geosyntec.com)	VOCS by	Metals	SVOCs by 8270	TCP by SPL 524M-TCP	Paper by PASC-195A	2-b by EPA 200.7 (Filter)	Lab (Lab)
Laboratory Name Geosyntec	Lab Contact S. Newark	Bottle Type and Volume/Preservative						
Lab Address	Lab Phone	Number of Containers						
	Carrier/Waybill No.	Sample Type						

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Number of Containers												Comments	Lab Use Only	Condition of Bottles
				1	2	3	4	5	6	7	8	9	10	11	12			
T-Blank 20180714	9/14/18	0700	Water	2													1	
E-Blank 20180914		1500		2													2	
F-Blank 20180914		1300		2													3	
DUP01-20180914		1550		3	3	1											4	
DUP02-20180914		1600		3	3	1											5	
CP22-AP09-31-33		0750		3	3	1											6	
CP22-AP04-35-37		0740		3	3	1											7	
CP22-AP08-37-41		0730		3	3	1											8	
CP22-AP07-31-33		0905		3	3	1											9	
CP22-AP09-35-37		0915		3	3	1											10	
CP22-AP10-31-33		1055		3	3	1											11	
CP22-AP10-35-37		1050		3	3	1											12	

Special Instructions: Only run CP22-AP12-37-41-31-33 for EPA 200.7; if sample quantity is determined to be adequate.

Turn-around Time:
 Normal Rush:

1. Relinquished by (Signature/Affiliation)	Date 9/14/18	Time 1635	1. Received by (Signature/Affiliation)	Date 9/14/18	Time 1635
2. Relinquished by (Signature/Affiliation)	Date 9/14/18	Time 1930	2. Received by (Signature/Affiliation)	Date 9/14/18	Time 1930
3. Relinquished by (Signature/Affiliation)	Date	Time	3. Received by (Signature/Affiliation)	Date	Time



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/14/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.8 °C (w/ CF): 3.3 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: UBVK

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: UBVK

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: H68

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples Yes No N/A

COC document(s) received complete Yes No N/A

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC Yes No N/A

Sample container label(s) consistent with COC Yes No N/A

Sample container(s) intact and in good condition Yes No N/A

Proper containers for analyses requested Yes No N/A

Sufficient volume/mass for analyses requested Yes No N/A

Samples received within holding time Yes No N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH Residual Chlorine Dissolved Sulfide Dissolved Oxygen Yes No N/A

Proper preservation chemical(s) noted on COC and/or sample container Yes No N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range Yes No N/A

Container(s) for certain analysis free of headspace..... Yes No N/A

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation Yes No N/A

CONTAINER TYPE: 6

(Trip Blank Lot Number: 180829C)

Aqueous: VOA VOAh VOAna2 100PJ 100PJna2 125AGB 125AGBh 125AGBp 125PB 125PBzanna (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGBna2 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO3, **na** = NaOH, **na2** = Na2S2O3, **p** = H3PO4, Labeled/Checked by: H68

s = H2SO4, **u** = ultra-pure, **x** = Na2SO3+NaHSO4.H2O, **zanna** = Zn (CH3CO2)2 + NaOH Reviewed by: H4M

SAMPLE ANOMALY REPORT

DATE: 09/14/2018

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
- Sample(s) received but NOT LISTED on COC
- Holding time expired (list client or ECI sample ID and analysis)
- Insufficient sample amount for requested analysis (list analysis)
- Improper container(s) used (list analysis)
- Improper preservative used (list analysis)
- pH outside acceptable range (list analysis)
- No preservative noted on COC or label (list analysis and notify lab)
- Sample container(s) not labeled
- Client sample label(s) illegible (list container type and analysis)
- Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
- Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
- Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

(-4) container for
EPA 200.7 (lab filter)
labeled as

DUPO2-20180914

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**
6	C	6			
11	F	6			

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

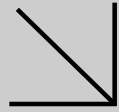
Reported by: llb
Reviewed by: H4MW

** Record the total number of containers (i.e., vials or bottles) for the affected sample.





Calscience



WORK ORDER NUMBER: 18-09-1544

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton / WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 10/01/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 18-09-1544

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/20/18. They were assigned to Work Order 18-09-1544.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



Calscience

Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-1544
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton / WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/20/18 18:50
	Number of Containers: 7

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
IDW-SOIL-20180919	18-09-1544-1	09/19/18 15:30	2	Solid
IDW-WATER-20180919	18-09-1544-2	09/19/18 15:45	5	Aqueous



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Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 18-09-1544
 Project Name: ESTCP C. Pendleton / WR2274
 Received: 09/20/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
IDW-SOIL-20180919 (18-09-1544-1)						
Arsenic	4.79		0.732	mg/kg	EPA 6010B	EPA 3050B
Barium	154		0.488	mg/kg	EPA 6010B	EPA 3050B
Beryllium	0.552		0.244	mg/kg	EPA 6010B	EPA 3050B
Chromium	21.2		0.244	mg/kg	EPA 6010B	EPA 3050B
Cobalt	8.54		0.244	mg/kg	EPA 6010B	EPA 3050B
Copper	12.7		0.488	mg/kg	EPA 6010B	EPA 3050B
Nickel	7.83		0.244	mg/kg	EPA 6010B	EPA 3050B
Vanadium	46.6		0.244	mg/kg	EPA 6010B	EPA 3050B
Zinc	54.6		0.976	mg/kg	EPA 6010B	EPA 3050B
IDW-WATER-20180919 (18-09-1544-2)						
Arsenic	0.597		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Barium	0.763		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Chromium	0.101		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Cobalt	0.0349		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Copper	0.328		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Lead	0.0253		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Nickel	0.0432		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Thallium	0.0173		0.0150	mg/L	EPA 6010B	EPA 3010A Total
Vanadium	0.235		0.0100	mg/L	EPA 6010B	EPA 3010A Total
Zinc	0.485		0.0100	mg/L	EPA 6010B	EPA 3010A Total
C6-C44 Total	170		96	ug/L	EPA 8015B (M)	EPA 3510C

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-SOIL-20180919	18-09-1544-1-B	09/19/18 15:30	Solid	GC 46	09/25/18	09/26/18 00:18	180925B04

Parameter	Result	RL	DF	Qualifiers
C6	ND	5.0	1.00	
C7	ND	5.0	1.00	
C8	ND	5.0	1.00	
C9-C10	ND	5.0	1.00	
C11-C12	ND	5.0	1.00	
C13-C14	ND	5.0	1.00	
C15-C16	ND	5.0	1.00	
C17-C18	ND	5.0	1.00	
C19-C20	ND	5.0	1.00	
C21-C22	ND	5.0	1.00	
C23-C24	ND	5.0	1.00	
C25-C28	ND	5.0	1.00	
C29-C32	ND	5.0	1.00	
C33-C36	ND	5.0	1.00	
C37-C40	ND	5.0	1.00	
C41-C44	ND	5.0	1.00	
C6-C44 Total	ND	5.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	97	61-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-490-3302	N/A	Solid	GC 46	09/25/18	09/25/18 20:48	180925B04

Parameter	Result	RL	DF	Qualifiers
C6	ND	5.0	1.00	
C7	ND	5.0	1.00	
C8	ND	5.0	1.00	
C9-C10	ND	5.0	1.00	
C11-C12	ND	5.0	1.00	
C13-C14	ND	5.0	1.00	
C15-C16	ND	5.0	1.00	
C17-C18	ND	5.0	1.00	
C19-C20	ND	5.0	1.00	
C21-C22	ND	5.0	1.00	
C23-C24	ND	5.0	1.00	
C25-C28	ND	5.0	1.00	
C29-C32	ND	5.0	1.00	
C33-C36	ND	5.0	1.00	
C37-C40	ND	5.0	1.00	
C41-C44	ND	5.0	1.00	
C6-C44 Total	ND	5.0	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	91	61-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3510C
Method: EPA 8015B (M)
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-WATER-20180919	18-09-1544-2-E	09/19/18 15:45	Aqueous	GC 49	09/25/18	09/27/18 10:28	180925B11A

Parameter	Result	RL	DF	Qualifiers
C6	ND	96	1.00	
C7	ND	96	1.00	
C8	ND	96	1.00	
C9-C10	ND	96	1.00	
C11-C12	ND	96	1.00	
C13-C14	ND	96	1.00	
C15-C16	ND	96	1.00	
C17-C18	ND	96	1.00	
C19-C20	ND	96	1.00	
C21-C22	ND	96	1.00	
C23-C24	ND	96	1.00	
C25-C28	ND	96	1.00	
C29-C32	ND	96	1.00	
C33-C36	ND	96	1.00	
C37-C40	ND	96	1.00	
C41-C44	ND	96	1.00	
C6-C44 Total	170	96	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	88	68-140		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3510C
Method: EPA 8015B (M)
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-498-634	N/A	Aqueous	GC 49	09/25/18	09/25/18 22:50	180925B11A

Parameter	Result	RL	DF	Qualifiers
C6	ND	100	1.00	
C7	ND	100	1.00	
C8	ND	100	1.00	
C9-C10	ND	100	1.00	
C11-C12	ND	100	1.00	
C13-C14	ND	100	1.00	
C15-C16	ND	100	1.00	
C17-C18	ND	100	1.00	
C19-C20	ND	100	1.00	
C21-C22	ND	100	1.00	
C23-C24	ND	100	1.00	
C25-C28	ND	100	1.00	
C29-C32	ND	100	1.00	
C33-C36	ND	100	1.00	
C37-C40	ND	100	1.00	
C41-C44	ND	100	1.00	
C6-C44 Total	ND	100	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	103	68-140	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-SOIL-20180919	18-09-1544-1-A	09/19/18 15:30	Solid	ICP 8300	09/26/18	09/27/18 12:23	180926L03

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.732	0.976	
Arsenic	4.79	0.732	0.976	
Barium	154	0.488	0.976	
Beryllium	0.552	0.244	0.976	
Cadmium	ND	0.488	0.976	
Chromium	21.2	0.244	0.976	
Cobalt	8.54	0.244	0.976	
Copper	12.7	0.488	0.976	
Lead	ND	0.488	0.976	
Molybdenum	ND	0.244	0.976	
Nickel	7.83	0.244	0.976	
Selenium	ND	0.732	0.976	
Silver	ND	0.244	0.976	
Thallium	ND	0.732	0.976	
Vanadium	46.6	0.244	0.976	
Zinc	54.6	0.976	0.976	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-002-27022	N/A	Solid	ICP 8300	09/26/18	09/27/18 20:07	180926L03

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.735	0.980	
Arsenic	ND	0.735	0.980	
Barium	ND	0.490	0.980	
Beryllium	ND	0.245	0.980	
Cadmium	ND	0.490	0.980	
Chromium	ND	0.245	0.980	
Cobalt	ND	0.245	0.980	
Copper	ND	0.490	0.980	
Lead	ND	0.490	0.980	
Molybdenum	ND	0.245	0.980	
Nickel	ND	0.245	0.980	
Selenium	ND	0.735	0.980	
Silver	ND	0.245	0.980	
Thallium	ND	0.735	0.980	
Vanadium	ND	0.245	0.980	
Zinc	ND	0.980	0.980	



Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: ESTCP C. Pendleton / WR2274

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-WATER-20180919	18-09-1544-2-D	09/19/18 15:45	Aqueous	ICP 8300	09/26/18	09/27/18 13:31	180926LA1

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	0.597	0.0100	1.00	
Barium	0.763	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	0.101	0.0100	1.00	
Cobalt	0.0349	0.0100	1.00	
Copper	0.328	0.0100	1.00	
Lead	0.0253	0.0100	1.00	
Molybdenum	ND	0.0100	1.00	
Nickel	0.0432	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	0.0173	0.0150	1.00	
Vanadium	0.235	0.0100	1.00	
Zinc	0.485	0.0100	1.00	



Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: ESTCP C. Pendleton / WR2274

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-003-17052	N/A	Aqueous	ICP 8300	09/26/18	09/26/18 12:51	180926LA1

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.0150	1.00	
Arsenic	ND	0.0100	1.00	
Barium	ND	0.0100	1.00	
Beryllium	ND	0.0100	1.00	
Cadmium	ND	0.0100	1.00	
Chromium	ND	0.0100	1.00	
Cobalt	ND	0.0100	1.00	
Copper	ND	0.0100	1.00	
Lead	ND	0.0100	1.00	
Molybdenum	ND	0.0100	1.00	
Nickel	ND	0.0100	1.00	
Selenium	ND	0.0150	1.00	
Silver	ND	0.00500	1.00	
Thallium	ND	0.0150	1.00	
Vanadium	ND	0.0100	1.00	
Zinc	ND	0.0100	1.00	



Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 7470A Total
Method: EPA 7470A
Units: mg/L

