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June 11, 2015

Ms. Dilan Roe
Site Cleanup Program Manager
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94501-6577

Subject: **Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report**
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California
Site Cleanup Program Case No. RO0003014

Dear Ms. Roe:

Enclosed please find a document entitled *Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report* for the Former Crown Chevrolet North Parcel site at 7544 Dublin Boulevard, in Dublin, California (Site Cleanup Program Case No. RO0003014, GeoTracker Global ID T10000001616). This report was prepared by Amec Foster Wheeler Environment & Infrastructure, Inc., on behalf of BWD Dublin LLC.

I declare under penalty of perjury that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

Please contact me at (408) 680-4938 or Avery Whitmarsh of Amec Foster Wheeler at (510) 663-4154 if you have any questions regarding this report.

Sincerely yours,

Pete Beritzhoff
BWD Dublin LLC

Attachment: Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report

Cc: Colleen Winey, Zone 7 Water Agency (electronic copy only)
Gregory Shreeve, City of Dublin (electronic copy only)

Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

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June 2015

Project No. OD14170800

VAPOR MITIGATION AND PERMEABLE REACTIVE BARRIER BASIS OF DESIGN REPORT

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California
Site Cleanup Program Case No. RO0003014

June 11, 2015
Project OD14170800

This report was prepared by the staff of Amec Foster Wheeler under the supervision of the Engineer and/or Geologist whose signature appears hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.

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VAPOR MITIGATION AND PERMEABLE REACTIVE BARRIER BASIS OF DESIGN REPORT

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin California

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. ("Amec Foster Wheeler"; formerly AMEC Environment & Infrastructure, Inc.),[1] has prepared this *Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report* ("Design Report") on behalf of BWD Dublin, LLC for the former Crown Chevrolet North Parcel located at 7544 Dublin Boulevard, Dublin, California (the "site"; Figure 1). This Design Report has been prepared in response to an August 16, 2013, letter from Alameda County Department of Environmental Health (ACDEH) to the Betty J. Woolverton Trust and Crown Chevrolet Cadillac Isuzu ("Crown Chevrolet"), the previous owners of the property and facility (ACDEH, 2013). The purpose of the Design Report is to describe and document the final design of the proposed corrective actions at the site: (1) a vapor mitigation system (VMS) to be installed beneath future occupied buildings in the northern portion of the site, and (2) a permeable reactive barrier (PRB) to be installed along the western edge of the property. Specifically, this Design Report describes existing site conditions, recent site characterization activities, design objectives, design assumptions, and the final design of the corrective actions.

The conceptual designs of the VMS and PRB were proposed in the *Revised Draft Feasibility Study and Corrective Action Plan,* which was submitted to ACDEH on March 25, 2013 (AMEC, 2013b), and acknowledged by ACDEH in the August 16, 2013, letter to Crown Chevrolet (ACDEH, 2013). The *Final Feasibility Study and Corrective Action Plan* (FS/CAP) was submitted to ACDEH on May 1, 2014 (AMEC, 2014a).

The VMS will generally consist of a spray-applied composite membrane installed beneath future building slabs in the vicinity of previously identified volatile organic compounds (VOCs) that are present at elevated concentrations in soil vapor. In addition, perforated vapor collection pipes will be installed in the permeable aggregate below the membrane and connected to risers that will passively vent accumulating vapors to outdoor air. The PRB will use zero-valent iron (ZVI) as the reactive media within a permeable treatment zone to facilitate reductive dechlorination of VOC-impacted groundwater. After the PRB is installed,

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[1] AMEC Environment & Infrastructure, Inc. (AMEC), became Amec Foster Wheeler Environment & Infrastructure, Inc., effective January 1, 2015.

concentrations of VOCs at the downgradient side of the wall are expected to attenuate with time.

2.0 BACKGROUND

The site was developed in 1968 as Crown Chevrolet, a car dealership with auto body shops, on land that appears to have been previously used for agricultural purposes. Operations as a car dealership and auto body shop continued from 1968 through 2013. The property was sold to BWD Dublin in the fall of 2014, and the site buildings were demolished in December 2014 in preparation for redevelopment.

2.1 SUMMARY OF PREVIOUS INVESTIGATIONS

Multiple environmental investigations have been conducted at the site, primarily between 2009 and 2012, to address regulatory concerns and to support transactional and potential redevelopment activities. The results of the investigations performed through 2012 are summarized in the *Soil, Groundwater, and Soil Vapor Investigation Report*, dated October 19, 2012 (AMEC, 2012). Quarterly groundwater monitoring was conducted at the site from 2012 through 2014 (the site monitoring wells were destroyed in December 2014 before the buildings were demolished), and will resume after the site has been redeveloped. Quarterly groundwater monitoring activities are summarized in the *Third and Fourth Quarter 2014 Groundwater Monitoring Report,* dated April 21, 2015 (Amec Foster Wheeler, 2015). The results of the investigations, remediation, and quarterly groundwater monitoring are briefly summarized below. The investigations indicated the presence of VOCs, primarily tetrachloroethene (PCE) and trichloroethene (TCE), in groundwater and soil vapor throughout the northern portion of the site. In addition, the investigations identified limited areas of impacts to soil beneath site buildings.

Groundwater is first encountered at the site between approximately 9 and 15 feet below ground surface and generally flows from the west to the east. The investigations conducted through 2012 indicated the presence of PCE and TCE in shallow groundwater and soil vapor throughout the northern portion of the site at concentrations above their respective Environmental Screening Levels (ESLs, California Regional Water Quality Control Board, San Francisco Bay Region [“Regional Water Board”]; December 2013) for residential land use, where groundwater is a potential drinking water resource. Daughter products of PCE and TCE degradation (e.g., cis-1,2-dichloroethene) were also present in groundwater and soil vapor, but at concentrations lower than those for PCE and TCE and below their respective ESLs, except for vinyl chloride, which was detected in some soil vapor samples at concentrations greater than the ESL.

The results of investigations conducted at the site in 2012 (AMEC, 2012; ENGEO, 2013) indicate that the source of PCE (and hence its degradation products) in groundwater is off site and hydraulically upgradient. During an investigation conducted by ENGEO Incorporated in October 2012, samples were collected west of the sanitary sewer within Golden Gate Drive, which is west and hydraulically upgradient of the site, to help identify whether the sanitary sewer was the source of PCE in groundwater (ENGEO, 2013). PCE and TCE were detected at concentrations similar to those at the western site boundary, thereby confirming that the source is upgradient of the site, but not providing clarity confirming whether or not the source is the sewer line was a/the source of PCE in groundwater. Quarterly groundwater monitoring was conducted at monitoring wells in the northern portion of the site from 2012 through 2014 and has indicated that concentrations of VOCs in groundwater are generally stable or declining (Amec Foster Wheeler, 2015).

The investigations also indicated that chlorobenzenes and related constituents had been released to the subsurface at a former sump and former front-end alignment pit within former Building B (Figure 2). These areas were excavated in 2011 (AMEC, 2011), but, as discussed in more detail in the FS/CAP, some impacted soil was inaccessible and remained beneath the building walls. After the site buildings were demolished in December 2014, more soil was removed from these areas in February 2015; the soil removal activities will be documented in a forthcoming *Post-Demolition Investigation and Remediation Report*, which will be submitted to ACDEH in June 2015.

During the demolition of the site buildings in December 2014, as subsurface features were removed, six other areas of soil impacts were identified by Amec Foster Wheeler:

- Beneath four hydraulic lifts within former Building B (HL-1, HL-3, HL-6, and HL-8).
- Beneath piping that was previously connected to a waste oil tank that was previously removed (WOTP).
- Beneath a sump within former Building C (BCFS).

The approximate locations of these features are shown on Figure 2. The soil impacts at each of the areas were related to total petroleum hydrocarbons (TPH) quantified in the diesel and motor oil ranges, polychlorinated biphenyls (PCBs), PCE, toluene, lead, and/or 2-methylnapthalene. Impacted soil at concentrations above residential ESLs was excavated from these six areas in February 2015 and the removal activities will be documented in the *Post-Demolition Investigation and Remediation Report.* No additional impacts were found during demolition of the site hardscape in March 2015.

2.2 PLANNED REDEVELOPMENT AND CORRECTIVE ACTIONS

Site redevelopment is scheduled to begin in summer 2015. The redevelopment will include mixed residential/commercial buildings at the site, comprising 313 apartments (a total of approximately 323,000 gross square feet in multi-unit structures) and 17,000 square feet of retail space at ground level along Dublin Boulevard; some of the apartments will be located above the retail space. An approximately 230,000-square-foot parking garage is planned for the eastern central portion of the site. The planned site layout following redevelopment is shown on Figure 3.

The absolute and functional corrective action objectives (CAOs) for the site were established in the approved FS/CAP for the protection of human health and the environment and are listed below (functional CAOs as hollow bullets beneath each absolute CAO):

- Mitigate potential vapor intrusion risks to future site occupants.
    - Confirm via 1 year of indoor air sampling that concentrations of constituents of concern (COCs) are below applicable indoor air screening levels (e.g., ESLs).
    - Obtain temporal shallow groundwater and vent riser (equivalent to sub-slab) data for 5 years (1 year of performance monitoring followed by 4 years of operations and maintenance [O&M] phase monitoring).
    - Comply with institutional controls (ICs) regarding property use, mitigation measures, and monitoring.
- Mitigate potential exposure to future construction and maintenance workers to VOC-impacted soil vapor, and groundwater.
    - Comply with a site management plan, which will provide guidance for worker protection and safety measures to be employed during site construction and maintenance.
- Remediate identified residual source material in the vicinity of the former sump and front-end alignment pit.
    - Remove residual impacted soil to the extent that COC concentrations in confirmation samples collected from the sidewalls of the excavation are below ESLs for shallow soil in a residential land use scenario, where groundwater is considered a potential drinking water resource.
    - Conduct additional removal of impacted soil that may be encountered during site demolition and development, as necessary.

To address the first CAO and mitigate the risk to future site residents from potential vapor intrusion of VOCs in soil vapor to indoor air, the FS/CAP recommended the installation of a VMS beneath occupied site buildings in the northern portion of the site to reduce the potential for soil vapor to affect indoor air quality and the installation of a PRB to treat impacted groundwater migrating onto the site. The FS/CAP further recommended soil excavation at selected locations to address residual soil contamination to address the third CAO. Additionally, groundwater sampling, long-term site management, and ICs are recommended. Collectively, the soil excavation, ICs, groundwater sampling, long-term site management, VMS, and PRB comprise the approved corrective action.

The soil excavation and ICs are being addressed separately and are not part of the scope of this document. The soil excavation (to remove residual impacted soil and additional impacted soil identified during site demolition) was performed in February 2015 in accordance with the

August 2014 *Revised Additional Investigation and Soil Removal Work Plan* (AMEC, 2014c). The work will be documented in the *Post-Demolition Investigation and Remediation Report*, which will be submitted to ACDEH in June 2015. The ICs will be implemented prior to building occupancy and will provide legal and administrative controls and methods for dissemination of information to minimize risk during property development, future below-ground construction and maintenance, and long-term site use. Key components of the ICs include the following:

- Land use covenants (LUCs) and activity use limitations (AULs), and codes, covenants, and restrictions (CCRs), which set forth requirements for notifications of work potentially impacting the VMS and PRB, prohibitions on activities that could encounter/breach the PRB and VMS without the express knowledge of ACDEH and other regulatory agencies.
- Right of access agreements.
- Language to specify in lease documents for site tenants.
- A Site Management Plan (SMP), which provides for communication primarily with contractors who will be performing future construction and maintenance activities at the site. The SMP will provide details regarding the location and construction of the remedies, precautions for working on site, and notifications procedures.

A draft of an Institutional Controls Plan that includes the LUCs and SMP will be provided to ACDEH under separate cover.

3.0 PROJECT FRAMEWORK

This section presents a summary of the design criteria and regulatory requirements that collectively form the project requirements framework for the VMS and PRB design and installation.

3.1 PROJECT GOALS AND OBJECTIVES

The overall goal for this project is to meet the first CAO ("mitigate potential vapor intrusion risks to future site occupants") and provide robust and long-lasting mitigation of the potential risk to future site occupants from intrusion of soil vapor from beneath building floor slabs to indoor air. In accordance with the FS/CAP, this risk will be mitigated by installing a VMS beneath the future building slabs in areas where elevated VOC concentrations have been measured in soil vapor and installing a permeable reactive barrier (PRB) at the upgradient site boundary. The objectives of each of these elements are discussed in more detail in the following sections.

3.1.1 VMS Objectives

The objectives of the VMS are as follows:

- Mitigate the potential for soil vapor beneath future building slabs to contribute to unacceptable risk in indoor air by installing a robust vapor membrane beneath the new foundations, and installing vapor collection piping below the membrane to passively vent sub-slab vapors above the roofline.

- Maintain vapor concentrations within the buildings below long-term indoor air quality objectives for PCE and its breakdown products and short-term screening levels for TCE.
- Provide a mitigation system that is passive and requires minimal operations and maintenance.
- Design the system such that it could be converted from a passive system to an active system, if needed.

3.1.2 PRB Objectives

The objectives of the PRB are as follows:

- Provide supplemental protection to human health beyond the VMS.
- Treat the highest concentrations of PCE in the groundwater plume to reduce concentrations of PCE and its degradation products entering the site to below levels that could contribute to a vapor intrusion concern.
- Reduce the mass flux of PCE entering the site so that VOC concentrations in groundwater within the site can decline.
- Provide long-term treatment efficacy with a passive system that has minimal operational requirements and little generation of waste during its operational lifetime.

3.2 PROJECT REGULATORY REQUIREMENTS

The design and installation of the VMS and PRB will be completed within the regulatory framework discussed in the following sections.

3.2.1 ACDEH

The site was previously part of Fuel Leak Case No. RO0003014 and consisted of two parcels, one north of St. Patrick Way, and one south of St. Patrick Way. The south parcel was transferred to a separate case in the Site Cleanup Program, which was closed on August 4, 2014, and is not addressed in this document. The north parcel was transferred from the Fuel Leak Program to the Site Cleanup Program in 2013 under the oversight of ACDEH.

ACDEH reviews and approves all documents related to environmental conditions at the site. The framework for the corrective actions for the site is presented in the August 16, 2013, letter from ACDEH to Crown Chevrolet.

3.2.2 City of Dublin

The construction of the VMS and PRB, as well as the overall mixed used development project, is within the purview and jurisdiction of the City of Dublin (City). The City is considered a stakeholder for this report and other key documentation related to environmental conditions at the site. Additionally, the City will review and approve construction plans for the VMS and PRB.

3.2.3 Zone 7 Water Agency

Although the shallow groundwater beneath the site currently is not considered a drinking water source, groundwater within this basin is within the purview of the Zone 7 Water Agency (Zone 7). As such, Zone 7 is considered a stakeholder for this report and other key documentation. Additionally, Zone 7 will review and approve permits for the installation of future monitoring wells and the PRB.

3.3 MITIGATION OBJECTIVES

In order to accomplish the project goals, the corrective actions will be designed and implemented to meet site-specific mitigation objectives for indoor air and groundwater. The mitigation objectives are based on the ESLs for each media (Regional Water Board, 2013), for residential land use where groundwater is a current or potential drinking water resource, and on short-term screening levels for TCE (U.S. EPA, 2014). As described by the Regional Water Board, ESLs are conservative screening levels that correspond to an acceptable risk level; concentrations of constituents below their respective ESLs can be considered to pose no significant risk, within noted limits. Concentrations of constituents above their respective ESLs do not necessarily indicate a risk is present, but rather suggest that additional evaluation is warranted.

The applicable mitigation objectives are discussed in the following sections.

3.3.1 Indoor Air

The objective of the VMS is to maintain concentrations of PCE, TCE, their degradation products, and other VOCs potentially present in soil vapor, at concentrations below their respective indoor air ESLs in indoor air within the future site buildings (Table E-3, Ambient and Indoor Air Screening Levels; Regional Water Board, 2013) and below short-term screening levels for TCE (U.S. EPA, 2014).

The specific treatment objectives for the main COCs in indoor air are as follows, based on the lowest residential endpoint in Table E-3, taking into considering the short-term screening levels for TCE:

- PCE – 0.41 micrograms per cubic meter [$\mu g/m^3$].
- TCE – 0.59 $\mu g/m^3$.
- cis-1,2-Dichloroethene (cis-1,2-DCE) – 7.3 $\mu g/m^3$.
- trans-1,2-Dichlorothene (trans-1,2-DCE) – 63 $\mu g/m^3$.
- 1,1-Dichloroethene – 210 $\mu g/m^3$.
- Vinyl chloride – 0.031 $\mu g/m^3$.
- Benzene – 0.084 $\mu g/m^3$.
- Chlorobenzene – 1,000 $\mu g/m^3$.

- 1,2-Dichlorobenzene – 210 µg/m^3.
- 1,4-Dichlorobenzene – 0.22 µg/m^3.

Should the indoor air ESLs be updated, the effectiveness of the corrective action will be assessed relative to whatever ESLs are current at the time.

3.3.2 Groundwater

Drinking water in the vicinity of the site is municipally supplied and groundwater at the site is not a drinking water resource. Therefore, the objective of the PRB is to reduce concentrations of PCE and its degradation products in groundwater entering the site from the west to below their respective groundwater ESLs for potential vapor intrusion (Table E-1, Groundwater Screening Levels for Potential Vapor Intrusion; Regional Water Board, 2013).[2]

The specific treatment objectives for the main COCs in groundwater are as follows, based on a mix of fine and coarse soil in a residential land use scenario (see Sections 4 and 5 for additional detail regarding site geology):

- *PCE* – 63 micrograms per liter [µg/L]; the maximum concentration of PCE detected at the site is 210 µg/L.
- *TCE* – 130 µg/L; the maximum concentration of TCE detected at the site is 78 µg/L.
- *cis-1,2-DCE* – 3,100 µg/L; the maximum concentration of cis-1,2-DCE detected at the site is 85 µg/L (however, this concentration is in the second water-bearing zone at the site).
- *trans-1,2*-DCE – 14,000 µg/L; the maximum concentration of trans-1,2-DCE detected at the site is 1.9 µg/L.
- *Vinyl chloride* – 1.8 µg/L; vinyl chloride has not been detected in groundwater at the site.

Groundwater treatment objectives for benzene, chlorobenzene, and 1,2-dichlorobenzene are not provided because these constituents have not been detected in groundwater in the vicinity of the proposed PRB.

3.3.3 Soil

Several areas of primarily VOC and/or TPH impacts to soil have been identified at the site. Soil remediation is being addressed in accordance with the *Revised Additional Investigation and Soil Removal Work Plan*, dated August 27, 2014 (AMEC, 2014c).

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[2] The ESLs are based on a depth to groundwater of at least 10 feet below ground surface (bgs) and a fine-coarse mix of soils with a significant proportion of fines, typical of Bay Area sites. Depths to groundwater in one former monitoring well at the site (MW-02) have been measured as shallow as approximately 9.5 feet bgs. However, the area of detectable VOC concentrations in groundwater (Figures 4 and 10) extends only as far south as the southern edge of future Building D, while the proposed vapor barrier extends approximately 75 feet farther south.

The corrective actions outlined in this document do not address impacts to soil. However, all of the identified areas of soil impacts are in the northern portion of the site, beneath the footprint of the planned VMS (with the exception of the former sump in Building C, where the COCs were lead and one semivolatile organic compound).

3.3.4 Soil Vapor

The corrective actions outlined in this document do not specifically address impacts to soil vapor; therefore, there are no specific treatment objectives for soil vapor discussed in this document. However, as discussed further in Section 6.2.2, the limits of the PCE and TCE plumes in soil vapor were used to determine the limits of the VMS.

4.0 PRB PRE-DESIGN INVESTIGATION

To further characterize the site hydrogeology and support the design of the proposed PRB, Amec Foster Wheeler conducted a pre-design investigation from August 18 through October 31, 2014, that included three primary components:

- A field investigation involving advancing borings and soil electrical conductivity (EC) probes and installing piezometers.
- A borehole dilution test.
- A column study of two ZVI products.

This work was conducted in general accordance with the August 14, 2014, *Permeable Reactive Barrier Pre-Design Investigation Work Plan* (AMEC, 2014b; the “Work Plan”).

The following sections describe the work performed and results of the investigation. Appendix A details the field investigation methods and notes deviations from the Work Plan, Appendix B describes the borehole dilution testing procedures, and Appendix C includes a copy of the third-party report documenting the ZVI column study.

4.1 SOIL AND GROUNDWATER INVESTIGATION

Amec Foster Wheeler conducted the field portion of the pre-design investigation between August 18 and August 26, 2014. The field investigation included advancing 13 soil EC probe borings for the collection of high-resolution soil type data, advancing one dual-tube direct-push boring for confirmation soil logging, collecting 13 depth-discrete grab-groundwater samples from HydroPunch™-type borings, and installing three piezometers. The EC probes, direct-push boring, HydroPunch-type borings, and borings for the installation of piezometers were advanced by National Exploration, Wells & Pumps (National), of Richmond, California, a California C57-licensed contractor, under the supervision of Amec Foster Wheeler field personnel.

A detailed description of the field investigation methods, including deviations from the Work Plan, is presented in Appendix A. Figure 4 presents the drilling and sampling locations, the groundwater sample results for PCE and TCE, the piezometer locations, and the alignment of two cross sections (Y-Y' parallel to Dublin Boulevard and Z-Z' parallel to Golden Gate Drive).

A brief discussion of each of the investigation activities and their results is presented in the following sections.

4.1.1 Electrical Conductivity Probe Borings and Soil Interpretation

Thirteen EC probe borings were installed along the PRB alignment presented in the FS/CAP (the currently proposed PRB [Figure 4] is configured slightly differently than the one proposed in the FS/CAP, as discussed further in this document). Figure 5 illustrates the EC data from each EC probe boring along cross sections Y-Y′ and Z-Z′, and copies of the EC probe logs are included in Appendix D.

Each EC probe was advanced to a total depth between 35 and 50 feet below ground surface (bgs) using direct-push drilling technology to provide a profile of electrical conductivity relative to depth below ground surface at each probe location. The resulting EC data were used to evaluate soil types in the vicinity of the proposed PRB. As described in the Work Plan, higher relative EC values are associated with higher clay content and correlate with finer-grained sediments. Conversely, lower EC values correlate with a higher fraction of coarse-grained materials (McCall, et al., 2006).

4.1.1.1 EC Data Interpretation

To interpret soil types, Amec Foster Wheeler assigned EC values as breakpoints between soil types. Based on previous experience by Amec Foster Wheeler using EC probes for site investigation in and around the San Francisco Bay area, EC values less than approximately 50 millisiemens per meter (mS/m) normally correspond to poorly graded sands and other similar coarse-grained soil types. EC values between 50 to 75 mS/m normally correspond to silty sands and similar borderline soil types. EC values greater than 75 mS/m normally correspond to fine-grained soils. Similar breakpoints have been used in soil type interpretations made in several references (McCall, et al., 2006; Schulmeister, 2003; Butler, 2002).

The EC probe is a screening tool that should be relied on primarily for relative differences and not exact numerical interpretation. In order to provide a conservative relative interpretation of soil types at the site (i.e., erring on the side of interpreting soils as coarser grained than they may actually be), Amec Foster Wheeler carefully evaluated the variations present in the EC logs generated during this investigation for natural breakpoints indicating sharp contacts between soil types, compared the EC data with observations made on boring logs from this and other investigations at the site, and evaluated the results of several samples for grain size analysis that were collected adjacent to the EC probe borings during this investigation.

Seven soil samples were collected for grain size analysis to assist with correlation of the EC logs to soil types, as shown on the cross section on Figure 5 and detailed in Appendix A. Amec Foster Wheeler field staff obtained samples that represented a range of the fine-grained soils encountered (with EC readings from approximately 120 to 200 mS/m). A copy of the laboratory report with the grain size distribution data is included in Appendix A and a summary of the percentages of sand-, silt-, and clay-sized grains is included in Table 1. As indicated in Table 1, the results of the grain size analysis indicate that all seven of the samples are identified as clays, and coarse-grained content is very low (4.4 to 20.5% sand).

Based on the evaluation described above, and considering previous experience and common interpretation, Amec Foster Wheeler has conservatively assigned EC breakpoints for the site-specific soil type interpretation as follows:

- ≤100 mS/m = coarse-grained units (e.g., sands)
- 100 mS/m and ≤150 mS/m = fine-grained units (e.g., silts and sandy silts)
- >150 mS/m = fine-grained units (e.g., clays and silts)

The above approach is considered conservative because the breakpoint between coarse- and fine-grained units may actually be closer to 50 or 75 mS/m. Some of the EC results from the site may therefore be interpreted to represented coarse-grained soils when they may actually be fine grained. For example, some of the thin sand lenses interpreted using the EC probe data were described by a field geologist as silty sand and sandy silt (copies of the soil boring logs for borings PRB-04, PZ-01, PZ-02, and PZ-03 advanced during this investigation are included in Appendix A).

4.1.1.2 Soil Interpretation

The EC log data presented on Figure 5 is color coded to reflect the selected breakpoints between soil types. The EC data have also been used to interpret soil types between the EC probes along the proposed PRB alignment.

As shown on Figure 5, the EC data indicate fine-grained soil is present along the proposed PRB alignment (cross sections Y-Y’ and Z-Z′) to a depth of approximately 28 feet bgs. Slightly coarser-grained soil (e.g., silts and sandy silts) is present at thicknesses of up to 6 feet along section Z-Z’ in the central portion of the proposed alignment. A laterally continuous fine-grained layer is present from approximately 28 to 30 feet bgs along the proposed PRB alignment. From approximately 30 to 43 feet bgs, the interpreted soil type is interbedded silts and sands with some clays. Two sand intervals were encountered from approximately 43 to 50 feet bgs in the two EC probes advanced to that depth.

4.1.2 Grab-Groundwater Sampling

Following the completion of the EC probe borings, Amec Foster Wheeler collected 13 grab-groundwater samples in order to better understand the distribution of VOCs in groundwater in the vicinity of the proposed PRB alignment. The samples were collected using a direct-push drill rig equipped with a HydroPunch tool for depth-discrete groundwater sampling, as described in Appendix A, and analyzed for VOCs and total petroleum hydrocarbons quantified in the gasoline range. Copies of the laboratory analytical reports for the grab-groundwater sampling are also included in Appendix A.

Table 2 presents a summary of the analytical results for VOCs in the grab-groundwater samples. The results for PCE and TCE from this investigation and from prior investigations are presented in plan view on Figure 4 and in cross section on Figure 6. The table and figures also present the groundwater ESLs for potential vapor intrusion, which are the mitigation objectives for groundwater at the site.

In cross-sectional view, concentrations of PCE and TCE exceeding groundwater ESLs for potential vapor intrusion occur in a relatively narrow zone near former multi-port monitoring well MP-01, between borings PRB-02 and PRB-04 (Figure 6), approximately 100 feet long and approximately 28 feet deep. Concentrations of PCE detected in grab-groundwater samples collected along the PRB alignment in August 2014 are similar to those detected at nearby locations in previous investigations (Figure 4 also shows contours of PCE concentrations in the first groundwater zone based on the 2012 data).

The highest concentration of PCE detected in groundwater during this investigation was 110 µg/L, collected from approximately 26 to 28 feet bgs at boring PRB-03HP. The next highest concentration of PCE in groundwater was collected from approximately 26 to 28 feet bgs at boring PRB-04HP. Both of these samples were taken in a zone of silts and sandy silts, below which a laterally continuous clay layer is present. PCE concentrations in the groundwater samples collected from beneath the clay layer were significantly lower and below the groundwater ESL for potential vapor intrusion for PCE of 63 µg/L.

The detected concentrations of TCE are also presented on Figures 4 and 6. TCE was detected at a maximum concentration of 3.0 µg/L during the investigation, well below the groundwater ESL for potential vapor intrusion for TCE of 130 µg/L. During the final groundwater monitoring event in October 2014, TCE was detected in the groundwater sample from monitoring well MP-01-1 at a historical maximum concentration of 17 µg/L, also below the groundwater ESL for potential vapor intrusion. No other VOCs have been detected in groundwater at the site at concentrations greater than their respective groundwater ESLs for potential vapor intrusion.

4.1.3 Piezometer Installation and Gauging

To supplement water level data from the other six shallow groundwater monitoring wells at the site, Amec Foster Wheeler installed three piezometers along the proposed PRB alignment (PZ-01 through PZ-03; Figure 4). Each piezometer was installed using a hollow-stem auger drill rig and developed using a combination of surging and bailing in order to improve the hydraulic connection with the surrounding formation. The drilling, installation, and development methods are described in Appendix A.

The three piezometers were included in the October and December 2014 groundwater elevation gauging events and the gauging methods and depths to water are documented in the *Third and Fourth Quarter 2014 Groundwater Monitoring Report* (Amec Foster Wheeler, 2015). An interpretation of the October 2014 potentiometric surface is shown on Figure 7 and an interpretation of the December 2014 potentiometric surface is shown on Figure 8. As shown on Figures 7 and 8, the potentiometric surface indicates groundwater flow is generally to the east. While the aggregate flow in the first water-bearing zone is toward the east, there are both northerly and southerly components to the gradient, indicating that groundwater flow from north and south of the proposed PRB alignment converges in the vicinity of the proposed PRB alignment and to the east of it.

4.2 GROUNDWATER VELOCITY MEASUREMENTS

Following installation of the piezometers, Amec Foster Wheeler conducted a borehole dilution test in PZ-01 to evaluate horizontal groundwater seepage flow velocities in the vicinity of the proposed PRB alignment.

4.2.1 Piezometer Selection

The borehole dilution test was performed in PZ-01 because, although it is not in the proposed PRB alignment (see Figure 7), it is screened in sediments that are most representative of soil conditions along the western portion of the PRB alignment.

4.2.2 Field Methods

A detailed description of the field methods used to perform the borehole dilution test is presented in Appendix B.

In summary, the borehole dilution test was performed using a recirculation pumping system, which included an above-ground pump connected to extraction tubing positioned in the piezometer at the bottom of the test interval (approximately 15 feet bgs) and injection tubing positioned at the top of the test interval (approximately 20 feet bgs). The test consisted of recirculating water in the piezometer by extracting and injecting water in a closed loop system, while maintaining the same water elevation in the piezometer, then adding sodium bromide (NaBr) salt solution into the recirculating water to effectively mix the NaBr into the water. The initial maximum concentration of bromide ion (Br^-) in the recirculating waster was approximately 170 milligrams per liter (mg/L), and this concentration reduced as groundwater flowed through the piezometer. An ion-specific electrode placed in the middle of the test interval within the piezometer was used to collect real time bromide concentrations, which were calibrated against analytical results from groundwater samples collected at regular time intervals. These data were used to calculate the rate of dilution of bromide tracer during the test, which was in turn used to calculate the ambient groundwater flow velocity through the piezometer in the test interval. The ambient flow through the piezometer was in turn used to infer the steady-state groundwater seepage velocity and Darcy velocity through the water-bearing formation surrounding the piezometer screen (Hall, 1993; Halevy et al., 1967).

4.2.3 Results

The steady-state groundwater seepage velocity was estimated to be 0.76 foot per day (ft/day) based on the probe measurements and 0.78 ft/day based on the laboratory analytical results. The corresponding calculated Darcy velocity at PZ-01 was 0.15 ft/day based on probe measurements and 0.16 ft/day based on laboratory sample results. Table 3 summarizes the results of the calculated seepage velocity and calculated Darcy velocity.

As noted in Appendix B, the groundwater velocities calculated using the field probe and laboratory analytical results are similar to each other and relatively high for the type of sediments encountered in PZ-01 and the horizontal hydraulic gradient in the vicinity of the piezometer. Because PZ-01 is screened in the coarsest-grained soil encountered by the three piezometers, with similar EC readings to the borings within the PRB alignment, the groundwater velocity estimated by this test is an appropriate representation of the groundwater velocity that will enter the PRB in the coarser-grained, and therefore higher velocity, zones.

4.3 ZVI COLUMN STUDY

Amec Foster Wheeler retained SiREM Laboratory (SiREM), of Guelph, Ontario, Canada, to perform laboratory column tests to evaluate the treatment efficacy and potential longevity of two available ZVI products for treatment of the site groundwater. The bench-scale column testing was conducted using impacted groundwater collected from the site. The results were used to estimate degradation rates (i.e. half-life) of PCE and its degradation products using different ZVI products and evaluate the effects of inorganic groundwater chemistry (such as mineral precipitation). The column testing was completed in accordance with the Work Plan and was also based on the guidance for the procedure by Interstate Technology Regulatory Council (ITRC; 2011).

Two commercially available ZVI products from separate manufacturers, Peerless Metal Powders & Abrasive (“Peerless”), of Detroit, Michigan, and Connelly-GPM, Inc., of Chicago, Illinois, were tested in order to compare the performance of the ZVI products and to evaluate if each would satisfy the design goals of the PRB. The general procedures and methods used, along with a summary of evaluation results, are provided below. A copy of SiREM’s *Treatability Study Report* is included in Appendix C and provides additional details and discussion regarding the column testing.

4.3.1 ZVI Column Testing Procedure

The testing apparatus consisted of a Plexiglas™ cylinder 1.64 feet in length, with an internal diameter of approximately 1.5 inch, and seven sampling ports positioned along the length of the cylinder. The ends were closed except for an inlet port at one end and an outlet port at the other end. Two columns were packed with 100% ZVI, one from each ZVI manufacturer. The ZVI was compacted into the columns by placing multiple lifts of ZVI and compacting each one with a Teflon rod. In addition to the two ZVI columns, a reference column containing 100% uniform, clean (no fines) sand was prepared to offer additional quality assurance/quality control. The control column of sand was only sampled from the influent and effluent.

The water used for the bench-scale testing was collected from the site monitoring well MW-01 during August 2014 when the concentrations of PCE and TCE in groundwater were 150 micrograms per liter (µg/L) and 1.9 µg/L, respectively. Approximately 17 gallons of water was collected from MW-01 following purging, using the same methodology used to collect groundwater samples during quarterly sampling (AMEC, 2015). The groundwater was collected into one-gallon containers, labeled, packaged in coolers, and shipped to SiREM under Amec Foster Wheeler Chain of Custody procedures. SiREM stored the groundwater at 4 degrees Celsius [ºC] until ready for use. Prior to and during the column test, the extracted groundwater was spiked a total of three times with additional PCE to achieve a concentration of approximately 2,000 µg/L, a 10-fold increase in the concentration, so that changes in chemistry during testing could more easily be detected. Spiked groundwater was pumped through each ZVI-filled cylinder in an up-flow configuration (i.e., the water would enter the vertical cylinder at the bottom and exit at the top) and at a constant rate to achieve the target flow velocity for each test. The test concluded after 64 pore volumes had been pumped through the columns.

Two quality control considerations were evaluated when reviewing the applicability of the SiREM *Treatability Study Report*. First, as noted in the method description in Appendix C, TCE was inadvertently included along with PCE in the third groundwater spike. Although the spike resulted in an increased TCE concentration at the endpoint sampling, the validity of the PCE half-life determination was not affected. The calculations of PCE half-life including and excluding the endpoint data values (shown in Table 7 of SiREM's *Treatability Study Report*) both resulted in an identical half-life of 2.7 hours, with similar coefficients of determination (r^2) for both calculations. Second, VOC concentrations measured by SiREM and a third-party laboratory analyzing confirmatory samples varied in their reported concentrations, with SiREM's results ranging from 13% to 40% higher than the third-party laboratory's results. SiREM reported that they have commonly found that samples sent to third-party laboratories experience losses of volatile during shipping and handling; therefore, the differing laboratory confirmation results do not affect the validity of the analyses performed by SiREM during the treatability study.

The sampling and analysis differed slightly from that proposed in the Work Plan, based on recommendations made by SiREM. These recommendations were based on extensive previous experience with ZVI column testing with a particular focus on sample volumes.

The modified sampling plan (shown on Table 2 of SiREM's *Treatability Study Report*) was as follows:

- Samples were collected and analyzed for selected VOCs (PCE, TCE, cis-1,2-DCE, and vinyl chloride), dissolved hydrocarbon gases (DHGs; ethene, ethane, and methane), oxidation-reduction potential (ORP), and pH analyses from the influent, each sampling port, and the effluent of each column. The samples were collected after approximately 6, 18, 31, 48, 57, and 64 pore volumes had passed through each column.
- Samples were collected and analyzed for major anions (chloride, nitrate-nitrogen, nitrite-nitrogen, phosphate and sulfate) were collected from the influent, each sampling port, and effluent of each column. The samples were collected after approximately 6, 48, and 64 pore volumes had passed through each column.
- Samples were collected and analyzed for cations (calcium, iron, magnesium, manganese, potassium, silicon, sodium, and strontium), anions, alkalinity, total and dissolved organic carbon (DOC/TOC), and total dissolved solids (TDS) from the influent at the beginning of testing and from the influent and effluent after approximately 64 pore volumes had passed through each column.

A description of the analytical methods used by SiREM and an external laboratory (ALS Environmental, of Waterloo, Ontario, Canada) for the above analyses is presented in the *Treatability Study Report* (Appendix C).

Because the pore volume of the entire column is approximately 250 milliliters (mL), collection of a 120 mL sample for analysis of VOCs by U.S. Environmental Protection Agency (U.S. EPA) Method 8260B, would adversely disturb the water in the column if collected rapidly, and collection of this sample volume at each sample port would significantly disrupt the column equilibrium. Therefore, the samples were collected from each port along the column, and from the effluent port using a glass syringe to remove approximately 4 mL of water from the column. Only one influent sample was collected from the influent reservoir at each round of sampling, because it is representative of influent to both columns.

Up to 1 mL of each sample was immediately transferred to a vial for GC/FID analysis of VOCs and DHGs. When major anions were also analyzed, 0.5 mL was transferred to an Eppendorf tube, which was frozen until analysis. The remaining volume of each sample was used to measure pH and ORP. Samples collected from the influent and effluent for analysis of cations, anions, alkalinity, DOC/TOC, and TDS (submitted to ALS Environmental) were collected into various containers with appropriate preservation methods. Samples were additionally collected from the influent and effluent after approximately 57 and 64 pore volumes and submitted to

ALS Environmental for VOC analysis by EPA Method 8260B. Table 6 of SiREM's *Treatability Study Report* presents a comparison of the GC/FID and EPA Method 8260B results for VOCs.

4.3.2 Column Test Results and ZVI Selection

The degradation rates for the target chemicals are reported in half-lives (a half-life is the time required for the concentration of the chemical to decrease by one-half). The half-life is incorporated into the design of the PRB so that the chemical in question remains within the PRB for a sufficiently long time to achieve the desired reduction in chemical concentrations. Based on the results of the ZVI column testing, the half-life for PCE in the ZVI from Connelly-GPM is 2.7 hours. The half-life for PCE in the ZVI from peerless is 3.9 hours. Based on these results, the ZVI from Connelly-GPM would require a shorter residence time in order to reduce PCE concentrations in groundwater.

The results from the column tests also provide information on the production of degradation products and, similarly, their calculated half-lives. Evaluation of the production of degradation products can be used to confirm that the PRB design is sufficient to treat the degradation products in addition to PCE. In general, there were little to no daughter products generated in either ZVI column. Importantly, there were no detections of vinyl chloride in the effluent from either ZVI column, with the exception of one isolated detection after 48 pore volumes had passed through the column of Peerless ZVI. No vinyl chloride was detected in any samples analyzed by ALS Environmental.

Analysis of inorganic groundwater chemistry provides important information about the type and magnitude of mineral precipitation. Based on the differences in inorganic water quality between the inlet and outlet of the testing apparatus, SiREM reported losses in dissolved concentrations of calcium, alkalinity, sulfate, silica and DOC/TOC, indicating that precipitation or adsorption of these minerals likely occurred. The SiREM report (Appendix C) concludes that these mineral losses will not substantially reduce the reactivity of the ZVI. Precipitation of carbonates, as well as silica and organic carbon films, was also identified by SiREM, and could negatively affect the long-term performance of the PRB. As a result, SiREM recommended an engineering factor of safety of 2 to 3 be applied, which is typical for PRB design.

5.0 SITE CONCEPTUAL MODEL UPDATE

The most recently updated site conceptual model (SCM) was presented in tabular format in the FS/CAP (AMEC, 2014a). The overall understanding of the site geology, hydrogeology, and contaminant distribution has not changed; however, the data from the PRB pre-design investigation were used to refine the SCM in the vicinity of the proposed PRB. The following sections present the SCM as it pertains to the corrective actions at the site.

5.1 GEOLOGY AND HYDROGEOLOGY

The understanding of the site geology has changed slightly based on the results of the PRB pre-design investigation. The subsurface materials were previously understood to consist primarily of finer-grained deposits (clays, sandy clays, silts, and sandy silts) with interbedded sand lenses from ground surface to approximately 20 feet bgs. These units were understood to be underlain by approximately 15 to 20 feet of lean clay (with varying amounts of sand, but with no documented coarse lenses). The results of the PRB pre-design investigation indicated that in the alignment of the proposed PRB (Figures 4 and 5), the interval of lean clay occurs deeper than previously expected and is only laterally extensive from approximately 28 to 30 feet bgs, but few, if any, sand lenses were noted. In contrast, north of the PRB, along the northern property boundary, the soil is primarily clay from the ground surface to approximately 30 feet bgs, and to the south of the PRB the soil is primarily clay from 20 to 30 feet bgs. The results from the PRB pre-design investigation confirm that beneath the layer of clay is an interval of clays interbedded with sand and/or gravel lenses (no significant coarse-grained units were encountered in the vicinity of the PRB shallower than approximately 30 feet bgs).

Groundwater at the site was previously understood to occur within discontinuous sand and/or gravel lenses that are a few inches to several feet thick, and also within the sandy clays that are present at similar depths. Based on the results of the PRB pre-design investigation, groundwater in the first water-bearing zone in the vicinity of proposed PRB occurs primarily in fine-grained units of silts and sandy silts; no significant sand or gravel lenses were noted in this area. Due to the fine-grained nature of the soil, no free water was observed in the first water-bearing zone in most borings in the vicinity of the PRB.

In summary, the investigation confirmed that groundwater (and chemical) movement primarily occurs in channel-like deposits of varying widths and thicknesses in a complex alluvial system, but these channel-like deposits are not generally coarse-grained in the first water-bearing zone. Review of publically available documents for nearby sites indicates that regional groundwater flow is to the southeast, but, as shown on the potentiometric surface maps (Figures 7 and 8) and as discussed above, in Section 4.1.3, groundwater flow through the site is generally to the east. There are also northerly and southerly components to the site groundwater flow, indicating that groundwater flow from north and south of the proposed PRB alignment converges in the vicinity of the proposed PRB alignment and to the east of it. Based on the potentiometric surface, it appears that the groundwater flow through the site in the first water-bearing zone is locally constrained to relatively coarser-grained silt and sandy silt channels that traverse the site.

Based on borehole dilution test data, the groundwater seepage velocity is approximately 0.78 ft/day in the area that the PRB is proposed. This groundwater seepage velocity is on the upper end of what would be expected based on the soil types encountered in the saturated zone at the site, and is considered a conservative value to be used in residence time calculations for groundwater passing through the proposed PRB. Therefore, the groundwater seepage velocity to be used in the PRB design will be conservatively based on 0.8 ft/day to represent the upper bound of the velocity that may be encountered along the PRB alignment.

5.2 NATURE AND EXTENT OF VOCS IN SOIL VAPOR

The understanding of the nature and extent of VOCs in soil vapor has not changed from that presented in the FS/CAP (AMEC, 2014a); our understanding of the contaminant distribution in this media is based on results from 2012 and prior.

As noted in the FS/CAP, soil vapor is impacted by PCE, TCE, and vinyl chloride at concentrations above their respective ESLs in the northern portion of the site (Table E-2, Soil Gas Screening Levels for Evaluation for Potential Vapor Intrusion; Regional Water Board, 2013), extending approximately 200 to 240 feet south from the northern property boundary (Figure 9). Additionally, benzene was detected in soil vapor at concentrations above the ESL in this portion of the site, likely related to fuel drippage from cars when the facility was a car dealership; and chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene have been detected in soil vapor in the vicinity of the former sump within former Building B (excavation of impacted soil was conducted in the vicinity of this sump in 2011, following soil vapor sample collection in 2010).

In the northwest corner of the site, elevated PCE concentrations in soil vapor are generally collocated with higher concentrations of PCE in groundwater (Figure 10), but this correlation does not hold in the northeast corner of the site. Instead, the spatial distribution of PCE in soil vapor appears to reflect the layout of the subsurface utilities at the site, indicating that higher permeability utility backfill and bedding may have provided a conduit for vapor transmission around the site. Additionally, the results for samples collected from the nested soil vapor probes at 4 and 8 feet bgs in the eastern portion of the site (i.e. SG-13, SG-14, SG-15 and SG-16, Figure 9) indicate significant attenuation between the 8-foot and 4-foot samples (up to an order of magnitude for PCE and two orders of magnitude for TCE). Although these results confirm that volatilization from groundwater is a contributor to the VOC concentrations in soil vapor at the site, the lower VOC concentrations in soil vapor detected in the deeper samples from the east side of the site, as compared with the shallower samples from the west side the of the site, indicate that soil vapor concentrations at the west side of the site likely are primarily due to vapor migration through utilities corridors rather than volatilization from groundwater at greater depths. These lines of evidence indicate that shallow soil vapor transport may be largely via on-site subsurface utilities and that the utility lines within the nearby streets may provide a conduit for some of the vapors to enter the subsurface at the site.

The spatial distributions of PCE and TCE in shallow soil vapor (i.e., 1 to 4 feet bgs) are similar to each other (Figure 9), with the exception that only minimal TCE is present north and west of former Building A (Figure 2). In the vicinity of the on-site sewer line and along the eastern property boundary, TCE is present at elevated concentrations relative to PCE (and some vinyl chloride is present), suggesting that natural degradation of PCE is occurring in the unsaturated zone.

As noted in the FS/CAP, PCE was also detected in soil vapor along the floor drain lateral to the sewer line within Building B and in a vapor sample collected from within the former front-end alignment pit in Building B (this pit has since been removed), indicating that PCE may have been used within Building B and that minor releases may have contributed, in part, to the PCE detected in soil vapor beneath Building B. PCE was also detected at low concentrations in several soil samples collected from beneath Building B during the demolition oversight sampling in December 2014 and confirmation samples collected in February 2015 (Figure 2); the results will be documented in the *Post-Demolition Investigation and Remediation Report*. However, PCE is present at non-detectable to very low concentrations in groundwater in this area, suggesting that vapor transport along site utilities likely is a primary contributor to PCE in soil vapor beneath Building B.

Based on the interpretation provided above and the stable to declining VOC concentrations in groundwater, the footprint and concentrations of the soil vapor plume are not expected to increase. Instead, soil vapor concentrations are expected to decrease and plume footprint is expected to reduce following removal of the existing utilities (occurring in March 2015) and installation of protected new utilities, in accordance with the FS/CAP.

5.3 NATURE AND EXTENT OF VOCS IN GROUNDWATER

The understanding of the nature and extent of VOCs in groundwater has not changed significantly from that presented in the FS/CAP (AMEC, 2014a), but the results of the PRB pre-design evaluation have allowed for some refinement of the SCM.

Groundwater is impacted by PCE, TCE, and some degradation products at concentrations above ESLs in the northern portion of the site. Detectable concentrations of these VOCs extend approximately 260 feet south of the northern property boundary. The results of the PRB pre-design investigation indicate that the core of the plume at the western property boundary is similar to previous interpretations, with a narrow area of higher concentrations in plan view. Concentrations of PCE attenuate over a relatively short distance to the north and south of the plume core (Figures 4 and 10).

As indicated by the isoconcentration contours presented on Figure 10, the core of the plume is migrating to the east under the site. The plume distribution in plan view reflects the SCM for the site hydrogeology. Groundwater flow appears to be primarily in channel-like deposits of coarser-grained sediments of varying widths and thicknesses. The highest VOC concentrations in groundwater are in the vicinity of the bend in the potentiometric surface lines

(Figures 7 and 8), indicating that most of the contaminant mass flux is occurring in the area of coarser-grained sediments.

PCE impacts in groundwater were previously thought to extend vertically from approximately 10 to 20 feet bgs, based on the depth to groundwater and the presence of lean clay encountered at approximately 20 feet bgs in many site borings. Based on the results of the PRB pre-design investigation, the plume extends deeper than anticipated in the vicinity of the proposed PRB alignment, with elevated concentrations extending to near the top of a laterally continuous clay layer at approximately 28 feet. Consistent with the previous understanding, PCE and other VOC concentrations in groundwater attenuate rapidly beneath this clay layer, with no concentrations detected above groundwater ESLs for vapor intrusion concerns.

Concentration trend graphs including the recent groundwater monitoring data (Amec Foster Wheeler, 2015) are shown on Figure 11, and also include water level elevation trends at each well. The trend graphs confirm that concentrations of PCE are stable to decreasing in all monitoring wells, with the decreasing PCE concentrations generally correlating with decreasing water level elevations. While the trend graphs show some variability in VOC concentrations over time, VOC concentrations are not anticipated to significantly exceed the maximum observed concentration of 210 μg/L (of PCE).[3] Indications of biodegradation of PCE were originally observed at monitoring well MW-02 in the northeastern portion of the site; the concentration trend graphs also show increased degradation from PCE to TCE and other breakdown products in the vicinity of the proposed PRB and at other site monitoring wells.

Several VOCs (e.g., benzene, chlorobenzene, and 1,2-dichlorobenzene) have also been identified in groundwater in the vicinity of the former sump (Figure 2); however, these VOCs have not been detected at concentrations greater than their respective groundwater ESLs for vapor intrusion concerns (AMEC, 2012; Amec Foster Wheeler, 2015). Soil remediation was conducted in this area in October 2011 (AMEC, 2011) and in February 2015 (to be documented in a forthcoming report).

6.0 VAPOR MITIGATION SYSTEM DESIGN

Consistent with the conceptual design presented in the FS/CAP, the vapor mitigation system (VMS) consists of a vapor membrane and a passive sub-slab venting system that will be installed during construction of the foundations for the proposed new development, Dublin Apartments. The VMS will be installed beneath the two proposed retail/apartment buildings located near the northern portion of the property along Dublin Boulevard, and partially beneath the apartments surrounding the recreational courtyard (see Figure 3). The vapor membrane provides the primary mitigation measure for the VMS by creating a physical barrier that has an

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[3] Concentrations of PCE at 210 μg/L have been detected at temporary boring SB-34 on August 27, 2012, and at former monitoring well MW-01 on July 30, 2013.

extremely low permeability to soil vapor. Correct installation of a properly design vapor membrane would be sufficient to mitigate the risks of vapor intrusion to indoor air. As an added mitigation measure, the sub-slab air will be passively vented to limit the accumulation of soil vapors beneath the slab, reducing the concentration gradient across the vapor membrane and therefore further reducing the risk to indoor air. Performance monitoring also will be performed to verify that the VMS is functioning as designed (Section 11). The VMS is designed such that it could be converted to an active sub slab venting system in the future, with the addition of powered ventilators, if performance monitoring results indicate that the passive VMS is not performing as intended.

The VMS design consists of the following main elements:

- Approximately 45,000 square feet of a composite vapor mitigation membrane, consisting of a minimum 60 mil-thick, spray-applied membrane installed between two high density polyethylene layers, below the two retail buildings and part of the residential apartment building.
- Sub-slab vapor collection piping within a permeable base layer beneath the membrane, which will be passively vented through a total of 15 wind turbine-equipped vents located above the corresponding rooflines.

The general extents and layout of the VMS system are shown on Figures 12 and 13. Detailed design drawings to support the VMS construction are included in Appendix E. Development of the VMS system design is discussed in the following sections.

6.1 KEY DESIGN PARAMETERS

The following key parameters were used for the design of the vapor mitigation membrane and the vapor collection system:

- Types of soil vapor contaminants and concentrations.
- Commercially available vapor mitigation systems (membranes and/or venting) and their expected performance.
- Current extent of groundwater and soil vapor plumes.
- Proposed building foundation design.
- Building footprint area.
- Collection piping head losses.
- Wind-turbine fan manufacturer specifications.
- Regulatory permitting.
- Regulatory advisories; the VMS will be installed in general accordance with the recommendations outlined in the *Vapor Intrusion Mitigation Advisory* published by the California Department of Toxic Substances Control (DTSC, 2011a).

6.2 VAPOR MITIGATION MEMBRANE DESIGN

The following sections describe the selection of the vapor membrane and determination of the extent of the membrane installation on proposed buildings.

6.2.1 Vapor Mitigation Membrane Selection

As described in Section 5, VOCs, primarily PCE and TCE, have been detected in groundwater and soil vapor in the northern portion of the north parcel. Available commercial systems to mitigate VOC vapor intrusion range from high-density polyethylene (HDPE) sheeting, spray-applied asphaltic emulsions, to multi-layered systems (HDPE sheeting and asphaltic emulsion). All systems are designed for installation between the building floor slab and the supporting sand or gravel layer, and are installed as part of foundation construction.

Two commercially available VOC vapor mitigation membrane systems were evaluated as part of the FS/CAP (AMEC, 2014a): Liquid Boot®, manufactured by CETCO, and Geo-Seal®, manufactured by Land Science Technologies (LST), including an evaluation of the systems' VOC vapor intrusion efficacy and cost. The evaluation concluded that both systems offer adequate protection against vapor intrusion from vapor concentrations that are up to four orders of magnitude greater than those that have been detected in soil vapor at the site. The Geo-Seal system was recommended as the selected remedial alternative due to its use of HDPE for the base and protection layers, and overall equivalent cost compared to Liquid Boot. The selected Geo-Seal vapor mitigation membrane will be applied to a nominal dry thickness of 60 mils, which is the typical installation thickness for vapor intrusion applications and provides damage (i.e. puncture) resistance during installation and subsequent foundation installation (ITRC, 2007).

6.2.2 Vapor Mitigation Membrane Extents

The lateral extent of the vapor mitigation membrane installation was determined based on the footprint of the proposed buildings, distribution of soil vapor concentrations, extent of the PCE and TCE in groundwater, and building foundation construction.

The proposed vapor mitigation membrane will be installed under structures designated for retail and/or residential occupancy where historical soil vapor concentrations were greater than their respective ESLs (Table E-2, Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion; Regional Water Board, 2013). The vapor mitigation membrane will extend at least 100 feet beyond the area where detected soil vapor concentrations were greater than ESLs, to encompass the buffer zone recommended in the *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, 2011b). Vapor mitigation membranes will not be installed under open space areas (parking or recreational) or parking garage structures.

As shown on Figure 12, the vapor mitigation membrane will be installed beneath the two proposed buildings located at the north end of the site, designated as Building Retail 1 and Building Retail 2, as well as beneath Building D and beneath parts of Buildings A and C. The vapor mitigation membrane will extend south of Building C (and beneath Buildings A and C) to the foundation closing strips (i.e., tendon anchor foundation for post-tension slab). Because the closing strips will be poured separately from the rest of the foundation, they represent a distinct and identifiable termination for the soil vapor membrane installation. In addition, the location of the closing strips is outside the 100-foot lateral buffer zone (DTSC, 2011b). The areas where soil vapor concentrations exceed their respective ESLs and the extents of the vapor mitigation membrane are shown on Figure 12.

6.3 SUB-SLAB VENTING SYSTEM DESIGN

A passive sub-slab venting (SSV) system will be installed beneath the vapor mitigation membrane. In accordance with the objectives for the VMS, the SSV system is intended to be passive and long lasting, and to require minimal operations and maintenance activities. The SSV system consists of a layer of permeable material, a series of horizontal vapor collection pipes installed within the permeable material layer, vent risers attached to the vapor collection pipes that run to the roof, and wind-driven turbine fans installed at the top of the vent risers.

The purpose of the SSV is to supplement the protection provided by the vapor mitigation membrane by extracting soil vapor that may accumulate in the permeable material layer installed beneath the vapor mitigation membrane. The SSV system passively extracts accumulated soil vapors and vents the extracted soil vapors to atmosphere. A description of the selected flow rate for the SSV system and a description of each component are presented below.

6.3.1 Maximum Allowable Design Flow Rate

SSV systems generally do not require abatement for the vapors being vented to the atmosphere due the relatively low concentrations and flow rates and, therefore, low mass loading. Furthermore, passive venting systems often operate at very low pressures such that addition of abatement equipment can have a significant effect on the system’s venting performance. Regulatory requirements set forth by the Bay Area Air Quality Management District (BAAQMD) exempt passive soil vapor extraction operations with operations with total emission of less than 1 pound per day of benzene, vinyl chloride, PCE, methylene chloride, and/or TCE per BAAQMD Regulation 8, Rule,47, Section 8-47-113 (BAAQMD, 2005). Therefore, to maintain the intent of the VMS objectives of a passive system that requires minimal maintenance, the VMS will be designed to operate below the threshold requiring abatement. The methodology used to estimate the maximum allowable design flow rate is described below.

The maximum allowable design flow rate for the SSV system was determined based on the historical soil vapor concentrations from samples collected within the footprints of the future buildings. The following soil vapor samples (AMEC, 2012) and their average detected concentrations of VOCs were used to calculate the maximum allowable flow rate per vent to meet BAAQMD 8-47-113 exemption:

Area	Selected Soil Vapor Samples Within Building Footprint	Average[1,2] Concentration of Detected VOC (µg/m^3)
Building Retail 1/ Building E	SV-23 and SV-24	5,950—PCE 4,755—TCE 258—VC
Building Retail 2/ Building F	SV-13 and SV-14	4,045—PCE 10,150—TCE 500—VC
Residential (Building D, Building A [Partial], Building C [Partial])	SG-04 through SG-06, SG-07, SV-08, SV-10, and SV-21	385—PCE 836—TCE 22—VC

Notes

1. The arithmetic average, which is the sum of detected concentrations divided by the number of samples.
2. Average concentration calculations are presented in Appendix F.

Abbreviations

µg/m^3 = micrograms per cubic meter
PCE – tetrachloroethene
TCE – trichloroethene
VC = vinyl chloride

Based on these soil vapor concentrations, the maximum allowable flow rate calculated for each vent is 82 cubic feet per minute (ft^3/min) or a total of 1,230 ft^3/min through all 15 vents to remain under the 1 pound per day emission limit per BAAQMD Regulation 8, Rule 47, Section 8-47-11. The maximum allowable vent flow rate calculation is presented in Appendix F.

The use of average soil vapor concentrations for each area, as opposed to the maximum detected soil vapor concentrations to estimate the maximum flow rate through the vents is representative of expected sub slab soil vapor concentrations and is conservative based on the following: 1) contaminant concentrations are expected to attenuate as soil vapor travels from subgrade soils to the sub-slab soil vapor collection system; 2) soil vapor concentrations are expected to diminish due to mixing with cleaner air during extraction by the sub-slab soil vapor collection system; 3) concentrations of the COCs in groundwater are stable and are expected to decline following installation of the PRB; and 4) future in-place soil vapor concentrations are expected to be lower following the recently completed remedial excavations, recent removal of utility trenches that could create preferential pathways, and as future grading operations during site redevelopment disturb shallow subgrade soils. In addition, potential ingress of soil vapors from outside the building footprints through utility corridors will be mitigated by incorporating impermeable collars around utilities where they meet future building foundations, in accordance with DTSC guidance for new construction (DTSC, 2011a).

6.3.2 Permeable Base

The permeable base layer will consist of a minimum of 4 inches of gravel or crushed rock placed continuously beneath each foundation included in the VMS. The base layer will meet the following specifications for gradation:

Sieve Size	Percentage Passing Sieve
1 inch	90–100
3/4 inch	30–100
1/2 inch	5–25
3/8 inch	0–6

The selected minimum thickness and material specifications for the permeable layer are in accordance with the recommendations made by Rockridge Geotechnical, the geotechnical engineer for the site redevelopment, for a capillary moisture break beneath the building foundations (Rockridge Geotechnical, 2014). The permeable base layer will be placed beneath building foundation slabs and the vapor mitigation membrane. The permeable base will provide a continuous, highly permeable zone that allows advective flow of soil vapor to the collection piping.

6.3.3 Vapor Collection Piping

The vapor collection piping will be Vapor-Vent™ HD by LST. The Vapor-Vent HD piping consists of highly perforated, oblong, low-profile HDPE piping wrapped with a nonwoven fabric. The Vapor-Vent HD was selected for the following reasons:

- The piping is part of the integrated VMS manufactured by LST.
- The material quality control is increased when the membrane and collection piping are sourced from a single vendor.
- The construction quality assurance and quality control are improved, as the installation of the piping and membrane will be performed by a single certified LST installer.
- The low profile (1 inch) of the Vapor-Vent HD allows for installation within the 4 inches of permeable base layer with sufficient granular material cover above and below the pipe and without the need for additional trenching.
- The low- and flat-profile pipe provides a greater opening area per lineal foot of piping when compared to traditional, perforated/slotted round piping. Per manufacturer-provided product data, Vapor-Vent HD is capable of a flow rate of approximately three times that of slotted, 4-inch schedule (SCH) 40 polyvinyl chloride (PVC) pipe, with 0.125-inch slot openings (LST, 2015b; Johnson Screens, 2005).

The layout for the vapor collection piping was designed to maximize coverage and maintain spacing between vent piping runs well below the LST-recommended maximum spacing of 50 feet for a passive system (LST, 2015c). The maximum designed spacing between each of the vent pipes is 36 feet. The layout of the vapor collection piping is presented on Figure 13 and the spacing is presented on Drawing VMS-1A in Appendix E.

6.3.4 Vapor Collection Risers

The horizontal vapor collection piping will be connected to vertical vent risers. The oblong piping is designed to connect to round, 4-inch SCH 80 PVC using manufacturer-provided transition fittings. The vertical vent risers will penetrate the vapor mitigation membrane and foundation slab, and penetration through the membrane will be sealed in accordance with the manufacturers recommendations, as shown on the Construction Drawings. The 4-inch SCH 80 PVC pipe transitions to SCH 40 black steel pipe above the slab penetration which continues to the building roof. The exposed vent piping above the roof is galvanized steel.

The vent riser foundation penetration locations are adjacent to vertical structural columns for the retail buildings, and coincide with demising walls for the residential buildings. The vent risers in the retail buildings travel up the podium columns and are routed to the nearest demising wall in the second floor. All riser vent pipes travel up to the roof inside demising walls. The vents continue past the roof and terminate approximately 1 foot above the building parapet elevation. The vents are located and terminated with minimum clearances specified in Section 906.2 of the 2013 California Plumbing Code.

The selected 4-inch vent piping is capable of conveying in excess of 350 ft^3/min of air with minimal pressure drop (CRANE, 1980) and has more than sufficient capacity to convey the maximum allowable design flow rate for each vent of 82 ft^3/min. The use of steel for the main vertical stack follows material specifications from the City of Los Angeles, Department of Building and Safety, for the installation of methane mitigation vent risers in buildings (residential and commercial) greater than two stories (LADBS, 2006).

A single 4-inch vent is capable of servicing a vapor mitigation membrane that covers an area ranging from 4,000 square feet (ft^2) (NAVFAC, 2011, and Hatton, 2010) to 10,000 ft^2 (LST, 2012). Using the conservative 4,000 ft^2 recommended service area, the number of vents per area with a vapor mitigation membrane was determined as follows:

Area	Square Footage[1] (ft^2)	Service Area for a 4-inch Vent (ft^2)	Calculated Number of Vents	Selected Number of Vents
Building Retail 1/ Building E	6,648[2]	4,000	2	3
Building Retail 2/ Building F	11,244[2]	4,000	3	4
Residential (Building D, Building A [Partial], Building C [Partial])	27,000	4,000	7	8

Notes

1. Square footage of area with vapor mitigation membrane.
2. Footage per DBE Architecture, Drawing A0.3 for Allowable Area/Opening Calculations.

The advective air flow due to the stack pressure within the vent riser is calculated from the stack pressure (*Ps)* and the effective aerodynamic area of the ventilator fan (*F)* in the following equation (AS/NZS, 2000):

$$\boldsymbol{Qs} = \boldsymbol{F}\, X \left(\frac{\boldsymbol{2Ps}}{\boldsymbol{\rho}}\right)^{\boldsymbol{1/2}}$$

where:

Qs = stack volume flow rate (m^3/s)
F = effective aerodynamic area of ventilator fan (m^2)
Ps = stack pressure (Pa)
ρ = air density at ambient temperature (kg/m^3)

The average minimum ambient temperature at the site was estimated from USA.com (USA.com, 2015) to be 50 degrees Fahrenheit (ºF) (10 ºC). Using this value, a sub-slab temperature of 55 ºF, a maximum stack height of 66 feet (the tallest building parapet elevation) and minimal wind, the average stack pressure–induced air flow is 51 ft^3/min (70.6 m^3/hr), less than the maximum allowable flow rate of 82 ft^3/min per vent. Under average ambient conditions of 59 ºF (USA.com, 2015), less pressure-induced flow will be generated because the temperature differential between the sub-slab and external ambient air is negative (the outdoor air is warmer than the sub-slab air). The majority of the vent flow will result from the siphoning effect of the wind-driven turbine fan installed at the top of the vent.

6.3.5 Wind-Driven Turbine Fans

A wind-driven turbine fan will be installed at the top of each riser vent to provide wind siphoning flow from the vent. The selected wind-driven turbine fan is a 13-inch (fan diameter), all aluminum, Hurricane Model H150 manufactured by Edmonds/CSR. The fan requires no power to operate.

The wind-siphoning flow rate is calculated by first determining the wind-siphoning pressure (*Pw)* and the effective aerodynamic area of the ventilator fan (*F)* then calculating the flow rate using the following equation (AS/NZS, 2000):

$$\boldsymbol{Qw} = \boldsymbol{F}\ X\ \left(\frac{\boldsymbol{2Pw}}{\boldsymbol{\rho}}\right)^{\boldsymbol{1/2}}$$

where:

Qw = wind volume flow rate (m^3/s)
F = effective aerodynamic area of ventilator fan (m^2)
Pw = wind siphoning pressure (Pa)
ρ = air density at ambient temperature (kg/m^3*)*

Based on average wind speeds of 16 miles per hour for the area (USA.com, 2015), the selected ventilator fan will pull 45 ft^3/min, below the maximum allowable flow rate of 82ft^3/min per vent.

The wind-siphoning flow rate is specific to the selected ventilator fan and calculated using manufacturer provided data for the throat area, flow coefficient (*Cf*) and discharge coefficient (*Cd*) for the selected fan. Only alternate ventilator fans with equivalent calculated performance are allowed as a substitution for the selected ventilator fan.

6.3.6 Vent Combined Effect Flow Rate and Emissions

During favorable conditions the flow rate out of the vent risers will be influenced by both stack pressure-induced flow and wind-siphoning. The combined effect of stack and wind siphoning pressure induced flow is calculated as follows (AS/NZS, 2000):

$$\boldsymbol{Qc} = \boldsymbol{F}\ X\ \left(\frac{\boldsymbol{2\sum Pc}}{\boldsymbol{\rho}}\right)^{\boldsymbol{1/2}}$$

where:

Qc= combined volume flow rate (m^3/s)
F= effective aerodynamic area of ventilator fan (m^2)
∑*Pc* = *Pw* + *Ps* (Pa)
ρ = air density at ambient temperature (kg/m^3*)*

Under the average minimum ambient temperature of 50 ºF (USA.com, 2015) and average wind speeds of 16 miles per hour for the area (USA.com, 2015), the combined flow rate is 68 ft^3/min, below the maximum allowable flow rate of 82 ft^3/min per vent. Under low and average ambient temperature and wind speed conditions, the calculated flow rate from each stack will range from 45 to 68 ft^3/min.

Based on the average VOC concentrations presented in Section 6.3.1 and the calculated flow rates, the total daily emissions are expected to vary from 0.54 lbs/day at 45 ft^3/min to 0.82 lbs/day at 68 ft^3/min. These flow rates, calculated under conservative conditions, indicate the total VOC emissions are expected to be less than the 1 pound per day and no abatement will be required. However, because the total calculated yearly emissions for vinyl chloride and TCE exceed their respective chronic trigger levels listed in BAAQMD Regulation 2, Rule 5, Section 2-5-110 (BAAQMD, 2005), the construction of the SSV system will require an Authority to Construct and subsequent Permit to Operate from the BAAQMD. The Permit to Operate will require a yearly renewal. If actual flow rates or concentrations are less than anticipated and result in calculated yearly emissions are below chronic trigger levels, BAAQMD may be petitioned to rescind the Permit to Operate requirement for the site. The vent flow rate and emission calculations for these combined conditions are presented in detail in Appendix F.

6.3.7 SSV System Layout

The layout of the soil vapor collection system maintains the maximum manufacturer-recommended spacing between piping of less than 50 feet and the maximum treatment area for each 4-inch vent of 4,000 ft^2. The layout is adapted to the foundation construction elements (e.g., footings, grade beams, etc.), the locations of demising walls, and the locations of proposed heating and ventilation equipment on the roof. The proposed system piping layout and the vent locations are presented on Figure 13 and the spacing is presented on Drawing VMS-01 in Appendix E.

The final locations of the roof vents may be modified during installation to maintain the minimum clearances and setback distances required by the 2013 California Plumbing Code between roof vents and other heating and ventilation equipment installed on the roof.

6.4 VMS IMPLEMENTATION CONSIDERATIONS

The VMS system will be installed as part of the construction of the buildings and in coordination with other building construction trades as necessary. As designed, the VMS system does not extend outside the building footprints; therefore, no private or public infrastructure improvements will be affected by the VMS system implementation.

6.4.1 VMS Membrane and Sub-Slab Piping Installation

The Geo-Seal membrane and sub-slab Vapor-Vent piping will be installed by a LST certified installer. Installation of the membrane and piping will follow LST-recommended installation and quality control procedures, the design drawings, and the construction specifications. In addition to the LST certification, the installer shall be licensed by the California Contractors State License Board as a general contractor.

The above-ground vent piping will be installed by a contractor licensed by the California Contractors State License Board (CA CSLB).

6.4.2 Project Phasing

The installation of the VMS will be coordinated with the overall site development activities and will be subject to regulatory and permit approvals as well as procurement lead times. Installation of the at-grade SSV system and vapor mitigation membrane will take place after final site grading activities have been conducted and coordinated with structural foundation work and completed prior to slab-on-grade installation. Completion of the above-ground vent risers will take place during vertical construction of the buildings and conducted in a manner similar to other plumbing piping installations for the buildings.

7.0 PRB DESIGN

Consistent with the conceptual design presented in the FS/CAP, the PRB will consist of a trench installed along the upgradient site boundary that will be backfilled with a mixture of granular ZVI and sand. Natural hydraulic gradients adjacent to and beneath the site will cause PCE-affected groundwater to flow through the PRB, where the relatively rapid abiotic reduction of chlorinated VOCs on the surface of ZVI particles is expected to reduce VOC concentrations to the mitigation objectives before groundwater exits the PRB. Performance monitoring wells will be installed within and upgradient of the PRB to verify hydraulic and treatment efficacy.

The PRB design consists of the following elements:

- A 2-foot-wide, 146-foot-long continuous trench that is backfilled with ZVI/sand treatment media located near the upgradient site boundary along Golden Gate Drive.
- The PRB will be installed to approximately 29 feet bgs, including a 1-foot key into an existing clay layer observed from approximately 28 to 30 feet bgs.
- The treatment media will be prepared in a 55%/45% ZVI/sand ratio by volume, creating an equivalent 1.1-foot-thick treatment zone of 100% ZVI.

The general layout of the PRB and associated monitoring network is shown on Figure 14. Detailed design drawings to support the PRB construction are included in Appendix G. Discussion of the development of these PRB components is provided in the following sections.

7.1 KEY DESIGN PARAMETERS

Primary design parameters analyzed in the development of the PRB design include alignment (location, length, and orientation), depth, wall thickness, and treatment media (type and composition). The criteria used to evaluate each of these parameters, along with the selected design for each element, are summarized in the following sections.

7.1.1 Alignment

The proposed alignment is depicted on Figure 14. In general, the PRB alignment is dictated by three factors: the location the highest PCE concentrations in groundwater near the western edge of the site; the predominant groundwater flow direction(s); and by stakeholder requirements regarding the PRB's location relative to the planned improvements near the PRB.

The primary objective of the PRB is to reduce concentrations of PCE and its degradation products entering the site to below levels that may contribute to a vapor intrusion concern. The PRB is conservatively designed to capture the currently mapped extents of PCE above 50 µg/L, which is below the mitigation objective of 63 µg/L (i.e., the ESL for groundwater for evaluation of potential vapor intrusion).

Figure 14 depicts the approximate lateral extents of PCE in groundwater, determined from the previous investigations, and the proposed 146-foot-long PRB alignment, which would capture the 50 µg/L isopleth. Figure 6 also illustrates that core of the plume is located within coarser-grained soils under the site. As discussed in Section 5, plume migration appears to be controlled by the presence of these coarser-grained soils.

The PRB will be installed generally perpendicular to the average groundwater flow direction to minimize the overall length required to capture the horizontal extents of the plume, and to conform to site constraints. Slight variations in groundwater flow direction will not affect the performance of the wall, as the flow path, and therefore the residence time, is increased as the flow angle moves beyond perpendicular.

The City requested that the PRB be installed within the future Golden Gate Drive right-of-way, aligned under the edge paved turn lane and concrete gutter to minimize potential conflicts with future utilities as well as to allow for access to the PRB if maintenance or repairs are required in the future. This requirement was used to determine the PRB location in the east-west direction.

7.1.2 Vertical Extents

The depth of the PRB was selected based on the vertical extents of the PCE plume and the depth of the underlying, lower-permeability clay layer that was identified from approximately 28 to 30 feet bgs. The installation depth must be sufficient to capture the plume extent and reduce the potential for underflow beneath the PRB by keying into lower-permeability soil.

Existing site characterization data indicates the vertical extent of the PCE plume extends to approximately 28 feet bgs (Figure 6), which generally coincides with the highest recently measured PCE concentrations and the presence of coarser-grained soils. To reduce the potential for underflow, the PRB will be keyed approximately 1 foot into the underlying clay layer; the total depth of the PRB will be approximately 29 feet bgs, with an average base elevation of approximately 312 feet relative to the National Geodetic Vertical Datum of 1929 (NGVD29).[4] The planned depth of the PRB relative to site soils is shown conceptually on Figure 6; refer to the Figure 14 and design drawings in Appendix G for additional layout and design details.

The top of the treatment media will extend approximately 2 feet above the historical high groundwater level of 329 feet to an elevation of 331 feet NGVD29.

The remainder of the trench section above the treatment media will be backfilled with controlled density fill (CDF)[5] material consisting of a single-sack cement/sand slurry. A geotextile filter fabric will be installed over the top of the treatment media to provide separation from treatment media while the CDF is placed.

7.1.3 PRB Thickness and Treatment Media Mix

Major design considerations used in determining the thickness of the PRB include the following:

- The mixture of chlorinated VOCs to be treated and their anticipated influent concentrations.
- Anticipated ZVI-mediated degradation rates (i.e., half-lives) for influent VOCs (corrected for site-specific groundwater temperature).
- Residence time of groundwater within the PRB (based on anticipated ambient groundwater velocities and porosity of the backfill).
- Constructability.
- The ability to monitor the effectiveness of the PRB.

The results of the ZVI column study (Section 4.3) and estimates of groundwater seepage velocity from the borehole dilution test (Section 4.2) were used in conjunction with the current site conceptual model (Section 5) to develop site-specific design parameters for the PRB. Of the VOCs detected in site groundwater, PCE is the primary driver for the PRB thickness design as it is generally found at higher concentrations than its degradation products (TCE, cis-1,2-DCE, and vinyl chloride), has a lower mitigation objective (PRB effluent concentration goal), and the slowest degradation rate in the presence of iron.

The theoretical PRB thickness was calculated based on the residence time required to reduce the concentration at the PRB effluent to the PCE mitigation objective, and the estimated groundwater seepage velocity within the PRB (ITRC, 2011). The required residence time, T was calculated using the pseudo first-order rate constant determined from column tests and the following equation from the ITRC *PRB: Technology Update* (ITRC, 2011):

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[4] Cross sections included in this report were developed based on survey data from site borings and monitoring wells, referenced to the North American Vertical Datum of 1988 (NAVD88). Elevations referenced to NAVD88 in the vicinity of the site are 2.7 feet higher than those referenced to NGVD29.

[5] CDF is also known as controlled low-strength material (CLSM) or single-sack cement/sand slurry.

$$T = \frac{1}{k_1} \ln\left(\frac{C_{Inf}}{C_{Eff}}\right)$$

where C_{Inf} is the influent concentration, C_{Eff} is the desired effluent concentration and k_1 is the adjusted PCE first-order degradation rate constant derived from the laboratory column study. The adjustment to the laboratory-determined first-order decay rate constant addresses the differences in degradation rates at the laboratory room temperature of 22 ºC and at the expected minimum field groundwater temperature of 16 ºC. This reduction to address lower expected ambient temperatures results in a 50% reduction from the laboratory-derived degradation rate, which in turn results in a 100% increase (i.e., doubling) of both the half-life and the required residence time. A conservative PCE concentration of 250 µg/L was used for C_{Inf}, as the maximum PCE concentration detected at the site was 210 µg/L (at SB-34 on August 27, 2012) along the western site boundary (AMEC, 2012b).[6] C_{Eff} is the treatment objective of 63 µg/L as established in Section 3.3. The adjusted rate constant $k_1$was determined as 3.08 day^{-1} (equivalent to a half-life of 5.4 hours), leading to a required field residence time T within the PRB of approximately 10.7 hours (approximately 0.45 days).

The theoretical PRB thickness was calculated using the groundwater seepage velocity estimate and the theoretical required residence time using the following equation from ITRC (2011)

$$L = V \cdot T$$

where *L* is the theoretical required thickness of PRB in feet, and *V* is the estimated groundwater seepage velocity in feet/day (Section 4.2). Based on the average groundwater seepage velocity of 0.77 feet/day calculated in Appendix B, a slightly more conservative value of 0.8 feet/day was selected for use in subsequent calculations. A comparison of the site-specific velocity with typical velocities for the type of sediment, and a discussion affirming its appropriateness for the PRB design, is also presented in Appendix B. The calculated required thickness is approximately 0.36 feet (approximately 4.3 inches). A factor of safety between 2 and 3 times the calculated thickness is typically applied to account for uncertainties in the groundwater flow and contaminant transport characteristics and to account for passivation of the ZVI over the life span of the PRB (ITRC, 2011). SiREM notes that the observed levels of carbonate alkalinity, carbonate mineral precipitation, and possible formation of silica or carbon solid phases over time, will together determine PRB longevity, with their impact proportional to groundwater velocity. The selected design thickness of a 1.1-foot-thick pure (100%) ZVI barrier represents a design safety factor of 3. This safety factor takes into account anticipated PCE concentrations, groundwater flow velocity, and passivation resulting from the formation of

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[6] PCE was also detected at 210 µg/L in a sample from former monitoring well MW-01 on July 30, 2013.

non-conducting precipitates on ZVI grains. Appendix H includes thickness design calculations for site VOCs.

Constructability of a PRB to approximately 29 feet bgs requires a minimum trench width of 2 feet to facilitate equipment access to the total design depth. Therefore, a 2-foot-thick PRB is proposed with a ZVI-to-sand ratio of 55%/45% by volume (equivalent to a 1.1-foot-thick barrier of pure ZVI). The addition of sand to complete the trench backfill has the benefit of increasing the total flow-through volume of the PRB, which may reduce the potential for permeability reduction due to precipitation of minerals over the life of the PRB. The 2-foot minimum thickness also allows for installation of wells directly within the PRB to monitor the performance, rather than downgradient, where VOC concentrations likely will be impacted by back diffusion of VOCs in site soils.

7.2 IMPLEMENTATION CONSIDERATIONS

While the PRB is part of the overall corrective action, the PRB may be constructed independently of the installation of the VMS system or of the apartment construction project. However, coordination with other building construction activities will be required.

7.2.1 Project Phasing

The installation of the PRB will be coordinated with the overall site development activities and will be subject to regulatory and permit approvals as well as procurement lead times. Assuming a reasonable timeline for regulatory and permit approvals, the PRB installation would ideally occur before earthwork for the building construction and public improvements along Golden Gate Drive begins.

8.0 VMS IMPLEMENTATION

The following sections describe the activities associated with the construction of the VMS, including preconstruction activities and installation.

8.1 PRECONSTRUCTION ACTIVITIES

No specific preconstruction activities are required for the installation of the VMS. Installation of the VMS will be conducted as part of the construction of the Dublin Apartments and coordinated with all construction trades accordingly.

8.1.1 Health, Safety and the Environment

No hazardous waste operation or other specialized safety training is required. Installation of the VMS will be conducted as part of the Dublin Apartments construction and performed under general construction health and safety procedures. The installation of the VMS will be conducted under the existing Stormwater Pollution Prevention Plan (SWPPP) for the development project (CB&G, 2014). No additional environmental control procedures are required for the installation of the VMS.

8.1.2 Regulatory Approvals, Permitting, and Notifications

The following approvals and permits are required for the installation of the VMS:

- ACDEH approval of this Design Report.
- City of Dublin grading and building permits issued as part of the construction of the Dublin Apartments.
- BAAQMD Authority to Construct and Subsequent Permit to Operate for the VMS.