Project: ESTCP C. Pendleton / WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-WATER-20180919	18-09-1544-2-D	09/19/18 15:45	Aqueous	Mercury 07	09/26/18	09/26/18 16:38	180926LA3

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	

Method Blank	099-04-008-8697	N/A	Aqueous	Mercury 07	09/26/18	09/26/18 15:54	180926LA3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.000500	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 7471A Total
Method: EPA 7471A
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-SOIL-20180919	18-09-1544-1-A	09/19/18 15:30	Solid	Mercury 08	09/27/18	09/27/18 16:18	180927L04

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0847	1.00	

Method Blank	099-16-272-4167	N/A	Solid	Mercury 08	09/27/18	09/27/18 15:39	180927L04
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0806	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton / WR2274

Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-SOIL-20180919	18-09-1544-1-B	09/19/18 15:30	Solid	GC/MS BB	09/21/18	09/25/18 10:20	180924L013

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	130	1.00	
Benzene	ND	5.0	1.00	
Bromobenzene	ND	5.0	1.00	
Bromochloromethane	ND	5.0	1.00	
Bromodichloromethane	ND	5.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	25	1.00	
2-Butanone	ND	50	1.00	
n-Butylbenzene	ND	5.0	1.00	
sec-Butylbenzene	ND	5.0	1.00	
tert-Butylbenzene	ND	5.0	1.00	
Carbon Disulfide	ND	50	1.00	
Carbon Tetrachloride	ND	5.0	1.00	
Chlorobenzene	ND	5.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	5.0	1.00	
Chloromethane	ND	25	1.00	
2-Chlorotoluene	ND	5.0	1.00	
4-Chlorotoluene	ND	5.0	1.00	
Dibromochloromethane	ND	5.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	10	1.00	
1,2-Dibromoethane	ND	5.0	1.00	
Dibromomethane	ND	5.0	1.00	
1,2-Dichlorobenzene	ND	5.0	1.00	
1,3-Dichlorobenzene	ND	5.0	1.00	
1,4-Dichlorobenzene	ND	5.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	5.0	1.00	
1,2-Dichloroethane	ND	5.0	1.00	
1,1-Dichloroethene	ND	5.0	1.00	
c-1,2-Dichloroethene	ND	5.0	1.00	
t-1,2-Dichloroethene	ND	5.0	1.00	
1,2-Dichloropropane	ND	5.0	1.00	
1,3-Dichloropropane	ND	5.0	1.00	
2,2-Dichloropropane	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton / WR2274

Page 2 of 4

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	5.0	1.00	
c-1,3-Dichloropropene	ND	5.0	1.00	
t-1,3-Dichloropropene	ND	5.0	1.00	
Ethylbenzene	ND	5.0	1.00	
2-Hexanone	ND	50	1.00	
Isopropylbenzene	ND	5.0	1.00	
p-Isopropyltoluene	ND	5.0	1.00	
Methylene Chloride	ND	50	1.00	
4-Methyl-2-Pentanone	ND	50	1.00	
Naphthalene	ND	50	1.00	
n-Propylbenzene	ND	5.0	1.00	
Styrene	ND	5.0	1.00	
1,1,1,2-Tetrachloroethane	ND	5.0	1.00	
1,1,2,2-Tetrachloroethane	ND	5.0	1.00	
Tetrachloroethene	ND	5.0	1.00	
Toluene	ND	5.0	1.00	
1,2,3-Trichlorobenzene	ND	10	1.00	
1,2,4-Trichlorobenzene	ND	5.0	1.00	
1,1,1-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50	1.00	
Trichloroethene	ND	5.0	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	5.0	1.00	
Trichlorofluoromethane	ND	50	1.00	
1,3,5-Trimethylbenzene	ND	5.0	1.00	
Vinyl Acetate	ND	50	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	5.0	1.00	
o-Xylene	ND	5.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	88	60-132	
Dibromofluoromethane	95	63-141	
1,2-Dichloroethane-d4	84	62-146	
Toluene-d8	107	70-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-314-1111	N/A	Solid	GC/MS BB	09/24/18	09/25/18 05:27	180924L013

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	120	1.00	
Benzene	ND	5.0	1.00	
Bromobenzene	ND	5.0	1.00	
Bromochloromethane	ND	5.0	1.00	
Bromodichloromethane	ND	5.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	25	1.00	
2-Butanone	ND	50	1.00	
n-Butylbenzene	ND	5.0	1.00	
sec-Butylbenzene	ND	5.0	1.00	
tert-Butylbenzene	ND	5.0	1.00	
Carbon Disulfide	ND	50	1.00	
Carbon Tetrachloride	ND	5.0	1.00	
Chlorobenzene	ND	5.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	5.0	1.00	
Chloromethane	ND	25	1.00	
2-Chlorotoluene	ND	5.0	1.00	
4-Chlorotoluene	ND	5.0	1.00	
Dibromochloromethane	ND	5.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	10	1.00	
1,2-Dibromoethane	ND	5.0	1.00	
Dibromomethane	ND	5.0	1.00	
1,2-Dichlorobenzene	ND	5.0	1.00	
1,3-Dichlorobenzene	ND	5.0	1.00	
1,4-Dichlorobenzene	ND	5.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	5.0	1.00	
1,2-Dichloroethane	ND	5.0	1.00	
1,1-Dichloroethene	ND	5.0	1.00	
c-1,2-Dichloroethene	ND	5.0	1.00	
t-1,2-Dichloroethene	ND	5.0	1.00	
1,2-Dichloropropane	ND	5.0	1.00	
1,3-Dichloropropane	ND	5.0	1.00	
2,2-Dichloropropane	ND	5.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/kg

Project: ESTCP C. Pendleton / WR2274

Page 4 of 4

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	5.0	1.00	
c-1,3-Dichloropropene	ND	5.0	1.00	
t-1,3-Dichloropropene	ND	5.0	1.00	
Ethylbenzene	ND	5.0	1.00	
2-Hexanone	ND	50	1.00	
Isopropylbenzene	ND	5.0	1.00	
p-Isopropyltoluene	ND	5.0	1.00	
Methylene Chloride	ND	50	1.00	
4-Methyl-2-Pentanone	ND	50	1.00	
Naphthalene	ND	50	1.00	
n-Propylbenzene	ND	5.0	1.00	
Styrene	ND	5.0	1.00	
1,1,1,2-Tetrachloroethane	ND	5.0	1.00	
1,1,2,2-Tetrachloroethane	ND	5.0	1.00	
Tetrachloroethene	ND	5.0	1.00	
Toluene	ND	5.0	1.00	
1,2,3-Trichlorobenzene	ND	10	1.00	
1,2,4-Trichlorobenzene	ND	5.0	1.00	
1,1,1-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloroethane	ND	5.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50	1.00	
Trichloroethene	ND	5.0	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	5.0	1.00	
Trichlorofluoromethane	ND	50	1.00	
1,3,5-Trimethylbenzene	ND	5.0	1.00	
Vinyl Acetate	ND	50	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	5.0	1.00	
o-Xylene	ND	5.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	84	60-132	
Dibromofluoromethane	96	63-141	
1,2-Dichloroethane-d4	89	62-146	
Toluene-d8	108	70-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IDW-WATER-20180919	18-09-1544-2-A	09/19/18 15:45	Aqueous	GC/MS PP	09/27/18	09/28/18 08:51	180927L045

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	20	1.00	
Benzene	ND	1.0	1.00	
Bromobenzene	ND	1.0	1.00	
Bromochloromethane	ND	2.0	1.00	
Bromodichloromethane	ND	1.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	50	1.00	
2-Butanone	ND	20	1.00	
n-Butylbenzene	ND	1.0	1.00	
sec-Butylbenzene	ND	1.0	1.00	
tert-Butylbenzene	ND	1.0	1.00	
Carbon Disulfide	ND	10	1.00	
Carbon Tetrachloride	ND	2.0	1.00	
Chlorobenzene	ND	1.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	1.0	1.00	
Chloromethane	ND	10	1.00	
2-Chlorotoluene	ND	1.0	1.00	
4-Chlorotoluene	ND	1.0	1.00	
Dibromochloromethane	ND	2.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	1.0	1.00	
Dibromomethane	ND	1.0	1.00	
1,2-Dichlorobenzene	ND	1.0	1.00	
1,3-Dichlorobenzene	ND	1.0	1.00	
1,4-Dichlorobenzene	ND	1.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	1.0	1.00	
1,2-Dichloroethane	ND	1.0	1.00	
1,1-Dichloroethene	ND	1.0	1.00	
c-1,2-Dichloroethene	ND	1.0	1.00	
t-1,2-Dichloroethene	ND	1.0	1.00	
1,2-Dichloropropane	ND	1.0	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

Page 2 of 4

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	1.0	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	1.0	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	1.0	1.00	
p-Isopropyltoluene	ND	1.0	1.00	
Methylene Chloride	ND	10	1.00	
4-Methyl-2-Pentanone	ND	10	1.00	
Naphthalene	ND	10	1.00	
n-Propylbenzene	ND	1.0	1.00	
Styrene	ND	1.0	1.00	
1,1,1,2-Tetrachloroethane	ND	2.0	1.00	
1,1,2,2-Tetrachloroethane	ND	1.0	1.00	
Tetrachloroethene	ND	1.0	1.00	
Toluene	ND	1.0	1.00	
1,2,3-Trichlorobenzene	ND	1.0	1.00	
1,2,4-Trichlorobenzene	ND	1.0	1.00	
1,1,1-Trichloroethane	ND	1.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	10	1.00	
1,1,2-Trichloroethane	ND	1.0	1.00	
Trichloroethene	ND	1.0	1.00	
Trichlorofluoromethane	ND	10	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	1.0	1.00	
1,3,5-Trimethylbenzene	ND	1.0	1.00	
Vinyl Acetate	ND	10	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	2.0	1.00	
o-Xylene	ND	1.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	94	78-120	
Dibromofluoromethane	103	80-126	
1,2-Dichloroethane-d4	95	80-129	
Toluene-d8	98	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-316-4231	N/A	Aqueous	GC/MS PP	09/27/18	09/28/18 05:39	180927L045

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	20	1.00	
Benzene	ND	1.0	1.00	
Bromobenzene	ND	1.0	1.00	
Bromochloromethane	ND	2.0	1.00	
Bromodichloromethane	ND	1.0	1.00	
Bromoform	ND	5.0	1.00	
Bromomethane	ND	50	1.00	
2-Butanone	ND	20	1.00	
n-Butylbenzene	ND	1.0	1.00	
sec-Butylbenzene	ND	1.0	1.00	
tert-Butylbenzene	ND	1.0	1.00	
Carbon Disulfide	ND	10	1.00	
Carbon Tetrachloride	ND	2.0	1.00	
Chlorobenzene	ND	1.0	1.00	
Chloroethane	ND	5.0	1.00	
Chloroform	ND	1.0	1.00	
Chloromethane	ND	10	1.00	
2-Chlorotoluene	ND	1.0	1.00	
4-Chlorotoluene	ND	1.0	1.00	
Dibromochloromethane	ND	2.0	1.00	
1,2-Dibromo-3-Chloropropane	ND	5.0	1.00	
1,2-Dibromoethane	ND	1.0	1.00	
Dibromomethane	ND	1.0	1.00	
1,2-Dichlorobenzene	ND	1.0	1.00	
1,3-Dichlorobenzene	ND	1.0	1.00	
1,4-Dichlorobenzene	ND	1.0	1.00	
Dichlorodifluoromethane	ND	5.0	1.00	
1,1-Dichloroethane	ND	1.0	1.00	
1,2-Dichloroethane	ND	1.0	1.00	
1,1-Dichloroethene	ND	1.0	1.00	
c-1,2-Dichloroethene	ND	1.0	1.00	
t-1,2-Dichloroethene	ND	1.0	1.00	
1,2-Dichloropropane	ND	1.0	1.00	
1,3-Dichloropropane	ND	1.0	1.00	
2,2-Dichloropropane	ND	1.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: ESTCP C. Pendleton / WR2274