Site grading and non-building construction activities may take place prior to final approval of the VMS by ACDEH and/or BAAQMD. However, installation of the SSV system will not proceed until approval from BAAQMD is obtained.

8.2 VMS INSTALLATION

The following sections describe the major activities required for the installation of the VMS.

8.2.1 Mobilization and Site Preparation

The selected certified installer for the Geo-Seal membrane and Vapor-Vent subsurface piping will mobilize to the site upon completion of grading activities and delineation of building foundations elements by others. Site preparation will include identification of appropriate locations for the final riser vent stub ups and developing a layout of the horizontal piping that is coordinated with other sub slab utility and foundation works. The final location of the vent riser slab penetrations shall coincide with the location of building demising walls and will be determined in coordination with the other relevant project disciplines, including the project architect and structural engineer.

8.2.2 Environmental Controls for Stormwater and Dust

The installation of the VMS will be conducted under general stormwater controls in the SWPPP prepared for the development project (CB&G, 2014). Minimal visible dust generation is expected during installation and grading of the permeable base layer. As necessary, general construction dust controls, including spraying/misting with water during grading, minimizing material drop height during placement, and protection of material stockpiles, will be implemented during installation of the VMS. No dust is expected to be generated during installation of the membrane and above-ground piping for the vent risers.

8.2.3 SSV Subsurface Piping Installation

Installation of the SSV subsurface piping will consist of placement of the permeable base layer, Vapor-Vent horizontal piping, and riser vent transitions and stub ups at proposed foundation slab penetration locations. The permeable base layer will be placed once the subgrade has been completed and the foundation extents have been established. A minimum 4-inch permeable base layer will be placed (in accordance with the structural design requirements) beneath the slab areas designated for membrane installation. The permeable material will be placed within the footprint of the future foundation, but will not extend beneath the any thickened slab edge or column foundation footing. Shallow trenches will be hand dug within the permeable base layer along the final Vapor-Vent horizontal piping layout. The horizontal collection piping will then be installed within the permeable base layer and covered with base material removed from the trenches with a minimum 1.5-inch-thick layer beneath and on top of the Vapor-Vent piping. Vapor-Vent horizontal piping lengths and spacing shall be as shown in the design drawings. The Vapor-Vent piping will transition to round piping prior to stubbing out at the selected foundation slab penetration. The round pipe will transition to vertical and will be terminated at a minimum elevation of 12 inches above the top of foundation slab. The stub out will be capped and remain so until vertical pipe installation can take place.

8.2.4 Vapor Mitigation Membrane Installation

The vapor mitigation membrane will be installed following installation of the SSV subsurface piping and prior to foundation slab construction. The Geo-Seal vapor mitigation membrane installation will consist of the installation of the separate base, core, and bond layers. The base layer will be installed on top of the permeable base layer. The base layer's minimum overlap between adjacent sheets and seam sealing of sheets will be per manufacturer recommendations. As necessary, the base layer will be cut to allow placement around utility penetrations, foundation reinforcement, and foundation perimeters and walls. Tears and/or punctures in the base layer shall be repaired prior to application of the core layer.

The core layer will be applied to the base layer using LST-recommended equipment and techniques for the installation of the spray-applied core layer. The core layer will be applied to a minimum dry thickness of 60 mils. The layer will be applied with smooth and consistent motion and with the layers sprayed such that they are overlapping. The core layer will require a curing period of 24 to 48 hours. Installation of the bond layer will not take place until all quality control testing and repairs to the core layer have been completed.

Upon completion of quality control testing (Section 10) of the core layer, the bond layer will be installed in the same manner as the base layer with similar overlaps and seam sealing procedures. Upon curing of the seam seals, foundation work can proceed.

Minor damage can be sustained by the bond layer without compromising the effectiveness of vapor mitigation membrane. However, any damage that penetrates the core layer will require repairs by a LST-certified installer.

8.2.5 SSV Riser Vent Piping Installation

The riser vent piping will be installed in conjunction with the vertical construction of the buildings. Installation of the vent risers will follow similar construction as other plumbing and mechanical installations for the buildings.

8.2.6 Waste Management

Waste material generated during the installation of the VMS system will be disposed as nonhazardous waste or recycled with other general construction debris.

8.2.7 Site Restoration, Project Closeout, and Demobilization

There are no specific site restoration activities associated with the VMS installation other than those required for the general construction of the buildings. The membrane and SSV piping contractor(s) will demobilize from the site after receiving approval by the owner and project engineer of the installed work. The aboveground SSV piping contractor will demobilize from the site upon completion of the vertical vent risers, which is expected to closely coincide with the completion of the vertical development of the buildings. As necessary, contractors may be required to return to the site to address deficiencies identified at startup/commissioning of the VMS.

General project closeout procedures will include owner and project engineer inspections and approvals of the installations. Closeout documents will include as-built markups of design drawings, documentation of installed materials and equipment, available operation and maintenance manuals, and written warranties (as applicable) for work and installed products.

8.2.8 Survey

As-built alignments of installed Vapor-Vent horizontal piping and locations of the vent riser slab penetrations shall be clearly marked on the design drawings or surveyed upon completion of their installation and prior to building foundation construction. Surveys will be conducted by a State of California–licensed surveyor in using the City of Dublin basis of survey benchmarks and NGVD29.

9.0 PRB IMPLEMENTATION

The following sections describe the activities associated with the construction of the PRB, including preconstruction activities and installation.

9.1 PRECONSTRUCTION ACTIVITIES

Preconstruction activities conducted prior to mobilization for PRB installation include Contractor selection of a qualified, experienced PRB subcontractor capable of performing the work.

The selected PRB subcontractor will complete and submit a work plan including the following for review by the owner and project engineer:

- A detailed description of the proposed approach and the means and methods to be used (including ZVI/sand treatment media preparation).
- Implementation schedule.

- Detailed staging layout and vehicle access plan describing the use of the site portion allotted for the PRB installation subcontractor.
- Material sources and specifications for all construction materials to be installed.
- Plans for construction quality assurance plan implementation and testing.
- A Health and Safety Plan.
- HAZWOPER and medical clearance documentation for all on-site staff.

9.1.1 Health Safety and the Environment

The PRB subcontractor will develop and implement a Health and Safety Plan (HASP) in accordance with the PRB specifications (Appendix G-2) specifically addressing all activities included within the PRB construction scope of work. The PRB subcontractor HASP will supplement the Contractor's Site Specific HASP. The PRB subcontractor will appoint an on-site health and safety representative responsible for both supervising and enforcing the HASP during PRB construction and coordinating with the Contractor. All personnel within the PRB work zone will be required to have current OSHA HAZWOPER training and medical clearance documentation.

9.1.2 Permitting

The PRB installation contractor must comply with all applicable federal, state, and local laws and regulations. The PRB contractor will be responsible for obtaining required permits from the agencies with jurisdiction over the PRB installation. Permits required for PRB construction include the following; other permits may be identified as being required during the permit application review:

- Building permit, City of Dublin.
- Encroachment and/or traffic control permits, City of Dublin.
- Well drilling permits, Zone 7 Water Agency.

The PRB contractor will coordinate with the Contractor to ensure that the permits obtained for the PRB installation scope of work are consistent with all other permits obtained for the site. The PRB contractor will be responsible for complying with all conditions required by their permits, including but not limited to construction noise ordinances, inspection scheduling, and maintaining on-site records and documentation.

9.2 PRB INSTALLATION

The following sections describe the major activities required for the installation of the PRB.

9.2.1 Mobilization and Site Preparation

The PRB subcontractor will coordinate closely with the Contractor to evaluate the progress made in the site demolition and rough grading tasks, and their impact on PRB installation. The

PRB subcontractor will confirm approval of all submittals prior to mobilization, including the staging layout plan, or receive Contractor approval to mobilize while approval is pending.

The PRB subcontractor will contact Underground Services Alert (USA) North (811; 800-227-2600) at least 2 business days prior to beginning work. The USA notification will be kept current throughout PRB installation activities.

9.2.2 Environmental Controls for Stormwater and Dust

Environmental controls required for the PRB installation will be implemented in part by the Contractor and in part by the PRB subcontractor. Environmental controls applicable to the entire site are described in the SWPPP. Contractor-implemented, site-wide environmental controls are shown on the Erosion Controls Plan within the Rough Grading Plan drawing set (CB&G, 2014) and shown by reference on the PRB Design Drawings (Appendix G-1). The PRB subcontractor will review applicable Contractor-implemented environmental controls within the limits of work and confirm their proper implementation.

The PRB subcontractor will be responsible for determining the alignment of the perimeter fence bordering the limits of work, relocating the fence, and installing a silt fence along its base. The PRB subcontractor will be responsible for any additional permit-required environmental controls.

9.2.3 ZVI/Sand Treatment Media Preparation

The ZVI used in the PRB construction will be product ETI CC-1004 (-8 +50 mesh size) manufactured by Connelly GPM Inc. of Chicago, Illinois. Virgin sand with a particle size distribution similar to the ZVI, free of fines, deleterious materials, recycled materials and contamination will be sourced from a quarry. The ZVI and sand media (PRB Media) will be mixed on site in a 55% ZVI / 45% sand ratio by volume. Mixing of the ZVI and sand aggregates will be completed using a volumetric mixer or a pug mill. The PRB subcontractor will propose a method for mixing that is most applicable to their proposed installation approach.

9.2.4 PRB Excavation and Backfill

The owner and project engineer will determine the PRB installation and backfill method by evaluating the contractor-proposed approaches and cost estimates provided during the bidding process. Acceptable methods include bio-polymer slurry trench construction and single-pass trenching. The bio-polymer slurry approach is a common approach for PRB installation. While cost effective, this approach is slower and requires greater efforts to maintain site housekeeping. Single-pass trenching offers speed and cleanliness at a typically higher cost.

The PRB will be installed to 1 foot below the top of clay layer encountered at approximately 28 feet bgs. Backfill above the PRB to grade will consist of CDF. Three 8-inch-diameter cylindrical concrete forms (e.g., Sonotube™) will be installed by the PRB contractor along the centerline of the PRB to provide a conductor casing through the CDF, facilitating future well installations within the PRB. The Sonotube forms will be installed to a depth of approximately 10 feet bgs, corresponding with the interface between the CDF and the PRB treatment media.

Monitoring wells will be installed within the PRB utilizing these casings, as well as upgradient monitoring wells, by a California-licensed well installation subcontractor after site development activities, including the public works improvements (expansion and paving of Golden Gate Drive), have been completed. Refer to Section 11.2 for additional details regarding the performance monitoring well network.

9.2.5 Waste management

Wastes generated during the PRB construction will be primarily excavation spoils. The soil removed from the excavation will be placed on plastic sheeting prior to being transferred to a suitable on-site storage area. Stockpiles, if utilized, will be constructed on plastic sheeting and covered with plastic sheeting at the end of each work day. Alternatively, the soil may be placed into lined roll-off bins for temporary on-site storage, pending waste characterization and approval, or loaded directly onto trucks for transport to the approved disposal facility. If any excavated soils are saturated, they will be collected within lined roll-off bins.

Other waste generated during the construction of the PRB will include groundwater or contact water generated during trenching or collected from stockpiles. The water will be collected within totes, tanks, or other approved containers, characterized, and disposed of off-site at an approved disposal facility.

9.2.6 Site Restoration, Surveying, and Demobilization

The site will remain an active construction site after PRB installation completion. The PRB subcontractor will backfill the trench with CDF to match existing grade at time of PRB installation, or as otherwise directed by the Construction Manager. Each monitoring well conductor casing will be covered with a 3-foot-diameter, traffic-rated steel plate pending future well installation.

The PRB subcontractor is responsible for obtaining final permit approvals following construction. Prior to demobilization, the subcontractor will retain a licensed surveyor to document the boundaries of the PRB, locations of the monitoring wells conductor casings, and ground surface and top-of-casing elevations.

9.2.7 Project Close-out

The PRB subcontractor will submit a complete record of documentation to the Engineer that will include the following items:

- Permit and permit drawings indicating final approval/sign-off.
- As-built reports/drawings.
- The total volume of ZVI, sand, and CDF installed.
- Copies of all waste disposal records, including bills of lading or manifests.

10.0 QUALITY ASSURANCE/QUALITY CONTROL

Specific quality assurance and quality control (QA/QC) measures for the installation of the VMS and PRB are included in the installation-specific Construction Quality Assurance (CQA) Plans presented in Appendix I. For both the VMS and PRB construction, the respective subcontractors will be required to submit a Construction Quality Control (CQC) Plan that will specify how they intend to meet the quality control requirements of the project as required by the relevant CQA Plan and the project specifications. Collectively, the CQA Plans and CQC Plans comprise the overall construction quality management program. The following subsections provide a general overview of the QA/QC requirements for both the VMS and PRB installations.

10.1 CONSTRUCTION QUALITY ASSURANCE COORDINATION

The CQA Plans provide definitions of the roles and responsibilities for the team, materials and procedures to be used during construction and assures the applicable regulatory agencies that construction materials will be tested, installed and monitored as specified by the Drawings and Specifications, accepted civil engineering practices, and applicable CQA requirements. A designated CQA Manager will oversee the tasks detailed in the CQA Plans. The roles and responsibilities for various parties are defined in each CQA Plan and an organizational chart depicting the various roles is included as part of each CQA Plan.

At a minimum, the CQA coordination will include a preconstruction meeting between the owner, project engineer, construction quality manager (CQM), and selected subcontractors for the installation of the VMS and PRB. Equipment or material suppliers may also attend the preconstruction meeting. These preconstruction meetings will serve to introduce all parties and establish the chain of command and lines of communications for the project.

During the construction of the VMS and PRB, additional meetings will be held at regular intervals to assess construction progress, address variances to the design, and discuss any identified QA/QC issues and resolutions.

10.2 QUALITY CONTROL FOR VMS INSTALLATION

General quality control requirements for the VMS installation are described below.

10.2.1 VMS Materials Quality Control

The selected contractor will provide material data specifications to the owner and project engineer for approval prior to delivery to the site. All materials will be inspected initially upon arrival at the site and prior to installation. Any materials found to be deviating from the approved specifications will be replaced and damaged materials will be repaired or replaced as necessary. The Geo-Seal and Vapor-Vent materials will be sourced solely from the manufacturer, LST.

10.2.2 VMS Construction Quality Control

Construction of the subsurface Vapor-Vent piping and Geo-Seal membrane will be a certified LST installer. The installer shall provide current certification document(s) issued by LST indicating that the installer meets and complies with the manufacturer’s QA requirements for the installation of its products. In addition, the contractor shall possess a current contractor license issued by the CA CSLB.

Construction quality control for the Geo-Seal membrane will include at a minimum smoke testing to demonstrate integrity of the applied membrane and selected coupon testing of installed membrane samples to verify applied membrane thickness.

Regularly scheduled inspections will be performed by the CQM during construction of the VMS to verify conformance with design drawings and specifications. The locations of foundation penetrations will be coordinated with the architect and structural engineer. Prior to completion of the vent risers at roof levels, the vent setback and clearance will be verified for conformance with the California Plumbing Code requirements for roof vents and adjusted as necessary.

10.3 QUALITY CONTROL FOR PRB INSTALLATION

General quality control requirements for the PRB installation are described below.

10.3.1 PRB Backfill Materials Quality Control

Only the specific ZVI product specified (ETICC-1004 manufactured by Connelly GPM Inc. of Chicago, Illinois) will be accepted.

The selected PRB subcontractor will provide material data specifications for the ZVI, sand, and controlled density fill to the Construction Manager and CQA manager for approval prior to delivery to the site. All materials will be inspected initially upon arrival at the site and prior to installation. Any materials found to be deviating from the approved specifications will be replaced and non-specification materials will be repaired or replaced as necessary.

10.3.2 PRB installation Quality Control

The installation of the PRB will be performed by a qualified contractor with experience in PRB installation. The contractor shall possess a current contractor license issued by the CA CSLB.

The key PRB parameters that will be monitored during installation are the alignment, depth, and thickness.

10.3.2.1 Alignment

The PRB subcontractor will be required to survey the PRB alignment prior to installation, and the location will be maintained using offset survey markers. The PRB alignment will be marked off at 10-foot station intervals so that the CQA Manager can verify that the PRB installation is within the design alignment tolerance. The subcontractor shall stop PRB installation activities immediately if the CQA Manager observes a deviation of +/- 0.5 feet from the design alignment and respond as described in the CQA Plan.

10.3.2.2 Depth

The QC approach for determining installation depth during construction will depend on the installation method used by the selected contractor.

If a bio-polymer slurry is used, a string and weight will be used to verify the installation depth. If a single-pass trencher is used, the PRB installation depth will be verified by monitoring the excavator boom height relative to a fixed survey benchmark or the ground surface. The CQA Manager will verify and document that the PRB installation at each 10-foot station is consistent with the design depth. The PRB subcontractor shall stop the installation activities immediately if the CQA Manager observes a deviation of +0.5/-0.1 feet from the design depth and respond as described in the CQA Plan.

10.3.2.3 Thickness

The actual width of the ZVI/sand mix installed within the PRB can only be measured directly at the surface. Indirect measures will be implemented to confirm that the minimum design thickness was successfully installed within the PRB trench. These measurements generally consist of tracking the volume of ZVI/sand mix installed over a given length of PRB at a given depth. The rate of ZVI/sand installed per design unit volume will be monitored continually during the PRB installation. The CQA Manager will monitor and record the weight of ZVI/sand mix that is used to backfill each 10-foot section of PRB trench. Each 10-foot section shall correlate with the stations established above. The CQA Manager will compare the estimated design tonnage of ZVI/sand mix for each 10-foot section to the actual ZVI/sand volume installed and calculate the estimated installed PRB width. The PRB subcontractor will be required to stop PRB installation activities immediately if the CQA Manager observes a deviation of +0.5/-0.0 feet from the design width and respond as described in the CQA Plan.

10.3.2.4 ZVI/Sand Treatment Media

Conformance to ZVI and sand product specifications will assure that the material shipped to and received at the site for installation in the PRB will perform as designed. The ZVI/sand mix proportion will be monitored by determining the volume of each used in the mix and calculating the actual ratio. If the mix ratio is determined on a weight basis, the moisture content of the sand also will be tested and considered in determining the actual ZVI/sand ratio. Moisture content will serve as a volume control method because the product will be procured on a weight basis. This testing will ensure that the quantity of sand procured and delivered is sufficient to adequately fill the PRB as per design specifications. Further details are presented in the CQA Plan.

11.0 PERFORMANCE MONITORING, OPERATIONS, AND MAINTENANCE

Operations, maintenance, and monitoring (OMM) activities will support the objectives of the VMS and PRB design. The VMS and PRB constitute a long-term, passive approach to remediating and mitigating risks to indoor air. Routine operations and maintenance activities are generally not required. Non-routine maintenance activities may be required if unexpected maintenance needs are observed during routine performance monitoring. Monitoring of both the VMS and PRB will be conducted to verify that each is functioning as intended.

A Performance Monitoring phase will occur during the first year following implementation to verify that each mitigation measure is functioning as intended. After the Performance Monitoring phase, the VMS and PRB will each progress to a routine Operations and Monitoring (O&M) phase for years two through five. However, the performance monitoring period is subject to ACDEH approval and the transition to the O&M phase may occur later in the initial five year monitoring period.

Following installation of the VMS and PRB, the owner will retain the services of one or more subcontractors to perform the performance monitoring, operations, and maintenance. Multiple personnel will be involved in the OMM of the PRB and VMS; their functional roles are listed within Section 1.2 of the respective OMM Plans, included in Appendix J and Appendix K. The names of assigned individuals, companies, and contact information will be kept updated within each OMM Plan to ensure that personnel are easily reachable when needed.

The Primary Operator (i.e., current entity responsible for operations of the VMS and/or PRB) will be responsible for performing site inspection, sampling, and data evaluation under the supervision of the OMM Manager. The PRB Primary Operator will recommend if the transition to the O&M phase is appropriate based upon the performance data collected, and seek approval from ACDEH.

Specific procedures for the monitoring and collection of samples to assess the performance of the VMS and PRB are presented in the respective OMM Plans included as Appendix J and Appendix K, respectively. The following sections summarize the general performance monitoring associated with the VMS and PRB.

11.1 VMS PERFORMANCE MONITORING

Performance monitoring will be conducted to confirm the efficacy of the installed VMS to mitigate intrusion of soil vapor into indoor air and demonstrate that VOC concentrations are below established ESLs for indoor air (Regional Water Board, 2013). The performance of the VMS will be evaluated by conducting vent riser and indoor air sampling as proposed in the FS/CAP (AMEC, 2014a). The Primary Operator will monitor the integrity of the vapor membrane by inspecting for and requesting notification regarding any building foundation modifications. Specific procedures for the monitoring and collection of samples are presented in the OMM Plan included as Appendix J.

11.1.1 Vent Riser Sampling

Vent riser performance monitoring will consist of collection of flow rate data and collection of samples of vented soil vapor from each installed riser. The flow rate data and vapor samples will be collected from pre-installed ports at roof level in each vent riser and concentrations may also be screened for total VOCs using a PID. The collected vented soil vapor sample will be sent for laboratory analysis for the presence of VOCs. Flow rate and vented soil vapor VOC concentrations will be used to calculate the emissions from each vent riser. Adjustments to the vent riser flow rate will be performed as necessary to maintain total combined emissions (aggregate of all vents) to less than 1 pound per day as required by BAAQMD regulations for unabated sources (BAAQMD, 2005).

The vent monitoring and sampling is currently scheduled to be conducted for a proposed 5 years at the following frequency:

- Performance Monitoring Phase - Monthly for year 1.
- O&M Phase - Quarterly for years 2 through 5.

The monitoring frequency may be revised in order to comply with monitoring requirements (if any) in the BAAQMD-issued permit to operate the SSV system. The owner will notify ACDEH of any proposed changes to the monitoring or sampling schedule. With ACDEH concurrence, monitoring during the O&M phase may be simplified to rely on PID readings rather than laboratory analyses if the results demonstrate steady or decreasing concentrations over time.

11.1.2 Indoor Air Sampling

Indoor air sampling will be conducted twice prior to building occupancy. The indoor air sampling will be conducted during two seasons; late summer/early autumn (as allowed by the construction schedule) and late winter/early spring. The air samples will be collected from typical vapor intrusion pathways, such as bathrooms, kitchens, and other identifiable potential points of entry. The integrated indoor air samples will be collected over a 24-hour period using laboratory-provided sampling equipment and analyzed for selected VOCs using U.S. EPA Method TO-15 (or the currently approved method at the time of sampling).

11.2 PRB PERFORMANCE MONITORING

Performance monitoring of the PRB will be conducted to confirm that the PRB is operating as designed (in terms of hydraulic and treatment performance), and to ensure that the PRB and associated monitoring wells remain undamaged. The performance monitoring will rely on above-ground observations and on a performance monitoring well network. Specifically, the performance of the PRB will be evaluated by monitoring and comparing groundwater quality and elevations in upgradient and in-barrier monitoring wells. Specific procedures for the monitoring and collection of samples are presented in the OMM Plan included as Appendix K.

11.2.1 Performance Monitoring and On-site Well Network

Following the installation of the PRB, six performance monitoring wells will be installed to create a performance monitoring network in accordance the OMM Plan (Appendix K). The performance monitoring well network will consist of new groundwater monitoring wells installed both within and upgradient of the PRB. Three in-barrier monitoring wells and three upgradient wells will be installed adjacent to each other to act as upgradient and in-barrier pairs. The proposed locations of the performance monitoring wells are shown on Figure 14.

As noted in the August 27, 2014 *Revised Additional Investigation and Soil Removal Work Plan* (Revised Work Plan; AMEC, 2014c), five replacement groundwater monitoring wells will be installed on site (i.e., downgradient of the PRB) to replace monitoring wells that were destroyed in December 2014 and resume groundwater monitoring following completion of site redevelopment. However, these wells, located downgradient from the PRB, will not be considered PRB performance monitoring wells. The network of on-site monitoring wells will provide data regarding concentration trends within the plume core and site-wide groundwater elevations. The monitoring wells will be installed in the first water-bearing zone throughout the northern portion of the site in the area of the groundwater plume. The locations of the proposed groundwater monitoring wells are also shown on Figure 14.

Appendix L presents a work plan for installation of the performance monitoring and on-site wells.

11.2.2 Performance Monitoring and Analysis

The treatment performance monitoring activities will consist of sampling and analysis for VOCs and PRB performance related parameters. Passive, no purge sampling equipment and methods will be used to complete the PRB performance monitoring. The performance monitoring samples will be analyzed as follows:

- VOC sampling and analysis – Groundwater samples will be collected and analyzed for VOCs using U.S. EPA Method 8260B (or the currently approved method at the time of sampling).

- Other PRB performance-related sampling – Groundwater samples will also be collected and analyzed for alkalinity using U.S. EPA Method 310.2, sulfate using U.S. EPA Method 300.0, and ethane/ethene using U.S. EPA Method RSK 175.

The PRB's treatment performance will be evaluated by comparing upgradient monitoring well concentrations to the in-barrier monitoring well concentrations. The treatment objectives are considered met if the in-barrier concentrations are notably less than upgradient concentrations. While the in-barrier monitoring wells will be located approximately halfway through the 2-foot width of the PRB, treatment will not occur linearly within the PRB because the reductive dechlorination reaction is a first-order (i.e., non-linear) reaction. However, expected PCE reductions at the in-barrier well locations are estimated to range from one-half to as low as one-tenth of the influent concentration (e.g., approximately 125 µg/L to 25 µg/L to assuming an influent concentration of 250 µg/L. The effluent concentration at the full flow-through thickness of can be calculated based on the influent and mid-barrier concentrations. Concentration trends over time will be evaluated using Mann-Kendall methodology (or other analysis methodology, as agreed upon with ACDEH), a non-parametric statistical evaluation that uses the relative magnitudes of the data to evaluate the probability that a concentration trend (positive or negative) exists.

Hydraulic performance monitoring will consist of depth-to-groundwater (groundwater level) measurements collected using a water level meter during each sampling event to allow for calculation of groundwater elevations. Groundwater elevations will be calculated to compare upgradient and in-barrier elevations to verify that groundwater is continuing to flow through the PRB.

The PRB performance monitoring is currently scheduled to be conducted for a proposed 5 year period with the following frequency:

- Performance Monitoring Phase - Quarterly for years 1 and 2.
- O&M Phase - Annually for years 3 through 5.

Appendix K presents an OMM Plan with detailed descriptions of PRB performance monitoring tasks.

12.0 SCHEDULE AND REPORTING

A description of the documentation and reporting of the PRB and VMS installations and a preliminary schedule are provided in the following sections.

12.1 DOCUMENTATION AND REPORTING

Following installation of the VMS and PRB, the Contractor will prepare and submit a construction completion report to Amec Foster Wheeler for review and approval. Upon Amec Foster Wheeler concurrence with the completion report findings and observations made during construction, the CQA manager and Design Engineer will prepare a certification that the completed project conforms to the Construction Documents, including the Design Drawings, Specifications, and CQA Plans.

Following certification, performance monitoring activities will commence for the PRB and VMS. Monitoring and inspection activities will be documented on the VMS and PRB Inspection Forms located in their respective OMM Plans; Appendix J and Appendix K). The VMS and PRB Inspection Forms will be retained by the Primary Operator. The Primary Operator will provide copies of maintenance and monitoring records to be maintained on site by the Property Owner’s Site Manager. Discussion of specific roles related to the VMS and PRB OMM are described in the OMM Plan.

Following completion of each site inspection and monitoring event, including the initial performance monitoring, the Primary Operator will provide ACDEH with a monitoring report. The monitoring report will document site inspections, address corrective actions, and provide evaluations and recommendations as needed. Copies of the site inspection forms and laboratory reports will be attached to the monitoring report. The CQA manager and Primary Operator will prepare a certification that all IC objectives have been maintained during the reporting period. The submittals for the VMS and PRB may be coordinated and submitted together to simplify reporting. The initial data and subsequent data collected during the initial baseline monitoring period will be evaluated by the Primary Operator and discussed with ACDEH to finalize reporting requirements for the site’s OMM Phase.

Additional reporting requirements beyond routine reporting will apply when any site conditions out of compliance with IC restrictions are identified. Upon determining lack of compliance with IC restrictions, the Primary Operator will notify ACDEH with a written explanation that describes the nature of the specific, inconsistent action, and the efforts or measures that have been or will be taken to correct the action. The associated time frame to correct the inconsistent action will also be provided.

12.2 PRELIMINARY SCHEDULE

The anticipated schedule for the activities described in this Design Report is presented below. This schedule is approximate, and the actual dates will depend on the timing and acquisition of applicable permits, subcontractor availability, and field conditions.

- June 2015
    - Design Report provided to ACDEH.
    - ACDEH approval of Design Report.
- July 2015
    - Site grading and utilities.
    - Begin PRB installation.
- August 2015

    - Complete PRB installation.
- August/September 2015
    - VMS installation during building foundation work.
- Approximately 3 months after final completion of the PRB and VMS
    - PRB and VMS Construction Completion Report and Certification.

Performance monitoring activities for the PRB will commence upon installation of the PRB and in-barrier monitoring wells. Performance monitoring activities for the VMS, including indoor air sampling, will commence once the building envelope has been constructed. A schedule for these activities will be provided to ACDEH prior to implementation.

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TABLES

TABLE 1

GRAIN SIZE DISTRIBUTION ANALYSIS FOR SOIL SAMPLES[1]

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Location	Sample ID	% Sand	% Silt	% Clay	Soil Description
PRB-04	PRB-04-18.5	14.7	54.0	31.3	Dark Olive CLAY
	PRB-04-20.0	7.5	55.5	37.0	Dark Olive Gray CLAY
	PRB-04-25.0	9.1	54.4	36.5	Dark Olive Gray CLAY
	PRB-04-27.5	10.1	55.5	34.4	Dark Olive CLAY
PZ-02	PZ-02-16.0	6.6	58.8	34.6	Dark Olive CLAY
	PZ-02-18.0	20.5	51.2	28.3	Dark Olive Brown CLAY with Sand
	PZ-02-19.5	4.4	58.6	37.0	Dark Olive Brown CLAY

Note

1. Samples collected by Amec Foster Wheeler between August 18 and August 22, 2014, and analyzed by Cooper Testing Laboraory of Palo Alto, California, by ASTM Method D 422 (Sieve and Hydrometer).

Abbreviation

ASTM = American Society for Testing and Materials

TABLE 2

VOLATILE ORGANIC COMPOUNDS IN GRAB GROUNDWATER SAMPLES[1]

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Concentrations reported in micrograms per liter (µg/L)

Location	Sample ID	Sample Type	Date	Acetone	PCE	TCE	TPHg	All Other VOCs [2]
PRB-01HP	PRB-01HP-19.0	Primary	8/25/2014	<50	<0.50	<0.50	<50	ND
PRB-02HP	PRB-02HP-18.5	Primary	8/19/2014	<50	**39** [3]	<0.50	<50	ND
	PRB-02HP-23.0	Primary	8/19/2014	<50	**59**	<0.50	60 R	ND
	PRB-02HP-27.5	Primary	8/21/2014	<50	**58**	**2.8**	61 R	ND
	PRB-02HP-33.0	Primary	8/25/2014	<50	**2.3**	<0.50	<50	ND
PRB-03HP	PRB-03HP-18.0	Primary	8/19/2014	<50	**45**	<0.50	<50	ND
	PRB-03HP-24.0	Primary	8/19/2014	**74**	**3.3**	<0.50	<50	ND
	PRB-03HP-28.0	Primary	8/20/2014	<50	**110** [4]	**2.3**	110 R	ND
	PRB-03HP-34.0	Primary	8/25/2014	<50	**11**	**1.3**	<50	ND
	PRB-03HP-340.0	Duplicate	8/25/2014	<50	**12**	**1.3**	<50	ND
PRB-04HP	PRB-04HP-28.0	Primary	8/26/2014	<50	**91**	**2.1**	92 R	ND
	PRB-04HP-280.0	Duplicate	8/26/2014	<50	**74**	**1.9**	82 R	ND
P-01HP	P-01HP-19.0	Primary	8/20/2014	<50	**2.1**	<0.50	<50	ND
P-02HP	P-02HP-18.0	Primary	8/21/2014	**70**	**12**	**3.0**	<50	ND
	P-02HP-27.5	Primary	8/21/2014	<50	**40**	**1.9**	<50	ND
Environmental Screening Level (groundwater screening levels for potential vapor intrusion)[5]				**130,000,000**	**63**	**130**	**No value**	**--**

Notes

1. Samples were collected by Amec Foster Wheeler between August 19 and August 26, 2014, and analyzed for VOCs by TestAmerica Laboratories, Inc., of Pleasanton, California, using U.S. EPA Method 8260B.
2. Laboratory results for all other VOCs were reviewed for quality control purposes and were determined to be less than the method reporting limits, with all compound reporting limits below their respective screening levels.
3. Results shown in **bold** indicate a detection.
4. Results shown in **bold** and in a shaded cell exceed their respective Environmental Screening Levels.
5. California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table E-1, Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion, December. The selected screening value is for residential land use with a mix of fine and coarse materials in the subsurface.

Abbreviations

< = not detected at or above the laboratory reporting limit shown
µg/L = micrograms per liter
PCE = tetrachloroethene
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
TCE = trichloroethene
U.S. EPA = United States Environmental Protection Agency
VOCs = volatile organic compounds

TABLE 3

SUMMARY OF CALCULATED GROUNDWATER VELOCITIES

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Location	Screened Interval (feet bgs)	Seepage Velocity (feet/day)			Darcy Velocity (feet/day)		
		Field Probe	**Laboratory**	**Average**	**Field Probe**	**Laboratory**	**Average**
PZ-01	15.3 to 19.7	0.76	0.78	0.77	0.15	0.16	0.16

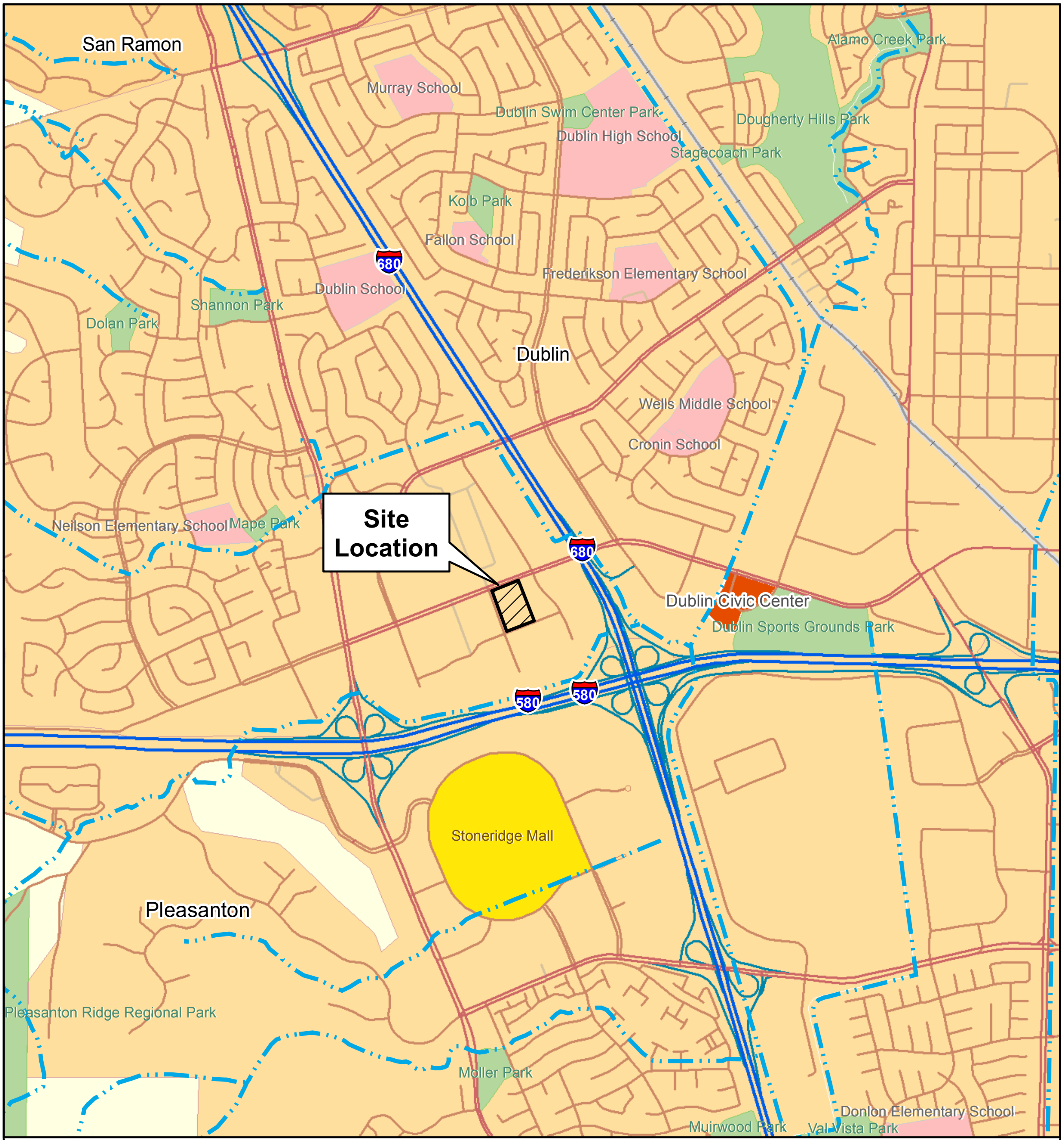
Note

1. The velocity values are based on calculations performed following a single-point borehole dilution test performed by Amec Foster Wheeler on October 31, 2014.

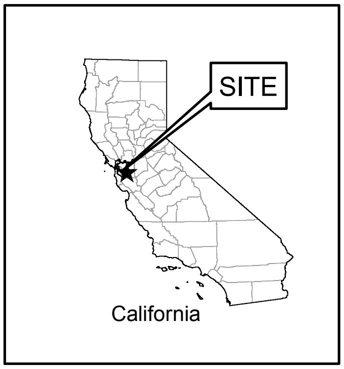
Abbreviation

bgs = below ground surface

FIGURES



Street map from ESRI, 2007.



0 2,000 4,000 Feet

N

SITE LOCATION MAP
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Figure
1

Date: 03/17/2015

Project No. OD14170800

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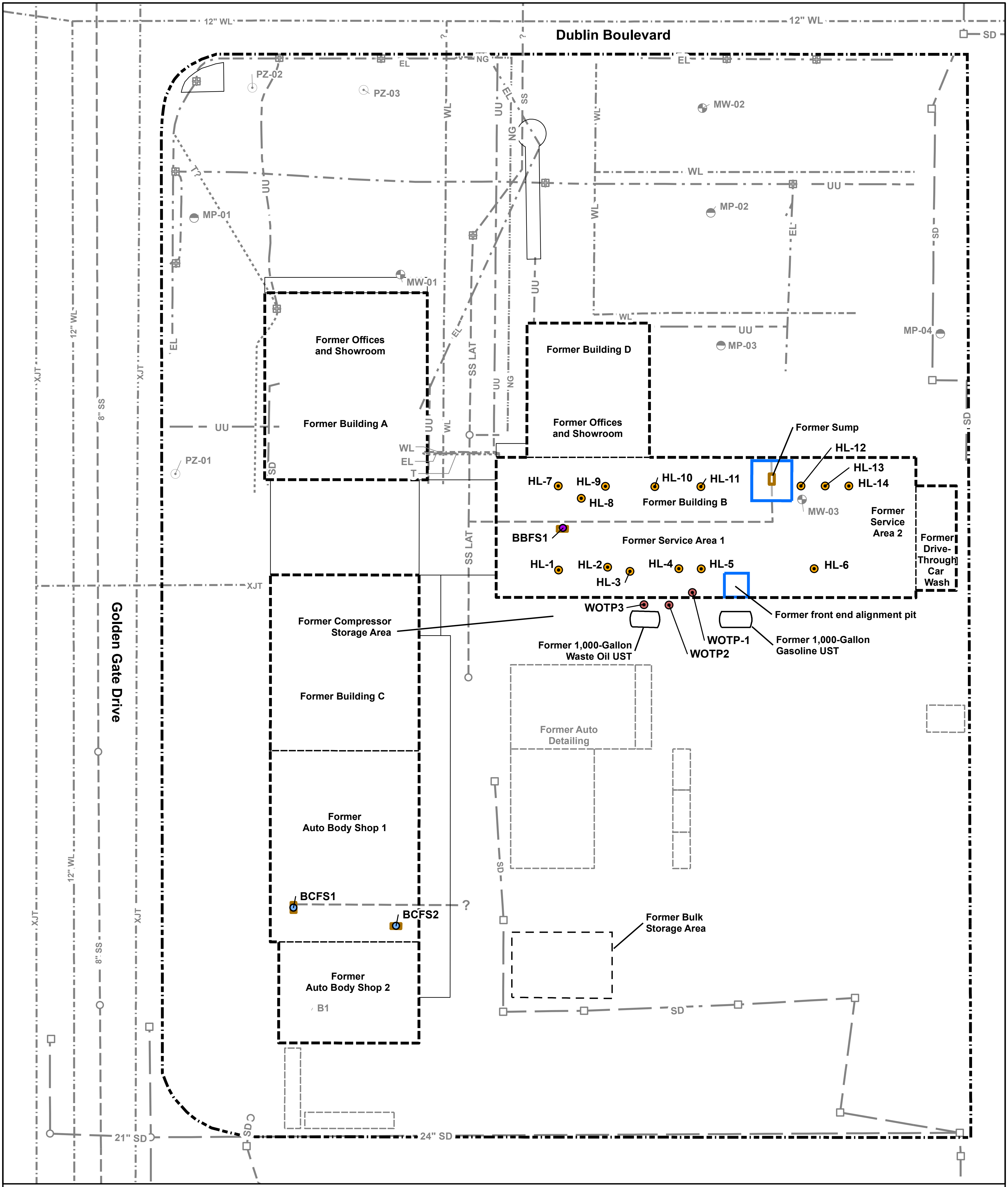
S:\OD14\170800\task_02\15_0205_PRB_BoD_fig_02.mxd



Explanation

● Building B former sump (BBFS) confirmation soil sample location
● Building C former sump (BCFS) confirmation soil sample location
● Waste oil tank pipe (WOTP) confirmation soil sample location
● Hydraulic lift (HL) confirmation soil sample location
⊙ Piezometer location (destroyed in December 2014)
◐ Shallow monitoring well location (destroyed in August or December 2014)
◒ Multi-port monitoring well (3-channel) location (destroyed in December 2014)
▭ Approximate excavation boundary (2011)
▭ Former building envelope (demolished December 2014)
— · — Approximate property line
— — Former drain line
▭ Approximate former sump location

□ Storm drain inlet
○ Manhole
⊞ Utility vault
— EL — Electric line
— NG — Natural gas line
— SS — Sanitary sewer line
— SS LAT — Sanitary sewer lateral line
— SD — Storm drain line
···· T ···· Telecommunications line
···· T? ···· Suspected telecommunications line
— UU — Undifferentiated utility line
— XJT — Joint trench
— WL — Water line

Abbreviation:
bgs = below ground surface
F.E. Pit or FEPIT = Front end alignment pit
UST = underground storage tank

Note:
Locations of utilities in north parking lot provided by NorCal Geophysical Consultants, Inc., in October 2012.
Locations of all other utilities provided by Carlson, Barbee, & Gibson, Inc., in July 2012 (locations are approximate).

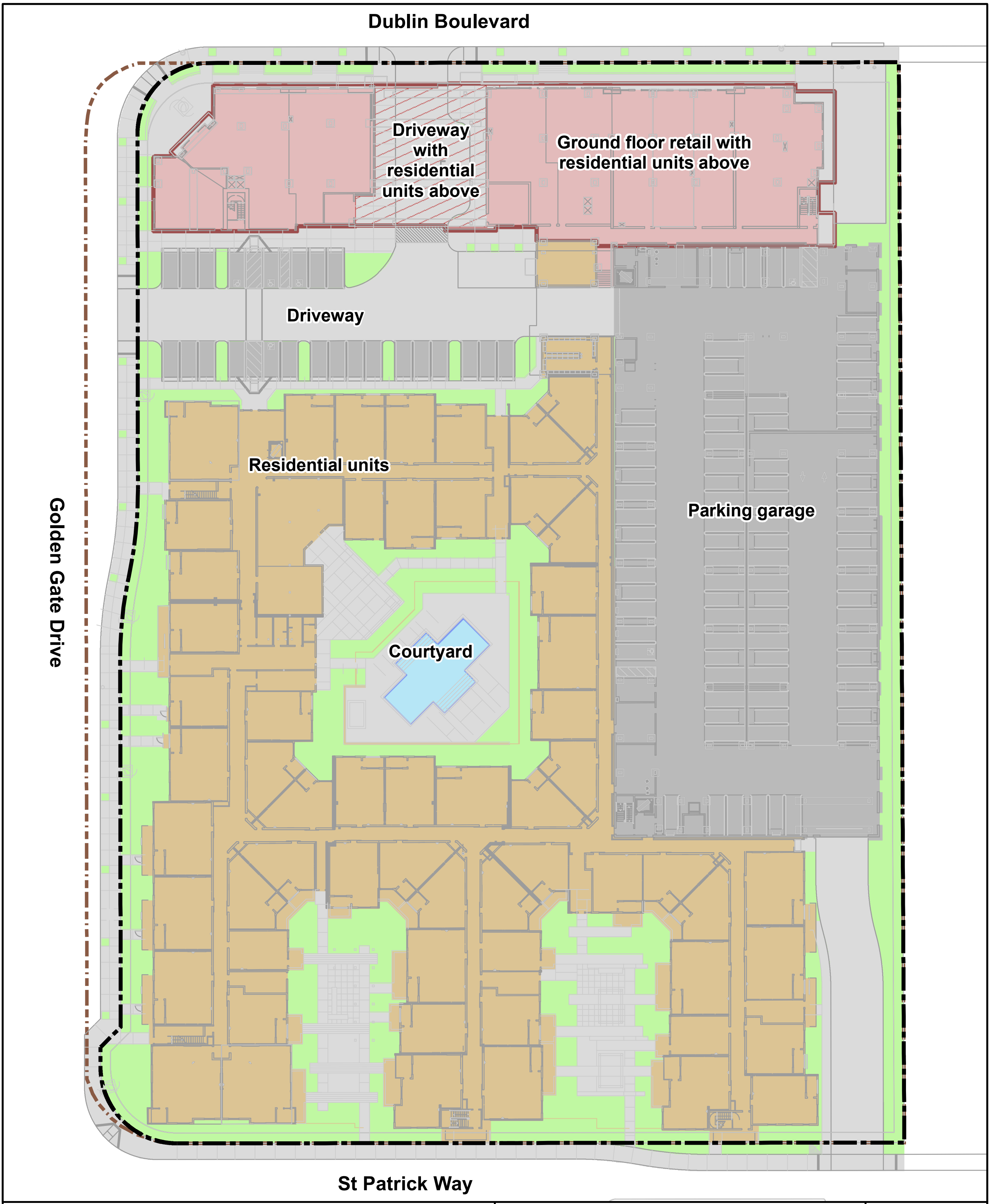
0 25 50
APPROXIMATE SCALE IN FEET

SITE PLAN WITH FORMER
BUILDINGS AND FEATURES
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Figure
2

Date: 03/18/2015
Project No. OD14170800



Explanation

Future property line

Existing property line

0 70

APPROXIMATE SCALE IN FEET

SITE PLAN WITH PLANNED
NEW CONSTRUCTION
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 03/19/2015

Project No. OD14170800

amec
foster
wheeler

Figure
3

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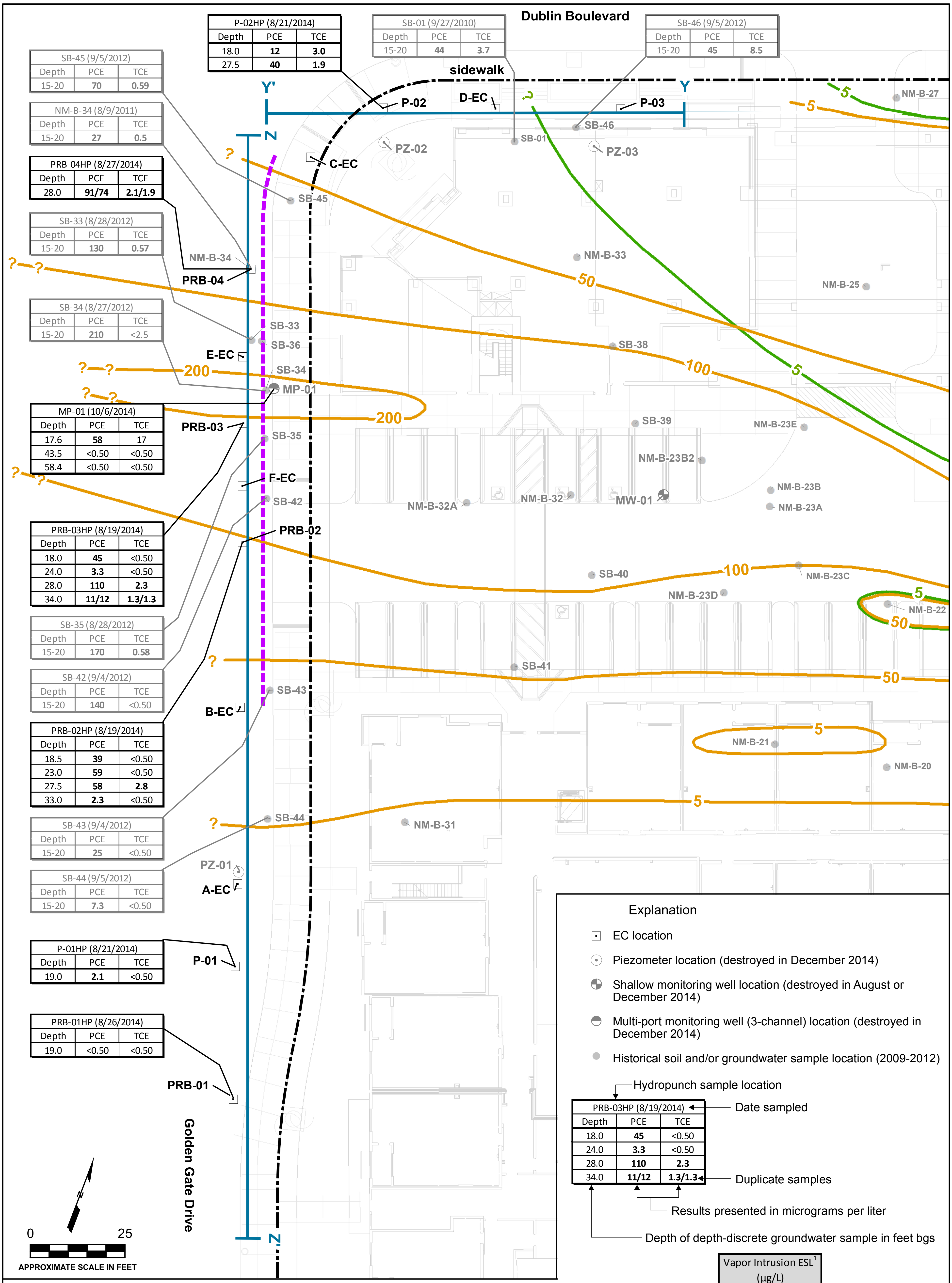


P-02HP (8/21/2014)		
Depth	PCE	TCE
18.0	**12**	**3.0**
27.5	**40**	**1.9**

SB-01 (9/27/2010)		
Depth	PCE	TCE
15-20	**44**	**3.7**

SB-46 (9/5/2012)		
Depth	PCE	TCE
15-20	**45**	**8.5**

SB-45 (9/5/2012)		
Depth	PCE	TCE
15-20	**70**	**0.59**

NM-B-34 (8/9/2011)		
Depth	PCE	TCE
15-20	**27**	**0.5**

PRB-04HP (8/27/2014)		
Depth	PCE	TCE
28.0	**91/74**	**2.1/1.9**

SB-33 (8/28/2012)		
Depth	PCE	TCE
15-20	**130**	**0.57**

SB-34 (8/27/2012)		
Depth	PCE	TCE
15-20	**210**	<2.5

MP-01 (10/6/2014)		
Depth	PCE	TCE
17.6	**58**	17
43.5	<0.50	<0.50
58.4	<0.50	<0.50

PRB-03HP (8/19/2014)		
Depth	PCE	TCE
18.0	**45**	<0.50
24.0	**3.3**	<0.50
28.0	**110**	**2.3**
34.0	**11/12**	**1.3/1.3**

SB-35 (8/28/2012)		
Depth	PCE	TCE
15-20	**170**	**0.58**

SB-42 (9/4/2012)		
Depth	PCE	TCE
15-20	**140**	<0.50

PRB-02HP (8/19/2014)		
Depth	PCE	TCE
18.5	**39**	<0.50
23.0	**59**	<0.50
27.5	**58**	**2.8**
33.0	**2.3**	<0.50

SB-43 (9/4/2012)		
Depth	PCE	TCE
15-20	**25**	<0.50

SB-44 (9/5/2012)		
Depth	PCE	TCE
15-20	**7.3**	<0.50

P-01HP (8/21/2014)		
Depth	PCE	TCE
19.0	**2.1**	<0.50

PRB-01HP (8/26/2014)		
Depth	PCE	TCE
19.0	<0.50	<0.50

Explanation

- ▫ EC location
- ○ Piezometer location (destroyed in December 2014)
- ◐ Shallow monitoring well location (destroyed in August or December 2014)
- ◓ Multi-port monitoring well (3-channel) location (destroyed in December 2014)
- ● Historical soil and/or groundwater sample location (2009-2012)

Hydropunch sample location

PRB-03HP (8/19/2014)		
Depth	PCE	TCE
18.0	**45**	<0.50
24.0	**3.3**	<0.50
28.0	**110**	**2.3**
34.0	**11/12**	**1.3/1.3**

Date sampled

Duplicate samples

Results presented in micrograms per liter

Depth of depth-discrete groundwater sample in feet bgs

Vapor Intrusion ESL[1] (µg/L)	
PCE	63
TCE	130

50 Approximate line of equal PCE concentration (2012)

50 Approximate line of equal TCE concentration (2012)

Z Z' Cross-section line

Proposed PRB

Approximate property line

Abbreviations:

bgs = below ground surface
ESL = Environmental Screening Level
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter
< = not detected at or above the laboratory reporting limit shown

Note:

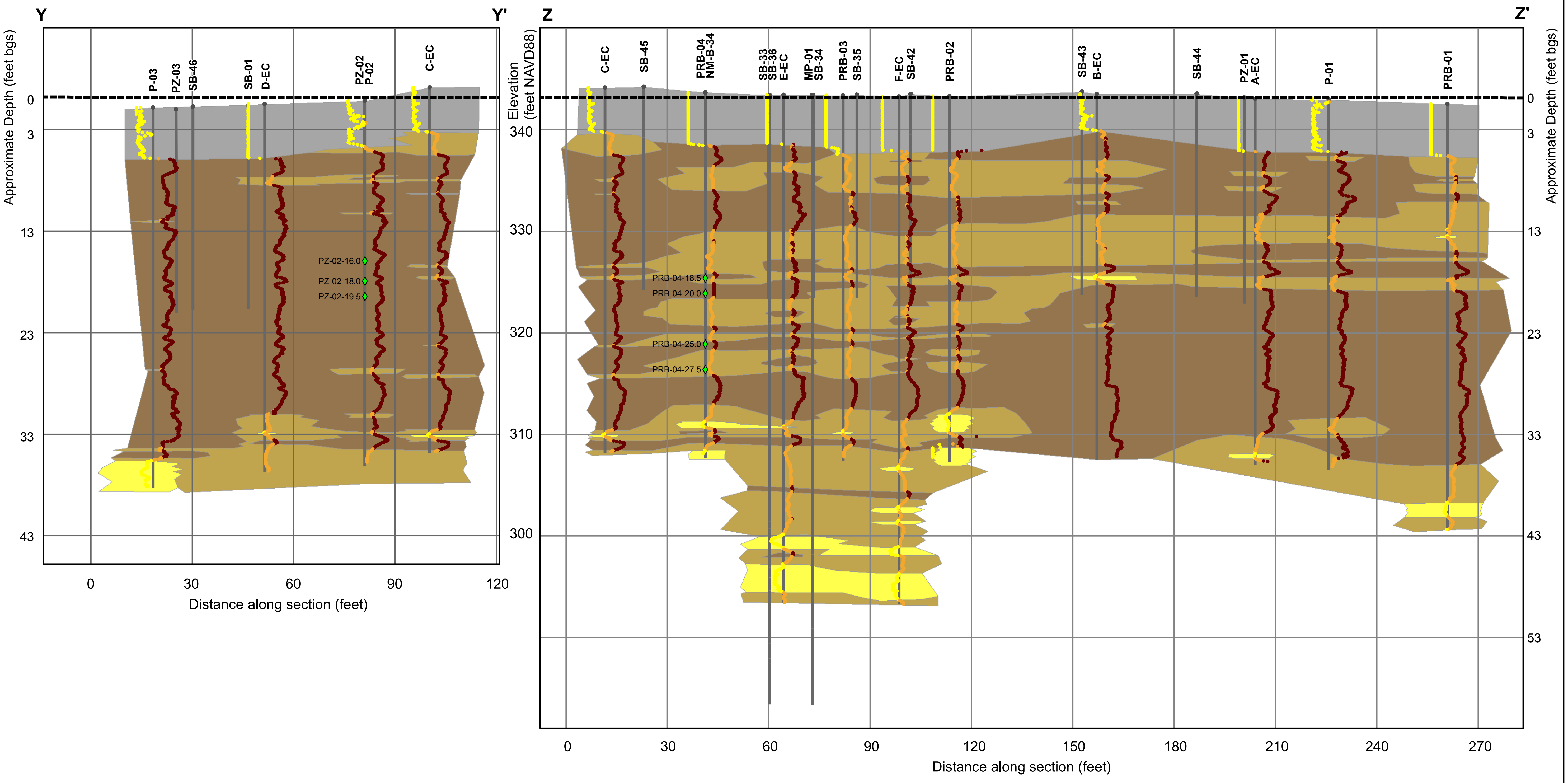
1. ESLs from California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table E-1, Groundwater Screening Levels for Potential Vapor Intrusion.

GROUNDWATER SAMPLING RESULTS
NEAR PROPOSED PRB
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 03/17/2015 Project No. OD14170800

amec foster wheeler

Figure
4



Legend

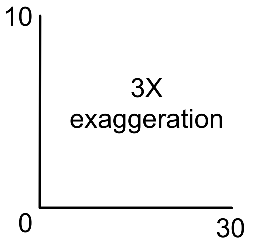
◆ Location of soil sample collected for grain size analysis

Interpreted soil types

🟨	Coarse-grained units (e.g., sands); EC ≤ 100 mS/m
🟫	Fine-grained units (e.g., silts and sandy silts); EC > 100 mS/m and ≤ 150 mS/m
🟫	Fine-grained units (e.g., clays and silts); EC > 150 mS/m
⬜	Data not valid (interval of borehole cleared by hand auger)

Abbreviations:
bgs = below ground surface
EC = Electrical conductivity
mS/m = millisiemens per meter
NAVD88 = North American Vertical Datum of 1988

Note:
1. The vertical axes indicating depths below ground surface are based on an average pre-construction ground surface elevation of 343.14 feet (NAVD88) along the PRB alignment. This elevation is represented by the dashed line.



SCALE IN FEET

GEOLOGIC CROSS-SECTIONS
Y-Y' AND Z-Z' - ELECTRICAL
CONDUCTIVITY DATA
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Figure
5

Date: 06/09/2015
Project No. OD14170800

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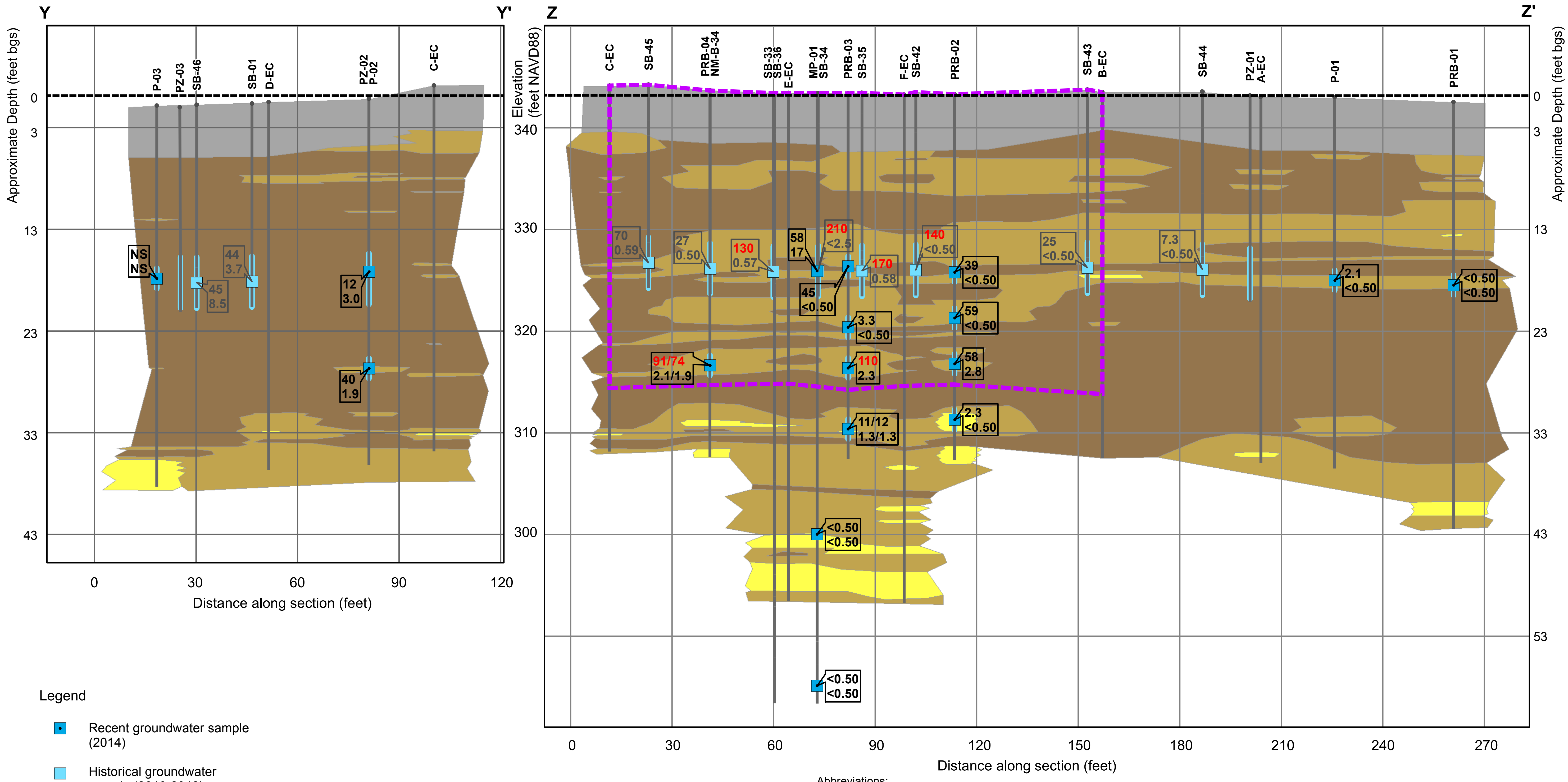


Legend

■ Recent groundwater sample (2014)

□ Historical groundwater sample (2010-2012)

━ Screened interval for groundwater sample collection

▭ Outline of proposed PRB

140 ◄ PCE concentration (µg/L). Red denotes concentration above ESL.
<0.50 ◄ TCE concentration (µg/L)

Interpreted soil types

🟨 Coarse-grained units (e.g., sands); EC ≤ 100 mS/m

▨ Fine-grained units (e.g., silts and sandy silts); EC > 100 mS/m and ≤ 150 mS/m

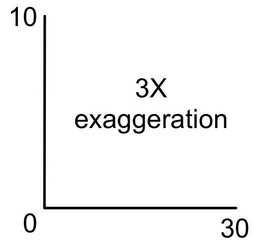
🟫 Fine-grained units (e.g., clays and silts); EC > 150 mS/m

⬜ Data not valid (interval of borehole cleared by hand auger)

Vapor Intrusion ESL[1] (µg/L)	
PCE	63
TCE	130

Abbreviations:
bgs = below ground surface
EC = Electrical conductivity
µg/L = micrograms per liter
mS/m = millisiemens per meter
NAVD88 = North American Vertical Datum of 1988
PCE = tetrachloroethene
PRB = permeable reactive barrier
TCE = trichloroethene

Notes:
1. ESLs from California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table E-1, Groundwater Screening Levels for Potential Vapor Intrusion.
2. The vertical axes indicating depths below ground surface are based on an average pre-construction ground surface elevation of 343.14 feet (NAVD88) along the PRB alignment. This elevation is represented by the dashed line.



SCALE IN FEET

GEOLOGIC CROSS-SECTIONS
Y-Y' AND Z-Z' - GROUNDWATER
DATA AND PROPOSED PRB
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec
foster
wheeler

Date: 06/09/2015

Project No.OD14170800

Figure
6

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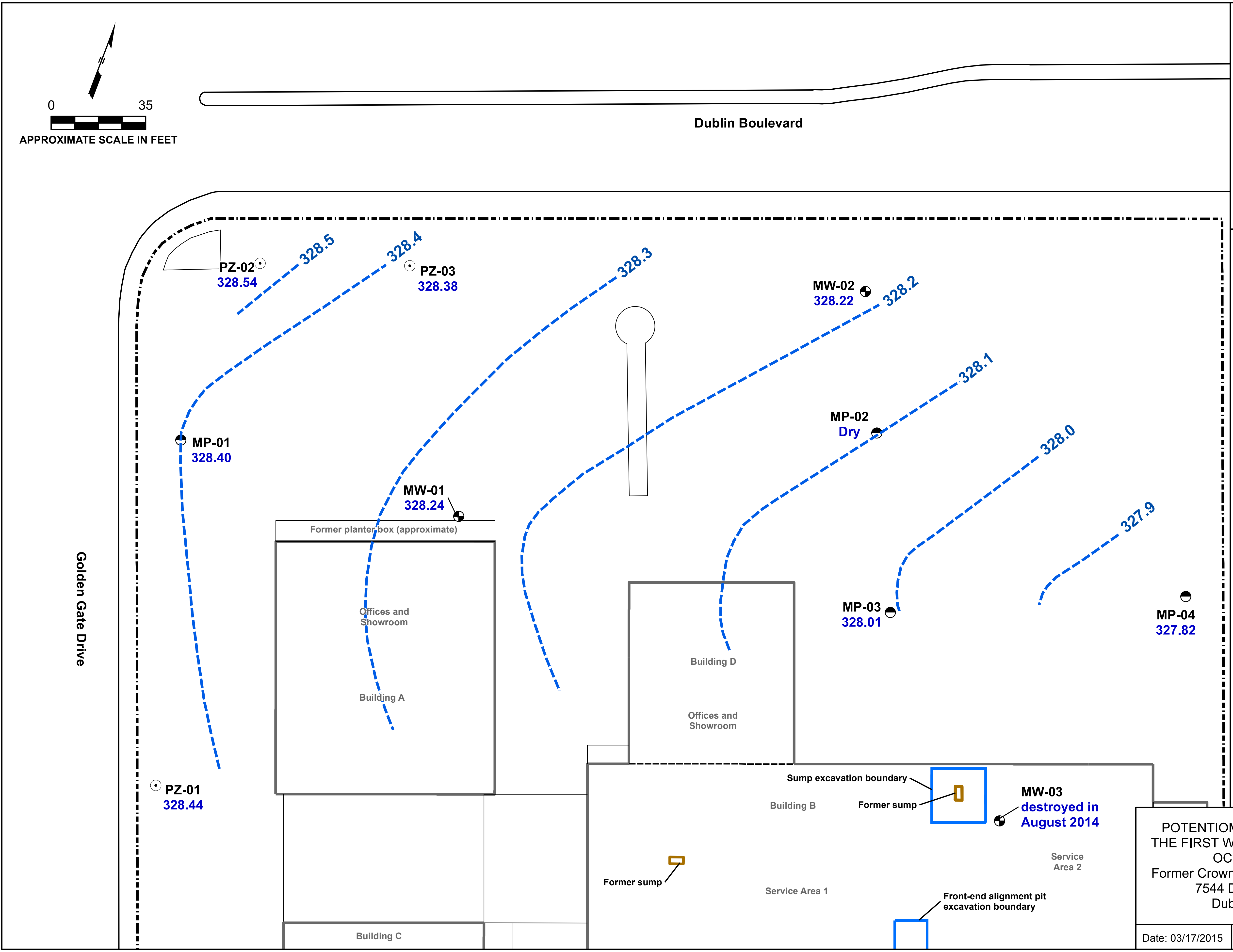

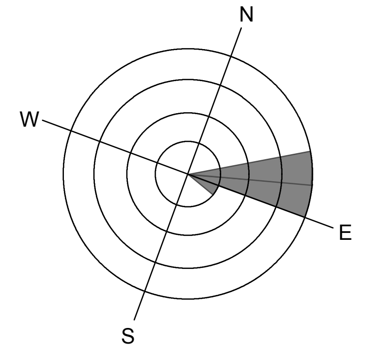

Rose diagram of
shallow groundwater flow direction

Explanation

⊕	Shallow monitoring well location (destroyed in August or December 2014)
◓	Multi-port monitoring well (3-channel) location (destroyed in December 2014)
MP-04 327.82	Groundwater elevation in feet NAVD88, measured on October 6, 2014.
- 327.9 - -	Line of equal groundwater elevation in feet NAVD88. Contours are approximate; contour interval = 0.1 feet.
▭	Approximate excavation boundary (October 2011)
-·-·-	Approximate property line
▭	Approximate sump location

Abbreviations:
NAVD88 = North American Vertical Datum of 1988

Note:
1. MP-02-1 was dry on October 6, 2014 and does not appear to reflect proper equilibration with atmospheric pressure. For this reason MP-02 is not used in the calculation of the potentiometric surface.

POTENTIOMETRIC SURFACE IN
THE FIRST WATER-BEARING ZONE
OCTOBER 2014
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Figure
7

Date: 03/17/2015
Project No. OD14170800

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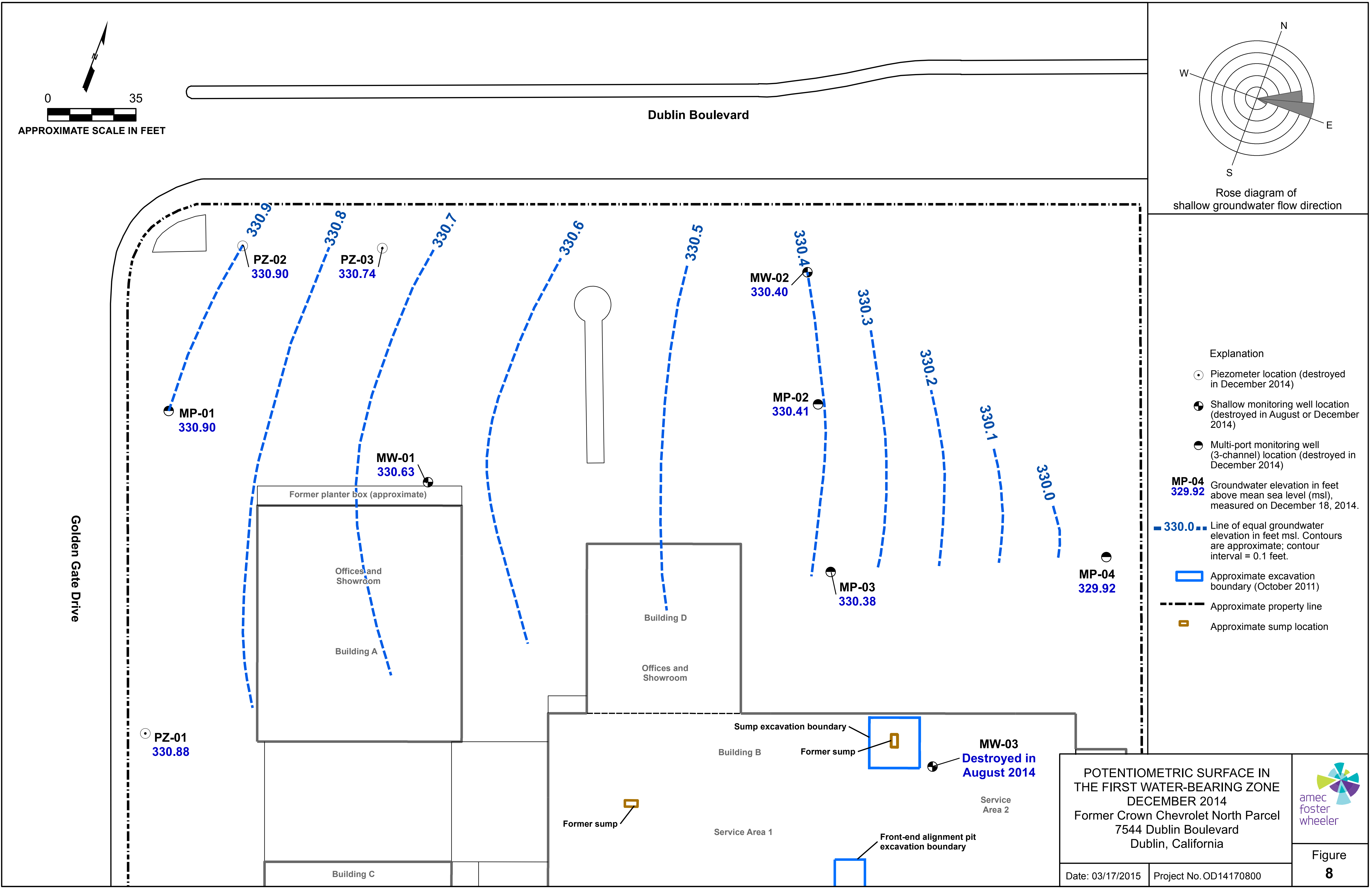

POTENTIOMETRIC SURFACE IN
THE FIRST WATER-BEARING ZONE
DECEMBER 2014
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec
foster
wheeler

Figure
8

Date: 03/17/2015
Project No. OD14170800

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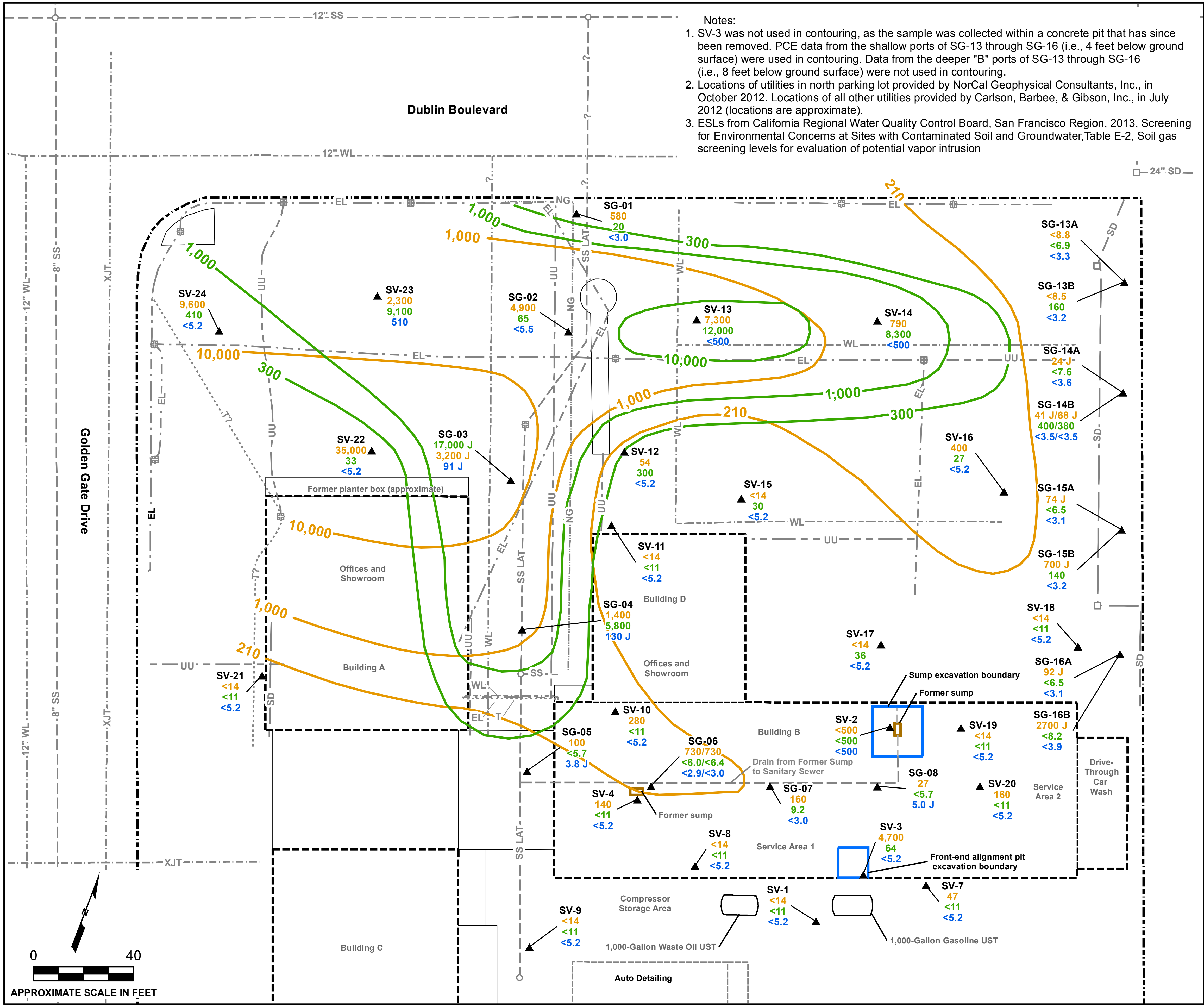

Notes:

1. SV-3 was not used in contouring, as the sample was collected within a concrete pit that has since been removed. PCE data from the shallow ports of SG-13 through SG-16 (i.e., 4 feet below ground surface) were used in contouring. Data from the deeper "B" ports of SG-13 through SG-16 (i.e., 8 feet below ground surface) were not used in contouring.
2. Locations of utilities in north parking lot provided by NorCal Geophysical Consultants, Inc., in October 2012. Locations of all other utilities provided by Carlson, Barbee, & Gibson, Inc., in July 2012 (locations are approximate).
3. ESLs from California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,Table E-2, Soil gas screening levels for evaluation of potential vapor intrusion

Explanation

—210— Approximate line of equal PCE concentration

—1,000— Approximate line of equal TCE concentration

"A" indicates sample from 4 feet bgs;
"B" indicates sample from 8 feet bgs.