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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
1,1-Dichloropropene	ND	1.0	1.00	
c-1,3-Dichloropropene	ND	0.50	1.00	
t-1,3-Dichloropropene	ND	0.50	1.00	
Ethylbenzene	ND	1.0	1.00	
2-Hexanone	ND	10	1.00	
Isopropylbenzene	ND	1.0	1.00	
p-Isopropyltoluene	ND	1.0	1.00	
Methylene Chloride	ND	10	1.00	
4-Methyl-2-Pentanone	ND	10	1.00	
Naphthalene	ND	10	1.00	
n-Propylbenzene	ND	1.0	1.00	
Styrene	ND	1.0	1.00	
1,1,1,2-Tetrachloroethane	ND	2.0	1.00	
1,1,2,2-Tetrachloroethane	ND	1.0	1.00	
Tetrachloroethene	ND	1.0	1.00	
Toluene	ND	1.0	1.00	
1,2,3-Trichlorobenzene	ND	1.0	1.00	
1,2,4-Trichlorobenzene	ND	1.0	1.00	
1,1,1-Trichloroethane	ND	1.0	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	10	1.00	
1,1,2-Trichloroethane	ND	1.0	1.00	
Trichloroethene	ND	1.0	1.00	
Trichlorofluoromethane	ND	10	1.00	
1,2,3-Trichloropropane	ND	5.0	1.00	
1,2,4-Trimethylbenzene	ND	1.0	1.00	
1,3,5-Trimethylbenzene	ND	1.0	1.00	
Vinyl Acetate	ND	10	1.00	
Vinyl Chloride	ND	5.0	1.00	
p/m-Xylene	ND	2.0	1.00	
o-Xylene	ND	1.0	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	1.0	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
1,4-Bromofluorobenzene	92	78-120	
Dibromofluoromethane	103	80-126	
1,2-Dichloroethane-d4	95	80-129	
Toluene-d8	97	80-120	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants	Date Received:	09/20/18
595 Market Street, Suite 610	Work Order:	18-09-1544
San Francisco, CA 94105-2811	Preparation:	EPA 3550B
Project: ESTCP C. Pendleton / WR2274	Method:	EPA 8015B (M)

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1634-4	Sample	Solid	GC 46	09/25/18	09/25/18 23:17	180925S04
18-09-1634-4	Matrix Spike	Solid	GC 46	09/25/18	09/25/18 21:28	180925S04
18-09-1634-4	Matrix Spike Duplicate	Solid	GC 46	09/25/18	09/25/18 21:56	180925S04

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	ND	400.0	355.1	89	357.5	89	64-130	1	0-15	



RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1649-2	Sample	Solid	ICP 8300	09/26/18	09/27/18 20:10	180926S03
18-09-1649-2	Matrix Spike	Solid	ICP 8300	09/26/18	09/27/18 20:15	180926S03
18-09-1649-2	Matrix Spike Duplicate	Solid	ICP 8300	09/26/18	09/27/18 20:16	180926S03

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	25.00	13.26	53	14.27	57	50-115	7	0-20	
Arsenic	1.661	25.00	27.84	105	27.33	103	75-125	2	0-20	
Barium	81.40	25.00	89.74	33	80.48	0	75-125	11	0-20	3
Beryllium	0.3032	25.00	28.10	111	27.97	111	75-125	0	0-20	
Cadmium	ND	25.00	28.62	114	28.27	113	75-125	1	0-20	
Chromium	11.44	25.00	40.68	117	38.36	108	75-125	6	0-20	
Cobalt	3.935	25.00	33.21	117	31.99	112	75-125	4	0-20	
Copper	6.885	25.00	35.57	115	37.44	122	75-125	5	0-20	
Lead	18.71	25.00	38.56	79	35.23	66	75-125	9	0-20	3
Molybdenum	ND	25.00	26.05	104	25.95	104	75-125	0	0-20	
Nickel	6.207	25.00	32.74	106	31.83	102	75-125	3	0-20	
Selenium	ND	25.00	26.13	105	26.69	107	75-125	2	0-20	
Silver	ND	12.50	14.12	113	14.19	114	75-125	0	0-20	
Thallium	ND	25.00	24.29	97	23.89	96	75-125	2	0-20	
Vanadium	13.31	25.00	42.21	116	42.19	116	75-125	0	0-20	
Zinc	34.30	25.00	64.64	121	63.72	118	75-125	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
18-09-1797-2	Sample	Aqueous	ICP 8300	09/26/18	09/26/18 12:55	180926SA1				
18-09-1797-2	Matrix Spike	Aqueous	ICP 8300	09/26/18	09/26/18 12:57	180926SA1				
18-09-1797-2	Matrix Spike Duplicate	Aqueous	ICP 8300	09/26/18	09/26/18 12:58	180926SA1				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	0.5000	0.4666	93	0.4684	94	72-132	0	0-10	
Arsenic	ND	0.5000	0.4942	99	0.4921	98	80-140	0	0-11	
Barium	0.2403	0.5000	0.7891	110	0.7923	110	87-123	0	0-6	
Beryllium	ND	0.5000	0.5093	102	0.5152	103	89-119	1	0-8	
Cadmium	ND	0.5000	0.5415	108	0.5438	109	82-124	0	0-7	
Chromium	ND	0.5000	0.5231	105	0.5221	104	86-122	0	0-8	
Cobalt	ND	0.5000	0.5403	108	0.5443	109	83-125	1	0-7	
Copper	0.01562	0.5000	0.5274	102	0.5297	103	78-126	0	0-7	
Lead	ND	0.5000	0.5927	119	0.5963	119	84-120	1	0-7	
Molybdenum	ND	0.5000	0.5314	106	0.5352	107	78-126	1	0-7	
Nickel	0.01410	0.5000	0.5214	101	0.5273	103	84-120	1	0-7	
Selenium	ND	0.5000	0.5198	104	0.5133	103	79-127	1	0-9	
Silver	ND	0.2500	0.2032	81	0.1895	76	86-128	7	0-7	3
Thallium	ND	0.5000	0.5231	105	0.5190	104	79-121	1	0-8	
Vanadium	ND	0.5000	0.5082	102	0.5099	102	88-118	0	0-7	
Zinc	0.01978	0.5000	0.5392	104	0.5474	106	89-131	2	0-8	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 7470A Total
Method: EPA 7470A

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1138-1	Sample	Aqueous	Mercury 07	09/26/18	09/26/18 16:03	180926SA3
18-09-1138-1	Matrix Spike	Aqueous	Mercury 07	09/26/18	09/26/18 16:06	180926SA3
18-09-1138-1	Matrix Spike Duplicate	Aqueous	Mercury 07	09/26/18	09/26/18 16:08	180926SA3

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.01000	0.008558	86	0.008686	87	55-133	1	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1649-2	Sample	Solid	Mercury 08	09/27/18	09/27/18 15:43	180927S04
18-09-1649-2	Matrix Spike	Solid	Mercury 08	09/27/18	09/27/18 15:46	180927S04
18-09-1649-2	Matrix Spike Duplicate	Solid	Mercury 08	09/27/18	09/27/18 15:48	180927S04

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.8350	0.7721	92	0.7757	93	71-137	0	0-14	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1560-2	Sample	Solid	GC/MS BB	09/21/18	09/25/18 06:20	180924S007
18-09-1560-2	Matrix Spike	Solid	GC/MS BB	09/21/18	09/25/18 06:47	180924S007
18-09-1560-2	Matrix Spike Duplicate	Solid	GC/MS BB	09/21/18	09/25/18 07:14	180924S007

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Benzene	ND	50.00	33.79	68	39.08	78	61-127	15	0-20	
Carbon Tetrachloride	ND	50.00	35.28	71	37.90	76	51-135	7	0-29	
Chlorobenzene	ND	50.00	33.07	66	34.53	69	57-123	4	0-20	
1,2-Dibromoethane	ND	50.00	39.48	79	40.23	80	64-124	2	0-20	
1,2-Dichlorobenzene	ND	50.00	33.76	68	35.52	71	35-131	5	0-25	
1,2-Dichloroethane	ND	50.00	32.09	64	35.77	72	80-120	11	0-20	3
1,1-Dichloroethene	ND	50.00	35.40	71	38.73	77	47-143	9	0-25	
Ethylbenzene	ND	50.00	31.67	63	33.44	67	57-129	5	0-22	
Toluene	6.025	50.00	38.84	66	47.25	82	63-123	20	0-20	
Trichloroethene	ND	50.00	40.62	81	42.45	85	44-158	4	0-20	
Vinyl Chloride	ND	50.00	38.58	77	37.54	75	49-139	3	0-47	
p/m-Xylene	ND	100.0	62.39	62	66.51	67	70-130	6	0-30	3
o-Xylene	ND	50.00	31.26	63	33.52	67	70-130	7	0-30	3
Methyl-t-Butyl Ether (MTBE)	ND	50.00	31.83	64	33.16	66	57-123	4	0-21	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3550B
Method: EPA 8015B (M)

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-490-3302	LCS	Solid	GC 46	09/25/18	09/25/18 21:08	180925B04

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
TPH as Diesel	400.0	353.1	88	75-123	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants 595 Market Street, Suite 610 San Francisco, CA 94105-2811	Date Received: 09/20/18 Work Order: 18-09-1544 Preparation: EPA 3510C Method: EPA 8015B (M)
Project: ESTCP C. Pendleton / WR2274	Page 2 of 10

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-15-498-634	LCS	Aqueous	GC 49	09/25/18	09/25/18 23:10	180925B11A			
099-15-498-634	LCSD	Aqueous	GC 49	09/25/18	09/25/18 23:29	180925B11A			
Parameter	<u>Spike Added</u>	<u>LCS Conc.</u>	<u>LCS %Rec.</u>	<u>LCSD Conc.</u>	<u>LCSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
TPH as Diesel	4000	3893	97	4026	101	69-123	3	0-30	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
097-01-002-27022	LCS	Solid	ICP 8300	09/26/18	09/27/18 20:09	180926L03	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		25.00	22.42	90	80-120	73-127	
Arsenic		25.00	22.25	89	80-120	73-127	
Barium		25.00	25.88	104	80-120	73-127	
Beryllium		25.00	25.49	102	80-120	73-127	
Cadmium		25.00	25.47	102	80-120	73-127	
Chromium		25.00	24.61	98	80-120	73-127	
Cobalt		25.00	25.26	101	80-120	73-127	
Copper		25.00	23.77	95	80-120	73-127	
Lead		25.00	27.29	109	80-120	73-127	
Molybdenum		25.00	24.40	98	80-120	73-127	
Nickel		25.00	24.93	100	80-120	73-127	
Selenium		25.00	24.14	97	80-120	73-127	
Silver		12.50	11.31	90	80-120	73-127	
Thallium		25.00	25.01	100	80-120	73-127	
Vanadium		25.00	23.76	95	80-120	73-127	
Zinc		25.00	26.60	106	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
097-01-003-17052	LCS	Aqueous	ICP 8300	09/26/18	09/26/18 12:52	180926LA1	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		0.5000	0.4256	85	80-120	73-127	
Arsenic		0.5000	0.4093	82	80-120	73-127	
Barium		0.5000	0.4925	98	80-120	73-127	
Beryllium		0.5000	0.4491	90	80-120	73-127	
Cadmium		0.5000	0.4862	97	80-120	73-127	
Chromium		0.5000	0.4693	94	80-120	73-127	
Cobalt		0.5000	0.4715	94	80-120	73-127	
Copper		0.5000	0.4580	92	80-120	73-127	
Lead		0.5000	0.5473	109	80-120	73-127	
Molybdenum		0.5000	0.4722	94	80-120	73-127	
Nickel		0.5000	0.4710	94	80-120	73-127	
Selenium		0.5000	0.4410	88	80-120	73-127	
Silver		0.2500	0.2223	89	80-120	73-127	
Thallium		0.5000	0.4777	96	80-120	73-127	
Vanadium		0.5000	0.4526	91	80-120	73-127	
Zinc		0.5000	0.4506	90	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/20/18
 Work Order: 18-09-1544
 Preparation: EPA 7470A Total
 Method: EPA 7470A

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-04-008-8697	LCS	Aqueous	Mercury 07	09/26/18	09/26/18 16:01	180926LA3

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury	0.01000	0.008531	85	80-120	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-16-272-4167	LCS	Solid	Mercury 08	09/27/18	09/27/18 15:41	180927L04
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury		0.8350	0.7564	91	85-121	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
099-14-314-1111	LCS	Solid	GC/MS BB	09/24/18	09/25/18 04:34	180924L013	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Acetone		50.00	44.92	90	70-130	60-140	
Benzene		50.00	39.83	80	78-120	71-127	
Bromobenzene		50.00	39.72	79	70-130	60-140	
Bromochloromethane		50.00	45.12	90	70-130	60-140	
Bromodichloromethane		50.00	39.14	78	70-130	60-140	
Bromoform		50.00	42.95	86	70-130	60-140	
Bromomethane		50.00	36.78	74	70-130	60-140	
2-Butanone		50.00	46.22	92	70-130	60-140	
n-Butylbenzene		50.00	40.24	80	77-123	69-131	
sec-Butylbenzene		50.00	41.02	82	70-130	60-140	
tert-Butylbenzene		50.00	39.99	80	70-130	60-140	
Carbon Disulfide		50.00	40.89	82	70-130	60-140	
Carbon Tetrachloride		50.00	40.26	81	49-139	34-154	
Chlorobenzene		50.00	41.99	84	79-120	72-127	
Chloroethane		50.00	40.55	81	70-130	60-140	
Chloroform		50.00	42.09	84	70-130	60-140	
Chloromethane		50.00	36.65	73	70-130	60-140	
2-Chlorotoluene		50.00	36.15	72	70-130	60-140	
4-Chlorotoluene		50.00	39.03	78	70-130	60-140	
Dibromochloromethane		50.00	44.94	90	70-130	60-140	
1,2-Dibromo-3-Chloropropane		50.00	42.25	85	70-130	60-140	
1,2-Dibromoethane		50.00	49.72	99	70-130	60-140	
Dibromomethane		50.00	41.10	82	70-130	60-140	
1,2-Dichlorobenzene		50.00	43.17	86	75-120	68-128	
1,3-Dichlorobenzene		50.00	41.28	83	70-130	60-140	
1,4-Dichlorobenzene		50.00	41.45	83	70-130	60-140	
Dichlorodifluoromethane		50.00	34.73	69	70-130	60-140	ME
1,1-Dichloroethane		50.00	37.33	75	70-130	60-140	
1,2-Dichloroethane		50.00	40.19	80	70-130	60-140	
1,1-Dichloroethene		50.00	38.44	77	74-122	66-130	
c-1,2-Dichloroethene		50.00	43.29	87	70-130	60-140	
t-1,2-Dichloroethene		50.00	42.25	84	70-130	60-140	
1,2-Dichloropropane		50.00	48.25	96	79-115	73-121	
1,3-Dichloropropane		50.00	47.90	96	70-130	60-140	
2,2-Dichloropropane		50.00	37.15	74	70-130	60-140	
1,1-Dichloropropene		50.00	39.91	80	70-130	60-140	
c-1,3-Dichloropropene		50.00	38.73	77	70-130	60-140	
t-1,3-Dichloropropene		50.00	43.02	86	70-130	60-140	

RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/20/18
 Work Order: 18-09-1544
 Preparation: EPA 5030C
 Method: EPA 8260B

Project: ESTCP C. Pendleton / WR2274

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<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Ethylbenzene	50.00	38.74	77	76-120	69-127	
2-Hexanone	50.00	44.84	90	70-130	60-140	
Isopropylbenzene	50.00	37.38	75	70-130	60-140	
p-Isopropyltoluene	50.00	40.43	81	70-130	60-140	
Methylene Chloride	50.00	44.20	88	70-130	60-140	
4-Methyl-2-Pentanone	50.00	48.07	96	70-130	60-140	
Naphthalene	50.00	45.80	92	70-130	60-140	
n-Propylbenzene	50.00	35.99	72	70-130	60-140	
Styrene	50.00	40.06	80	70-130	60-140	
1,1,1,2-Tetrachloroethane	50.00	43.32	87	70-130	60-140	
1,1,2,2-Tetrachloroethane	50.00	43.89	88	70-130	60-140	
Tetrachloroethene	50.00	58.03	116	70-130	60-140	
Toluene	50.00	44.96	90	77-120	70-127	
1,2,3-Trichlorobenzene	50.00	44.02	88	70-130	60-140	
1,2,4-Trichlorobenzene	50.00	41.67	83	70-130	60-140	
1,1,1-Trichloroethane	50.00	38.76	78	70-130	60-140	
1,1,2-Trichloroethane	50.00	47.32	95	70-130	60-140	
1,1,2-Trichloro-1,2,2-Trifluoroethane	50.00	38.40	77	70-130	60-140	
Trichloroethene	50.00	45.62	91	70-130	60-140	
1,2,3-Trichloropropane	50.00	39.35	79	70-130	60-140	
1,2,4-Trimethylbenzene	50.00	40.94	82	70-130	60-140	
Trichlorofluoromethane	50.00	42.77	86	70-130	60-140	
1,3,5-Trimethylbenzene	50.00	36.71	73	70-130	60-140	
Vinyl Acetate	50.00	35.50	71	70-130	60-140	
Vinyl Chloride	50.00	41.37	83	68-122	59-131	
p/m-Xylene	100.0	77.20	77	70-130	60-140	
o-Xylene	50.00	38.38	77	70-130	60-140	
Methyl-t-Butyl Ether (MTBE)	50.00	39.15	78	77-120	70-127	

Total number of LCS compounds: 66

Total number of ME compounds: 1

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number				
099-14-316-4231	LCS	Aqueous	GC/MS PP	09/27/18	09/28/18 03:50	180927L045				
099-14-316-4231	LCSD	Aqueous	GC/MS PP	09/27/18	09/28/18 04:17	180927L045				
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Acetone	50.00	48.68	97	48.20	96	50-150	33-167	1	0-30	
Benzene	50.00	51.29	103	50.15	100	78-120	71-127	2	0-21	
Bromobenzene	50.00	54.44	109	53.46	107	80-120	73-127	2	0-20	
Bromochloromethane	50.00	56.47	113	56.52	113	77-125	69-133	0	0-22	
Bromodichloromethane	50.00	54.49	109	53.55	107	80-125	72-132	2	0-20	
Bromoform	50.00	60.79	122	60.90	122	68-128	58-138	0	0-30	
Bromomethane	50.00	54.54	109	56.52	113	50-150	33-167	4	0-30	
2-Butanone	50.00	45.92	92	48.29	97	53-137	39-151	5	0-30	
n-Butylbenzene	50.00	53.48	107	51.89	104	78-132	69-141	3	0-23	
sec-Butylbenzene	50.00	51.71	103	50.22	100	80-125	72-132	3	0-20	
tert-Butylbenzene	50.00	49.97	100	49.42	99	80-125	72-132	1	0-20	
Carbon Disulfide	50.00	51.98	104	50.76	102	50-150	33-167	2	0-30	
Carbon Tetrachloride	50.00	55.64	111	53.93	108	67-139	55-151	3	0-30	
Chlorobenzene	50.00	53.32	107	51.78	104	80-120	73-127	3	0-20	
Chloroethane	50.00	49.23	98	48.98	98	64-130	53-141	1	0-30	
Chloroform	50.00	53.28	107	53.11	106	77-120	70-127	0	0-23	
Chloromethane	50.00	48.69	97	48.85	98	56-128	44-140	0	0-30	
2-Chlorotoluene	50.00	53.31	107	51.95	104	80-121	73-128	3	0-20	
4-Chlorotoluene	50.00	53.00	106	51.89	104	80-120	73-127	2	0-20	
Dibromochloromethane	50.00	57.26	115	56.80	114	77-125	69-133	1	0-21	
1,2-Dibromo-3-Chloropropane	50.00	51.29	103	51.19	102	68-128	58-138	0	0-30	
1,2-Dibromoethane	50.00	53.91	108	53.87	108	80-120	73-127	0	0-30	
Dibromomethane	50.00	53.59	107	53.30	107	80-120	73-127	1	0-20	
1,2-Dichlorobenzene	50.00	52.85	106	52.60	105	80-120	73-127	0	0-20	
1,3-Dichlorobenzene	50.00	53.25	106	52.24	104	80-120	73-127	2	0-20	
1,4-Dichlorobenzene	50.00	51.61	103	50.71	101	80-120	73-127	2	0-20	
Dichlorodifluoromethane	50.00	49.32	99	48.65	97	50-150	33-167	1	0-30	
1,1-Dichloroethane	50.00	45.86	92	45.08	90	73-127	64-136	2	0-30	
1,2-Dichloroethane	50.00	50.97	102	50.99	102	75-123	67-131	0	0-24	
1,1-Dichloroethene	50.00	51.06	102	50.19	100	64-136	52-148	2	0-30	
c-1,2-Dichloroethene	50.00	55.02	110	54.88	110	78-120	71-127	0	0-23	
t-1,2-Dichloroethene	50.00	55.39	111	54.89	110	70-130	60-140	1	0-30	
1,2-Dichloropropane	50.00	50.57	101	50.45	101	80-120	73-127	0	0-20	
1,3-Dichloropropane	50.00	51.52	103	51.55	103	80-120	73-127	0	0-20	
2,2-Dichloropropane	50.00	44.86	90	43.02	86	53-155	36-172	4	0-30	
1,1-Dichloropropene	50.00	50.94	102	50.37	101	73-127	64-136	1	0-30	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1544
Preparation: EPA 5030C
Method: EPA 8260B

Project: ESTCP C. Pendleton / WR2274

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Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
c-1,3-Dichloropropene	50.00	55.07	110	54.54	109	80-129	72-137	1	0-21	
t-1,3-Dichloropropene	50.00	48.38	97	48.17	96	78-132	69-141	0	0-22	
Ethylbenzene	50.00	53.19	106	51.57	103	80-120	73-127	3	0-20	
2-Hexanone	50.00	47.47	95	46.49	93	59-131	47-143	2	0-30	
Isopropylbenzene	50.00	52.61	105	50.65	101	80-126	72-134	4	0-20	
p-Isopropyltoluene	50.00	52.04	104	50.95	102	80-129	72-137	2	0-20	
Methylene Chloride	50.00	51.13	102	50.74	101	73-127	64-136	1	0-25	
4-Methyl-2-Pentanone	50.00	48.19	96	47.88	96	68-122	59-131	1	0-30	
Naphthalene	50.00	51.97	104	52.87	106	64-136	52-148	2	0-30	
n-Propylbenzene	50.00	53.66	107	51.93	104	80-125	72-132	3	0-20	
Styrene	50.00	53.92	108	53.03	106	80-122	73-129	2	0-20	
1,1,1,2-Tetrachloroethane	50.00	57.12	114	56.11	112	80-126	72-134	2	0-30	
1,1,2,2-Tetrachloroethane	50.00	48.50	97	49.81	100	76-120	69-127	3	0-28	
Tetrachloroethene	50.00	80.33	161	71.49	143	54-144	39-159	12	0-30	X
Toluene	50.00	53.48	107	51.82	104	80-122	73-129	3	0-20	
1,2,3-Trichlorobenzene	50.00	55.42	111	55.72	111	76-130	67-139	1	0-30	
1,2,4-Trichlorobenzene	50.00	56.60	113	56.81	114	74-134	64-144	0	0-30	
1,1,1-Trichloroethane	50.00	52.01	104	51.69	103	73-127	64-136	1	0-30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	50.00	50.81	102	49.97	100	53-155	36-172	2	0-30	
1,1,2-Trichloroethane	50.00	52.01	104	52.23	104	80-120	73-127	0	0-30	
Trichloroethene	50.00	56.22	112	53.73	107	77-125	69-133	5	0-22	
Trichlorofluoromethane	50.00	52.55	105	50.77	102	69-141	57-153	3	0-30	
1,2,3-Trichloropropane	50.00	53.79	108	52.61	105	77-125	69-133	2	0-30	
1,2,4-Trimethylbenzene	50.00	51.08	102	50.38	101	80-123	73-130	1	0-30	
1,3,5-Trimethylbenzene	50.00	52.03	104	50.46	101	80-126	72-134	3	0-20	
Vinyl Acetate	50.00	40.59	81	46.71	93	50-150	33-167	14	0-30	
Vinyl Chloride	50.00	50.98	102	49.05	98	63-135	51-147	4	0-30	
p/m-Xylene	100.0	102.6	103	99.60	100	80-125	72-132	3	0-30	
o-Xylene	50.00	51.59	103	50.44	101	80-125	72-132	2	0-20	
Methyl-t-Butyl Ether (MTBE)	50.00	40.49	81	41.26	83	77-120	70-127	2	0-24	

Total number of LCS compounds: 66

Total number of ME compounds: 0

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits

Sample Analysis Summary Report

Work Order: 18-09-1544

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 6010B	EPA 3010A Total	771	ICP 8300	1
EPA 6010B	EPA 3050B	771	ICP 8300	1
EPA 7470A	EPA 7470A Total	868	Mercury 07	1
EPA 7471A	EPA 7471A Total	868	Mercury 08	1
EPA 8015B (M)	EPA 3510C	1028	GC 49	1
EPA 8015B (M)	EPA 3550B	1028	GC 46	1
EPA 8260B	EPA 5030C	1120	GC/MS BB	2
EPA 8260B	EPA 5030C	1176	GC/MS PP	2

Glossary of Terms and Qualifiers

Work Order: 18-09-1544

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/20/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.7°C (w/ CF): 3.2°C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: UBUK

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: UBUK

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: WFSO

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples Yes No N/A

COC document(s) received complete Yes No N/A

Sampling date Sampling time Matrix Number of containers

No analysis requested Not relinquished No relinquished date No relinquished time

Sampler's name indicated on COC Yes No N/A

Sample container label(s) consistent with COC Yes No N/A

Sample container(s) intact and in good condition Yes No N/A

Proper containers for analyses requested Yes No N/A

Sufficient volume/mass for analyses requested Yes No N/A

Samples received within holding time Yes No N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH Residual Chlorine Dissolved Sulfide Dissolved Oxygen Yes No N/A

Proper preservation chemical(s) noted on COC and/or sample container Yes No N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics Total Metals Dissolved Metals

Acid/base preserved samples - pH within acceptable range Yes No N/A

Container(s) for certain analysis free of headspace..... Yes No N/A

Volatile Organics Dissolved Gases (RSK-175) Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500) Ferrous Iron (SM 3500) Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation Yes No N/A

CONTAINER TYPE: (3)

(Trip Blank Lot Number: _____)

Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{nna} (pH__9)

250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB

1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, Labeled/Checked by: WFSO

s = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z_{nna}** = Zn (CH₃CO₂)₂ + NaOH Reviewed by: WFSO

SAMPLE ANOMALY REPORT

DATE: 09/20/2018

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
 - Sample(s) received but NOT LISTED on COC
 - Holding time expired (list client or ECI sample ID and analysis)
 - Insufficient sample amount for requested analysis (list analysis)
 - Improper container(s) used (list analysis)
 - Improper preservative used (list analysis)
 - pH outside acceptable range (list analysis)
 - No preservative noted on COC or label (list analysis and notify lab)
 - Sample container(s) not labeled
 - Client sample label(s) illegible (list container type and analysis)
 - Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
 - Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
 - Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)
- * Transferred at client's request.