SG-14B ← Well/Boring ID
41 J/68 J ← PCE concentration in μg/m^3
400/380 ← TCE concentration in μg/m^3
<3.5/<3.5 ← VC concentration in μg/m^3
Duplicate data

Soil Vapor ESLs (μg/m^3) (Residential Land Use)	
PCE	210
TCE	300
Vinyl chloride	16

▲ Soil vapor sample location
▭ Approximate excavation boundary (October 2011)
▭ Former building envelope (demolished December 2014)
—·— Approximate property line
▭ Approximate sump location
□ Storm drain inlet
○ Manhole
⊞ Utility vault
– · EL · – Electric line
··– NG ·–· Natural gas line
– · SS – – Sanitary sewer line
– SS LAT – Sanitary sewer lateral line
— SD — Storm drain line
·····T····· Telecommunications line
····T?···· Suspected telecommunications line
— UU · – Undifferentiated utility line
– · – XJT · – Joint trench
– – · WL · – · Water line

Abbreviations:
bgs = below ground surface
ESL = Environmental Screening Level
PCE = tetrachloroethene
TCE = trichloroethene
UST = underground storage tank
VC = vinyl chloride
μg/m³ = micrograms per cubic meter
< = not detected at or above laboratory reporting limit shown
J = estimated value

PCE, TCE, AND VINYL CHLORIDE IN SOIL VAPOR
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Figure 9

Date: 03/17/2015

Project No. OD14170800

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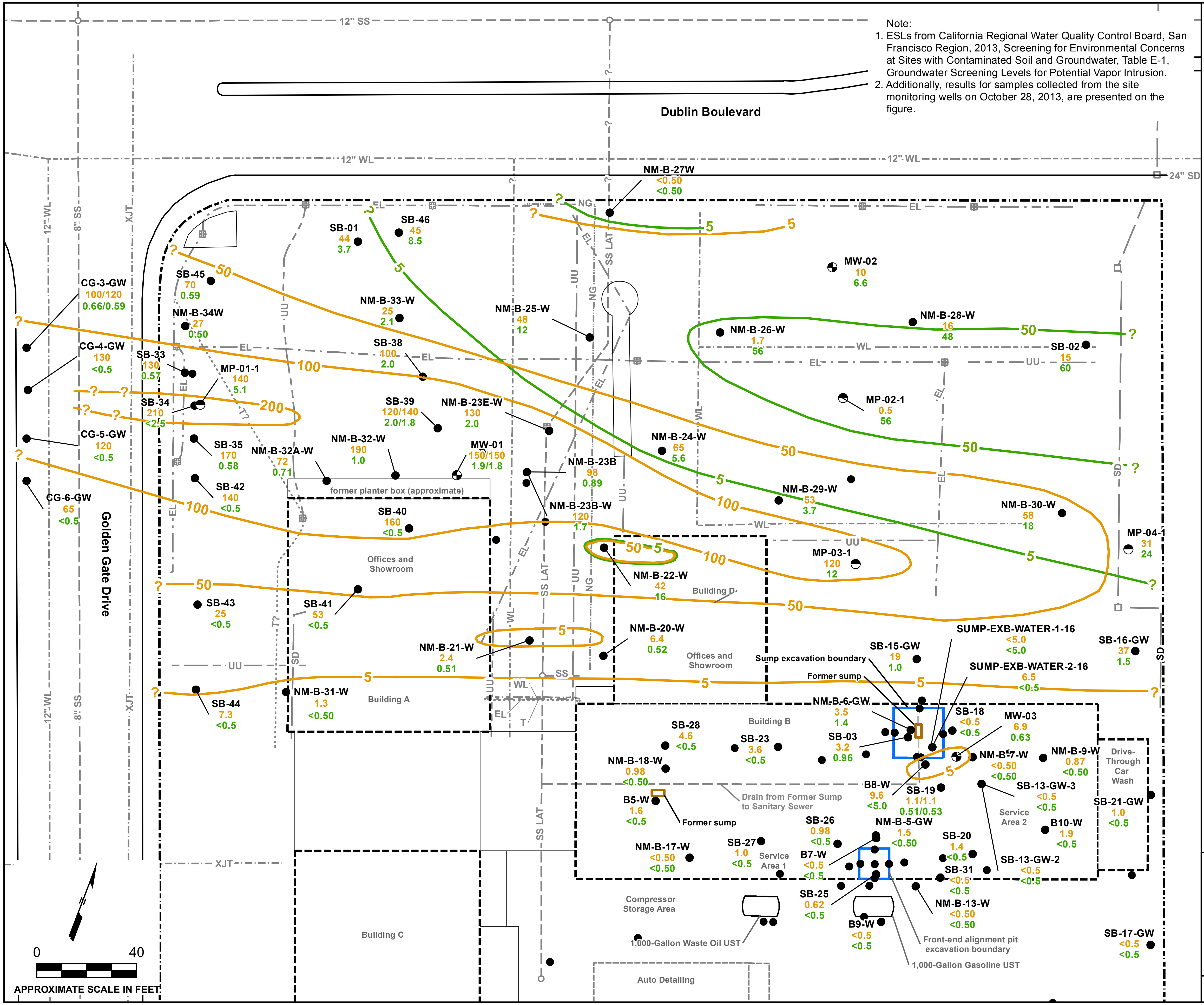

Note:
1. ESLs from California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table E-1, Groundwater Screening Levels for Potential Vapor Intrusion.
2. Additionally, results for samples collected from the site monitoring wells on October 28, 2013, are presented on the figure.

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Explanation

50 Approximate line of equal PCE concentration
50 Approximate line of equal TCE concentration

MW-01 ← Well/Boring ID
150/150 ← PCE concentration in µg/L
1.9/1.8 ← TCE concentration in µg/L
Duplicate data
Grab groundwater sample

Vapor Intrusion ESL[1] (µg/L)	
PCE	63
TCE	130

- Shallow monitoring well location (destroyed in August or December 2014)
- Multi-port monitoring well (3-channel) location (destroyed in December 2014)
- ● Historical soil and/or groundwater sample location (2009-2012)
- Approximate excavation boundary (2011)
- Former building envelope (demolished December 2014)
- Approximate property line
- Approximate sump location
- ☐ Storm drain inlet
- ○ Manhole
- ⊞ Utility vault
- EL Electric line
- NG Natural gas line
- SS Sanitary sewer line
- SS LAT Sanitary sewer lateral line
- SD Storm drain line
- T Telecommunications line
- T? Suspected telecommunications line
- UU Undifferentiated utility line
- XJT Joint trench
- WL Water line

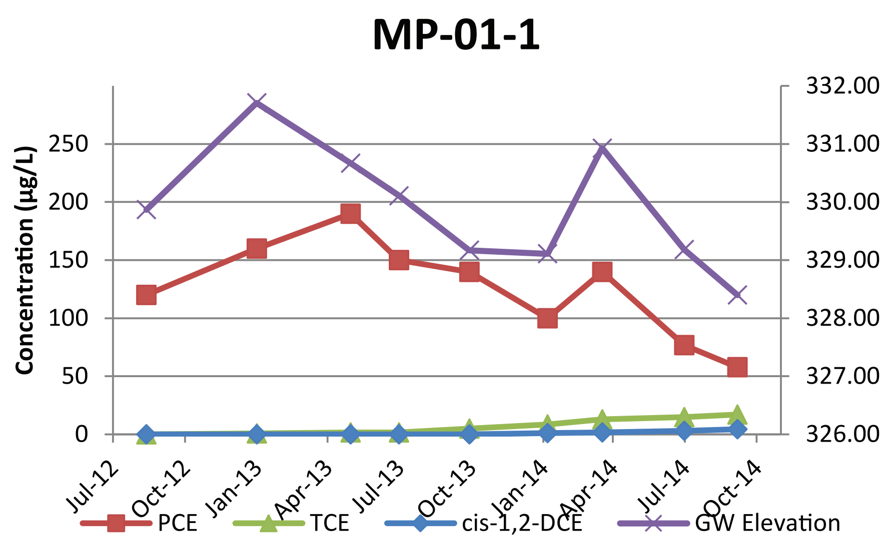
Abbreviations:
ESL = Environmental Screening Level
NS = not sampled
PCE = tetrachloroethene
TCE = trichloroethene
UST = underground storage tank
µg/L = micrograms per liter
< = not detected at or above laboratory reporting limit shown

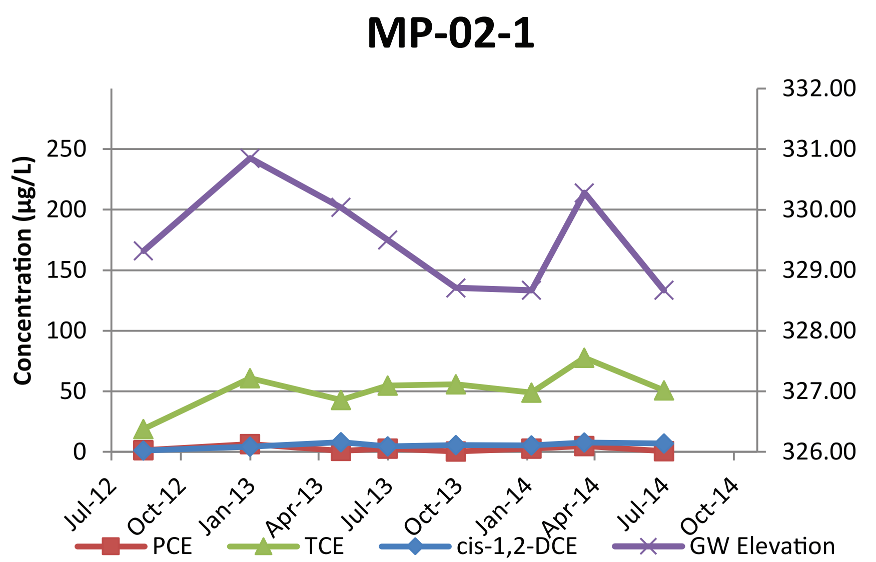
PCE AND TCE IN
SHALLOW GRAB GROUNDWATER
SAMPLES (2009-2012)
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

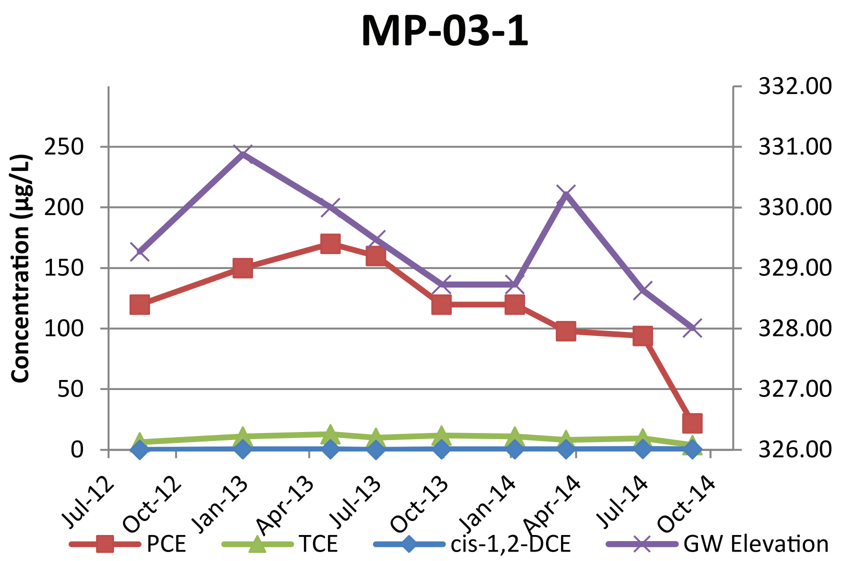
amec foster wheeler

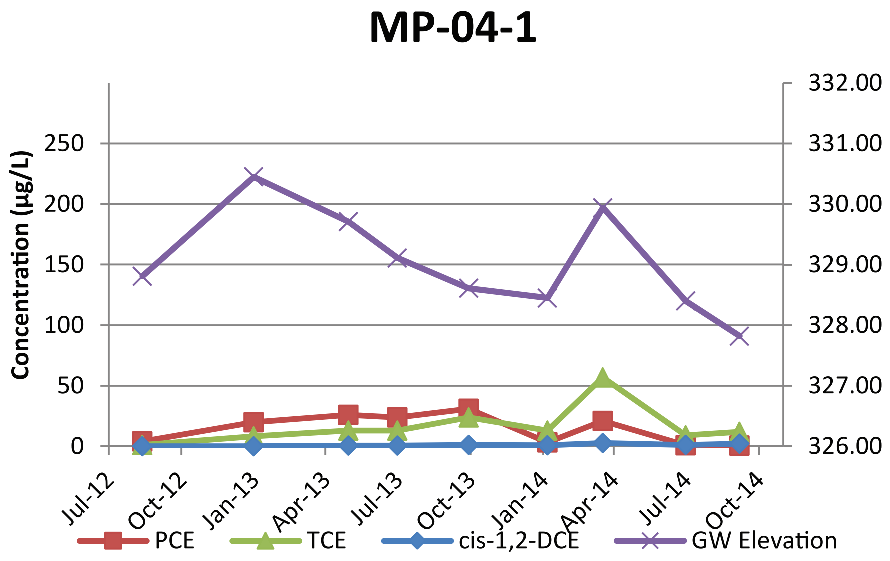
Figure
10

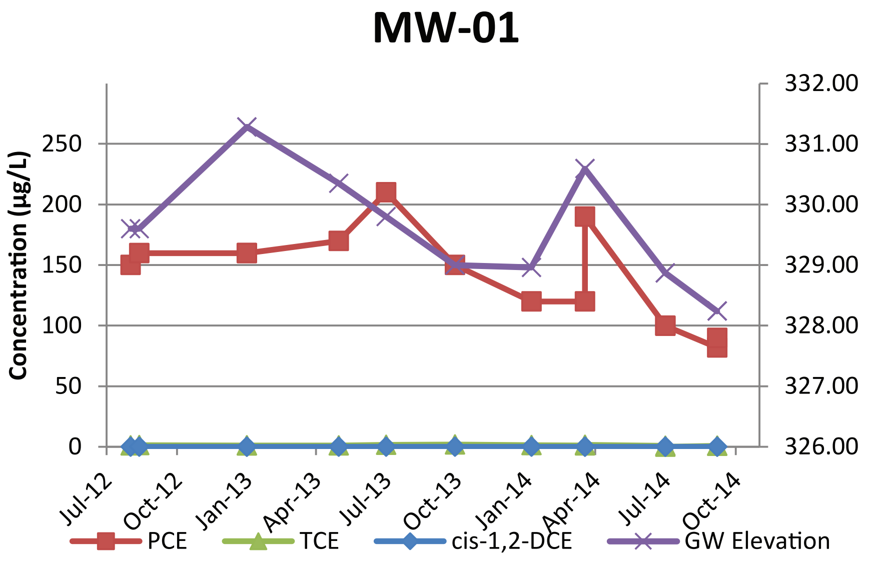
Date: 03/19/2015
Project No. OD14170800

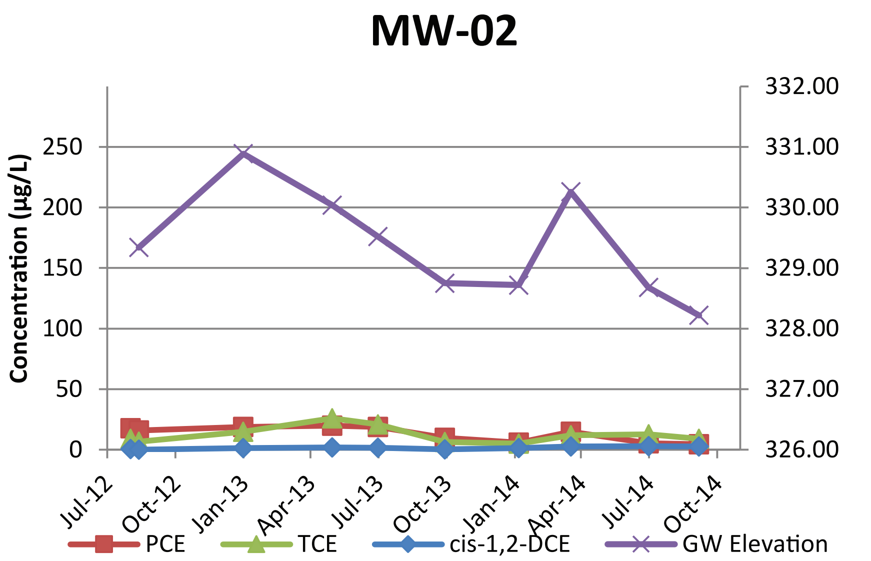


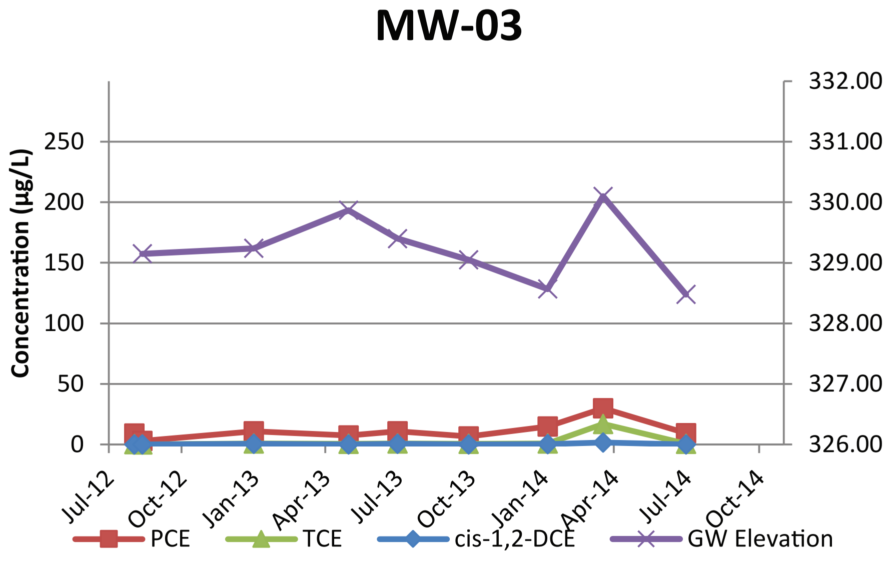












Note:

Sample results reported as not detected at or above the laboratory reporting limit are plotted as zero.

Abbreviations:

cis-1,2-DCE = cis-1,2-dichloroethene
µg/L = micrograms per liter
PCE = tetrachloroethene
TCE = trichloroethene
VOC = volatile organic compound

SELECTED VOC CONCENTRATION
AND GROUNDWATER ELEVATION
TRENDS IN THE FIRST
WATER-BEARING ZONE
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec
foster
wheeler

Date: 03/17/2015
Project No. OD14170800

Figure
11

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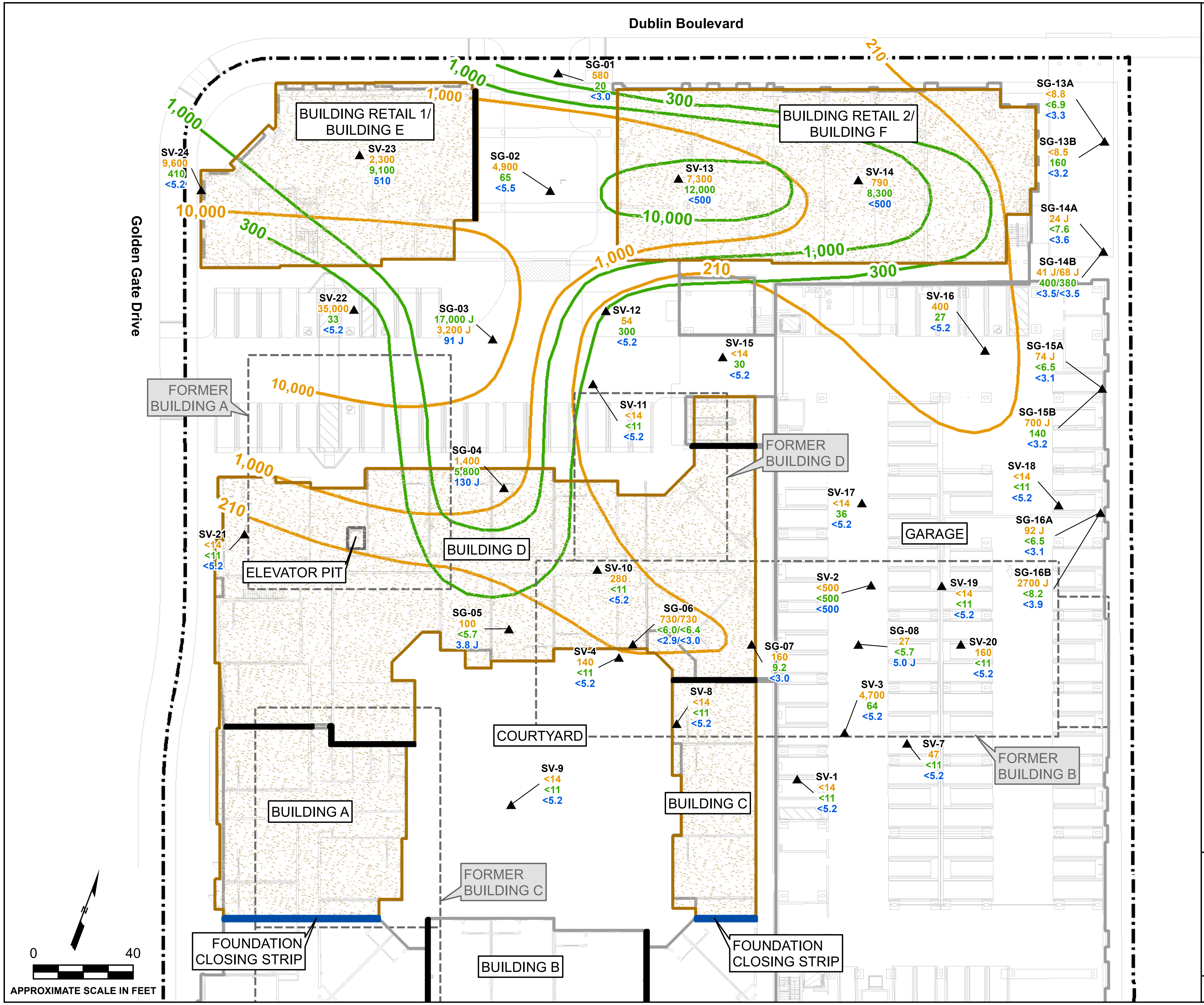

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Explanation

—210— Approximate line of equal PCE concentration

—1,000— Approximate line of equal TCE concentration

"A" indicates sample from 4 feet bgs;
"B" indicates sample from 8 feet bgs.

SG-14B ← Well/Boring ID
41 J/68 J ← PCE concentration in µg/m³
400/380 ← TCE concentration in µg/m³
<3.5/<3.5 ← VC concentration in µg/m³
Duplicate data

Soil Vapor ESLs (µg/m³) (Residential Land Use)	
PCE	210
TCE	300
Vinyl chloride	16

▨ Soil vapor mitigation membrane extents

▬ Building boundary (fire wall)

▲ Soil vapor sample location

-·-·- Approximate property line

Abbreviations:
bgs = below ground surface
ESL = Environmental Screening Level
PCE = tetrachloroethene
TCE = trichloroethene
UST = underground storage tank
VC = vinyl chloride
µg/m³ = micrograms per cubic meter
< = not detected at or above laboratory reporting limit shown
J = estimated value

Notes:

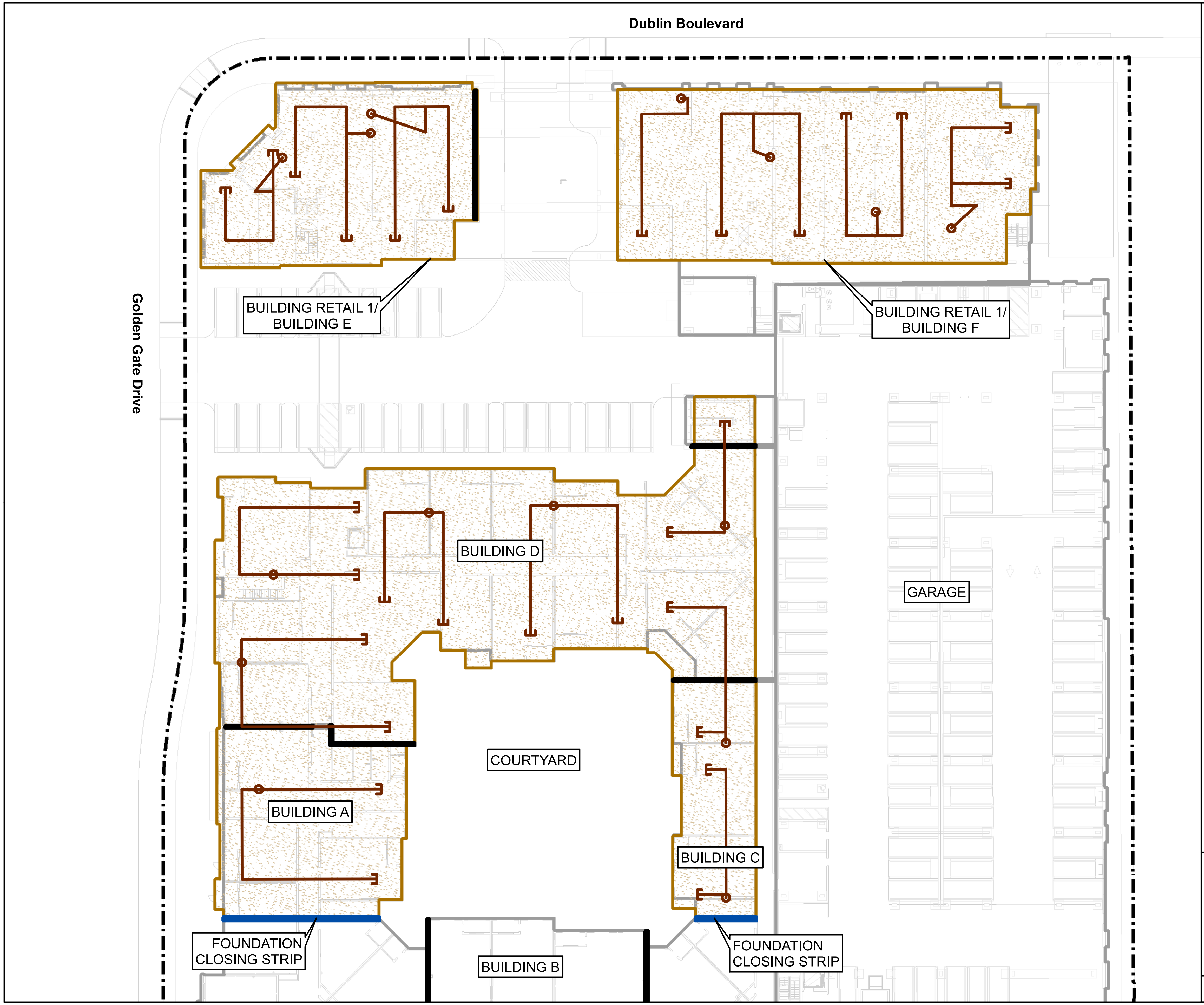
1. SV-3 was not used in contouring, as the sample was collected within a concrete pit that has since been removed. PCE data from the shallow ports of SG-13 through SG-16 (i.e., 4 feet below ground surface) were used in contouring. Data from the deeper "B" ports of SG-13 through SG-16 (i.e., 8 feet below ground surface) were not used in contouring.
2. Locations of structures and foundation layouts provided by Carlon, Barbee, & Gibson, Inc., and BDE Architecture in January 2015.
3. ESLs from California Regional Water Quality Control Board, San Francisco Region, 2013, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table E2, Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion.

SOIL VAPOR MITIGATION MEMBRANE
AND SOIL VAPOR CONCENTRATIONS
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec
foster
wheeler

Date: 06/01/2015
Project No. OD14170800

Figure
12



S:\OD14170800\task_02115_0205_PRB_BoD_fig_13_V02.mxd

Explanation

▨ Soil vapor mitigation membrane extents

— Sub-slab venting system

○ Vent riser

━ Building boundary (fire wall)

-·-·- Approximate property line

Note:

1. Locations of structures and foundation layouts provided by Carlson, Barbee, & Gibson, Inc., and BDE Architecture in January 2015.

0 40

APPROXIMATE SCALE IN FEET

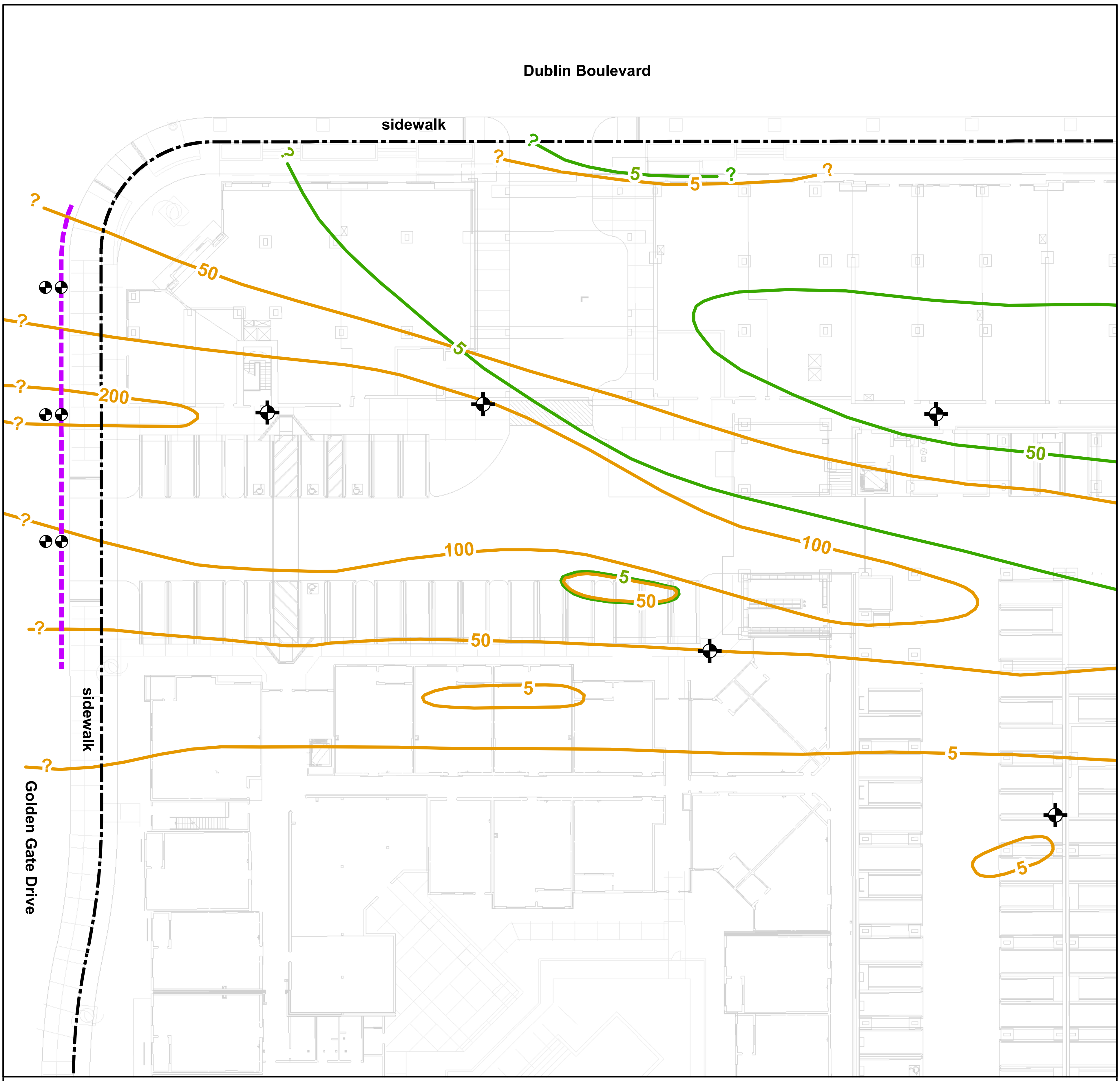
SUB-SLAB VENTING SYSTEM
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

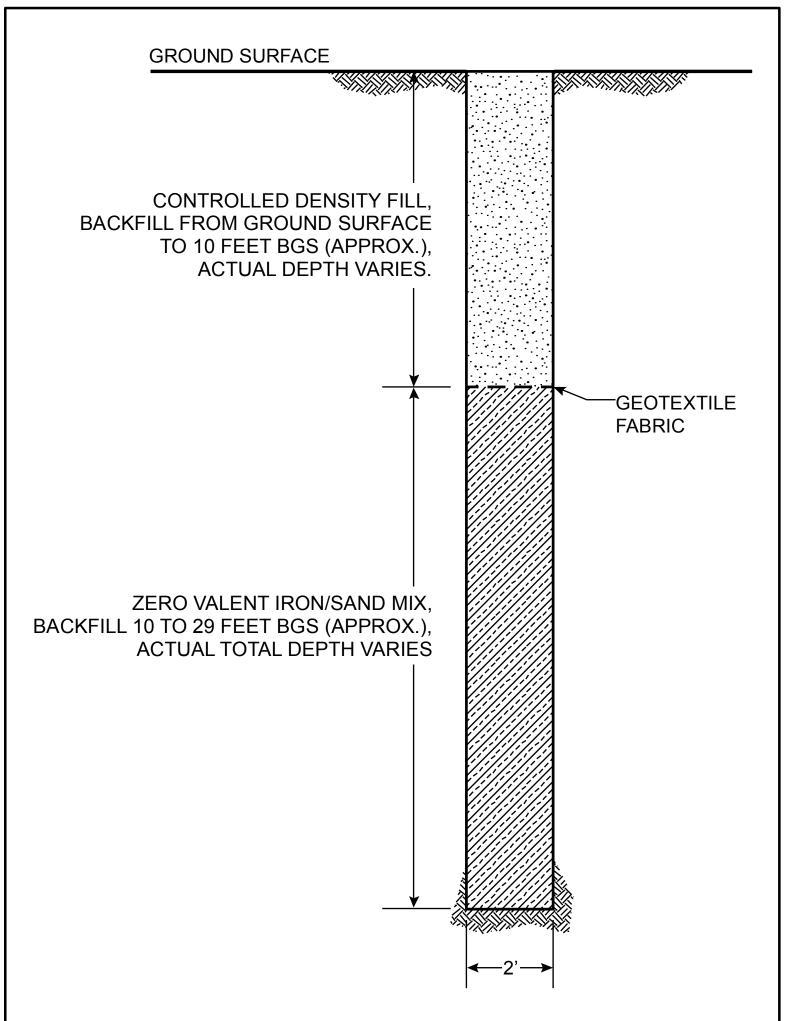
amec foster wheeler

Figure
13

Date: 05/21/2015 | Project No. OD14170800

S:\OD14\170800\task_02\15_0205_PRB_BoD_fig_14.mxd

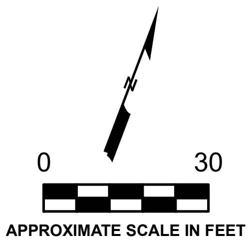




CROSS SECTION OF PERMEABLE REACTIVE BARRIER

Explanation

- ⊕ Proposed performance monitoring well location
- ⌖ Proposed on-site monitoring well location
- 50 — Approximate line of equal PCE concentration (2012)
- 50 — Approximate line of equal TCE concentration (2012)
- - - - Proposed PRB
- —·—·— Approximate property line



Abbreviations:
PCE = tetrachloroethene
TCE = trichloroethene

Notes:
1. Units for lines of equal concentration are micrograms per liter.
2. Wells are paired, with one in barrier, and the other upgradient with an approximate 5 foot offset.

MONITORING WELL NETWORK LAYOUT
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Date: 06/09/2015 | Project No. OD14170800

Figure
14

APPENDIX A

Soil and Groundwater Investigation Field and Laboratory Methods

Soil and Groundwater Investigation Field and Laboratory Methods

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

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ATTACHMENTS

APPENDIX A

SOIL AND GROUNDWATER INVESTIGATION FIELD AND LABORATORY METHODS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Amec Foster Wheeler Environment & Infrastructure, Inc. (“Amec Foster Wheeler”) conducted a soil and groundwater investigation at the former Crown Chevrolet site (the site) from August 18 through 26, 2014. The investigation was designed to further characterize the site geology and groundwater chemistry and support the design of the permeable reactive barrier (PRB) planned for the site. The field investigation included advancing 13 soil electrical conductivity (EC) probe borings for the collection of high-resolution soil type data, advancing 1 dual-tube direct push boring for confirmation soil logging, collecting 13 depth-discrete grab-groundwater samples from HydroPunch™-type borings, and installing 3 piezometers.

A sampling matrix is presented as Table A-1 that summarizes sample collection and analyses performed during this investigation and prior investigations conducted at the site. Table A-2 includes construction details for piezometers installed at the site.

A1.0 DEVIATIONS FROM THE WORK PLAN

The primary deviations to the work plan are discussed in this section. Other minor deviations (including minor variations in total depths of borings), are discussed throughout this appendix.

The work plan indicated that EC borings would be advanced at up to 11 locations. Based on the results of the EC borings, it was determined that additional EC borings were warranted to more clearly define the subsurface lithology, for a total of 13 borings.

The work plan indicated that nine depth-discrete groundwater samples would be collected from six locations. Based on the analytical results from the groundwater samples collected early in the investigation, several additional samples were collected to more clearly define the horizontal and vertical extents of the groundwater plume, for a total of 13 samples from 11 locations.

A2.0 FIELD METHODS

The EC probes, direct push boring, HydroPunch-type borings, and borings for the installation of piezometers were advanced by National Exploration, Wells & Pumps (“National”), of Richmond, California, a California C57-licensed contractor, under the supervision of Amec Foster Wheeler field personnel. Prior to conducting the field work, Amec Foster Wheeler obtained well installation and boring permit from the Zone 7 Water Agency; a copy of the well permit is included in Attachment A-1 to this appendix.

At least two business days prior to sampling, the anticipated boundaries of the areas to be sampled were marked with white paint and Underground Service Alert (USA) was contacted, in accordance with state law, to identify public utilities that may be in the vicinity of the proposed borings. Additionally, Amec Foster Wheeler contracted with a private utility locator to clear boring locations for underground utilities.

The borings were advanced under the direction of an Amec Foster Wheeler field geologist under the supervision of an Amec Foster Wheeler California Professional Geologist. Additionally, the first 5 feet of each boring was advanced using a hand auger as a precautionary measure to avoid unknown underground utilities. The hand auger was cleaned between use at each boring location by washing with a Liquinox® and potable water solution, and rinsing with potable water.

A2.1 ELECTRIC CONDUCTIVITY PROBE BORINGS

EC probe borings were advanced at 13 locations (see Table A-1 of this appendix and Figure 4 of the main portion of this report). The locations and total depths of the EC borings were determined based on the lithology encountered in the borings as the investigation progressed.

At each location, National advanced an EC probe, with a 1.75-inch outside diameter, to a total depth between 35 and 50 feet below ground surface (bgs) using direct-push drilling technology. The EC probe continuously measures electrical conductivity, which is a physical property of the soil matrix and is primarily controlled by the clay mineral content. Soil with relatively high clay mineral content is generally more electrically conductive than soil with low clay mineral content (for example, a sand or gravel with less than 5 percent fines would have a low electrical conductivity). Because the EC probe electrodes are in direct contact with soil as the tool is advanced through the subsurface, the resulting log aids in identification of coarse-grained and fine-grained sediments at a higher resolution than can be readily discerned during visual logging of soil extracted from the borehole. The EC logs were used to identify thin, coarse-grained layers that could be targeted for grab-groundwater sampling and to interpret the subsurface geology in the vicinity of the proposed PRB.

A2.2 DUAL-TUBE SOIL BORINGS

One soil boring was advanced by National to 35 feet bgs using a track-mounted GeoProbe® 7730DT drill rig with a DT32 dual-tube sampling system with an outside diameter of 3.25 inches. The soil boring was advanced in order to collect a continuous core of soil for comparison to the EC logs. The dual-tube boring was advanced adjacent to boring PRB-04, in an area where logs prepared by different consultants for historical borings located close to each other have indicated significant variation (see Figure 4 of the main portion of this report and Table A-1).

The recovered soil was described by an Amec Foster Wheeler field geologist under the supervision of an Amec Foster Wheeler California-licensed Professional Geologist, using the visual-manual procedures of the ASTM International Standard D2488 for guidance, which is based on the Unified Soil Classification System (USCS). The recovered soils were screened for the presence of volatile organic compounds (VOCs) using a photoionization detector ("PID"). The PID readings were recorded on the soil boring log, a copy of which is included in Attachment A-2.

A2.3 DEPTH-DISCRETE GRAB-GROUNDWATER SAMPLING

Following completion of the EC probe borings, National advanced 10 HydroPunch-type borings using direct-push drilling technology with a 2.25-inch outside diameter rods, from which 13 grab-groundwater samples were collected (Table A-1). The borings were located in close proximity to, and upgradient (i.e., west) of, six of the EC probe borings, as shown on Figure 4 of the main portion of this report. The grab-groundwater samples were collected to provide an assessment of expected concentrations of VOCs within and beneath the PRB. The results are discussed and presented on Table 2 in the main portion of this report.

HydroPunch technology allows for collection of up to two depth-discrete grab-groundwater samples from the same borehole. At locations where a third or fourth depth-discrete sample was desired, an additional borehole was advanced a few feet away. Using the HydroPunch tool, one grab-groundwater sample was collected from three of the locations (PRB-01, PRB-04, and P-01), two samples were collected from P-02, and four samples were collected from PRB-02 and PRB-03 (from three borings at each location). Additionally, Amec Foster Wheeler attempted to collect a grab-groundwater sample from location P-03; but no sample was collected due to lack of water in the borehole. The grab-groundwater sampling depths were determined in the field based on data from the adjacent EC probe borings in order to collect groundwater samples from the first water-bearing zone (within the vertical range of the proposed PRB), from the fine-grained soils at or near the base of the proposed PRB, and from beneath the proposed PRB (see Figure 5 of the main portion of this report). Table A-1 provides a summary of the EC borings and groundwater sampling program.

Beginning with the shallowest planned groundwater sample interval, the HydroPunch sampling system was advanced to the bottom of the target interval where a grab-groundwater sample was to be collected. Once the target depth was reached, the outer casing of the HydroPunch was retracted to expose the target interval (between 6 inches and 2 feet) to the HydroPunch screen and the surrounding formation. At locations where a second groundwater sample was planned to be collected from the next water-bearing zone, the HydroPunch sampler was removed from the borehole, decontaminated, and reinserted into the same borehole in order to advance to the next target interval. This methodology is acceptable because the HydroPunch casing seals off the first water-bearing zone during the collection of the second sample (i.e., there is no opportunity for cross-contamination).

Prior to the collection of the groundwater sample at each target interval, the HydroPunch casing was purged to decrease turbidity in the sample (at locations where there was insufficient groundwater flow, a sample was collected without purging). The purging was performed using a peristaltic pump with new polyethylene tubing. Following purging, a grab-groundwater sample was collected using the peristaltic pump and placed directly into laboratory-provided containers equipped with preservatives appropriate for the desired analyses. Each sample was immediately labeled with a unique identifier and the sample collection time, and stored in an ice-chilled cooler pending transport to TestAmerica Laboratories, Inc., of Pleasanton, California, a California Department of Public Health−certified analytical laboratory, under Amec Foster Wheeler chain-of-custody procedures.

A2.4 PIEZOMETER INSTALLATION, DEVELOPMENT AND GAUGING

Three piezometers were installed, developed, and gauged in order to refine our understanding of the groundwater gradient in the northwest corner of the site near the proposed PRB alignment. The locations of the piezometers (identified as PZ-01, PZ-02 and PZ-03) are shown on Figure 4 of the main portion of this report. The following sections describe the piezometer installation, development and gauging.

A2.4.1 Piezometer Installation

The piezometers were constructed in accordance with the appropriate state (California Department of Water Resources, 1991) and Zone 7 Water Agency requirements. The piezometers were installed within an 8.25-inch-diameter borehole that was advanced by National using hollow-stem auger drilling technology.

The piezometers were constructed using 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) blank casing and 5 feet of slotted (0.010-inch slots) screen, and were screened from approximately 15 to 20 feet bgs (Table A-2). The annular space between the piezometer screen and surrounding formation was backfilled with Cemex brand #2/12 sized filter pack sand. The filter pack sand in each piezometer was placed such that the top of the filter pack sand extends approximately 1 foot above the screened interval. Approximately 2 feet of bentonite chips were then placed above the filter pack sand and allowed to hydrate in place. The remaining annular space above the hydrated bentonite chips was sealed using neat cement grout. All of the annular materials were placed into the well as the hollow-stem auger drill rods were retracted. Each piezometer was completed at the surface using a flush-mounted, traffic-rated box set into concrete. A locking, watertight plug was placed in the top of the casing at each piezometer.

The piezometer construction details are included in Table A-2. Copies of the piezometer logs are included in Attachment A-2.

A2.4.2 Piezometer Development

At least 48 hours after installation, the piezometers were developed using a combination of bailing, surging, and purging until field parameters (turbidity, temperature, pH, and specific conductance) were relatively stable. These parameters were monitored during piezometer development and recorded on piezometer development records, copies of which are included in Attachment A-3.

A2.4.3 Piezometer Gauging

The three piezometers were included in the October 2014 and December 2014 groundwater elevation gauging events, and the gauging methods and depths-to-water are documented in *the Third and Fourth Quarter 2014 Groundwater Monitoring Report* (Amec Foster Wheeler, 2015).

An interpretation of the October 2014 potentiometric surface is shown on Figure 7 of the main portion of this report and an interpretation of the December 2014 potentiometric surface is shown on Figure 8 of the main portion of this report.

A2.4.4 Piezometer Destruction

The three piezometers were destroyed in December 2014, prior to site redevelopment. The piezometer destruction work will be documented in a forthcoming *Post-Demolition Investigation and Remediation Report*, which will be submitted to the Alameda County Department of Environmental Health in June 2015.

A2.5 SOIL SAMPLING FOR PHYSICAL PROPERTIES

In order to provide additional information regarding the soil types that will be adjacent to the proposed PRB, Amec Foster Wheeler collected seven bulk soil samples for grain-size analysis by ASTM D422. Samples targeting both finer- and coarser-grained soils encountered were collected from hollow-stem-auger boring PZ-02 (3 samples) and dual-tube boring PRB-04 (4 samples). See Table A-1 for a summary of samples collected.

Each soil sample was placed into a plastic bag and immediately labeled with a unique identifier and the sample collection time. The samples were sent to Cooper Testing Laboratory, of Palo Alto, California, under Amec Foster Wheeler chain-of-custody procedures. Copies of the laboratory results are included in Appendix G of the main portion of this report.

A2.6 DECONTAMINATION

All reusable sampling equipment was decontaminated prior to sampling and between use at each boring using a steam cleaner and/or Liquinox rinse followed by a final rinse using potable water.

A2.7 BORING DESTRUCTION

Following completion of the sampling activities, each direct-push boring (i.e., the EC, dual-tube, and HydroPunch borings) was backfilled with Type I/II neat cement grout using a tremie pipe, so that the boring was sealed from total depth to ground surface. The grab-groundwater samples were collected on a different day than the adjacent EC borings were installed in order to avoid possible impacts from the cement grout before it cured.

A2.8 INVESTIGATION-DERIVED WASTE

The investigation-derived waste (IDW), including drill cuttings, purge water, and equipment wash water, was stored at the site in appropriately-labeled 55-gallon drums pending disposal by Crown Chevrolet. To assist in the disposal, Amec Foster Wheeler collected one sample from each drum of soil cuttings, purge water, or equipment wash water generated during the investigation. Each IDW sample was submitted for analysis as described below in Section A3.0.

Following completion of the sampling, the waste was profiled and transported off-site for disposal at Potrero Hills Landfill, in Suisun, California. Copies of the waste disposal manifests are included in Attachment A-4.

A2.9 SURVEY OF INVESTIGATION POINTS AND PIEZOMETERS

Following completion of field investigation activities, Kister, Savio & Rei, Inc., of Pinole, California, a California Licensed Land Surveyor, recorded the location of each direct push boring and piezometer. The measuring point at each boring or piezometer was surveyed to a vertical accuracy of 0.01 foot and a horizontal accuracy of 0.1 foot.

A copy of the survey report is included in Attachment A-5.

A3.0 LABORATORY ANALYTICAL METHODS AND QUALITY ASSURANCE

Two blind field duplicate grab-groundwater samples were collected from the HydroPunch borings during the sampling event (samples PRB-03HP-340.0 and PRB-04HP-280.0; Table A-1). The blind field duplicate samples were analyzed for the same suite of constituents as the primary samples. Additionally, one equipment blank and two trip blank samples were submitted for analysis. The equipment blank was collected by decanting laboratory-provided deionized water through the decontaminated HydroPunch sampler and into laboratory-provided sample containers. The laboratory provided trip blank samples, which were included in coolers used to transport samples to the laboratory and analyzed following receipt.

A3.1 LABORATORY ANALYTICAL METHODS

The grab-groundwater samples, trip and equipment blank samples, and IDW characterization samples were submitted under chain-of-custody procedures to TestAmerica Laboratories, Inc., of Pleasanton, California, a California Department of Public Health−certified analytical laboratory. The grab-groundwater samples were analyzed for the presence of VOCs and total petroleum hydrocarbons quantified in the gasoline range (TPHg) using U.S. Environmental Protection Agency (U.S. EPA) Method 8260B. The IDW characterization samples were analyzed by TestAmerica as follows:

- Each sample from a drum containing purge water or equipment wash water was analyzed for pH by U.S. EPA Method 9040B; and
- A composite of all purge water and equipment wash water samples was analyzed for VOCs using U.S. EPA Method 8260B, and for Title 22 (CAM 17) Metals by U.S. EPA Methods 6020B and 7470/7471.
- One composite sample of soil from each soil drum was analyzed for VOCs using U.S. EPA Method 8260B, and for Title 22 (CAM 17) Metals by U.S. EPA Methods 6020B and 7470/7471.

The soil samples for physical properties analysis were submitted to Cooper Testing Laboratory, of Palo Alto, California, for grain size analysis by ASTM D422, including hydrometer analysis for differentiation of the fine sediments.

Copies of the laboratory analytical reports for the groundwater and waste characterization samples are included in Attachment A-6. Copies of the grain size analysis reports are included in Attachment A-7.

A3.2 DATA QUALITY REVIEW

Amec Foster Wheeler evaluated the grab-groundwater analytical data using guidelines set forth in the U.S. EPA's *USEPA National Functional Guidelines for Superfund Organic Methods Data Review* (U.S. EPA, 2014). The complete data quality review, which was reviewed and acknowledged by an Amec Foster Wheeler quality assurance/quality control (QA/QC) senior technical reviewer, is included in Attachment A-8, and is summarized below.

Quality assurance procedures for groundwater samples collected during the quarterly groundwater monitoring program include the collection and analysis of one blind field duplicate sample and one MS/MSD sample per event; laboratory analysis of method blank samples, surrogate spikes, and LCS/LCSDs; and evaluation of the analytical results. Data accuracy was assessed by the analysis of laboratory control spike/laboratory control spike duplicate (LCS/LCSD) samples, matrix spike/matrix spike duplicate (MS/MSD) samples and evaluation of the recovery of spiked compounds, and is expressed as a percentage of the true or known concentrations. Surrogate recoveries and blank results also were used to assess accuracy.

Data precision is evaluated by comparing analytical results from duplicate sample pairs and evaluating the calculated relative percent difference (RPD) between the data sets. Results for LCS/LCSD, MS/MSD, and field duplicate sample pairs (as available) were evaluated to assess the precision of the analytical methods for the water sample data.

All detectable concentrations of TPHg (reported by the analytical laboratory as gasoline range organics) were identified by the laboratory to be the result of discrete peaks caused by the presence of PCE. Therefore, these TPHg results were qualified with “R” to indicate that they are rejected.

No other data quality deficiencies were identified during the data quality review. With the exception of the rejected data, all laboratory results are valid and usable.

A4.0 REFERENCES

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2015. Third and Fourth Quarter 2014 Groundwater Monitoring Report and Annual Summary, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard, Dublin, California, April 21.

California Department of Water Resources, 1991. California Well Standards, Bulletin 74-90, June.

U.S. Environmental Protection Agency (U.S. EPA), 2014. USEPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-08-01, August.

TABLES

TABLE A-1

SOIL AND GROUNDWATER INVESTIGATION BORINGS AND SAMPLES

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Location	Boring or Boring Cluster ID	Date	Boring Type/ Drilling Method	Purpose	Sample ID	Sample Interval or Total Depth	Comments
PRB-01	PRB-01EC	8/20/2014	EC	EC	--	41.9	--
	PRB-01HP	8/25/2014	HP	GGW	PRB-01HP-19.0	17.0 - 19.0	--
PRB-02	PRB-02EC	8/18/2014	EC	EC	--	35.5	--
	PRB-02HP	8/19/2014	HP	GGW	PRB-02HP-18.5	16.5 - 18.5	--
				GGW	PRB-02HP-23.0	21.0 - 23.0	--
		8/21/2014	HP	GGW	PRB-02HP-27.5	25.5 - 27.5	--
		8/25/2014	HP	GGW	PRB-02HP-33.0	31.0 - 33.0	--
PRB-03	PRB-03EC	8/18/2014	EC	EC	--	36.6	--
	PRB-03HP	8/19/2014	HP	GGW	PRB-03HP-18.0	16.0 - 18.0	--
				GGW	PRB-03HP-24.0	22.0 - 24.0	--
		8/20/2014	HP	GGW	PRB-03HP-28.0	26.0 - 28.0	--
		8/25/2014	HP	GGW	PRB-03HP-34.0	32.0 - 34.0	--
				GGW	PRB-03HP-340.0	32.0 - 34.0	Duplicate of PRB03-HP-34.0
PRB-04	PRB-04EC	8/18/2014	EC	EC	--	35.5	--
	PRB-04HP	8/26/2014	HP	GGW	PRB-04HP-28.0	26.0 - 28.0	--
				GGW	PRB-04HP-280.0	26.0 - 28.0	Duplicate of PRB-04HP-28.0
	PRB-04	8/18/2014	Dual-tube	Grain Size	PRB-04-18.5	18.0 - 18.5	--
				Grain Size	PRB-04-20.0	19.5 - 20.0	--
				Grain Size	PRB-04-25.0	24.5 - 25.0	--
				Grain Size	PRB-04-27.5	27.0 - 27.5	--
P-01	P-01EC	8/20/2014	EC	EC	--	36.2	--
	P-01HP	8/20/2014	HP	GGW	P-01HP-19.0	17.0 - 19.0	--
P-02	P-02EC	8/20/2014	EC	EC	--	35.6	--
	P-02HP	8/21/2014	HP	GGW	P-02HP-18.0	16.0 - 18.0	--
				GGW	P-02HP-27.5	25.5 - 27.5	--
P-03	P-03EC	8/20/2014	EC	EC	--	37.35	--
	P-03HP	--	HP	GGW	No water present	16.0 - 18.0	--
PZ-01	PZ-01	8/25/2015	HSA	Piezometer	--	15.3 - 19.7	
PZ-02	PZ-02	8/22/2014	HSA	Piezometer	--	15.5 - 19.9	
				Grain Size	PZ-02-16.0	15.5 - 16.0	--
				Grain Size	PZ-02-18.0	17.5 - 18.0	--
				Grain Size	PZ-02-19.5	19.0 - 19.5	--
PZ-03	PZ-03	8/22/2014	HSA	Piezometer	--	15.1 - 19.6	
Boring A	A-EC	8/20/2014	EC	EC	--	35.7	--
Boring B	B-EC	8/20/2014	EC	EC	--	35.7	--
Boring C	C-EC	8/20/2014	EC	EC	--	35.8	--
Boring D	D-EC	8/26/2014	EC	EC	--	36.1	--
Boring E	E-EC	8/26/2014	EC	EC	--	50.0	--
Boring F	F-EC	8/26/2014	EC	EC	--	50.0	--

Abbreviations

-- = not applicable
EC = electrical conductivity probe boring
HP = HydroPunch-type boring
HSA = hollow-stem auger
GGW = grab groundwater sample

TABLE A-2

PIEZOMETER CONSTRUCTION DETAILS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Piezometer ID	Date Installed	Date Destroyed[1]	Survey Data[2]				Construction Information					
			Ground Surface Elevation (feet)	Top of Casing Elevation (feet)	Northing	Easting	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Well Depth (feet bgs)	Casing Diameter (inches)	Well Screen Slot Size (inches)	Filter Pack
PZ-01	8/21/2014	12/18/2014	343.18	328.44	2081792.36	6148269.44	15.3	19.7	20.3	2.00	0.010	#20/40 and 2/12 sand
PZ-02	8/22/2014	12/18/2014	342.93	328.54	2081986.53	6148237.08	15.5	19.9	20.4	2.00	0.010	#20/40 and 2/12 sand
PZ-03	8/22/2014	12/18/2014	342.10	328.38	2082005.33	6148289.18	15.1	19.6	20.2	2.00	0.010	#20/40 and 2/12 sand

Notes

1. The piezometer destruction will be documenting in a separate report to be provided by Amec Foster Wheeler.
2. The piezometers were surveyed by Kister, Savio, and Rei, Inc., of Pinole, California, relative to the NAD 83 horizontal datum and NAVD88 vertical datum.

Abbreviations

feet bgs = below ground surface
NAD = North American Datum
NAVD = North American Vertical Datum

ATTACHMENT A-1

Boring and Well Permit

ZONE 7 WATER AGENCY

100 NORTH CANYONS PARKWAY, LIVERMORE, CALIFORNIA 94551 VOICE (925) 454-5000 FAX (925) 245-9306
E-MAIL whong@zone7water.com

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT Former Crown Chevrolet Cadillac Isuzu
7544 Dublin blvd., Dublin CA

Coordinates Source ___ ft. Accuracy∀ ___ ft.
LAT: 37.70368 ft. LONG: -121.92838 ft.
APN 941-1500-15-09

CLIENT
Name Terri Costello
Address 12 Meadowlark Ct. Phone 925-984-1426
City Danville, CA Zip 94526

APPLICANT
Name AMEC E&I (Alex Rosenthal)
Email alex.Rosenthal@amec.com Fax 510-663-4141
Address 180 Grand Ave, Suite 1100 Phone 510-663-4152
City Oakland, CA Zip 94612

TYPE OF PROJECT:
Well Construction X
Well Destruction ___
Cathodic Protection ___
Geotechnical Investigation ___
Contamination Investigation X
Other ___ ___

PROPOSED WELL USE:
Domestic ___
Municipal ___
Industrial ___
Dewatering ___
Irrigation ___
Remediation ___
Groundwater Monitoring X
Other ___ ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Hollow Stem Auger X
Cable Tool ___ Direct Push X Other ___ ___

DRILLING COMPANY National Exploration, Wells and Pumps
DRILLER'S LICENSE NO. C57 953646

WELL SPECIFICATIONS:
Drill Hole Diameter 8.25 in. Maximum
Casing Diameter 2 in. Depth 20 ft.
Surface Seal Depth 12 ft. Number 3

SOIL BORINGS:
Number of Borings 18 Maximum
Hole Diameter 3.25 in. Depth 35 ft.

ESTIMATED STARTING DATE 8/18/14
ESTIMATED COMPLETION DATE 8/25/14

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE ___ Date 8/7/14

ATTACH SITE PLAN OR SKETCH

FOR OFFICE USE

PERMIT NUMBER 2014117
WELL NUMBER 3S/1W-1E28 to 1E30 (P-01 to P-03)
APN 941-1500-015-09

PERMIT CONDITIONS
(Circled Permit Requirements Apply)

[✓ A.] GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to your proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original **Department of Water Resources Water Well Drillers Report (DWR Form 188), signed by the driller**.
3. Permit is void if project not begun within 90 days of approval date.
4. **Notify Zone 7 at least 24 hours before the start of work.**

B. WATER SUPPLY WELLS
1. Minimum surface seal diameter is four inches greater than the well casing diameter.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.
3. Grout placed by tremie.
4. An access port at least 0.5 inches in diameter is required on the wellhead for water level measurements.
5. A sample port is required on the discharge pipe near the wellhead.

[✓ C.] GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal diameter is four inches greater than the well or piezometer casing diameter.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.
3. Grout placed by tremie.

D. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

E. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION. See attached.

G. SPECIAL CONDITIONS. Submit to Zone 7 within 60 days after completion of permitted work the well installation report **including all soil and water laboratory analysis results**.

Approved Wyman Hong Date 8/15/14
Wyman Hong

Revised: January 4, 2010

🟥 = proposed boring location

🟩 = proposed piezometer location

PERMIT 2014117
APN: 941-1500-015-09

ATTACHMENT A-2

Boring and Piezometer Logs

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Boring No. PRB-04

BORING LOCATION: 2081942.2910, 6148216.0051

ELEVATION AND DATUM: 343.65' (NAVD 88)

DRILLING CONTRACTOR: National Exploration Wells and Pumps

DATE STARTED: 8/18/14

DATE FINISHED: 8/18/14

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 35.0

MEASURING POINT: Ground Surface

DRILLING EQUIPMENT: Geoprobe 7730DT

DEPTH TO WATER (ft.) FIRST 17.5 COMPL. NA

SAMPLING METHOD: Geoprobe DT32 dual-tube sampling system [5' x 3.25"]

LOGGED BY: A. Rosenthal

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: A. Whitmarsh

REG. NO. PG 8541

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 343.65	REMARKS
					ASPHALTIC CONCRETE (8 inches)	
1				0	AGGREGATE BASE (5 inches)	
					LEAN CLAY with SAND (CL): very dark gray (10YR 3/1), moist, 80% low palsticity fines, 20% fine sand, hard	
2				0		Hand augered to 5 feet bgs
3				0	SANDY LEAN CLAY (CL)	
4				0	CLAYEY SAND (SC): dark brown (10YR 3/3), moist, 60% fine to medium sand, 40% low plasticity fines	
5				0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine sand, firm	OVM = MiniRAE 2000 PID calibrated with 100 ppm isobutylene standard
6				0		
7				0		
8				0	60% fines, 40% fine to medium sand	
9				0		
10				0		
11				0		
12				0		
13				0	70% fines, 30% fine to medium sand, hard	
14				0		
15						

OAKBOREV (REV. 8/2011)

Log of Boring No. PRB-04 (cont'd)

DEPTH (feet)	SAMPLES			OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
	Sample No.	Sample	Blows/ Foot			
				0	CLAYEY SAND (SC): dark brown (10YR 3/3), moist, 60% fine to medium sand, 40% low plasticity fines	
16				0		
17				0		
					wet, 80% fine to medium sand, 20% fines	
18	PRB-04-18.5	■		0		
					60% fine to medium sand, 40% fines	
19				0	SANDY LEAN CLAY (CL): very dark grayish brown (10YR 3/2), moist, 60% low plasticity fines, 40% fine sand, hard	
	PRB-04-20.0	■				
20				0		
					CLAYEY SAND (SC): dark brown (10YR 3/3), wet, 60% fine to medium sand, 40% low plasticity fines	
21				0		
22				0		
23				0		
24				0		
25				0		
26				0		
27				0		
28				0		
29				0	LEAN CLAY with SAND (CL): very dark grayish brown (10YR 3/2), moist, 80% low plasticity fines, 20% fine sand, firm	
30				0	LEAN CLAY (CL): very dark grayish brown (10YR 3/2), moist, 90% low plasticity fines, 10% fine sand, hard	
31				0		
					LEAN CLAY with SAND (CL): brown (10YR 5/3), moist, 80% low plasticity fines, 20% fine sand, firm	
32				0		
					SANDY LEAN CLAY (CL): brown (10YR 5/3), moist, 60% low plasticity fines, 40% fine sand, firm	
33						

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Boring No. PRB-04 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		REMARKS
				0	SANDY LEAN CLAY (CL): continued		Borehole destroyed using type II/V neat cement grout placed from total depth to ground surface with a tremie pipe
34				0	CLAYEY SAND (SC): brown (10YR 5/3), wet, 70% fine to medium sand, 30% low plasticity fines		
				0			
35					Bottom of boring at 35 feet		
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							

OAKBOREV (REV. 8/2011)

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-01

BORING LOCATION: Latitude: 37.703537492; Longitude: -121.929015074

TOP OF CASING ELEVATION AND DATUM: 343.18' (NAVD 88)

DRILLING CONTRACTOR: National Exploration Wells and Pumps

DATE STARTED: 8/21/14

DATE FINISHED: 8/21/14

DRILLING METHOD: Direct push/Hollow Stem Auger

TOTAL DEPTH (ft.): 20.3

SCREEN INTERVAL (ft.): 15.3-19.7

DRILLING EQUIPMENT: Geoprobe 7730DT

DEPTH TO WATER (ft.): FIRST 12.5 COMPL. 12.01

CASING: 2" Sch. 40 PVC

SAMPLING METHOD: Geoprobe DT22 dual-tube sampling system [5’ x 1.125"]

LOGGED BY: A. Rosenthal

HAMMER WEIGHT: NA

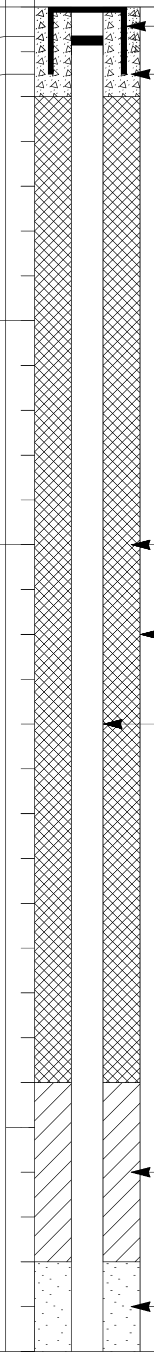
DROP: NA

RESPONSIBLE PROFESSIONAL: A. Whitmarsh

REG. NO. PG 8541

DEPTH (feet)	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 343.18
0		ASPHALTIC CONCRETE (4 inches)
		AGGREGATE BASE (5 inches)
1	0	LEAN CLAY with SAND (CL): very dark gray (10YR 3/1), moist, 80% low palsticity fines, 20% fine sand, hard
2	0	
3	0	SANDY LEAN CLAY (CL)
4	0	CLAYEY SAND (SC): dark brown (10YR 3/3), moist, 60% fine to medium sand, 40% low plasticity fines
5	0	
6	0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine sand, firm
7	0	
7.5		70% fines, 30% fine to medium sand
8	0	
9	0	
10	0	
11	0	
12	0	
13	0	CLAYEY SAND (SC): dark yellowish brown (10YR 4/4), wet, 30% fines, 70% fine to medium sand
14		
15		

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note
1. Hand augered to 5 feet bgs
2. Boring location coordinates are based on North American Datum of 1983
3. OVM = MiniRAE 2000 PID calibrated with 100 ppm isobutylene standard

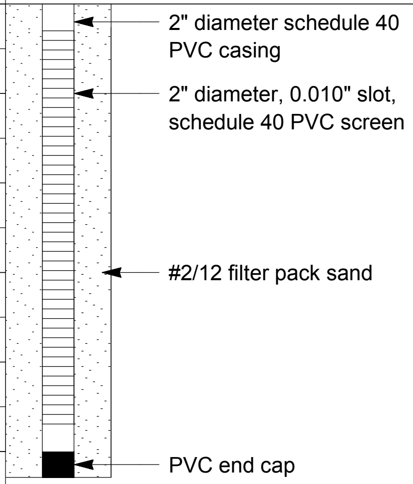
OAKWELLV_TOC (REV. 8/2011)

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-01 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				0	CLAYEY SAND (SC): continued
16				0	
17				0	SANDY LEAN CLAY (CL)
18				0	LEAN CLAY (CL): dark gray (10YR 4/1), moist, 90% low plasticity fines, 10% fine sand, firm
19					
20					Bottom of boring at 20 feet
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



OAKWELLV_TOC (REV. 8/2011)

amec

Project No. OD10160070

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-02

BORING LOCATION: Latitude: 37.704069339; Longitude: -121.929137149

TOP OF CASING ELEVATION AND DATUM: 342.93' (NAVD 88)

DRILLING CONTRACTOR: National Exploration Wells and Pumps

DATE STARTED: 8/22/14

DATE FINISHED: 8/22/14

DRILLING METHOD: Direct push/Hollow Stem Auger

TOTAL DEPTH (ft.): 20.4

SCREEN INTERVAL (ft.): 15.5-19.9

DRILLING EQUIPMENT: Geoprobe 7730DT

DEPTH TO WATER (ft.): FIRST 14.2 COMPL. 11.74

CASING: 2" Sch. 40 PVC

SAMPLING METHOD: Geoprobe DT22 dual-tube sampling system [5' x 1.125"]

LOGGED BY: A. Rosenthal

HAMMER WEIGHT: NA

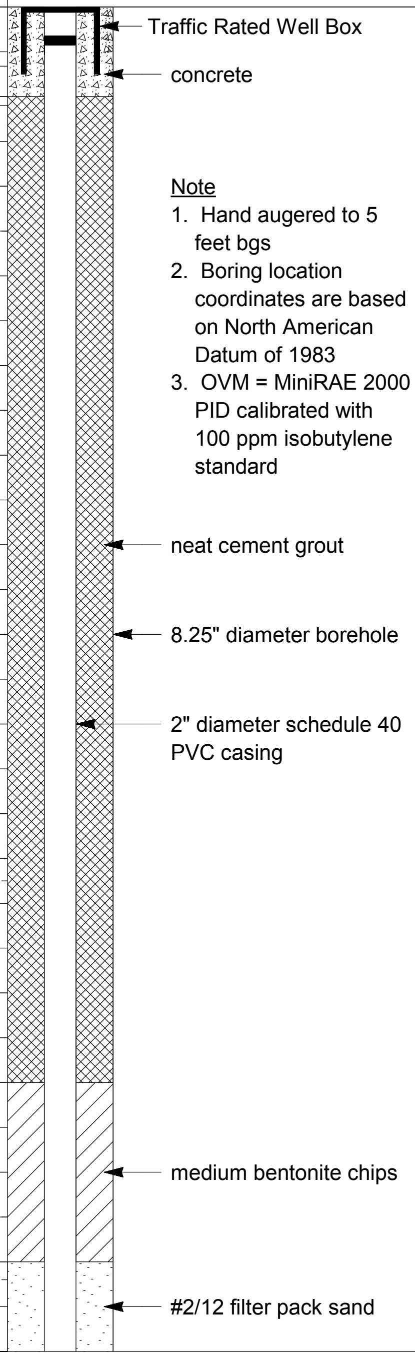
DROP: NA

RESPONSIBLE PROFESSIONAL: A. Whitmarsh

REG. NO. PG 8541

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 342.93
					ASPHALTIC CONCRETE (8 inches)
					AGGREGATE BASE (5 inches)
1				0	LEAN CLAY with SAND (CL): very dark gray (10YR 3/1), moist, 80% low plasticity fines, 20% fine sand, hard
2				0	
					SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine to medium sand, firm
3				0	
4				0	
5				0	
6				0	
7				0	CLAYEY SAND (SC)
8				0	
9				0	
10				0	LEAN CLAY with SAND (CL): dark brown (10YR 3/3), moist, 80% low plasticity fines, 20% fine sand, firm
11				0	
12				0	
13				0	
14				0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine to medium sand, firm
					CLAYEY SAND (SC): dark gray (5Y 4/1), wet, 60% fine to medium sand, 40% low plasticity fines
15					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



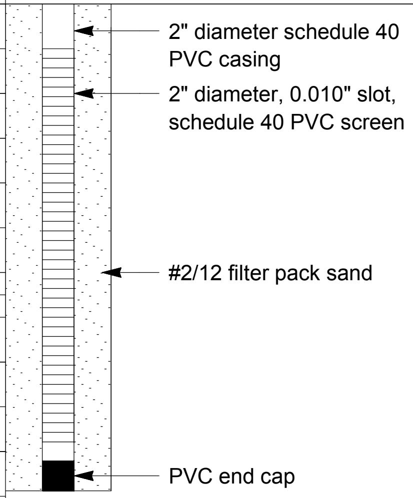
Note
1. Hand augered to 5 feet bgs
2. Boring location coordinates are based on North American Datum of 1983
3. OVM = MiniRAE 2000 PID calibrated with 100 ppm isobutylene standard

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine sand, firm
16	PZ-02-16.0	■			
				0	CLAYEY SAND (SC): dark brown (10YR 3/3), wet, 60% fine to medium sand, 40% low plasticity fines
17				0	70% fine to coarse sand, 30% fines
18	PZ-02-18.0	■		0	60% fine to medium sand, 40% fines
					SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine sand, firm
19	PZ-02-19.5	■			LEAN CLAY (CL): dark gray (10YR 4/1), moist, 90% low plasticity fines, 10% fine sand, hard
20					Bottom of boring at 20 feet

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



OAKWELLV_TOC (REV. 8/2011)

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-03

BORING LOCATION: Latitude: 37.704123140; Longitude: -121.928958058

TOP OF CASING ELEVATION AND DATUM: 342.10' (NAVD 88)

DRILLING CONTRACTOR: National Exploration Wells and Pumps

DATE STARTED: 8/22/14

DATE FINISHED: 8/22/14

DRILLING METHOD: Direct push/Hollow Stem Auger

TOTAL DEPTH (ft.): 20.2

SCREEN INTERVAL (ft.): 15.1-19.6

DRILLING EQUIPMENT: Geoprobe 7730DT

DEPTH TO WATER (ft.): FIRST 15.5 COMPL. 11.04

CASING: 2" Sch. 40 PVC

SAMPLING METHOD: Geoprobe DT22 dual-tube sampling system [5’ x 1.125"]

LOGGED BY: A. Rosenthal

HAMMER WEIGHT: NA

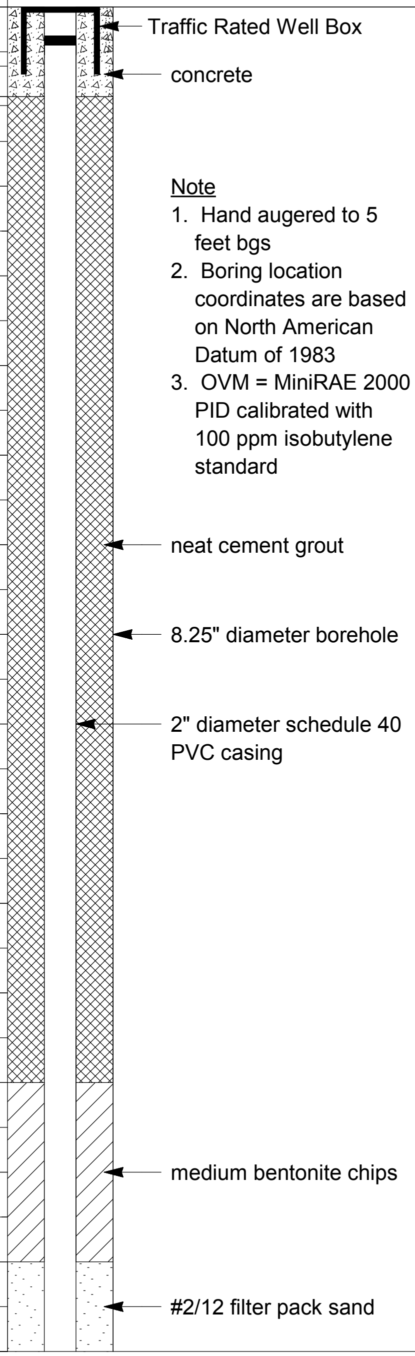
DROP: NA

RESPONSIBLE PROFESSIONAL: A. Whitmarsh

REG. NO. PG 8541

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 342.10
					ASPHALTIC CONCRETE (8 inches)
1				0	AGGREGATE BASE (5 inches) LEAN CLAY with SAND (CL): very dark gray (10YR 3/1), moist, 80% low plasticity fines, 20% fine sand, hard
2				0	
3				0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine to medium sand, firm
4				0	
5				0	
6				0	
7				0	CLAYEY SAND (SC)
8				0	
9					LEAN CLAY with SAND (CL): dark brown (10YR 3/3), moist, 80% low plasticity fines, 20% fine sand, hard
10				0	
11				0	
12				0	dark gray (10YR 4/1)
13				0	
14				0	SANDY LEAN CLAY (CL): dark gray (10YR 4/1), moist, 60% low plasticity fines, 40% fine to medium sand, firm LEAN CLAY with SAND (CL): dark gray (10YR 4/1), moist, 80% low plasticity fines, 20% fine sand, firm
15					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note
1. Hand augered to 5 feet bgs
2. Boring location coordinates are based on North American Datum of 1983
3. OVM = MiniRAE 2000 PID calibrated with 100 ppm isobutylene standard

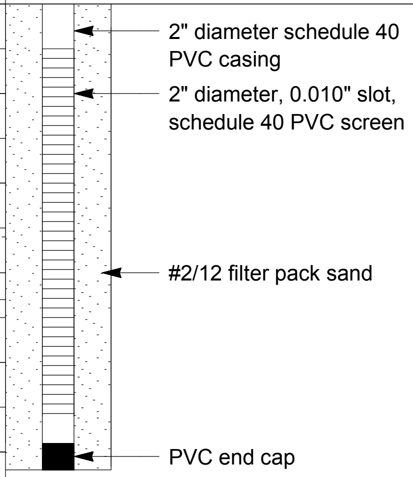
OAKWELLV_TOC (REV. 8/2011)

PROJECT: CROWN CHEVROLET
7544 Dublin Blvd., Dublin, CA

Log of Well No. PZ-03 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				0	LEAN CLAY with SAND (CL): continued
16				0	CLAYEY SAND (SC): dark brown (10YR 3/3), wet, 60% fine sand, 40% low plasticity fines LEAN CLAY WITH SAND (CL)
17				0	SANDY LEAN CLAY (CL): dark brown (10YR 3/3), moist, 60% low plasticity fines, 40% fine sand, firm
18				0	LEAN CLAY with SAND (CL): dark brown (10YR 3/3), moist, 80% low plasticity fines, 20% fine sand, firm
19				0	LEAN CLAY (CL): very dark gray (10YR 3/1), moist, 90% low plasticity fines, 10% fine sand, hard
20					Bottom of boring at 20 feet
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



OAKWELLV_TOC (REV. 8/2011)

ATTACHMENT A-3

Well Development Records

amec

WELL DEVELOPMENT FORM

Job Number: 0D10160070.00012.A

Project: Crown Chevy

Development Method: Surge/pump

Well No. PZ-01

Personnel: A Rosenthal

Total Depth: 20.0

Date: 8/25/14

Time	Depth to water ft.	Gallons Removed	Turbidity (Ntu)	pH	Temp C	Electrical Conductivity	D.O. mg/liter	Redox Mv	Recovery Rate Inches/min.	Recovery Rate gpm	
1540	~14										Surge for 15 min
1604	14.30	4	>1000	6.82	23.6	1433					bail ~4 gallons
1607	14.30	8	>1000	6.79	22.3	1377					
1609	14.30	9	1000	6.83	21.8	1358					
1614	14.30	14	>1000	6.83	23.0	1373					
1616	14.30	15	1000	6.75	22.0	1355					
1619	14.30	20	>1000	6.70	21.8	1326					
1621	14.30	22	244	6.70	21.6	1332					
1625	14.30	25	757	6.79	21.5	1335					
1627	14.30	27	150	6.75	21.5	1326					
1629	14.30	29	47	6.77	21.3	1329					
1631	14.30	31	23	6.76	21.3	1324					

Subtotal Gallons Removed:

Total Gallons Removed:

Reviewed by

amec

WELL DEVELOPMENT FORM

Job Number: OD10160070.0012. A

Project: Crown Cheny

Development Method Surge/Pump

Well No. PZ-02

Personnel: A Rosenthal

Total Depth: 20.0'

Date: 8/25/14

BTOC ↓

Time	Depth to water ft.	Gallons Removed	Turbidity (Ntu)	pH	Temp C	Electrical Conductivity	D.O. mg/liter	Redox Mv	Recovery Rate Inches/min.	Recovery Rate gpm	
1300	13.81	0									Surge For 15 Min
1320	13.94	0									Begin bailing.
1336	13.81	4	>100	6.88	21.9	1340					
1347	13.86	7	>1000	6.92	24.3	1321					
1400	13.90	8	>1000	6.87	22.9	1277					
1403	13.89	9	594	6.92	22.5	1258					
1406	13.93	10	102	6.98	22.1	1251					
1426	14.01	12	346	6.68	24.2	1215					
1430	14.27	13	183	6.64	228	1208					
1431	14.25	14	198	6.82	22.4	1200					
1433	13.91	15	47	6.83	22.7	1210					

Subtotal Gallons Removed: ____

Total Gallons Removed: ____

Reviewed by ____

WELL DEVELOPMENT FORM

Job Number: 0D1016070.0012.A

Project: Crown Chevy

Development Method Surge/Pump

Well No. PZ-03

Personnel: A Rosenthal

Total Depth: 20.0

Date: 8/25/14

Time	Depth to water ft.	Gallons Removed	Turbidity (Ntu)	pH	Temp C	Electrical Conductivity	D.O. mg/liter	Redox Mv	Recovery Rate Inches/min.	Recovery Rate gpm	
1445	13.20										Surge block for 15 min
1515	14.34	4	>1000	7.04	23.6	1293					bail 3 gal, begin pumping.
1520	13.15	6	732	7.09	23.2	1245					
1522	13.32	7	356	7.23	23.3	1244					
1524	13.32	8	>1000	7.21	23.1	1291					
1527	13.33	10	886	7.22	23.0	1312					
1529	13.10	11	>1000	7.24	22.7	1346					

Subtotal Gallons Removed:

Total Gallons Removed:

Reviewed by

ATTACHMENT A-4

Waste Disposal Manifests

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number NOT REQUIRED

2. Page 1 of 1

3. Emergency Response Phone 800-424-9300

4. Waste Tracking Number 214668

5. Generator's Name and Mailing Address

Crown Chevrolet Inc.
7544 Dublin Blvd., Dublin CA

Generator's Phone (925) 828-6500

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name American Integrated Services, Inc. U.S. EPA ID Number CAR000148338

7. Transporter 2 Company Name U.S. EPA ID Number

8. Designated Facility Name and Site Address

Potrero Hills Landfill
3675 Potrero Hills Lane
Suisun, CA 94585

Facility's Phone:

U.S. EPA ID Number NOT REQUIRED

GENERATOR

9a.	9b. U.S. DOT Description (including Proper Shipping Name)	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
	1. Non-Hazardous Waste Solid, (Soil)	010	DM	5000	P
	2.				
	3.				
	4.				

13. Special Handling Instructions and Additional Information

Wear level D PPE while handling. Weights or volumes are approximate. 24 hour emergency number (888) 423-6060

Profile#: PHLF11058
Project #: 74026-17-1

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name JESS COSTELLO Signature Jess Costello Month 11 Day 12 Year 14

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgement of Receipt of Materials

Transporter 1 Printed/Typed Name MARCO MARTINEZ Signature Marco Mart Month 11 Day 12 Year 14

Transporter 2 Printed/Typed Name Signature Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name Signature Month 12 Day 41 Year 14

169-BLC-O 5 11977 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	NOT REQUIRED	1	800-424-9300	214670

GENERATOR

5. Generator's Name and Mailing Address
CROWN CHEVROLET INC
7544 Dublin Blvd., Dublin CA 94568
Generator's Phone (925)828-6500

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
American Integrated Services, Inc.
U.S. EPA ID Number CAR000146338

7. Transporter 2 Company Name
Environmental Waste Inc
U.S. EPA ID Number CAR000217513

8. Designated Facility Name and Site Address
Crosby & Overton, Inc.
1630 W. 16th Street
Long Beach, CA. 90813
Facility's Phone: 562-432-5445
U.S. EPA ID Number CAD028409019

9a.	9b. U.S. DOT Description (including Proper Shipping Name)	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
	1. NON-HAZARDOUS WASTE LIQUID (WATER)	005	DM	275	G
	2.				
	3.				
	4.				