Comments

Number of containers received:
 (-1) 2
 (-2) 5

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

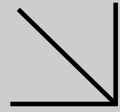
Reported by: YFSO
 Reviewed by: WGL

** Record the total number of containers (i.e., vials or bottles) for the affected sample.

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WORK ORDER NUMBER: 18-09-1545

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Geosyntec Consultants

Client Project Name: ESTCP C. Pendleton / WR2274

Attention: Lea Kane
595 Market Street
Suite 610
San Francisco, CA 94105-2811

Approved for release on 10/01/2018 by:
Stephen Nowak
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.



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Work Order Number: 18-09-1545

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/20/18. They were assigned to Work Order 18-09-1545.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.



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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-1545
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton / WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/20/18 18:50
	Number of Containers: 47

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
IP02E-1'-38	18-09-1545-1	09/17/18 14:20	1	Solid
IP02E-1'-41	18-09-1545-2	09/17/18 14:25	1	Solid
IP02E-1'-45	18-09-1545-3	09/17/18 14:30	1	Solid
IP02E-3'-36	18-09-1545-4	09/17/18 12:30	1	Solid
IP02E-3'-40	18-09-1545-5	09/17/18 12:35	1	Solid
IP02E-3'-44	18-09-1545-6	09/17/18 12:40	1	Solid
IP02E-5'-35	18-09-1545-7	09/17/18 09:40	1	Solid
IP02E-5'-38	18-09-1545-8	09/17/18 09:45	1	Solid
IP02E-5'-42	18-09-1545-9	09/17/18 09:50	1	Solid
IP02W-1'-37	18-09-1545-10	09/18/18 09:40	1	Solid
IP02W-1'-39	18-09-1545-11	09/18/18 09:45	1	Solid
IP02W-1'-43	18-09-1545-12	09/18/18 09:50	1	Solid
IP02W-3'-38	18-09-1545-13	09/18/18 08:30	1	Solid
IP02W-3'-42	18-09-1545-14	09/18/18 08:40	1	Solid
IP02W-3'-45	18-09-1545-15	09/18/18 08:45	1	Solid
IP02W-5'-36	18-09-1545-16	09/17/18 16:00	1	Solid
IP02W-5'-41	18-09-1545-17	09/17/18 16:05	1	Solid
IP02W-5'-45	18-09-1545-18	09/17/18 16:10	1	Solid
IP08W-1'-35	18-09-1545-19	09/18/18 14:15	1	Solid
IP08W-1'-39	18-09-1545-20	09/18/18 14:20	1	Solid
IP08W-1'-40	18-09-1545-21	09/18/18 14:25	1	Solid
IP08W-3'-35	18-09-1545-22	09/18/18 12:10	1	Solid
IP08W-3'-38	18-09-1545-23	09/18/18 12:15	1	Solid
IP08W-3'-40	18-09-1545-24	09/18/18 12:20	1	Solid
IP08W-3'-45	18-09-1545-25	09/18/18 12:25	1	Solid
IP08W-5'-35	18-09-1545-26	09/18/18 11:00	1	Solid
IP08W-5'-36	18-09-1545-27	09/18/18 11:05	1	Solid
IP08W-5'-41	18-09-1545-28	09/18/18 11:10	1	Solid
IP08E-1'-35	18-09-1545-29	09/19/18 10:00	1	Solid
IP08E-1'-37	18-09-1545-30	09/19/18 10:05	1	Solid
IP08E-1'-44	18-09-1545-31	09/19/18 10:10	1	Solid
IP08E-3'-38	18-09-1545-32	09/18/18 15:00	1	Solid
IP08E-3'-40	18-09-1545-33	09/18/18 15:05	1	Solid
IP08E-3'-42	18-09-1545-34	09/18/18 15:10	1	Solid
IP08E-5'-38	18-09-1545-35	09/19/18 08:20	1	Solid
IP08E-5'-40	18-09-1545-36	09/19/18 08:25	1	Solid
IP08E-5'-42	18-09-1545-37	09/19/18 08:30	1	Solid
IP08N-1'-34	18-09-1545-38	09/19/18 14:00	1	Solid
IP08N-1'-36	18-09-1545-39	09/19/18 14:05	1	Solid
IP08N-1'-38	18-09-1545-40	09/19/18 14:10	1	Solid
IP08N-3'-34	18-09-1545-41	09/19/18 12:40	1	Solid
IP08N-3'-35	18-09-1545-42	09/19/18 12:45	1	Solid

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Sample Summary

Client: Geosyntec Consultants	Work Order: 18-09-1545
595 Market Street, Suite 610	Project Name: ESTCP C. Pendleton / WR2274
San Francisco, CA 94105-2811	PO Number:
	Date/Time Received: 09/20/18 18:50
	Number of Containers: 47

Attn: Lea Kane

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
IP08N-3'-38	18-09-1545-43	09/19/18 12:50	1	Solid
IP08N-5'-35	18-09-1545-44	09/19/18 11:30	1	Solid
IP08N-5'-37	18-09-1545-45	09/19/18 11:35	1	Solid
IP08N-5'-42	18-09-1545-46	09/19/18 11:40	1	Solid
IP08N-3'-41	18-09-1545-47	09/19/18 12:55	1	Solid

Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 18-09-1545
 Project Name: ESTCP C. Pendleton / WR2274
 Received: 09/20/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
IP02E-1'-38 (18-09-1545-1) Zinc	53.2		1.01	mg/kg	EPA 6010B	EPA 3050B
IP02E-1'-41 (18-09-1545-2) Zinc	36.6		0.985	mg/kg	EPA 6010B	EPA 3050B
IP02E-1'-45 (18-09-1545-3) Zinc	42.7		1.01	mg/kg	EPA 6010B	EPA 3050B
IP02E-3'-36 (18-09-1545-4) Zinc	98.7		1.01	mg/kg	EPA 6010B	EPA 3050B
IP02E-3'-40 (18-09-1545-5) Zinc	36.4		1.00	mg/kg	EPA 6010B	EPA 3050B
IP02E-3'-44 (18-09-1545-6) Zinc	59.1		1.04	mg/kg	EPA 6010B	EPA 3050B
IP02E-5'-35 (18-09-1545-7) Zinc	49.4		0.952	mg/kg	EPA 6010B	EPA 3050B
IP02E-5'-38 (18-09-1545-8) Zinc	41.5		0.990	mg/kg	EPA 6010B	EPA 3050B
IP02E-5'-42 (18-09-1545-9) Zinc	66.3		0.952	mg/kg	EPA 6010B	EPA 3050B
IP02W-1'-37 (18-09-1545-10) Zinc	65.6		0.971	mg/kg	EPA 6010B	EPA 3050B
IP02W-1'-39 (18-09-1545-11) Zinc	63.4		0.966	mg/kg	EPA 6010B	EPA 3050B
IP02W-1'-43 (18-09-1545-12) Zinc	46.6		1.01	mg/kg	EPA 6010B	EPA 3050B
IP02W-3'-38 (18-09-1545-13) Zinc	65.0		0.966	mg/kg	EPA 6010B	EPA 3050B
IP02W-3'-42 (18-09-1545-14) Zinc	47.4		0.980	mg/kg	EPA 6010B	EPA 3050B
IP02W-3'-45 (18-09-1545-15) Zinc	46.1		0.985	mg/kg	EPA 6010B	EPA 3050B
IP02W-5'-36 (18-09-1545-16) Zinc	45.4		1.01	mg/kg	EPA 6010B	EPA 3050B
IP02W-5'-41 (18-09-1545-17) Zinc	45.6		0.990	mg/kg	EPA 6010B	EPA 3050B
IP02W-5'-45 (18-09-1545-18) Zinc	41.9		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08W-1'-35 (18-09-1545-19) Zinc	65.0		1.03	mg/kg	EPA 6010B	EPA 3050B

* MDL is shown

Detections Summary

Client: Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Work Order: 18-09-1545
 Project Name: ESTCP C. Pendleton / WR2274
 Received: 09/20/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
IP08W-1'-39 (18-09-1545-20) Zinc	117		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08W-1'-40 (18-09-1545-21) Zinc	67.3		0.980	mg/kg	EPA 6010B	EPA 3050B
IP08W-3'-35 (18-09-1545-22) Zinc	98.0		0.971	mg/kg	EPA 6010B	EPA 3050B
IP08W-3'-38 (18-09-1545-23) Zinc	70.1		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08W-3'-40 (18-09-1545-24) Zinc	53.4		0.990	mg/kg	EPA 6010B	EPA 3050B
IP08W-3'-45 (18-09-1545-25) Zinc	57.1		0.990	mg/kg	EPA 6010B	EPA 3050B
IP08W-5'-35 (18-09-1545-26) Zinc	75.4		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08W-5'-36 (18-09-1545-27) Zinc	75.5		0.976	mg/kg	EPA 6010B	EPA 3050B
IP08W-5'-41 (18-09-1545-28) Zinc	51.8		0.976	mg/kg	EPA 6010B	EPA 3050B
IP08E-1'-35 (18-09-1545-29) Zinc	72.2		0.966	mg/kg	EPA 6010B	EPA 3050B
IP08E-1'-37 (18-09-1545-30) Zinc	43.1		0.962	mg/kg	EPA 6010B	EPA 3050B
IP08E-1'-44 (18-09-1545-31) Zinc	44.0		0.990	mg/kg	EPA 6010B	EPA 3050B
IP08E-3'-38 (18-09-1545-32) Zinc	159		1.00	mg/kg	EPA 6010B	EPA 3050B
IP08E-3'-40 (18-09-1545-33) Zinc	72.5		0.980	mg/kg	EPA 6010B	EPA 3050B
IP08E-3'-42 (18-09-1545-34) Zinc	65.2		0.976	mg/kg	EPA 6010B	EPA 3050B
IP08E-5'-38 (18-09-1545-35) Zinc	42.6		1.01	mg/kg	EPA 6010B	EPA 3050B
IP08E-5'-40 (18-09-1545-36) Zinc	44.5		0.995	mg/kg	EPA 6010B	EPA 3050B
IP08E-5'-42 (18-09-1545-37) Zinc	43.7		1.00	mg/kg	EPA 6010B	EPA 3050B
IP08N-1'-34 (18-09-1545-38) Zinc	82.2		1.04	mg/kg	EPA 6010B	EPA 3050B

* MDL is shown



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Detections Summary

Client: Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Work Order: 18-09-1545
Project Name: ESTCP C. Pendleton / WR2274
Received: 09/20/18

Attn: Lea Kane

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Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
IP08N-1'-36 (18-09-1545-39) Zinc	75.8		1.04	mg/kg	EPA 6010B	EPA 3050B
IP08N-1'-38 (18-09-1545-40) Zinc	84.0		1.00	mg/kg	EPA 6010B	EPA 3050B
IP08N-3'-34 (18-09-1545-41) Zinc	67.4		1.00	mg/kg	EPA 6010B	EPA 3050B
IP08N-3'-35 (18-09-1545-42) Zinc	59.2		0.957	mg/kg	EPA 6010B	EPA 3050B
IP08N-3'-38 (18-09-1545-43) Zinc	272		0.995	mg/kg	EPA 6010B	EPA 3050B
IP08N-5'-35 (18-09-1545-44) Zinc	71.2		1.03	mg/kg	EPA 6010B	EPA 3050B
IP08N-5'-37 (18-09-1545-45) Zinc	68.2		0.995	mg/kg	EPA 6010B	EPA 3050B
IP08N-5'-42 (18-09-1545-46) Zinc	48.9		0.957	mg/kg	EPA 6010B	EPA 3050B
IP08N-3'-41 (18-09-1545-47) Zinc	75.1		0.971	mg/kg	EPA 6010B	EPA 3050B

Subcontracted analyses, if any, are not included in this summary.