13. Special Handling Instructions and Additional Information

Wear protective equipment while handling, splash protection. Weights or volumes are approximate. 24 hour emergency number (888) 423-6060

Profile#: 27578
Project #: 74020-17-1

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: JEFF COSTELLO
Signature: Jeff Costello
Month 11 Day 12 Year 14

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Port of entry/exit:
Transporter Signature (for exports only):
Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgement of Receipt of Materials

Transporter 1 Printed/Typed Name: MARCO MARTINEZ
Signature: Marco Mtz
Month 11 Day 12 Year 14

Transporter 2 Printed/Typed Name: Lee M Christensen
Signature: L Christen
Month 12 Day 04 Year 14

DESIGNED FACILITY

17. Discrepancy

17a Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

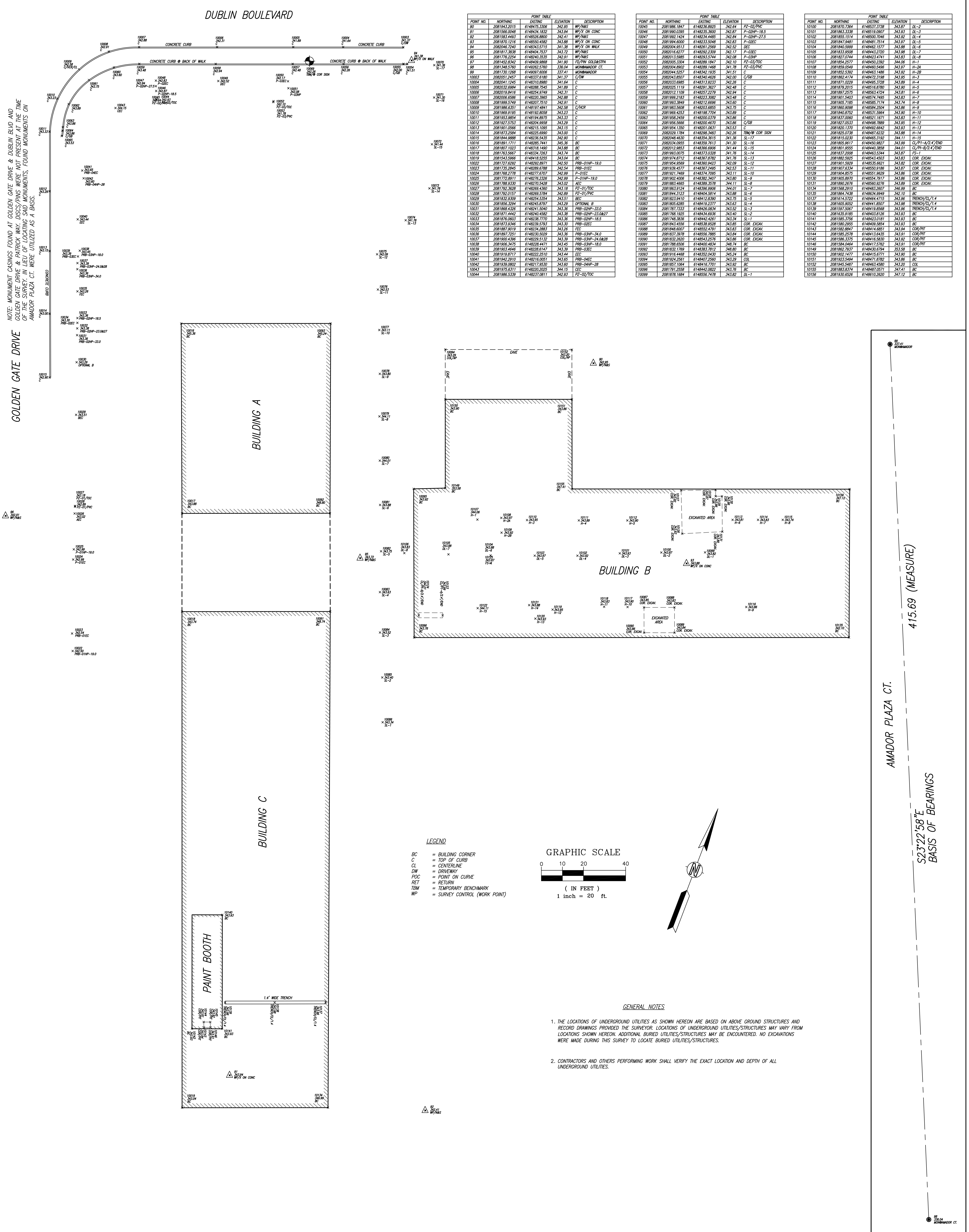
Printed/Typed Name
Signature
Month Day Year

169-BLC-O 5 11977 (Rev. 9/09)

TRANSPORTER #1

ATTACHMENT A-5

Survey Data



NOTE: MONUMENT CASINGS FOUND AT GOLDEN GATE DRIVE & DUBLIN BLVD AND GOLDEN GATE DRIVE & PATRICK WAY. DISCS/PINS WERE NOT PRESENT AT THE TIME OF THE SURVEY. IN LIEU OF LOCATING SAID MONUMENTS, FOUND MONUMENTS ON AMADOR PLAZA CT. WERE UTILIZED AS A BASIS.

POINT TABLE

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
90	2081943.2015	6148475.3306	342.95	WP/N&S
91	2081566.0048	6148434.1832	343.94	WP/X ON CONC
92	2081583.4493	6148526.8800	342.41	WP/N&S
93	2081870.1216	6148550.4582	343.88	WP/X ON CONC
94	2082046.7240	6148343.5715	341.38	WP/X ON WALK
95	2081817.3838	6148404.7537	343.72	WP/N&S
96	2081776.2254	6148240.3535	342.91	WP/N&S
97	2081452.8342	6148409.9868	341.90	FD/PIN GOLD&STPA
98	2081348.5760	6149262.5760	336.04	MON@AMADOR CT.
99	2081730.1268	6149097.6006	337.41	MON@AMADOR
10003	2082051.2457	6148337.6180	341.37	C/DW
10004	2082041.1245	6148310.8980	341.64	C
10005	2082032.6984	6148288.7545	341.89	C
10006	2082019.8416	6148254.9749	342.31	C
10007	2082006.6586	6148220.3965	342.88	C
10008	2081999.5749	6148207.7510	342.91	C
10009	2081986.6351	6148197.4841	342.58	C/HCR
10010	2081969.9195	6148192.8058	343.23	C
10011	2081953.9854	6148194.8975	343.33	C
10012	2081927.5753	6148204.9958	343.29	C
10013	2081901.0566	6148215.1095	343.15	C
10014	2081873.2584	6148225.6990	343.00	C
10015	2081844.9888	6148236.5435	342.90	C
10016	2081891.1711	6148285.7441	345.36	BC
10017	2081807.1023	6148318.1490	343.88	BC
10018	2081763.5667	6148334.7263	343.74	BC
10019	2081543.5966	6148418.5255	343.04	BC
10022	2081727.6292	6148292.8971	342.50	PRB-01HP-19.0
10023	2081735.2845	6148289.6788	342.54	PRB-01EC
10024	2081768.2778	6148277.6707	342.99	P-01EC
10025	2081772.8911	6148276.2326	342.99	P-01HP-19.0
10026	2081788.9330	6148270.5428	343.02	AEC
10027	2081792.3628	6148269.4360	343.18	PZ-01/TOC
10028	2081792.0157	6148269.5784	342.89	PZ-01/PVC
10029	2081832.9309	6148254.5354	343.51	BEC
10030	2081856.3294	6148245.8797	343.29	OPTIONAL B
10031	2081868.4326	6148241.5040	343.36	PRB-02HP-33.0
10032	2081871.4442	6148240.4582	343.38	PRB-02HP-23.0&27
10033	2081876.0603	6148238.7770	343.36	PRB-02HP-18.5
10034	2081873.9346	6148239.5793	343.30	PRB-02EC
10035	2081887.9019	6148234.2883	343.26	FEC
10036	2081897.7251	6148230.5029	343.36	PRB-03HP-34.0
10037	2081900.4396	6148229.5132	343.39	PRB-03HP-24.0&28
10038	2081906.3475	6148228.4471	343.45	PRB-03HP-18.0
10039	2081903.4646	6148228.6147	343.39	PRB-03EC
10040	2081919.8717	6148222.2510	343.44	EEC
10041	2081942.2910	6148216.0051	343.65	PRB-04EC
10042	2081939.0802	6148217.9530	343.60	PRB-04HP-28
10043	2081975.6311	6148220.2025	344.15	CEC
10044	2081986.5339	6148237.0811	342.93	PZ-02/TOC

POINT TABLE

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
10045	2081986.1847	6148236.8925	342.64	PZ-02/PVC
10046	2081990.0395	6148235.3600	342.87	P-02HP-18.5
10047	2081992.1424	6148234.4485	342.84	P-02HP-27.5
10048	2081994.6000	6148233.5048	342.83	P-02EC
10049	2082004.9513	6148261.2569	342.52	DEC
10050	2082016.6277	6148292.2309	342.17	P-03EC
10051	2082013.5985	6148293.5744	342.08	P-03HP
10052	2082005.3304	6148289.1847	342.10	PZ-03/TOC
10053	2082004.8902	6148289.1468	341.78	PZ-03/PVC
10054	2082044.5257	6148342.1935	341.51	C
10055	2082043.8507	6148340.4626	342.00	C/GB
10056	2082033.6985	6148313.9233	342.26	C
10057	2082025.1119	6148291.3627	342.48	C
10058	2082012.1109	6148257.2279	342.94	C
10059	2081999.2183	6148223.3082	343.48	C
10060	2081993.3849	6148212.6696	343.60	C
10061	2081983.5608	6148203.6855	343.75	C
10062	2081969.4253	6148198.7704	343.89	C
10063	2081958.2459	6148200.0379	343.86	C
10064	2081956.5666	6148200.4670	343.86	C/GB
10065	2081954.1350	6148201.0631	343.53	C
10069	2082029.1784	6148298.3483	342.26	TBM/@ COR SIGN
10070	2082048.4630	6148354.3615	341.36	SL-17
10071	2082034.0955	6148359.7613	341.30	SL-16
10072	2082012.9853	6148366.6906	341.44	SL-15
10073	2081993.0075	6148373.0328	341.76	SL-14
10074	2081974.8712	6148367.8782	341.76	SL-13
10075	2081954.9569	6148360.9423	342.09	SL-12
10076	2081939.4577	6148367.2495	342.53	SL-11
10077	2081921.7469	6148374.7095	343.11	SL-10
10078	2081902.4006	6148382.3407	343.80	SL-9
10079	2081883.4665	6148389.3578	344.11	SL-8
10080	2081863.9124	6148396.9906	344.01	SL-7
10081	2081844.3123	6148404.5814	343.88	SL-6
10082	2081823.9410	6148412.8390	343.75	SL-5
10083	2081805.6285	6148419.2377	343.63	SL-4
10084	2081787.7333	6148426.0834	343.52	SL-3
10085	2081768.1925	6148434.6936	343.40	SL-2
10086	2081748.3836	6148442.4261	343.34	SL-1
10087	2081843.4556	6148538.9528	343.85	COR. EXCAV.
10088	2081848.6007	6148552.4791	343.83	COR. EXCAV.
10089	2081837.3978	6148556.7885	343.84	COR. EXCAV.
10090	2081832.2620	6148543.2576	343.86	COR. EXCAV.
10091	2081788.6506	6148400.4834	348.74	BC
10092	2081832.1769	6148383.7812	348.80	BC
10093	2081916.4468	6148352.0430	345.24	BC
10094	2081924.2561	6148407.2560	343.29	COL
10095	2081857.1064	6148416.7701	343.92	BC
10096	2081791.2558	6148442.0822	343.76	BC
10099	2081878.1684	6148556.7478	343.82	DL-1

POINT TABLE

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
10100	2081870.7364	6148537.3738	343.87	DL-2
10101	2081863.3338	6148519.0907	343.93	DL-3
10102	2081855.1514	6148500.7046	343.92	DL-4
10103	2081847.9481	6148481.7514	343.97	DL-5
10104	2081840.5999	6148462.1577	343.88	DL-6
10105	2081833.9508	6148443.2720	343.98	DL-7
10106	2081827.0744	6148423.4741	343.83	DL-8
10107	2081854.2577	6148450.2392	344.06	H-1
10108	2081859.0549	6148460.5496	343.97	H-2A
10109	2081852.5392	6148463.1486	343.92	H-2B
10110	2081862.4174	6148472.3198	343.95	H-3
10111	2081871.0229	6148495.3728	343.89	H-4
10112	2081879.2015	6148516.8780	343.90	H-5
10113	2081897.2575	6148563.4724	343.81	H-6
10114	2081901.5403	6148574.7495	343.83	H-7
10115	2081905.7185	6148585.7174	343.74	H-8
10116	2081860.9098	6148584.2504	343.86	H-9
10117	2081840.8752	6148531.5964	343.90	H-10
10118	2081837.0060	6148521.1671	343.83	H-11
10119	2081827.0533	6148498.7889	343.95	H-12
10120	2081820.1370	6148492.6642	343.93	H-13
10121	2081825.0738	6148487.6232	343.88	H-14
10122	2081815.0230	6148465.3192	344.11	H-15
10123	2081805.9617	6148450.9827	343.99	CL/P1-A/2.4'/END
10124	2081801.9555	6148440.3858	344.01	CL/PI-B/2.4'/END
10125	2081837.2008	6148463.5344	343.87	FS-1
10126	2081882.5925	6148543.4503	343.83	COR. EXCAV.
10127	2081901.5929	6148535.6621	343.82	COR. EXCAV.
10128	2081907.6334	6148550.9186	343.87	COR. EXCAV.
10129	2081904.8575	6148551.9629	343.86	COR. EXCAV.
10130	2081905.8970	6148554.7917	343.86	COR. EXCAV.
10131	2081890.2676	6148560.9276	343.89	COR. EXCAV.
10134	2081568.2910	6148483.2607	346.99	BC
10135	2081864.7438	6148634.9949	342.10	BC
10137	2081614.5722	6148464.4715	343.96	TRENCH/CL/1.4
10138	2081605.9052	6148441.8507	343.98	TRENCH/CL/1.4
10139	2081597.5067	6148419.8568	343.96	TRENCH/CL/1.4
10140	2081635.9185	6148403.8126	343.93	BC
10141	2081585.3756	6148423.0181	343.93	BC
10142	2081580.2955	6148409.5854	343.93	BC
10143	2081582.8847	6148414.6851	343.94	COR/PIT
10144	2081585.2578	6148413.6435	343.91	COR/PIT
10145	2081586.3375	6148416.5830	343.92	COR/PIT
10146	2081584.0464	6148417.5762	343.91	COR/PIT
10149	2081862.7937	6148430.6794	353.58	BC
10150	2081902.1477	6148415.6771	343.90	BC
10151	2081923.5494	6148471.8782	343.86	BC
10152	2081945.5487	6148463.4580	343.20	COL
10155	2081883.8374	6148487.0571	347.41	BC
10156	2081930.6526	6148610.2620	347.12	BC

LEGEND

BC	=	BUILDING CORNER
C	=	TOP OF CURB
CL	=	CENTERLINE
DW	=	DRIVEWAY
POC	=	POINT ON CURVE
RET	=	RETURN
TBM	=	TEMPORARY BENCHMARK
WP	=	SURVEY CONTROL (WORK POINT)

GENERAL NOTES

1. THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN HEREON ARE BASED ON ABOVE GROUND STRUCTURES AND RECORD DRAWINGS PROVIDED THE SURVEYOR. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES.

2. CONTRACTORS AND OTHERS PERFORMING WORK SHALL VERIFY THE EXACT LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES.

REFERENCES

FIELD BOOK No.
FILE MAP:
TITLE CO.:
POLICY No.:
DATUM:
MISC. REF.:

REVISIONS

REV 1: 10/29/14
ADJUSTED X,Y & Z VALUES TO MATCH COORDINATE SYSTEM/DATUM FROM PREVIOUS SURVEY BY KSR, PROJECT NO. 19152.

KISTER, SAVIO & REI, INC.
LAND SURVEYORS – CIVIL ENGINEERS
825 SAN PABLO AVENUE
PINOLE, CALIFORNIA 94564

DESCRIPTION

LOCATION SURVEY
VARIOUS LOCATIONS BASED ON CLIENT DIRECTION
7544 DUBLIN BOULEVARD
DUBLIN CALIFORNIA

FOR: AMEC
SCALE: 1"=20'
JOB No. 19431
DATE: 10-03-14
DWG No. 0-1283

P:\projects\1943\19431-REV1.dwg 10/29/14

ATTACHMENT A-6

Laboratory Analytical Reports

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59372-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/20/2014 2:20:45 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Glossary

Abbreviation	**These commonly used abbreviations may or may not be present in this report.**
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59372-1

Job ID: 720-59372-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59372-1

Comments
No additional comments.

Receipt
The samples were received on 8/19/2014 4:50 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client Sample ID: PRB-03HP-18.0 — Lab Sample ID: 720-59372-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	45		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: PRB-02HP-18.5 — Lab Sample ID: 720-59372-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	39		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-03HP-18.0
Date Collected: 08/19/14 12:15
Date Received: 08/19/14 16:50

Lab Sample ID: 720-59372-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 02:37	1
Acetone	ND		50		ug/L			08/20/14 02:37	1
Benzene	ND		0.50		ug/L			08/20/14 02:37	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 02:37	1
Bromobenzene	ND		1.0		ug/L			08/20/14 02:37	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 02:37	1
Bromoform	ND		1.0		ug/L			08/20/14 02:37	1
Bromomethane	ND		1.0		ug/L			08/20/14 02:37	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 02:37	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 02:37	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 02:37	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 02:37	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 02:37	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 02:37	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 02:37	1
Chloroethane	ND		1.0		ug/L			08/20/14 02:37	1
Chloroform	ND		1.0		ug/L			08/20/14 02:37	1
Chloromethane	ND		1.0		ug/L			08/20/14 02:37	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 02:37	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 02:37	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 02:37	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 02:37	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 02:37	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 02:37	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 02:37	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 02:37	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 02:37	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 02:37	1
Dibromomethane	ND		0.50		ug/L			08/20/14 02:37	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 02:37	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 02:37	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 02:37	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 02:37	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 02:37	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 02:37	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 02:37	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 02:37	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 02:37	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 02:37	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 02:37	1
2-Hexanone	ND		50		ug/L			08/20/14 02:37	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 02:37	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 02:37	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 02:37	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 02:37	1
Naphthalene	ND		1.0		ug/L			08/20/14 02:37	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 02:37	1
Styrene	ND		0.50		ug/L			08/20/14 02:37	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 02:37	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-18.0
Lab Sample ID: 720-59372-1
Date Collected: 08/19/14 12:15
Matrix: Water
Date Received: 08/19/14 16:50

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 02:37	1
Tetrachloroethene	**45**		0.50		ug/L			08/20/14 02:37	1
Toluene	ND		0.50		ug/L			08/20/14 02:37	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 02:37	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 02:37	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 02:37	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 02:37	1
Trichloroethene	ND		0.50		ug/L			08/20/14 02:37	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 02:37	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 02:37	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 02:37	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 02:37	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 02:37	1
Vinyl acetate	ND		10		ug/L			08/20/14 02:37	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 02:37	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 02:37	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 02:37	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 02:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*100*		*67 - 130*		*08/20/14 02:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*72 - 130*		*08/20/14 02:37*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/20/14 02:37*	*1*

Client Sample ID: PRB-02HP-18.5
Lab Sample ID: 720-59372-2
Date Collected: 08/19/14 14:50
Matrix: Water
Date Received: 08/19/14 16:50

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 03:05	1
Acetone	ND		50		ug/L			08/20/14 03:05	1
Benzene	ND		0.50		ug/L			08/20/14 03:05	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 03:05	1
Bromobenzene	ND		1.0		ug/L			08/20/14 03:05	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 03:05	1
Bromoform	ND		1.0		ug/L			08/20/14 03:05	1
Bromomethane	ND		1.0		ug/L			08/20/14 03:05	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 03:05	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 03:05	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 03:05	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 03:05	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 03:05	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 03:05	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 03:05	1
Chloroethane	ND		1.0		ug/L			08/20/14 03:05	1
Chloroform	ND		1.0		ug/L			08/20/14 03:05	1
Chloromethane	ND		1.0		ug/L			08/20/14 03:05	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 03:05	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 03:05	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 03:05	1

Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-18.5
Date Collected: 08/19/14 14:50
Date Received: 08/19/14 16:50

Lab Sample ID: 720-59372-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:05	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:05	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:05	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 03:05	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 03:05	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 03:05	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 03:05	1
Dibromomethane	ND		0.50		ug/L			08/20/14 03:05	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 03:05	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 03:05	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 03:05	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 03:05	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 03:05	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 03:05	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 03:05	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 03:05	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 03:05	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 03:05	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 03:05	1
2-Hexanone	ND		50		ug/L			08/20/14 03:05	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 03:05	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 03:05	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 03:05	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 03:05	1
Naphthalene	ND		1.0		ug/L			08/20/14 03:05	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 03:05	1
Styrene	ND		0.50		ug/L			08/20/14 03:05	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 03:05	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 03:05	1
Tetrachloroethene	**39**		0.50		ug/L			08/20/14 03:05	1
Toluene	ND		0.50		ug/L			08/20/14 03:05	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 03:05	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 03:05	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 03:05	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 03:05	1
Trichloroethene	ND		0.50		ug/L			08/20/14 03:05	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 03:05	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 03:05	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 03:05	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 03:05	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 03:05	1
Vinyl acetate	ND		10		ug/L			08/20/14 03:05	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 03:05	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 03:05	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 03:05	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 03:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*67 - 130*		*08/20/14 03:05*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-18.5
Date Collected: 08/19/14 14:50
Date Received: 08/19/14 16:50

Lab Sample ID: 720-59372-2
Matrix: Water

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	98		72 - 130		08/20/14 03:05	1
Toluene-d8 (Surr)	96		70 - 130		08/20/14 03:05	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165258/4
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/19/14 19:57	1
Acetone	ND		50		ug/L			08/19/14 19:57	1
Benzene	ND		0.50		ug/L			08/19/14 19:57	1
Dichlorobromomethane	ND		0.50		ug/L			08/19/14 19:57	1
Bromobenzene	ND		1.0		ug/L			08/19/14 19:57	1
Chlorobromomethane	ND		1.0		ug/L			08/19/14 19:57	1
Bromoform	ND		1.0		ug/L			08/19/14 19:57	1
Bromomethane	ND		1.0		ug/L			08/19/14 19:57	1
2-Butanone (MEK)	ND		50		ug/L			08/19/14 19:57	1
n-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
sec-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
tert-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
Carbon disulfide	ND		5.0		ug/L			08/19/14 19:57	1
Carbon tetrachloride	ND		0.50		ug/L			08/19/14 19:57	1
Chlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
Chloroethane	ND		1.0		ug/L			08/19/14 19:57	1
Chloroform	ND		1.0		ug/L			08/19/14 19:57	1
Chloromethane	ND		1.0		ug/L			08/19/14 19:57	1
2-Chlorotoluene	ND		0.50		ug/L			08/19/14 19:57	1
4-Chlorotoluene	ND		0.50		ug/L			08/19/14 19:57	1
Chlorodibromomethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3-Dichloropropane	ND		1.0		ug/L			08/19/14 19:57	1
1,1-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/19/14 19:57	1
Ethylene Dibromide	ND		0.50		ug/L			08/19/14 19:57	1
Dibromomethane	ND		0.50		ug/L			08/19/14 19:57	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1-Dichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
Ethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
Hexachlorobutadiene	ND		1.0		ug/L			08/19/14 19:57	1
2-Hexanone	ND		50		ug/L			08/19/14 19:57	1
Isopropylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
4-Isopropyltoluene	ND		1.0		ug/L			08/19/14 19:57	1
Methylene Chloride	ND		5.0		ug/L			08/19/14 19:57	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/19/14 19:57	1
Naphthalene	ND		1.0		ug/L			08/19/14 19:57	1
N-Propylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
Styrene	ND		0.50		ug/L			08/19/14 19:57	1

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59372-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165258/4
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/19/14 19:57	1
Tetrachloroethene	ND		0.50		ug/L			08/19/14 19:57	1
Toluene	ND		0.50		ug/L			08/19/14 19:57	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/19/14 19:57	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/19/14 19:57	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
Trichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
Trichlorofluoromethane	ND		1.0		ug/L			08/19/14 19:57	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
Vinyl acetate	ND		10		ug/L			08/19/14 19:57	1
Vinyl chloride	ND		0.50		ug/L			08/19/14 19:57	1
Xylenes, Total	ND		1.0		ug/L			08/19/14 19:57	1
2,2-Dichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/19/14 19:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*96*		*67 - 130*		*08/19/14 19:57*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/19/14 19:57*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/19/14 19:57*	*1*

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	25.5		ug/L		102	62 - 130
Acetone	125	119		ug/L		95	26 - 180
Benzene	25.0	25.3		ug/L		101	79 - 130
Dichlorobromomethane	25.0	25.3		ug/L		101	70 - 130
Bromobenzene	25.0	25.5		ug/L		102	70 - 130
Chlorobromomethane	25.0	24.0		ug/L		96	70 - 130
Bromoform	25.0	25.8		ug/L		103	68 - 136
Bromomethane	25.0	20.8		ug/L		83	43 - 151
2-Butanone (MEK)	125	120		ug/L		96	54 - 130
n-Butylbenzene	25.0	24.9		ug/L		99	70 - 142
sec-Butylbenzene	25.0	25.2		ug/L		101	70 - 134
tert-Butylbenzene	25.0	25.6		ug/L		102	70 - 135
Carbon disulfide	25.0	22.9		ug/L		92	58 - 130
Carbon tetrachloride	25.0	24.3		ug/L		97	70 - 146
Chlorobenzene	25.0	24.2		ug/L		97	70 - 130
Chloroethane	25.0	21.5		ug/L		86	62 - 138
Chloroform	25.0	24.6		ug/L		98	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	21.8		ug/L		87	52 - 175
2-Chlorotoluene	25.0	26.1		ug/L		105	70 - 130
4-Chlorotoluene	25.0	26.1		ug/L		104	70 - 130
Chlorodibromomethane	25.0	25.7		ug/L		103	70 - 145
1,2-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,3-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,4-Dichlorobenzene	25.0	24.6		ug/L		99	70 - 130
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130
1,1-Dichloropropene	25.0	25.9		ug/L		104	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.5		ug/L		102	70 - 136
Ethylene Dibromide	25.0	25.0		ug/L		100	70 - 130
Dibromomethane	25.0	24.4		ug/L		98	70 - 130
Dichlorodifluoromethane	25.0	18.4		ug/L		73	34 - 132
1,1-Dichloroethane	25.0	25.0		ug/L		100	70 - 130
1,2-Dichloroethane	25.0	23.9		ug/L		96	61 - 132
1,1-Dichloroethene	25.0	21.6		ug/L		86	64 - 128
cis-1,2-Dichloroethene	25.0	24.6		ug/L		98	70 - 130
trans-1,2-Dichloroethene	25.0	23.6		ug/L		95	68 - 130
1,2-Dichloropropane	25.0	25.6		ug/L		102	70 - 130
cis-1,3-Dichloropropene	25.0	27.0		ug/L		108	70 - 130
trans-1,3-Dichloropropene	25.0	29.3		ug/L		117	70 - 140
Ethylbenzene	25.0	24.1		ug/L		96	80 - 120
Hexachlorobutadiene	25.0	25.1		ug/L		100	70 - 130
2-Hexanone	125	121		ug/L		97	60 - 164
Isopropylbenzene	25.0	24.8		ug/L		99	70 - 130
4-Isopropyltoluene	25.0	24.6		ug/L		99	70 - 130
Methylene Chloride	25.0	24.8		ug/L		99	70 - 147
4-Methyl-2-pentanone (MIBK)	125	128		ug/L		103	58 - 130
Naphthalene	25.0	26.9		ug/L		108	70 - 130
N-Propylbenzene	25.0	26.0		ug/L		104	70 - 130
Styrene	25.0	26.8		ug/L		107	70 - 130
1,1,1,2-Tetrachloroethane	25.0	25.8		ug/L		103	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.0		ug/L		100	70 - 130
Tetrachloroethene	25.0	23.4		ug/L		94	70 - 130
Toluene	25.0	24.6		ug/L		99	78 - 120
1,2,3-Trichlorobenzene	25.0	25.0		ug/L		100	70 - 130
1,2,4-Trichlorobenzene	25.0	25.3		ug/L		101	70 - 130
1,1,1-Trichloroethane	25.0	24.2		ug/L		97	70 - 130
1,1,2-Trichloroethane	25.0	25.5		ug/L		102	70 - 130
Trichloroethene	25.0	24.4		ug/L		97	70 - 130
Trichlorofluoromethane	25.0	24.4		ug/L		97	66 - 132
1,2,3-Trichloropropane	25.0	26.0		ug/L		104	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.8		ug/L		83	42 - 162
1,2,4-Trimethylbenzene	25.0	25.3		ug/L		101	70 - 132
1,3,5-Trimethylbenzene	25.0	26.0		ug/L		104	70 - 130
Vinyl acetate	25.0	19.6		ug/L		78	43 - 163
Vinyl chloride	25.0	19.1		ug/L		76	54 - 135

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.0		ug/L		96	70 - 142
o-Xylene	25.0	24.9		ug/L		100	70 - 130
2,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165258/7
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	551		ug/L		110	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

Lab Sample ID: LCSD 720-165258/6
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	24.9		ug/L		100	62 - 130	2	20
Acetone	125	114		ug/L		91	26 - 180	5	30
Benzene	25.0	25.3		ug/L		101	79 - 130	0	20
Dichlorobromomethane	25.0	25.1		ug/L		101	70 - 130	1	20
Bromobenzene	25.0	25.6		ug/L		102	70 - 130	0	20
Chlorobromomethane	25.0	23.9		ug/L		96	70 - 130	0	20
Bromoform	25.0	24.9		ug/L		100	68 - 136	3	20
Bromomethane	25.0	20.8		ug/L		83	43 - 151	0	20
2-Butanone (MEK)	125	111		ug/L		89	54 - 130	7	20
n-Butylbenzene	25.0	25.1		ug/L		100	70 - 142	1	20
sec-Butylbenzene	25.0	25.2		ug/L		101	70 - 134	0	20
tert-Butylbenzene	25.0	25.7		ug/L		103	70 - 135	1	20
Carbon disulfide	25.0	22.9		ug/L		92	58 - 130	0	20
Carbon tetrachloride	25.0	24.4		ug/L		98	70 - 146	1	20
Chlorobenzene	25.0	24.1		ug/L		96	70 - 130	0	20
Chloroethane	25.0	21.5		ug/L		86	62 - 138	0	20
Chloroform	25.0	24.6		ug/L		98	70 - 130	0	20
Chloromethane	25.0	21.4		ug/L		86	52 - 175	1	20
2-Chlorotoluene	25.0	26.3		ug/L		105	70 - 130	1	20
4-Chlorotoluene	25.0	26.3		ug/L		105	70 - 130	1	20
Chlorodibromomethane	25.0	25.4		ug/L		101	70 - 145	1	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165258/6
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165258

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130	0	20
1,3-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
1,4-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
1,3-Dichloropropane	25.0	24.4		ug/L		97	70 - 130	1	20
1,1-Dichloropropene	25.0	26.0		ug/L		104	70 - 130	0	20
1,2-Dibromo-3-Chloropropane	25.0	24.0		ug/L		96	70 - 136	6	20
Ethylene Dibromide	25.0	24.6		ug/L		98	70 - 130	2	20
Dibromomethane	25.0	23.9		ug/L		96	70 - 130	2	20
Dichlorodifluoromethane	25.0	18.3		ug/L		73	34 - 132	0	20
1,1-Dichloroethane	25.0	25.1		ug/L		101	70 - 130	1	20
1,2-Dichloroethane	25.0	23.7		ug/L		95	61 - 132	1	20
1,1-Dichloroethene	25.0	21.8		ug/L		87	64 - 128	1	20
cis-1,2-Dichloroethene	25.0	24.6		ug/L		98	70 - 130	0	20
trans-1,2-Dichloroethene	25.0	23.8		ug/L		95	68 - 130	1	20
1,2-Dichloropropane	25.0	25.6		ug/L		102	70 - 130	0	20
cis-1,3-Dichloropropene	25.0	26.9		ug/L		107	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	28.5		ug/L		114	70 - 140	3	20
Ethylbenzene	25.0	24.2		ug/L		97	80 - 120	0	20
Hexachlorobutadiene	25.0	25.1		ug/L		101	70 - 130	0	20
2-Hexanone	125	114		ug/L		92	60 - 164	6	20
Isopropylbenzene	25.0	25.0		ug/L		100	70 - 130	1	20
4-Isopropyltoluene	25.0	24.8		ug/L		99	70 - 130	1	20
Methylene Chloride	25.0	24.8		ug/L		99	70 - 147	0	20
4-Methyl-2-pentanone (MIBK)	125	122		ug/L		97	58 - 130	5	20
Naphthalene	25.0	26.1		ug/L		105	70 - 130	3	20
N-Propylbenzene	25.0	26.1		ug/L		104	70 - 130	0	20
Styrene	25.0	26.8		ug/L		107	70 - 130	0	20
1,1,1,2-Tetrachloroethane	25.0	25.8		ug/L		103	70 - 130	0	20
1,1,2,2-Tetrachloroethane	25.0	24.1		ug/L		96	70 - 130	4	20
Tetrachloroethene	25.0	23.6		ug/L		94	70 - 130	1	20
Toluene	25.0	24.6		ug/L		99	78 - 120	0	20
1,2,3-Trichlorobenzene	25.0	24.9		ug/L		100	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	25.1		ug/L		101	70 - 130	0	20
1,1,1-Trichloroethane	25.0	24.1		ug/L		96	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.2		ug/L		101	70 - 130	1	20
Trichloroethene	25.0	24.5		ug/L		98	70 - 130	1	20
Trichlorofluoromethane	25.0	24.2		ug/L		97	66 - 132	0	20
1,2,3-Trichloropropane	25.0	25.1		ug/L		101	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.4		ug/L		82	42 - 162	2	20
1,2,4-Trimethylbenzene	25.0	25.6		ug/L		103	70 - 132	1	20
1,3,5-Trimethylbenzene	25.0	26.2		ug/L		105	70 - 130	1	20
Vinyl acetate	25.0	17.9		ug/L		72	43 - 163	9	20
Vinyl chloride	25.0	19.4		ug/L		77	54 - 135	1	20
m-Xylene & p-Xylene	25.0	24.3		ug/L		97	70 - 142	1	20
o-Xylene	25.0	25.0		ug/L		100	70 - 130	0	20
2,2-Dichloropropane	25.0	24.9		ug/L		100	70 - 140	5	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165258/6 **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165258

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165258/8 **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165258

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	553		ug/L		111	62 - 120	0	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

GC/MS VOA

Analysis Batch: 165258

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59372-1	PRB-03HP-18.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59372-2	PRB-02HP-18.5	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165258/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165258/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165258/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165258/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165258/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: PRB-03HP-18.0

Lab Sample ID: 720-59372-1

Date Collected: 08/19/14 12:15
Matrix: Water
Date Received: 08/19/14 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165258	08/20/14 02:37	ASC	TAL PLS

Client Sample ID: PRB-02HP-18.5

Lab Sample ID: 720-59372-2

Date Collected: 08/19/14 14:50
Matrix: Water
Date Received: 08/19/14 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165258	08/20/14 03:05	ASC	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.

TestAmerica Job ID: 720-59372-1

Project/Site: Crown Chevrolet

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59372-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59372-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59372-1	PRB-03HP-18.0	Water	08/19/14 12:15	08/19/14 16:50
720-59372-2	PRB-02HP-18.5	Water	08/19/14 14:50	08/19/14 16:50

CHAIN-OF-CUSTODY RECORD

720-59372

OAK 18473

PROJECT NAME: Crown Cuvry

PROJECT NUMBER: OD10160070.00012.A

RESULTS TO: Avery Whitmarsh

TURNAROUND TIME: 3 day rush

SAMPLE SHIPMENT METHOD: Courier

LABORATORY NAME: TestAmerica

LABORATORY ADDRESS: Pleasanton, CA

LABORATORY CONTACT: Afsaneh

LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION:

DATE: 8/19/14

PAGE 1 OF 1

REPORTING REQUIREMENTS: 155702

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	ANALYSES: VOCs by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/19/19	1215	PKB-03HP-18.0	X	40 mL VOA	W	N	HCl	Y	N	3	
↓	1450	PRB-02HP-18.5	X	↓	↓	↓	↓	↓	↓	↓	

RUSH

720-59372 Chain of Custody

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	8/19/14	1630	SIGNATURE:	08/19/14	1630
PRINTED NAME: Alex Rosenthal			PRINTED NAME: Savio Mathe		
COMPANY: AMEC			COMPANY: TAP		
SIGNATURE:	08/19/14	1650	SIGNATURE: Justin	8/19/14	1650
PRINTED NAME: Savio Mathe			PRINTED NAME: J Gorner		
COMPANY: TAP			COMPANY: TAP		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY		

TOTAL NUMBER OF CONTAINERS: 6

SAMPLING COMMENTS: 3 day rush TAT

3.2°c

Per client 8260+gas
AS 8/20/14

2101 Webster Street, 12th Floor
Oakland, California 94612-3066
Tel 510.663.4100 Fax 510.663.4141

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59372-1

Login Number: 59372

List Number: 1

Creator: Gonzales, Justinn

List Source: TestAmerica Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59373-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/25/2014 12:38:18 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-59373-1
Project/Site: Crown Chevrolet

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 720-59373-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59373-1

Comments
No additional comments.

Receipt
The sample was received on 8/19/2014 4:50 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2º C.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
TestAmerica Job ID: 720-59373-1

Project/Site: Crown Chevrolet

Client Sample ID: EB-1 **Lab Sample ID: 720-59373-1**

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59373-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: EB-1
Date Collected: 08/19/14 15:15
Date Received: 08/19/14 16:50

Lab Sample ID: 720-59373-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/21/14 00:36	1
Acetone	ND		50		ug/L			08/21/14 00:36	1
Benzene	ND		0.50		ug/L			08/21/14 00:36	1
Dichlorobromomethane	ND		0.50		ug/L			08/21/14 00:36	1
Bromobenzene	ND		1.0		ug/L			08/21/14 00:36	1
Chlorobromomethane	ND		1.0		ug/L			08/21/14 00:36	1
Bromoform	ND		1.0		ug/L			08/21/14 00:36	1
Bromomethane	ND		1.0		ug/L			08/21/14 00:36	1
2-Butanone (MEK)	ND		50		ug/L			08/21/14 00:36	1
n-Butylbenzene	ND		1.0		ug/L			08/21/14 00:36	1
sec-Butylbenzene	ND		1.0		ug/L			08/21/14 00:36	1
tert-Butylbenzene	ND		1.0		ug/L			08/21/14 00:36	1
Carbon disulfide	ND		5.0		ug/L			08/21/14 00:36	1
Carbon tetrachloride	ND		0.50		ug/L			08/21/14 00:36	1
Chlorobenzene	ND		0.50		ug/L			08/21/14 00:36	1
Chloroethane	ND		1.0		ug/L			08/21/14 00:36	1
Chloroform	ND		1.0		ug/L			08/21/14 00:36	1
Chloromethane	ND		1.0		ug/L			08/21/14 00:36	1
2-Chlorotoluene	ND		0.50		ug/L			08/21/14 00:36	1
4-Chlorotoluene	ND		0.50		ug/L			08/21/14 00:36	1
Chlorodibromomethane	ND		0.50		ug/L			08/21/14 00:36	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/21/14 00:36	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/21/14 00:36	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/21/14 00:36	1
1,3-Dichloropropane	ND		1.0		ug/L			08/21/14 00:36	1
1,1-Dichloropropene	ND		0.50		ug/L			08/21/14 00:36	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/21/14 00:36	1
Ethylene Dibromide	ND		0.50		ug/L			08/21/14 00:36	1
Dibromomethane	ND		0.50		ug/L			08/21/14 00:36	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/21/14 00:36	1
1,1-Dichloroethane	ND		0.50		ug/L			08/21/14 00:36	1
1,2-Dichloroethane	ND		0.50		ug/L			08/21/14 00:36	1
1,1-Dichloroethene	ND		0.50		ug/L			08/21/14 00:36	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/21/14 00:36	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/21/14 00:36	1
1,2-Dichloropropane	ND		0.50		ug/L			08/21/14 00:36	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/21/14 00:36	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/21/14 00:36	1
Ethylbenzene	ND		0.50		ug/L			08/21/14 00:36	1
Hexachlorobutadiene	ND		1.0		ug/L			08/21/14 00:36	1
2-Hexanone	ND		50		ug/L			08/21/14 00:36	1
Isopropylbenzene	ND		0.50		ug/L			08/21/14 00:36	1
4-Isopropyltoluene	ND		1.0		ug/L			08/21/14 00:36	1
Methylene Chloride	ND		5.0		ug/L			08/21/14 00:36	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/21/14 00:36	1
Naphthalene	ND		1.0		ug/L			08/21/14 00:36	1
N-Propylbenzene	ND		1.0		ug/L			08/21/14 00:36	1
Styrene	ND		0.50		ug/L			08/21/14 00:36	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/21/14 00:36	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: EB-1
Lab Sample ID: 720-59373-1
Date Collected: 08/19/14 15:15
Matrix: Water
Date Received: 08/19/14 16:50

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/21/14 00:36	1
Tetrachloroethene	ND		0.50		ug/L			08/21/14 00:36	1
Toluene	ND		0.50		ug/L			08/21/14 00:36	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/21/14 00:36	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/21/14 00:36	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/21/14 00:36	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/21/14 00:36	1
Trichloroethene	ND		0.50		ug/L			08/21/14 00:36	1
Trichlorofluoromethane	ND		1.0		ug/L			08/21/14 00:36	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/21/14 00:36	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/21/14 00:36	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/21/14 00:36	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/21/14 00:36	1
Vinyl acetate	ND		10		ug/L			08/21/14 00:36	1
Vinyl chloride	ND		0.50		ug/L			08/21/14 00:36	1
Xylenes, Total	ND		1.0		ug/L			08/21/14 00:36	1
2,2-Dichloropropane	ND		0.50		ug/L			08/21/14 00:36	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/21/14 00:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*100*		*67 - 130*		*08/21/14 00:36*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*72 - 130*		*08/21/14 00:36*	*1*
Toluene-d8 (Surr)	*97*		*70 - 130*		*08/21/14 00:36*	*1*

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 15:32	1
Acetone	ND		50		ug/L			08/20/14 15:32	1
Benzene	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Bromobenzene	ND		1.0		ug/L			08/20/14 15:32	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 15:32	1
Bromoform	ND		1.0		ug/L			08/20/14 15:32	1
Bromomethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 15:32	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 15:32	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 15:32	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
Chloroethane	ND		1.0		ug/L			08/20/14 15:32	1
Chloroform	ND		1.0		ug/L			08/20/14 15:32	1
Chloromethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 15:32	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 15:32	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 15:32	1
Dibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 15:32	1
2-Hexanone	ND		50		ug/L			08/20/14 15:32	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 15:32	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 15:32	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 15:32	1
Naphthalene	ND		1.0		ug/L			08/20/14 15:32	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Styrene	ND		0.50		ug/L			08/20/14 15:32	1

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59373-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Tetrachloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Toluene	ND		0.50		ug/L			08/20/14 15:32	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Trichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 15:32	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Vinyl acetate	ND		10		ug/L			08/20/14 15:32	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 15:32	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 15:32	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 15:32	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/20/14 15:32*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/20/14 15:32*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/20/14 15:32*	*1*

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	26.2		ug/L		105	62 - 130
Acetone	125	127		ug/L		102	26 - 180
Benzene	25.0	25.8		ug/L		103	79 - 130
Dichlorobromomethane	25.0	25.5		ug/L		102	70 - 130
Bromobenzene	25.0	25.3		ug/L		101	70 - 130
Chlorobromomethane	25.0	24.5		ug/L		98	70 - 130
Bromoform	25.0	26.3		ug/L		105	68 - 136
Bromomethane	25.0	20.7		ug/L		83	43 - 151
2-Butanone (MEK)	125	125		ug/L		100	54 - 130
n-Butylbenzene	25.0	26.4		ug/L		106	70 - 142
sec-Butylbenzene	25.0	25.7		ug/L		103	70 - 134
tert-Butylbenzene	25.0	25.5		ug/L		102	70 - 135
Carbon disulfide	25.0	23.7		ug/L		95	58 - 130
Carbon tetrachloride	25.0	25.1		ug/L		100	70 - 146
Chlorobenzene	25.0	24.7		ug/L		99	70 - 130
Chloroethane	25.0	21.6		ug/L		86	62 - 138
Chloroform	25.0	24.9		ug/L		100	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	21.6		ug/L		86	52 - 175
2-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
4-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
Chlorodibromomethane	25.0	26.0		ug/L		104	70 - 145
1,2-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,3-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,4-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
1,3-Dichloropropane	25.0	25.3		ug/L		101	70 - 130
1,1-Dichloropropene	25.0	27.0		ug/L		108	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.8		ug/L		103	70 - 136
Ethylene Dibromide	25.0	25.4		ug/L		101	70 - 130
Dibromomethane	25.0	24.8		ug/L		99	70 - 130
Dichlorodifluoromethane	25.0	17.5		ug/L		70	34 - 132
1,1-Dichloroethane	25.0	25.6		ug/L		102	70 - 130
1,2-Dichloroethane	25.0	24.4		ug/L		98	61 - 132
1,1-Dichloroethene	25.0	22.0		ug/L		88	64 - 128
cis-1,2-Dichloroethene	25.0	25.2		ug/L		101	70 - 130
trans-1,2-Dichloroethene	25.0	24.3		ug/L		97	68 - 130
1,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 130
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130
trans-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 140
Ethylbenzene	25.0	24.8		ug/L		99	80 - 120
Hexachlorobutadiene	25.0	25.5		ug/L		102	70 - 130
2-Hexanone	125	129		ug/L		103	60 - 164
Isopropylbenzene	25.0	25.6		ug/L		102	70 - 130
4-Isopropyltoluene	25.0	25.4		ug/L		102	70 - 130
Methylene Chloride	25.0	26.2		ug/L		105	70 - 147
4-Methyl-2-pentanone (MIBK)	125	134		ug/L		107	58 - 130
Naphthalene	25.0	27.5		ug/L		110	70 - 130
N-Propylbenzene	25.0	26.6		ug/L		106	70 - 130
Styrene	25.0	27.5		ug/L		110	70 - 130
1,1,1,2-Tetrachloroethane	25.0	26.2		ug/L		105	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.4		ug/L		101	70 - 130
Tetrachloroethene	25.0	24.1		ug/L		96	70 - 130
Toluene	25.0	25.0		ug/L		100	78 - 120
1,2,3-Trichlorobenzene	25.0	25.4		ug/L		102	70 - 130
1,2,4-Trichlorobenzene	25.0	26.0		ug/L		104	70 - 130
1,1,1-Trichloroethane	25.0	24.6		ug/L		98	70 - 130
1,1,2-Trichloroethane	25.0	25.8		ug/L		103	70 - 130
Trichloroethene	25.0	24.5		ug/L		98	70 - 130
Trichlorofluoromethane	25.0	25.3		ug/L		101	66 - 132
1,2,3-Trichloropropane	25.0	26.6		ug/L		106	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.4		ug/L		85	42 - 162
1,2,4-Trimethylbenzene	25.0	26.0		ug/L		104	70 - 132
1,3,5-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 130
Vinyl acetate	25.0	21.3		ug/L		85	43 - 163
Vinyl chloride	25.0	18.8		ug/L		75	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.8		ug/L		99	70 - 142
o-Xylene	25.0	25.4		ug/L		102	70 - 130
2,2-Dichloropropane	25.0	26.2		ug/L		105	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165333/7
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	563		ug/L		113	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*97*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/6
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	25.5		ug/L		102	62 - 130	3	20
Acetone	125	114		ug/L		91	26 - 180	11	30
Benzene	25.0	26.0		ug/L		104	79 - 130	1	20
Dichlorobromomethane	25.0	25.4		ug/L		102	70 - 130	0	20
Bromobenzene	25.0	25.7		ug/L		103	70 - 130	2	20
Chlorobromomethane	25.0	24.2		ug/L		97	70 - 130	1	20
Bromoform	25.0	25.6		ug/L		102	68 - 136	3	20
Bromomethane	25.0	20.7		ug/L		83	43 - 151	0	20
2-Butanone (MEK)	125	116		ug/L		92	54 - 130	8	20
n-Butylbenzene	25.0	26.9		ug/L		108	70 - 142	2	20
sec-Butylbenzene	25.0	26.3		ug/L		105	70 - 134	2	20
tert-Butylbenzene	25.0	26.3		ug/L		105	70 - 135	3	20
Carbon disulfide	25.0	23.9		ug/L		96	58 - 130	1	20
Carbon tetrachloride	25.0	25.5		ug/L		102	70 - 146	2	20
Chlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
Chloroethane	25.0	21.6		ug/L		86	62 - 138	0	20
Chloroform	25.0	25.1		ug/L		100	70 - 130	1	20
Chloromethane	25.0	21.5		ug/L		86	52 - 175	0	20
2-Chlorotoluene	25.0	27.2		ug/L		109	70 - 130	3	20
4-Chlorotoluene	25.0	27.4		ug/L		110	70 - 130	4	20
Chlorodibromomethane	25.0	25.5		ug/L		102	70 - 145	2	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6 **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165333

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130	1	20
1,3-Dichlorobenzene	25.0	25.5		ug/L		102	70 - 130	2	20
1,4-Dichlorobenzene	25.0	25.4		ug/L		102	70 - 130	1	20
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130	2	20
1,1-Dichloropropene	25.0	27.4		ug/L		109	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	25.4		ug/L		102	70 - 136	2	20
Ethylene Dibromide	25.0	24.7		ug/L		99	70 - 130	3	20
Dibromomethane	25.0	24.6		ug/L		98	70 - 130	1	20
Dichlorodifluoromethane	25.0	17.4		ug/L		70	34 - 132	0	20
1,1-Dichloroethane	25.0	26.1		ug/L		104	70 - 130	2	20
1,2-Dichloroethane	25.0	24.0		ug/L		96	61 - 132	1	20
1,1-Dichloroethene	25.0	22.5		ug/L		90	64 - 128	2	20
cis-1,2-Dichloroethene	25.0	25.5		ug/L		102	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	24.8		ug/L		99	68 - 130	2	20
1,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	29.3		ug/L		117	70 - 140	2	20
Ethylbenzene	25.0	25.0		ug/L		100	80 - 120	1	20
Hexachlorobutadiene	25.0	26.3		ug/L		105	70 - 130	3	20
2-Hexanone	125	119		ug/L		95	60 - 164	8	20
Isopropylbenzene	25.0	26.0		ug/L		104	70 - 130	2	20
4-Isopropyltoluene	25.0	26.1		ug/L		104	70 - 130	3	20
Methylene Chloride	25.0	26.0		ug/L		104	70 - 147	1	20
4-Methyl-2-pentanone (MIBK)	125	126		ug/L		101	58 - 130	7	20
Naphthalene	25.0	26.8		ug/L		107	70 - 130	2	20
N-Propylbenzene	25.0	27.4		ug/L		109	70 - 130	3	20
Styrene	25.0	27.6		ug/L		110	70 - 130	0	20
1,1,1,2-Tetrachloroethane	25.0	26.1		ug/L		105	70 - 130	0	20
1,1,2,2-Tetrachloroethane	25.0	25.2		ug/L		101	70 - 130	1	20
Tetrachloroethene	25.0	24.4		ug/L		97	70 - 130	1	20
Toluene	25.0	25.5		ug/L		102	78 - 120	2	20
1,2,3-Trichlorobenzene	25.0	25.5		ug/L		102	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	26.2		ug/L		105	70 - 130	1	20
1,1,1-Trichloroethane	25.0	24.7		ug/L		99	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.4		ug/L		101	70 - 130	2	20
Trichloroethene	25.0	24.6		ug/L		99	70 - 130	1	20
Trichlorofluoromethane	25.0	25.1		ug/L		100	66 - 132	1	20
1,2,3-Trichloropropane	25.0	25.7		ug/L		103	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.2		ug/L		85	42 - 162	1	20
1,2,4-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 132	2	20
1,3,5-Trimethylbenzene	25.0	27.1		ug/L		109	70 - 130	2	20
Vinyl acetate	25.0	21.4		ug/L		85	43 - 163	0	20
Vinyl chloride	25.0	19.0		ug/L		76	54 - 135	1	20
m-Xylene & p-Xylene	25.0	25.3		ug/L		101	70 - 142	2	20
o-Xylene	25.0	25.8		ug/L		103	70 - 130	2	20
2,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 140	1	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*88*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/8
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	572		ug/L		114	62 - 120	2	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

GC/MS VOA

Analysis Batch: 165333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59373-1	EB-1	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165333/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: EB-1

Date Collected: 08/19/14 15:15

Date Received: 08/19/14 16:50

Lab Sample ID: 720-59373-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165333	08/21/14 00:36	PDR	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59373-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59373-1	EB-1	Water	08/19/14 15:15	08/19/14 16:50

CHAIN-OF-CUSTODY RECORD

720-59373

OAK 17805

PROJECT NAME: Crown Chevy		DATE: 8/19/14	PAGE 1 OF 1
PROJECT NUMBER: 0D10160070.00012.A	LABORATORY NAME: TestAmerica	CLIENT INFORMATION:	REPORTING REQUIREMENTS: 155703
RESULTS TO: Avery Whitmarsh	LABORATORY ADDRESS:		
TURNAROUND TIME: Standard	Pleasanton, CA		
SAMPLE SHIPMENT METHOD: Courier	LABORATORY CONTACT: Afsaneh		GEOTRACKER REQUIRED YES NO
	LABORATORY PHONE NUMBER: 425-484-1919		SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

ANALYSES

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/19/14	1515	EB-1	X	40 mL VOA	W	N	HCl	Y	N	3	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	8/19/14	1630	SIGNATURE:	08/19/14	1630
PRINTED NAME: Alex Rosenthal			PRINTED NAME: Arvio Mothe.		
COMPANY: AMEC			COMPANY: TAP		
SIGNATURE:	08/19/14	1650	SIGNATURE:	8/19/14	1650
PRINTED NAME: Arvio Mothe			PRINTED NAME: J Gonzales		
COMPANY: TAP			COMPANY: TAP		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		

TOTAL NUMBER OF CONTAINERS 3

SAMPLING COMMENTS: 3.2°c

720-59373 Chain of Custody

2101 Webster Street, 12th Floor
Oakland, California 94612-3066
Tel 510.663.4100 Fax 510.663.4141

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59373-1

Login Number: 59373

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Gonzales, Justinn

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59375-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/20/2014 2:25:08 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 720-59375-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59375-1

Comments
No additional comments.

Receipt
The samples were received on 8/19/2014 6:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.4° C.

Except:

The container label for the following sample(s) did not match the information listed on the Chain-of-Custody (COC):

Both samples received are labeled the same; as PRB-03HP-24.0. One is labeled at 1650 and the other 1715. Labeled the sample at 1715 as PRB-02HP-23.0.

GC/MS VOA
Method(s) 8260B: The Gasoline Range Organics (GRO) concentration reported for the following sample(s) is due to the presence of discrete peaks: PRB-02HP-23.0 (720-59375-2). PCE

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

Client Sample ID: PRB-03HP-24.0

Lab Sample ID: 720-59375-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	74		50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Tetrachloroethene	3.3		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: PRB-02HP-23.0

Lab Sample ID: 720-59375-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	59		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Gasoline Range Organics (GRO) -C5-C12	60	R	50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-03HP-24.0
Date Collected: 08/19/14 16:50
Date Received: 08/19/14 18:10

Lab Sample ID: 720-59375-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 03:34	1
Acetone	**74**		50		ug/L			08/20/14 03:34	1
Benzene	ND		0.50		ug/L			08/20/14 03:34	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 03:34	1
Bromobenzene	ND		1.0		ug/L			08/20/14 03:34	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 03:34	1
Bromoform	ND		1.0		ug/L			08/20/14 03:34	1
Bromomethane	ND		1.0		ug/L			08/20/14 03:34	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 03:34	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 03:34	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 03:34	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 03:34	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 03:34	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 03:34	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 03:34	1
Chloroethane	ND		1.0		ug/L			08/20/14 03:34	1
Chloroform	ND		1.0		ug/L			08/20/14 03:34	1
Chloromethane	ND		1.0		ug/L			08/20/14 03:34	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 03:34	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 03:34	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 03:34	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:34	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:34	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 03:34	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 03:34	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 03:34	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 03:34	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 03:34	1
Dibromomethane	ND		0.50		ug/L			08/20/14 03:34	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 03:34	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 03:34	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 03:34	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 03:34	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 03:34	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 03:34	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 03:34	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 03:34	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 03:34	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 03:34	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 03:34	1
2-Hexanone	ND		50		ug/L			08/20/14 03:34	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 03:34	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 03:34	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 03:34	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 03:34	1
Naphthalene	ND		1.0		ug/L			08/20/14 03:34	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 03:34	1
Styrene	ND		0.50		ug/L			08/20/14 03:34	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 03:34	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-24.0
Date Collected: 08/19/14 16:50
Date Received: 08/19/14 18:10

Lab Sample ID: 720-59375-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 03:34	1
Tetrachloroethene	**3.3**		0.50		ug/L			08/20/14 03:34	1
Toluene	ND		0.50		ug/L			08/20/14 03:34	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 03:34	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 03:34	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 03:34	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 03:34	1
Trichloroethene	ND		0.50		ug/L			08/20/14 03:34	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 03:34	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 03:34	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 03:34	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 03:34	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 03:34	1
Vinyl acetate	ND		10		ug/L			08/20/14 03:34	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 03:34	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 03:34	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 03:34	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 03:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*97*		*67 - 130*		*08/20/14 03:34*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*72 - 130*		*08/20/14 03:34*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/20/14 03:34*	*1*

Client Sample ID: PRB-02HP-23.0
Date Collected: 08/19/14 17:15
Date Received: 08/19/14 18:10

Lab Sample ID: 720-59375-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 04:03	1
Acetone	ND		50		ug/L			08/20/14 04:03	1
Benzene	ND		0.50		ug/L			08/20/14 04:03	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 04:03	1
Bromobenzene	ND		1.0		ug/L			08/20/14 04:03	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 04:03	1
Bromoform	ND		1.0		ug/L			08/20/14 04:03	1
Bromomethane	ND		1.0		ug/L			08/20/14 04:03	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 04:03	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 04:03	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 04:03	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 04:03	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 04:03	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 04:03	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 04:03	1
Chloroethane	ND		1.0		ug/L			08/20/14 04:03	1
Chloroform	ND		1.0		ug/L			08/20/14 04:03	1
Chloromethane	ND		1.0		ug/L			08/20/14 04:03	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 04:03	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 04:03	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 04:03	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-23.0 **Lab Sample ID: 720-59375-2**
Date Collected: 08/19/14 17:15 **Matrix: Water**
Date Received: 08/19/14 18:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 04:03	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 04:03	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 04:03	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 04:03	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 04:03	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 04:03	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 04:03	1
Dibromomethane	ND		0.50		ug/L			08/20/14 04:03	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 04:03	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 04:03	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 04:03	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 04:03	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 04:03	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 04:03	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 04:03	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 04:03	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 04:03	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 04:03	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 04:03	1
2-Hexanone	ND		50		ug/L			08/20/14 04:03	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 04:03	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 04:03	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 04:03	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 04:03	1
Naphthalene	ND		1.0		ug/L			08/20/14 04:03	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 04:03	1
Styrene	ND		0.50		ug/L			08/20/14 04:03	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 04:03	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 04:03	1
Tetrachloroethene	**59**		0.50		ug/L			08/20/14 04:03	1
Toluene	ND		0.50		ug/L			08/20/14 04:03	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 04:03	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 04:03	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 04:03	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 04:03	1
Trichloroethene	ND		0.50		ug/L			08/20/14 04:03	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 04:03	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 04:03	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 04:03	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 04:03	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 04:03	1
Vinyl acetate	ND		10		ug/L			08/20/14 04:03	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 04:03	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 04:03	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 04:03	1
Gasoline Range Organics (GRO) -C5-C12	**60**	R	50		ug/L			08/20/14 04:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*97*		*67 - 130*		*08/20/14 04:03*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-23.0
Date Collected: 08/19/14 17:15
Date Received: 08/19/14 18:10

Lab Sample ID: 720-59375-2
Matrix: Water

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*72 - 130*		*08/20/14 04:03*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/20/14 04:03*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165258/4
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/19/14 19:57	1
Acetone	ND		50		ug/L			08/19/14 19:57	1
Benzene	ND		0.50		ug/L			08/19/14 19:57	1
Dichlorobromomethane	ND		0.50		ug/L			08/19/14 19:57	1
Bromobenzene	ND		1.0		ug/L			08/19/14 19:57	1
Chlorobromomethane	ND		1.0		ug/L			08/19/14 19:57	1
Bromoform	ND		1.0		ug/L			08/19/14 19:57	1
Bromomethane	ND		1.0		ug/L			08/19/14 19:57	1
2-Butanone (MEK)	ND		50		ug/L			08/19/14 19:57	1
n-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
sec-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
tert-Butylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
Carbon disulfide	ND		5.0		ug/L			08/19/14 19:57	1
Carbon tetrachloride	ND		0.50		ug/L			08/19/14 19:57	1
Chlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
Chloroethane	ND		1.0		ug/L			08/19/14 19:57	1
Chloroform	ND		1.0		ug/L			08/19/14 19:57	1
Chloromethane	ND		1.0		ug/L			08/19/14 19:57	1
2-Chlorotoluene	ND		0.50		ug/L			08/19/14 19:57	1
4-Chlorotoluene	ND		0.50		ug/L			08/19/14 19:57	1
Chlorodibromomethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3-Dichloropropane	ND		1.0		ug/L			08/19/14 19:57	1
1,1-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/19/14 19:57	1
Ethylene Dibromide	ND		0.50		ug/L			08/19/14 19:57	1
Dibromomethane	ND		0.50		ug/L			08/19/14 19:57	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1-Dichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
1,2-Dichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/19/14 19:57	1
Ethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
Hexachlorobutadiene	ND		1.0		ug/L			08/19/14 19:57	1
2-Hexanone	ND		50		ug/L			08/19/14 19:57	1
Isopropylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
4-Isopropyltoluene	ND		1.0		ug/L			08/19/14 19:57	1
Methylene Chloride	ND		5.0		ug/L			08/19/14 19:57	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/19/14 19:57	1
Naphthalene	ND		1.0		ug/L			08/19/14 19:57	1
N-Propylbenzene	ND		1.0		ug/L			08/19/14 19:57	1
Styrene	ND		0.50		ug/L			08/19/14 19:57	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165258/4
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/19/14 19:57	1
Tetrachloroethene	ND		0.50		ug/L			08/19/14 19:57	1
Toluene	ND		0.50		ug/L			08/19/14 19:57	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/19/14 19:57	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/19/14 19:57	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/19/14 19:57	1
Trichloroethene	ND		0.50		ug/L			08/19/14 19:57	1
Trichlorofluoromethane	ND		1.0		ug/L			08/19/14 19:57	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/19/14 19:57	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/19/14 19:57	1
Vinyl acetate	ND		10		ug/L			08/19/14 19:57	1
Vinyl chloride	ND		0.50		ug/L			08/19/14 19:57	1
Xylenes, Total	ND		1.0		ug/L			08/19/14 19:57	1
2,2-Dichloropropane	ND		0.50		ug/L			08/19/14 19:57	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/19/14 19:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*96*		*67 - 130*		*08/19/14 19:57*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/19/14 19:57*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/19/14 19:57*	*1*

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	25.5		ug/L		102	62 - 130
Acetone	125	119		ug/L		95	26 - 180
Benzene	25.0	25.3		ug/L		101	79 - 130
Dichlorobromomethane	25.0	25.3		ug/L		101	70 - 130
Bromobenzene	25.0	25.5		ug/L		102	70 - 130
Chlorobromomethane	25.0	24.0		ug/L		96	70 - 130
Bromoform	25.0	25.8		ug/L		103	68 - 136
Bromomethane	25.0	20.8		ug/L		83	43 - 151
2-Butanone (MEK)	125	120		ug/L		96	54 - 130
n-Butylbenzene	25.0	24.9		ug/L		99	70 - 142
sec-Butylbenzene	25.0	25.2		ug/L		101	70 - 134
tert-Butylbenzene	25.0	25.6		ug/L		102	70 - 135
Carbon disulfide	25.0	22.9		ug/L		92	58 - 130
Carbon tetrachloride	25.0	24.3		ug/L		97	70 - 146
Chlorobenzene	25.0	24.2		ug/L		97	70 - 130
Chloroethane	25.0	21.5		ug/L		86	62 - 138
Chloroform	25.0	24.6		ug/L		98	70 - 130

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	21.8		ug/L		87	52 - 175
2-Chlorotoluene	25.0	26.1		ug/L		105	70 - 130
4-Chlorotoluene	25.0	26.1		ug/L		104	70 - 130
Chlorodibromomethane	25.0	25.7		ug/L		103	70 - 145
1,2-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,3-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,4-Dichlorobenzene	25.0	24.6		ug/L		99	70 - 130
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130
1,1-Dichloropropene	25.0	25.9		ug/L		104	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.5		ug/L		102	70 - 136
Ethylene Dibromide	25.0	25.0		ug/L		100	70 - 130
Dibromomethane	25.0	24.4		ug/L		98	70 - 130
Dichlorodifluoromethane	25.0	18.4		ug/L		73	34 - 132
1,1-Dichloroethane	25.0	25.0		ug/L		100	70 - 130
1,2-Dichloroethane	25.0	23.9		ug/L		96	61 - 132
1,1-Dichloroethene	25.0	21.6		ug/L		86	64 - 128
cis-1,2-Dichloroethene	25.0	24.6		ug/L		98	70 - 130
trans-1,2-Dichloroethene	25.0	23.6		ug/L		95	68 - 130
1,2-Dichloropropane	25.0	25.6		ug/L		102	70 - 130
cis-1,3-Dichloropropene	25.0	27.0		ug/L		108	70 - 130
trans-1,3-Dichloropropene	25.0	29.3		ug/L		117	70 - 140
Ethylbenzene	25.0	24.1		ug/L		96	80 - 120
Hexachlorobutadiene	25.0	25.1		ug/L		100	70 - 130
2-Hexanone	125	121		ug/L		97	60 - 164
Isopropylbenzene	25.0	24.8		ug/L		99	70 - 130
4-Isopropyltoluene	25.0	24.6		ug/L		99	70 - 130
Methylene Chloride	25.0	24.8		ug/L		99	70 - 147
4-Methyl-2-pentanone (MIBK)	125	128		ug/L		103	58 - 130
Naphthalene	25.0	26.9		ug/L		108	70 - 130
N-Propylbenzene	25.0	26.0		ug/L		104	70 - 130
Styrene	25.0	26.8		ug/L		107	70 - 130
1,1,1,2-Tetrachloroethane	25.0	25.8		ug/L		103	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.0		ug/L		100	70 - 130
Tetrachloroethene	25.0	23.4		ug/L		94	70 - 130
Toluene	25.0	24.6		ug/L		99	78 - 120
1,2,3-Trichlorobenzene	25.0	25.0		ug/L		100	70 - 130
1,2,4-Trichlorobenzene	25.0	25.3		ug/L		101	70 - 130
1,1,1-Trichloroethane	25.0	24.2		ug/L		97	70 - 130
1,1,2-Trichloroethane	25.0	25.5		ug/L		102	70 - 130
Trichloroethene	25.0	24.4		ug/L		97	70 - 130
Trichlorofluoromethane	25.0	24.4		ug/L		97	66 - 132
1,2,3-Trichloropropane	25.0	26.0		ug/L		104	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.8		ug/L		83	42 - 162
1,2,4-Trimethylbenzene	25.0	25.3		ug/L		101	70 - 132
1,3,5-Trimethylbenzene	25.0	26.0		ug/L		104	70 - 130
Vinyl acetate	25.0	19.6		ug/L		78	43 - 163
Vinyl chloride	25.0	19.1		ug/L		76	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165258/5
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.0		ug/L		96	70 - 142
o-Xylene	25.0	24.9		ug/L		100	70 - 130
2,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165258/7
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	551		ug/L		110	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

Lab Sample ID: LCSD 720-165258/6
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	24.9		ug/L		100	62 - 130	2	20
Acetone	125	114		ug/L		91	26 - 180	5	30
Benzene	25.0	25.3		ug/L		101	79 - 130	0	20
Dichlorobromomethane	25.0	25.1		ug/L		101	70 - 130	1	20
Bromobenzene	25.0	25.6		ug/L		102	70 - 130	0	20
Chlorobromomethane	25.0	23.9		ug/L		96	70 - 130	0	20
Bromoform	25.0	24.9		ug/L		100	68 - 136	3	20
Bromomethane	25.0	20.8		ug/L		83	43 - 151	0	20
2-Butanone (MEK)	125	111		ug/L		89	54 - 130	7	20
n-Butylbenzene	25.0	25.1		ug/L		100	70 - 142	1	20
sec-Butylbenzene	25.0	25.2		ug/L		101	70 - 134	0	20
tert-Butylbenzene	25.0	25.7		ug/L		103	70 - 135	1	20
Carbon disulfide	25.0	22.9		ug/L		92	58 - 130	0	20
Carbon tetrachloride	25.0	24.4		ug/L		98	70 - 146	1	20
Chlorobenzene	25.0	24.1		ug/L		96	70 - 130	0	20
Chloroethane	25.0	21.5		ug/L		86	62 - 138	0	20
Chloroform	25.0	24.6		ug/L		98	70 - 130	0	20
Chloromethane	25.0	21.4		ug/L		86	52 - 175	1	20
2-Chlorotoluene	25.0	26.3		ug/L		105	70 - 130	1	20
4-Chlorotoluene	25.0	26.3		ug/L		105	70 - 130	1	20
Chlorodibromomethane	25.0	25.4		ug/L		101	70 - 145	1	20

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165258/6
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130	0	20
1,3-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
1,4-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
1,3-Dichloropropane	25.0	24.4		ug/L		97	70 - 130	1	20
1,1-Dichloropropene	25.0	26.0		ug/L		104	70 - 130	0	20
1,2-Dibromo-3-Chloropropane	25.0	24.0		ug/L		96	70 - 136	6	20
Ethylene Dibromide	25.0	24.6		ug/L		98	70 - 130	2	20
Dibromomethane	25.0	23.9		ug/L		96	70 - 130	2	20
Dichlorodifluoromethane	25.0	18.3		ug/L		73	34 - 132	0	20
1,1-Dichloroethane	25.0	25.1		ug/L		101	70 - 130	1	20
1,2-Dichloroethane	25.0	23.7		ug/L		95	61 - 132	1	20
1,1-Dichloroethene	25.0	21.8		ug/L		87	64 - 128	1	20
cis-1,2-Dichloroethene	25.0	24.6		ug/L		98	70 - 130	0	20
trans-1,2-Dichloroethene	25.0	23.8		ug/L		95	68 - 130	1	20
1,2-Dichloropropane	25.0	25.6		ug/L		102	70 - 130	0	20
cis-1,3-Dichloropropene	25.0	26.9		ug/L		107	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	28.5		ug/L		114	70 - 140	3	20
Ethylbenzene	25.0	24.2		ug/L		97	80 - 120	0	20
Hexachlorobutadiene	25.0	25.1		ug/L		101	70 - 130	0	20
2-Hexanone	125	114		ug/L		92	60 - 164	6	20
Isopropylbenzene	25.0	25.0		ug/L		100	70 - 130	1	20
4-Isopropyltoluene	25.0	24.8		ug/L		99	70 - 130	1	20
Methylene Chloride	25.0	24.8		ug/L		99	70 - 147	0	20
4-Methyl-2-pentanone (MIBK)	125	122		ug/L		97	58 - 130	5	20
Naphthalene	25.0	26.1		ug/L		105	70 - 130	3	20
N-Propylbenzene	25.0	26.1		ug/L		104	70 - 130	0	20
Styrene	25.0	26.8		ug/L		107	70 - 130	0	20
1,1,1,2-Tetrachloroethane	25.0	25.8		ug/L		103	70 - 130	0	20
1,1,2,2-Tetrachloroethane	25.0	24.1		ug/L		96	70 - 130	4	20
Tetrachloroethene	25.0	23.6		ug/L		94	70 - 130	1	20
Toluene	25.0	24.6		ug/L		99	78 - 120	0	20
1,2,3-Trichlorobenzene	25.0	24.9		ug/L		100	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	25.1		ug/L		101	70 - 130	0	20
1,1,1-Trichloroethane	25.0	24.1		ug/L		96	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.2		ug/L		101	70 - 130	1	20
Trichloroethene	25.0	24.5		ug/L		98	70 - 130	1	20
Trichlorofluoromethane	25.0	24.2		ug/L		97	66 - 132	0	20
1,2,3-Trichloropropane	25.0	25.1		ug/L		101	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.4		ug/L		82	42 - 162	2	20
1,2,4-Trimethylbenzene	25.0	25.6		ug/L		103	70 - 132	1	20
1,3,5-Trimethylbenzene	25.0	26.2		ug/L		105	70 - 130	1	20
Vinyl acetate	25.0	17.9		ug/L		72	43 - 163	9	20
Vinyl chloride	25.0	19.4		ug/L		77	54 - 135	1	20
m-Xylene & p-Xylene	25.0	24.3		ug/L		97	70 - 142	1	20
o-Xylene	25.0	25.0		ug/L		100	70 - 130	0	20
2,2-Dichloropropane	25.0	24.9		ug/L		100	70 - 140	5	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165258/6
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165258/8
Matrix: Water
Analysis Batch: 165258

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	553		ug/L		111	62 - 120	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

QC Association Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

GC/MS VOA

Analysis Batch: 165258

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59375-1	PRB-03HP-24.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59375-2	PRB-02HP-23.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165258/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165258/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165258/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165258/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165258/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Lab Chronicle

Client Sample ID: PRB-03HP-24.0

Lab Sample ID: 720-59375-1

Date Collected: 08/19/14 16:50

Matrix: Water

Date Received: 08/19/14 18:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165258	08/20/14 03:34	ASC	TAL PLS

Client Sample ID: PRB-02HP-23.0

Lab Sample ID: 720-59375-2

Date Collected: 08/19/14 17:15

Matrix: Water

Date Received: 08/19/14 18:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165258	08/20/14 04:03	ASC	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59375-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59375-1	PRB-03HP-24.0	Water	08/19/14 16:50	08/19/14 18:10
720-59375-2	PRB-02HP-23.0	Water	08/19/14 17:15	08/19/14 18:10

OAK 17803

CHAIN-OF-CUSTODY RECORD

720 59375

PROJECT NAME: Crown Chevy

DATE: 8/19/14

PAGE 1 OF 1

PROJECT NUMBER: 0D10160070.0012.A

RESULTS TO: Avery Whitmarsh

TURNAROUND TIME: 3-day rush

SAMPLE SHIPMENT METHOD: drop off

LABORATORY NAME: TestAmerica

LABORATORY ADDRESS: Pleasanton, CA

LABORATORY CONTACT: Afsaneh

LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION:

REPORTING REQUIREMENTS: 155706

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE): AR

ANALYSES

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/19/14	1650	PRB-03HP-24.0	X	40mL VOA	W	N	HCl	Y	N	3	
↓	1715	PRB-02HP-23.0	X	↓	↓	↓	↓	↓	↓	↓	

RUSH

720-59375 Chain of Custody

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: AR	8/19/14	1810	SIGNATURE:	8/19/14	1810
PRINTED NAME: Alex Rosenthal			PRINTED NAME: T. Bullock		
COMPANY: AMEC			COMPANY: TAP		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		
SIGNATURE:			SIGNATURE.		
PRINTED NAME:			PRINTED NAME.		
COMPANY:			COMPANY:		

TOTAL NUMBER OF CONTAINERS: 6

SAMPLING COMMENTS:
3-day Rush TAT
per client VOC's + GAS
AS. 8/20/14
5.4° c

2101 Webster Street, 12th Floor
Oakland, California 94612-3066
Tel 510.663.4100 Fax 510.663.4141

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59375-1

Login Number: 59375
List Number: 1
Creator: Gonzales, Justinn

List Source: TestAmerica Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	SEE NCM
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59402-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/22/2014 4:14:53 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

Table of Contents

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 720-59402-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59402-1

Comments
No additional comments.

Receipt
The samples were received on 8/20/2014 1:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7º C.