* MDL is shown



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP02E-1'-38	18-09-1545-1-A	09/17/18 14:20	Solid	ICP 8300	09/24/18	09/27/18 16:25	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		53.2		1.01		1.01	
IP02E-1'-41	18-09-1545-2-A	09/17/18 14:25	Solid	ICP 8300	09/24/18	09/27/18 16:34	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		36.6		0.985		0.985	
IP02E-1'-45	18-09-1545-3-A	09/17/18 14:30	Solid	ICP 8300	09/24/18	09/27/18 16:35	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		42.7		1.01		1.01	
IP02E-3'-36	18-09-1545-4-A	09/17/18 12:30	Solid	ICP 8300	09/24/18	09/27/18 16:36	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		98.7		1.01		1.01	
IP02E-3'-40	18-09-1545-5-A	09/17/18 12:35	Solid	ICP 8300	09/24/18	09/27/18 16:37	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		36.4		1.00		1.00	
IP02E-3'-44	18-09-1545-6-A	09/17/18 12:40	Solid	ICP 8300	09/24/18	09/27/18 16:38	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		59.1		1.04		1.04	
IP02E-5'-35	18-09-1545-7-A	09/17/18 09:40	Solid	ICP 8300	09/24/18	09/27/18 16:39	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		49.4		0.952		0.952	
IP02E-5'-38	18-09-1545-8-A	09/17/18 09:45	Solid	ICP 8300	09/24/18	09/27/18 16:40	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		41.5		0.990		0.990	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP02E-5'-42	18-09-1545-9-A	09/17/18 09:50	Solid	ICP 8300	09/24/18	09/27/18 16:41	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		66.3		0.952		0.952	
IP02W-1'-37	18-09-1545-10-A	09/18/18 09:40	Solid	ICP 8300	09/24/18	09/27/18 16:42	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		65.6		0.971		0.971	
IP02W-1'-39	18-09-1545-11-A	09/18/18 09:45	Solid	ICP 8300	09/24/18	09/27/18 16:44	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		63.4		0.966		0.966	
IP02W-1'-43	18-09-1545-12-A	09/18/18 09:50	Solid	ICP 8300	09/24/18	09/27/18 20:40	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		46.6		1.01		1.01	
IP02W-3'-38	18-09-1545-13-A	09/18/18 08:30	Solid	ICP 8300	09/24/18	09/27/18 20:41	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		65.0		0.966		0.966	
IP02W-3'-42	18-09-1545-14-A	09/18/18 08:40	Solid	ICP 8300	09/24/18	09/27/18 20:42	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		47.4		0.980		0.980	
IP02W-3'-45	18-09-1545-15-A	09/18/18 08:45	Solid	ICP 8300	09/24/18	09/27/18 20:43	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		46.1		0.985		0.985	
IP02W-5'-36	18-09-1545-16-A	09/17/18 16:00	Solid	ICP 8300	09/24/18	09/27/18 20:44	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		45.4		1.01		1.01	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP02W-5'-41	18-09-1545-17-A	09/17/18 16:05	Solid	ICP 8300	09/24/18	09/27/18 20:45	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		45.6		0.990		0.990	
IP02W-5'-45	18-09-1545-18-A	09/17/18 16:10	Solid	ICP 8300	09/24/18	09/27/18 20:46	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		41.9		1.01		1.01	
IP08W-1'-35	18-09-1545-19-A	09/18/18 14:15	Solid	ICP 8300	09/24/18	09/27/18 20:47	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		65.0		1.03		1.03	
IP08W-1'-39	18-09-1545-20-A	09/18/18 14:20	Solid	ICP 8300	09/24/18	09/27/18 20:48	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		117		1.01		1.01	
IP08W-1'-40	18-09-1545-21-A	09/18/18 14:25	Solid	ICP 8300	09/25/18	09/27/18 16:28	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		67.3		0.980		0.980	
IP08W-3'-35	18-09-1545-22-A	09/18/18 12:10	Solid	ICP 8300	09/25/18	09/27/18 20:49	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		98.0		0.971		0.971	
IP08W-3'-38	18-09-1545-23-A	09/18/18 12:15	Solid	ICP 8300	09/25/18	09/27/18 20:53	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		70.1		1.01		1.01	
IP08W-3'-40	18-09-1545-24-A	09/18/18 12:20	Solid	ICP 8300	09/25/18	09/27/18 20:54	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		53.4		0.990		0.990	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP08W-3'-45	18-09-1545-25-A	09/18/18 12:25	Solid	ICP 8300	09/25/18	09/27/18 20:55	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		57.1		0.990		0.990	
IP08W-5'-35	18-09-1545-26-A	09/18/18 11:00	Solid	ICP 8300	09/25/18	09/27/18 20:56	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		75.4		1.01		1.01	
IP08W-5'-36	18-09-1545-27-A	09/18/18 11:05	Solid	ICP 8300	09/25/18	09/27/18 20:57	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		75.5		0.976		0.976	
IP08W-5'-41	18-09-1545-28-A	09/18/18 11:10	Solid	ICP 8300	09/25/18	09/27/18 20:58	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		51.8		0.976		0.976	
IP08E-1'-35	18-09-1545-29-A	09/19/18 10:00	Solid	ICP 8300	09/25/18	09/27/18 20:59	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		72.2		0.966		0.966	
IP08E-1'-37	18-09-1545-30-A	09/19/18 10:05	Solid	ICP 8300	09/25/18	09/27/18 21:00	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		43.1		0.962		0.962	
IP08E-1'-44	18-09-1545-31-A	09/19/18 10:10	Solid	ICP 8300	09/25/18	09/27/18 21:01	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		44.0		0.990		0.990	
IP08E-3'-38	18-09-1545-32-A	09/18/18 15:00	Solid	ICP 8300	09/25/18	09/27/18 21:03	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		159		1.00		1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B
Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP08E-3'-40	18-09-1545-33-A	09/18/18 15:05	Solid	ICP 8300	09/25/18	09/27/18 21:06	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		72.5		0.980		0.980	
IP08E-3'-42	18-09-1545-34-A	09/18/18 15:10	Solid	ICP 8300	09/25/18	09/27/18 21:07	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		65.2		0.976		0.976	
IP08E-5'-38	18-09-1545-35-A	09/19/18 08:20	Solid	ICP 8300	09/25/18	09/27/18 21:08	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		42.6		1.01		1.01	
IP08E-5'-40	18-09-1545-36-A	09/19/18 08:25	Solid	ICP 8300	09/25/18	09/27/18 21:09	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		44.5		0.995		0.995	
IP08E-5'-42	18-09-1545-37-A	09/19/18 08:30	Solid	ICP 8300	09/25/18	09/27/18 21:10	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		43.7		1.00		1.00	
IP08N-1'-34	18-09-1545-38-A	09/19/18 14:00	Solid	ICP 8300	09/25/18	09/27/18 21:11	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		82.2		1.04		1.04	
IP08N-1'-36	18-09-1545-39-A	09/19/18 14:05	Solid	ICP 8300	09/25/18	09/27/18 21:13	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		75.8		1.04		1.04	
IP08N-1'-38	18-09-1545-40-A	09/19/18 14:10	Solid	ICP 8300	09/25/18	09/27/18 21:14	180925L02
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		84.0		1.00		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/20/18
 Work Order: 18-09-1545
 Preparation: EPA 3050B
 Method: EPA 6010B
 Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
IP08N-3'-34	18-09-1545-41-A	09/19/18 12:40	Solid	ICP 8300	09/24/18	09/27/18 21:15	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		67.4		1.00		1.00	
IP08N-3'-35	18-09-1545-42-A	09/19/18 12:45	Solid	ICP 8300	09/24/18	09/27/18 21:16	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		59.2		0.957		0.957	
IP08N-3'-38	18-09-1545-43-A	09/19/18 12:50	Solid	ICP 8300	09/24/18	09/27/18 21:19	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		272		0.995		0.995	
IP08N-5'-35	18-09-1545-44-A	09/19/18 11:30	Solid	ICP 8300	09/24/18	09/27/18 21:20	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		71.2		1.03		1.03	
IP08N-5'-37	18-09-1545-45-A	09/19/18 11:35	Solid	ICP 8300	09/24/18	09/27/18 21:21	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		68.2		0.995		0.995	
IP08N-5'-42	18-09-1545-46-A	09/19/18 11:40	Solid	ICP 8300	09/24/18	09/27/18 21:23	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		48.9		0.957		0.957	
IP08N-3'-41	18-09-1545-47-A	09/19/18 12:55	Solid	ICP 8300	09/24/18	09/27/18 21:24	180924L05
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		75.1		0.971		0.971	
Method Blank	097-01-002-27025	N/A	Solid	ICP 8300	09/24/18	09/27/18 16:20	180924L04
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Zinc		ND		0.971		0.971	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Analytical Report

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/20/18
 Work Order: 18-09-1545
 Preparation: EPA 3050B
 Method: EPA 6010B
 Units: mg/kg

Project: ESTCP C. Pendleton / WR2274

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-002-27018	N/A	Solid	ICP 8300	09/24/18	09/27/18 11:27	180924L05

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	ND	0.971	0.971	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-002-27026	N/A	Solid	ICP 8300	09/25/18	09/27/18 16:23	180925L02

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	ND	1.00	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
 595 Market Street, Suite 610
 San Francisco, CA 94105-2811

Date Received: 09/20/18
 Work Order: 18-09-1545
 Preparation: EPA 3050B
 Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
IP02E-1'-38	Sample	Solid	ICP 8300	09/24/18	09/27/18 16:25	180924S04
IP02E-1'-38	Matrix Spike	Solid	ICP 8300	09/24/18	09/27/18 16:26	180924S04
IP02E-1'-38	Matrix Spike Duplicate	Solid	ICP 8300	09/24/18	09/27/18 16:27	180924S04

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	53.16	25.00	73.81	83	83.15	120	75-125	12	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1485-11	Sample	Solid	ICP 8300	09/24/18	09/27/18 11:35	180924S05
18-09-1485-11	Matrix Spike	Solid	ICP 8300	09/24/18	09/27/18 11:37	180924S05
18-09-1485-11	Matrix Spike Duplicate	Solid	ICP 8300	09/24/18	09/27/18 11:38	180924S05

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	56.45	25.00	83.74	109	86.08	119	75-125	3	0-20	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - Spike/Spike Duplicate

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
IP08W-1'-40	Sample	Solid	ICP 8300	09/25/18	09/27/18 16:28	180925S02
IP08W-1'-40	Matrix Spike	Solid	ICP 8300	09/25/18	09/27/18 16:29	180925S02
IP08W-1'-40	Matrix Spike Duplicate	Solid	ICP 8300	09/25/18	09/27/18 16:30	180925S02

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Zinc	67.26	25.00	98.77	126	89.09	87	75-125	10	0-20	3


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
097-01-002-27025	LCS	Solid	ICP 8300	09/24/18	09/27/18 16:22	180924L04
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		25.00	22.48	90	80-120	



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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

Page 2 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
097-01-002-27018	LCS	Solid	ICP 8300	09/24/18	09/27/18 11:34	180924L05
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		25.00	26.05	104	80-120	

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS

Geosyntec Consultants
595 Market Street, Suite 610
San Francisco, CA 94105-2811

Date Received: 09/20/18
Work Order: 18-09-1545
Preparation: EPA 3050B
Method: EPA 6010B

Project: ESTCP C. Pendleton / WR2274

Page 3 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
097-01-002-27026	LCS	Solid	ICP 8300	09/25/18	09/27/18 16:24	180925L02
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Zinc		25.00	22.40	90	80-120	



Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Sample Analysis Summary Report

Work Order: 18-09-1545

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
EPA 6010B	EPA 3050B	771	ICP 8300	1


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Location 1: 7440 Lincoln Way, Garden Grove, CA 92841

Glossary of Terms and Qualifiers

Work Order: 18-09-1545

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

Analysis Request and Chain of Custody Record

18-09-1545

Page 1 of 3

Project Name ESTCP C. Remediation	Project Number WR2274	Required Analyses			
Samplers Names F. (Bookwell)	Project Contact La Kane (kane@geosyntec.com)	VOCs by	Metals B# 6016	SVOCS by 8270	Field Remediation Sample
Laboratory Name CRS Science	Lab Contact Steve Nowak	Bottle Type and Volume/Preservative			
Lab Address	Lab Phone	Number of Containers			
	Carrier/Waybill No.	Lab Use Only			