GC/MS VOA
Method(s) 8260B: The Gasoline Range Organics (GRO) concentration reported for the following sample is due to the presence of discrete peaks: PRB-03HP-28.0 (720-59402-1). PCE

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample ID: PRB-03HP-28.0 Lab Sample ID: 720-59402-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	110		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	2.3		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Gasoline Range Organics (GRO) -C5-C12	110		50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-59402-1
Project/Site: Crown Chevrolet

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-03HP-28.0 **Lab Sample ID: 720-59402-1**
Date Collected: 08/20/14 08:00 **Matrix: Water**
Date Received: 08/20/14 13:55

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 22:41	1
Acetone	ND		50		ug/L			08/20/14 22:41	1
Benzene	ND		0.50		ug/L			08/20/14 22:41	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 22:41	1
Bromobenzene	ND		1.0		ug/L			08/20/14 22:41	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 22:41	1
Bromoform	ND		1.0		ug/L			08/20/14 22:41	1
Bromomethane	ND		1.0		ug/L			08/20/14 22:41	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 22:41	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 22:41	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 22:41	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 22:41	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 22:41	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 22:41	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 22:41	1
Chloroethane	ND		1.0		ug/L			08/20/14 22:41	1
Chloroform	ND		1.0		ug/L			08/20/14 22:41	1
Chloromethane	ND		1.0		ug/L			08/20/14 22:41	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 22:41	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 22:41	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 22:41	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 22:41	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 22:41	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 22:41	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 22:41	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 22:41	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 22:41	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 22:41	1
Dibromomethane	ND		0.50		ug/L			08/20/14 22:41	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 22:41	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 22:41	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 22:41	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 22:41	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 22:41	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 22:41	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 22:41	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 22:41	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 22:41	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 22:41	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 22:41	1
2-Hexanone	ND		50		ug/L			08/20/14 22:41	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 22:41	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 22:41	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 22:41	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 22:41	1
Naphthalene	ND		1.0		ug/L			08/20/14 22:41	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 22:41	1
Styrene	ND		0.50		ug/L			08/20/14 22:41	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 22:41	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-28.0
Date Collected: 08/20/14 08:00
Date Received: 08/20/14 13:55

Lab Sample ID: 720-59402-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 22:41	1
Tetrachloroethene	**110**		0.50		ug/L			08/20/14 22:41	1
Toluene	ND		0.50		ug/L			08/20/14 22:41	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 22:41	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 22:41	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 22:41	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 22:41	1
Trichloroethene	**2.3**		0.50		ug/L			08/20/14 22:41	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 22:41	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 22:41	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 22:41	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 22:41	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 22:41	1
Vinyl acetate	ND		10		ug/L			08/20/14 22:41	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 22:41	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 22:41	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 22:41	1
Gasoline Range Organics (GRO) -C5-C12	**110**		50		ug/L			08/20/14 22:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*67 - 130*		*08/20/14 22:41*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*72 - 130*		*08/20/14 22:41*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/20/14 22:41*	*1*

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 15:32	1
Acetone	ND		50		ug/L			08/20/14 15:32	1
Benzene	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Bromobenzene	ND		1.0		ug/L			08/20/14 15:32	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 15:32	1
Bromoform	ND		1.0		ug/L			08/20/14 15:32	1
Bromomethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 15:32	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 15:32	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 15:32	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
Chloroethane	ND		1.0		ug/L			08/20/14 15:32	1
Chloroform	ND		1.0		ug/L			08/20/14 15:32	1
Chloromethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 15:32	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 15:32	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 15:32	1
Dibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 15:32	1
2-Hexanone	ND		50		ug/L			08/20/14 15:32	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 15:32	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 15:32	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 15:32	1
Naphthalene	ND		1.0		ug/L			08/20/14 15:32	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Styrene	ND		0.50		ug/L			08/20/14 15:32	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Tetrachloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Toluene	ND		0.50		ug/L			08/20/14 15:32	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Trichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 15:32	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Vinyl acetate	ND		10		ug/L			08/20/14 15:32	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 15:32	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 15:32	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 15:32	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/20/14 15:32*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/20/14 15:32*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/20/14 15:32*	*1*

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	26.2		ug/L		105	62 - 130
Acetone	125	127		ug/L		102	26 - 180
Benzene	25.0	25.8		ug/L		103	79 - 130
Dichlorobromomethane	25.0	25.5		ug/L		102	70 - 130
Bromobenzene	25.0	25.3		ug/L		101	70 - 130
Chlorobromomethane	25.0	24.5		ug/L		98	70 - 130
Bromoform	25.0	26.3		ug/L		105	68 - 136
Bromomethane	25.0	20.7		ug/L		83	43 - 151
2-Butanone (MEK)	125	125		ug/L		100	54 - 130
n-Butylbenzene	25.0	26.4		ug/L		106	70 - 142
sec-Butylbenzene	25.0	25.7		ug/L		103	70 - 134
tert-Butylbenzene	25.0	25.5		ug/L		102	70 - 135
Carbon disulfide	25.0	23.7		ug/L		95	58 - 130
Carbon tetrachloride	25.0	25.1		ug/L		100	70 - 146
Chlorobenzene	25.0	24.7		ug/L		99	70 - 130
Chloroethane	25.0	21.6		ug/L		86	62 - 138
Chloroform	25.0	24.9		ug/L		100	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	21.6		ug/L		86	52 - 175
2-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
4-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
Chlorodibromomethane	25.0	26.0		ug/L		104	70 - 145
1,2-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,3-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,4-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
1,3-Dichloropropane	25.0	25.3		ug/L		101	70 - 130
1,1-Dichloropropene	25.0	27.0		ug/L		108	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.8		ug/L		103	70 - 136
Ethylene Dibromide	25.0	25.4		ug/L		101	70 - 130
Dibromomethane	25.0	24.8		ug/L		99	70 - 130
Dichlorodifluoromethane	25.0	17.5		ug/L		70	34 - 132
1,1-Dichloroethane	25.0	25.6		ug/L		102	70 - 130
1,2-Dichloroethane	25.0	24.4		ug/L		98	61 - 132
1,1-Dichloroethene	25.0	22.0		ug/L		88	64 - 128
cis-1,2-Dichloroethene	25.0	25.2		ug/L		101	70 - 130
trans-1,2-Dichloroethene	25.0	24.3		ug/L		97	68 - 130
1,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 130
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130
trans-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 140
Ethylbenzene	25.0	24.8		ug/L		99	80 - 120
Hexachlorobutadiene	25.0	25.5		ug/L		102	70 - 130
2-Hexanone	125	129		ug/L		103	60 - 164
Isopropylbenzene	25.0	25.6		ug/L		102	70 - 130
4-Isopropyltoluene	25.0	25.4		ug/L		102	70 - 130
Methylene Chloride	25.0	26.2		ug/L		105	70 - 147
4-Methyl-2-pentanone (MIBK)	125	134		ug/L		107	58 - 130
Naphthalene	25.0	27.5		ug/L		110	70 - 130
N-Propylbenzene	25.0	26.6		ug/L		106	70 - 130
Styrene	25.0	27.5		ug/L		110	70 - 130
1,1,1,2-Tetrachloroethane	25.0	26.2		ug/L		105	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.4		ug/L		101	70 - 130
Tetrachloroethene	25.0	24.1		ug/L		96	70 - 130
Toluene	25.0	25.0		ug/L		100	78 - 120
1,2,3-Trichlorobenzene	25.0	25.4		ug/L		102	70 - 130
1,2,4-Trichlorobenzene	25.0	26.0		ug/L		104	70 - 130
1,1,1-Trichloroethane	25.0	24.6		ug/L		98	70 - 130
1,1,2-Trichloroethane	25.0	25.8		ug/L		103	70 - 130
Trichloroethene	25.0	24.5		ug/L		98	70 - 130
Trichlorofluoromethane	25.0	25.3		ug/L		101	66 - 132
1,2,3-Trichloropropane	25.0	26.6		ug/L		106	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.4		ug/L		85	42 - 162
1,2,4-Trimethylbenzene	25.0	26.0		ug/L		104	70 - 132
1,3,5-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 130
Vinyl acetate	25.0	21.3		ug/L		85	43 - 163
Vinyl chloride	25.0	18.8		ug/L		75	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.8		ug/L		99	70 - 142
o-Xylene	25.0	25.4		ug/L		102	70 - 130
2,2-Dichloropropane	25.0	26.2		ug/L		105	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165333/7
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	563		ug/L		113	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*97*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/6
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165333

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	25.5		ug/L		102	62 - 130	3	20
Acetone	125	114		ug/L		91	26 - 180	11	30
Benzene	25.0	26.0		ug/L		104	79 - 130	1	20
Dichlorobromomethane	25.0	25.4		ug/L		102	70 - 130	0	20
Bromobenzene	25.0	25.7		ug/L		103	70 - 130	2	20
Chlorobromomethane	25.0	24.2		ug/L		97	70 - 130	1	20
Bromoform	25.0	25.6		ug/L		102	68 - 136	3	20
Bromomethane	25.0	20.7		ug/L		83	43 - 151	0	20
2-Butanone (MEK)	125	116		ug/L		92	54 - 130	8	20
n-Butylbenzene	25.0	26.9		ug/L		108	70 - 142	2	20
sec-Butylbenzene	25.0	26.3		ug/L		105	70 - 134	2	20
tert-Butylbenzene	25.0	26.3		ug/L		105	70 - 135	3	20
Carbon disulfide	25.0	23.9		ug/L		96	58 - 130	1	20
Carbon tetrachloride	25.0	25.5		ug/L		102	70 - 146	2	20
Chlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
Chloroethane	25.0	21.6		ug/L		86	62 - 138	0	20
Chloroform	25.0	25.1		ug/L		100	70 - 130	1	20
Chloromethane	25.0	21.5		ug/L		86	52 - 175	0	20
2-Chlorotoluene	25.0	27.2		ug/L		109	70 - 130	3	20
4-Chlorotoluene	25.0	27.4		ug/L		110	70 - 130	4	20
Chlorodibromomethane	25.0	25.5		ug/L		102	70 - 145	2	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130	1	20
1,3-Dichlorobenzene	25.0	25.5		ug/L		102	70 - 130	2	20
1,4-Dichlorobenzene	25.0	25.4		ug/L		102	70 - 130	1	20
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130	2	20
1,1-Dichloropropene	25.0	27.4		ug/L		109	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	25.4		ug/L		102	70 - 136	2	20
Ethylene Dibromide	25.0	24.7		ug/L		99	70 - 130	3	20
Dibromomethane	25.0	24.6		ug/L		98	70 - 130	1	20
Dichlorodifluoromethane	25.0	17.4		ug/L		70	34 - 132	0	20
1,1-Dichloroethane	25.0	26.1		ug/L		104	70 - 130	2	20
1,2-Dichloroethane	25.0	24.0		ug/L		96	61 - 132	1	20
1,1-Dichloroethene	25.0	22.5		ug/L		90	64 - 128	2	20
cis-1,2-Dichloroethene	25.0	25.5		ug/L		102	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	24.8		ug/L		99	68 - 130	2	20
1,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	29.3		ug/L		117	70 - 140	2	20
Ethylbenzene	25.0	25.0		ug/L		100	80 - 120	1	20
Hexachlorobutadiene	25.0	26.3		ug/L		105	70 - 130	3	20
2-Hexanone	125	119		ug/L		95	60 - 164	8	20
Isopropylbenzene	25.0	26.0		ug/L		104	70 - 130	2	20
4-Isopropyltoluene	25.0	26.1		ug/L		104	70 - 130	3	20
Methylene Chloride	25.0	26.0		ug/L		104	70 - 147	1	20
4-Methyl-2-pentanone (MIBK)	125	126		ug/L		101	58 - 130	7	20
Naphthalene	25.0	26.8		ug/L		107	70 - 130	2	20
N-Propylbenzene	25.0	27.4		ug/L		109	70 - 130	3	20
Styrene	25.0	27.6		ug/L		110	70 - 130	0	20
1,1,1,2-Tetrachloroethane	25.0	26.1		ug/L		105	70 - 130	0	20
1,1,2,2-Tetrachloroethane	25.0	25.2		ug/L		101	70 - 130	1	20
Tetrachloroethene	25.0	24.4		ug/L		97	70 - 130	1	20
Toluene	25.0	25.5		ug/L		102	78 - 120	2	20
1,2,3-Trichlorobenzene	25.0	25.5		ug/L		102	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	26.2		ug/L		105	70 - 130	1	20
1,1,1-Trichloroethane	25.0	24.7		ug/L		99	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.4		ug/L		101	70 - 130	2	20
Trichloroethene	25.0	24.6		ug/L		99	70 - 130	1	20
Trichlorofluoromethane	25.0	25.1		ug/L		100	66 - 132	1	20
1,2,3-Trichloropropane	25.0	25.7		ug/L		103	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.2		ug/L		85	42 - 162	1	20
1,2,4-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 132	2	20
1,3,5-Trimethylbenzene	25.0	27.1		ug/L		109	70 - 130	2	20
Vinyl acetate	25.0	21.4		ug/L		85	43 - 163	0	20
Vinyl chloride	25.0	19.0		ug/L		76	54 - 135	1	20
m-Xylene & p-Xylene	25.0	25.3		ug/L		101	70 - 142	2	20
o-Xylene	25.0	25.8		ug/L		103	70 - 130	2	20
2,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 140	1	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*88*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/8
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	572		ug/L		114	62 - 120	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

Lab Sample ID: 720-59402-1 MS
Matrix: Water
Analysis Batch: 165333

Client Sample ID: PRB-03HP-28.0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	ND		25.0	26.0		ug/L		104	60 - 138
Acetone	ND		125	135		ug/L		85	60 - 140
Benzene	ND		25.0	26.2		ug/L		105	60 - 140
Dichlorobromomethane	ND		25.0	26.2		ug/L		105	60 - 140
Bromobenzene	ND		25.0	25.8		ug/L		103	60 - 140
Chlorobromomethane	ND		25.0	24.9		ug/L		99	60 - 140
Bromoform	ND		25.0	25.5		ug/L		102	56 - 140
Bromomethane	ND		25.0	20.3		ug/L		81	23 - 140
2-Butanone (MEK)	ND		125	117		ug/L		94	60 - 140
n-Butylbenzene	ND		25.0	25.7		ug/L		103	60 - 140
sec-Butylbenzene	ND		25.0	25.3		ug/L		101	60 - 140
tert-Butylbenzene	ND		25.0	25.4		ug/L		102	60 - 140
Carbon disulfide	ND		25.0	23.1		ug/L		92	38 - 140
Carbon tetrachloride	ND		25.0	24.9		ug/L		99	60 - 140
Chlorobenzene	ND		25.0	24.6		ug/L		99	60 - 140
Chloroethane	ND		25.0	21.7		ug/L		87	51 - 140
Chloroform	ND		25.0	25.4		ug/L		102	60 - 140
Chloromethane	ND		25.0	19.7		ug/L		79	52 - 140
2-Chlorotoluene	ND		25.0	26.7		ug/L		107	60 - 140
4-Chlorotoluene	ND		25.0	26.8		ug/L		107	60 - 140
Chlorodibromomethane	ND		25.0	26.4		ug/L		105	60 - 140
1,2-Dichlorobenzene	ND		25.0	25.1		ug/L		100	60 - 140
1,3-Dichlorobenzene	ND		25.0	25.2		ug/L		101	60 - 140
1,4-Dichlorobenzene	ND		25.0	25.3		ug/L		101	60 - 140
1,3-Dichloropropane	ND		25.0	25.3		ug/L		101	60 - 140
1,1-Dichloropropene	ND		25.0	26.6		ug/L		106	60 - 140

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59402-1 MS
Matrix: Water
Analysis Batch: 165333

Client Sample ID: PRB-03HP-28.0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2-Dibromo-3-Chloropropane	ND		25.0	24.6		ug/L		98	60 - 140
Ethylene Dibromide	ND		25.0	25.4		ug/L		102	60 - 140
Dibromomethane	ND		25.0	25.1		ug/L		100	60 - 140
Dichlorodifluoromethane	ND		25.0	17.4		ug/L		70	38 - 140
1,1-Dichloroethane	ND		25.0	26.0		ug/L		104	60 - 140
1,2-Dichloroethane	ND		25.0	24.4		ug/L		97	60 - 140
1,1-Dichloroethene	ND		25.0	22.0		ug/L		88	60 - 140
cis-1,2-Dichloroethene	ND		25.0	25.5		ug/L		102	60 - 140
trans-1,2-Dichloroethene	ND		25.0	24.3		ug/L		97	60 - 140
1,2-Dichloropropane	ND		25.0	26.6		ug/L		106	60 - 140
cis-1,3-Dichloropropene	ND		25.0	28.0		ug/L		112	60 - 140
trans-1,3-Dichloropropene	ND		25.0	30.3		ug/L		121	60 - 140
Ethylbenzene	ND		25.0	24.4		ug/L		98	60 - 140
Hexachlorobutadiene	ND		25.0	24.5		ug/L		98	60 - 140
2-Hexanone	ND		125	117		ug/L		93	60 - 140
Isopropylbenzene	ND		25.0	24.9		ug/L		100	60 - 140
4-Isopropyltoluene	ND		25.0	24.8		ug/L		99	60 - 140
Methylene Chloride	ND		25.0	25.7		ug/L		103	40 - 140
4-Methyl-2-pentanone (MIBK)	ND		125	124		ug/L		100	58 - 130
Naphthalene	ND		25.0	26.3		ug/L		105	56 - 140
N-Propylbenzene	ND		25.0	26.4		ug/L		105	60 - 140
Styrene	ND		25.0	27.4		ug/L		110	60 - 140
1,1,1,2-Tetrachloroethane	ND		25.0	26.3		ug/L		105	60 - 140
1,1,2,2-Tetrachloroethane	ND		25.0	25.2		ug/L		101	60 - 140
Tetrachloroethene	110		25.0	123	4	ug/L		70	60 - 140
Toluene	ND		25.0	24.8		ug/L		99	60 - 140
1,2,3-Trichlorobenzene	ND		25.0	25.0		ug/L		100	60 - 140
1,2,4-Trichlorobenzene	ND		25.0	25.7		ug/L		103	60 - 140
1,1,1-Trichloroethane	ND		25.0	24.5		ug/L		98	60 - 140
1,1,2-Trichloroethane	ND		25.0	26.2		ug/L		105	60 - 140
Trichloroethene	2.3		25.0	26.8		ug/L		98	60 - 140
Trichlorofluoromethane	ND		25.0	24.0		ug/L		96	60 - 140
1,2,3-Trichloropropane	ND		25.0	25.1		ug/L		101	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		25.0	20.9		ug/L		84	60 - 140
1,2,4-Trimethylbenzene	ND		25.0	25.9		ug/L		104	60 - 140
1,3,5-Trimethylbenzene	ND		25.0	26.2		ug/L		105	60 - 140
Vinyl acetate	ND		25.0	21.0		ug/L		84	40 - 140
Vinyl chloride	ND		25.0	19.3		ug/L		77	58 - 140
m-Xylene & p-Xylene	ND		25.0	24.4		ug/L		98	60 - 140
o-Xylene	ND		25.0	25.4		ug/L		102	60 - 140
2,2-Dichloropropane	ND		25.0	25.4		ug/L		102	60 - 140

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*
Toluene-d8 (Surr)	*99*		*70 - 130*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59402-1 MSD
Matrix: Water
Analysis Batch: 165333

Client Sample ID: PRB-03HP-28.0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	ND		25.0	27.1		ug/L		108	60 - 138	4	20
Acetone	ND		125	144		ug/L		92	60 - 140	6	20
Benzene	ND		25.0	26.2		ug/L		105	60 - 140	0	20
Dichlorobromomethane	ND		25.0	26.4		ug/L		106	60 - 140	1	20
Bromobenzene	ND		25.0	25.8		ug/L		103	60 - 140	0	20
Chlorobromomethane	ND		25.0	24.9		ug/L		100	60 - 140	0	20
Bromoform	ND		25.0	26.3		ug/L		105	56 - 140	3	20
Bromomethane	ND		25.0	20.0		ug/L		80	23 - 140	1	20
2-Butanone (MEK)	ND		125	122		ug/L		98	60 - 140	4	20
n-Butylbenzene	ND		25.0	25.7		ug/L		103	60 - 140	0	20
sec-Butylbenzene	ND		25.0	25.0		ug/L		100	60 - 140	1	20
tert-Butylbenzene	ND		25.0	25.3		ug/L		101	60 - 140	0	20
Carbon disulfide	ND		25.0	23.4		ug/L		94	38 - 140	1	20
Carbon tetrachloride	ND		25.0	24.6		ug/L		98	60 - 140	1	20
Chlorobenzene	ND		25.0	24.7		ug/L		99	60 - 140	0	20
Chloroethane	ND		25.0	21.5		ug/L		86	51 - 140	1	20
Chloroform	ND		25.0	25.5		ug/L		102	60 - 140	0	20
Chloromethane	ND		25.0	19.3		ug/L		77	52 - 140	2	20
2-Chlorotoluene	ND		25.0	26.5		ug/L		106	60 - 140	1	20
4-Chlorotoluene	ND		25.0	26.6		ug/L		106	60 - 140	1	20
Chlorodibromomethane	ND		25.0	26.8		ug/L		107	60 - 140	2	20
1,2-Dichlorobenzene	ND		25.0	25.4		ug/L		102	60 - 140	1	20
1,3-Dichlorobenzene	ND		25.0	25.3		ug/L		101	60 - 140	0	20
1,4-Dichlorobenzene	ND		25.0	25.4		ug/L		101	60 - 140	0	20
1,3-Dichloropropane	ND		25.0	26.0		ug/L		104	60 - 140	3	20
1,1-Dichloropropene	ND		25.0	26.6		ug/L		106	60 - 140	0	20
1,2-Dibromo-3-Chloropropane	ND		25.0	25.9		ug/L		104	60 - 140	5	20
Ethylene Dibromide	ND		25.0	26.2		ug/L		105	60 - 140	3	20
Dibromomethane	ND		25.0	25.7		ug/L		103	60 - 140	2	20
Dichlorodifluoromethane	ND		25.0	16.4		ug/L		66	38 - 140	5	20
1,1-Dichloroethane	ND		25.0	26.0		ug/L		104	60 - 140	0	20
1,2-Dichloroethane	ND		25.0	25.0		ug/L		100	60 - 140	3	20
1,1-Dichloroethene	ND		25.0	21.8		ug/L		87	60 - 140	1	20
cis-1,2-Dichloroethene	ND		25.0	25.5		ug/L		102	60 - 140	0	20
trans-1,2-Dichloroethene	ND		25.0	24.3		ug/L		97	60 - 140	0	20
1,2-Dichloropropane	ND		25.0	27.1		ug/L		108	60 - 140	2	20
cis-1,3-Dichloropropene	ND		25.0	28.1		ug/L		113	60 - 140	1	20
trans-1,3-Dichloropropene	ND		25.0	30.6		ug/L		122	60 - 140	1	20
Ethylbenzene	ND		25.0	24.6		ug/L		98	60 - 140	1	20
Hexachlorobutadiene	ND		25.0	24.8		ug/L		99	60 - 140	1	20
2-Hexanone	ND		125	125		ug/L		100	60 - 140	7	20
Isopropylbenzene	ND		25.0	24.9		ug/L		100	60 - 140	0	20
4-Isopropyltoluene	ND		25.0	24.8		ug/L		99	60 - 140	0	20
Methylene Chloride	ND		25.0	25.7		ug/L		103	40 - 140	0	20
4-Methyl-2-pentanone (MIBK)	ND		125	134		ug/L		107	58 - 130	7	20
Naphthalene	ND		25.0	27.6		ug/L		110	56 - 140	5	20
N-Propylbenzene	ND		25.0	26.3		ug/L		105	60 - 140	0	20
Styrene	ND		25.0	27.5		ug/L		110	60 - 140	0	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59402-1 MSD
Matrix: Water
Analysis Batch: 165333

Client Sample ID: PRB-03HP-28.0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	ND		25.0	26.4		ug/L		106	60 - 140	1	20
1,1,2,2-Tetrachloroethane	ND		25.0	26.2		ug/L		105	60 - 140	4	20
Tetrachloroethene	110		25.0	121	4	ug/L		61	60 - 140	2	20
Toluene	ND		25.0	24.9		ug/L		100	60 - 140	0	20
1,2,3-Trichlorobenzene	ND		25.0	25.8		ug/L		103	60 - 140	3	20
1,2,4-Trichlorobenzene	ND		25.0	26.3		ug/L		105	60 - 140	2	20
1,1,1-Trichloroethane	ND		25.0	24.5		ug/L		98	60 - 140	0	20
1,1,2-Trichloroethane	ND		25.0	26.6		ug/L		106	60 - 140	1	20
Trichloroethene	2.3		25.0	26.6		ug/L		97	60 - 140	1	20
Trichlorofluoromethane	ND		25.0	23.9		ug/L		95	60 - 140	1	20
1,2,3-Trichloropropane	ND		25.0	26.6		ug/L		106	60 - 140	6	20
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		25.0	20.7		ug/L		83	60 - 140	1	20
1,2,4-Trimethylbenzene	ND		25.0	26.0		ug/L		104	60 - 140	0	20
1,3,5-Trimethylbenzene	ND		25.0	26.3		ug/L		105	60 - 140	1	20
Vinyl acetate	ND		25.0	21.8		ug/L		87	40 - 140	4	20
Vinyl chloride	ND		25.0	19.0		ug/L		76	58 - 140	1	20
m-Xylene & p-Xylene	ND		25.0	24.5		ug/L		98	60 - 140	0	20
o-Xylene	ND		25.0	25.4		ug/L		101	60 - 140	0	20
2,2-Dichloropropane	ND		25.0	25.7		ug/L		103	60 - 140	1	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

QC Association Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-1

GC/MS VOA

Analysis Batch: 165333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59402-1	PRB-03HP-28.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59402-1 MS	PRB-03HP-28.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59402-1 MSD	PRB-03HP-28.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165333/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: PRB-03HP-28.0

Lab Sample ID: 720-59402-1

Date Collected: 08/20/14 08:00

Matrix: Water

Date Received: 08/20/14 13:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165333	08/20/14 22:41	PDR	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59402-1	PRB-03HP-28.0	Water	08/20/14 08:00	08/20/14 13:55

CHAIN-OF-CUSTODY RECORD 720-59402

15102

PROJECT NAME: Crown Cherry

PROJECT NUMBER: OD1016070.0012. A

RESULTS TO: Avery Whitmarsh

TURNAROUND TIME: 2-day rush

SAMPLE SHIPMENT METHOD: Courier

LABORATORY NAME: TestAmerica

LABORATORY ADDRESS: Pleasanton, CA

LABORATORY CONTACT: Afsaneh

LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION

DATE: 8/20/14 PAGE 1 OF 1

REPORTING REQUIREMENTS: 155732

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	ANALYSES VOCs by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/20/14	0800	PRB-03HP-28.0	X	40 mL VOA	W	N	HCl	Y	N	3	
↓	1215	TB-1	X	↓	↓	↓	↓	↓	↓	↓	No RUSH

RUSH

RUSH

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	8/20/14	1355	SIGNATURE: Jason Mullen	8/20/14	1355
PRINTED NAME: Alex Rosenthal			PRINTED NAME: Mullen		
COMPANY: AMEC			COMPANY: TestAmerica		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME		
COMPANY:			COMPA		
SIGNATURE:			SIGNAT		
PRINTED NAME:			PRINTE		
COMPANY:			COMPA		

TOTAL NUMBER OF CONTAINERS: 6

SAMPLING COMMENTS: 2-day rush TAT for PRB sample, no rush for TB sample (standard TAT)

2.7°C

720-59402 Chain of Custody

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59402-1

Login Number: 59402

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Gonzales, Justinn

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59402-2
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/25/2014 12:25:13 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

Table of Contents

Definitions/Glossary

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 720-59402-2

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59402-2

Comments

No additional comments.

Receipt

The samples were received on 8/20/2014 1:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7º C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Client Sample ID: TB-1 **Lab Sample ID: 720-59402-2**

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: TB-1
Date Collected: 08/20/14 12:15
Date Received: 08/20/14 13:55

Lab Sample ID: 720-59402-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/22/14 01:28	1
Acetone	ND		50		ug/L			08/22/14 01:28	1
Benzene	ND		0.50		ug/L			08/22/14 01:28	1
Dichlorobromomethane	ND		0.50		ug/L			08/22/14 01:28	1
Bromobenzene	ND		1.0		ug/L			08/22/14 01:28	1
Chlorobromomethane	ND		1.0		ug/L			08/22/14 01:28	1
Bromoform	ND		1.0		ug/L			08/22/14 01:28	1
Bromomethane	ND		1.0		ug/L			08/22/14 01:28	1
2-Butanone (MEK)	ND		50		ug/L			08/22/14 01:28	1
n-Butylbenzene	ND		1.0		ug/L			08/22/14 01:28	1
sec-Butylbenzene	ND		1.0		ug/L			08/22/14 01:28	1
tert-Butylbenzene	ND		1.0		ug/L			08/22/14 01:28	1
Carbon disulfide	ND		5.0		ug/L			08/22/14 01:28	1
Carbon tetrachloride	ND		0.50		ug/L			08/22/14 01:28	1
Chlorobenzene	ND		0.50		ug/L			08/22/14 01:28	1
Chloroethane	ND		1.0		ug/L			08/22/14 01:28	1
Chloroform	ND		1.0		ug/L			08/22/14 01:28	1
Chloromethane	ND		1.0		ug/L			08/22/14 01:28	1
2-Chlorotoluene	ND		0.50		ug/L			08/22/14 01:28	1
4-Chlorotoluene	ND		0.50		ug/L			08/22/14 01:28	1
Chlorodibromomethane	ND		0.50		ug/L			08/22/14 01:28	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/22/14 01:28	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/22/14 01:28	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/22/14 01:28	1
1,3-Dichloropropane	ND		1.0		ug/L			08/22/14 01:28	1
1,1-Dichloropropene	ND		0.50		ug/L			08/22/14 01:28	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/22/14 01:28	1
Ethylene Dibromide	ND		0.50		ug/L			08/22/14 01:28	1
Dibromomethane	ND		0.50		ug/L			08/22/14 01:28	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/22/14 01:28	1
1,1-Dichloroethane	ND		0.50		ug/L			08/22/14 01:28	1
1,2-Dichloroethane	ND		0.50		ug/L			08/22/14 01:28	1
1,1-Dichloroethene	ND		0.50		ug/L			08/22/14 01:28	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 01:28	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 01:28	1
1,2-Dichloropropane	ND		0.50		ug/L			08/22/14 01:28	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 01:28	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 01:28	1
Ethylbenzene	ND		0.50		ug/L			08/22/14 01:28	1
Hexachlorobutadiene	ND		1.0		ug/L			08/22/14 01:28	1
2-Hexanone	ND		50		ug/L			08/22/14 01:28	1
Isopropylbenzene	ND		0.50		ug/L			08/22/14 01:28	1
4-Isopropyltoluene	ND		1.0		ug/L			08/22/14 01:28	1
Methylene Chloride	ND		5.0		ug/L			08/22/14 01:28	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/22/14 01:28	1
Naphthalene	ND		1.0		ug/L			08/22/14 01:28	1
N-Propylbenzene	ND		1.0		ug/L			08/22/14 01:28	1
Styrene	ND		0.50		ug/L			08/22/14 01:28	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 01:28	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: TB-1
Date Collected: 08/20/14 12:15
Date Received: 08/20/14 13:55

Lab Sample ID: 720-59402-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 01:28	1
Tetrachloroethene	ND		0.50		ug/L			08/22/14 01:28	1
Toluene	ND		0.50		ug/L			08/22/14 01:28	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/22/14 01:28	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/22/14 01:28	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/22/14 01:28	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/22/14 01:28	1
Trichloroethene	ND		0.50		ug/L			08/22/14 01:28	1
Trichlorofluoromethane	ND		1.0		ug/L			08/22/14 01:28	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/22/14 01:28	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/22/14 01:28	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/22/14 01:28	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/22/14 01:28	1
Vinyl acetate	ND		10		ug/L			08/22/14 01:28	1
Vinyl chloride	ND		0.50		ug/L			08/22/14 01:28	1
Xylenes, Total	ND		1.0		ug/L			08/22/14 01:28	1
2,2-Dichloropropane	ND		0.50		ug/L			08/22/14 01:28	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/22/14 01:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*96*		*67 - 130*		*08/22/14 01:28*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*		*08/22/14 01:28*	*1*
Toluene-d8 (Surr)	*97*		*70 - 130*		*08/22/14 01:28*	*1*

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165412/4
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/21/14 16:40	1
Acetone	ND		50		ug/L			08/21/14 16:40	1
Benzene	ND		0.50		ug/L			08/21/14 16:40	1
Dichlorobromomethane	ND		0.50		ug/L			08/21/14 16:40	1
Bromobenzene	ND		1.0		ug/L			08/21/14 16:40	1
Chlorobromomethane	ND		1.0		ug/L			08/21/14 16:40	1
Bromoform	ND		1.0		ug/L			08/21/14 16:40	1
Bromomethane	ND		1.0		ug/L			08/21/14 16:40	1
2-Butanone (MEK)	ND		50		ug/L			08/21/14 16:40	1
n-Butylbenzene	ND		1.0		ug/L			08/21/14 16:40	1
sec-Butylbenzene	ND		1.0		ug/L			08/21/14 16:40	1
tert-Butylbenzene	ND		1.0		ug/L			08/21/14 16:40	1
Carbon disulfide	ND		5.0		ug/L			08/21/14 16:40	1
Carbon tetrachloride	ND		0.50		ug/L			08/21/14 16:40	1
Chlorobenzene	ND		0.50		ug/L			08/21/14 16:40	1
Chloroethane	ND		1.0		ug/L			08/21/14 16:40	1
Chloroform	ND		1.0		ug/L			08/21/14 16:40	1
Chloromethane	ND		1.0		ug/L			08/21/14 16:40	1
2-Chlorotoluene	ND		0.50		ug/L			08/21/14 16:40	1
4-Chlorotoluene	ND		0.50		ug/L			08/21/14 16:40	1
Chlorodibromomethane	ND		0.50		ug/L			08/21/14 16:40	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/21/14 16:40	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/21/14 16:40	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/21/14 16:40	1
1,3-Dichloropropane	ND		1.0		ug/L			08/21/14 16:40	1
1,1-Dichloropropene	ND		0.50		ug/L			08/21/14 16:40	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/21/14 16:40	1
Ethylene Dibromide	ND		0.50		ug/L			08/21/14 16:40	1
Dibromomethane	ND		0.50		ug/L			08/21/14 16:40	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/21/14 16:40	1
1,1-Dichloroethane	ND		0.50		ug/L			08/21/14 16:40	1
1,2-Dichloroethane	ND		0.50		ug/L			08/21/14 16:40	1
1,1-Dichloroethene	ND		0.50		ug/L			08/21/14 16:40	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/21/14 16:40	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/21/14 16:40	1
1,2-Dichloropropane	ND		0.50		ug/L			08/21/14 16:40	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/21/14 16:40	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/21/14 16:40	1
Ethylbenzene	ND		0.50		ug/L			08/21/14 16:40	1
Hexachlorobutadiene	ND		1.0		ug/L			08/21/14 16:40	1
2-Hexanone	ND		50		ug/L			08/21/14 16:40	1
Isopropylbenzene	ND		0.50		ug/L			08/21/14 16:40	1
4-Isopropyltoluene	ND		1.0		ug/L			08/21/14 16:40	1
Methylene Chloride	ND		5.0		ug/L			08/21/14 16:40	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/21/14 16:40	1
Naphthalene	ND		1.0		ug/L			08/21/14 16:40	1
N-Propylbenzene	ND		1.0		ug/L			08/21/14 16:40	1
Styrene	ND		0.50		ug/L			08/21/14 16:40	1

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165412/4
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/21/14 16:40	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/21/14 16:40	1
Tetrachloroethene	ND		0.50		ug/L			08/21/14 16:40	1
Toluene	ND		0.50		ug/L			08/21/14 16:40	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/21/14 16:40	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/21/14 16:40	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/21/14 16:40	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/21/14 16:40	1
Trichloroethene	ND		0.50		ug/L			08/21/14 16:40	1
Trichlorofluoromethane	ND		1.0		ug/L			08/21/14 16:40	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/21/14 16:40	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/21/14 16:40	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/21/14 16:40	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/21/14 16:40	1
Vinyl acetate	ND		10		ug/L			08/21/14 16:40	1
Vinyl chloride	ND		0.50		ug/L			08/21/14 16:40	1
Xylenes, Total	ND		1.0		ug/L			08/21/14 16:40	1
2,2-Dichloropropane	ND		0.50		ug/L			08/21/14 16:40	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/21/14 16:40	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*97*		*67 - 130*		*08/21/14 16:40*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*72 - 130*		*08/21/14 16:40*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/21/14 16:40*	*1*

Lab Sample ID: LCS 720-165412/5
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Methyl tert-butyl ether			25.0	25.9		ug/L		103	62 - 130		
Acetone			125	103		ug/L		83	26 - 180		
Benzene			25.0	27.0		ug/L		108	79 - 130		
Dichlorobromomethane			25.0	29.5		ug/L		118	70 - 130		
Bromobenzene			25.0	26.1		ug/L		105	70 - 130		
Chlorobromomethane			25.0	26.5		ug/L		106	70 - 130		
Bromoform			25.0	30.0		ug/L		120	68 - 136		
Bromomethane			25.0	25.7		ug/L		103	43 - 151		
2-Butanone (MEK)			125	123		ug/L		99	54 - 130		
n-Butylbenzene			25.0	29.1		ug/L		116	70 - 142		
sec-Butylbenzene			25.0	28.1		ug/L		112	70 - 134		
tert-Butylbenzene			25.0	26.9		ug/L		107	70 - 135		
Carbon disulfide			25.0	26.5		ug/L		106	58 - 130		
Carbon tetrachloride			25.0	29.3		ug/L		117	70 - 146		
Chlorobenzene			25.0	27.4		ug/L		110	70 - 130		
Chloroethane			25.0	22.8		ug/L		91	62 - 138		
Chloroform			25.0	27.1		ug/L		108	70 - 130		

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165412/5
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	20.6		ug/L		82	52 - 175
2-Chlorotoluene	25.0	27.2		ug/L		109	70 - 130
4-Chlorotoluene	25.0	27.3		ug/L		109	70 - 130
Chlorodibromomethane	25.0	30.1		ug/L		120	70 - 145
1,2-Dichlorobenzene	25.0	27.2		ug/L		109	70 - 130
1,3-Dichlorobenzene	25.0	27.3		ug/L		109	70 - 130
1,4-Dichlorobenzene	25.0	27.5		ug/L		110	70 - 130
1,3-Dichloropropane	25.0	27.2		ug/L		109	70 - 130
1,1-Dichloropropene	25.0	28.0		ug/L		112	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	28.6		ug/L		114	70 - 136
Ethylene Dibromide	25.0	28.4		ug/L		113	70 - 130
Dibromomethane	25.0	26.8		ug/L		107	70 - 130
Dichlorodifluoromethane	25.0	24.7		ug/L		99	34 - 132
1,1-Dichloroethane	25.0	26.3		ug/L		105	70 - 130
1,2-Dichloroethane	25.0	24.4		ug/L		98	61 - 132
1,1-Dichloroethene	25.0	23.4		ug/L		94	64 - 128
cis-1,2-Dichloroethene	25.0	25.0		ug/L		100	70 - 130
trans-1,2-Dichloroethene	25.0	26.9		ug/L		108	68 - 130
1,2-Dichloropropane	25.0	26.7		ug/L		107	70 - 130
cis-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 130
trans-1,3-Dichloropropene	25.0	32.2		ug/L		129	70 - 140
Ethylbenzene	25.0	27.5		ug/L		110	80 - 120
Hexachlorobutadiene	25.0	26.8		ug/L		107	70 - 130
2-Hexanone	125	112		ug/L		89	60 - 164
Isopropylbenzene	25.0	28.3		ug/L		113	70 - 130
4-Isopropyltoluene	25.0	27.5		ug/L		110	70 - 130
Methylene Chloride	25.0	24.3		ug/L		97	70 - 147
4-Methyl-2-pentanone (MIBK)	125	112		ug/L		90	58 - 130
Naphthalene	25.0	29.5		ug/L		118	70 - 130
N-Propylbenzene	25.0	28.0		ug/L		112	70 - 130
Styrene	25.0	28.2		ug/L		113	70 - 130
1,1,1,2-Tetrachloroethane	25.0	29.7		ug/L		119	70 - 130
1,1,2,2-Tetrachloroethane	25.0	28.0		ug/L		112	70 - 130
Tetrachloroethene	25.0	27.0		ug/L		108	70 - 130
Toluene	25.0	27.2		ug/L		109	78 - 120
1,2,3-Trichlorobenzene	25.0	28.1		ug/L		112	70 - 130
1,2,4-Trichlorobenzene	25.0	28.5		ug/L		114	70 - 130
1,1,1-Trichloroethane	25.0	27.4		ug/L		110	70 - 130
1,1,2-Trichloroethane	25.0	28.2		ug/L		113	70 - 130
Trichloroethene	25.0	26.4		ug/L		105	70 - 130
Trichlorofluoromethane	25.0	30.6		ug/L		122	66 - 132
1,2,3-Trichloropropane	25.0	28.3		ug/L		113	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	23.9		ug/L		96	42 - 162
1,2,4-Trimethylbenzene	25.0	27.2		ug/L		109	70 - 132
1,3,5-Trimethylbenzene	25.0	27.5		ug/L		110	70 - 130
Vinyl acetate	25.0	21.7		ug/L		87	43 - 163
Vinyl chloride	25.0	22.4		ug/L		89	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165412/5
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	27.6		ug/L		110	70 - 142
o-Xylene	25.0	27.5		ug/L		110	70 - 130
2,2-Dichloropropane	25.0	26.6		ug/L		106	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*87*		*72 - 130*
Toluene-d8 (Surr)	*99*		*70 - 130*

Lab Sample ID: LCS 720-165412/7
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	549		ug/L		110	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*89*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

Lab Sample ID: LCSD 720-165412/6
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	25.3		ug/L		101	62 - 130	2	20
Acetone	125	96.3		ug/L		77	26 - 180	7	30
Benzene	25.0	26.8		ug/L		107	79 - 130	1	20
Dichlorobromomethane	25.0	28.3		ug/L		113	70 - 130	4	20
Bromobenzene	25.0	26.3		ug/L		105	70 - 130	1	20
Chlorobromomethane	25.0	26.1		ug/L		104	70 - 130	2	20
Bromoform	25.0	29.3		ug/L		117	68 - 136	3	20
Bromomethane	25.0	24.8		ug/L		99	43 - 151	4	20
2-Butanone (MEK)	125	117		ug/L		94	54 - 130	5	20
n-Butylbenzene	25.0	28.5		ug/L		114	70 - 142	2	20
sec-Butylbenzene	25.0	27.6		ug/L		110	70 - 134	2	20
tert-Butylbenzene	25.0	26.4		ug/L		106	70 - 135	2	20
Carbon disulfide	25.0	25.6		ug/L		102	58 - 130	3	20
Carbon tetrachloride	25.0	28.7		ug/L		115	70 - 146	2	20
Chlorobenzene	25.0	27.0		ug/L		108	70 - 130	1	20
Chloroethane	25.0	21.8		ug/L		87	62 - 138	5	20
Chloroform	25.0	26.8		ug/L		107	70 - 130	1	20
Chloromethane	25.0	19.7		ug/L		79	52 - 175	4	20
2-Chlorotoluene	25.0	27.1		ug/L		108	70 - 130	0	20
4-Chlorotoluene	25.0	27.3		ug/L		109	70 - 130	0	20
Chlorodibromomethane	25.0	30.0		ug/L		120	70 - 145	0	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165412/6
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	26.9		ug/L		108	70 - 130	1	20
1,3-Dichlorobenzene	25.0	27.1		ug/L		108	70 - 130	1	20
1,4-Dichlorobenzene	25.0	27.2		ug/L		109	70 - 130	1	20
1,3-Dichloropropane	25.0	26.8		ug/L		107	70 - 130	2	20
1,1-Dichloropropene	25.0	27.8		ug/L		111	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	26.5		ug/L		106	70 - 136	8	20
Ethylene Dibromide	25.0	27.5		ug/L		110	70 - 130	3	20
Dibromomethane	25.0	26.3		ug/L		105	70 - 130	2	20
Dichlorodifluoromethane	25.0	23.6		ug/L		94	34 - 132	5	20
1,1-Dichloroethane	25.0	25.7		ug/L		103	70 - 130	2	20
1,2-Dichloroethane	25.0	23.8		ug/L		95	61 - 132	2	20
1,1-Dichloroethene	25.0	22.6		ug/L		91	64 - 128	3	20
cis-1,2-Dichloroethene	25.0	24.5		ug/L		98	70 - 130	2	20
trans-1,2-Dichloroethene	25.0	26.6		ug/L		106	68 - 130	1	20
1,2-Dichloropropane	25.0	26.5		ug/L		106	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	29.4		ug/L		118	70 - 130	1	20
trans-1,3-Dichloropropene	25.0	31.7		ug/L		127	70 - 140	2	20
Ethylbenzene	25.0	27.2		ug/L		109	80 - 120	1	20
Hexachlorobutadiene	25.0	26.2		ug/L		105	70 - 130	3	20
2-Hexanone	125	105		ug/L		84	60 - 164	7	20
Isopropylbenzene	25.0	27.9		ug/L		112	70 - 130	1	20
4-Isopropyltoluene	25.0	27.0		ug/L		108	70 - 130	2	20
Methylene Chloride	25.0	23.5		ug/L		94	70 - 147	3	20
4-Methyl-2-pentanone (MIBK)	125	105		ug/L		84	58 - 130	7	20
Naphthalene	25.0	28.4		ug/L		113	70 - 130	4	20
N-Propylbenzene	25.0	27.8		ug/L		111	70 - 130	1	20
Styrene	25.0	27.9		ug/L		111	70 - 130	1	20
1,1,1,2-Tetrachloroethane	25.0	29.3		ug/L		117	70 - 130	1	20
1,1,2,2-Tetrachloroethane	25.0	27.4		ug/L		109	70 - 130	2	20
Tetrachloroethene	25.0	26.4		ug/L		106	70 - 130	2	20
Toluene	25.0	27.0		ug/L		108	78 - 120	1	20
1,2,3-Trichlorobenzene	25.0	27.2		ug/L		109	70 - 130	3	20
1,2,4-Trichlorobenzene	25.0	28.3		ug/L		113	70 - 130	1	20
1,1,1-Trichloroethane	25.0	26.9		ug/L		108	70 - 130	2	20
1,1,2-Trichloroethane	25.0	27.7		ug/L		111	70 - 130	2	20
Trichloroethene	25.0	26.2		ug/L		105	70 - 130	1	20
Trichlorofluoromethane	25.0	29.3		ug/L		117	66 - 132	4	20
1,2,3-Trichloropropane	25.0	27.7		ug/L		111	70 - 130	2	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	22.9		ug/L		92	42 - 162	4	20
1,2,4-Trimethylbenzene	25.0	27.2		ug/L		109	70 - 132	0	20
1,3,5-Trimethylbenzene	25.0	27.5		ug/L		110	70 - 130	0	20
Vinyl acetate	25.0	21.1		ug/L		84	43 - 163	3	20
Vinyl chloride	25.0	22.0		ug/L		88	54 - 135	2	20
m-Xylene & p-Xylene	25.0	27.2		ug/L		109	70 - 142	1	20
o-Xylene	25.0	27.1		ug/L		109	70 - 130	1	20
2,2-Dichloropropane	25.0	27.0		ug/L		108	70 - 140	1	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165412/6
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*87*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

Lab Sample ID: LCSD 720-165412/8
Matrix: Water
Analysis Batch: 165412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	558		ug/L		112	62 - 120	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

QC Association Summary

GC/MS VOA

Analysis Batch: 165412

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59402-2	TB-1	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165412/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165412/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165412/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165412/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165412/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: TB-1
Date Collected: 08/20/14 12:15
Date Received: 08/20/14 13:55

Lab Sample ID: 720-59402-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165412	08/22/14 01:28	PDR	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59402-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59402-2	TB-1	Water	08/20/14 12:15	08/20/14 13:55

CHAIN-OF-CUSTODY RECORD 720-59402

15102

PROJECT NAME: Crown Cherry

DATE: 8/20/14

PAGE 1 OF 1

PROJECT NUMBER: OD01607?0.0012. A

RESULTS TO: Avery Whitmarsh

TURNAROUND TIME: 2-day rush

SAMPLE SHIPMENT METHOD: Courier

LABORATORY NAME: TestAmerica

LABORATORY ADDRESS: Pleasanton, CA

LABORATORY CONTACT: Afsaneh

LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION

REPORTING REQUIREMENTS: 155732

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	ANALYSES: VOCs by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/20/14	0800	PRB-03HP-28.0	X	40 mL VOA	W	N	HCl	Y	N	3	
↓	1215	TB-1	X	↓	↓	↓	↓	↓	↓	↓	No RUSH

RUSH

RUSH

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	8/20/14	1355	SIGNATURE: Joern Mueller	8/20/14	1355
PRINTED NAME: Alex Rosenthal			PRINTED NAME: Mueller		
COMPANY: AMEC			COMPANY: TestAmerica		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME		
COMPANY:			COMPA		
SIGNATURE:			SIGNAT		
PRINTED NAME:			PRINTE		
COMPANY:			COMPA		

TOTAL NUMBER OF CONTAINERS: 6

SAMPLING COMMENTS: 2-day rush TAT for PRB sample, no rush for TB sample (standard TAT)

2.7°

720-59402 Chain of Custody

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59402-2

Login Number: 59402

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Gonzales, Justinn

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59412-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/22/2014 11:16:50 AM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

Table of Contents

Definitions/Glossary

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59412-1

Job ID: 720-59412-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59412-1

Comments
No additional comments.

Receipt
The sample was received on 8/20/2014 5:50 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.1° C.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59412-1

Client Sample ID: P-01HP-19.0

Lab Sample ID: 720-59412-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	2.1		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-59412-1
Project/Site: Crown Chevrolet

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: P-01HP-19.0 **Lab Sample ID: 720-59412-1**
Date Collected: 08/20/14 16:00 **Matrix: Water**
Date Received: 08/20/14 17:50

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 23:10	1
Acetone	ND		50		ug/L			08/20/14 23:10	1
Benzene	ND		0.50		ug/L			08/20/14 23:10	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 23:10	1
Bromobenzene	ND		1.0		ug/L			08/20/14 23:10	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 23:10	1
Bromoform	ND		1.0		ug/L			08/20/14 23:10	1
Bromomethane	ND		1.0		ug/L			08/20/14 23:10	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 23:10	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 23:10	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 23:10	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 23:10	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 23:10	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 23:10	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 23:10	1
Chloroethane	ND		1.0		ug/L			08/20/14 23:10	1
Chloroform	ND		1.0		ug/L			08/20/14 23:10	1
Chloromethane	ND		1.0		ug/L			08/20/14 23:10	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 23:10	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 23:10	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 23:10	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 23:10	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 23:10	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 23:10	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 23:10	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 23:10	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 23:10	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 23:10	1
Dibromomethane	ND		0.50		ug/L			08/20/14 23:10	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 23:10	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 23:10	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 23:10	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 23:10	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 23:10	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 23:10	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 23:10	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 23:10	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 23:10	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 23:10	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 23:10	1
2-Hexanone	ND		50		ug/L			08/20/14 23:10	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 23:10	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 23:10	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 23:10	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 23:10	1
Naphthalene	ND		1.0		ug/L			08/20/14 23:10	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 23:10	1
Styrene	ND		0.50		ug/L			08/20/14 23:10	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 23:10	1

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Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: P-01HP-19.0
Date Collected: 08/20/14 16:00
Date Received: 08/20/14 17:50

Lab Sample ID: 720-59412-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 23:10	1
Tetrachloroethene	**2.1**		0.50		ug/L			08/20/14 23:10	1
Toluene	ND		0.50		ug/L			08/20/14 23:10	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 23:10	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 23:10	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 23:10	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 23:10	1
Trichloroethene	ND		0.50		ug/L			08/20/14 23:10	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 23:10	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 23:10	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 23:10	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 23:10	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 23:10	1
Vinyl acetate	ND		10		ug/L			08/20/14 23:10	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 23:10	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 23:10	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 23:10	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 23:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*97*		*67 - 130*		*08/20/14 23:10*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/20/14 23:10*	*1*
Toluene-d8 (Surr)	*94*		*70 - 130*		*08/20/14 23:10*	*1*

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/20/14 15:32	1
Acetone	ND		50		ug/L			08/20/14 15:32	1
Benzene	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorobromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Bromobenzene	ND		1.0		ug/L			08/20/14 15:32	1
Chlorobromomethane	ND		1.0		ug/L			08/20/14 15:32	1
Bromoform	ND		1.0		ug/L			08/20/14 15:32	1
Bromomethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Butanone (MEK)	ND		50		ug/L			08/20/14 15:32	1
n-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
sec-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
tert-Butylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Carbon disulfide	ND		5.0		ug/L			08/20/14 15:32	1
Carbon tetrachloride	ND		0.50		ug/L			08/20/14 15:32	1
Chlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
Chloroethane	ND		1.0		ug/L			08/20/14 15:32	1
Chloroform	ND		1.0		ug/L			08/20/14 15:32	1
Chloromethane	ND		1.0		ug/L			08/20/14 15:32	1
2-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
4-Chlorotoluene	ND		0.50		ug/L			08/20/14 15:32	1
Chlorodibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3-Dichloropropane	ND		1.0		ug/L			08/20/14 15:32	1
1,1-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/20/14 15:32	1
Ethylene Dibromide	ND		0.50		ug/L			08/20/14 15:32	1
Dibromomethane	ND		0.50		ug/L			08/20/14 15:32	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
1,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/20/14 15:32	1
Ethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Hexachlorobutadiene	ND		1.0		ug/L			08/20/14 15:32	1
2-Hexanone	ND		50		ug/L			08/20/14 15:32	1
Isopropylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
4-Isopropyltoluene	ND		1.0		ug/L			08/20/14 15:32	1
Methylene Chloride	ND		5.0		ug/L			08/20/14 15:32	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/20/14 15:32	1
Naphthalene	ND		1.0		ug/L			08/20/14 15:32	1
N-Propylbenzene	ND		1.0		ug/L			08/20/14 15:32	1
Styrene	ND		0.50		ug/L			08/20/14 15:32	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165333/4
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Tetrachloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Toluene	ND		0.50		ug/L			08/20/14 15:32	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/20/14 15:32	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/20/14 15:32	1
Trichloroethene	ND		0.50		ug/L			08/20/14 15:32	1
Trichlorofluoromethane	ND		1.0		ug/L			08/20/14 15:32	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/20/14 15:32	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/20/14 15:32	1
Vinyl acetate	ND		10		ug/L			08/20/14 15:32	1
Vinyl chloride	ND		0.50		ug/L			08/20/14 15:32	1
Xylenes, Total	ND		1.0		ug/L			08/20/14 15:32	1
2,2-Dichloropropane	ND		0.50		ug/L			08/20/14 15:32	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/20/14 15:32	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/20/14 15:32*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/20/14 15:32*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/20/14 15:32*	*1*

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	26.2		ug/L		105	62 - 130
Acetone	125	127		ug/L		102	26 - 180
Benzene	25.0	25.8		ug/L		103	79 - 130
Dichlorobromomethane	25.0	25.5		ug/L		102	70 - 130
Bromobenzene	25.0	25.3		ug/L		101	70 - 130
Chlorobromomethane	25.0	24.5		ug/L		98	70 - 130
Bromoform	25.0	26.3		ug/L		105	68 - 136
Bromomethane	25.0	20.7		ug/L		83	43 - 151
2-Butanone (MEK)	125	125		ug/L		100	54 - 130
n-Butylbenzene	25.0	26.4		ug/L		106	70 - 142
sec-Butylbenzene	25.0	25.7		ug/L		103	70 - 134
tert-Butylbenzene	25.0	25.5		ug/L		102	70 - 135
Carbon disulfide	25.0	23.7		ug/L		95	58 - 130
Carbon tetrachloride	25.0	25.1		ug/L		100	70 - 146
Chlorobenzene	25.0	24.7		ug/L		99	70 - 130
Chloroethane	25.0	21.6		ug/L		86	62 - 138
Chloroform	25.0	24.9		ug/L		100	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165333

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	21.6		ug/L		86	52 - 175
2-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
4-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
Chlorodibromomethane	25.0	26.0		ug/L		104	70 - 145
1,2-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,3-Dichlorobenzene	25.0	24.9		ug/L		100	70 - 130
1,4-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
1,3-Dichloropropane	25.0	25.3		ug/L		101	70 - 130
1,1-Dichloropropene	25.0	27.0		ug/L		108	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.8		ug/L		103	70 - 136
Ethylene Dibromide	25.0	25.4		ug/L		101	70 - 130
Dibromomethane	25.0	24.8		ug/L		99	70 - 130
Dichlorodifluoromethane	25.0	17.5		ug/L		70	34 - 132
1,1-Dichloroethane	25.0	25.6		ug/L		102	70 - 130
1,2-Dichloroethane	25.0	24.4		ug/L		98	61 - 132
1,1-Dichloroethene	25.0	22.0		ug/L		88	64 - 128
cis-1,2-Dichloroethene	25.0	25.2		ug/L		101	70 - 130
trans-1,2-Dichloroethene	25.0	24.3		ug/L		97	68 - 130
1,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 130
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130
trans-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 140
Ethylbenzene	25.0	24.8		ug/L		99	80 - 120
Hexachlorobutadiene	25.0	25.5		ug/L		102	70 - 130
2-Hexanone	125	129		ug/L		103	60 - 164
Isopropylbenzene	25.0	25.6		ug/L		102	70 - 130
4-Isopropyltoluene	25.0	25.4		ug/L		102	70 - 130
Methylene Chloride	25.0	26.2		ug/L		105	70 - 147
4-Methyl-2-pentanone (MIBK)	125	134		ug/L		107	58 - 130
Naphthalene	25.0	27.5		ug/L		110	70 - 130
N-Propylbenzene	25.0	26.6		ug/L		106	70 - 130
Styrene	25.0	27.5		ug/L		110	70 - 130
1,1,1,2-Tetrachloroethane	25.0	26.2		ug/L		105	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.4		ug/L		101	70 - 130
Tetrachloroethene	25.0	24.1		ug/L		96	70 - 130
Toluene	25.0	25.0		ug/L		100	78 - 120
1,2,3-Trichlorobenzene	25.0	25.4		ug/L		102	70 - 130
1,2,4-Trichlorobenzene	25.0	26.0		ug/L		104	70 - 130
1,1,1-Trichloroethane	25.0	24.6		ug/L		98	70 - 130
1,1,2-Trichloroethane	25.0	25.8		ug/L		103	70 - 130
Trichloroethene	25.0	24.5		ug/L		98	70 - 130
Trichlorofluoromethane	25.0	25.3		ug/L		101	66 - 132
1,2,3-Trichloropropane	25.0	26.6		ug/L		106	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.4		ug/L		85	42 - 162
1,2,4-Trimethylbenzene	25.0	26.0		ug/L		104	70 - 132
1,3,5-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 130
Vinyl acetate	25.0	21.3		ug/L		85	43 - 163
Vinyl chloride	25.0	18.8		ug/L		75	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165333/5
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.8		ug/L		99	70 - 142
o-Xylene	25.0	25.4		ug/L		102	70 - 130
2,2-Dichloropropane	25.0	26.2		ug/L		105	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165333/7
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	563		ug/L		113	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*97*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/6
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	25.5		ug/L		102	62 - 130	3	20
Acetone	125	114		ug/L		91	26 - 180	11	30
Benzene	25.0	26.0		ug/L		104	79 - 130	1	20
Dichlorobromomethane	25.0	25.4		ug/L		102	70 - 130	0	20
Bromobenzene	25.0	25.7		ug/L		103	70 - 130	2	20
Chlorobromomethane	25.0	24.2		ug/L		97	70 - 130	1	20
Bromoform	25.0	25.6		ug/L		102	68 - 136	3	20
Bromomethane	25.0	20.7		ug/L		83	43 - 151	0	20
2-Butanone (MEK)	125	116		ug/L		92	54 - 130	8	20
n-Butylbenzene	25.0	26.9		ug/L		108	70 - 142	2	20
sec-Butylbenzene	25.0	26.3		ug/L		105	70 - 134	2	20
tert-Butylbenzene	25.0	26.3		ug/L		105	70 - 135	3	20
Carbon disulfide	25.0	23.9		ug/L		96	58 - 130	1	20
Carbon tetrachloride	25.0	25.5		ug/L		102	70 - 146	2	20
Chlorobenzene	25.0	24.8		ug/L		99	70 - 130	0	20
Chloroethane	25.0	21.6		ug/L		86	62 - 138	0	20
Chloroform	25.0	25.1		ug/L		100	70 - 130	1	20
Chloromethane	25.0	21.5		ug/L		86	52 - 175	0	20
2-Chlorotoluene	25.0	27.2		ug/L		109	70 - 130	3	20
4-Chlorotoluene	25.0	27.4		ug/L		110	70 - 130	4	20
Chlorodibromomethane	25.0	25.5		ug/L		102	70 - 145	2	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6 **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165333

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130	1	20
1,3-Dichlorobenzene	25.0	25.5		ug/L		102	70 - 130	2	20
1,4-Dichlorobenzene	25.0	25.4		ug/L		102	70 - 130	1	20
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130	2	20
1,1-Dichloropropene	25.0	27.4		ug/L		109	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	25.4		ug/L		102	70 - 136	2	20
Ethylene Dibromide	25.0	24.7		ug/L		99	70 - 130	3	20
Dibromomethane	25.0	24.6		ug/L		98	70 - 130	1	20
Dichlorodifluoromethane	25.0	17.4		ug/L		70	34 - 132	0	20
1,1-Dichloroethane	25.0	26.1		ug/L		104	70 - 130	2	20
1,2-Dichloroethane	25.0	24.0		ug/L		96	61 - 132	1	20
1,1-Dichloroethene	25.0	22.5		ug/L		90	64 - 128	2	20
cis-1,2-Dichloroethene	25.0	25.5		ug/L		102	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	24.8		ug/L		99	68 - 130	2	20
1,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	29.3		ug/L		117	70 - 140	2	20
Ethylbenzene	25.0	25.0		ug/L		100	80 - 120	1	20
Hexachlorobutadiene	25.0	26.3		ug/L		105	70 - 130	3	20
2-Hexanone	125	119		ug/L		95	60 - 164	8	20
Isopropylbenzene	25.0	26.0		ug/L		104	70 - 130	2	20
4-Isopropyltoluene	25.0	26.1		ug/L		104	70 - 130	3	20
Methylene Chloride	25.0	26.0		ug/L		104	70 - 147	1	20
4-Methyl-2-pentanone (MIBK)	125	126		ug/L		101	58 - 130	7	20
Naphthalene	25.0	26.8		ug/L		107	70 - 130	2	20
N-Propylbenzene	25.0	27.4		ug/L		109	70 - 130	3	20
Styrene	25.0	27.6		ug/L		110	70 - 130	0	20
1,1,1,2-Tetrachloroethane	25.0	26.1		ug/L		105	70 - 130	0	20
1,1,2,2-Tetrachloroethane	25.0	25.2		ug/L		101	70 - 130	1	20
Tetrachloroethene	25.0	24.4		ug/L		97	70 - 130	1	20
Toluene	25.0	25.5		ug/L		102	78 - 120	2	20
1,2,3-Trichlorobenzene	25.0	25.5		ug/L		102	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	26.2		ug/L		105	70 - 130	1	20
1,1,1-Trichloroethane	25.0	24.7		ug/L		99	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.4		ug/L		101	70 - 130	2	20
Trichloroethene	25.0	24.6		ug/L		99	70 - 130	1	20
Trichlorofluoromethane	25.0	25.1		ug/L		100	66 - 132	1	20
1,2,3-Trichloropropane	25.0	25.7		ug/L		103	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.2		ug/L		85	42 - 162	1	20
1,2,4-Trimethylbenzene	25.0	26.5		ug/L		106	70 - 132	2	20
1,3,5-Trimethylbenzene	25.0	27.1		ug/L		109	70 - 130	2	20
Vinyl acetate	25.0	21.4		ug/L		85	43 - 163	0	20
Vinyl chloride	25.0	19.0		ug/L		76	54 - 135	1	20
m-Xylene & p-Xylene	25.0	25.3		ug/L		101	70 - 142	2	20
o-Xylene	25.0	25.8		ug/L		103	70 - 130	2	20
2,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 140	1	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165333/6
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*88*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165333/8
Matrix: Water
Analysis Batch: 165333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	572		ug/L		114	62 - 120	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

GC/MS VOA

Analysis Batch: 165333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59412-1	P-01HP-19.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165333/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165333/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165333/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: P-01HP-19.0
Date Collected: 08/20/14 16:00
Date Received: 08/20/14 17:50

Lab Sample ID: 720-59412-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165333	08/20/14 23:10	PDR	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.

TestAmerica Job ID: 720-59412-1

Project/Site: Crown Chevrolet

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59412-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59412-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59412-1	P-01HP-19.0	Water	08/20/14 16:00	08/20/14 17:50

15105

CHAIN-OF-CUSTODY RECORD

720-59412

PROJECT NAME: Crown Chevy

PROJECT NUMBER: OD10160070.0012.A

RESULTS TO: Avery Whitmarsh

TURNAROUND TIME: 2-day Rush

SAMPLE SHIPMENT METHOD: drop off

LABORATORY NAME: TestAmerica

LABORATORY ADDRESS: Pleasanton, CA

LABORATORY CONTACT: Afsaneh

LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION:

DATE: 8/20/14 PAGE 1 OF 1

REPORTING REQUIREMENTS:

155744

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

ANALYSES

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	TPHg by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/20/14	1600	P-01HP-19.0	X	X	40 mL VOA	W	N	HCl	Y	N	3	

720-59412 Chain of Custody

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: AZ PRINTED NAME: Alex Rosenthal COMPANY: AMEC	8/20/14	1750	SIGNATURE: PRINTED NAME: T. Bullock COMPANY: TA	8/20/14	1750
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 3

SAMPLING COMMENTS:

2-day Rush TAT

5.1 °c

RUSH

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59412-1

Login Number: 59412

List Source: TestAmerica Pleasanton

List Number: 1

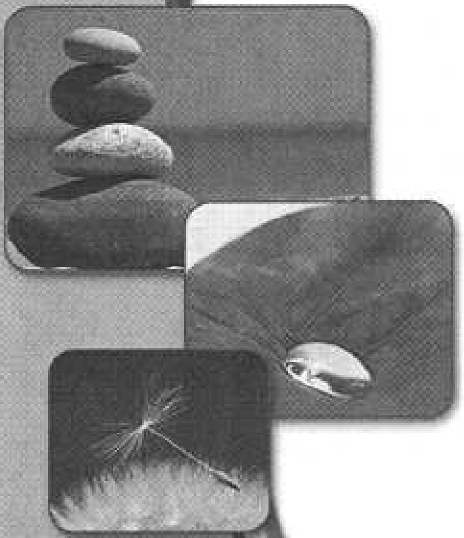
Creator: Gonzales, Justinn

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT



TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59448-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/28/2014 9:31:55 AM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 720-59448-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59448-1

Comments
No additional comments.

Receipt
The samples were received on 8/21/2014 5:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7° C.

GC/MS VOA
Method(s) 8260B: The Gasoline Range Organics (GRO) concentration reported for the following sample is due to the presence of discrete peaks: PRB-02HP-27.5 (720-59448-1). <<PCE>>

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Client Sample ID: PRB-02HP-27.5 — Lab Sample ID: 720-59448-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	58		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	2.8		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Gasoline Range Organics (GRO) -C5-C12	61	R	50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: P-02HP-27.5 — Lab Sample ID: 720-59448-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	40		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	1.9		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: P-02HP-18.0 — Lab Sample ID: 720-59448-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	70		50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Tetrachloroethene	12		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	3.0		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-02HP-27.5
Date Collected: 08/21/14 15:10
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/22/14 12:15	1
Acetone	ND		50		ug/L			08/22/14 12:15	1
Benzene	ND		0.50		ug/L			08/22/14 12:15	1
Dichlorobromomethane	ND		0.50		ug/L			08/22/14 12:15	1
Bromobenzene	ND		1.0		ug/L			08/22/14 12:15	1
Chlorobromomethane	ND		1.0		ug/L			08/22/14 12:15	1
Bromoform	ND		1.0		ug/L			08/22/14 12:15	1
Bromomethane	ND		1.0		ug/L			08/22/14 12:15	1
2-Butanone (MEK)	ND		50		ug/L			08/22/14 12:15	1
n-Butylbenzene	ND		1.0		ug/L			08/22/14 12:15	1
sec-Butylbenzene	ND		1.0		ug/L			08/22/14 12:15	1
tert-Butylbenzene	ND		1.0		ug/L			08/22/14 12:15	1
Carbon disulfide	ND		5.0		ug/L			08/22/14 12:15	1
Carbon tetrachloride	ND		0.50		ug/L			08/22/14 12:15	1
Chlorobenzene	ND		0.50		ug/L			08/22/14 12:15	1
Chloroethane	ND		1.0		ug/L			08/22/14 12:15	1
Chloroform	ND		1.0		ug/L			08/22/14 12:15	1
Chloromethane	ND		1.0		ug/L			08/22/14 12:15	1
2-Chlorotoluene	ND		0.50		ug/L			08/22/14 12:15	1
4-Chlorotoluene	ND		0.50		ug/L			08/22/14 12:15	1
Chlorodibromomethane	ND		0.50		ug/L			08/22/14 12:15	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:15	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:15	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:15	1
1,3-Dichloropropane	ND		1.0		ug/L			08/22/14 12:15	1
1,1-Dichloropropene	ND		0.50		ug/L			08/22/14 12:15	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/22/14 12:15	1
Ethylene Dibromide	ND		0.50		ug/L			08/22/14 12:15	1
Dibromomethane	ND		0.50		ug/L			08/22/14 12:15	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/22/14 12:15	1
1,1-Dichloroethane	ND		0.50		ug/L			08/22/14 12:15	1
1,2-Dichloroethane	ND		0.50		ug/L			08/22/14 12:15	1
1,1-Dichloroethene	ND		0.50		ug/L			08/22/14 12:15	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 12:15	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 12:15	1
1,2-Dichloropropane	ND		0.50		ug/L			08/22/14 12:15	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 12:15	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 12:15	1
Ethylbenzene	ND		0.50		ug/L			08/22/14 12:15	1
Hexachlorobutadiene	ND		1.0		ug/L			08/22/14 12:15	1
2-Hexanone	ND		50		ug/L			08/22/14 12:15	1
Isopropylbenzene	ND		0.50		ug/L			08/22/14 12:15	1
4-Isopropyltoluene	ND		1.0		ug/L			08/22/14 12:15	1
Methylene Chloride	ND		5.0		ug/L			08/22/14 12:15	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/22/14 12:15	1
Naphthalene	ND		1.0		ug/L			08/22/14 12:15	1
N-Propylbenzene	ND		1.0		ug/L			08/22/14 12:15	1
Styrene	ND		0.50		ug/L			08/22/14 12:15	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 12:15	1

Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-27.5
Date Collected: 08/21/14 15:10
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 12:15	1
Tetrachloroethene	**58**		0.50		ug/L			08/22/14 12:15	1
Toluene	ND		0.50		ug/L			08/22/14 12:15	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/22/14 12:15	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/22/14 12:15	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/22/14 12:15	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/22/14 12:15	1
Trichloroethene	**2.8**		0.50		ug/L			08/22/14 12:15	1
Trichlorofluoromethane	ND		1.0		ug/L			08/22/14 12:15	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/22/14 12:15	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/22/14 12:15	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/22/14 12:15	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/22/14 12:15	1
Vinyl acetate	ND		10		ug/L			08/22/14 12:15	1
Vinyl chloride	ND		0.50		ug/L			08/22/14 12:15	1
Xylenes, Total	ND		1.0		ug/L			08/22/14 12:15	1
2,2-Dichloropropane	ND		0.50		ug/L			08/22/14 12:15	1
Gasoline Range Organics (GRO) -C5-C12	**61**	R	50		ug/L			08/22/14 12:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*67 - 130*		*08/22/14 12:15*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*72 - 130*		*08/22/14 12:15*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/22/14 12:15*	*1*

Client Sample ID: P-02HP-27.5
Date Collected: 08/21/14 16:15
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/22/14 12:44	1
Acetone	ND		50		ug/L			08/22/14 12:44	1
Benzene	ND		0.50		ug/L			08/22/14 12:44	1
Dichlorobromomethane	ND		0.50		ug/L			08/22/14 12:44	1
Bromobenzene	ND		1.0		ug/L			08/22/14 12:44	1
Chlorobromomethane	ND		1.0		ug/L			08/22/14 12:44	1
Bromoform	ND		1.0		ug/L			08/22/14 12:44	1
Bromomethane	ND		1.0		ug/L			08/22/14 12:44	1
2-Butanone (MEK)	ND		50		ug/L			08/22/14 12:44	1
n-Butylbenzene	ND		1.0		ug/L			08/22/14 12:44	1
sec-Butylbenzene	ND		1.0		ug/L			08/22/14 12:44	1
tert-Butylbenzene	ND		1.0		ug/L			08/22/14 12:44	1
Carbon disulfide	ND		5.0		ug/L			08/22/14 12:44	1
Carbon tetrachloride	ND		0.50		ug/L			08/22/14 12:44	1
Chlorobenzene	ND		0.50		ug/L			08/22/14 12:44	1
Chloroethane	ND		1.0		ug/L			08/22/14 12:44	1
Chloroform	ND		1.0		ug/L			08/22/14 12:44	1
Chloromethane	ND		1.0		ug/L			08/22/14 12:44	1
2-Chlorotoluene	ND		0.50		ug/L			08/22/14 12:44	1
4-Chlorotoluene	ND		0.50		ug/L			08/22/14 12:44	1
Chlorodibromomethane	ND		0.50		ug/L			08/22/14 12:44	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: P-02HP-27.5
Date Collected: 08/21/14 16:15
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:44	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:44	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/22/14 12:44	1
1,3-Dichloropropane	ND		1.0		ug/L			08/22/14 12:44	1
1,1-Dichloropropene	ND		0.50		ug/L			08/22/14 12:44	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/22/14 12:44	1
Ethylene Dibromide	ND		0.50		ug/L			08/22/14 12:44	1
Dibromomethane	ND		0.50		ug/L			08/22/14 12:44	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/22/14 12:44	1
1,1-Dichloroethane	ND		0.50		ug/L			08/22/14 12:44	1
1,2-Dichloroethane	ND		0.50		ug/L			08/22/14 12:44	1
1,1-Dichloroethene	ND		0.50		ug/L			08/22/14 12:44	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 12:44	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 12:44	1
1,2-Dichloropropane	ND		0.50		ug/L			08/22/14 12:44	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 12:44	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 12:44	1
Ethylbenzene	ND		0.50		ug/L			08/22/14 12:44	1
Hexachlorobutadiene	ND		1.0		ug/L			08/22/14 12:44	1
2-Hexanone	ND		50		ug/L			08/22/14 12:44	1
Isopropylbenzene	ND		0.50		ug/L			08/22/14 12:44	1
4-Isopropyltoluene	ND		1.0		ug/L			08/22/14 12:44	1
Methylene Chloride	ND		5.0		ug/L			08/22/14 12:44	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/22/14 12:44	1
Naphthalene	ND		1.0		ug/L			08/22/14 12:44	1
N-Propylbenzene	ND		1.0		ug/L			08/22/14 12:44	1
Styrene	ND		0.50		ug/L			08/22/14 12:44	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 12:44	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 12:44	1
Tetrachloroethene	**40**		0.50		ug/L			08/22/14 12:44	1
Toluene	ND		0.50		ug/L			08/22/14 12:44	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/22/14 12:44	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/22/14 12:44	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/22/14 12:44	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/22/14 12:44	1
Trichloroethene	**1.9**		0.50		ug/L			08/22/14 12:44	1
Trichlorofluoromethane	ND		1.0		ug/L			08/22/14 12:44	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/22/14 12:44	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/22/14 12:44	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/22/14 12:44	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/22/14 12:44	1
Vinyl acetate	ND		10		ug/L			08/22/14 12:44	1
Vinyl chloride	ND		0.50		ug/L			08/22/14 12:44	1
Xylenes, Total	ND		1.0		ug/L			08/22/14 12:44	1
2,2-Dichloropropane	ND		0.50		ug/L			08/22/14 12:44	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/22/14 12:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*100*		*67 - 130*		*08/22/14 12:44*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: P-02HP-27.5
Date Collected: 08/21/14 16:15
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-2
Matrix: Water

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*		*08/22/14 12:44*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/22/14 12:44*	*1*

Client Sample ID: P-02HP-18.0
Date Collected: 08/21/14 16:35
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/22/14 14:10	1
Acetone	**70**		50		ug/L			08/22/14 14:10	1
Benzene	ND		0.50		ug/L			08/22/14 14:10	1
Dichlorobromomethane	ND		0.50		ug/L			08/22/14 14:10	1
Bromobenzene	ND		1.0		ug/L			08/22/14 14:10	1
Chlorobromomethane	ND		1.0		ug/L			08/22/14 14:10	1
Bromoform	ND		1.0		ug/L			08/22/14 14:10	1
Bromomethane	ND		1.0		ug/L			08/22/14 14:10	1
2-Butanone (MEK)	ND		50		ug/L			08/22/14 14:10	1
n-Butylbenzene	ND		1.0		ug/L			08/22/14 14:10	1
sec-Butylbenzene	ND		1.0		ug/L			08/22/14 14:10	1
tert-Butylbenzene	ND		1.0		ug/L			08/22/14 14:10	1
Carbon disulfide	ND		5.0		ug/L			08/22/14 14:10	1
Carbon tetrachloride	ND		0.50		ug/L			08/22/14 14:10	1
Chlorobenzene	ND		0.50		ug/L			08/22/14 14:10	1
Chloroethane	ND		1.0		ug/L			08/22/14 14:10	1
Chloroform	ND		1.0		ug/L			08/22/14 14:10	1
Chloromethane	ND		1.0		ug/L			08/22/14 14:10	1
2-Chlorotoluene	ND		0.50		ug/L			08/22/14 14:10	1
4-Chlorotoluene	ND		0.50		ug/L			08/22/14 14:10	1
Chlorodibromomethane	ND		0.50		ug/L			08/22/14 14:10	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/22/14 14:10	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/22/14 14:10	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/22/14 14:10	1
1,3-Dichloropropane	ND		1.0		ug/L			08/22/14 14:10	1
1,1-Dichloropropene	ND		0.50		ug/L			08/22/14 14:10	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/22/14 14:10	1
Ethylene Dibromide	ND		0.50		ug/L			08/22/14 14:10	1
Dibromomethane	ND		0.50		ug/L			08/22/14 14:10	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/22/14 14:10	1
1,1-Dichloroethane	ND		0.50		ug/L			08/22/14 14:10	1
1,2-Dichloroethane	ND		0.50		ug/L			08/22/14 14:10	1
1,1-Dichloroethene	ND		0.50		ug/L			08/22/14 14:10	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 14:10	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 14:10	1
1,2-Dichloropropane	ND		0.50		ug/L			08/22/14 14:10	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 14:10	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 14:10	1
Ethylbenzene	ND		0.50		ug/L			08/22/14 14:10	1
Hexachlorobutadiene	ND		1.0		ug/L			08/22/14 14:10	1
2-Hexanone	ND		50		ug/L			08/22/14 14:10	1
Isopropylbenzene	ND		0.50		ug/L			08/22/14 14:10	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: P-02HP-18.0
Date Collected: 08/21/14 16:35
Date Received: 08/21/14 17:45

Lab Sample ID: 720-59448-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Isopropyltoluene	ND		1.0		ug/L			08/22/14 14:10	1
Methylene Chloride	ND		5.0		ug/L			08/22/14 14:10	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/22/14 14:10	1
Naphthalene	ND		1.0		ug/L			08/22/14 14:10	1
N-Propylbenzene	ND		1.0		ug/L			08/22/14 14:10	1
Styrene	ND		0.50		ug/L			08/22/14 14:10	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 14:10	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 14:10	1
Tetrachloroethene	**12**		0.50		ug/L			08/22/14 14:10	1
Toluene	ND		0.50		ug/L			08/22/14 14:10	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/22/14 14:10	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/22/14 14:10	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/22/14 14:10	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/22/14 14:10	1
Trichloroethene	**3.0**		0.50		ug/L			08/22/14 14:10	1
Trichlorofluoromethane	ND		1.0		ug/L			08/22/14 14:10	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/22/14 14:10	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/22/14 14:10	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/22/14 14:10	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/22/14 14:10	1
Vinyl acetate	ND		10		ug/L			08/22/14 14:10	1
Vinyl chloride	ND		0.50		ug/L			08/22/14 14:10	1
Xylenes, Total	ND		1.0		ug/L			08/22/14 14:10	1
2,2-Dichloropropane	ND		0.50		ug/L			08/22/14 14:10	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/22/14 14:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*67 - 130*		*08/22/14 14:10*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*72 - 130*		*08/22/14 14:10*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/22/14 14:10*	*1*

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165439/4
Matrix: Water
Analysis Batch: 165439

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/22/14 08:55	1
Acetone	ND		50		ug/L			08/22/14 08:55	1
Benzene	ND		0.50		ug/L			08/22/14 08:55	1
Dichlorobromomethane	ND		0.50		ug/L			08/22/14 08:55	1
Bromobenzene	ND		1.0		ug/L			08/22/14 08:55	1
Chlorobromomethane	ND		1.0		ug/L			08/22/14 08:55	1
Bromoform	ND		1.0		ug/L			08/22/14 08:55	1
Bromomethane	ND		1.0		ug/L			08/22/14 08:55	1
2-Butanone (MEK)	ND		50		ug/L			08/22/14 08:55	1
n-Butylbenzene	ND		1.0		ug/L			08/22/14 08:55	1
sec-Butylbenzene	ND		1.0		ug/L			08/22/14 08:55	1
tert-Butylbenzene	ND		1.0		ug/L			08/22/14 08:55	1
Carbon disulfide	ND		5.0		ug/L			08/22/14 08:55	1
Carbon tetrachloride	ND		0.50		ug/L			08/22/14 08:55	1
Chlorobenzene	ND		0.50		ug/L			08/22/14 08:55	1
Chloroethane	ND		1.0		ug/L			08/22/14 08:55	1
Chloroform	ND		1.0		ug/L			08/22/14 08:55	1
Chloromethane	ND		1.0		ug/L			08/22/14 08:55	1
2-Chlorotoluene	ND		0.50		ug/L			08/22/14 08:55	1
4-Chlorotoluene	ND		0.50		ug/L			08/22/14 08:55	1
Chlorodibromomethane	ND		0.50		ug/L			08/22/14 08:55	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/22/14 08:55	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/22/14 08:55	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/22/14 08:55	1
1,3-Dichloropropane	ND		1.0		ug/L			08/22/14 08:55	1
1,1-Dichloropropene	ND		0.50		ug/L			08/22/14 08:55	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/22/14 08:55	1
Ethylene Dibromide	ND		0.50		ug/L			08/22/14 08:55	1
Dibromomethane	ND		0.50		ug/L			08/22/14 08:55	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/22/14 08:55	1
1,1-Dichloroethane	ND		0.50		ug/L			08/22/14 08:55	1
1,2-Dichloroethane	ND		0.50		ug/L			08/22/14 08:55	1
1,1-Dichloroethene	ND		0.50		ug/L			08/22/14 08:55	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 08:55	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/22/14 08:55	1
1,2-Dichloropropane	ND		0.50		ug/L			08/22/14 08:55	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 08:55	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/22/14 08:55	1
Ethylbenzene	ND		0.50		ug/L			08/22/14 08:55	1
Hexachlorobutadiene	ND		1.0		ug/L			08/22/14 08:55	1
2-Hexanone	ND		50		ug/L			08/22/14 08:55	1
Isopropylbenzene	ND		0.50		ug/L			08/22/14 08:55	1
4-Isopropyltoluene	ND		1.0		ug/L			08/22/14 08:55	1
Methylene Chloride	ND		5.0		ug/L			08/22/14 08:55	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/22/14 08:55	1
Naphthalene	ND		1.0		ug/L			08/22/14 08:55	1
N-Propylbenzene	ND		1.0		ug/L			08/22/14 08:55	1
Styrene	ND		0.50		ug/L			08/22/14 08:55	1

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165439/4
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165439

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 08:55	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/22/14 08:55	1
Tetrachloroethene	ND		0.50		ug/L			08/22/14 08:55	1
Toluene	ND		0.50		ug/L			08/22/14 08:55	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/22/14 08:55	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/22/14 08:55	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/22/14 08:55	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/22/14 08:55	1
Trichloroethene	ND		0.50		ug/L			08/22/14 08:55	1
Trichlorofluoromethane	ND		1.0		ug/L			08/22/14 08:55	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/22/14 08:55	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/22/14 08:55	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/22/14 08:55	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/22/14 08:55	1
Vinyl acetate	ND		10		ug/L			08/22/14 08:55	1
Vinyl chloride	ND		0.50		ug/L			08/22/14 08:55	1
Xylenes, Total	ND		1.0		ug/L			08/22/14 08:55	1
2,2-Dichloropropane	ND		0.50		ug/L			08/22/14 08:55	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/22/14 08:55	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/22/14 08:55*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*		*08/22/14 08:55*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/22/14 08:55*	*1*