White copy: to accompany samples
Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Number of Containers	Comments	Lab Use Only	Condition of Bottles
IP02E-1-38	9/17/18	1420	Soil	X			
IP02E-1-41		1425					
IP02E-1-45		1430					
IP02E-3-36		1230					
IP02E-3-40		1235					
IP02E-3-44		1240					
IP02E-5-35		0940					
IP02E-5-39		0945					
IP02E-5-42		0950					
IP02U-1-37	9/19/18	0940					
IP02U-1-39	9/19/18	0945					
IP02W-1-43	9/19/18	0950					

Turn-around Time:
 Normal Rush:

Special Instructions:

1. Relinquished by (Signature/Affiliation)	Date 09/20/18	Time 1505	1. Received by (Signature/Affiliation)	Date 09/20/18	Time 1505
2. Relinquished by (Signature/Affiliation)	Date 09/20/18	Time 1850	2. Received by (Signature/Affiliation)	Date 09/20/18	Time 1850
3. Relinquished by (Signature/Affiliation)	Date	Time	3. Received by (Signature/Affiliation)	Date	Time



Analysis Request and Chain of Custody Record

1545

Page 3 of 3

Continued from Document Number:

11500

Project Name: **ESTCP C. Penetration**
 Project Number: **UR2274**

White copy: to accompany samples
 Yellow copy: field copy

Sample Name	Date	Time	Sample Type	Required Analyses						Comments	Lab Use Only	Condition of Bottles			
				VOCS by	Metals (Pb, etc)	SVOCs by 8270	Field Recovery Eff.	for additional analysis	Number of Containers				Bottle Type and Volume/Preservative		
IP08E-3'-40	9/19/18	1505	S.L.	X					X						
IP08E-3'-42	↓	1510													
IP08E-5'-39	9/19/18	0820													
IP08E-5'-40		0825													
IP08E-5'-42		0830													
IP08N-1'-34		1400													
IP08N-1'-36		1405													
IP08N-1'-39		1410													
IP08N-3'-34		1240													
IP08N-3'-35		1245													
IP08N-3'-38		1250													
IP08N-5'-35		1130													
IP08N-5'-37		0825 AM													
IP08N-5'-42		0825 AM													
IP08N-5'-41	↓	1255													

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: GEOSYNTEC

DATE: 09/20/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.7 °C (w/ CF): 3.2 °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter Checked by: UBUK

CUSTODY SEAL:
 Cooler Present and Intact Present but Not Intact Not Present N/A Checked by: UBUK
 Sample(s) Present and Intact Present but Not Intact Not Present N/A Checked by: WFSO

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input checked="" type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (Trip Blank Lot Number: _____)
Aqueous: VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz₂na (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____ _____
 Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag
 Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, **Labeled/Checked by:** WFSO
s = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z₂na** = Zn (CH₃CO₂)₂ + NaOH **Reviewed by:** WFL

SAMPLE ANOMALY REPORT

DATE: 09/20/2018

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
 - Sample(s) received but NOT LISTED on COC
 - Holding time expired (list client or ECI sample ID and analysis)
 - Insufficient sample amount for requested analysis (list analysis)
 - Improper container(s) used (list analysis)
 - Improper preservative used (list analysis)
 - pH outside acceptable range (list analysis)
 - No preservative noted on COC or label (list analysis and notify lab)
 - Sample container(s) not labeled
 - Client sample label(s) illegible (list container type and analysis)
 - Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
 - Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
 - Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)
- * Transferred at client's request.

Comments

(-1) to (-47) / Received 1-container only.

** (-1), (-5), (12-13), (-17) to (-20), (-22), (-35) to (-37)
 (-41-42) * H₂O present.*

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

Reported by: UFSO
 Reviewed by: UQU

** Record the total number of containers (i.e., vials or bottles) for the affected sample.

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APPENDIX E QUALITY ASSURANCE/QUALITY CONTROL REVIEW

Memorandum

Date: 4 October 2017
To: Brian Rockwell/Lea Kane
From: Sherry Watts
Subject: Stage 1 Data Validation Summary
Work Orders:
17-09-0693
17-09-0821
17-09-0822
17-09-0989
17-09-1116
ESTCP - Pendleton

INTRODUCTION

This report summarizes the findings of the Stage 1 data validation for the above listed work orders for groundwater samples and associated quality control samples collected 11 through 14 October 2017 from the ESTCP – Pendleton site located in Oceanside, California (Site). Groundwater samples collected from the site were submitted to Eurofins/Calscience, Inc. of Garden Grove, California for laboratory analysis. The samples were submitted for one or more of the following analytical tests:

- Dissolved Metals by EPA Method 200.7
- Anions by EPA Method 300.0
- Metals by EPA Method 6010B/7470A
- Total Petroleum Hydrocarbons by EPA 8015B(M)
- Volatile Organic Compounds (VOCs) by EPA Method 8260B
- Propene by RSK-175M
- 1,2,3-Trichloropropene by SRL 524M

EXECUTIVE SUMMARY

The samples were handled, prepared, and measured in the same manner under similar prescribed conditions as reported in the laboratory analytical. Data packages were reviewed for chain of custody (COC) discrepancies; adherence to sample holding times; evaluation of matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples/laboratory control sample duplicates (LCS/LCSD), field duplicates; and assessment of equipment, field, trip and method blanks.

The data were reviewed based on the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, August 2014 (USEPA-540-R-014-002) and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, August 2014 (USEPA-540-R-013-001), as well as by the pertinent methods referenced by the data package and professional judgment.

Error corrections were observed on the COC forms. The proper procedure of a single strike through of the correction was utilized; however, in some instances the initial and/or date of correction was missing. This COC issue did not result in qualification of the data.

Overall, based on this Stage 1 data validation covering the quality control (QC) parameters, the data as qualified are usable for meeting project objectives. Qualified data should be used within the limitations of the qualification. Additional QC issues, other than those discussed in the following sections, were noted; however, these QC issues had no impact on the reported results and are therefore not discussed in further detail.

WORK ORDER 17-09-0693

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. No qualifiers were applied to the data as a result of the noted headspace.

VOCs

The COC listed the trip blank; however, no time of collection was listed and no analyses for the trip blank were marked on the COC. The laboratory used a time of collection of 00:00 and ran the trip blank for VOCs. No qualifications were applied to the data as a result of this COC issue.

WORK ORDER 17-09-0821

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. No qualifiers were applied to the data as a result of the noted headspace.

One field duplicate sample was collected with the groundwater samples. Acceptable precision (Relative Percent Difference (RPD <30%) was demonstrated between the field duplicate sample CP22-DUP1-09122017 and the original sample CP22-HP10-43-45 for all duplicate analyses with the following exceptions.

Sample	Compound	RPD (%)	Laboratory Concentration (mg/L)	Validation Qualifier*	Validation Concentration (mg/L)	Reason Code*
CP22-HP10-43-45	Zinc	64	0.0147	J	0.0147 J	7
CP22-DUP-09122017			0.0286	J	0.0286 J	

Sample	Compound	RPD (%)	Laboratory Concentration (ug/L)	Validation Qualifier	Validation Concentration (ug/L)	Reason Code
CP22-HP10-43-45	Propene	Noncalculable >99	2.96	J	2.96 J	7
CP22-DUP-09122017			ND <1.00	J	1.00 UJ	

*Validation Qualifier and Reason Code defined in Attachment 1.

Anions

Chloride and nitrite as N were detected in the equipment blank, EB-09122017, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

Metals

Calcium and silicon were detected in the equipment blank, EB-09122017, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

VOCs

The COC listed the trip blank; however, no time of collection was on the COC. The laboratory used a time of collection of 00:00. No qualifications were applied to the data as a result of this COC issue.

WORK ORDER 17-09-0822

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. No qualifiers were applied to the data as a result of the noted headspace.

The COC listed the year of sample collection as 2016. The laboratory used a collection year of 2017 to log in the samples. No qualifications were applied to the data as a result of this COC issue.

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP-GW-091217 and the original sample CP22-PMW04 for all duplicate analyses with the following exceptions.

Sample	Compound	RPD (%)	Laboratory Concentration (mg/L)	Validation Qualifier	Validation Concentration (mg/L)	Reason Code
CP22-PMW04	Zinc	167	0.181	J	0.181 J	7
DUP-GW-091217			0.0164	J	0.0164 J	

Anions

Chloride and sulfate were detected in the equipment blank, EB-GW-091217, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

Metals

Calcium and silicon were detected in the equipment blank, EB-GW-091217, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

WORK ORDER 17-09-0989

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. No qualifiers were applied to the data as a result of the noted headspace.

Three field duplicate samples were collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate samples CP22-DUP3-091317 and CP22-DUP4-091317 and the original samples CP22-HP12-39-41 and CP22-HP08-43-45, respectively for all duplicate analyses.¹

The RPD for field duplicate pair CP22-HP12-35-37/CP22-DUP2-091317 could not be calculated because the original sample was collected on 9/12/2017 and the duplicate sample on 9/13/2017; therefore, they are not a true field duplicate pair.

Metals

Calcium was detected in the equipment blank, EB3-091317, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

VOCs

The COC listed the trip blank; however, no time of collection was on the COC. The laboratory used a time of collection of 00:00. No qualifications were applied to the data as a result of this COC issue.

WORK ORDER 17-09-1116(S1)

The laboratory reissued the report on 2 October 2017 since the original report did not include the correct results for sample CP22-IDW-091417.

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. No qualifiers were applied to the data as a result of the noted headspace.

¹ The RPD for field duplicate pair CP22-HP08-43-45/CP22-DUP4-091317 could not be calculated because zinc was not detected in one of the sample pairs. The RPD is anticipated to be approximately 28% based on the laboratory reporting limit for zinc (0.0100 µg/L) and the detected value (0.0133 µg/L).

Metals

Zinc was detected in the equipment blank, EB4-091417, above the reporting limit (RL). No qualifiers were applied to the data; however, the discrepancy should be noted.

The percent recovery in the MS/MSD, using sample CP22-HP03-35-37, was below the laboratory established control limits for iron. The associated iron result is qualified as follows:

Sample	Compound	Laboratory Concentration (mg/L)	Validation Qualifier	Validation Concentration (mg/L)	Reason Code
CP22-HP03-35-37	Iron	0.594	J	0.594 J	4

VOCs

The COC listed the trip blank; however, no time of collection was on the COC. The laboratory used a time of collection of 00:00. No qualifications were applied to the data as a result of this COC issue.

* * * * *

Memorandum

Date: 11 February 2018
To: Brian Rockwell/Lea Kane
From: Sherry Watts
Subject: Stage 1 Data Validation Summary
Work Orders:
18-01-1215
18-01-1334
18-01-1452
ESTCP - Pendleton

INTRODUCTION

This report summarizes the findings of the Stage 1 data validation for the above listed work orders for soil, groundwater, industrial derived waste samples and associated quality control samples collected 17 through 19 January 2018 from the ESTCP – Pendleton site located in Oceanside, California (Site). Samples collected from the site were submitted to Eurofins/Calscience, Inc. of Garden Grove, California for laboratory analysis. The samples were submitted for one or more of the following analytical tests:

- Metals by EPA Method 6010B/7470A (aqueous)
- Metals by EPA Method 6010B/7471A (solid)
- Total Petroleum Hydrocarbons by EPA 8015B(M) (solid/aqueous)
- Volatile Organic Compounds (VOCs) by EPA Method 8260B (solid/aqueous)
- Propene by RSK-175M (aqueous)
- 1,2,3-Trichloropropene by SRL 524M (aqueous)

EXECUTIVE SUMMARY

The samples were handled, prepared, and measured in the same manner under similar prescribed conditions as reported in the laboratory analytical. Data packages were reviewed for chain of

custody (COC) discrepancies; adherence to sample holding times; evaluation of matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples/laboratory control sample duplicates (LCS/LCSD), field duplicates; and assessment of equipment, field, trip, and method blanks.

The data were reviewed based on the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, August 2014 (USEPA-540-R-014-002) and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, August 2014 (USEPA-540-R-013-001), as well as by the pertinent methods referenced by the data package and professional judgment.

Error corrections were observed on the COC forms. The proper procedure of a single strike through of the correction was utilized; however, in some instances the initial and/or date of correction was missing. This COC issue did not result in qualification of the data.

Overall, based on this Stage 1 data validation covering the quality control (QC) parameters, the data as qualified are usable for meeting project objectives. Qualified data should be used within the limitations of the qualification. Additional QC issues, other than those discussed in the following sections, were noted; however, these QC issues had no impact on the reported results and are therefore not discussed in further detail.

WORK ORDER 18-01-1215

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. The laboratory made an effort to use containers with no reported headspace when possible; however, in the following instances containers with headspace were utilized for analyses:

- CP22-HP01-35-37: Propene and 1,2,3-Trichloropropane

No qualifiers were applied to the data as a result of the noted headspace; however, the discrepancy should be noted.

1,2,3-Trichloropropene

An equipment, trip, and field blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory reporting limit (RL).