Lab Sample ID: LCS 720-165439/5
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165439

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	26.2		ug/L		105	62 - 130
Acetone	125	125		ug/L		100	26 - 180
Benzene	25.0	25.6		ug/L		103	79 - 130
Dichlorobromomethane	25.0	25.7		ug/L		103	70 - 130
Bromobenzene	25.0	25.1		ug/L		100	70 - 130
Chlorobromomethane	25.0	24.1		ug/L		97	70 - 130
Bromoform	25.0	25.7		ug/L		103	68 - 136
Bromomethane	25.0	21.1		ug/L		84	43 - 151
2-Butanone (MEK)	125	124		ug/L		99	54 - 130
n-Butylbenzene	25.0	26.3		ug/L		105	70 - 142
sec-Butylbenzene	25.0	25.2		ug/L		101	70 - 134
tert-Butylbenzene	25.0	25.1		ug/L		100	70 - 135
Carbon disulfide	25.0	23.3		ug/L		93	58 - 130
Carbon tetrachloride	25.0	24.5		ug/L		98	70 - 146
Chlorobenzene	25.0	24.4		ug/L		98	70 - 130
Chloroethane	25.0	22.1		ug/L		88	62 - 138
Chloroform	25.0	24.9		ug/L		100	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165439/5
Matrix: Water
Analysis Batch: 165439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	22.5		ug/L		90	52 - 175
2-Chlorotoluene	25.0	26.5		ug/L		106	70 - 130
4-Chlorotoluene	25.0	26.7		ug/L		107	70 - 130
Chlorodibromomethane	25.0	26.1		ug/L		104	70 - 145
1,2-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,3-Dichlorobenzene	25.0	24.9		ug/L		99	70 - 130
1,4-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
1,3-Dichloropropane	25.0	25.4		ug/L		102	70 - 130
1,1-Dichloropropene	25.0	26.7		ug/L		107	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.2		ug/L		101	70 - 136
Ethylene Dibromide	25.0	25.4		ug/L		101	70 - 130
Dibromomethane	25.0	25.1		ug/L		100	70 - 130
Dichlorodifluoromethane	25.0	20.4		ug/L		81	34 - 132
1,1-Dichloroethane	25.0	25.7		ug/L		103	70 - 130
1,2-Dichloroethane	25.0	24.1		ug/L		96	61 - 132
1,1-Dichloroethene	25.0	21.6		ug/L		86	64 - 128
cis-1,2-Dichloroethene	25.0	25.2		ug/L		101	70 - 130
trans-1,2-Dichloroethene	25.0	24.1		ug/L		97	68 - 130
1,2-Dichloropropane	25.0	26.3		ug/L		105	70 - 130
cis-1,3-Dichloropropene	25.0	27.8		ug/L		111	70 - 130
trans-1,3-Dichloropropene	25.0	30.1		ug/L		120	70 - 140
Ethylbenzene	25.0	24.5		ug/L		98	80 - 120
Hexachlorobutadiene	25.0	24.8		ug/L		99	70 - 130
2-Hexanone	125	126		ug/L		101	60 - 164
Isopropylbenzene	25.0	25.1		ug/L		100	70 - 130
4-Isopropyltoluene	25.0	25.0		ug/L		100	70 - 130
Methylene Chloride	25.0	26.6		ug/L		106	70 - 147
4-Methyl-2-pentanone (MIBK)	125	132		ug/L		105	58 - 130
Naphthalene	25.0	26.8		ug/L		107	70 - 130
N-Propylbenzene	25.0	26.6		ug/L		106	70 - 130
Styrene	25.0	27.2		ug/L		109	70 - 130
1,1,1,2-Tetrachloroethane	25.0	25.6		ug/L		102	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.7		ug/L		103	70 - 130
Tetrachloroethene	25.0	23.8		ug/L		95	70 - 130
Toluene	25.0	24.9		ug/L		99	78 - 120
1,2,3-Trichlorobenzene	25.0	25.3		ug/L		101	70 - 130
1,2,4-Trichlorobenzene	25.0	26.3		ug/L		105	70 - 130
1,1,1-Trichloroethane	25.0	24.1		ug/L		96	70 - 130
1,1,2-Trichloroethane	25.0	26.1		ug/L		104	70 - 130
Trichloroethene	25.0	24.7		ug/L		99	70 - 130
Trichlorofluoromethane	25.0	24.8		ug/L		99	66 - 132
1,2,3-Trichloropropane	25.0	25.8		ug/L		103	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.5		ug/L		82	42 - 162
1,2,4-Trimethylbenzene	25.0	25.7		ug/L		103	70 - 132
1,3,5-Trimethylbenzene	25.0	26.3		ug/L		105	70 - 130
Vinyl acetate	25.0	24.8		ug/L		99	43 - 163
Vinyl chloride	25.0	19.1		ug/L		76	54 - 135

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-59448-1
Project/Site: Crown Chevrolet

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165439/5 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165439

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.7		ug/L		99	70 - 142
o-Xylene	25.0	25.3		ug/L		101	70 - 130
2,2-Dichloropropane	25.0	26.1		ug/L		104	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*93*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCS 720-165439/7 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165439

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	563		ug/L		113	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*97*		*72 - 130*
Toluene-d8 (Surr)	*96*		*70 - 130*

Lab Sample ID: LCSD 720-165439/6 **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165439

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	26.5		ug/L		106	62 - 130	1	20
Acetone	125	129		ug/L		103	26 - 180	3	30
Benzene	25.0	25.3		ug/L		101	79 - 130	1	20
Dichlorobromomethane	25.0	25.3		ug/L		101	70 - 130	2	20
Bromobenzene	25.0	24.5		ug/L		98	70 - 130	3	20
Chlorobromomethane	25.0	23.9		ug/L		96	70 - 130	1	20
Bromoform	25.0	26.3		ug/L		105	68 - 136	2	20
Bromomethane	25.0	21.1		ug/L		84	43 - 151	0	20
2-Butanone (MEK)	125	128		ug/L		103	54 - 130	4	20
n-Butylbenzene	25.0	25.9		ug/L		103	70 - 142	2	20
sec-Butylbenzene	25.0	24.9		ug/L		100	70 - 134	1	20
tert-Butylbenzene	25.0	24.8		ug/L		99	70 - 135	1	20
Carbon disulfide	25.0	23.4		ug/L		94	58 - 130	0	20
Carbon tetrachloride	25.0	24.5		ug/L		98	70 - 146	0	20
Chlorobenzene	25.0	24.2		ug/L		97	70 - 130	1	20
Chloroethane	25.0	22.2		ug/L		89	62 - 138	0	20
Chloroform	25.0	24.6		ug/L		98	70 - 130	1	20
Chloromethane	25.0	22.9		ug/L		92	52 - 175	2	20
2-Chlorotoluene	25.0	25.9		ug/L		104	70 - 130	2	20
4-Chlorotoluene	25.0	25.9		ug/L		104	70 - 130	3	20
Chlorodibromomethane	25.0	26.2		ug/L		105	70 - 145	0	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165439/6
Matrix: Water
Analysis Batch: 165439

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	24.3		ug/L		97	70 - 130	2	20
1,3-Dichlorobenzene	25.0	24.4		ug/L		98	70 - 130	2	20
1,4-Dichlorobenzene	25.0	24.5		ug/L		98	70 - 130	2	20
1,3-Dichloropropane	25.0	25.3		ug/L		101	70 - 130	0	20
1,1-Dichloropropene	25.0	26.6		ug/L		106	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	26.6		ug/L		106	70 - 136	5	20
Ethylene Dibromide	25.0	25.5		ug/L		102	70 - 130	0	20
Dibromomethane	25.0	24.9		ug/L		100	70 - 130	1	20
Dichlorodifluoromethane	25.0	20.5		ug/L		82	34 - 132	1	20
1,1-Dichloroethane	25.0	25.4		ug/L		102	70 - 130	1	20
1,2-Dichloroethane	25.0	24.0		ug/L		96	61 - 132	1	20
1,1-Dichloroethene	25.0	21.6		ug/L		86	64 - 128	0	20
cis-1,2-Dichloroethene	25.0	25.0		ug/L		100	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	24.0		ug/L		96	68 - 130	1	20
1,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.5		ug/L		110	70 - 130	1	20
trans-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 140	1	20
Ethylbenzene	25.0	24.4		ug/L		98	80 - 120	0	20
Hexachlorobutadiene	25.0	24.5		ug/L		98	70 - 130	1	20
2-Hexanone	125	133		ug/L		106	60 - 164	6	20
Isopropylbenzene	25.0	25.1		ug/L		100	70 - 130	0	20
4-Isopropyltoluene	25.0	24.6		ug/L		98	70 - 130	2	20
Methylene Chloride	25.0	26.3		ug/L		105	70 - 147	1	20
4-Methyl-2-pentanone (MIBK)	125	139		ug/L		111	58 - 130	5	20
Naphthalene	25.0	27.2		ug/L		109	70 - 130	1	20
N-Propylbenzene	25.0	25.9		ug/L		104	70 - 130	2	20
Styrene	25.0	26.9		ug/L		108	70 - 130	1	20
1,1,1,2-Tetrachloroethane	25.0	25.4		ug/L		102	70 - 130	1	20
1,1,2,2-Tetrachloroethane	25.0	25.9		ug/L		104	70 - 130	1	20
Tetrachloroethene	25.0	23.5		ug/L		94	70 - 130	1	20
Toluene	25.0	24.7		ug/L		99	78 - 120	1	20
1,2,3-Trichlorobenzene	25.0	24.7		ug/L		99	70 - 130	3	20
1,2,4-Trichlorobenzene	25.0	25.4		ug/L		102	70 - 130	4	20
1,1,1-Trichloroethane	25.0	24.2		ug/L		97	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.8		ug/L		103	70 - 130	1	20
Trichloroethene	25.0	24.1		ug/L		96	70 - 130	2	20
Trichlorofluoromethane	25.0	24.9		ug/L		99	66 - 132	0	20
1,2,3-Trichloropropane	25.0	26.2		ug/L		105	70 - 130	1	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.5		ug/L		82	42 - 162	0	20
1,2,4-Trimethylbenzene	25.0	25.2		ug/L		101	70 - 132	2	20
1,3,5-Trimethylbenzene	25.0	25.7		ug/L		103	70 - 130	2	20
Vinyl acetate	25.0	25.2		ug/L		101	43 - 163	1	20
Vinyl chloride	25.0	19.3		ug/L		77	54 - 135	1	20
m-Xylene & p-Xylene	25.0	24.5		ug/L		98	70 - 142	1	20
o-Xylene	25.0	25.1		ug/L		100	70 - 130	1	20
2,2-Dichloropropane	25.0	26.0		ug/L		104	70 - 140	0	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165439/6
Matrix: Water
Analysis Batch: 165439

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*102*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*91*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

Lab Sample ID: LCSD 720-165439/8
Matrix: Water
Analysis Batch: 165439

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12			500	559		ug/L		112	62 - 120	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*104*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*99*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: 720-59448-1 MS
Matrix: Water
Analysis Batch: 165439

Client Sample ID: PRB-02HP-27.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	ND		25.0	28.0		ug/L		112	60 - 138
Acetone	ND		125	130		ug/L		104	60 - 140
Benzene	ND		25.0	26.4		ug/L		104	60 - 140
Dichlorobromomethane	ND		25.0	26.5		ug/L		106	60 - 140
Bromobenzene	ND		25.0	25.5		ug/L		102	60 - 140
Chlorobromomethane	ND		25.0	24.9		ug/L		99	60 - 140
Bromoform	ND		25.0	27.2		ug/L		109	56 - 140
Bromomethane	ND		25.0	20.4		ug/L		82	23 - 140
2-Butanone (MEK)	ND		125	122		ug/L		98	60 - 140
n-Butylbenzene	ND		25.0	26.3		ug/L		105	60 - 140
sec-Butylbenzene	ND		25.0	25.0		ug/L		100	60 - 140
tert-Butylbenzene	ND		25.0	25.1		ug/L		100	60 - 140
Carbon disulfide	ND		25.0	23.2		ug/L		93	38 - 140
Carbon tetrachloride	ND		25.0	24.5		ug/L		98	60 - 140
Chlorobenzene	ND		25.0	25.0		ug/L		100	60 - 140
Chloroethane	ND		25.0	22.3		ug/L		89	51 - 140
Chloroform	ND		25.0	25.4		ug/L		102	60 - 140
Chloromethane	ND		25.0	21.3		ug/L		85	52 - 140
2-Chlorotoluene	ND		25.0	26.6		ug/L		106	60 - 140
4-Chlorotoluene	ND		25.0	27.0		ug/L		108	60 - 140
Chlorodibromomethane	ND		25.0	27.5		ug/L		110	60 - 140
1,2-Dichlorobenzene	ND		25.0	25.4		ug/L		101	60 - 140
1,3-Dichlorobenzene	ND		25.0	25.3		ug/L		101	60 - 140
1,4-Dichlorobenzene	ND		25.0	25.6		ug/L		102	60 - 140
1,3-Dichloropropane	ND		25.0	26.7		ug/L		107	60 - 140
1,1-Dichloropropene	ND		25.0	26.6		ug/L		106	60 - 140

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59448-1 MS
Matrix: Water
Analysis Batch: 165439

Client Sample ID: PRB-02HP-27.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2-Dibromo-3-Chloropropane	ND		25.0	26.5		ug/L		106	60 - 140
Ethylene Dibromide	ND		25.0	26.6		ug/L		107	60 - 140
Dibromomethane	ND		25.0	25.9		ug/L		103	60 - 140
Dichlorodifluoromethane	ND		25.0	19.9		ug/L		80	38 - 140
1,1-Dichloroethane	ND		25.0	26.2		ug/L		105	60 - 140
1,2-Dichloroethane	ND		25.0	25.4		ug/L		102	60 - 140
1,1-Dichloroethene	ND		25.0	21.2		ug/L		85	60 - 140
cis-1,2-Dichloroethene	ND		25.0	25.9		ug/L		104	60 - 140
trans-1,2-Dichloroethene	ND		25.0	24.2		ug/L		97	60 - 140
1,2-Dichloropropane	ND		25.0	27.3		ug/L		109	60 - 140
cis-1,3-Dichloropropene	ND		25.0	28.9		ug/L		115	60 - 140
trans-1,3-Dichloropropene	ND		25.0	31.6		ug/L		126	60 - 140
Ethylbenzene	ND		25.0	24.9		ug/L		100	60 - 140
Hexachlorobutadiene	ND		25.0	24.7		ug/L		99	60 - 140
2-Hexanone	ND		125	135		ug/L		108	60 - 140
Isopropylbenzene	ND		25.0	25.5		ug/L		102	60 - 140
4-Isopropyltoluene	ND		25.0	24.9		ug/L		100	60 - 140
Methylene Chloride	ND		25.0	26.5		ug/L		106	40 - 140
4-Methyl-2-pentanone (MIBK)	ND		125	142		ug/L		114	58 - 130
Naphthalene	ND		25.0	28.0		ug/L		112	56 - 140
N-Propylbenzene	ND		25.0	26.1		ug/L		104	60 - 140
Styrene	ND		25.0	28.4		ug/L		113	60 - 140
1,1,1,2-Tetrachloroethane	ND		25.0	26.6		ug/L		107	60 - 140
1,1,2,2-Tetrachloroethane	ND		25.0	26.6		ug/L		107	60 - 140
Tetrachloroethene	58		25.0	76.8		ug/L		74	60 - 140
Toluene	ND		25.0	25.1		ug/L		100	60 - 140
1,2,3-Trichlorobenzene	ND		25.0	26.3		ug/L		105	60 - 140
1,2,4-Trichlorobenzene	ND		25.0	26.8		ug/L		107	60 - 140
1,1,1-Trichloroethane	ND		25.0	24.5		ug/L		98	60 - 140
1,1,2-Trichloroethane	ND		25.0	27.6		ug/L		110	60 - 140
Trichloroethene	2.8		25.0	27.0		ug/L		97	60 - 140
Trichlorofluoromethane	ND		25.0	24.4		ug/L		97	60 - 140
1,2,3-Trichloropropane	ND		25.0	27.2		ug/L		109	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		25.0	19.9		ug/L		80	60 - 140
1,2,4-Trimethylbenzene	ND		25.0	26.0		ug/L		104	60 - 140
1,3,5-Trimethylbenzene	ND		25.0	26.3		ug/L		105	60 - 140
Vinyl acetate	ND		25.0	26.6		ug/L		106	40 - 140
Vinyl chloride	ND		25.0	19.1		ug/L		76	58 - 140
m-Xylene & p-Xylene	ND		25.0	25.1		ug/L		101	60 - 140
o-Xylene	ND		25.0	26.0		ug/L		104	60 - 140
2,2-Dichloropropane	ND		25.0	25.7		ug/L		103	60 - 140

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene	*102*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*94*		*72 - 130*
Toluene-d8 (Surr)	*99*		*70 - 130*

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59448-1 MSD
Matrix: Water
Analysis Batch: 165439

Client Sample ID: PRB-02HP-27.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	ND		25.0	27.0		ug/L		108	60 - 138	4	20
Acetone	ND		125	122		ug/L		97	60 - 140	6	20
Benzene	ND		25.0	26.2		ug/L		104	60 - 140	0	20
Dichlorobromomethane	ND		25.0	26.3		ug/L		105	60 - 140	1	20
Bromobenzene	ND		25.0	25.1		ug/L		100	60 - 140	2	20
Chlorobromomethane	ND		25.0	24.5		ug/L		98	60 - 140	2	20
Bromoform	ND		25.0	26.0		ug/L		104	56 - 140	4	20
Bromomethane	ND		25.0	20.3		ug/L		81	23 - 140	1	20
2-Butanone (MEK)	ND		125	122		ug/L		97	60 - 140	0	20
n-Butylbenzene	ND		25.0	26.1		ug/L		104	60 - 140	1	20
sec-Butylbenzene	ND		25.0	25.1		ug/L		100	60 - 140	0	20
tert-Butylbenzene	ND		25.0	25.0		ug/L		100	60 - 140	0	20
Carbon disulfide	ND		25.0	23.2		ug/L		93	38 - 140	0	20
Carbon tetrachloride	ND		25.0	24.5		ug/L		98	60 - 140	0	20
Chlorobenzene	ND		25.0	24.6		ug/L		99	60 - 140	1	20
Chloroethane	ND		25.0	21.9		ug/L		88	51 - 140	2	20
Chloroform	ND		25.0	25.3		ug/L		101	60 - 140	0	20
Chloromethane	ND		25.0	20.6		ug/L		82	52 - 140	4	20
2-Chlorotoluene	ND		25.0	26.4		ug/L		106	60 - 140	1	20
4-Chlorotoluene	ND		25.0	26.8		ug/L		107	60 - 140	1	20
Chlorodibromomethane	ND		25.0	26.5		ug/L		106	60 - 140	4	20
1,2-Dichlorobenzene	ND		25.0	24.8		ug/L		99	60 - 140	2	20
1,3-Dichlorobenzene	ND		25.0	25.0		ug/L		100	60 - 140	1	20
1,4-Dichlorobenzene	ND		25.0	25.3		ug/L		101	60 - 140	1	20
1,3-Dichloropropane	ND		25.0	26.0		ug/L		104	60 - 140	3	20
1,1-Dichloropropene	ND		25.0	26.6		ug/L		106	60 - 140	0	20
1,2-Dibromo-3-Chloropropane	ND		25.0	24.8		ug/L		99	60 - 140	6	20
Ethylene Dibromide	ND		25.0	25.9		ug/L		104	60 - 140	3	20
Dibromomethane	ND		25.0	25.4		ug/L		102	60 - 140	2	20
Dichlorodifluoromethane	ND		25.0	19.2		ug/L		77	38 - 140	3	20
1,1-Dichloroethane	ND		25.0	26.2		ug/L		105	60 - 140	0	20
1,2-Dichloroethane	ND		25.0	24.8		ug/L		99	60 - 140	2	20
1,1-Dichloroethene	ND		25.0	21.3		ug/L		85	60 - 140	0	20
cis-1,2-Dichloroethene	ND		25.0	25.8		ug/L		103	60 - 140	1	20
trans-1,2-Dichloroethene	ND		25.0	24.0		ug/L		96	60 - 140	1	20
1,2-Dichloropropane	ND		25.0	27.2		ug/L		109	60 - 140	1	20
cis-1,3-Dichloropropene	ND		25.0	28.4		ug/L		114	60 - 140	1	20
trans-1,3-Dichloropropene	ND		25.0	30.8		ug/L		123	60 - 140	3	20
Ethylbenzene	ND		25.0	24.7		ug/L		99	60 - 140	1	20
Hexachlorobutadiene	ND		25.0	24.8		ug/L		99	60 - 140	0	20
2-Hexanone	ND		125	126		ug/L		101	60 - 140	7	20
Isopropylbenzene	ND		25.0	25.2		ug/L		101	60 - 140	1	20
4-Isopropyltoluene	ND		25.0	24.8		ug/L		99	60 - 140	0	20
Methylene Chloride	ND		25.0	26.2		ug/L		105	40 - 140	1	20
4-Methyl-2-pentanone (MIBK)	ND		125	135		ug/L		108	58 - 130	5	20
Naphthalene	ND		25.0	27.1		ug/L		108	56 - 140	3	20
N-Propylbenzene	ND		25.0	26.1		ug/L		105	60 - 140	0	20
Styrene	ND		25.0	27.6		ug/L		111	60 - 140	3	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: 720-59448-1 MSD
Matrix: Water
Analysis Batch: 165439

Client Sample ID: PRB-02HP-27.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	ND		25.0	26.1		ug/L		104	60 - 140	2	20
1,1,2,2-Tetrachloroethane	ND		25.0	25.5		ug/L		102	60 - 140	4	20
Tetrachloroethene	58		25.0	76.6		ug/L		73	60 - 140	0	20
Toluene	ND		25.0	25.0		ug/L		100	60 - 140	0	20
1,2,3-Trichlorobenzene	ND		25.0	25.6		ug/L		102	60 - 140	3	20
1,2,4-Trichlorobenzene	ND		25.0	26.4		ug/L		106	60 - 140	1	20
1,1,1-Trichloroethane	ND		25.0	24.4		ug/L		97	60 - 140	0	20
1,1,2-Trichloroethane	ND		25.0	26.5		ug/L		106	60 - 140	4	20
Trichloroethene	2.8		25.0	26.8		ug/L		96	60 - 140	1	20
Trichlorofluoromethane	ND		25.0	24.0		ug/L		96	60 - 140	1	20
1,2,3-Trichloropropane	ND		25.0	25.7		ug/L		103	60 - 140	6	20
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		25.0	19.8		ug/L		79	60 - 140	0	20
1,2,4-Trimethylbenzene	ND		25.0	26.0		ug/L		104	60 - 140	0	20
1,3,5-Trimethylbenzene	ND		25.0	26.1		ug/L		104	60 - 140	1	20
Vinyl acetate	ND		25.0	25.3		ug/L		101	40 - 140	5	20
Vinyl chloride	ND		25.0	19.3		ug/L		77	58 - 140	1	20
m-Xylene & p-Xylene	ND		25.0	24.9		ug/L		100	60 - 140	1	20
o-Xylene	ND		25.0	25.7		ug/L		103	60 - 140	1	20
2,2-Dichloropropane	ND		25.0	25.7		ug/L		103	60 - 140	0	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene	*101*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

QC Association Summary

GC/MS VOA

Analysis Batch: 165439

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59448-1	PRB-02HP-27.5	Total/NA	Water	8260B/CA_LUFT MS	
720-59448-1 MS	PRB-02HP-27.5	Total/NA	Water	8260B/CA_LUFT MS	
720-59448-1 MSD	PRB-02HP-27.5	Total/NA	Water	8260B/CA_LUFT MS	
720-59448-2	P-02HP-27.5	Total/NA	Water	8260B/CA_LUFT MS	
720-59448-3	P-02HP-18.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165439/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165439/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165439/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165439/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165439/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Lab Chronicle

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Client Sample ID: PRB-02HP-27.5

Lab Sample ID: 720-59448-1

Date Collected: 08/21/14 15:10
Date Received: 08/21/14 17:45

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165439	08/22/14 12:15	ASC	TAL PLS

Client Sample ID: P-02HP-27.5

Lab Sample ID: 720-59448-2

Date Collected: 08/21/14 16:15
Date Received: 08/21/14 17:45

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165439	08/22/14 12:44	ASC	TAL PLS

Client Sample ID: P-02HP-18.0

Lab Sample ID: 720-59448-3

Date Collected: 08/21/14 16:35
Date Received: 08/21/14 17:45

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165439	08/22/14 14:10	ASC	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59448-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59448-1	PRB-02HP-27.5	Water	08/21/14 15:10	08/21/14 17:45
720-59448-2	P-02HP-27.5	Water	08/21/14 16:15	08/21/14 17:45
720-59448-3	P-02HP-18.0	Water	08/21/14 16:35	08/21/14 17:45

CHAIN-OF-CUSTODY RECORD

15103

PROJECT NAME: Crown Cherry
DATE: 8/21/14
PAGE 1 OF 1
PROJECT NUMBER: 0D10160070.00012-A
RESULTS TO: Avery Whitmarsh
TURNAROUND TIME: Standard
SAMPLE SHIPMENT METHOD: drop off
LABORATORY NAME: TestAmerica
LABORATORY ADDRESS: Pleasanton, CA
LABORATORY CONTACT: AFSaveli
LABORATORY PHONE NUMBER: 925-484-1919
CLIENT INFORMATION: 720-59448
REPORTING REQUIREMENTS: 155777
GEOTRACKER REQUIRED YES NO
SITE SPECIFIC GLOBAL ID NO

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	TPHg by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No of Containers	ADDITIONAL COMMENTS
~~8/21/14~~ AR	~~1515~~ AR	~~PRB-02HP-27.5~~										
	~~1635~~	~~P-02HP~~ AR										
8/21/14	1510	PRB-02HP-27.5	X	X	40 mL VOA	W	N	HCl	Y	N	3	
↓	1615	P-02HP-27.5	X	X	↓	↓	↓	↓	↓	↓	↓	
↓	1635	P-02HP-18.0	X	X	↓	↓	↓	↓	↓	↓	↓	AR

ANALYSES

720-59448 Chain of Custody

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: PRINTED NAME: Alex Rosenthal COMPANY: AMEC	8/21/14	1745	SIGNATURE: PRINTED NAME: T. Bullock COMPANY: TAP	8/21/14	1745
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 9

SAMPLING COMMENTS:

4.7°C

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59448-1

Login Number: 59448
List Number: 1
Creator: Bullock, Tracy

List Source: TestAmerica Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59492-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/29/2014 3:54:07 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

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Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

Job ID: 720-59492-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59492-1

Comments

No additional comments.

Receipt

The samples were received on 8/25/2014 5:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8º C.

GC/MS VOA

Method(s) 8260B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch #165832 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

Client Sample ID: PRB-01HP-19.0 — Lab Sample ID: 720-59492-1

No Detections.

Client Sample ID: PRB-02HP-33.0 — Lab Sample ID: 720-59492-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	2.3		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: PRB-03HP-34.0 — Lab Sample ID: 720-59492-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	11		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	1.3		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: PRB-03HP-340.0 — Lab Sample ID: 720-59492-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	12		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	1.3		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: TB-2 — Lab Sample ID: 720-59492-6

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-01HP-19.0
Date Collected: 08/25/14 10:40
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/27/14 16:35	1
Acetone	ND		50		ug/L			08/27/14 16:35	1
Benzene	ND		0.50		ug/L			08/27/14 16:35	1
Dichlorobromomethane	ND		0.50		ug/L			08/27/14 16:35	1
Bromobenzene	ND		1.0		ug/L			08/27/14 16:35	1
Chlorobromomethane	ND		1.0		ug/L			08/27/14 16:35	1
Bromoform	ND		1.0		ug/L			08/27/14 16:35	1
Bromomethane	ND		1.0		ug/L			08/27/14 16:35	1
2-Butanone (MEK)	ND		50		ug/L			08/27/14 16:35	1
n-Butylbenzene	ND		1.0		ug/L			08/27/14 16:35	1
sec-Butylbenzene	ND		1.0		ug/L			08/27/14 16:35	1
tert-Butylbenzene	ND		1.0		ug/L			08/27/14 16:35	1
Carbon disulfide	ND		5.0		ug/L			08/27/14 16:35	1
Carbon tetrachloride	ND		0.50		ug/L			08/27/14 16:35	1
Chlorobenzene	ND		0.50		ug/L			08/27/14 16:35	1
Chloroethane	ND		1.0		ug/L			08/27/14 16:35	1
Chloroform	ND		1.0		ug/L			08/27/14 16:35	1
Chloromethane	ND		1.0		ug/L			08/27/14 16:35	1
2-Chlorotoluene	ND		0.50		ug/L			08/27/14 16:35	1
4-Chlorotoluene	ND		0.50		ug/L			08/27/14 16:35	1
Chlorodibromomethane	ND		0.50		ug/L			08/27/14 16:35	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/27/14 16:35	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/27/14 16:35	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/27/14 16:35	1
1,3-Dichloropropane	ND		1.0		ug/L			08/27/14 16:35	1
1,1-Dichloropropene	ND		0.50		ug/L			08/27/14 16:35	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/27/14 16:35	1
Ethylene Dibromide	ND		0.50		ug/L			08/27/14 16:35	1
Dibromomethane	ND		0.50		ug/L			08/27/14 16:35	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/27/14 16:35	1
1,1-Dichloroethane	ND		0.50		ug/L			08/27/14 16:35	1
1,2-Dichloroethane	ND		0.50		ug/L			08/27/14 16:35	1
1,1-Dichloroethene	ND		0.50		ug/L			08/27/14 16:35	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 16:35	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 16:35	1
1,2-Dichloropropane	ND		0.50		ug/L			08/27/14 16:35	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 16:35	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 16:35	1
Ethylbenzene	ND		0.50		ug/L			08/27/14 16:35	1
Hexachlorobutadiene	ND		1.0		ug/L			08/27/14 16:35	1
2-Hexanone	ND		50		ug/L			08/27/14 16:35	1
Isopropylbenzene	ND		0.50		ug/L			08/27/14 16:35	1
4-Isopropyltoluene	ND		1.0		ug/L			08/27/14 16:35	1
Methylene Chloride	ND		5.0		ug/L			08/27/14 16:35	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/27/14 16:35	1
Naphthalene	ND		1.0		ug/L			08/27/14 16:35	1
N-Propylbenzene	ND		1.0		ug/L			08/27/14 16:35	1
Styrene	ND		0.50		ug/L			08/27/14 16:35	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 16:35	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-01HP-19.0 **Lab Sample ID: 720-59492-1**

Date Collected: 08/25/14 10:40 **Matrix: Water**

Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 16:35	1
Tetrachloroethene	ND		0.50		ug/L			08/27/14 16:35	1
Toluene	ND		0.50		ug/L			08/27/14 16:35	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/27/14 16:35	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/27/14 16:35	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/27/14 16:35	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/27/14 16:35	1
Trichloroethene	ND		0.50		ug/L			08/27/14 16:35	1
Trichlorofluoromethane	ND		1.0		ug/L			08/27/14 16:35	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/27/14 16:35	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/27/14 16:35	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/27/14 16:35	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/27/14 16:35	1
Vinyl acetate	ND		10		ug/L			08/27/14 16:35	1
Vinyl chloride	ND		0.50		ug/L			08/27/14 16:35	1
Xylenes, Total	ND		1.0		ug/L			08/27/14 16:35	1
2,2-Dichloropropane	ND		0.50		ug/L			08/27/14 16:35	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/27/14 16:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*103*		*67 - 130*		*08/27/14 16:35*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*		*08/27/14 16:35*	*1*
Toluene-d8 (Surr)	*98*		*70 - 130*		*08/27/14 16:35*	*1*

Client Sample ID: PRB-02HP-33.0 **Lab Sample ID: 720-59492-3**

Date Collected: 08/25/14 11:25 **Matrix: Water**

Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/27/14 17:04	1
Acetone	ND		50		ug/L			08/27/14 17:04	1
Benzene	ND		0.50		ug/L			08/27/14 17:04	1
Dichlorobromomethane	ND		0.50		ug/L			08/27/14 17:04	1
Bromobenzene	ND		1.0		ug/L			08/27/14 17:04	1
Chlorobromomethane	ND		1.0		ug/L			08/27/14 17:04	1
Bromoform	ND		1.0		ug/L			08/27/14 17:04	1
Bromomethane	ND		1.0		ug/L			08/27/14 17:04	1
2-Butanone (MEK)	ND		50		ug/L			08/27/14 17:04	1
n-Butylbenzene	ND		1.0		ug/L			08/27/14 17:04	1
sec-Butylbenzene	ND		1.0		ug/L			08/27/14 17:04	1
tert-Butylbenzene	ND		1.0		ug/L			08/27/14 17:04	1
Carbon disulfide	ND		5.0		ug/L			08/27/14 17:04	1
Carbon tetrachloride	ND		0.50		ug/L			08/27/14 17:04	1
Chlorobenzene	ND		0.50		ug/L			08/27/14 17:04	1
Chloroethane	ND		1.0		ug/L			08/27/14 17:04	1
Chloroform	ND		1.0		ug/L			08/27/14 17:04	1
Chloromethane	ND		1.0		ug/L			08/27/14 17:04	1
2-Chlorotoluene	ND		0.50		ug/L			08/27/14 17:04	1
4-Chlorotoluene	ND		0.50		ug/L			08/27/14 17:04	1
Chlorodibromomethane	ND		0.50		ug/L			08/27/14 17:04	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-33.0 **Lab Sample ID: 720-59492-3**
Date Collected: 08/25/14 11:25 **Matrix: Water**
Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:04	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:04	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:04	1
1,3-Dichloropropane	ND		1.0		ug/L			08/27/14 17:04	1
1,1-Dichloropropene	ND		0.50		ug/L			08/27/14 17:04	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/27/14 17:04	1
Ethylene Dibromide	ND		0.50		ug/L			08/27/14 17:04	1
Dibromomethane	ND		0.50		ug/L			08/27/14 17:04	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/27/14 17:04	1
1,1-Dichloroethane	ND		0.50		ug/L			08/27/14 17:04	1
1,2-Dichloroethane	ND		0.50		ug/L			08/27/14 17:04	1
1,1-Dichloroethene	ND		0.50		ug/L			08/27/14 17:04	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 17:04	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 17:04	1
1,2-Dichloropropane	ND		0.50		ug/L			08/27/14 17:04	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 17:04	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 17:04	1
Ethylbenzene	ND		0.50		ug/L			08/27/14 17:04	1
Hexachlorobutadiene	ND		1.0		ug/L			08/27/14 17:04	1
2-Hexanone	ND		50		ug/L			08/27/14 17:04	1
Isopropylbenzene	ND		0.50		ug/L			08/27/14 17:04	1
4-Isopropyltoluene	ND		1.0		ug/L			08/27/14 17:04	1
Methylene Chloride	ND		5.0		ug/L			08/27/14 17:04	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/27/14 17:04	1
Naphthalene	ND		1.0		ug/L			08/27/14 17:04	1
N-Propylbenzene	ND		1.0		ug/L			08/27/14 17:04	1
Styrene	ND		0.50		ug/L			08/27/14 17:04	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 17:04	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 17:04	1
Tetrachloroethene	**2.3**		0.50		ug/L			08/27/14 17:04	1
Toluene	ND		0.50		ug/L			08/27/14 17:04	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/27/14 17:04	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/27/14 17:04	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/27/14 17:04	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/27/14 17:04	1
Trichloroethene	ND		0.50		ug/L			08/27/14 17:04	1
Trichlorofluoromethane	ND		1.0		ug/L			08/27/14 17:04	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/27/14 17:04	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/27/14 17:04	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/27/14 17:04	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/27/14 17:04	1
Vinyl acetate	ND		10		ug/L			08/27/14 17:04	1
Vinyl chloride	ND		0.50		ug/L			08/27/14 17:04	1
Xylenes, Total	ND		1.0		ug/L			08/27/14 17:04	1
2,2-Dichloropropane	ND		0.50		ug/L			08/27/14 17:04	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/27/14 17:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*67 - 130*		*08/27/14 17:04*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-02HP-33.0
Date Collected: 08/25/14 11:25
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-3
Matrix: Water

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*72 - 130*		*08/27/14 17:04*	*1*
Toluene-d8 (Surr)	*97*		*70 - 130*		*08/27/14 17:04*	*1*

Client Sample ID: PRB-03HP-34.0
Date Collected: 08/25/14 15:10
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/27/14 17:33	1
Acetone	ND		50		ug/L			08/27/14 17:33	1
Benzene	ND		0.50		ug/L			08/27/14 17:33	1
Dichlorobromomethane	ND		0.50		ug/L			08/27/14 17:33	1
Bromobenzene	ND		1.0		ug/L			08/27/14 17:33	1
Chlorobromomethane	ND		1.0		ug/L			08/27/14 17:33	1
Bromoform	ND		1.0		ug/L			08/27/14 17:33	1
Bromomethane	ND		1.0		ug/L			08/27/14 17:33	1
2-Butanone (MEK)	ND		50		ug/L			08/27/14 17:33	1
n-Butylbenzene	ND		1.0		ug/L			08/27/14 17:33	1
sec-Butylbenzene	ND		1.0		ug/L			08/27/14 17:33	1
tert-Butylbenzene	ND		1.0		ug/L			08/27/14 17:33	1
Carbon disulfide	ND		5.0		ug/L			08/27/14 17:33	1
Carbon tetrachloride	ND		0.50		ug/L			08/27/14 17:33	1
Chlorobenzene	ND		0.50		ug/L			08/27/14 17:33	1
Chloroethane	ND		1.0		ug/L			08/27/14 17:33	1
Chloroform	ND		1.0		ug/L			08/27/14 17:33	1
Chloromethane	ND		1.0		ug/L			08/27/14 17:33	1
2-Chlorotoluene	ND		0.50		ug/L			08/27/14 17:33	1
4-Chlorotoluene	ND		0.50		ug/L			08/27/14 17:33	1
Chlorodibromomethane	ND		0.50		ug/L			08/27/14 17:33	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:33	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:33	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/27/14 17:33	1
1,3-Dichloropropane	ND		1.0		ug/L			08/27/14 17:33	1
1,1-Dichloropropene	ND		0.50		ug/L			08/27/14 17:33	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/27/14 17:33	1
Ethylene Dibromide	ND		0.50		ug/L			08/27/14 17:33	1
Dibromomethane	ND		0.50		ug/L			08/27/14 17:33	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/27/14 17:33	1
1,1-Dichloroethane	ND		0.50		ug/L			08/27/14 17:33	1
1,2-Dichloroethane	ND		0.50		ug/L			08/27/14 17:33	1
1,1-Dichloroethene	ND		0.50		ug/L			08/27/14 17:33	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 17:33	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 17:33	1
1,2-Dichloropropane	ND		0.50		ug/L			08/27/14 17:33	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 17:33	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 17:33	1
Ethylbenzene	ND		0.50		ug/L			08/27/14 17:33	1
Hexachlorobutadiene	ND		1.0		ug/L			08/27/14 17:33	1
2-Hexanone	ND		50		ug/L			08/27/14 17:33	1
Isopropylbenzene	ND		0.50		ug/L			08/27/14 17:33	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-34.0
Date Collected: 08/25/14 15:10
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Isopropyltoluene	ND		1.0		ug/L			08/27/14 17:33	1
Methylene Chloride	ND		5.0		ug/L			08/27/14 17:33	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/27/14 17:33	1
Naphthalene	ND		1.0		ug/L			08/27/14 17:33	1
N-Propylbenzene	ND		1.0		ug/L			08/27/14 17:33	1
Styrene	ND		0.50		ug/L			08/27/14 17:33	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 17:33	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 17:33	1
Tetrachloroethene	**11**		0.50		ug/L			08/27/14 17:33	1
Toluene	ND		0.50		ug/L			08/27/14 17:33	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/27/14 17:33	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/27/14 17:33	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/27/14 17:33	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/27/14 17:33	1
Trichloroethene	**1.3**		0.50		ug/L			08/27/14 17:33	1
Trichlorofluoromethane	ND		1.0		ug/L			08/27/14 17:33	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/27/14 17:33	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/27/14 17:33	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/27/14 17:33	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/27/14 17:33	1
Vinyl acetate	ND		10		ug/L			08/27/14 17:33	1
Vinyl chloride	ND		0.50		ug/L			08/27/14 17:33	1
Xylenes, Total	ND		1.0		ug/L			08/27/14 17:33	1
2,2-Dichloropropane	ND		0.50		ug/L			08/27/14 17:33	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/27/14 17:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*67 - 130*		*08/27/14 17:33*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*		*08/27/14 17:33*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*		*08/27/14 17:33*	*1*

Client Sample ID: PRB-03HP-340.0
Date Collected: 08/25/14 15:15
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/29/14 02:46	1
Acetone	ND		50		ug/L			08/29/14 02:46	1
Benzene	ND		0.50		ug/L			08/29/14 02:46	1
Dichlorobromomethane	ND		0.50		ug/L			08/29/14 02:46	1
Bromobenzene	ND		1.0		ug/L			08/29/14 02:46	1
Chlorobromomethane	ND		1.0		ug/L			08/29/14 02:46	1
Bromoform	ND		1.0		ug/L			08/29/14 02:46	1
Bromomethane	ND		1.0		ug/L			08/29/14 02:46	1
2-Butanone (MEK)	ND		50		ug/L			08/29/14 02:46	1
n-Butylbenzene	ND		1.0		ug/L			08/29/14 02:46	1
sec-Butylbenzene	ND		1.0		ug/L			08/29/14 02:46	1
tert-Butylbenzene	ND		1.0		ug/L			08/29/14 02:46	1
Carbon disulfide	ND		5.0		ug/L			08/29/14 02:46	1
Carbon tetrachloride	ND		0.50		ug/L			08/29/14 02:46	1

Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-340.0
Lab Sample ID: 720-59492-5
Date Collected: 08/25/14 15:15
Matrix: Water
Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlorobenzene	ND		0.50		ug/L			08/29/14 02:46	1
Chloroethane	ND		1.0		ug/L			08/29/14 02:46	1
Chloroform	ND		1.0		ug/L			08/29/14 02:46	1
Chloromethane	ND		1.0		ug/L			08/29/14 02:46	1
2-Chlorotoluene	ND		0.50		ug/L			08/29/14 02:46	1
4-Chlorotoluene	ND		0.50		ug/L			08/29/14 02:46	1
Chlorodibromomethane	ND		0.50		ug/L			08/29/14 02:46	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/29/14 02:46	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/29/14 02:46	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/29/14 02:46	1
1,3-Dichloropropane	ND		1.0		ug/L			08/29/14 02:46	1
1,1-Dichloropropene	ND		0.50		ug/L			08/29/14 02:46	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/29/14 02:46	1
Ethylene Dibromide	ND		0.50		ug/L			08/29/14 02:46	1
Dibromomethane	ND		0.50		ug/L			08/29/14 02:46	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/29/14 02:46	1
1,1-Dichloroethane	ND		0.50		ug/L			08/29/14 02:46	1
1,2-Dichloroethane	ND		0.50		ug/L			08/29/14 02:46	1
1,1-Dichloroethene	ND		0.50		ug/L			08/29/14 02:46	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/29/14 02:46	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/29/14 02:46	1
1,2-Dichloropropane	ND		0.50		ug/L			08/29/14 02:46	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/29/14 02:46	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/29/14 02:46	1
Ethylbenzene	ND		0.50		ug/L			08/29/14 02:46	1
Hexachlorobutadiene	ND		1.0		ug/L			08/29/14 02:46	1
2-Hexanone	ND		50		ug/L			08/29/14 02:46	1
Isopropylbenzene	ND		0.50		ug/L			08/29/14 02:46	1
4-Isopropyltoluene	ND		1.0		ug/L			08/29/14 02:46	1
Methylene Chloride	ND		5.0		ug/L			08/29/14 02:46	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/29/14 02:46	1
Naphthalene	ND		1.0		ug/L			08/29/14 02:46	1
N-Propylbenzene	ND		1.0		ug/L			08/29/14 02:46	1
Styrene	ND		0.50		ug/L			08/29/14 02:46	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/29/14 02:46	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/29/14 02:46	1
Tetrachloroethene	**12**		0.50		ug/L			08/29/14 02:46	1
Toluene	ND		0.50		ug/L			08/29/14 02:46	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/29/14 02:46	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/29/14 02:46	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/29/14 02:46	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/29/14 02:46	1
Trichloroethene	**1.3**		0.50		ug/L			08/29/14 02:46	1
Trichlorofluoromethane	ND		1.0		ug/L			08/29/14 02:46	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/29/14 02:46	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/29/14 02:46	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/29/14 02:46	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/29/14 02:46	1
Vinyl acetate	ND		10		ug/L			08/29/14 02:46	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-03HP-340.0
Lab Sample ID: 720-59492-5
Date Collected: 08/25/14 15:15
Matrix: Water
Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	ND		0.50		ug/L			08/29/14 02:46	1
Xylenes, Total	ND		1.0		ug/L			08/29/14 02:46	1
2,2-Dichloropropane	ND		0.50		ug/L			08/29/14 02:46	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/29/14 02:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*95*		*67 - 130*		*08/29/14 02:46*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*72 - 130*		*08/29/14 02:46*	*1*
Toluene-d8 (Surr)	*99*		*70 - 130*		*08/29/14 02:46*	*1*

Client Sample ID: TB-2
Lab Sample ID: 720-59492-6
Date Collected: 08/25/14 16:35
Matrix: Water
Date Received: 08/25/14 17:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/27/14 13:14	1
Acetone	ND		50		ug/L			08/27/14 13:14	1
Benzene	ND		0.50		ug/L			08/27/14 13:14	1
Dichlorobromomethane	ND		0.50		ug/L			08/27/14 13:14	1
Bromobenzene	ND		1.0		ug/L			08/27/14 13:14	1
Chlorobromomethane	ND		1.0		ug/L			08/27/14 13:14	1
Bromoform	ND		1.0		ug/L			08/27/14 13:14	1
Bromomethane	ND		1.0		ug/L			08/27/14 13:14	1
2-Butanone (MEK)	ND		50		ug/L			08/27/14 13:14	1
n-Butylbenzene	ND		1.0		ug/L			08/27/14 13:14	1
sec-Butylbenzene	ND		1.0		ug/L			08/27/14 13:14	1
tert-Butylbenzene	ND		1.0		ug/L			08/27/14 13:14	1
Carbon disulfide	ND		5.0		ug/L			08/27/14 13:14	1
Carbon tetrachloride	ND		0.50		ug/L			08/27/14 13:14	1
Chlorobenzene	ND		0.50		ug/L			08/27/14 13:14	1
Chloroethane	ND		1.0		ug/L			08/27/14 13:14	1
Chloroform	ND		1.0		ug/L			08/27/14 13:14	1
Chloromethane	ND		1.0		ug/L			08/27/14 13:14	1
2-Chlorotoluene	ND		0.50		ug/L			08/27/14 13:14	1
4-Chlorotoluene	ND		0.50		ug/L			08/27/14 13:14	1
Chlorodibromomethane	ND		0.50		ug/L			08/27/14 13:14	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/27/14 13:14	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/27/14 13:14	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/27/14 13:14	1
1,3-Dichloropropane	ND		1.0		ug/L			08/27/14 13:14	1
1,1-Dichloropropene	ND		0.50		ug/L			08/27/14 13:14	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/27/14 13:14	1
Ethylene Dibromide	ND		0.50		ug/L			08/27/14 13:14	1
Dibromomethane	ND		0.50		ug/L			08/27/14 13:14	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/27/14 13:14	1
1,1-Dichloroethane	ND		0.50		ug/L			08/27/14 13:14	1
1,2-Dichloroethane	ND		0.50		ug/L			08/27/14 13:14	1
1,1-Dichloroethene	ND		0.50		ug/L			08/27/14 13:14	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 13:14	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 13:14	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: TB-2
Date Collected: 08/25/14 16:35
Date Received: 08/25/14 17:10

Lab Sample ID: 720-59492-6
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichloropropane	ND		0.50		ug/L			08/27/14 13:14	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 13:14	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 13:14	1
Ethylbenzene	ND		0.50		ug/L			08/27/14 13:14	1
Hexachlorobutadiene	ND		1.0		ug/L			08/27/14 13:14	1
2-Hexanone	ND		50		ug/L			08/27/14 13:14	1
Isopropylbenzene	ND		0.50		ug/L			08/27/14 13:14	1
4-Isopropyltoluene	ND		1.0		ug/L			08/27/14 13:14	1
Methylene Chloride	ND		5.0		ug/L			08/27/14 13:14	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/27/14 13:14	1
Naphthalene	ND		1.0		ug/L			08/27/14 13:14	1
N-Propylbenzene	ND		1.0		ug/L			08/27/14 13:14	1
Styrene	ND		0.50		ug/L			08/27/14 13:14	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 13:14	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 13:14	1
Tetrachloroethene	ND		0.50		ug/L			08/27/14 13:14	1
Toluene	ND		0.50		ug/L			08/27/14 13:14	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/27/14 13:14	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/27/14 13:14	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/27/14 13:14	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/27/14 13:14	1
Trichloroethene	ND		0.50		ug/L			08/27/14 13:14	1
Trichlorofluoromethane	ND		1.0		ug/L			08/27/14 13:14	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/27/14 13:14	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/27/14 13:14	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/27/14 13:14	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/27/14 13:14	1
Vinyl acetate	ND		10		ug/L			08/27/14 13:14	1
Vinyl chloride	ND		0.50		ug/L			08/27/14 13:14	1
Xylenes, Total	ND		1.0		ug/L			08/27/14 13:14	1
2,2-Dichloropropane	ND		0.50		ug/L			08/27/14 13:14	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/27/14 13:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/27/14 13:14*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*		*08/27/14 13:14*	*1*
Toluene-d8 (Surr)	*94*		*70 - 130*		*08/27/14 13:14*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165701/4
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165701

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/27/14 08:57	1
Acetone	ND		50		ug/L			08/27/14 08:57	1
Benzene	ND		0.50		ug/L			08/27/14 08:57	1
Dichlorobromomethane	ND		0.50		ug/L			08/27/14 08:57	1
Bromobenzene	ND		1.0		ug/L			08/27/14 08:57	1
Chlorobromomethane	ND		1.0		ug/L			08/27/14 08:57	1
Bromoform	ND		1.0		ug/L			08/27/14 08:57	1
Bromomethane	ND		1.0		ug/L			08/27/14 08:57	1
2-Butanone (MEK)	ND		50		ug/L			08/27/14 08:57	1
n-Butylbenzene	ND		1.0		ug/L			08/27/14 08:57	1
sec-Butylbenzene	ND		1.0		ug/L			08/27/14 08:57	1
tert-Butylbenzene	ND		1.0		ug/L			08/27/14 08:57	1
Carbon disulfide	ND		5.0		ug/L			08/27/14 08:57	1
Carbon tetrachloride	ND		0.50		ug/L			08/27/14 08:57	1
Chlorobenzene	ND		0.50		ug/L			08/27/14 08:57	1
Chloroethane	ND		1.0		ug/L			08/27/14 08:57	1
Chloroform	ND		1.0		ug/L			08/27/14 08:57	1
Chloromethane	ND		1.0		ug/L			08/27/14 08:57	1
2-Chlorotoluene	ND		0.50		ug/L			08/27/14 08:57	1
4-Chlorotoluene	ND		0.50		ug/L			08/27/14 08:57	1
Chlorodibromomethane	ND		0.50		ug/L			08/27/14 08:57	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/27/14 08:57	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/27/14 08:57	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/27/14 08:57	1
1,3-Dichloropropane	ND		1.0		ug/L			08/27/14 08:57	1
1,1-Dichloropropene	ND		0.50		ug/L			08/27/14 08:57	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/27/14 08:57	1
Ethylene Dibromide	ND		0.50		ug/L			08/27/14 08:57	1
Dibromomethane	ND		0.50		ug/L			08/27/14 08:57	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/27/14 08:57	1
1,1-Dichloroethane	ND		0.50		ug/L			08/27/14 08:57	1
1,2-Dichloroethane	ND		0.50		ug/L			08/27/14 08:57	1
1,1-Dichloroethene	ND		0.50		ug/L			08/27/14 08:57	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 08:57	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/27/14 08:57	1
1,2-Dichloropropane	ND		0.50		ug/L			08/27/14 08:57	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 08:57	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/27/14 08:57	1
Ethylbenzene	ND		0.50		ug/L			08/27/14 08:57	1
Hexachlorobutadiene	ND		1.0		ug/L			08/27/14 08:57	1
2-Hexanone	ND		50		ug/L			08/27/14 08:57	1
Isopropylbenzene	ND		0.50		ug/L			08/27/14 08:57	1
4-Isopropyltoluene	ND		1.0		ug/L			08/27/14 08:57	1
Methylene Chloride	ND		5.0		ug/L			08/27/14 08:57	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/27/14 08:57	1
Naphthalene	ND		1.0		ug/L			08/27/14 08:57	1
N-Propylbenzene	ND		1.0		ug/L			08/27/14 08:57	1
Styrene	ND		0.50		ug/L			08/27/14 08:57	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165701/4
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165701

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 08:57	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/27/14 08:57	1
Tetrachloroethene	ND		0.50		ug/L			08/27/14 08:57	1
Toluene	ND		0.50		ug/L			08/27/14 08:57	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/27/14 08:57	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/27/14 08:57	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/27/14 08:57	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/27/14 08:57	1
Trichloroethene	ND		0.50		ug/L			08/27/14 08:57	1
Trichlorofluoromethane	ND		1.0		ug/L			08/27/14 08:57	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/27/14 08:57	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/27/14 08:57	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/27/14 08:57	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/27/14 08:57	1
Vinyl acetate	ND		10		ug/L			08/27/14 08:57	1
Vinyl chloride	ND		0.50		ug/L			08/27/14 08:57	1
Xylenes, Total	ND		1.0		ug/L			08/27/14 08:57	1
2,2-Dichloropropane	ND		0.50		ug/L			08/27/14 08:57	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/27/14 08:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/27/14 08:57*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*72 - 130*		*08/27/14 08:57*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*08/27/14 08:57*	*1*

Lab Sample ID: LCS 720-165701/5
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165701

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	24.9		ug/L		99	62 - 130
Acetone	125	119		ug/L		95	26 - 180
Benzene	25.0	25.3		ug/L		101	79 - 130
Dichlorobromomethane	25.0	24.8		ug/L		99	70 - 130
Bromobenzene	25.0	26.6		ug/L		106	70 - 130
Chlorobromomethane	25.0	23.6		ug/L		95	70 - 130
Bromoform	25.0	27.9		ug/L		112	68 - 136
Bromomethane	25.0	20.4		ug/L		82	43 - 151
2-Butanone (MEK)	125	111		ug/L		88	54 - 130
n-Butylbenzene	25.0	26.5		ug/L		106	70 - 142
sec-Butylbenzene	25.0	26.1		ug/L		104	70 - 134
tert-Butylbenzene	25.0	26.3		ug/L		105	70 - 135
Carbon disulfide	25.0	22.7		ug/L		91	58 - 130
Carbon tetrachloride	25.0	24.3		ug/L		97	70 - 146
Chlorobenzene	25.0	24.9		ug/L		100	70 - 130
Chloroethane	25.0	19.8		ug/L		79	62 - 138
Chloroform	25.0	23.9		ug/L		96	70 - 130

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165701/5
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	19.7		ug/L		79	52 - 175
2-Chlorotoluene	25.0	26.9		ug/L		108	70 - 130
4-Chlorotoluene	25.0	27.4		ug/L		109	70 - 130
Chlorodibromomethane	25.0	26.5		ug/L		106	70 - 145
1,2-Dichlorobenzene	25.0	26.1		ug/L		105	70 - 130
1,3-Dichlorobenzene	25.0	26.2		ug/L		105	70 - 130
1,4-Dichlorobenzene	25.0	26.5		ug/L		106	70 - 130
1,3-Dichloropropane	25.0	24.8		ug/L		99	70 - 130
1,1-Dichloropropene	25.0	26.1		ug/L		104	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	26.5		ug/L		106	70 - 136
Ethylene Dibromide	25.0	25.1		ug/L		100	70 - 130
Dibromomethane	25.0	24.0		ug/L		96	70 - 130
Dichlorodifluoromethane	25.0	19.7		ug/L		79	34 - 132
1,1-Dichloroethane	25.0	24.4		ug/L		98	70 - 130
1,2-Dichloroethane	25.0	22.7		ug/L		91	61 - 132
1,1-Dichloroethene	25.0	21.2		ug/L		85	64 - 128
cis-1,2-Dichloroethene	25.0	23.9		ug/L		96	70 - 130
trans-1,2-Dichloroethene	25.0	23.7		ug/L		95	68 - 130
1,2-Dichloropropane	25.0	24.9		ug/L		99	70 - 130
cis-1,3-Dichloropropene	25.0	26.8		ug/L		107	70 - 130
trans-1,3-Dichloropropene	25.0	29.5		ug/L		118	70 - 140
Ethylbenzene	25.0	24.6		ug/L		98	80 - 120
Hexachlorobutadiene	25.0	27.5		ug/L		110	70 - 130
2-Hexanone	125	111		ug/L		89	60 - 164
Isopropylbenzene	25.0	26.1		ug/L		104	70 - 130
4-Isopropyltoluene	25.0	26.1		ug/L		104	70 - 130
Methylene Chloride	25.0	24.3		ug/L		97	70 - 147
4-Methyl-2-pentanone (MIBK)	125	118		ug/L		95	58 - 130
Naphthalene	25.0	28.0		ug/L		112	70 - 130
N-Propylbenzene	25.0	26.5		ug/L		106	70 - 130
Styrene	25.0	28.4		ug/L		113	70 - 130
1,1,1,2-Tetrachloroethane	25.0	26.7		ug/L		107	70 - 130
1,1,2,2-Tetrachloroethane	25.0	25.7		ug/L		103	70 - 130
Tetrachloroethene	25.0	24.5		ug/L		98	70 - 130
Toluene	25.0	24.7		ug/L		99	78 - 120
1,2,3-Trichlorobenzene	25.0	26.8		ug/L		107	70 - 130
1,2,4-Trichlorobenzene	25.0	27.9		ug/L		112	70 - 130
1,1,1-Trichloroethane	25.0	23.9		ug/L		96	70 - 130
1,1,2-Trichloroethane	25.0	25.7		ug/L		103	70 - 130
Trichloroethene	25.0	24.4		ug/L		98	70 - 130
Trichlorofluoromethane	25.0	25.1		ug/L		100	66 - 132
1,2,3-Trichloropropane	25.0	26.8		ug/L		107	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	20.8		ug/L		83	42 - 162
1,2,4-Trimethylbenzene	25.0	26.6		ug/L		106	70 - 132
1,3,5-Trimethylbenzene	25.0	27.0		ug/L		108	70 - 130
Vinyl acetate	25.0	20.3		ug/L		81	43 - 163
Vinyl chloride	25.0	16.7		ug/L		67	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165701/5
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	24.8		ug/L		99	70 - 142
o-Xylene	25.0	25.7		ug/L		103	70 - 130
2,2-Dichloropropane	25.0	25.7		ug/L		103	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*85*		*72 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

Lab Sample ID: LCS 720-165701/7
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	541		ug/L		108	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*100*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165701/6
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	24.2		ug/L		97	62 - 130	3	20
Acetone	125	114		ug/L		91	26 - 180	4	30
Benzene	25.0	25.5		ug/L		102	79 - 130	1	20
Dichlorobromomethane	25.0	24.1		ug/L		96	70 - 130	3	20
Bromobenzene	25.0	25.3		ug/L		101	70 - 130	5	20
Chlorobromomethane	25.0	23.6		ug/L		94	70 - 130	0	20
Bromoform	25.0	25.4		ug/L		102	68 - 136	9	20
Bromomethane	25.0	21.0		ug/L		84	43 - 151	3	20
2-Butanone (MEK)	125	107		ug/L		86	54 - 130	3	20
n-Butylbenzene	25.0	25.6		ug/L		102	70 - 142	4	20
sec-Butylbenzene	25.0	25.4		ug/L		101	70 - 134	3	20
tert-Butylbenzene	25.0	25.7		ug/L		103	70 - 135	2	20
Carbon disulfide	25.0	23.2		ug/L		93	58 - 130	2	20
Carbon tetrachloride	25.0	25.0		ug/L		100	70 - 146	3	20
Chlorobenzene	25.0	24.5		ug/L		98	70 - 130	2	20
Chloroethane	25.0	20.4		ug/L		81	62 - 138	3	20
Chloroform	25.0	24.0		ug/L		96	70 - 130	1	20
Chloromethane	25.0	20.1		ug/L		80	52 - 175	2	20
2-Chlorotoluene	25.0	25.9		ug/L		104	70 - 130	4	20
4-Chlorotoluene	25.0	26.2		ug/L		105	70 - 130	4	20
Chlorodibromomethane	25.0	25.0		ug/L		100	70 - 145	6	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165701/6
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165701

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	25.0		ug/L		100	70 - 130	4	20
1,3-Dichlorobenzene	25.0	25.2		ug/L		101	70 - 130	4	20
1,4-Dichlorobenzene	25.0	25.3		ug/L		101	70 - 130	5	20
1,3-Dichloropropane	25.0	23.7		ug/L		95	70 - 130	5	20
1,1-Dichloropropene	25.0	26.3		ug/L		105	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	24.0		ug/L		96	70 - 136	10	20
Ethylene Dibromide	25.0	24.0		ug/L		96	70 - 130	4	20
Dibromomethane	25.0	23.4		ug/L		94	70 - 130	2	20
Dichlorodifluoromethane	25.0	20.1		ug/L		81	34 - 132	2	20
1,1-Dichloroethane	25.0	25.0		ug/L		100	70 - 130	2	20
1,2-Dichloroethane	25.0	22.4		ug/L		90	61 - 132	1	20
1,1-Dichloroethene	25.0	22.0		ug/L		88	64 - 128	4	20
cis-1,2-Dichloroethene	25.0	24.2		ug/L		97	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	24.2		ug/L		97	68 - 130	2	20
1,2-Dichloropropane	25.0	24.7		ug/L		99	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	26.4		ug/L		106	70 - 130	2	20
trans-1,3-Dichloropropene	25.0	27.9		ug/L		112	70 - 140	5	20
Ethylbenzene	25.0	24.4		ug/L		98	80 - 120	1	20
Hexachlorobutadiene	25.0	27.0		ug/L		108	70 - 130	2	20
2-Hexanone	125	106		ug/L		84	60 - 164	5	20
Isopropylbenzene	25.0	25.6		ug/L		102	70 - 130	2	20
4-Isopropyltoluene	25.0	25.3		ug/L		101	70 - 130	3	20
Methylene Chloride	25.0	24.7		ug/L		99	70 - 147	2	20
4-Methyl-2-pentanone (MIBK)	125	112		ug/L		89	58 - 130	6	20
Naphthalene	25.0	26.4		ug/L		105	70 - 130	6	20
N-Propylbenzene	25.0	26.0		ug/L		104	70 - 130	2	20
Styrene	25.0	27.5		ug/L		110	70 - 130	3	20
1,1,1,2-Tetrachloroethane	25.0	25.6		ug/L		102	70 - 130	4	20
1,1,2,2-Tetrachloroethane	25.0	23.6		ug/L		94	70 - 130	9	20
Tetrachloroethene	25.0	24.7		ug/L		99	70 - 130	1	20
Toluene	25.0	25.0		ug/L		100	78 - 120	1	20
1,2,3-Trichlorobenzene	25.0	25.6		ug/L		103	70 - 130	5	20
1,2,4-Trichlorobenzene	25.0	26.5		ug/L		106	70 - 130	5	20
1,1,1-Trichloroethane	25.0	24.1		ug/L		96	70 - 130	1	20
1,1,2-Trichloroethane	25.0	24.4		ug/L		98	70 - 130	5	20
Trichloroethene	25.0	24.7		ug/L		99	70 - 130	1	20
Trichlorofluoromethane	25.0	25.6		ug/L		103	66 - 132	2	20
1,2,3-Trichloropropane	25.0	24.2		ug/L		97	70 - 130	10	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	21.5		ug/L		86	42 - 162	3	20
1,2,4-Trimethylbenzene	25.0	25.8		ug/L		103	70 - 132	3	20
1,3,5-Trimethylbenzene	25.0	26.3		ug/L		105	70 - 130	3	20
Vinyl acetate	25.0	19.3		ug/L		77	43 - 163	5	20
Vinyl chloride	25.0	17.7		ug/L		71	54 - 135	6	20
m-Xylene & p-Xylene	25.0	24.9		ug/L		99	70 - 142	0	20
o-Xylene	25.0	25.4		ug/L		102	70 - 130	1	20
2,2-Dichloropropane	25.0	25.4		ug/L		102	70 - 140	1	20

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165701/6
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

	LCSD	*LCSD*	
Surrogate	***%Recovery***	***Qualifier***	***Limits***
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*84*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: LCSD 720-165701/8
Matrix: Water
Analysis Batch: 165701

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			**Added**	**Result**	**Qualifier**	**Unit**	**D**	**%Rec**	**Limits**	**RPD**	**Limit**
Gasoline Range Organics (GRO) -C5-C12			500	511		ug/L		102	62 - 120	6	20

	LCSD	*LCSD*	
Surrogate	***%Recovery***	***Qualifier***	***Limits***
4-Bromofluorobenzene	*102*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*92*		*72 - 130*
Toluene-d8 (Surr)	*97*		*70 - 130*

Lab Sample ID: MB 720-165832/4
Matrix: Water
Analysis Batch: 165832

Client Sample ID: Method Blank
Prep Type: Total/NA

	MB	MB							
Analyte	**Result**	**Qualifier**	**RL**	**MDL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
Methyl tert-butyl ether	ND		0.50		ug/L			08/28/14 18:34	1
Acetone	ND		50		ug/L			08/28/14 18:34	1
Benzene	ND		0.50		ug/L			08/28/14 18:34	1
Dichlorobromomethane	ND		0.50		ug/L			08/28/14 18:34	1
Bromobenzene	ND		1.0		ug/L			08/28/14 18:34	1
Chlorobromomethane	ND		1.0		ug/L			08/28/14 18:34	1
Bromoform	ND		1.0		ug/L			08/28/14 18:34	1
Bromomethane	ND		1.0		ug/L			08/28/14 18:34	1
2-Butanone (MEK)	ND		50		ug/L			08/28/14 18:34	1
n-Butylbenzene	ND		1.0		ug/L			08/28/14 18:34	1
sec-Butylbenzene	ND		1.0		ug/L			08/28/14 18:34	1
tert-Butylbenzene	ND		1.0		ug/L			08/28/14 18:34	1
Carbon disulfide	ND		5.0		ug/L			08/28/14 18:34	1
Carbon tetrachloride	ND		0.50		ug/L			08/28/14 18:34	1
Chlorobenzene	ND		0.50		ug/L			08/28/14 18:34	1
Chloroethane	ND		1.0		ug/L			08/28/14 18:34	1
Chloroform	ND		1.0		ug/L			08/28/14 18:34	1
Chloromethane	ND		1.0		ug/L			08/28/14 18:34	1
2-Chlorotoluene	ND		0.50		ug/L			08/28/14 18:34	1
4-Chlorotoluene	ND		0.50		ug/L			08/28/14 18:34	1
Chlorodibromomethane	ND		0.50		ug/L			08/28/14 18:34	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/28/14 18:34	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/28/14 18:34	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/28/14 18:34	1
1,3-Dichloropropane	ND		1.0		ug/L			08/28/14 18:34	1
1,1-Dichloropropene	ND		0.50		ug/L			08/28/14 18:34	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165832/4
Matrix: Water
Analysis Batch: 165832

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/28/14 18:34	1
Ethylene Dibromide	ND		0.50		ug/L			08/28/14 18:34	1
Dibromomethane	ND		0.50		ug/L			08/28/14 18:34	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/28/14 18:34	1
1,1-Dichloroethane	ND		0.50		ug/L			08/28/14 18:34	1
1,2-Dichloroethane	ND		0.50		ug/L			08/28/14 18:34	1
1,1-Dichloroethene	ND		0.50		ug/L			08/28/14 18:34	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 18:34	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 18:34	1
1,2-Dichloropropane	ND		0.50		ug/L			08/28/14 18:34	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 18:34	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 18:34	1
Ethylbenzene	ND		0.50		ug/L			08/28/14 18:34	1
Hexachlorobutadiene	ND		1.0		ug/L			08/28/14 18:34	1
2-Hexanone	ND		50		ug/L			08/28/14 18:34	1
Isopropylbenzene	ND		0.50		ug/L			08/28/14 18:34	1
4-Isopropyltoluene	ND		1.0		ug/L			08/28/14 18:34	1
Methylene Chloride	ND		5.0		ug/L			08/28/14 18:34	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/28/14 18:34	1
Naphthalene	ND		1.0		ug/L			08/28/14 18:34	1
N-Propylbenzene	ND		1.0		ug/L			08/28/14 18:34	1
Styrene	ND		0.50		ug/L			08/28/14 18:34	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 18:34	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 18:34	1
Tetrachloroethene	ND		0.50		ug/L			08/28/14 18:34	1
Toluene	ND		0.50		ug/L			08/28/14 18:34	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/28/14 18:34	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/28/14 18:34	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/28/14 18:34	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/28/14 18:34	1
Trichloroethene	ND		0.50		ug/L			08/28/14 18:34	1
Trichlorofluoromethane	ND		1.0		ug/L			08/28/14 18:34	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/28/14 18:34	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/28/14 18:34	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/28/14 18:34	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/28/14 18:34	1
Vinyl acetate	ND		10		ug/L			08/28/14 18:34	1
Vinyl chloride	ND		0.50		ug/L			08/28/14 18:34	1
Xylenes, Total	ND		1.0		ug/L			08/28/14 18:34	1
2,2-Dichloropropane	ND		0.50		ug/L			08/28/14 18:34	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/28/14 18:34	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*95*		*67 - 130*		*08/28/14 18:34*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*72 - 130*		*08/28/14 18:34*	*1*
Toluene-d8 (Surr)	*98*		*70 - 130*		*08/28/14 18:34*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165832/5
Matrix: Water
Analysis Batch: 165832

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	26.7		ug/L		107	62 - 130
Acetone	125	103		ug/L		82	26 - 180
Benzene	25.0	24.7		ug/L		99	79 - 130
Dichlorobromomethane	25.0	27.2		ug/L		109	70 - 130
Bromobenzene	25.0	26.1		ug/L		105	70 - 130
Chlorobromomethane	25.0	27.3		ug/L		109	70 - 130
Bromoform	25.0	27.3		ug/L		109	68 - 136
Bromomethane	25.0	23.3		ug/L		93	43 - 151
2-Butanone (MEK)	125	123		ug/L		98	54 - 130
n-Butylbenzene	25.0	24.2		ug/L		97	70 - 142
sec-Butylbenzene	25.0	23.9		ug/L		96	70 - 134
tert-Butylbenzene	25.0	24.1		ug/L		97	70 - 135
Carbon disulfide	25.0	20.4		ug/L		81	58 - 130
Carbon tetrachloride	25.0	26.0		ug/L		104	70 - 146
Chlorobenzene	25.0	25.7		ug/L		103	70 - 130
Chloroethane	25.0	21.0		ug/L		84	62 - 138
Chloroform	25.0	26.3		ug/L		105	70 - 130
Chloromethane	25.0	18.7		ug/L		75	52 - 175
2-Chlorotoluene	25.0	23.9		ug/L		96	70 - 130
4-Chlorotoluene	25.0	24.4		ug/L		97	70 - 130
Chlorodibromomethane	25.0	29.1		ug/L		116	70 - 145
1,2-Dichlorobenzene	25.0	26.0		ug/L		104	70 - 130
1,3-Dichlorobenzene	25.0	25.7		ug/L		103	70 - 130
1,4-Dichlorobenzene	25.0	25.3		ug/L		101	70 - 130
1,3-Dichloropropane	25.0	26.0		ug/L		104	70 - 130
1,1-Dichloropropene	25.0	26.0		ug/L		104	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	26.3		ug/L		105	70 - 136
Ethylene Dibromide	25.0	27.2		ug/L		109	70 - 130
Dibromomethane	25.0	26.8		ug/L		107	70 - 130
Dichlorodifluoromethane	25.0	20.6		ug/L		82	34 - 132
1,1-Dichloroethane	25.0	24.0		ug/L		96	70 - 130
1,2-Dichloroethane	25.0	25.8		ug/L		103	61 - 132
1,1-Dichloroethene	25.0	21.2		ug/L		85	64 - 128
cis-1,2-Dichloroethene	25.0	24.8		ug/L		99	70 - 130
trans-1,2-Dichloroethene	25.0	23.5		ug/L		94	68 - 130
1,2-Dichloropropane	25.0	24.5		ug/L		98	70 - 130
cis-1,3-Dichloropropene	25.0	27.4		ug/L		110	70 - 130
trans-1,3-Dichloropropene	25.0	30.7		ug/L		123	70 - 140
Ethylbenzene	25.0	25.0		ug/L		100	80 - 120
Hexachlorobutadiene	25.0	24.0		ug/L		96	70 - 130
2-Hexanone	125	108		ug/L		86	60 - 164
Isopropylbenzene	25.0	25.0		ug/L		100	70 - 130
4-Isopropyltoluene	25.0	24.3		ug/L		97	70 - 130
Methylene Chloride	25.0	23.9		ug/L		96	70 - 147
4-Methyl-2-pentanone (MIBK)	125	111		ug/L		89	58 - 130
Naphthalene	25.0	24.7		ug/L		99	70 - 130
N-Propylbenzene	25.0	24.4		ug/L		97	70 - 130
Styrene	25.0	26.2		ug/L		105	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165832/5

Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1,2-Tetrachloroethane	25.0	27.5		ug/L		110	70 - 130
1,1,2,2-Tetrachloroethane	25.0	23.6		ug/L		94	70 - 130
Tetrachloroethene	25.0	26.5		ug/L		106	70 - 130
Toluene	25.0	23.9		ug/L		96	78 - 120
1,2,3-Trichlorobenzene	25.0	28.3		ug/L		113	70 - 130
1,2,4-Trichlorobenzene	25.0	27.5		ug/L		110	70 - 130
1,1,1-Trichloroethane	25.0	25.3		ug/L		101	70 - 130
1,1,2-Trichloroethane	25.0	26.1		ug/L		105	70 - 130
Trichloroethene	25.0	26.7		ug/L		107	70 - 130
Trichlorofluoromethane	25.0	24.4		ug/L		98	66 - 132
1,2,3-Trichloropropane	25.0	25.4		ug/L		102	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	22.2		ug/L		89	42 - 162
1,2,4-Trimethylbenzene	25.0	24.7		ug/L		99	70 - 132
1,3,5-Trimethylbenzene	25.0	24.7		ug/L		99	70 - 130
Vinyl acetate	25.0	19.2		ug/L		77	43 - 163
Vinyl chloride	25.0	20.9		ug/L		83	54 - 135
m-Xylene & p-Xylene	25.0	25.0		ug/L		100	70 - 142
o-Xylene	25.0	25.5		ug/L		102	70 - 130
2,2-Dichloropropane	25.0	25.4		ug/L		102	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*97*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*101*		*72 - 130*
Toluene-d8 (Surr)	*101*		*70 - 130*

Lab Sample ID: LCS 720-165832/7

Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	511		ug/L		102	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*105*		*72 - 130*
Toluene-d8 (Surr)	*102*		*70 - 130*

Lab Sample ID: LCSD 720-165832/6

Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165832

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	26.5		ug/L		106	62 - 130	1	20
Acetone	125	102		ug/L		82	26 - 180	1	30
Benzene	25.0	25.2		ug/L		101	79 - 130	2	20
Dichlorobromomethane	25.0	26.4		ug/L		105	70 - 130	3	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165832/6
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 165832

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromobenzene	25.0	25.9		ug/L		104	70 - 130	1	20
Chlorobromomethane	25.0	27.6		ug/L		110	70 - 130	1	20
Bromoform	25.0	27.4		ug/L		110	68 - 136	0	20
Bromomethane	25.0	24.0		ug/L		96	43 - 151	3	20
2-Butanone (MEK)	125	121		ug/L		97	54 - 130	1	20
n-Butylbenzene	25.0	24.9		ug/L		99	70 - 142	3	20
sec-Butylbenzene	25.0	24.1		ug/L		96	70 - 134	1	20
tert-Butylbenzene	25.0	24.4		ug/L		97	70 - 135	1	20
Carbon disulfide	25.0	21.1		ug/L		84	58 - 130	4	20
Carbon tetrachloride	25.0	26.1		ug/L		105	70 - 146	1	20
Chlorobenzene	25.0	25.8		ug/L		103	70 - 130	1	20
Chloroethane	25.0	21.4		ug/L		86	62 - 138	2	20
Chloroform	25.0	26.2		ug/L		105	70 - 130	1	20
Chloromethane	25.0	19.4		ug/L		78	52 - 175	3	20
2-Chlorotoluene	25.0	24.0		ug/L		96	70 - 130	0	20
4-Chlorotoluene	25.0	24.2		ug/L		97	70 - 130	0	20
Chlorodibromomethane	25.0	28.7		ug/L		115	70 - 145	1	20
1,2-Dichlorobenzene	25.0	26.3		ug/L		105	70 - 130	1	20
1,3-Dichlorobenzene	25.0	26.0		ug/L		104	70 - 130	1	20
1,4-Dichlorobenzene	25.0	25.8		ug/L		103	70 - 130	2	20
1,3-Dichloropropane	25.0	26.0		ug/L		104	70 - 130	0	20
1,1-Dichloropropene	25.0	26.3		ug/L		105	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	26.3		ug/L		105	70 - 136	0	20
Ethylene Dibromide	25.0	26.8		ug/L		107	70 - 130	1	20
Dibromomethane	25.0	26.6		ug/L		106	70 - 130	1	20
Dichlorodifluoromethane	25.0	21.4		ug/L		86	34 - 132	4	20
1,1-Dichloroethane	25.0	24.4		ug/L		97	70 - 130	1	20
1,2-Dichloroethane	25.0	25.5		ug/L		102	61 - 132	1	20
1,1-Dichloroethene	25.0	22.2		ug/L		89	64 - 128	4	20
cis-1,2-Dichloroethene	25.0	24.8		ug/L		99	70 - 130	0	20
trans-1,2-Dichloroethene	25.0	24.2		ug/L		97	68 - 130	3	20
1,2-Dichloropropane	25.0	24.6		ug/L		99	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.5		ug/L		110	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	30.5		ug/L		122	70 - 140	1	20
Ethylbenzene	25.0	25.2		ug/L		101	80 - 120	1	20
Hexachlorobutadiene	25.0	24.3		ug/L		97	70 - 130	1	20
2-Hexanone	125	106		ug/L		85	60 - 164	1	20
Isopropylbenzene	25.0	25.2		ug/L		101	70 - 130	1	20
4-Isopropyltoluene	25.0	24.6		ug/L		98	70 - 130	1	20
Methylene Chloride	25.0	24.7		ug/L		99	70 - 147	3	20
4-Methyl-2-pentanone (MIBK)	125	109		ug/L		87	58 - 130	2	20
Naphthalene	25.0	24.8		ug/L		99	70 - 130	0	20
N-Propylbenzene	25.0	24.3		ug/L		97	70 - 130	0	20
Styrene	25.0	26.5		ug/L		106	70 - 130	1	20
1,1,1,2-Tetrachloroethane	25.0	27.3		ug/L		109	70 - 130	1	20
1,1,2,2-Tetrachloroethane	25.0	23.8		ug/L		95	70 - 130	1	20
Tetrachloroethene	25.0	26.8		ug/L		107	70 - 130	1	20
Toluene	25.0	24.1		ug/L		96	78 - 120	1	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165832/6
Matrix: Water
Analysis Batch: 165832

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2,3-Trichlorobenzene	25.0	29.1		ug/L		116	70 - 130	3	20
1,2,4-Trichlorobenzene	25.0	27.9		ug/L		111	70 - 130	1	20
1,1,1-Trichloroethane	25.0	25.3		ug/L		101	70 - 130	0	20
1,1,2-Trichloroethane	25.0	26.3		ug/L		105	70 - 130	1	20
Trichloroethene	25.0	26.9		ug/L		108	70 - 130	1	20
Trichlorofluoromethane	25.0	24.8		ug/L		99	66 - 132	2	20
1,2,3-Trichloropropane	25.0	26.1		ug/L		104	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	23.2		ug/L		93	42 - 162	5	20
1,2,4-Trimethylbenzene	25.0	24.6		ug/L		98	70 - 132	0	20
1,3,5-Trimethylbenzene	25.0	24.7		ug/L		99	70 - 130	0	20
Vinyl acetate	25.0	19.3		ug/L		77	43 - 163	1	20
Vinyl chloride	25.0	21.5		ug/L		86	54 - 135	3	20
m-Xylene & p-Xylene	25.0	25.1		ug/L		100	70 - 142	1	20
o-Xylene	25.0	25.5		ug/L		102	70 - 130	0	20
2,2-Dichloropropane	25.0	24.4		ug/L		98	70 - 140	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*96*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*
Toluene-d8 (Surr)	*100*		*70 - 130*

Lab Sample ID: LCSD 720-165832/8
Matrix: Water
Analysis Batch: 165832

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	534		ug/L		107	62 - 120	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*
Toluene-d8 (Surr)	*100*		*70 - 130*

QC Association Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

GC/MS VOA

Analysis Batch: 165701

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59492-1	PRB-01HP-19.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59492-3	PRB-02HP-33.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59492-4	PRB-03HP-34.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59492-6	TB-2	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165701/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165701/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165701/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165701/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165701/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Analysis Batch: 165832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59492-5	PRB-03HP-340.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165832/5	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165832/7	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165832/6	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165832/8	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165832/4	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Client Sample ID: PRB-01HP-19.0
Lab Sample ID: 720-59492-1
Date Collected: 08/25/14 10:40
Matrix: Water
Date Received: 08/25/14 17:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165701	08/27/14 16:35	PDR	TAL PLS

Client Sample ID: PRB-02HP-33.0
Lab Sample ID: 720-59492-3
Date Collected: 08/25/14 11:25
Matrix: Water
Date Received: 08/25/14 17:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165701	08/27/14 17:04	PDR	TAL PLS

Client Sample ID: PRB-03HP-34.0
Lab Sample ID: 720-59492-4
Date Collected: 08/25/14 15:10
Matrix: Water
Date Received: 08/25/14 17:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165701	08/27/14 17:33	PDR	TAL PLS

Client Sample ID: PRB-03HP-340.0
Lab Sample ID: 720-59492-5
Date Collected: 08/25/14 15:15
Matrix: Water
Date Received: 08/25/14 17:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165832	08/29/14 02:46	ASC	TAL PLS

Client Sample ID: TB-2
Lab Sample ID: 720-59492-6
Date Collected: 08/25/14 16:35
Matrix: Water
Date Received: 08/25/14 17:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165701	08/27/14 13:14	PDR	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	**Program**	**EPA Region**	**Certification ID**	**Expiration Date**
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59492-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59492-1	PRB-01HP-19.0	Water	08/25/14 10:40	08/25/14 17:10
720-59492-3	PRB-02HP-33.0	Water	08/25/14 11:25	08/25/14 17:10
720-59492-4	PRB-03HP-34.0	Water	08/25/14 15:10	08/25/14 17:10
720-59492-5	PRB-03HP-340.0	Water	08/25/14 15:15	08/25/14 17:10
720-59492-6	TB-2	Water	08/25/14 16:35	08/25/14 17:10

CHAIN-OF-CUSTODY RECORD

720-59492

15104

PROJECT NAME: Crown Cherry
PROJECT NUMBER: 0D10160070.00012.LD
RESULTS TO: Avery Whitmarsh
TURNAROUND TIME: Standard
SAMPLE SHIPMENT METHOD: Drop off

LABORATORY NAME: TestAmerica
LABORATORY ADDRESS: Pleasanton, CA
LABORATORY CONTACT: Afsaneh
LABORATORY PHONE NUMBER: 925-484-1919

CLIENT INFORMATION:

DATE: 8/25/14
PAGE 1 OF 1
REPORTING REQUIREMENTS: 155834
GEOTRACKER REQUIRED YES NO
SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

ANALYSES

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	TPHg by 8260B	HOLD	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/25/14	1040	PRB-01HP-19.0	X	X		40 mL VOA	W	N	HCl	Y	N	3	
	1055	PRB-01HP-190.0	X	X	X								hold
	1125	PRB-02HP-33.0	X	X									
	1510	PRB-03HP-34.0	X	X									
	1515	PRB-03HP-340.0	X	X									
	1635	TB-2	X	X									

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: PRINTED NAME: Alex Rosenthal COMPANY: AMEC	8/25/14	1710	SIGNATURE: J. Mueller PRINTED NAME: Mulley COMPANY: Test Am	8/25/14	1710
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 18

SAMPLING COMMENTS:

720-59492 Chain of Custody

3.8c

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59492-1

Login Number: 59492

List Number: 1

Creator: Gonzales, Justinn

List Source: TestAmerica Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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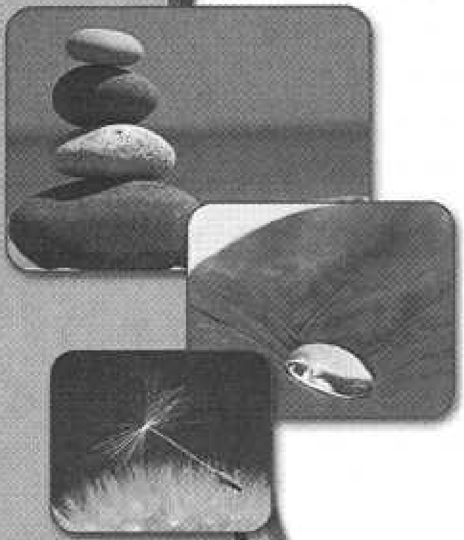
TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT



TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-59507-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
8/29/2014 1:15:52 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 720-59507-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-59507-1

Comments

No additional comments.