One field duplicate sample was collected with the groundwater samples. Acceptable precision (Relative Percent Difference (RPD <30%) was demonstrated between the field duplicate sample DUP20180117 and the original sample CP22-HP03-35-37.

Propene

One field duplicate sample was collected with the groundwater samples. Acceptable precision (Relative Percent Difference (RPD <30%) was demonstrated between the field duplicate sample DUP20180117 and the original sample CP22-HP03-35-37.

Zinc

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One MS/MSD, using sample IP02-1-35, was reported with the soils data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for zinc was below the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (µg/kg)	Validation Result (µg/kg)	Validation Qualifier*	Reason Code*
IDW-Soil-20180119	Zinc	82.7	82.7	J	4

*Validation Qualifier and Reason Code defined in Attachment 1

WORK ORDER 18-01-1334

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. The laboratory made an effort to use containers with no reported headspace when possible; however, in the following instances containers with headspace were utilized for analyses:

- CP22-HP08-35-37: 1,2,3-Trichloropropane

No qualifiers were applied to the data as a result of the noted headspace, however the discrepancy should be noted.

1,2,3-Trichloropropene

An equipment, trip, and field blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory RL.

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP20180118 and the original sample CP22-HP08-39-41.

Propene

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was not demonstrated between the field duplicate sample DUP20180118 and the original sample CP22-HP08-39-41. The associated sample results were qualified as follows:

Sample	Compound	RPD (%)	Laboratory Result (µg/L)	Validation Result (µg/L)	Validation Qualifier*	Reason Code*
CP22-HP08-39-41	Propene	87	1.04	1.04	J	7
DUP20180118			2.64	2.64	J	

WORK ORDER 18-01-1452

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. The laboratory made an effort to use containers with no reported headspace when possible; however, in the following instances containers with headspace were utilized for analyses:

- CP22-HP10-39-41: 1,2,3-Trichloropropane
- CP22-HP05-35-37: 1,2,3-Trichloropropane
- CP22-HP04-39-41: 1,2,3-Trichloropropane

No qualifiers were applied to the data as a result of the noted headspace; however, the discrepancy should be noted.

1,2,3-Trichloropropane

An equipment, trip, and field blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory RL.

One field duplicate sample was collected with the groundwater samples. Acceptable RPD was demonstrated between the field duplicate sample DUP20180119 and the original sample CP22-HP12-35-37.

Propene

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP20180119 and the original sample CP22-HP12-35-37

VOCs

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One MS/MSD, using sample IDW-Soil-20180119, was reported with the soils data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for acetone and tetrachloroethene were below the laboratory acceptance criteria. The associated sample results were qualified as follows:

Sample	Compound	Laboratory Result (µg/kg)	Validation Result (µg/kg)	Validation Qualifier	Reason Code
IDW-Soil-20180119	Acetone	ND <120	<120	UJ	5
	Tetrachloroethene	ND <5.0	<5.0	UJ	5

LCS/LCSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS/LCSD was reported with the soils data. The results for the LCS/LCSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for acetone and 1,1-dichloroethene were below the laboratory acceptance criteria. The associated sample results were qualified as follows:

Sample	Compound	Laboratory Result (µg/kg)	Validation Result (µg/kg)	Validation Qualifier	Reason Code
IDW-Soil-20180119	Acetone	ND <120	<120	UJ	4
	1,1-Dichloroethene	ND <5.0	<5.0	UJ	4

LCS/LCSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS/LCSD was reported with the water data. The results for

the LCS/LCSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for 2,2-dichloropropane and 1,1-dichloropropane were above the laboratory acceptance criteria. 2,2-Dichloropropane and 1,1-dichloropropane were not detected in the sample associated with this batch above the laboratory RL. No qualifications were applied as a result of the data validation process.

Metals (including mercury)

There were no reported QC issues associated with the metals analyses that impacted the reported results.

Total Petroleum Hydrocarbons

There were no reported QC issues associated with the metals analyses that impacted the reported results.

* * * * *

Memorandum

Date: 10 October 2018
To: Brian Rockwell/Lea Kane
From: Sherry Watts
Subject: Stage 1 Data Validation Summary
Work Orders:
18-09-0814
18-09-0815
18-09-0979
18-09-1119
18-09-1544
18-09-1545
ESTCP - Pendleton

INTRODUCTION

This report summarizes the findings of the Stage 1 data validation for the above listed work orders for soil, groundwater, industrial derived waste samples and associated quality control samples collected 12 through 19 September 2018 from the ESTCP – Pendleton site located in Oceanside, California (Site). Samples collected from the site were submitted to Eurofins/Calscience, Inc. of Garden Grove, California for laboratory analysis. The samples were submitted for one or more of the following analytical tests:

- Zinc by EPA Method 200.7 (aqueous)
- Sulfate by EPA Method 300.0 (aqueous)
- Metals by EPA Method 6010B/7470A (aqueous)
- Metals by EPA Method 6010B/7471A (solid)
- Total Petroleum Hydrocarbons by EPA 8015B(M) (solid/aqueous)
- Volatile Organic Compounds (VOCs) by EPA Method 8260B (solid/aqueous)
- Propene by RSK-175M (aqueous)

- 1,2,3-Trichloropropene by SRL 524M (aqueous)

EXECUTIVE SUMMARY

The samples were handled, prepared, and measured in the same manner under similar prescribed conditions as reported in the laboratory analytical. Data packages were reviewed for chain of custody (COC) discrepancies; adherence to sample holding times; evaluation of matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples/laboratory control sample duplicates (LCS/LCSD), field duplicates; and assessment of equipment, field, trip, and method blanks.

The data were reviewed based on the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, January 2014 (USEPA-540-R-2017-002) and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, January 2017 (USEPA-540-R-2017-001), as well as by the pertinent methods referenced by the data package and professional judgment.

Error corrections were observed on the COC forms. The proper procedure of a single strike through of the correction was utilized; however, in some instances the initial and/or date of correction was missing. This COC issue did not result in qualification of the data.

Overall, based on this Stage 1 data validation covering the quality control (QC) parameters, the data as qualified are usable for meeting project objectives. Qualified data should be used within the limitations of the qualification. Additional QC issues, other than those discussed in the following sections, were noted; however, these QC issues had no impact on the reported results and are therefore not discussed in further detail.

WORK ORDER 18-09-0814

1,2,3-Trichloropropene

An equipment blank was reported with the data. 1,2,3-Trichloropropane was not detected in the blank above the laboratory reporting limit (RL).

One field duplicate sample was collected with the groundwater samples. Acceptable precision (Relative Percent Difference (RPD <30%) was demonstrated between the field duplicate sample DUP and the original sample CP22-PMW04.

Propene

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP and the original sample CP22-PMW04.

Sulfate

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP and the original sample CP22-PMW04.

Zinc

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP and the original sample CP22-PMW04.

WORK ORDER 18-09-0815

An incomplete sample identification on one container label was noted for CP22-P03-35-37. The laboratory was able to properly identify the sample by the date and time noted on the sample label.

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. The laboratory made an effort to use containers with no reported headspace when possible; however, in the following instances containers with headspace were utilized for analyses:

- CP22-HP02-35-37: Propene
- CP22-HP01-35-37: 1,2,3-Trichloropropene
- CP22-HP03-39-41: 1,2,3-Trichloropropene

No qualifiers were applied to the data as a result of the noted mislabeling and headspace; however, the discrepancies should be noted.

1,2,3-Trichloropropene

An equipment, field and trip blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory RL.

One field duplicate sample was collected with the water samples. Acceptable precision (Relative Percent Difference (RPD <30%) was demonstrated between the field duplicate sample DUP-20180912 and the original sample CP22-HP01-31-33.

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs, using samples DUP-20180912 and CP22-HP01-39-41, were reported with the groundwater data. The results for the MS/MSD pairs were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for 1,2,3-trichloropropene was above the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (µg/L)	Validation Result (µg/L)	Validation Qualifier*	Reason Code*
DUP-20180912	1,2,3-Trichloropropene	0.27	0.27	J	4
CP22-HP01-39-41	1,2,3-Trichloropropene	0.28	0.28	J	4

*Validation Qualifier and Reason Code defined in Attachment 1

Propene

One field duplicate sample was collected with the water samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP-20180912 and the original sample CP22-HP01-31-33.

Zinc

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD, using sample DUP-20180912, was reported with the groundwater data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for zinc was below the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (mg/L)	Validation Result (mg/L)	Validation Qualifier	Reason Code
DUP-20180912	Zinc	ND <0.0100	<0.0100	UJ	4

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was not demonstrated between the field duplicate sample DUP-20180912 and the original sample CP22-HP01-31-33. The associated sample results were qualified as follows:

Sample	Compound	RPD (%)	Laboratory Result (mg/L)	Validation Result (mg/L)	Validation Qualifier	Reason Code
CP22-HP01-31-33	Zinc	Noncalculable >170%	0.122	0.122	J	7
DUP-20180912			ND <0.0100	<0.0100	UJ	

WORK ORDER 18-09-0979

1,2,3-Trichloropropene

An equipment, field and trip blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory RL.

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair, using sample CP22-HP06-35-37, was reported with the groundwater data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for 1,2,3-trichloropropene was above the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (µg/L)	Validation Result (µg/L)	Validation Qualifier	Reason Code
CP22-HP06-35-37	1,2,3-Trichloropropene	0.32	0.32	J	4

One field duplicate sample was collected with the water samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP-20180912 and the original sample CP22-HP01-31-33.

Propene

One field duplicate sample was collected with the water samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP20180913 and the original sample CP22-HP04-35-37.1

Zinc

One field duplicate sample was collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate sample DUP20180913 and the original sample CP22-HP04-35-37.

WORK ORDER 18-09-1119

The laboratory noted headspace in several sample containers on the Sample Anomaly Report included in the laboratory data package. The laboratory made an effort to use containers with no reported headspace when possible. No samples containers with headspace were utilized for sample analysis.

1,2,3-Trichloropropene

An equipment, trip, and field blank were reported with the data. 1,2,3-Trichloropropane was not detected in any of the blanks above the laboratory RL.

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pair, using sample CP22-HP11-35-37 and DUP02-20180914, were reported with the groundwater data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for 1,2,3-trichloropropene was above the laboratory acceptance criteria. The associated sample result was qualified as follows:

¹ The RPD for field duplicate pair CP22-HP04-35-37/DUP-20180913 could not be calculated because propene was not detected in one of the sample pairs. The RPD is anticipated to be approximately 25% based on the laboratory reporting limit for propene (1.00 µg/L) and the detected value (1.29 µg/L).

Sample	Compound	Laboratory Result (µg/L)	Validation Result (µg/L)	Validation Qualifier	Reason Code
CP22-HP11-35-37	1,2,3-Trichloropropene	0.27	0.27	J	4
DUP02-20180914		0.55	0.55	J	4

Two field duplicate samples were collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate samples DUP01-20180914 and DUP02-20180914 and the original samples CP22-HP08-39-41 and CP22-HP08-35-37, respectively.

Propene

Two field duplicate samples were collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate samples DUP01-20180914 and DUP02-20180914 and the original samples CP22-HP08-39-41 and CP22-HP08-35-37, respectively.

Zinc

Two field duplicate samples were collected with the groundwater samples. Acceptable precision (RPD <30%) was demonstrated between the field duplicate samples DUP01-20180914 and DUP02-20180914 and the original samples CP22-HP08-39-41 and CP22-HP08-35-37, respectively.

WORK ORDER 18-09-1944

VOCs

LCS/LCSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS/LCSD pair was reported with the soil data. The results for the LCS/LCSD pairs were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for dichlorodifluoromethane was below the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (µg/kg)	Validation Result (µg/kg)	Validation Qualifier	Reason Code
IDW-SOIL-20180919	Dichlorodifluoromethane	ND <5.0	<5.0	UJ	5

Metals (including mercury)

There were no reported QC issues associated with the metals analyses that impacted the reported results.

Total Petroleum Hydrocarbons

There were no reported QC issues associated with the metals analyses that impacted the reported results.

WORK ORDER 18-09-1945

The Sample Anomaly sheet indicated water in 14 samples. The presence of water was a result of the actual sample matrix and not due to storage or transportation issues.

Zinc

MS/MSDs were run at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair, using sample IP08W-1'-40, was reported with the soil data. The results for the MS/MSD pair were within the laboratory specified criteria for recovery and RPD with the following exceptions: the recovery for zinc was above the laboratory acceptance criteria. The associated sample result was qualified as follows:

Sample	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)	Validation Qualifier	Reason Code
IP08W-1'-40	Zinc	67.3	67.3	J	4

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS
AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

- B** Analyte detected in the method blank
- U** The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- J+** The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.
- J-** The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.
- UJ** The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits and RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other

RPD-relative percent difference