Receipt

The samples were received on 8/26/2014 12:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

GC/MS VOA

Method(s) 8260B: The Gasoline Range Organics (GRO) concentration reported for the following sample(s) is due to the presence of discrete peaks: PRB-04HP-28.0 (720-59507-1), PRB-04HP-280.0 (720-59507-2). <<PCE>>

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Client Sample ID: PRB-04HP-28.0 Lab Sample ID: 720-59507-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	91		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	2.1		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Gasoline Range Organics (GRO) -C5-C12	92	R	50		ug/L	1		8260B/CA_LUFT MS	Total/NA

Client Sample ID: PRB-04HP-280.0 Lab Sample ID: 720-59507-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	74		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Trichloroethene	1.9		0.50		ug/L	1		8260B/CA_LUFT MS	Total/NA
Gasoline Range Organics (GRO) -C5-C12	82	R	50		ug/L	1		8260B/CA_LUFT MS	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Client Sample ID: PRB-04HP-28.0
Date Collected: 08/26/14 09:50
Date Received: 08/26/14 12:20

Lab Sample ID: 720-59507-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/28/14 14:35	1
Acetone	ND		50		ug/L			08/28/14 14:35	1
Benzene	ND		0.50		ug/L			08/28/14 14:35	1
Dichlorobromomethane	ND		0.50		ug/L			08/28/14 14:35	1
Bromobenzene	ND		1.0		ug/L			08/28/14 14:35	1
Chlorobromomethane	ND		1.0		ug/L			08/28/14 14:35	1
Bromoform	ND		1.0		ug/L			08/28/14 14:35	1
Bromomethane	ND		1.0		ug/L			08/28/14 14:35	1
2-Butanone (MEK)	ND		50		ug/L			08/28/14 14:35	1
n-Butylbenzene	ND		1.0		ug/L			08/28/14 14:35	1
sec-Butylbenzene	ND		1.0		ug/L			08/28/14 14:35	1
tert-Butylbenzene	ND		1.0		ug/L			08/28/14 14:35	1
Carbon disulfide	ND		5.0		ug/L			08/28/14 14:35	1
Carbon tetrachloride	ND		0.50		ug/L			08/28/14 14:35	1
Chlorobenzene	ND		0.50		ug/L			08/28/14 14:35	1
Chloroethane	ND		1.0		ug/L			08/28/14 14:35	1
Chloroform	ND		1.0		ug/L			08/28/14 14:35	1
Chloromethane	ND		1.0		ug/L			08/28/14 14:35	1
2-Chlorotoluene	ND		0.50		ug/L			08/28/14 14:35	1
4-Chlorotoluene	ND		0.50		ug/L			08/28/14 14:35	1
Chlorodibromomethane	ND		0.50		ug/L			08/28/14 14:35	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/28/14 14:35	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/28/14 14:35	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/28/14 14:35	1
1,3-Dichloropropane	ND		1.0		ug/L			08/28/14 14:35	1
1,1-Dichloropropene	ND		0.50		ug/L			08/28/14 14:35	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/28/14 14:35	1
Ethylene Dibromide	ND		0.50		ug/L			08/28/14 14:35	1
Dibromomethane	ND		0.50		ug/L			08/28/14 14:35	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/28/14 14:35	1
1,1-Dichloroethane	ND		0.50		ug/L			08/28/14 14:35	1
1,2-Dichloroethane	ND		0.50		ug/L			08/28/14 14:35	1
1,1-Dichloroethene	ND		0.50		ug/L			08/28/14 14:35	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 14:35	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 14:35	1
1,2-Dichloropropane	ND		0.50		ug/L			08/28/14 14:35	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 14:35	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 14:35	1
Ethylbenzene	ND		0.50		ug/L			08/28/14 14:35	1
Hexachlorobutadiene	ND		1.0		ug/L			08/28/14 14:35	1
2-Hexanone	ND		50		ug/L			08/28/14 14:35	1
Isopropylbenzene	ND		0.50		ug/L			08/28/14 14:35	1
4-Isopropyltoluene	ND		1.0		ug/L			08/28/14 14:35	1
Methylene Chloride	ND		5.0		ug/L			08/28/14 14:35	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/28/14 14:35	1
Naphthalene	ND		1.0		ug/L			08/28/14 14:35	1
N-Propylbenzene	ND		1.0		ug/L			08/28/14 14:35	1
Styrene	ND		0.50		ug/L			08/28/14 14:35	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 14:35	1

Client Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-04HP-28.0
Date Collected: 08/26/14 09:50
Date Received: 08/26/14 12:20

Lab Sample ID: 720-59507-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 14:35	1
Tetrachloroethene	**91**		0.50		ug/L			08/28/14 14:35	1
Toluene	ND		0.50		ug/L			08/28/14 14:35	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/28/14 14:35	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/28/14 14:35	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/28/14 14:35	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/28/14 14:35	1
Trichloroethene	**2.1**		0.50		ug/L			08/28/14 14:35	1
Trichlorofluoromethane	ND		1.0		ug/L			08/28/14 14:35	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/28/14 14:35	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/28/14 14:35	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/28/14 14:35	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/28/14 14:35	1
Vinyl acetate	ND		10		ug/L			08/28/14 14:35	1
Vinyl chloride	ND		0.50		ug/L			08/28/14 14:35	1
Xylenes, Total	ND		1.0		ug/L			08/28/14 14:35	1
2,2-Dichloropropane	ND		0.50		ug/L			08/28/14 14:35	1
Gasoline Range Organics (GRO) -C5-C12	**92**	R	50		ug/L			08/28/14 14:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*67 - 130*		*08/28/14 14:35*	*1*
1,2-Dichloroethane-d4 (Surr)	*86*		*72 - 130*		*08/28/14 14:35*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*08/28/14 14:35*	*1*

Client Sample ID: PRB-04HP-280.0
Date Collected: 08/26/14 08:20
Date Received: 08/26/14 12:20

Lab Sample ID: 720-59507-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/28/14 15:05	1
Acetone	ND		50		ug/L			08/28/14 15:05	1
Benzene	ND		0.50		ug/L			08/28/14 15:05	1
Dichlorobromomethane	ND		0.50		ug/L			08/28/14 15:05	1
Bromobenzene	ND		1.0		ug/L			08/28/14 15:05	1
Chlorobromomethane	ND		1.0		ug/L			08/28/14 15:05	1
Bromoform	ND		1.0		ug/L			08/28/14 15:05	1
Bromomethane	ND		1.0		ug/L			08/28/14 15:05	1
2-Butanone (MEK)	ND		50		ug/L			08/28/14 15:05	1
n-Butylbenzene	ND		1.0		ug/L			08/28/14 15:05	1
sec-Butylbenzene	ND		1.0		ug/L			08/28/14 15:05	1
tert-Butylbenzene	ND		1.0		ug/L			08/28/14 15:05	1
Carbon disulfide	ND		5.0		ug/L			08/28/14 15:05	1
Carbon tetrachloride	ND		0.50		ug/L			08/28/14 15:05	1
Chlorobenzene	ND		0.50		ug/L			08/28/14 15:05	1
Chloroethane	ND		1.0		ug/L			08/28/14 15:05	1
Chloroform	ND		1.0		ug/L			08/28/14 15:05	1
Chloromethane	ND		1.0		ug/L			08/28/14 15:05	1
2-Chlorotoluene	ND		0.50		ug/L			08/28/14 15:05	1
4-Chlorotoluene	ND		0.50		ug/L			08/28/14 15:05	1
Chlorodibromomethane	ND		0.50		ug/L			08/28/14 15:05	1

Client Sample Results

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-59507-1
Project/Site: Crown Chevrolet

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-04HP-280.0 **Lab Sample ID: 720-59507-2**
Date Collected: 08/26/14 08:20 **Matrix: Water**
Date Received: 08/26/14 12:20

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			08/28/14 15:05	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/28/14 15:05	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/28/14 15:05	1
1,3-Dichloropropane	ND		1.0		ug/L			08/28/14 15:05	1
1,1-Dichloropropene	ND		0.50		ug/L			08/28/14 15:05	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/28/14 15:05	1
Ethylene Dibromide	ND		0.50		ug/L			08/28/14 15:05	1
Dibromomethane	ND		0.50		ug/L			08/28/14 15:05	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/28/14 15:05	1
1,1-Dichloroethane	ND		0.50		ug/L			08/28/14 15:05	1
1,2-Dichloroethane	ND		0.50		ug/L			08/28/14 15:05	1
1,1-Dichloroethene	ND		0.50		ug/L			08/28/14 15:05	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 15:05	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 15:05	1
1,2-Dichloropropane	ND		0.50		ug/L			08/28/14 15:05	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 15:05	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 15:05	1
Ethylbenzene	ND		0.50		ug/L			08/28/14 15:05	1
Hexachlorobutadiene	ND		1.0		ug/L			08/28/14 15:05	1
2-Hexanone	ND		50		ug/L			08/28/14 15:05	1
Isopropylbenzene	ND		0.50		ug/L			08/28/14 15:05	1
4-Isopropyltoluene	ND		1.0		ug/L			08/28/14 15:05	1
Methylene Chloride	ND		5.0		ug/L			08/28/14 15:05	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/28/14 15:05	1
Naphthalene	ND		1.0		ug/L			08/28/14 15:05	1
N-Propylbenzene	ND		1.0		ug/L			08/28/14 15:05	1
Styrene	ND		0.50		ug/L			08/28/14 15:05	1
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 15:05	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 15:05	1
Tetrachloroethene	**74**		0.50		ug/L			08/28/14 15:05	1
Toluene	ND		0.50		ug/L			08/28/14 15:05	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/28/14 15:05	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/28/14 15:05	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/28/14 15:05	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/28/14 15:05	1
Trichloroethene	**1.9**		0.50		ug/L			08/28/14 15:05	1
Trichlorofluoromethane	ND		1.0		ug/L			08/28/14 15:05	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/28/14 15:05	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/28/14 15:05	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/28/14 15:05	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/28/14 15:05	1
Vinyl acetate	ND		10		ug/L			08/28/14 15:05	1
Vinyl chloride	ND		0.50		ug/L			08/28/14 15:05	1
Xylenes, Total	ND		1.0		ug/L			08/28/14 15:05	1
2,2-Dichloropropane	ND		0.50		ug/L			08/28/14 15:05	1
Gasoline Range Organics (GRO) -C5-C12	**82**	R	50		ug/L			08/28/14 15:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*67 - 130*		*08/28/14 15:05*	*1*

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Client Sample ID: PRB-04HP-280.0
Date Collected: 08/26/14 08:20
Date Received: 08/26/14 12:20

Lab Sample ID: 720-59507-2
Matrix: Water

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	*85*		*72 - 130*		*08/28/14 15:05*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*08/28/14 15:05*	*1*

Surrogate Summary

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)		
		BFB	12DCE	TOL
Lab Sample ID	Client Sample ID	(67-130)	(72-130)	(70-130)
720-59507-1	PRB-04HP-28.0	98	86	100
720-59507-2	PRB-04HP-280.0	98	85	100
LCS 720-165779/6	Lab Control Sample	97	85	101
LCS 720-165779/8	Lab Control Sample	99	90	100
LCSD 720-165779/7	Lab Control Sample Dup	98	85	101
LCSD 720-165779/9	Lab Control Sample Dup	100	88	100
MB 720-165779/5	Method Blank	99	85	98

Surrogate Legend

BFB = 4-Bromofluorobenzene

12DCE = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS

Lab Sample ID: MB 720-165779/5
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		0.50		ug/L			08/28/14 09:04	1
Acetone	ND		50		ug/L			08/28/14 09:04	1
Benzene	ND		0.50		ug/L			08/28/14 09:04	1
Dichlorobromomethane	ND		0.50		ug/L			08/28/14 09:04	1
Bromobenzene	ND		1.0		ug/L			08/28/14 09:04	1
Chlorobromomethane	ND		1.0		ug/L			08/28/14 09:04	1
Bromoform	ND		1.0		ug/L			08/28/14 09:04	1
Bromomethane	ND		1.0		ug/L			08/28/14 09:04	1
2-Butanone (MEK)	ND		50		ug/L			08/28/14 09:04	1
n-Butylbenzene	ND		1.0		ug/L			08/28/14 09:04	1
sec-Butylbenzene	ND		1.0		ug/L			08/28/14 09:04	1
tert-Butylbenzene	ND		1.0		ug/L			08/28/14 09:04	1
Carbon disulfide	ND		5.0		ug/L			08/28/14 09:04	1
Carbon tetrachloride	ND		0.50		ug/L			08/28/14 09:04	1
Chlorobenzene	ND		0.50		ug/L			08/28/14 09:04	1
Chloroethane	ND		1.0		ug/L			08/28/14 09:04	1
Chloroform	ND		1.0		ug/L			08/28/14 09:04	1
Chloromethane	ND		1.0		ug/L			08/28/14 09:04	1
2-Chlorotoluene	ND		0.50		ug/L			08/28/14 09:04	1
4-Chlorotoluene	ND		0.50		ug/L			08/28/14 09:04	1
Chlorodibromomethane	ND		0.50		ug/L			08/28/14 09:04	1
1,2-Dichlorobenzene	ND		0.50		ug/L			08/28/14 09:04	1
1,3-Dichlorobenzene	ND		0.50		ug/L			08/28/14 09:04	1
1,4-Dichlorobenzene	ND		0.50		ug/L			08/28/14 09:04	1
1,3-Dichloropropane	ND		1.0		ug/L			08/28/14 09:04	1
1,1-Dichloropropene	ND		0.50		ug/L			08/28/14 09:04	1
1,2-Dibromo-3-Chloropropane	ND		1.0		ug/L			08/28/14 09:04	1
Ethylene Dibromide	ND		0.50		ug/L			08/28/14 09:04	1
Dibromomethane	ND		0.50		ug/L			08/28/14 09:04	1
Dichlorodifluoromethane	ND		0.50		ug/L			08/28/14 09:04	1
1,1-Dichloroethane	ND		0.50		ug/L			08/28/14 09:04	1
1,2-Dichloroethane	ND		0.50		ug/L			08/28/14 09:04	1
1,1-Dichloroethene	ND		0.50		ug/L			08/28/14 09:04	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 09:04	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			08/28/14 09:04	1
1,2-Dichloropropane	ND		0.50		ug/L			08/28/14 09:04	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 09:04	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			08/28/14 09:04	1
Ethylbenzene	ND		0.50		ug/L			08/28/14 09:04	1
Hexachlorobutadiene	ND		1.0		ug/L			08/28/14 09:04	1
2-Hexanone	ND		50		ug/L			08/28/14 09:04	1
Isopropylbenzene	ND		0.50		ug/L			08/28/14 09:04	1
4-Isopropyltoluene	ND		1.0		ug/L			08/28/14 09:04	1
Methylene Chloride	ND		5.0		ug/L			08/28/14 09:04	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/L			08/28/14 09:04	1
Naphthalene	ND		1.0		ug/L			08/28/14 09:04	1
N-Propylbenzene	ND		1.0		ug/L			08/28/14 09:04	1
Styrene	ND		0.50		ug/L			08/28/14 09:04	1

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: MB 720-165779/5 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165779

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 09:04	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			08/28/14 09:04	1
Tetrachloroethene	ND		0.50		ug/L			08/28/14 09:04	1
Toluene	ND		0.50		ug/L			08/28/14 09:04	1
1,2,3-Trichlorobenzene	ND		1.0		ug/L			08/28/14 09:04	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			08/28/14 09:04	1
1,1,1-Trichloroethane	ND		0.50		ug/L			08/28/14 09:04	1
1,1,2-Trichloroethane	ND		0.50		ug/L			08/28/14 09:04	1
Trichloroethene	ND		0.50		ug/L			08/28/14 09:04	1
Trichlorofluoromethane	ND		1.0		ug/L			08/28/14 09:04	1
1,2,3-Trichloropropane	ND		0.50		ug/L			08/28/14 09:04	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			08/28/14 09:04	1
1,2,4-Trimethylbenzene	ND		0.50		ug/L			08/28/14 09:04	1
1,3,5-Trimethylbenzene	ND		0.50		ug/L			08/28/14 09:04	1
Vinyl acetate	ND		10		ug/L			08/28/14 09:04	1
Vinyl chloride	ND		0.50		ug/L			08/28/14 09:04	1
Xylenes, Total	ND		1.0		ug/L			08/28/14 09:04	1
2,2-Dichloropropane	ND		0.50		ug/L			08/28/14 09:04	1
Gasoline Range Organics (GRO) -C5-C12	ND		50		ug/L			08/28/14 09:04	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*67 - 130*		*08/28/14 09:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*85*		*72 - 130*		*08/28/14 09:04*	*1*
Toluene-d8 (Surr)	*98*		*70 - 130*		*08/28/14 09:04*	*1*

Lab Sample ID: LCS 720-165779/6 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 165779

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methyl tert-butyl ether	25.0	24.1		ug/L		96	62 - 130
Acetone	125	91.8		ug/L		73	26 - 180
Benzene	25.0	24.9		ug/L		100	79 - 130
Dichlorobromomethane	25.0	26.6		ug/L		106	70 - 130
Bromobenzene	25.0	24.1		ug/L		97	70 - 130
Chlorobromomethane	25.0	25.5		ug/L		102	70 - 130
Bromoform	25.0	28.6		ug/L		114	68 - 136
Bromomethane	25.0	24.2		ug/L		97	43 - 151
2-Butanone (MEK)	125	113		ug/L		91	54 - 130
n-Butylbenzene	25.0	26.4		ug/L		106	70 - 142
sec-Butylbenzene	25.0	25.4		ug/L		102	70 - 134
tert-Butylbenzene	25.0	24.7		ug/L		99	70 - 135
Carbon disulfide	25.0	23.6		ug/L		95	58 - 130
Carbon tetrachloride	25.0	27.8		ug/L		111	70 - 146
Chlorobenzene	25.0	25.8		ug/L		103	70 - 130
Chloroethane	25.0	21.1		ug/L		84	62 - 138
Chloroform	25.0	25.4		ug/L		101	70 - 130

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165779/6
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloromethane	25.0	17.4		ug/L		70	52 - 175
2-Chlorotoluene	25.0	24.5		ug/L		98	70 - 130
4-Chlorotoluene	25.0	24.9		ug/L		100	70 - 130
Chlorodibromomethane	25.0	29.1		ug/L		116	70 - 145
1,2-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
1,3-Dichlorobenzene	25.0	25.2		ug/L		101	70 - 130
1,4-Dichlorobenzene	25.0	25.4		ug/L		101	70 - 130
1,3-Dichloropropane	25.0	24.7		ug/L		99	70 - 130
1,1-Dichloropropene	25.0	26.0		ug/L		104	70 - 130
1,2-Dibromo-3-Chloropropane	25.0	25.6		ug/L		102	70 - 136
Ethylene Dibromide	25.0	26.2		ug/L		105	70 - 130
Dibromomethane	25.0	24.3		ug/L		97	70 - 130
Dichlorodifluoromethane	25.0	21.0		ug/L		84	34 - 132
1,1-Dichloroethane	25.0	23.5		ug/L		94	70 - 130
1,2-Dichloroethane	25.0	21.7		ug/L		87	61 - 132
1,1-Dichloroethene	25.0	21.1		ug/L		84	64 - 128
cis-1,2-Dichloroethene	25.0	22.2		ug/L		89	70 - 130
trans-1,2-Dichloroethene	25.0	25.5		ug/L		102	68 - 130
1,2-Dichloropropane	25.0	23.5		ug/L		94	70 - 130
cis-1,3-Dichloropropene	25.0	27.1		ug/L		109	70 - 130
trans-1,3-Dichloropropene	25.0	29.7		ug/L		119	70 - 140
Ethylbenzene	25.0	25.5		ug/L		102	80 - 120
Hexachlorobutadiene	25.0	25.1		ug/L		100	70 - 130
2-Hexanone	125	91.8		ug/L		73	60 - 164
Isopropylbenzene	25.0	27.0		ug/L		108	70 - 130
4-Isopropyltoluene	25.0	25.4		ug/L		102	70 - 130
Methylene Chloride	25.0	21.9		ug/L		88	70 - 147
4-Methyl-2-pentanone (MIBK)	125	92.3		ug/L		74	58 - 130
Naphthalene	25.0	26.3		ug/L		105	70 - 130
N-Propylbenzene	25.0	25.3		ug/L		101	70 - 130
Styrene	25.0	26.7		ug/L		107	70 - 130
1,1,1,2-Tetrachloroethane	25.0	28.2		ug/L		113	70 - 130
1,1,2,2-Tetrachloroethane	25.0	24.8		ug/L		99	70 - 130
Tetrachloroethene	25.0	26.1		ug/L		104	70 - 130
Toluene	25.0	25.5		ug/L		102	78 - 120
1,2,3-Trichlorobenzene	25.0	25.4		ug/L		102	70 - 130
1,2,4-Trichlorobenzene	25.0	26.5		ug/L		106	70 - 130
1,1,1-Trichloroethane	25.0	26.3		ug/L		105	70 - 130
1,1,2-Trichloroethane	25.0	26.1		ug/L		104	70 - 130
Trichloroethene	25.0	25.1		ug/L		100	70 - 130
Trichlorofluoromethane	25.0	27.8		ug/L		111	66 - 132
1,2,3-Trichloropropane	25.0	25.8		ug/L		103	70 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	22.5		ug/L		90	42 - 162
1,2,4-Trimethylbenzene	25.0	25.0		ug/L		100	70 - 132
1,3,5-Trimethylbenzene	25.0	25.2		ug/L		101	70 - 130
Vinyl acetate	25.0	19.2		ug/L		77	43 - 163
Vinyl chloride	25.0	20.3		ug/L		81	54 - 135

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCS 720-165779/6
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	25.0	26.0		ug/L		104	70 - 142
o-Xylene	25.0	25.7		ug/L		103	70 - 130
2,2-Dichloropropane	25.0	26.9		ug/L		108	70 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*97*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*85*		*72 - 130*
Toluene-d8 (Surr)	*101*		*70 - 130*

Lab Sample ID: LCS 720-165779/8
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C5-C12	500	490		ug/L		98	62 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*72 - 130*
Toluene-d8 (Surr)	*100*		*70 - 130*

Lab Sample ID: LCSD 720-165779/7
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	25.0	24.4		ug/L		98	62 - 130	1	20
Acetone	125	91.9		ug/L		74	26 - 180	0	30
Benzene	25.0	25.2		ug/L		101	79 - 130	1	20
Dichlorobromomethane	25.0	26.8		ug/L		107	70 - 130	1	20
Bromobenzene	25.0	24.7		ug/L		99	70 - 130	2	20
Chlorobromomethane	25.0	25.8		ug/L		103	70 - 130	1	20
Bromoform	25.0	29.0		ug/L		116	68 - 136	2	20
Bromomethane	25.0	23.4		ug/L		94	43 - 151	4	20
2-Butanone (MEK)	125	112		ug/L		90	54 - 130	1	20
n-Butylbenzene	25.0	26.7		ug/L		107	70 - 142	1	20
sec-Butylbenzene	25.0	25.9		ug/L		104	70 - 134	2	20
tert-Butylbenzene	25.0	25.2		ug/L		101	70 - 135	2	20
Carbon disulfide	25.0	22.3		ug/L		89	58 - 130	6	20
Carbon tetrachloride	25.0	28.2		ug/L		113	70 - 146	1	20
Chlorobenzene	25.0	26.2		ug/L		105	70 - 130	1	20
Chloroethane	25.0	20.4		ug/L		82	62 - 138	3	20
Chloroform	25.0	25.5		ug/L		102	70 - 130	0	20
Chloromethane	25.0	16.7		ug/L		67	52 - 175	4	20
2-Chlorotoluene	25.0	25.3		ug/L		101	70 - 130	3	20
4-Chlorotoluene	25.0	25.4		ug/L		101	70 - 130	2	20
Chlorodibromomethane	25.0	29.1		ug/L		116	70 - 145	0	20

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165779/7
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130	1	20
1,3-Dichlorobenzene	25.0	25.7		ug/L		103	70 - 130	2	20
1,4-Dichlorobenzene	25.0	26.1		ug/L		104	70 - 130	3	20
1,3-Dichloropropane	25.0	24.9		ug/L		100	70 - 130	1	20
1,1-Dichloropropene	25.0	26.2		ug/L		105	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	25.0	25.9		ug/L		104	70 - 136	1	20
Ethylene Dibromide	25.0	26.4		ug/L		106	70 - 130	1	20
Dibromomethane	25.0	24.4		ug/L		98	70 - 130	1	20
Dichlorodifluoromethane	25.0	20.5		ug/L		82	34 - 132	2	20
1,1-Dichloroethane	25.0	23.5		ug/L		94	70 - 130	0	20
1,2-Dichloroethane	25.0	21.8		ug/L		87	61 - 132	0	20
1,1-Dichloroethene	25.0	20.9		ug/L		84	64 - 128	1	20
cis-1,2-Dichloroethene	25.0	22.4		ug/L		90	70 - 130	1	20
trans-1,2-Dichloroethene	25.0	25.5		ug/L		102	68 - 130	0	20
1,2-Dichloropropane	25.0	23.8		ug/L		95	70 - 130	1	20
cis-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 130	2	20
trans-1,3-Dichloropropene	25.0	29.9		ug/L		120	70 - 140	1	20
Ethylbenzene	25.0	25.8		ug/L		103	80 - 120	1	20
Hexachlorobutadiene	25.0	24.9		ug/L		100	70 - 130	0	20
2-Hexanone	125	91.7		ug/L		73	60 - 164	0	20
Isopropylbenzene	25.0	27.3		ug/L		109	70 - 130	1	20
4-Isopropyltoluene	25.0	25.7		ug/L		103	70 - 130	1	20
Methylene Chloride	25.0	21.6		ug/L		86	70 - 147	1	20
4-Methyl-2-pentanone (MIBK)	125	92.0		ug/L		74	58 - 130	0	20
Naphthalene	25.0	26.3		ug/L		105	70 - 130	0	20
N-Propylbenzene	25.0	26.1		ug/L		104	70 - 130	3	20
Styrene	25.0	26.9		ug/L		108	70 - 130	1	20
1,1,1,2-Tetrachloroethane	25.0	28.8		ug/L		115	70 - 130	2	20
1,1,2,2-Tetrachloroethane	25.0	25.3		ug/L		101	70 - 130	2	20
Tetrachloroethene	25.0	26.4		ug/L		106	70 - 130	1	20
Toluene	25.0	25.9		ug/L		104	78 - 120	2	20
1,2,3-Trichlorobenzene	25.0	25.3		ug/L		101	70 - 130	0	20
1,2,4-Trichlorobenzene	25.0	26.4		ug/L		106	70 - 130	0	20
1,1,1-Trichloroethane	25.0	26.6		ug/L		106	70 - 130	1	20
1,1,2-Trichloroethane	25.0	25.9		ug/L		104	70 - 130	1	20
Trichloroethene	25.0	25.3		ug/L		101	70 - 130	1	20
Trichlorofluoromethane	25.0	27.7		ug/L		111	66 - 132	0	20
1,2,3-Trichloropropane	25.0	26.7		ug/L		107	70 - 130	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	22.3		ug/L		89	42 - 162	0	20
1,2,4-Trimethylbenzene	25.0	25.4		ug/L		101	70 - 132	2	20
1,3,5-Trimethylbenzene	25.0	25.7		ug/L		103	70 - 130	2	20
Vinyl acetate	25.0	18.6		ug/L		74	43 - 163	4	20
Vinyl chloride	25.0	19.7		ug/L		79	54 - 135	3	20
m-Xylene & p-Xylene	25.0	26.3		ug/L		105	70 - 142	1	20
o-Xylene	25.0	26.0		ug/L		104	70 - 130	1	20
2,2-Dichloropropane	25.0	27.3		ug/L		109	70 - 140	2	20

QC Sample Results

Method: 8260B/CA_LUFTMS - 8260B / CA LUFT MS (Continued)

Lab Sample ID: LCSD 720-165779/7
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	98		67 - 130
1,2-Dichloroethane-d4 (Surr)	85		72 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCSD 720-165779/9
Matrix: Water
Analysis Batch: 165779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C5-C12	500	489		ug/L		98	62 - 120	0	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene	100		67 - 130
1,2-Dichloroethane-d4 (Surr)	88		72 - 130
Toluene-d8 (Surr)	100		70 - 130

QC Association Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

GC/MS VOA

Analysis Batch: 165779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-59507-1	PRB-04HP-28.0	Total/NA	Water	8260B/CA_LUFT MS	
720-59507-2	PRB-04HP-280.0	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165779/6	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCS 720-165779/8	Lab Control Sample	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165779/7	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
LCSD 720-165779/9	Lab Control Sample Dup	Total/NA	Water	8260B/CA_LUFT MS	
MB 720-165779/5	Method Blank	Total/NA	Water	8260B/CA_LUFT MS	

Lab Chronicle

Client Sample ID: PRB-04HP-28.0 **Lab Sample ID: 720-59507-1**
Date Collected: 08/26/14 09:50 **Matrix: Water**
Date Received: 08/26/14 12:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165779	08/28/14 14:35	ASC	TAL PLS

Client Sample ID: PRB-04HP-280.0 **Lab Sample ID: 720-59507-2**
Date Collected: 08/26/14 08:20 **Matrix: Water**
Date Received: 08/26/14 12:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/CA_LUFTMS		1	165779	08/28/14 15:05	ASC	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Method	Method Description	Protocol	Laboratory
8260B/CA_LUFTMS	8260B / CA LUFT MS	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-59507-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-59507-1	PRB-04HP-28.0	Water	08/26/14 09:50	08/26/14 12:20
720-59507-2	PRB-04HP-280.0	Water	08/26/14 08:20	08/26/14 12:20

CHAIN-OF-CUSTODY RECORD

720-59507

15107

PROJECT NAME: Crown Chevy

DATE: 8/26/14

PAGE 1 OF 1

PROJECT NUMBER: OD10160700.0012.A

LABORATORY NAME: TestAmerica

CLIENT INFORMATION:

REPORTING REQUIREMENTS: 155844

RESULTS TO: Avery Whitmarsh

LABORATORY ADDRESS: Pleasanton, CA

TURNAROUND TIME: Standard

SAMPLE SHIPMENT METHOD: drop off

LABORATORY CONTACT: AHsarch

LABORATORY PHONE NUMBER: 925-484-1919

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	VOCs by 8260B	TPHg by 8260B	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/26/14	0750	[redacted]-04HP-28.0	X	X	40 mL VOA	W	N	HCl	Y	N	3	
↓	0820	[redacted]-04HP-280.0	X	X	↓	↓	↓	↓	↓	↓	↓	

ANALYSES

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: PRINTED NAME: Alex Rosenthal COMPANY: AMEC	8/26/14	1220	SIGNATURE: PRINTED NAME: Mullen COMPANY: [illegible]	8/26/14	1220
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 6

SAMPLING COMMENTS

720-59507 Chain of Custody

2.1°

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-59507-1

Login Number: 59507
List Number: 1
Creator: Gonzales, Justinn

List Source: TestAmerica Pleasanton

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-60404-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Avery Whitmarsh

Authorized for release by:
10/17/2014 4:12:04 PM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60404-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60404-1

Job ID: 720-60404-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-60404-1

Comments
No additional comments.

Receipt
The samples were received on 10/6/2014 5:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.6º C and 3.2º C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method(s) 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for prep batch 168743 were outside control limits. Sample matrix interference and/or

Method(s) 6010B: The following sample(s) was diluted due to the abundance of non-target analyte Fe: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10 (720-60404-17). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client Sample ID: IDW-W-1 — Lab Sample ID: 720-60404-1

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	12.0		0.100		SU	1		9040B	Total/NA

Client Sample ID: IDW-W-2 — Lab Sample ID: 720-60404-2

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	12.3		0.100		SU	1		9040B	Total/NA

Client Sample ID: IDW-W-3 — Lab Sample ID: 720-60404-3

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.77		0.100		SU	1		9040B	Total/NA

Client Sample ID: IDW-W-4 — Lab Sample ID: 720-60404-4

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.86		0.100		SU	1		9040B	Total/NA

Client Sample ID: IDW-W-5 — Lab Sample ID: 720-60404-5

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	12.3		0.100		SU	1		9040B	Total/NA

Client Sample ID: IDW-W-1,-2,-3,-4,-5 — Lab Sample ID: 720-60404-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.42		0.0050		mg/L	1		6010B	Total/NA
Chromium	0.052		0.010		mg/L	1		6010B	Total/NA
Molybdenum	0.046		0.010		mg/L	1		6010B	Total/NA

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10 — Lab Sample ID: 720-60404-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	7.1		2.9		mg/Kg	4		6010B	Total/NA
Barium	110		1.5		mg/Kg	4		6010B	Total/NA
Beryllium	0.41		0.29		mg/Kg	4		6010B	Total/NA
Chromium	38		1.5		mg/Kg	4		6010B	Total/NA
Cobalt	8.8		0.58		mg/Kg	4		6010B	Total/NA
Copper	25		4.4		mg/Kg	4		6010B	Total/NA
Lead	6.4		1.5		mg/Kg	4		6010B	Total/NA
Nickel	36		1.5		mg/Kg	4		6010B	Total/NA
Vanadium	37		1.5		mg/Kg	4		6010B	Total/NA
Zinc	52		4.4		mg/Kg	4		6010B	Total/NA
Mercury	0.025		0.0097		mg/Kg	1		7471A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Method: 8260B - Volatile Organic Compounds (GC/MS)

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10
Date Collected: 10/06/14 15:01
Date Received: 10/06/14 17:40

Lab Sample ID: 720-60404-17
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Acetone	ND		48		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Benzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Dichlorobromomethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Bromobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chlorobromomethane	ND		19		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Bromoform	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Bromomethane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
2-Butanone (MEK)	ND		48		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
n-Butylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
sec-Butylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
tert-Butylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Carbon disulfide	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Carbon tetrachloride	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chloroethane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chloroform	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chloromethane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
2-Chlorotoluene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
4-Chlorotoluene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Chlorodibromomethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2-Dichlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,3-Dichlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,4-Dichlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,3-Dichloropropane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1-Dichloropropene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2-Dibromo-3-Chloropropane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Ethylene Dibromide	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Dibromomethane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Dichlorodifluoromethane	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1-Dichloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2-Dichloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1-Dichloroethene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
cis-1,2-Dichloroethene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
trans-1,2-Dichloroethene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2-Dichloropropane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
cis-1,3-Dichloropropene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
trans-1,3-Dichloropropene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Ethylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Hexachlorobutadiene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
2-Hexanone	ND		48		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Isopropylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
4-Isopropyltoluene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Methylene Chloride	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
4-Methyl-2-pentanone (MIBK)	ND		48		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Naphthalene	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
N-Propylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Styrene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1,1,2-Tetrachloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10 **Lab Sample ID: 720-60404-17**
Date Collected: 10/06/14 15:01 **Matrix: Solid**
Date Received: 10/06/14 17:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2,2-Tetrachloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Tetrachloroethene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Toluene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2,3-Trichlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2,4-Trichlorobenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1,1-Trichloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1,2-Trichloroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Trichloroethene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Trichlorofluoromethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2,3-Trichloropropane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,2,4-Trimethylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
1,3,5-Trimethylbenzene	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Vinyl acetate	ND		19		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Vinyl chloride	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
Xylenes, Total	ND		9.7		ug/Kg		10/15/14 20:30	10/15/14 22:45	1
2,2-Dichloropropane	ND		4.8		ug/Kg		10/15/14 20:30	10/15/14 22:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*91*		*45 - 131*	*10/15/14 20:30*	*10/15/14 22:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*86*		*60 - 140*	*10/15/14 20:30*	*10/15/14 22:45*	*1*
Toluene-d8 (Surr)	*91*		*58 - 140*	*10/15/14 20:30*	*10/15/14 22:45*	*1*

Client Sample Results

Method: 6010B - Metals (ICP)

Client Sample ID: IDW-W-1,-2,-3,-4,-5
Date Collected: 10/06/14 14:40
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-6
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Arsenic	ND		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Barium	**0.42**		0.0050		mg/L		10/13/14 22:08	10/14/14 17:53	1
Beryllium	ND		0.0020		mg/L		10/13/14 22:08	10/14/14 17:53	1
Cadmium	ND		0.0025		mg/L		10/13/14 22:08	10/14/14 17:53	1
Chromium	**0.052**		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Cobalt	ND		0.0020		mg/L		10/13/14 22:08	10/14/14 17:53	1
Copper	ND		0.020		mg/L		10/13/14 22:08	10/14/14 17:53	1
Lead	ND		0.0050		mg/L		10/13/14 22:08	10/14/14 17:53	1
Molybdenum	**0.046**		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Nickel	ND		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Selenium	ND		0.020		mg/L		10/13/14 22:08	10/14/14 17:53	1
Silver	ND		0.0050		mg/L		10/13/14 22:08	10/14/14 17:53	1
Thallium	ND		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Vanadium	ND		0.010		mg/L		10/13/14 22:08	10/14/14 17:53	1
Zinc	ND		0.020		mg/L		10/13/14 22:08	10/14/14 17:53	1

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10
Date Collected: 10/06/14 15:01
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-17
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Arsenic	**7.1**		2.9		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Barium	**110**		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Beryllium	**0.41**		0.29		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Cadmium	ND		0.36		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Chromium	**38**		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Cobalt	**8.8**		0.58		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Copper	**25**		4.4		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Lead	**6.4**		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Molybdenum	ND		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Nickel	**36**		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Selenium	ND		2.9		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Silver	ND		0.73		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Thallium	ND		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Vanadium	**37**		1.5		mg/Kg		10/13/14 23:22	10/17/14 10:52	4
Zinc	**52**		4.4		mg/Kg		10/13/14 23:22	10/17/14 10:52	4

Method: 7470A - Mercury (CVAA)

Client Sample ID: IDW-W-1,-2,-3,-4,-5
Lab Sample ID: 720-60404-6
Date Collected: 10/06/14 14:40
Matrix: Water
Date Received: 10/06/14 17:40

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		10/15/14 08:22	10/15/14 18:43	1

Client Sample Results

Method: 7471A - Mercury (CVAA)

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10
Date Collected: 10/06/14 15:01
Date Received: 10/06/14 17:40

Lab Sample ID: 720-60404-17
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.025**		0.0097		mg/Kg		10/15/14 14:35	10/16/14 14:24	1

Client Sample Results

General Chemistry

Client Sample ID: IDW-W-1
Date Collected: 10/06/14 14:40
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-1
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	12.0		0.100		SU			10/06/14 19:00	1

Client Sample ID: IDW-W-2
Date Collected: 10/06/14 14:42
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-2
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	12.3		0.100		SU			10/06/14 19:05	1

Client Sample ID: IDW-W-3
Date Collected: 10/06/14 14:44
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-3
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.77		0.100		SU			10/06/14 19:08	1

Client Sample ID: IDW-W-4
Date Collected: 10/06/14 14:46
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-4
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.86		0.100		SU			10/06/14 19:11	1

Client Sample ID: IDW-W-5
Date Collected: 10/06/14 15:08
Date Received: 10/06/14 17:40
Lab Sample ID: 720-60404-5
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	12.3		0.100		SU			10/06/14 19:13	1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 720-168905/4 **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 168905

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	ND		5.0		ug/Kg			10/15/14 20:20	1
Acetone	ND		50		ug/Kg			10/15/14 20:20	1
Benzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Dichlorobromomethane	ND		5.0		ug/Kg			10/15/14 20:20	1
Bromobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Chlorobromomethane	ND		20		ug/Kg			10/15/14 20:20	1
Bromoform	ND		5.0		ug/Kg			10/15/14 20:20	1
Bromomethane	ND		10		ug/Kg			10/15/14 20:20	1
2-Butanone (MEK)	ND		50		ug/Kg			10/15/14 20:20	1
n-Butylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
sec-Butylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
tert-Butylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Carbon disulfide	ND		5.0		ug/Kg			10/15/14 20:20	1
Carbon tetrachloride	ND		5.0		ug/Kg			10/15/14 20:20	1
Chlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Chloroethane	ND		10		ug/Kg			10/15/14 20:20	1
Chloroform	ND		5.0		ug/Kg			10/15/14 20:20	1
Chloromethane	ND		10		ug/Kg			10/15/14 20:20	1
2-Chlorotoluene	ND		5.0		ug/Kg			10/15/14 20:20	1
4-Chlorotoluene	ND		5.0		ug/Kg			10/15/14 20:20	1
Chlorodibromomethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2-Dichlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,3-Dichlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,4-Dichlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,3-Dichloropropane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1-Dichloropropene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2-Dibromo-3-Chloropropane	ND		10		ug/Kg			10/15/14 20:20	1
Ethylene Dibromide	ND		5.0		ug/Kg			10/15/14 20:20	1
Dibromomethane	ND		10		ug/Kg			10/15/14 20:20	1
Dichlorodifluoromethane	ND		10		ug/Kg			10/15/14 20:20	1
1,1-Dichloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2-Dichloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1-Dichloroethene	ND		5.0		ug/Kg			10/15/14 20:20	1
cis-1,2-Dichloroethene	ND		5.0		ug/Kg			10/15/14 20:20	1
trans-1,2-Dichloroethene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2-Dichloropropane	ND		5.0		ug/Kg			10/15/14 20:20	1
cis-1,3-Dichloropropene	ND		5.0		ug/Kg			10/15/14 20:20	1
trans-1,3-Dichloropropene	ND		5.0		ug/Kg			10/15/14 20:20	1
Ethylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Hexachlorobutadiene	ND		5.0		ug/Kg			10/15/14 20:20	1
2-Hexanone	ND		50		ug/Kg			10/15/14 20:20	1
Isopropylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
4-Isopropyltoluene	ND		5.0		ug/Kg			10/15/14 20:20	1
Methylene Chloride	ND		10		ug/Kg			10/15/14 20:20	1
4-Methyl-2-pentanone (MIBK)	ND		50		ug/Kg			10/15/14 20:20	1
Naphthalene	ND		10		ug/Kg			10/15/14 20:20	1
N-Propylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Styrene	ND		5.0		ug/Kg			10/15/14 20:20	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 720-168905/4
Matrix: Solid
Analysis Batch: 168905

Client Sample ID: Method Blank
Prep Type: Total/NA

	MB	MB							
Analyte	**Result**	**Qualifier**	**RL**	**MDL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
1,1,1,2-Tetrachloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1,2,2-Tetrachloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
Tetrachloroethene	ND		5.0		ug/Kg			10/15/14 20:20	1
Toluene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2,3-Trichlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2,4-Trichlorobenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1,1-Trichloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1,2-Trichloroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
Trichloroethene	ND		5.0		ug/Kg			10/15/14 20:20	1
Trichlorofluoromethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2,3-Trichloropropane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		5.0		ug/Kg			10/15/14 20:20	1
1,2,4-Trimethylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
1,3,5-Trimethylbenzene	ND		5.0		ug/Kg			10/15/14 20:20	1
Vinyl acetate	ND		20		ug/Kg			10/15/14 20:20	1
Vinyl chloride	ND		5.0		ug/Kg			10/15/14 20:20	1
Xylenes, Total	ND		10		ug/Kg			10/15/14 20:20	1
2,2-Dichloropropane	ND		5.0		ug/Kg			10/15/14 20:20	1

	MB	*MB*				
Surrogate	***%Recovery***	***Qualifier***	***Limits***	***Prepared***	***Analyzed***	***Dil Fac***
4-Bromofluorobenzene	*96*		*45 - 131*		*10/15/14 20:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*60 - 140*		*10/15/14 20:20*	*1*
Toluene-d8 (Surr)	*92*		*58 - 140*		*10/15/14 20:20*	*1*

Lab Sample ID: LCS 720-168905/5
Matrix: Solid
Analysis Batch: 168905

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

	Spike	LCS	LCS				%Rec.
Analyte	**Added**	**Result**	**Qualifier**	**Unit**	**D**	**%Rec**	**Limits**
Methyl tert-butyl ether	50.0	45.8		ug/Kg		92	70 - 144
Acetone	250	165		ug/Kg		66	30 - 162
Benzene	50.0	46.7		ug/Kg		93	70 - 130
Dichlorobromomethane	50.0	48.0		ug/Kg		96	70 - 131
Bromobenzene	50.0	49.2		ug/Kg		98	70 - 130
Chlorobromomethane	50.0	48.4		ug/Kg		97	70 - 130
Bromoform	50.0	49.2		ug/Kg		98	59 - 158
Bromomethane	50.0	40.0		ug/Kg		80	59 - 132
2-Butanone (MEK)	250	214		ug/Kg		85	53 - 124
n-Butylbenzene	50.0	48.8		ug/Kg		98	70 - 142
sec-Butylbenzene	50.0	46.8		ug/Kg		94	70 - 136
tert-Butylbenzene	50.0	47.4		ug/Kg		95	70 - 130
Carbon disulfide	50.0	38.5		ug/Kg		77	60 - 140
Carbon tetrachloride	50.0	46.3		ug/Kg		93	70 - 138
Chlorobenzene	50.0	47.4		ug/Kg		95	70 - 130
Chloroethane	50.0	42.2		ug/Kg		84	65 - 130
Chloroform	50.0	46.6		ug/Kg		93	77 - 127
Chloromethane	50.0	40.8		ug/Kg		82	55 - 140
2-Chlorotoluene	50.0	47.4		ug/Kg		95	70 - 138

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-168905/5
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 168905

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4-Chlorotoluene	50.0	47.8		ug/Kg		96	70 - 136
Chlorodibromomethane	50.0	51.0		ug/Kg		102	70 - 146
1,2-Dichlorobenzene	50.0	49.9		ug/Kg		100	70 - 130
1,3-Dichlorobenzene	50.0	49.6		ug/Kg		99	70 - 131
1,4-Dichlorobenzene	50.0	48.6		ug/Kg		97	70 - 130
1,3-Dichloropropane	50.0	49.9		ug/Kg		100	70 - 140
1,1-Dichloropropene	50.0	49.4		ug/Kg		99	70 - 130
1,2-Dibromo-3-Chloropropane	50.0	51.3		ug/Kg		103	60 - 145
Ethylene Dibromide	50.0	50.8		ug/Kg		102	70 - 140
Dibromomethane	50.0	49.1		ug/Kg		98	70 - 139
Dichlorodifluoromethane	50.0	38.1		ug/Kg		76	37 - 158
1,1-Dichloroethane	50.0	47.8		ug/Kg		96	70 - 130
1,2-Dichloroethane	50.0	45.0		ug/Kg		90	70 - 130
1,1-Dichloroethene	50.0	41.1		ug/Kg		82	76 - 122
cis-1,2-Dichloroethene	50.0	47.6		ug/Kg		95	70 - 138
trans-1,2-Dichloroethene	50.0	46.4		ug/Kg		93	67 - 130
1,2-Dichloropropane	50.0	50.5		ug/Kg		101	73 - 127
cis-1,3-Dichloropropene	50.0	52.3		ug/Kg		105	68 - 147
trans-1,3-Dichloropropene	50.0	55.4		ug/Kg		111	70 - 136
Ethylbenzene	50.0	43.7		ug/Kg		87	80 - 137
Hexachlorobutadiene	50.0	43.5		ug/Kg		87	70 - 132
2-Hexanone	250	246		ug/Kg		98	44 - 133
Isopropylbenzene	50.0	45.5		ug/Kg		91	70 - 130
4-Isopropyltoluene	50.0	45.8		ug/Kg		92	70 - 133
Methylene Chloride	50.0	46.3		ug/Kg		93	70 - 134
4-Methyl-2-pentanone (MIBK)	250	250		ug/Kg		100	60 - 160
Naphthalene	50.0	53.2		ug/Kg		106	60 - 147
N-Propylbenzene	50.0	47.5		ug/Kg		95	70 - 130
Styrene	50.0	49.6		ug/Kg		99	70 - 130
1,1,1,2-Tetrachloroethane	50.0	48.0		ug/Kg		96	70 - 130
1,1,2,2-Tetrachloroethane	50.0	52.8		ug/Kg		106	70 - 146
Tetrachloroethene	50.0	47.1		ug/Kg		94	70 - 132
Toluene	50.0	43.5		ug/Kg		87	80 - 128
1,2,3-Trichlorobenzene	50.0	48.6		ug/Kg		97	60 - 140
1,2,4-Trichlorobenzene	50.0	47.7		ug/Kg		95	60 - 140
1,1,1-Trichloroethane	50.0	44.9		ug/Kg		90	70 - 130
1,1,2-Trichloroethane	50.0	50.5		ug/Kg		101	70 - 130
Trichloroethene	50.0	46.7		ug/Kg		93	70 - 133
Trichlorofluoromethane	50.0	41.1		ug/Kg		82	60 - 140
1,2,3-Trichloropropane	50.0	51.3		ug/Kg		103	70 - 146
1,1,2-Trichloro-1,2,2-trifluoroethane	50.0	39.7		ug/Kg		79	60 - 140
1,2,4-Trimethylbenzene	50.0	46.6		ug/Kg		93	70 - 130
1,3,5-Trimethylbenzene	50.0	47.6		ug/Kg		95	70 - 131
Vinyl acetate	50.0	42.9		ug/Kg		86	38 - 176
Vinyl chloride	50.0	37.2		ug/Kg		74	58 - 125
m-Xylene & p-Xylene	50.0	44.9		ug/Kg		90	70 - 146
o-Xylene	50.0	46.1		ug/Kg		92	70 - 140

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-168905/5
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 168905

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,2-Dichloropropane	50.0	43.0		ug/Kg		86	70 - 162

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*97*		*45 - 131*
1,2-Dichloroethane-d4 (Surr)	*85*		*60 - 140*
Toluene-d8 (Surr)	*94*		*58 - 140*

Lab Sample ID: LCSD 720-168905/6
Client Sample ID: Lab Control Sample Dup
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 168905

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether	50.0	47.4		ug/Kg		95	70 - 144	3	20
Acetone	250	188		ug/Kg		75	30 - 162	13	30
Benzene	50.0	46.8		ug/Kg		94	70 - 130	0	20
Dichlorobromomethane	50.0	48.0		ug/Kg		96	70 - 131	0	20
Bromobenzene	50.0	49.5		ug/Kg		99	70 - 130	1	20
Chlorobromomethane	50.0	49.7		ug/Kg		99	70 - 130	3	20
Bromoform	50.0	50.3		ug/Kg		101	59 - 158	2	20
Bromomethane	50.0	40.9		ug/Kg		82	59 - 132	2	20
2-Butanone (MEK)	250	228		ug/Kg		91	53 - 124	7	20
n-Butylbenzene	50.0	48.1		ug/Kg		96	70 - 142	2	20
sec-Butylbenzene	50.0	46.9		ug/Kg		94	70 - 136	0	20
tert-Butylbenzene	50.0	47.0		ug/Kg		94	70 - 130	1	20
Carbon disulfide	50.0	38.8		ug/Kg		78	60 - 140	1	20
Carbon tetrachloride	50.0	45.2		ug/Kg		90	70 - 138	2	20
Chlorobenzene	50.0	47.3		ug/Kg		95	70 - 130	0	20
Chloroethane	50.0	43.7		ug/Kg		87	65 - 130	4	20
Chloroform	50.0	46.6		ug/Kg		93	77 - 127	0	20
Chloromethane	50.0	42.6		ug/Kg		85	55 - 140	4	20
2-Chlorotoluene	50.0	47.4		ug/Kg		95	70 - 138	0	20
4-Chlorotoluene	50.0	47.7		ug/Kg		95	70 - 136	0	20
Chlorodibromomethane	50.0	51.1		ug/Kg		102	70 - 146	0	20
1,2-Dichlorobenzene	50.0	50.3		ug/Kg		101	70 - 130	1	20
1,3-Dichlorobenzene	50.0	49.3		ug/Kg		99	70 - 131	1	20
1,4-Dichlorobenzene	50.0	48.7		ug/Kg		97	70 - 130	0	20
1,3-Dichloropropane	50.0	51.1		ug/Kg		102	70 - 140	2	20
1,1-Dichloropropene	50.0	48.8		ug/Kg		98	70 - 130	1	20
1,2-Dibromo-3-Chloropropane	50.0	54.2		ug/Kg		108	60 - 145	5	20
Ethylene Dibromide	50.0	51.6		ug/Kg		103	70 - 140	2	20
Dibromomethane	50.0	50.4		ug/Kg		101	70 - 139	3	20
Dichlorodifluoromethane	50.0	39.8		ug/Kg		80	37 - 158	4	20
1,1-Dichloroethane	50.0	48.4		ug/Kg		97	70 - 130	1	20
1,2-Dichloroethane	50.0	44.3		ug/Kg		89	70 - 130	2	20
1,1-Dichloroethene	50.0	41.5		ug/Kg		83	76 - 122	1	20
cis-1,2-Dichloroethene	50.0	48.1		ug/Kg		96	70 - 138	1	20
trans-1,2-Dichloroethene	50.0	46.8		ug/Kg		94	67 - 130	1	20
1,2-Dichloropropane	50.0	50.8		ug/Kg		102	73 - 127	1	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-168905/6
Matrix: Solid
Analysis Batch: 168905

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,3-Dichloropropene	50.0	52.9		ug/Kg		106	68 - 147	1	20
trans-1,3-Dichloropropene	50.0	55.7		ug/Kg		111	70 - 136	0	20
Ethylbenzene	50.0	43.3		ug/Kg		87	80 - 137	1	20
Hexachlorobutadiene	50.0	44.4		ug/Kg		89	70 - 132	2	20
2-Hexanone	250	262		ug/Kg		105	44 - 133	7	20
Isopropylbenzene	50.0	45.3		ug/Kg		91	70 - 130	0	20
4-Isopropyltoluene	50.0	45.6		ug/Kg		91	70 - 133	0	20
Methylene Chloride	50.0	47.3		ug/Kg		95	70 - 134	2	20
4-Methyl-2-pentanone (MIBK)	250	266		ug/Kg		106	60 - 160	6	20
Naphthalene	50.0	55.9		ug/Kg		112	60 - 147	5	20
N-Propylbenzene	50.0	46.6		ug/Kg		93	70 - 130	2	20
Styrene	50.0	49.5		ug/Kg		99	70 - 130	0	20
1,1,1,2-Tetrachloroethane	50.0	47.9		ug/Kg		96	70 - 130	0	20
1,1,2,2-Tetrachloroethane	50.0	55.4		ug/Kg		111	70 - 146	5	20
Tetrachloroethene	50.0	46.3		ug/Kg		93	70 - 132	2	20
Toluene	50.0	43.7		ug/Kg		87	80 - 128	0	20
1,2,3-Trichlorobenzene	50.0	50.7		ug/Kg		101	60 - 140	4	20
1,2,4-Trichlorobenzene	50.0	49.3		ug/Kg		99	60 - 140	3	20
1,1,1-Trichloroethane	50.0	44.2		ug/Kg		88	70 - 130	1	20
1,1,2-Trichloroethane	50.0	52.4		ug/Kg		105	70 - 130	4	20
Trichloroethene	50.0	46.7		ug/Kg		93	70 - 133	0	20
Trichlorofluoromethane	50.0	41.0		ug/Kg		82	60 - 140	0	20
1,2,3-Trichloropropane	50.0	52.4		ug/Kg		105	70 - 146	2	20
1,1,2-Trichloro-1,2,2-trifluoroethane	50.0	40.0		ug/Kg		80	60 - 140	1	20
1,2,4-Trimethylbenzene	50.0	46.4		ug/Kg		93	70 - 130	0	20
1,3,5-Trimethylbenzene	50.0	47.5		ug/Kg		95	70 - 131	0	20
Vinyl acetate	50.0	49.3		ug/Kg		99	38 - 176	14	20
Vinyl chloride	50.0	37.9		ug/Kg		76	58 - 125	2	20
m-Xylene & p-Xylene	50.0	44.5		ug/Kg		89	70 - 146	1	20
o-Xylene	50.0	45.8		ug/Kg		92	70 - 140	1	20
2,2-Dichloropropane	50.0	42.0		ug/Kg		84	70 - 162	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*97*		*45 - 131*
1,2-Dichloroethane-d4 (Surr)	*83*		*60 - 140*
Toluene-d8 (Surr)	*94*		*58 - 140*

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 720-168743/1-A
Matrix: Water
Analysis Batch: 168805

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 168743

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Arsenic	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Barium	ND		0.0050		mg/L		10/13/14 22:08	10/14/14 13:53	1

QC Sample Results

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: MB 720-168743/1-A
Matrix: Water
Analysis Batch: 168805

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 168743

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0020		mg/L		10/13/14 22:08	10/14/14 13:53	1
Cadmium	ND		0.0025		mg/L		10/13/14 22:08	10/14/14 13:53	1
Chromium	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Cobalt	ND		0.0020		mg/L		10/13/14 22:08	10/14/14 13:53	1
Copper	ND		0.020		mg/L		10/13/14 22:08	10/14/14 13:53	1
Lead	ND		0.0050		mg/L		10/13/14 22:08	10/14/14 13:53	1
Molybdenum	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Nickel	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Selenium	ND		0.020		mg/L		10/13/14 22:08	10/14/14 13:53	1
Silver	ND		0.0050		mg/L		10/13/14 22:08	10/14/14 13:53	1
Thallium	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Vanadium	ND		0.010		mg/L		10/13/14 22:08	10/14/14 13:53	1
Zinc	ND		0.020		mg/L		10/13/14 22:08	10/14/14 13:53	1

Lab Sample ID: LCS 720-168743/2-A
Matrix: Water
Analysis Batch: 168805

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 168743

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Antimony			1.00	0.935		mg/L		93	80 - 120		
Arsenic			1.00	1.01		mg/L		101	80 - 120		
Barium			1.00	1.07		mg/L		107	80 - 120		
Beryllium			1.00	1.05		mg/L		105	80 - 120		
Cadmium			1.00	0.979		mg/L		98	80 - 120		
Chromium			1.00	1.00		mg/L		100	80 - 120		
Cobalt			1.00	1.01		mg/L		101	80 - 120		
Copper			1.00	0.996		mg/L		100	80 - 120		
Lead			1.00	1.04		mg/L		104	80 - 120		
Molybdenum			1.00	1.06		mg/L		106	80 - 120		
Nickel			1.00	1.01		mg/L		101	80 - 120		
Selenium			1.00	0.964		mg/L		96	80 - 120		
Silver			0.500	0.488		mg/L		98	80 - 120		
Thallium			1.00	1.02		mg/L		102	80 - 120		
Vanadium			1.00	1.04		mg/L		104	80 - 120		
Zinc			1.00	0.960		mg/L		96	80 - 120		

Lab Sample ID: LCSD 720-168743/3-A
Matrix: Water
Analysis Batch: 168805

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 168743

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony			1.00	0.936		mg/L		94	80 - 120	0	20
Arsenic			1.00	0.987		mg/L		99	80 - 120	2	20
Barium			1.00	0.996		mg/L		100	80 - 120	7	20
Beryllium			1.00	0.993		mg/L		99	80 - 120	6	20
Cadmium			1.00	0.966		mg/L		97	80 - 120	1	20
Chromium			1.00	0.995		mg/L		99	80 - 120	1	20
Cobalt			1.00	0.997		mg/L		100	80 - 120	1	20
Copper			1.00	0.999		mg/L		100	80 - 120	0	20

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCSD 720-168743/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 168805 **Prep Batch: 168743**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	1.00	1.02		mg/L		102	80 - 120	2	20
Molybdenum	1.00	1.05		mg/L		105	80 - 120	0	20
Nickel	1.00	0.997		mg/L		100	80 - 120	2	20
Selenium	1.00	0.962		mg/L		96	80 - 120	0	20
Silver	0.500	0.483		mg/L		97	80 - 120	1	20
Thallium	1.00	1.01		mg/L		101	80 - 120	1	20
Vanadium	1.00	1.01		mg/L		101	80 - 120	3	20
Zinc	1.00	0.940		mg/L		94	80 - 120	2	20

Lab Sample ID: MB 720-168744/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 169002 **Prep Batch: 168744**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Arsenic	ND		1.0		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Barium	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Beryllium	ND		0.10		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Cadmium	ND		0.13		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Chromium	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Cobalt	ND		0.20		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Copper	ND		1.5		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Lead	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Molybdenum	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Nickel	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Selenium	ND		1.0		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Silver	ND		0.25		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Thallium	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Vanadium	ND		0.50		mg/Kg		10/13/14 23:22	10/16/14 15:37	1
Zinc	ND		1.5		mg/Kg		10/13/14 23:22	10/16/14 15:37	1

Lab Sample ID: LCS 720-168744/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 169002 **Prep Batch: 168744**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	50.0	49.4		mg/Kg		99	80 - 120
Arsenic	50.0	50.6		mg/Kg		101	80 - 120
Barium	50.0	53.1		mg/Kg		106	80 - 120
Beryllium	50.0	51.9		mg/Kg		104	80 - 120
Cadmium	50.0	50.6		mg/Kg		101	80 - 120
Chromium	50.0	51.8		mg/Kg		104	80 - 120
Cobalt	50.0	52.5		mg/Kg		105	80 - 120
Copper	50.0	51.9		mg/Kg		104	80 - 120
Lead	50.0	52.2		mg/Kg		104	80 - 120
Molybdenum	50.0	52.3		mg/Kg		105	80 - 120
Nickel	50.0	51.8		mg/Kg		104	80 - 120
Selenium	50.0	49.7		mg/Kg		99	80 - 120
Silver	25.0	25.2		mg/Kg		101	80 - 120

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCS 720-168744/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 169002 **Prep Batch: 168744**

	Spike	LCS	LCS				%Rec.
Analyte	**Added**	**Result**	**Qualifier**	**Unit**	**D**	**%Rec**	**Limits**
Thallium	50.0	52.3		mg/Kg		105	80 - 120
Vanadium	50.0	51.2		mg/Kg		102	80 - 120
Zinc	50.0	47.9		mg/Kg		96	80 - 120

Lab Sample ID: LCSD 720-168744/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 169002 **Prep Batch: 168744**

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	**Added**	**Result**	**Qualifier**	**Unit**	**D**	**%Rec**	**Limits**	**RPD**	**Limit**
Antimony	50.0	49.2		mg/Kg		98	80 - 120	0	20
Arsenic	50.0	50.1		mg/Kg		100	80 - 120	1	20
Barium	50.0	52.3		mg/Kg		105	80 - 120	1	20
Beryllium	50.0	51.0		mg/Kg		102	80 - 120	2	20
Cadmium	50.0	49.9		mg/Kg		100	80 - 120	1	20
Chromium	50.0	51.3		mg/Kg		103	80 - 120	1	20
Cobalt	50.0	51.8		mg/Kg		104	80 - 120	1	20
Copper	50.0	51.4		mg/Kg		103	80 - 120	1	20
Lead	50.0	51.4		mg/Kg		103	80 - 120	1	20
Molybdenum	50.0	52.6		mg/Kg		105	80 - 120	1	20
Nickel	50.0	52.0		mg/Kg		104	80 - 120	0	20
Selenium	50.0	49.2		mg/Kg		98	80 - 120	1	20
Silver	25.0	24.8		mg/Kg		99	80 - 120	2	20
Thallium	50.0	51.3		mg/Kg		103	80 - 120	2	20
Vanadium	50.0	50.6		mg/Kg		101	80 - 120	1	20
Zinc	50.0	47.3		mg/Kg		95	80 - 120	1	20

Lab Sample ID: LCSSRM 720-168744/25-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 169002 **Prep Batch: 168744**

	Spike	LCSSRM	LCSSRM				%Rec.
Analyte	**Added**	**Result**	**Qualifier**	**Unit**	**D**	**%Rec**	**Limits**
Antimony	74.6	35.5		mg/Kg		48	11 - 101
Arsenic	45.5	41.3		mg/Kg		91	69 - 119
Barium	579	515		mg/Kg		89	61 - 117
Beryllium	155	140		mg/Kg		91	56 - 102
Cadmium	201	175		mg/Kg		87	67 - 118
Chromium	106	95.2		mg/Kg		90	67 - 121
Cobalt	247	221		mg/Kg		90	64 - 133
Copper	130	119		mg/Kg		92	68 - 126
Lead	302	264		mg/Kg		88	62 - 113
Molybdenum	165	143		mg/Kg		87	62 - 128
Nickel	305	267		mg/Kg		88	65 - 117
Selenium	133	121		mg/Kg		91	63 - 126
Silver	33.5	29.9		mg/Kg		89	51 - 130
Thallium	191	167		mg/Kg		88	64 - 124
Vanadium	214	195		mg/Kg		91	67 - 123
Zinc	388	331		mg/Kg		85	62 - 110

QC Sample Results

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 720-168854/1-A
Matrix: Water
Analysis Batch: 168922

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 168854

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		10/15/14 08:22	10/15/14 18:27	1

Lab Sample ID: LCS 720-168854/2-A
Matrix: Water
Analysis Batch: 168922

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 168854

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.0100	0.0103		mg/L		103	85 - 115		

Lab Sample ID: LCSD 720-168854/3-A
Matrix: Water
Analysis Batch: 168922

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 168854

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury			0.0100	0.0102		mg/L		102	85 - 115	1	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 720-168888/1-A
Matrix: Solid
Analysis Batch: 168985

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 168888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.010		mg/Kg		10/15/14 14:35	10/16/14 13:20	1

Lab Sample ID: LCS 720-168888/2-A
Matrix: Solid
Analysis Batch: 168985

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 168888

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.833	0.867		mg/Kg		104	80 - 120		

Lab Sample ID: LCSD 720-168888/3-A
Matrix: Solid
Analysis Batch: 168985

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 168888

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury			0.833	0.875		mg/Kg		105	80 - 120	1	20

Method: 9040B - pH

Lab Sample ID: LCS 720-168259/1
Matrix: Water
Analysis Batch: 168259

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			7.00	6.980		SU		100	99 - 101		

QC Sample Results

Method: 9040B - pH (Continued)

Lab Sample ID: 720-60404-1 DU
Matrix: Water
Analysis Batch: 168259

Client Sample ID: IDW-W-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH	12.0			12.04		SU				0.4	5

QC Association Summary

GC/MS VOA

Analysis Batch: 168905

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	8260B	168929
LCS 720-168905/5	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 720-168905/6	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 720-168905/4	Method Blank	Total/NA	Solid	8260B	

Prep Batch: 168929

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	5030B	

Metals

Prep Batch: 168743

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-6	IDW-W-1,-2,-3,-4,-5	Total/NA	Water	3010A	
LCS 720-168743/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 720-168743/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
MB 720-168743/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 168744

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	3050B	
LCS 720-168744/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 720-168744/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	
LCSSRM 720-168744/25-A	Lab Control Sample	Total/NA	Solid	3050B	
MB 720-168744/1-A	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 168805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 720-168743/2-A	Lab Control Sample	Total/NA	Water	6010B	168743
LCSD 720-168743/3-A	Lab Control Sample Dup	Total/NA	Water	6010B	168743
MB 720-168743/1-A	Method Blank	Total/NA	Water	6010B	168743

Analysis Batch: 168818

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-6	IDW-W-1,-2,-3,-4,-5	Total/NA	Water	6010B	168743

Prep Batch: 168854

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-6	IDW-W-1,-2,-3,-4,-5	Total/NA	Water	7470A	
LCS 720-168854/2-A	Lab Control Sample	Total/NA	Water	7470A	
LCSD 720-168854/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	
MB 720-168854/1-A	Method Blank	Total/NA	Water	7470A	

Prep Batch: 168888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	7471A	
LCS 720-168888/2-A	Lab Control Sample	Total/NA	Solid	7471A	
LCSD 720-168888/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	
MB 720-168888/1-A	Method Blank	Total/NA	Solid	7471A	

Metals (Continued)

Analysis Batch: 168922

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-6	IDW-W-1,-2,-3,-4,-5	Total/NA	Water	7470A	168854
LCS 720-168854/2-A	Lab Control Sample	Total/NA	Water	7470A	168854
LCSD 720-168854/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	168854
MB 720-168854/1-A	Method Blank	Total/NA	Water	7470A	168854

Analysis Batch: 168985

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	7471A	168888
LCS 720-168888/2-A	Lab Control Sample	Total/NA	Solid	7471A	168888
LCSD 720-168888/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	168888
MB 720-168888/1-A	Method Blank	Total/NA	Solid	7471A	168888

Analysis Batch: 169002

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 720-168744/2-A	Lab Control Sample	Total/NA	Solid	6010B	168744
LCSD 720-168744/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	168744
LCSSRM 720-168744/25-A	Lab Control Sample	Total/NA	Solid	6010B	168744
MB 720-168744/1-A	Method Blank	Total/NA	Solid	6010B	168744

Analysis Batch: 169071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Total/NA	Solid	6010B	168744

General Chemistry

Analysis Batch: 168259

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60404-1	IDW-W-1	Total/NA	Water	9040B	
720-60404-1 DU	IDW-W-1	Total/NA	Water	9040B	
720-60404-2	IDW-W-2	Total/NA	Water	9040B	
720-60404-3	IDW-W-3	Total/NA	Water	9040B	
720-60404-4	IDW-W-4	Total/NA	Water	9040B	
720-60404-5	IDW-W-5	Total/NA	Water	9040B	
LCS 720-168259/1	Lab Control Sample	Total/NA	Water	9040B	

Lab Chronicle

Client Sample ID: IDW-W-1

Lab Sample ID: 720-60404-1

Date Collected: 10/06/14 14:40

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9040B		1	168259	10/06/14 19:00	EYT	TAL PLS

Client Sample ID: IDW-W-2

Lab Sample ID: 720-60404-2

Date Collected: 10/06/14 14:42

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9040B		1	168259	10/06/14 19:05	EYT	TAL PLS

Client Sample ID: IDW-W-3

Lab Sample ID: 720-60404-3

Date Collected: 10/06/14 14:44

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9040B		1	168259	10/06/14 19:08	EYT	TAL PLS

Client Sample ID: IDW-W-4

Lab Sample ID: 720-60404-4

Date Collected: 10/06/14 14:46

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9040B		1	168259	10/06/14 19:11	EYT	TAL PLS

Client Sample ID: IDW-W-5

Lab Sample ID: 720-60404-5

Date Collected: 10/06/14 15:08

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9040B		1	168259	10/06/14 19:13	EYT	TAL PLS

Client Sample ID: IDW-W-1,-2,-3,-4,-5

Lab Sample ID: 720-60404-6

Date Collected: 10/06/14 14:40

Matrix: Water

Date Received: 10/06/14 17:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			168743	10/13/14 22:08	CTD	TAL PLS
Total/NA	Analysis	6010B		1	168818	10/14/14 17:53	SLK	TAL PLS
Total/NA	Prep	7470A			168854	10/15/14 08:22	ECT	TAL PLS
Total/NA	Analysis	7470A		1	168922	10/15/14 18:43	SLK	TAL PLS

Lab Chronicle

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60404-1

Client Sample ID: IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10

Date Collected: 10/06/14 15:01
Date Received: 10/06/14 17:40

Lab Sample ID: 720-60404-17

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			168929	10/15/14 20:30	LPL	TAL PLS
Total/NA	Analysis	8260B		1	168905	10/15/14 22:45	PDR	TAL PLS
Total/NA	Prep	3050B			168744	10/13/14 23:22	CTD	TAL PLS
Total/NA	Analysis	6010B		4	169071	10/17/14 10:52	EFH	TAL PLS
Total/NA	Prep	7471A			168888	10/15/14 14:35	ASB	TAL PLS
Total/NA	Analysis	7471A		1	168985	10/16/14 14:24	EFH	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60404-1

Laboratory: TestAmerica Pleasanton

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Analysis Method	Prep Method	Matrix	Analyte

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60404-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL PLS
6010B	Metals (ICP)	SW846	TAL PLS
7470A	Mercury (CVAA)	SW846	TAL PLS
7471A	Mercury (CVAA)	SW846	TAL PLS
9040B	pH	SW846	TAL PLS

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-60404-1	IDW-W-1	Water	10/06/14 14:40	10/06/14 17:40
720-60404-2	IDW-W-2	Water	10/06/14 14:42	10/06/14 17:40
720-60404-3	IDW-W-3	Water	10/06/14 14:44	10/06/14 17:40
720-60404-4	IDW-W-4	Water	10/06/14 14:46	10/06/14 17:40
720-60404-5	IDW-W-5	Water	10/06/14 15:08	10/06/14 17:40
720-60404-6	IDW-W-1,-2,-3,-4,-5	Water	10/06/14 14:40	10/06/14 17:40
720-60404-17	IDW-S-1,-2,-3,-4,-5,-6,-7,-8,-9,-10	Solid	10/06/14 15:01	10/06/14 17:40

Page 1 of 2

amec 156738

10/17/2014

CHAIN OF CUSTODY FORM

Seq. 2439

Lab: TA

1330 Broadway
Suite 1702
Oakland, CA 94612
(510) 451-1001

10/7/14 TO

Samplers: D. Allbut

Job Number: OD10160070.00008.A **720-60397 60404**

Name/Location: Crown Chevrolet Cadillac Isuzu

Project Manager: Avery whitmarsh

Recorder: David Allbut (Signature Required)

720-60404 Chain of Custody

	MATRIX			# CONTAINER					DATE				STATION DESCRIPTION	ANALYSIS REQUESTED			
	Water	Soil	Air	Unpres.	H2SO4	HNO3	HCL	SAMPLE NUMBER	YR	MO	DAY	TIME	DEPTH	8260B	8270	TITLE 22 METALS (CAM 17) 6010B and 7470/7471 *	pH 9040B
1	X			1		1	~~1~~ DA	1DW-W-1	14	10	06	1440	DA	~~X~~		X	X
2	X			1		1		1DW-W-2	14	10	06	1442	DA	~~X~~		X	X
3	X			1		1		1DW-W-3	14	10	06	1444				X	X
4	X			1		1		1DW-W-4	14	10	06	1446				X	X
5	X			1		1		1DW-W-5	14	10	06	1508				X	X
7		X		1				1DW-S-1	14	10	06	1450		X		X	
8		X		1				1DW-S-2	14	10	06	1452		X		X	
9		X		1				1DW-S-3	14	10	06	1453		X		X	
10		X		1				1DW-S-4	14	10	06	1456		X		X	
11		X		1				1DW-S-5	14	10	06	1457		X		X	

composite for metals (#6) 0x

composite for metals, VOCs

ADDITIONAL INFORMATION

REPORT TO: avery.whitmarsh@amec.com
david.allbut@amec.com 510-847-8410

PO#: C01225652

TAT: Standard

Comments: Field Filtered Y [✓ N]

Geotracker required! iD T10000001616

PO# C01225652

* 8260B and Metals on hold. Please contact Avery Whitmarsh

- Please composite water samples for metals; analyze separately for pH (1DW-W-1, 1DW-W-2, 1DW-W-3, 1DW-W-4, 1DW-W-5)
- Please composite soil samples for metals and VOCs (1DW-S-1, 1DW-S-2, 1DW-S-3, 1DW-S-4, 1DW-S-5, 1DW-S-6, 1DW-S-7, 1DW-S-8, 1DW-S-9, 1DW-S-10)

CHAIN OF CUSTODY RECORD

David Allbut	David Allbut	AMEC	10/6/14 1740
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Jason Muller	Muller	TestAm	10-6-14 1740
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)

Method of Shipment: 3.2°/1.6°

White - Laboratory Copy Yellow - Project Office Copy Pink - Field or Office Copy

F1008-B

CHAIN OF CUSTODY FORM

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156738

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Seq. No. 1245
Lab: TA

1465 North McDowell Blvd.
Suite 200
Petaluma, CA 94954
(707) 793-3800

10/7/14 TB
720 ~~60397~~ 60404

Samplers: D. Allbut
Job Number: 0D10160070.00008.A
Name/Location: Crown Chevrolet Cadillac Isuzu
Project Manager: Avery whitmarsh
Recorder: D Allbut (Signature Required)

	MATRIX			# CONTAINERS					DATE				STATION DESCRIPTION		ANALYSIS REQUESTED		
	Water	Soil	Air	Unpres.	H2SO4	HNO3	HCL	SAMPLE NUMBER	YR	MO	DAY	TIME		DEPTH	8260 B *	8270	TITLE 22 METALS (CAM 17) 6010 and 7470/7471 *
12		X		1				1DW-S-6	14	10	06	1501			X		X
13								1DW-S-7	14	10	06	1503			X		X
14								1DW-S-8	14	10	06	1501			X		X
15								1DW-S-9	14	10	06	1503			X		X
16								1DW-S-10	14	10	06	1505			X		X

composite for metals, VOCs

ADDITIONAL INFORMATION

REPORT TO: avery.whitmarsh@amec.com
david.allbut@amec.com 510-847-8411
PO#: C01205652
TAT: standard
Comments: Field Filtered Y/[✓ N]

Geotracker required: ID T10000001616
* 8260B and Metals on HOLD.
- Please composite water samples for metals; analyze separately for pH (1DW-W-1, 1DW-W-2, 1DW-W-3, 1DW-W-4, 1DW-W-5)
- Please composite soil samples for metals and VOCs (1DW-S-1, 1DW-S-2, 1DW-S-3, 1DW-S-4, 1DW-S-5, 1DW-S-6, 1DW-S-7, 1DW-S-8, 1DW-S-9, 1DW-S-10

CHAIN OF CUSTODY RECORD

Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
D Allbut	David Allbut	AMEC	10/06/14 1740

Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Jason Muller	Mullen	TestAmerica	10-6-14 1740

Relinquished By (Signature) (Print Name) (Company) (Date/Time)

Received By (Signature): (Print Name) (Company) (Date/Time)

Relinquished By (Signature) (Print Name) (Company) (Date/Time)

Received By (Signature): (Print Name) (Company) (Date/Time)

Method of Shipment:

White - Laboratory Copy Yellow - Project Office Copy Pink - Field or Office Copy

F1008-E

CHAIN OF CUSTODY FORM

Page 1 o 2

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156738

10/17/2014

Seq. 2439

Lab: TA

1330 Broadway
Suite 1702
Oakland, CA 94612
(510) 451-1001

10/7/14 TO
720-~~60397~~60404

Samplers: D. Allbut

Job Number: OD10160070.00008.A

Name/Location: Crown Chevrolet Cadillac Isuzu

Project Manager: Avery Whitmarsh

Recorder: David Allbut (Signature Required)

720-60404 Chain of Custody

	MATRIX				# CONTAINER						DATE				STATION DESCRIPTION		ANALYSIS REQUESTED			
	Water	Soil	Air		Unpres.	H2SO4	HNO3	HCL		SAMPLE NUMBER	YR	MO	DAY	TIME		DEPTH	8260 B	8270	TITLE 22 METALS (CAM 17) 6010B and 7470/7471 *	pH 9040B
1	X				1		1	~~1~~ TA		1DW-W-1	14	10	06	1440		DA	~~X~~		X	X
2	|				1		1			1DW-W-2	14	10	06	1442		DA	~~X~~		X	X
3	|				1		1			1DW-W-3	14	10	06	1449					X	X
4	|				1		1			1DW-W-4	14	10	06	1446					X	X
5	|				1		1			1DW-W-5	14	10	06	1508					X	X
7	/	X			1					1DW-S-1	14	10	06	1450			X		X	
8	/	|			1					1DW-S-2	14	10	06	1452			X		X	
9	/	|			1					1DW-S-3	14	10	06	1453			X		X	
10	/	|			1					1DW-S-4	14	10	06	1456			X		X	
11	/	|			1					1DW-S-5	14	10	06	1457			X		X	

composite for metals (#6) &
composite for metals, VOCs

ADDITIONAL INFORMATION

REPORT TO: avery.whitmarsh@amec.com
david.allbut@amec.com 510-847-8411

PO#: C01225652

TAT: Standard

Comments: Field Filtered Y [✓ N]

Geotracker required: iD T10000001616
PO# C01225652
* 8260B and Metals on hold. Please contact Avery Whitmarsh
- Please composite water samples for metals; analyze separately for pH (1DW-W-1, 1DW-W-2, 1DW-W-3, 1DW-W-4, 1DW-W-5)
- Please composite soil samples for metals and VOCs (1DW-S-1, 1DW-S-2, 1DW-S-3, 1DW-S-4, 1DW-S-5, 1DW-S-6, 1DW-S-7, 1DW-S-8, 1DW-S-9, 1DW-S-10)

CHAIN OF CUSTODY RECORD

David Allbut	David Allbut	AMEC	10/6/14 1740
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Doreen Muller	Muller	TA	10-6-14 1740
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)

Method of Shipment: 3.2°/1.6°

White - Laboratory Copy Yellow - Project Office Copy Pink - Field or Office Copy

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156738

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CHAIN OF CUSTODY FORM

Seq. No. 1245

Lab: TA

1465 North McDowell Blvd.
Suite 200
Petaluma, CA 94954
(707) 793-3800

10/7/14 TB

Samplers: D. Allbut

Job Number: 0D10160070.00008.A

720-~~60397~~ 60404

Name/Location: Crown Chevrolet Cadillac Isuzu

Project Manager: Avery Whitmarsh

Recorder: David Allbut
(Signature Required)

	MATRIX				# CONTAINERS					SAMPLE NUMBER	DATE				STATION DESCRIPTION		ANALYSIS REQUESTED		
	Water	Soil	Air		Unpres.	H2SO4	HNO3	HCL			YR	MO	DAY	TIME		DEPTH	8260B*	8270	TITLE 22 METALS (CAM 17) and 6010/7470/7471 *
12		X			1					10W-S-6	14	10	06	1501			X		X
13		|			|					10W-S-7	14	10	06	1503			X		X
14		|			|					10W-S-8	14	10	06	150[illegible]			X		X
15		|			|					10W-S-9	14	10	06	1503			X		X
16		|			|					10W-S-10	14	10	06	1505			X		X

composite for metals, VOCs

ADDITIONAL INFORMATION

REPORT TO: avery.whitmarsh@amec.com
david.allbut@amec.com 510-847-8411

PO#: C01205652

TAT: standard

Comments: Field Filtered Y/ [✓ N]

Geotracker required: iD T10000001616

* 8260B and Metals on HOLD.

- Please composite water samples for metals; analyze separately for pH (10W-W-1, 10W-W-2, 10W-W-3, 10W-W-4, 10W-W-5)

- Please composite soil samples for metals and VOCs (10W-S-1, 10W-S-2, 10W-S-3, 10W-S-4, 10W-S-5, 10W-S-6, 10W-S-7, 10W-S-8, 10W-S-9, 10W-S-10

CHAIN OF CUSTODY RECORD

David Allbut	David Allbut	AMEC	10/06/14 1740
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
	[illegible]	[illegible]	10-6-14 1740
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)
Relinquished By (Signature)	(Print Name)	(Company)	(Date/Time)
Received By (Signature):	(Print Name)	(Company)	(Date/Time)

Method of Shipment:

White - Laboratory Copy Yellow - Project Office Copy Pink - Field or Office Copy

F1008-E

Salimpour, Afsaneh

From: Whitmarsh, Avery [avery.whitmarsh@amec.com]
Sent: Friday, October 10, 2014 10:58 AM
To: Salimpour, Afsaneh
Cc: Allbut, David; Stemler, Greg
Subject: Crown - sample analysis

Hi Afsaneh –

We'd like to release all the samples from hold that we had submitted on Monday for Crown Chevrolet.

That is for the following job numbers:

- 720-60396
- 720-60404

Please let me know if you have any questions.

Thanks
Avery

Avery Whitmarsh, PG
Senior Geologist
AMEC
Environment & Infrastructure
180 Grand Avenue Suite 1100, Oakland, CA 94612 USA
tel 510-663-4100 (fax 510-663-4141)
direct 510-663-4154 mobile/cell 415-378-3912
avery.whitmarsh@amec.com
amec.com

720-60404 Chain of Custody

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-60404-1

Login Number: 60404

List Source: TestAmerica Pleasanton

List Number: 1

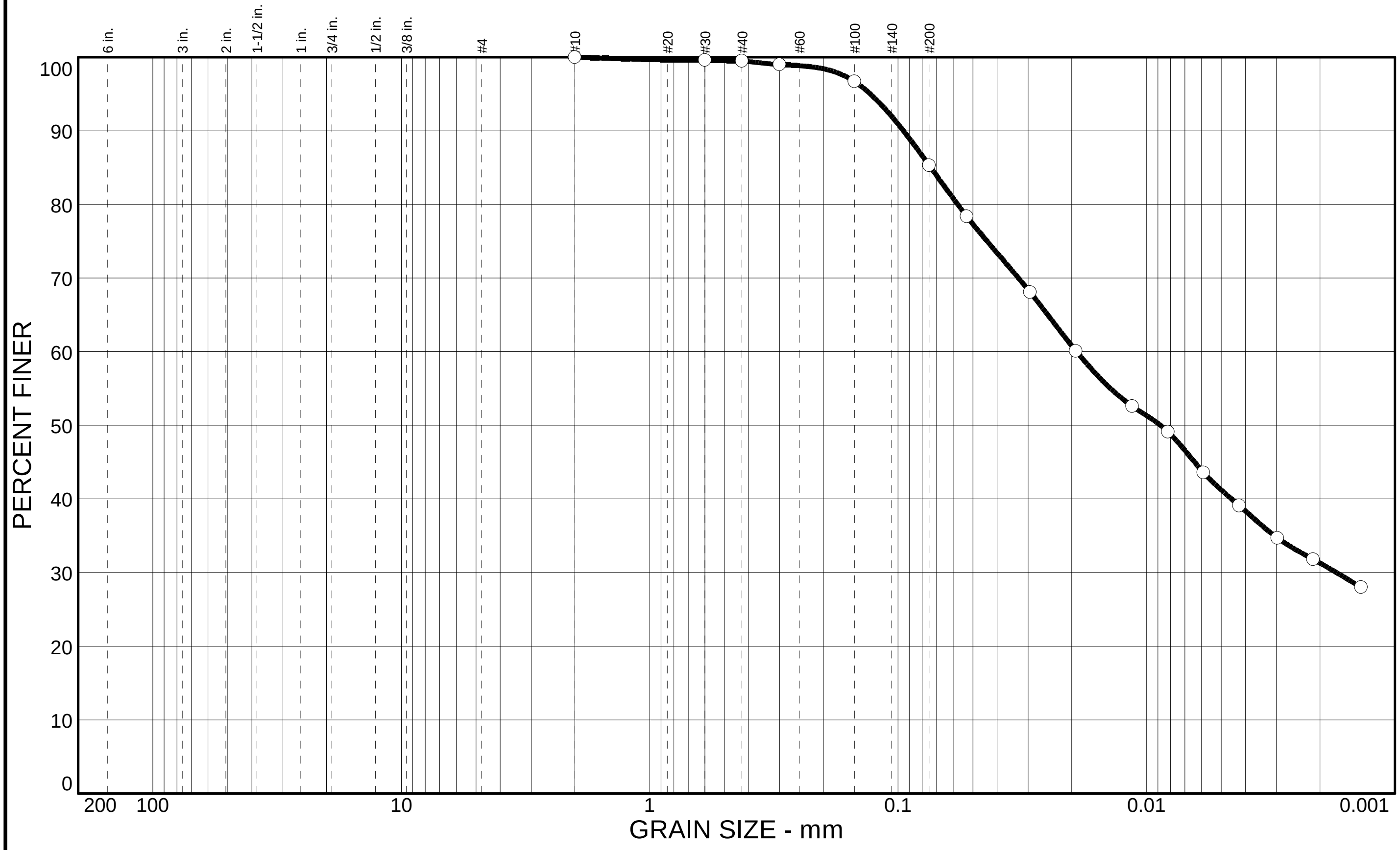
Creator: Bullock, Tracy

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT A-7

Grain-Size Analysis Reports

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			14.7	54.0	31.3				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0191		
D_{30}	0.0017		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.6		
#40	99.5		
#50	99.0		
#100	96.7		
#200	85.3		
#270	78.4		

SOIL DESCRIPTION

○ Dark Olive CLAY

REMARKS:

○

○ Source: PRB-04-18.5

COOPER TESTING LABORATORY

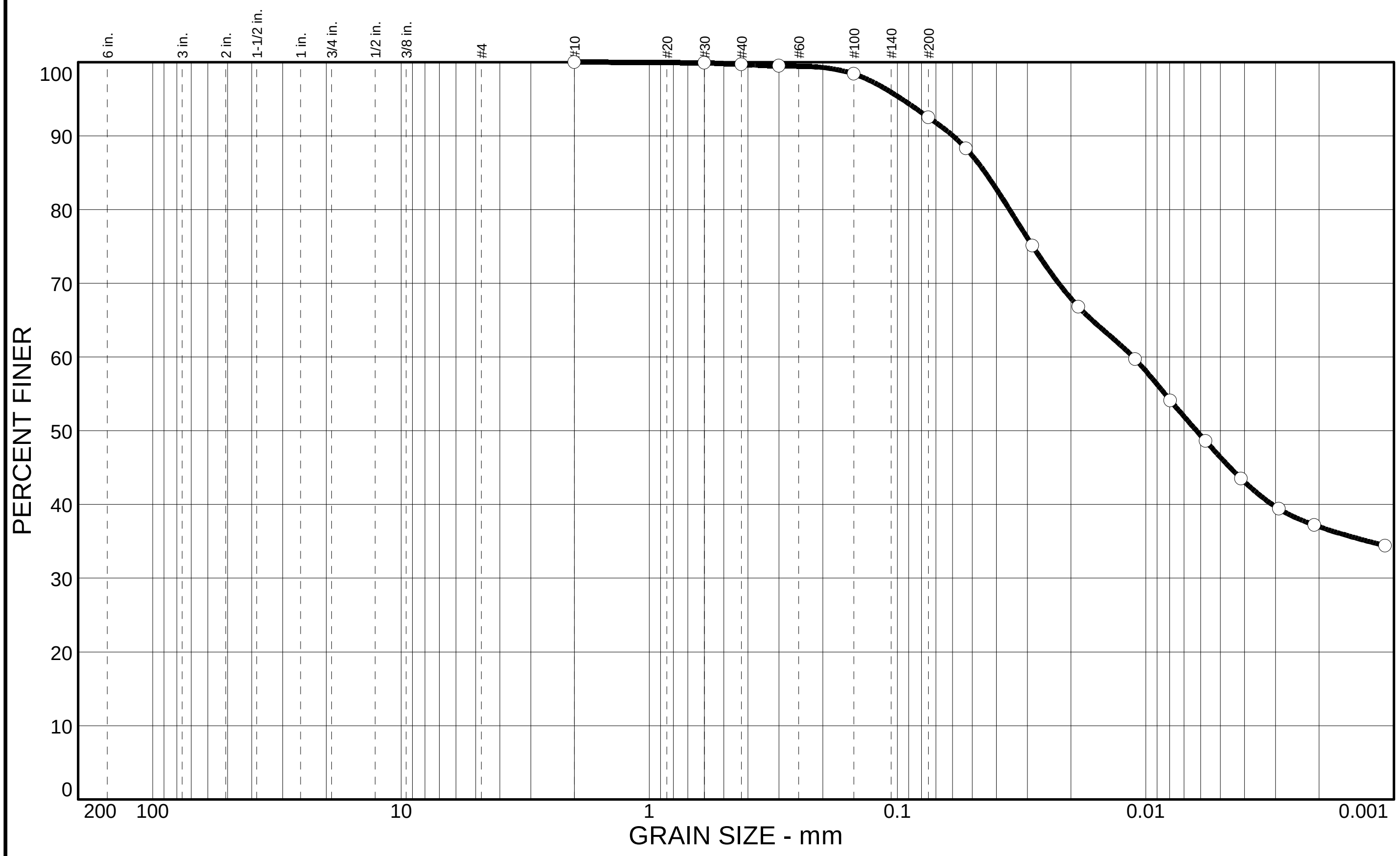
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			7.5	55.5	37.0				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0113		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.9		
#40	99.7		
#50	99.5		
#100	98.4		
#200	92.5		
#270	88.3		

SOIL DESCRIPTION

○ Dark Olive Gray CLAY

REMARKS:

○

○ Source: PRB-04-20.0

COOPER TESTING LABORATORY

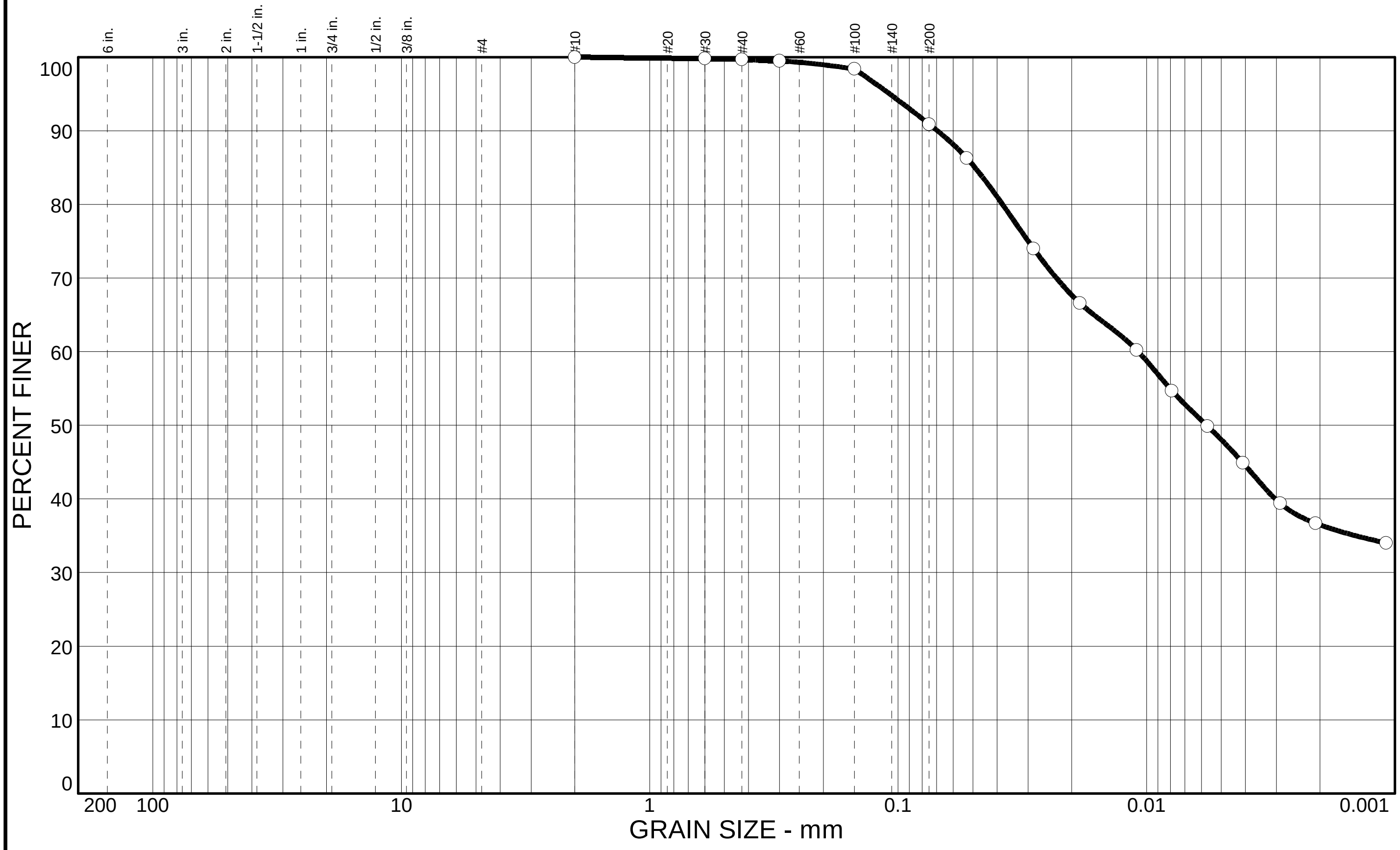
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			9.1	54.4	36.5				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D60	0.0108		
D30			
D10			
	COEFFICIENTS		
Cc			
Cu			

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.8		
#40	99.7		
#50	99.5		
#100	98.4		
#200	90.9		
#270	86.3		

SOIL DESCRIPTION

○ Dark Olive Gray CLAY

REMARKS:

○

○ Source: PRB-04-25.0

COOPER TESTING LABORATORY

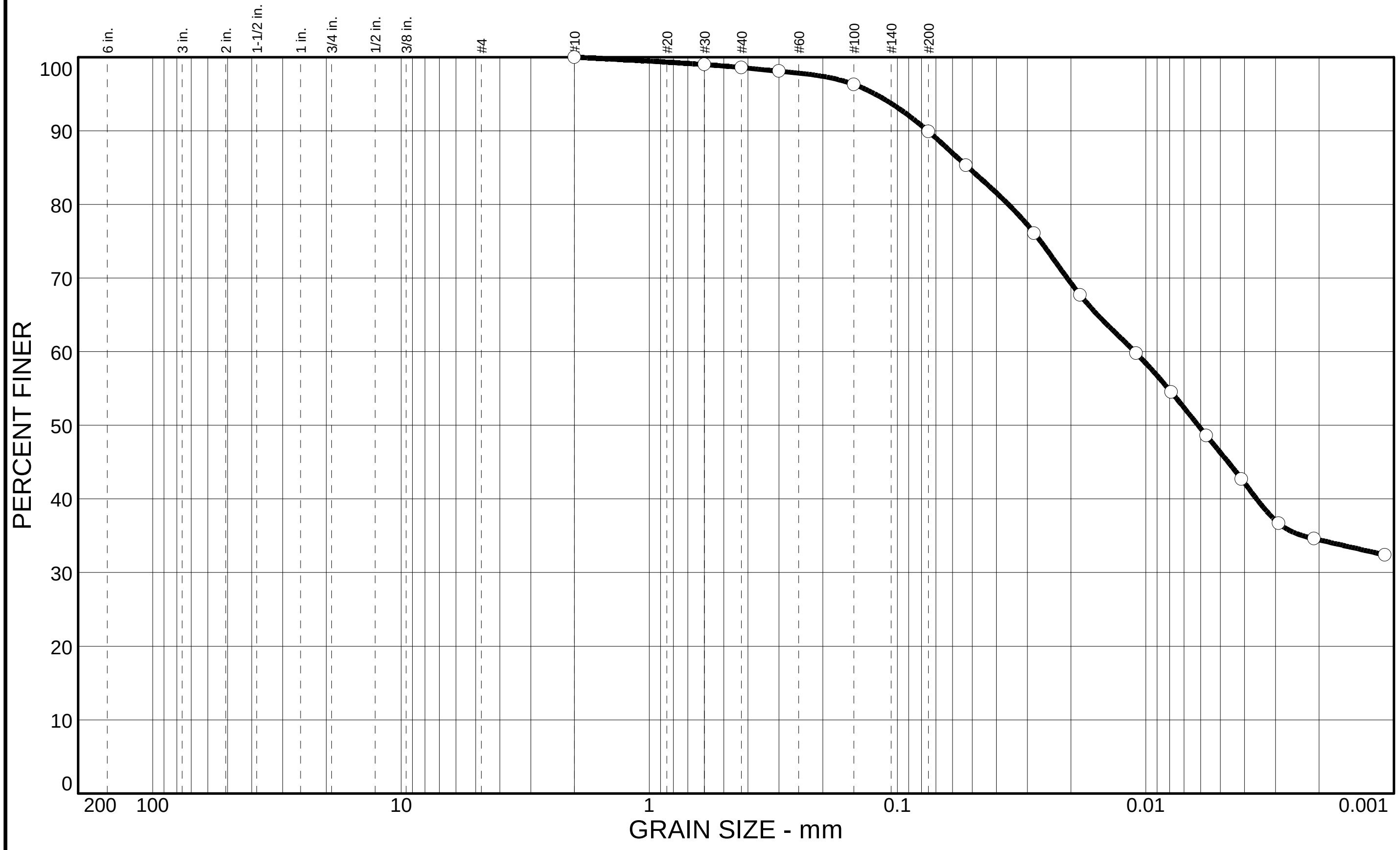
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			10.1	55.5	34.4				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0111		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.0		
#40	98.6		
#50	98.1		
#100	96.3		
#200	89.9		
#270	85.3		

SOIL DESCRIPTION

○ Dark Olive CLAY

REMARKS:

○

○ Source: PRB-04-27.5

COOPER TESTING LABORATORY

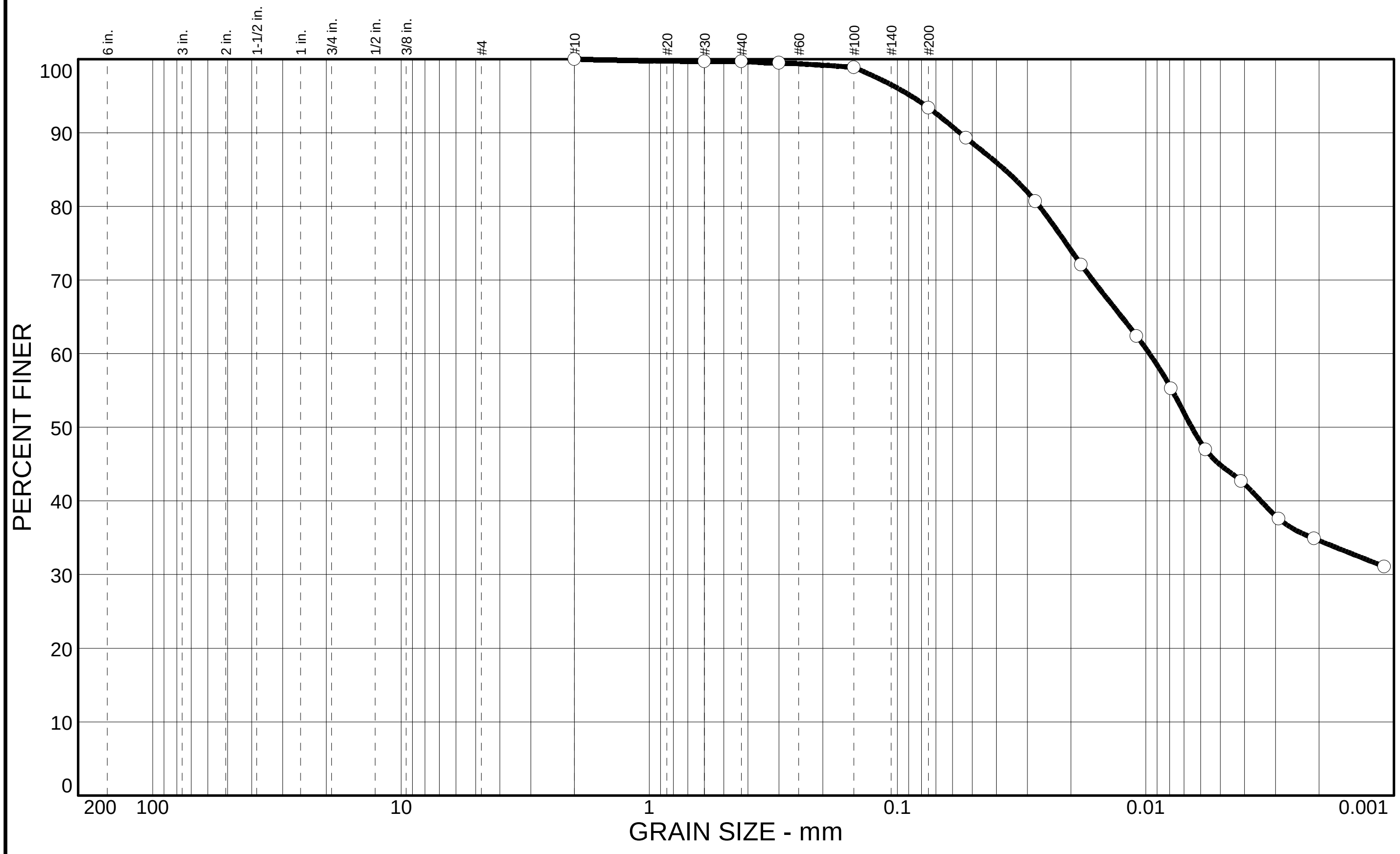
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			6.6	58.8	34.6				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0097		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

○ Source: PZ-02-16.0

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.7		
#40	99.7		
#50	99.5		
#100	98.9		
#200	93.4		
#270	89.3		

SOIL DESCRIPTION

○ Dark Olive CLAY

REMARKS:

○

COOPER TESTING LABORATORY

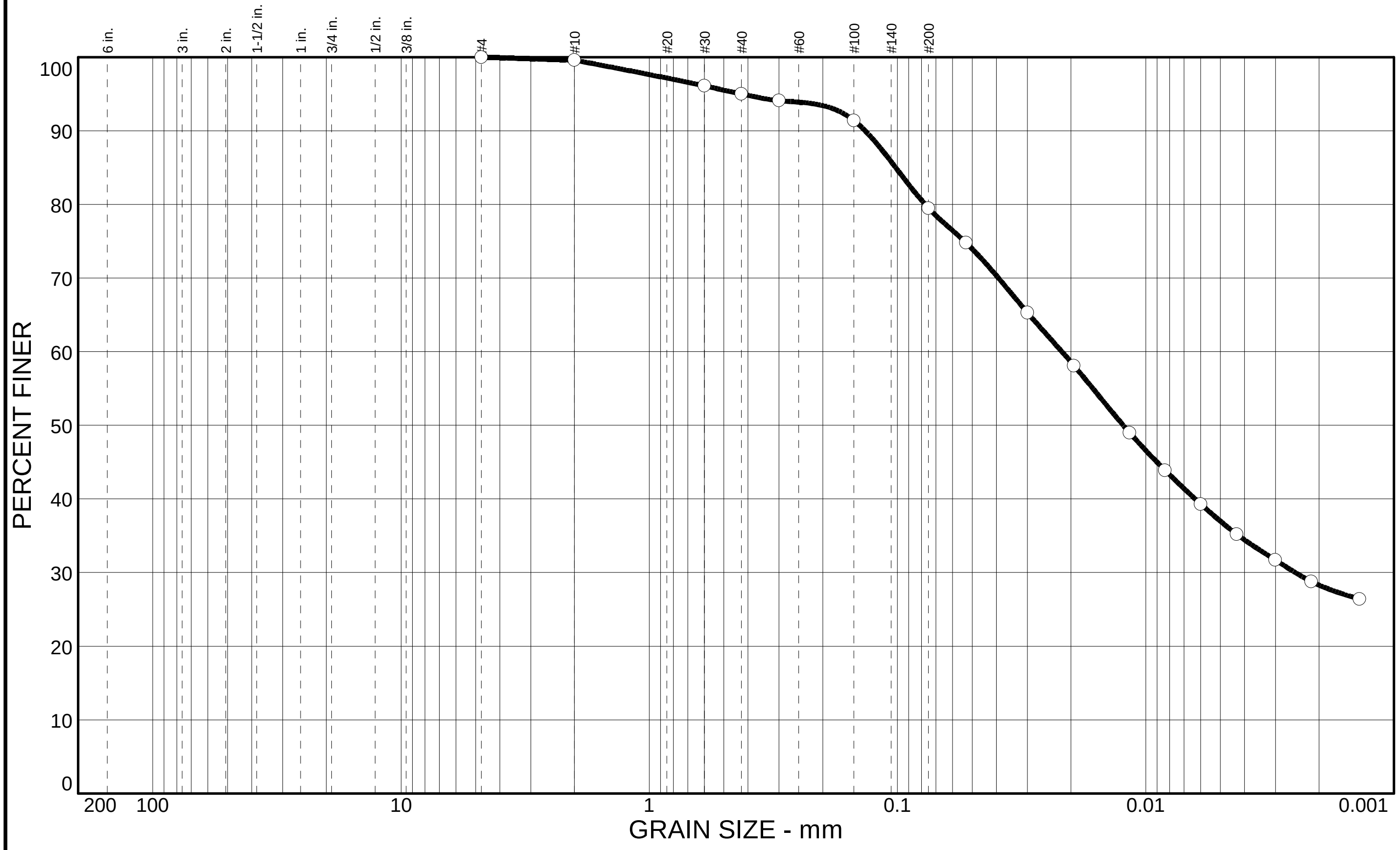
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			20.5	51.2	28.3				

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0218		
D_{30}	0.0025		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	99.6		
#30	96.1		
#40	95.0		
#50	94.1		
#100	91.4		
#200	79.5		
#270	74.8		

SOIL DESCRIPTION

○ Dark Olive Brown CLAY w/ Sand

REMARKS:

○

○ Source: PZ-02-18.0

COOPER TESTING LABORATORY

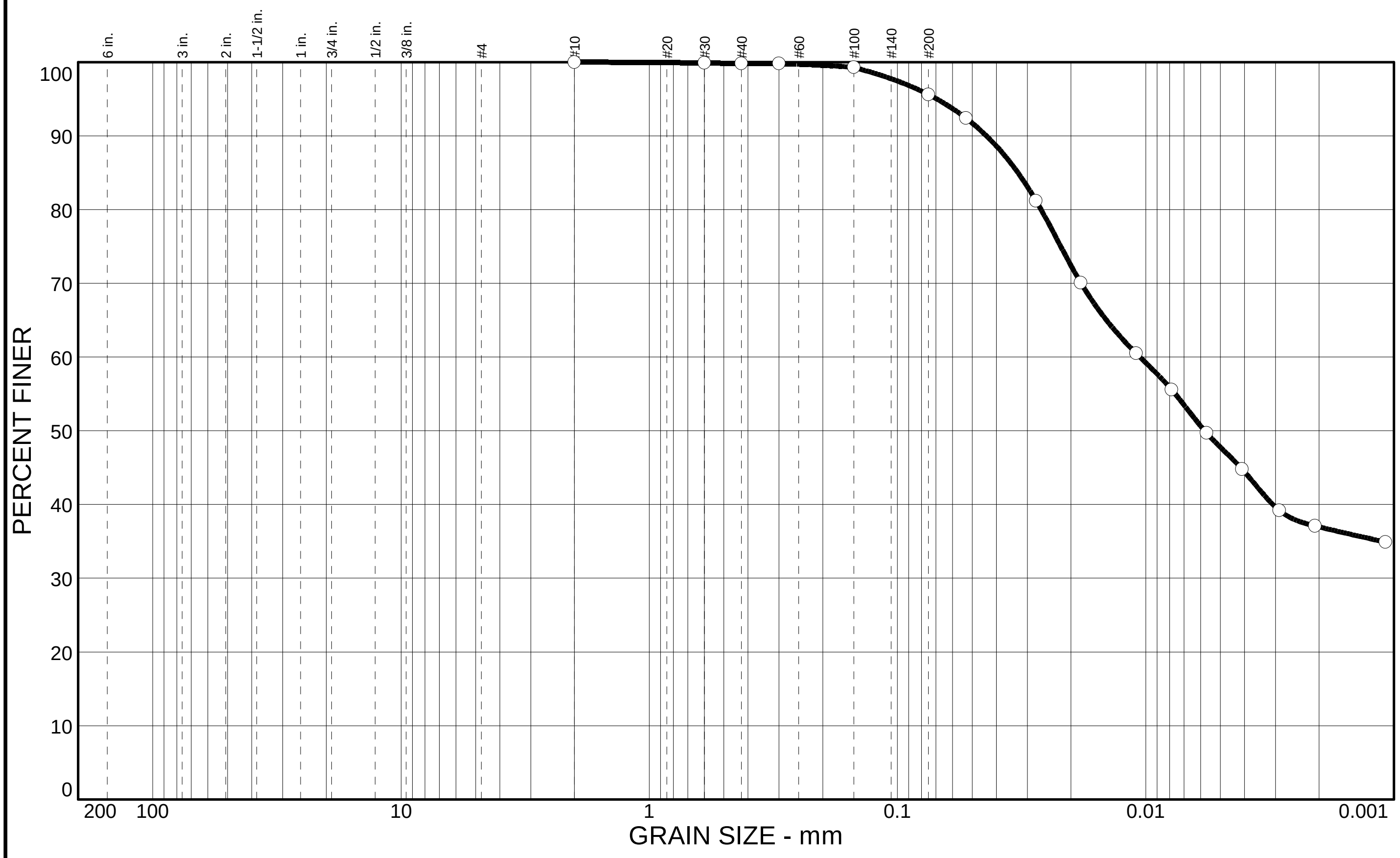
Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			4.4	58.6	37.0	ML			

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.0106		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#10	100.0		
#30	99.9		
#40	99.8		
#50	99.8		
#100	99.3		
#200	95.6		
#270	92.4		

SOIL DESCRIPTION

○ Dark Olive Brown CLAY

REMARKS:

○

○ Source: PZ-02-19.5

COOPER TESTING LABORATORY

Client: AMEC

Project: Crown Chevy - OD10160070.0012.A

Project No.: 109-747

Figure

COC# 109747

16930

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: Crown Chevy

DATE: 9/2/14

PAGE 1 OF 1

PROJECT NUMBER: OD10160070.00012.A

LABORATORY NAME: Cooper

CLIENT INFORMATION: 9/3

REPORTING REQUIREMENTS:

RESULTS TO: avery.whitmarsh@amec.com

LABORATORY ADDRESS: 937 Commercial St.
Palo Alto, CA 94303

TURNAROUND TIME: Standard

SAMPLE SHIPMENT METHOD: FedEx

LABORATORY CONTACT:

LABORATORY PHONE NUMBER: 650-213-8436

GEOTRACKER REQUIRED YES NO

SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

ANALYSES

DATE	TIME	SAMPLE NUMBER	Grain Size ①															CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
8/18/14	1055	PRB-04-18.5	X															Plastic bag	S	N	NA	N	N	1	
↓	1100	PRB-04-20.0	X															↓	↓	↓	↓	↓	↓	↓	
↓	1550	PRB-04-25.0	X															↓	↓	↓	↓	↓	↓	↓	
↓	1555	PRB-04-27.5	X															↓	↓	↓	↓	↓	↓	↓	
8/22/14	0950	PZ-02-16.0	X															↓	↓	↓	↓	↓	↓	↓	
↓	0945	PZ-02-18.0	X															↓	↓	↓	↓	↓	↓	↓	
↓	0955	PZ-02-19.5	X															↓	↓	↓	↓	↓	↓	↓	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	9/2/14	1330	SIGNATURE:		
PRINTED NAME: Alex Rosenthal			PRINTED NAME:		
COMPANY: AMEC			COMPANY:		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		

TOTAL NUMBER OF CONTAINERS: 7

SAMPLING COMMENTS: ① Grain size analysis w/ Hydrometer

Contact Greg Stemler at 510-663-4191 or Avery Whitmarsh at 510-663-4154 with any questions

amec

ATTACHMENT A-8

Data Quality Review

Data Quality Review

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

DATA QUALITY REVIEW

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California
Site Cleanup Program Case No. RO0003014

June 11, 2015
Project OD14170800

This Data Quality Review appendix was prepared by the staff of Amec Foster Wheeler under the supervision of the project Data Quality Manager whose signature appears hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.

Jake Torrens
Associate Scientist
Amec Foster Wheeler
Environment & Infrastructure, Inc.

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ATTACHMENT A-8
DATA QUALITY REVIEW
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. ("Amec Foster Wheeler"), evaluated the analytical data from the August 2014 grab-groundwater investigation using guidelines set forth in the U.S. Environmental Protection Agency's (EPA's) *USEPA National Functional Guidelines for Superfund Organic Methods Data Review* (U.S. EPA, 2014).

The data quality review also included a data completeness check of the data packages, a transcription check of sample results, and a review of all laboratory reporting forms. Qualified data are included in the data summary tables in the main body of this report (with the exception of analytes that have not been detected at the site, which are not tabulated). Data qualifiers for the third and fourth quarter 2014 groundwater monitoring events are included on the laboratory analytical reports, copies of which are included in Attachment A-6.

2.0 GRAB-GROUNDWATER DATA EVALUATION

Quality assurance procedures for groundwater samples collected during the August 2014 grab-groundwater investigation included the collection and analysis of two blind field duplicate samples; laboratory analysis of method blank samples, surrogate spikes, matrix spike/matrix spike duplicate (MS/MSD) samples, and laboratory control spike/laboratory control spike duplicates (LCS/LCSDs); and evaluation of the analytical results.

The blind field duplicate groundwater samples were collected from grab groundwater locations PRB-03HP and PRB-04HP at 34.0 and 28.0 feet, respectively. The primary samples were labeled PRB-03HP-34.0 and PRB-04HP-28.0, and the duplicate samples were labeled PRB-04HP-340.0 and PRB-04HP-280.0.

A review of groundwater data quality is provided in the following sections.

2.1 DATA ACCURACY

Data accuracy was assessed by the analysis of LCS, LCSD, MS, and MSD samples and evaluation of the recovery of spiked compounds, and is expressed as a percentage of the true or known concentrations. Surrogate recoveries and blank results also were used to assess accuracy.

2.1.1 Spiked Compounds

No results were qualified due to LCS/LCSD or MS/MSD recoveries.

2.1.2 Surrogate Recoveries

No groundwater data were qualified due to surrogate recoveries.

2.1.3 Method Blanks

There were no detections in the method blank samples.

2.1.4 Trip Blanks

Two trip blanks were submitted for volatile organic compound (VOC) analysis. There were no detections in the trip blank samples.

2.1.5 Other Factors

Total petroleum hydrocarbons quantified as gasoline (TPHg; reported by the analytical laboratory as gasoline range organics) were reported at a concentration similar to tetrachloroethene (PCE) in groundwater samples PRB-02HP-23.0, PRB-02HP-27.5, and PRB-04HP-28.0 and its field duplicate, PRB-04HP-280.0. The analytical laboratory indicated in the case narratives for these samples that the reported TPHg results were due to presence of discrete peaks (PCE) and not the presence of gasoline range organics. As a result, Amec Foster Wheeler qualified these TPHg results with “R” to indicate that they are rejected.

2.2 DATA PRECISION

Data precision is evaluated by comparing analytical results from the duplicate sample pair and evaluating the calculated relative percent difference (RPD) between the data sets. Results for LCS/LCSD, MS/MSD, and the field duplicate sample pair were evaluated to assess the precision of the analytical methods. A summary of sample results from the field duplicate sample pairs is shown in Table 1.

The RPDs for the MS/MSD, LCS/LCSD, and field duplicate pairs were within acceptance limits.

2.3 DATA COMPLETENESS

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. The percent complete is calculated by the following equation:

$$\%\ \text{Complete} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

The percent complete for groundwater sample data collected during the third quarter 2014 groundwater monitoring event is 100 percent, with the exception of TPHg results, where the percent complete is 70 percent.

3.0 SUMMARY OF GROUNDWATER DATA QUALITY REVIEW

Based on an evaluation of data quality for samples collected during grab-groundwater investigation, all the analytical results are valid and useable, with the exception of the rejected results. The data are acceptable and can be used for decision-making purposes.

4.0 REFERENCES

U.S. Environmental Protection Agency, 2014, USEPA National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-08-01, August.

TABLE

TABLE A-8-1

SUMMARY OF PRECISION DATA
FOR ANALYSIS OF GROUNDWATER FIELD DUPLICATE SAMPLES

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

All concentrations reported in µg/L

Primary Sample ID	Duplicate Sample ID	Collection Date	Compound[1]	Reporting Limit	Primary Sample Result	Duplicate Sample Result	RPD[2]	Absolute Difference Between Sample Results[3]
PRB-04HP-28.0	PRB-04HP-280.0	8/26/2014	Tetrachloroethene	0.5	91	74	20.6%	NA
			Trichloroethene	0.5	2.1	1.9	10.0%	NA
PRB-03HP-34.0	PRB-03HP-340.0	8/25/2014	Tetrachloroethene	0.5	11	12	8.7%	NA
			Trichchloroethene	0.5	1.3	1.3	0.0%	NA

Notes

1. Only compounds detected in at least one of the field primary or field duplicate samples are shown.
2. Relative Percent Difference (RPD) is calculated by:

$$RPD\ \% = \left| \frac{2(S_1 - S_2)}{S_1 + S_2} \right| \times 100$$

Where S_1, is the sample concentration and S_2 is the blind duplicate sample concentration.

3. The RPD is not applicable when the sample results are less than two times the reporting limit.
In those cases, duplicate results are acceptable when the absolute difference between the results is less than the reporting limit.
When a compound was detected in one duplicate sample, but was not detected at or above the laboratory reporting limit in the other sample, then the results are acceptable when the absolute difference between the detected result and the reporting limit is less than the reporting limit.

Abbreviations

µg/L = micrograms per liter
NA = not applicable

APPENDIX B

Borehole Dilution Test Methods

Borehole Dilution Test Methods

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

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APPENDIX B
BOREHOLE DILUTION TEST METHODS
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

B1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (“Amec Foster Wheeler”) conducted a borehole dilution test at the former Crown Chevrolet site (the site) on October 31, 2014. The test was performed in groundwater piezometer PZ-01 to aid in estimation of horizontal groundwater seepage flow velocities in the vicinity of the proposed permeable reactive barrier (PRB). This work was conducted in general accordance with the *Permeable Reactive Barrier Pre-Design Investigation Work Plan* (AMEC, 2014; “Work Plan”) prepared by Amec Foster Wheeler and dated August 14, 2014.

This document describes the field methodology, data analysis, and results of the borehole dilution testing.

B2.0 FIELD METHODS

Amec Foster Wheeler prepared the equipment and conducted the borehole dilution testing on October 31, 2014. The calibration of the bromide-specific probe, test setup and tracer injection, tracer monitoring, and laboratory sample collection and analyses are summarized in the following sections.

B2.1 INSTRUMENT CALIBRATION

A TempHion ion-specific electrode (Br– probe), manufactured by Instrumentation Northwest, was used to monitor the bromide ion (Br–) tracer concentration during the tests. The Br– probe was calibrated the day prior to use using a two-point calibration procedure by a trained technician from the Br– probe supplier, Geotech Environmental. Amec Foster Wheeler then field tested the probe in a Br– standard with an expected concentration of 799 milligrams per liter (mg/L). The Br– standard was prepared prior to fieldwork by Amec Foster Wheeler by mixing a measured quantity of American Chemical Society (ACS) Reagent Grade sodium bromide (NaBr) salt provided by MP Biomedicals of Santa Ana, California, and a measured quantity of de-ionized water provided by TestAmerica Laboratories (“TestAmerica”), of Pleasanton, California. A sample of the field testing Br– standard was submitted along with other project samples to TestAmerica for analysis using U.S. Environmental Protection Agency (U.S. EPA) Method 300.0 to confirm its actual Br- concentration (Attachment B-1). The Br–

concentrations measured for the field testing Br– standard by the probe and the laboratory respectively were 806 mg/L and 810 mg/L respectively, confirming the instrument calibration.

B2.2 TEST SETUP AND TRACER INJECTION

Prior to the setting up the tracer dilution testing assembly, Amec Foster Wheeler removed the well cap from the piezometer, allowed it to equilibrate, and measured the initial water level and the total depth of the piezometer (Table B-1).

To set up the test assembly, thin metal and fiberglass rods were decontaminated, connected into one length, and inserted into the total depth of the piezometer. The connected rods formed the support structure of the test assembly. Two lengths of new, ¼-inch polyethylene tubing were attached to the rods. The bottom of one length of tubing was placed at the bottom of the screened interval for the piezometer, greater than 0.5 foot above the sounded bottom of the piezometer. The bottom of the other length of tubing was placed at the top of the screened interval, greater than 0.5 foot below the measured depth to groundwater. The distance between the bottom of each length of tubing comprised the test interval for the test. A Br– probe was attached to the rod at the approximate midpoint of the test interval. The tube ending at the bottom of the test interval (extraction end) was connected to the intake of the primary peristaltic pump, and the tube ending at the top of the test interval (injection end) was connected to the effluent of the main tubing of the injection/sampling manifold. Another length of new, ¼-inch polyethylene tubing was used to connect the effluent of the primary peristaltic pump and the influent of the main tubing of the injection/sampling manifold, closing the recirculation loop. Figure B-1 provides additional information regarding the test setup, including the assembly of the injection/sampling manifold. Table B-1 provides a summary of the setup parameters for the test, including relevant well construction details and the test interval.

The primary peristaltic pump was adjusted to extract groundwater from near the bottom of the piezometer screen and re-circulate the groundwater back near the top of the piezometer screen at a flow rate of approximately 700 milliliters per minute (mL/min). The primary pump was operated for approximately 45 minutes before the tracer injection. During this period, approximately 30 mL of groundwater was collected into a laboratory-supplied unpreserved 250 mL polyethylene bottle to analyze for the background Br– concentration in groundwater. The sample was shipped to TestAmerica for analysis using EPA Method 300.0. The results of the pre-injection groundwater sample indicate background Br^- concentrations of 1.3 milligrams per liter (mg/L) in PZ-01. The Br– probes were set up to begin logging during this pre-injection period. After approximately 20 minutes, the background bromide concentration was measured and recorded on an Excel spreadsheet in both voltage (in mV) and the corresponding concentration (in ppm).

The tracer injection solution was made before the start of the test by mixing a measured quantity of NaBr salt into a measured quantity of lab-prepared deionized water. A mass of 0.94 milligrams of NaBr salt was used to achieve an initial Br concentration of approximately 200 to 500 mg/L in the test interval, with a target initial concentration of 250 mg/L (Table B-1).

The bromide solution was injected via the one-way valve of the injection/sampling manifold using the secondary peristaltic pump. The solution was injected at a rate of approximately 50 mL/min so that the entire volume of solution (210 mL) was injected during the time required to circulate one test volume. The time of injection was recorded on the field spreadsheet.

Table B-1 includes a summary of the injection parameters for the test, including circulation rate, tracer mass added, and injection rate.

B2.3 TRACER MONITORING

Beginning immediately after the injection period, the Br– probe datalogger recorded Br– readings once every 4 seconds for the first hour and once every minute for the remainder of the test duration (approximately 10 hours). In addition, Br– readings were recorded on the field spreadsheet on a timed basis during testing (approximately once every 2 minutes for the first 10 minutes, once every 5 minutes until the end of the first hour, and once every 10 minutes until the end of the test). Figure B-2 depicts a concentration versus time plot showing recorded Br– concentrations, as well as a natural logarithmic depiction of Br– concentrations for use in the velocity calculations. This figure also shows the interval selected as the dilution testing period. The dilution testing period was selected based on the timing of stabilization of the tracer concentration and the end of the circulation period.

B2.4 SAMPLE COLLECTION AND LABORATORY ANALYSES

Once every 60 minutes, approximately 30 mL of groundwater was collected into a laboratory-supplied, unpreserved 250 mL polyethylene bottle by opening the sample port on the injection/sampling manifold and pinching the silicone tubing on the injection end of the main tubing in order to direct the flow toward the sample port.

The sample collection time, volume, and probe reading at the time of collection were recorded. The samples were submitted to TestAmerica for analysis of bromide using EPA Method 300.0, and the results were used as a quality control measure to confirm the probe measurements.

The laboratory analytical results are summarized in Table B-2 and plotted on Figure B-1. A copy of the laboratory analytical report is provided in Attachment B-1.

B3.0 DATA EVALUATION AND ANALYSIS

The tracer test data were evaluated using the simplifying assumptions that the water-bearing formation is homogeneous and isotropic through the test interval and that dilution of the tracer over time is dominated by horizontal groundwater flow through the well (Hall, 1993).The data were used to calculate Darcy velocity and groundwater seepage velocity. The Darcy velocity, also known as specific discharge, represents the volumetric flow rate across a cross-sectional area, and is proportional to the hydraulic conductivity and the hydraulic gradient. Since flow in porous media is confined to the connected pore space (a fraction of the total cross-sectional area), the seepage velocity (or linear/pore velocity), is also calculated. The seepage velocity represents the rate at which water particles and non-sorbing chemicals move in the groundwater, and is equal to the Darcy velocity divided by the effective porosity of the soil matrix. The calculations of groundwater seepage velocity and Darcy velocity are provided in the following sections.

B3.1 CALCULATION OF GROUNDWATER SEEPAGE VELOCITY

The rate of groundwater flow through the well screen, *Q*, was calculated directly from the tracer dilution rate using the assumptions outlined above. The tracer dilution rate is directly related to *Q* and inversely related to the volume of the test interval, *V*, as described below (Hall, 1993):

$$dC/dt = -\left(Q/V\right) \bullet C(t) \tag{1}$$

where *C(t)* is the tracer concentration at an elapsed time *t*.

Assuming the tracer is well mixed within the test interval (i.e., the well screen interval) to give the initial tracer concentration, C_0, *Q* can be obtained by integrating Equation 1 from time $t = 0$ to an elapsed time *t*, where C_0 decreases to a concentration *C* over the time interval of the test (*t*), as shown below (Hall, 1993):

$$Q = -\left(\frac{V}{t}\right)\ln\left(\frac{C}{C_0}\right) \tag{2}$$

Q is obtained graphically by plotting the natural logarithm of the tracer concentration versus time (*ln(C)* vs. *t*). The initial concentration C_0 is calculated from the *y*-intercept of the plot (concentration at stabilization in the well), and *Q/V is* obtained from the slope by rearranging Equation 2 as follows:

$$\ln(C) = -\left(Q/V\right)t + \ln(C_0) \tag{3}$$

The groundwater seepage velocity *v* through the formation of the test interval is calculated using Equation 4 by dividing flow through the well, *Q*, by the cross-sectional area of the test interval *A* (well diameter multiplied by length of test interval), a correction factor α (estimated to be 3.7 for the piezometer PZ-01 based on well construction and borehole skin effects), and the effective porosity of the test interval formation *n* (estimated to be equal to 0.2):

$$v = Q \big/ (nA\alpha) \tag{4}$$

Substituting Equation 3 into Equation 4 yields Equation 5:

$$v = \frac{-m\pi r}{2n\alpha} \tag{5}$$

where *m* is the slope of the *ln* (*C)* versus *t* plot, and *r* is the radius of the well.

B3.2 CALCULATION OF DARCY VELOCITY

The flow rate through the well (*Q*) may be used to calculate the Darcy velocity Q_f through the formation of the test interval using Equation 6, dividing by the cross-sectional area of the test interval (*A*) and an assumed correction for flow convergence at the monitoring well (α), (estimated to be 3.7 for the piezometer PZ-01 based on well construction and borehole skin effects), based on Hall (1993):

$$Q_f = \frac{Q}{A\alpha} \tag{6}$$

Substituting Equation 3 into Equation 6 yields Equation 7:

$$Q_f = -\frac{m\pi r}{2\alpha} \tag{7}$$

where *m* is the slope of the *ln* (*C)* versus *t* plot, and *r* is the radius of the well. The Darcy velocity can also be calculated by multiplying the groundwater seepage velocity by the effective porosity, *n*.

B4.0 RESULTS

Based on the equations described above, the groundwater seepage velocity and Darcy velocity were calculated using data from the selected dilution test period. The time at which the observed Br– concentration in the well stabilized was designated as t = 0 (the beginning of the dilution test period), and the time at which circulation stopped was designated as the end of the dilution testing period. The selected dilution test period is shown on the concentration versus time plot (Figure B-1). The Br– concentrations observed in the well during the dilution test period are shown on a detailed scale on Figure B-2. This figure plots ln (C) versus t for probe data and laboratory results and includes the best-fit lines for each ln (C) versus t plot. A summary of the groundwater seepage velocity and Darcy velocity values calculated using field probe data and laboratory analyses is provided in Table B-3.

The slopes of the best-fit lines and the assumptions and equations described in Section 3 above indicate that the groundwater velocity though the formation test interval is 0.76 foot per day (ft/day) based on probe measurements and 0.78 ft/day based on laboratory sample results. The corresponding calculated Darcy velocity through the test interval was 0.15 ft/day based on probe measurements and 0.16 ft/day based on laboratory sample results.

The groundwater velocities calculated using the field probe and laboratory analytical results are similar to each other and relatively high for the type of sediments encountered in PZ-01 and the horizontal hydraulic gradient in the vicinity of the piezometer. Because PZ-01 is screened in the coarsest-grained soil encountered by the three piezometers, with similar EC readings to the borings within the PRB alignment, the groundwater velocity estimated by this test is an appropriate representation of the groundwater velocity that will enter the PRB in the coarser-grained, and therefore higher velocity, zones. In general, however, the results described herein should be used with appropriate consideration of (1) heterogeneities in the site subsurface, both recognized and unrecognized, and (2) the simplifying assumptions and uncertainties inherent in the test method. For example, velocity calculated is average velocity for the test interval, and horizontal flow through subzones of higher or lower permeability within the test intervals may be higher or lower than this average.

B5.0 REFERENCES

Hall, S.H., 1993. Single well tracer tests in aquifer characterization, Ground Water Monitoring and Remediation, vol. 13, no. 2, pp. 118-124.

AMEC Environment & Infrastructure (AMEC), 2014. Permeable Reactive Barrier Pre-Design Investigation Work Plan, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard, Dublin, California, August 14.

TABLES

TABLE B-1

TEST SETUP, CIRCULATION, AND INJECTION PARAMETERS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Piezometer Construction and Testing Measurements[1]	
Depth to Top of Screen (feet bmp)	15.04
Depth to Bottom of Screen (feet bmp)	19.47
Depth of Well (feet bmp)	20.03
Depth to Water (feet bmp)	14.53
Casing Diameter (inch)	2.067
Pump Intake Setting (feet bmp)	19.47
Return Flow Setting (feet bmp)	15.04
Length of Test Interval or Zone of Circulation (feet)	4.43
Probe Depth (feet bmp)	17.26
Volume in Test Interval (L)	2.92
Recirculation Pumping Rate (Lpm)	0.70
Time for Recirculation of one Test Interval at Recirculation Pumping Rate (minutes)	4.2
Volume of Injection Solution at an Injection Rate of 0.05 Lpm (L)	0.21
Mass of Sodium Bromide for Target Initial Concentration of 250 mg/L Br– (grams) [2]	0.94

Notes

1. Amec Foster Wheeler measured the depth to top and bottom of screen in PZ-01 during piezometer installation on 8/21/14. Amec Foster Wheeler measured total depth and depth to water in PZ-01 prior to testing on October 31, 2014.
2. 1.29 grams of sodium bromide = 1 gram of the bromide ion.

Abbreviations

Br– = bromide ion
feet bmp = feet below measuring point
L = liter
Lpm = liters per minute
mg/L = milligrams per liter

TABLE B-2

SUMMARY OF ANALYTICAL RESULTS FOR BROMIDE ION IN GROUNDWATER

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Results reported in milligrams per liter (mg/L)

Sample Location or Type	Sample Identification	Sample Date and Time	Sample Time Relative to Start of Injection (minutes)	Bromide Ion Concentration (U.S. EPA Method 300.0)	Notes
Samples from MW-6 Dilution Testing					
PZ-01	BDT-BACKGROUND	10/31/2014 - 10:00	-12	1.3	Background prior to injection
	BDT-1052	10/31/2014 - 10:52	39	170	
	BDT-1122	10/31/2014 - 11:22	70	130	
	BDT-1220	10/31/2014 - 12:20	128	100	
	BDT-1321	10/31/2014 - 13:21	189	110	
	BDT-1421	10/31/2014 - 14:21	249	95	
	BDT-1520	10/31/2014 - 15:20	308	82	
	BDT-1622	10/31/2014 - 16:22	370	67	
	BDT-1724	10/31/2014 - 17:24	432	54	
	BDT-1821	10/31/2014 - 18:21	489	44	Terminated circulation at 18:30
Standard Samples					
Injectant	BDT-INJECTANT	10/31/2014 - 10:22	NA	3,500	Bromide injection solution
Probe Field Testing Standard	BDT-CAL	10/31/2014 - 19:50	NA	810	Bromide standard used to test probe calibration

Abbreviations

NA = not applicable
U.S. EPA = U.S. Environmental Protection Agency

TABLE B-3

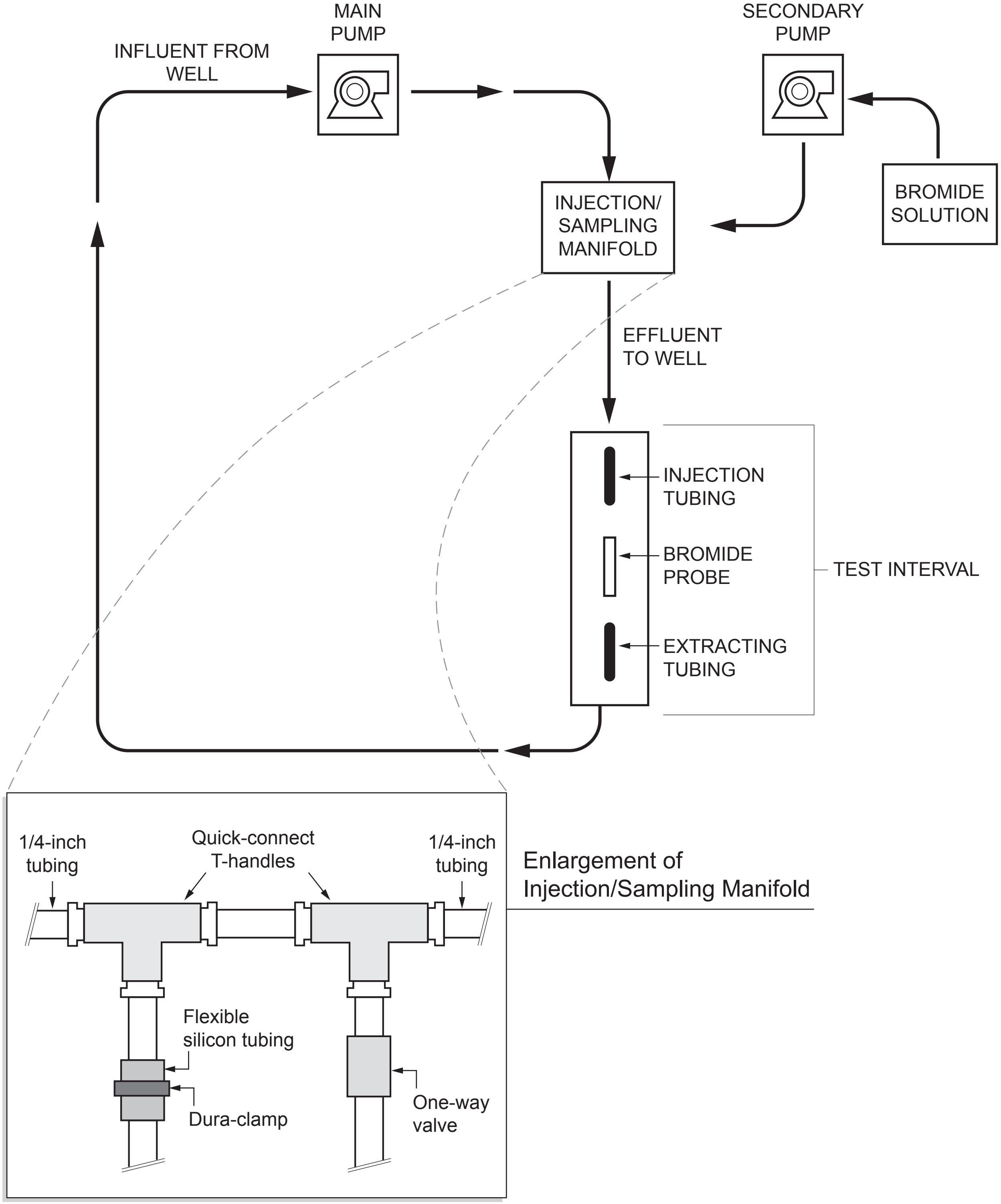
SUMMARY OF CALCULATED GROUNDWATER SEEPAGE VELOCITY AND DARCY VELOCITY

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Location	Test Interval (feet bmp)	Seepage Velocity (feet/day)			Darcy Velocity (feet/day)		
		Field Probe	Laboratory	Average	Field Probe	Laboratory	Average
PZ-01	15.3 to 19.7	0.76	0.78	0.77	0.15	0.16	0.16

Abbreviation
bmp = below measuring point

FIGURES

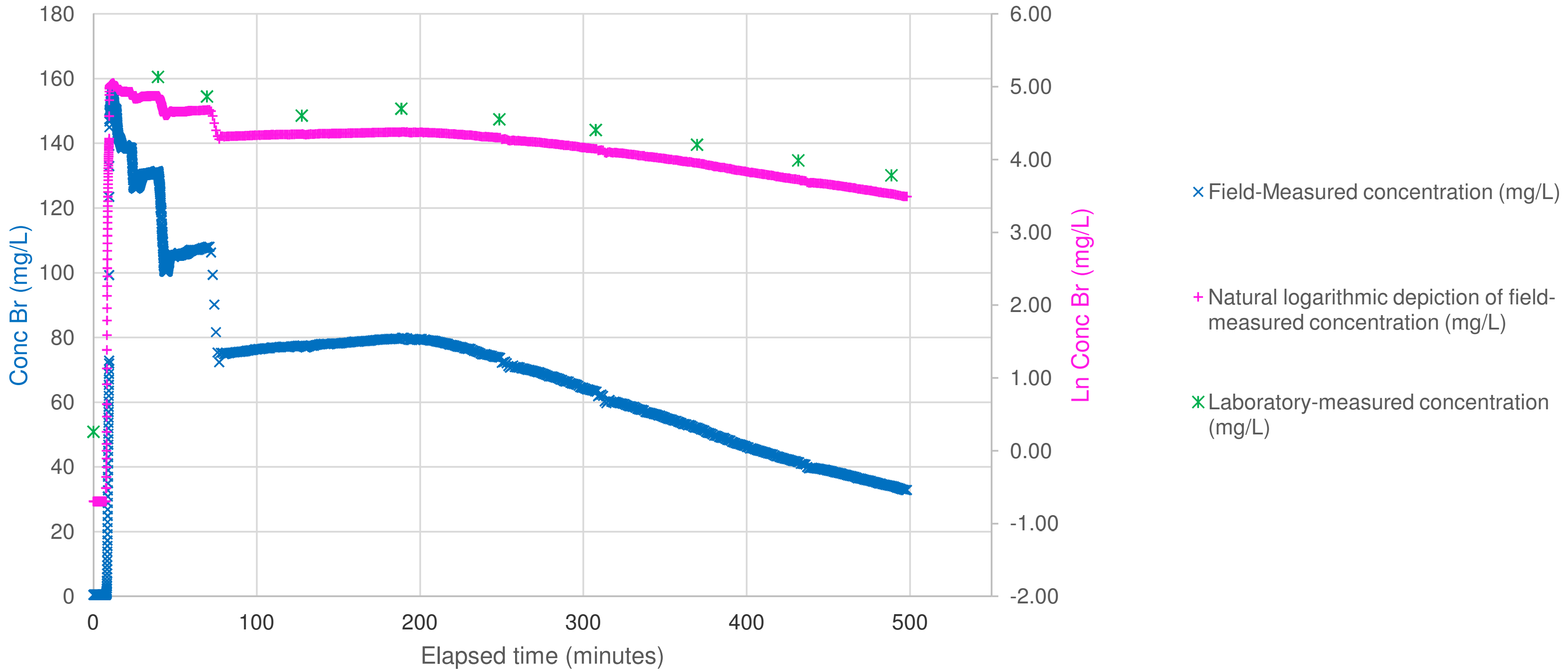


SCHEMATIC OF BOREHOLE DILUTION
TEST SETUP
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 03/17/2015 | Project No. OD14170800.02.3

Figure
B-1

S:\OD14\170800\task_02\15_0205_PRB_BoD_fig_B-1.ai



Abbreviation:
mg/L = milligrams per liter

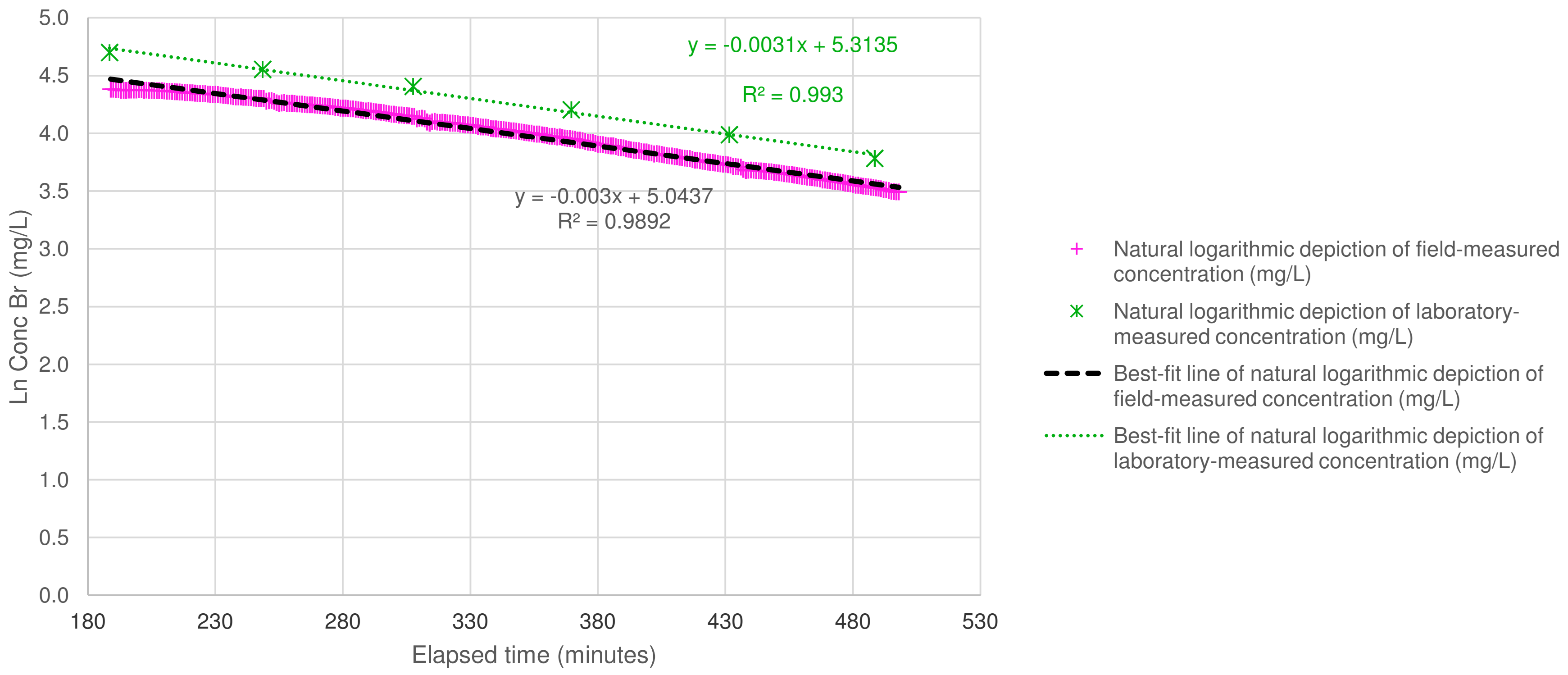
PLOT OF CONCENTRATION VS TIME
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Proiect No.: OD14170800.02.03

Date: 3/16/15

Figure
B-2



BROMIDE ION DILUTION RATE
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Project No.: OD14170800.02.03

Date: 3/16/15

Figure
B-3

ATTACHMENT B-1

Laboratory Analytical Report

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-60983-1
Client Project/Site: Crown Chevrolet

For:
AMEC Environment & Infrastructure, Inc.
180 Grand Avenue
Suite 1100
Oakland, California 94612

Attn: Connie Lu

Authorized for release by:
11/12/2014 11:09:31 AM

Afsaneh Salimpour, Senior Project Manager
(925)484-1919
afsaneh.salimpour@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Glossary

Abbreviation	**These commonly used abbreviations may or may not be present in this report.**
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60983-1

Job ID: 720-60983-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-60983-1

Comments

No additional comments.

Receipt

The samples were received on 11/3/2014 4:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7º C.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client Sample ID: BDT-INJECTANT — Lab Sample ID: 720-60983-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	3500		1000		mg/L	1000		300.0	Total/NA

Client Sample ID: BDT-BACKGROUND — Lab Sample ID: 720-60983-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	1.3		1.0		mg/L	1		300.0	Total/NA

Client Sample ID: BDT-1052 — Lab Sample ID: 720-60983-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	170		20		mg/L	20		300.0	Total/NA

Client Sample ID: BDT-1122 — Lab Sample ID: 720-60983-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	130		20		mg/L	20		300.0	Total/NA

Client Sample ID: BDT-1220 — Lab Sample ID: 720-60983-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	100		20		mg/L	20		300.0	Total/NA

Client Sample ID: BDT-1321 — Lab Sample ID: 720-60983-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	110		20		mg/L	20		300.0	Total/NA

Client Sample ID: BDT-1421 — Lab Sample ID: 720-60983-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	95		20		mg/L	20		300.0	Total/NA

Client Sample ID: BDT-1520 — Lab Sample ID: 720-60983-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	82		10		mg/L	10		300.0	Total/NA

Client Sample ID: BDT-1622 — Lab Sample ID: 720-60983-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	67		10		mg/L	10		300.0	Total/NA

Client Sample ID: BDT-1724 — Lab Sample ID: 720-60983-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	54		10		mg/L	10		300.0	Total/NA

Client Sample ID: BDT-1821 — Lab Sample ID: 720-60983-11

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60983-1

Client Sample ID: BDT-1821 (Continued)

Lab Sample ID: 720-60983-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	44		10		mg/L	10		300.0	Total/NA

Client Sample ID: BDT-CAL

Lab Sample ID: 720-60983-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	810		100		mg/L	100		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14

General Chemistry

Client Sample ID: BDT-INJECTANT **Lab Sample ID: 720-60983-1**
Date Collected: 10/31/14 10:22 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**3500**		1000		mg/L			11/07/14 18:34	1000

Client Sample ID: BDT-BACKGROUND **Lab Sample ID: 720-60983-2**
Date Collected: 10/31/14 10:00 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**1.3**		1.0		mg/L			11/07/14 12:00	1

Client Sample ID: BDT-1052 **Lab Sample ID: 720-60983-3**
Date Collected: 10/31/14 10:52 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**170**		20		mg/L			11/07/14 18:51	20

Client Sample ID: BDT-1122 **Lab Sample ID: 720-60983-4**
Date Collected: 10/31/14 11:22 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**130**		20		mg/L			11/07/14 19:08	20

Client Sample ID: BDT-1220 **Lab Sample ID: 720-60983-5**
Date Collected: 10/31/14 12:20 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**100**		20		mg/L			11/07/14 19:25	20

Client Sample ID: BDT-1321 **Lab Sample ID: 720-60983-6**
Date Collected: 10/31/14 13:21 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**110**		20		mg/L			11/07/14 19:42	20

Client Sample ID: BDT-1421 **Lab Sample ID: 720-60983-7**
Date Collected: 10/31/14 14:21 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**95**		20		mg/L			11/07/14 19:59	20

Client Sample ID: BDT-1520 **Lab Sample ID: 720-60983-8**
Date Collected: 10/31/14 15:20 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**82**		10		mg/L			11/07/14 20:56	10

Client Sample ID: BDT-1622 **Lab Sample ID: 720-60983-9**
Date Collected: 10/31/14 16:22 **Matrix: Water**
Date Received: 11/03/14 16:45

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**67**		10		mg/L			11/07/14 21:13	10

Client Sample Results

General Chemistry

Client Sample ID: BDT-1724
Date Collected: 10/31/14 17:24
Date Received: 11/03/14 16:45

Lab Sample ID: 720-60983-10
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**54**		10		mg/L			11/07/14 21:30	10

Client Sample ID: BDT-1821
Date Collected: 10/31/14 18:21
Date Received: 11/03/14 16:45

Lab Sample ID: 720-60983-11
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**44**		10		mg/L			11/07/14 21:47	10

Client Sample ID: BDT-CAL
Date Collected: 10/31/14 19:50
Date Received: 11/03/14 16:45

Lab Sample ID: 720-60983-12
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**810**		100		mg/L			11/07/14 22:04	100

QC Sample Results

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 720-170470/4
Matrix: Water
Analysis Batch: 170470

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND		1.0		mg/L			11/07/14 10:18	1

Lab Sample ID: LCS 720-170470/5
Matrix: Water
Analysis Batch: 170470

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Bromide			10.0	9.90		mg/L		99	90 - 110		

Lab Sample ID: 720-61049-A-3 MS
Matrix: Water
Analysis Batch: 170470

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Bromide	ND		1000	988		mg/L		99	80 - 120		

Lab Sample ID: 720-61049-A-3 MSD
Matrix: Water
Analysis Batch: 170470

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromide	ND		1000	1000		mg/L		100	80 - 120	2	20

QC Association Summary

General Chemistry

Analysis Batch: 170470

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-60983-1	BDT-INJECTANT	Total/NA	Water	300.0	
720-60983-2	BDT-BACKGROUND	Total/NA	Water	300.0	
720-60983-3	BDT-1052	Total/NA	Water	300.0	
720-60983-4	BDT-1122	Total/NA	Water	300.0	
720-60983-5	BDT-1220	Total/NA	Water	300.0	
720-60983-6	BDT-1321	Total/NA	Water	300.0	
720-60983-7	BDT-1421	Total/NA	Water	300.0	
720-60983-8	BDT-1520	Total/NA	Water	300.0	
720-60983-9	BDT-1622	Total/NA	Water	300.0	
720-60983-10	BDT-1724	Total/NA	Water	300.0	
720-60983-11	BDT-1821	Total/NA	Water	300.0	
720-60983-12	BDT-CAL	Total/NA	Water	300.0	
720-61049-A-3 MS	Matrix Spike	Total/NA	Water	300.0	
720-61049-A-3 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
LCS 720-170470/5	Lab Control Sample	Total/NA	Water	300.0	
MB 720-170470/4	Method Blank	Total/NA	Water	300.0	

Lab Chronicle

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60983-1

Client Sample ID: BDT-INJECTANT

Lab Sample ID: 720-60983-1

Date Collected: 10/31/14 10:22
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		1000	170470	11/07/14 18:34	MJK	TAL PLS

Client Sample ID: BDT-BACKGROUND

Lab Sample ID: 720-60983-2

Date Collected: 10/31/14 10:00
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		1	170470	11/07/14 12:00	MJK	TAL PLS

Client Sample ID: BDT-1052

Lab Sample ID: 720-60983-3

Date Collected: 10/31/14 10:52
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		20	170470	11/07/14 18:51	MJK	TAL PLS

Client Sample ID: BDT-1122

Lab Sample ID: 720-60983-4

Date Collected: 10/31/14 11:22
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		20	170470	11/07/14 19:08	MJK	TAL PLS

Client Sample ID: BDT-1220

Lab Sample ID: 720-60983-5

Date Collected: 10/31/14 12:20
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		20	170470	11/07/14 19:25	MJK	TAL PLS

Client Sample ID: BDT-1321

Lab Sample ID: 720-60983-6

Date Collected: 10/31/14 13:21
Date Received: 11/03/14 16:45

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	**Type**	**Method**	**Run**	**Factor**	**Number**	**or Analyzed**	**Analyst**	**Lab**
Total/NA	Analysis	300.0		20	170470	11/07/14 19:42	MJK	TAL PLS

Lab Chronicle

Client: AMEC Environment & Infrastructure, Inc. TestAmerica Job ID: 720-60983-1
Project/Site: Crown Chevrolet

Client Sample ID: BDT-1421 Lab Sample ID: 720-60983-7

Date Collected: 10/31/14 14:21 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		20	170470	11/07/14 19:59	MJK	TAL PLS

Client Sample ID: BDT-1520 Lab Sample ID: 720-60983-8

Date Collected: 10/31/14 15:20 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	170470	11/07/14 20:56	MJK	TAL PLS

Client Sample ID: BDT-1622 Lab Sample ID: 720-60983-9

Date Collected: 10/31/14 16:22 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	170470	11/07/14 21:13	MJK	TAL PLS

Client Sample ID: BDT-1724 Lab Sample ID: 720-60983-10

Date Collected: 10/31/14 17:24 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	170470	11/07/14 21:30	MJK	TAL PLS

Client Sample ID: BDT-1821 Lab Sample ID: 720-60983-11

Date Collected: 10/31/14 18:21 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	170470	11/07/14 21:47	MJK	TAL PLS

Client Sample ID: BDT-CAL Lab Sample ID: 720-60983-12

Date Collected: 10/31/14 19:50 **Matrix: Water**
Date Received: 11/03/14 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		100	170470	11/07/14 22:04	MJK	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Laboratory: TestAmerica Pleasanton

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-16

Method Summary

Client: AMEC Environment & Infrastructure, Inc.
Project/Site: Crown Chevrolet

TestAmerica Job ID: 720-60983-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PLS

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-60983-1	BDT-INJECTANT	Water	10/31/14 10:22	11/03/14 16:45
720-60983-2	BDT-BACKGROUND	Water	10/31/14 10:00	11/03/14 16:45
720-60983-3	BDT-1052	Water	10/31/14 10:52	11/03/14 16:45
720-60983-4	BDT-1122	Water	10/31/14 11:22	11/03/14 16:45
720-60983-5	BDT-1220	Water	10/31/14 12:20	11/03/14 16:45
720-60983-6	BDT-1321	Water	10/31/14 13:21	11/03/14 16:45
720-60983-7	BDT-1421	Water	10/31/14 14:21	11/03/14 16:45
720-60983-8	BDT-1520	Water	10/31/14 15:20	11/03/14 16:45
720-60983-9	BDT-1622	Water	10/31/14 16:22	11/03/14 16:45
720-60983-10	BDT-1724	Water	10/31/14 17:24	11/03/14 16:45
720-60983-11	BDT-1821	Water	10/31/14 18:21	11/03/14 16:45
720-60983-12	BDT-CAL	Water	10/31/14 19:50	11/03/14 16:45

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CHAIN-OF-CUSTODY RECORD 720-60983 15096

PROJECT NAME: Crown Chevy
PROJECT NUMBER:
RESULTS TO: connie.lu@amec.com
TURNAROUND TIME: Standard
SAMPLE SHIPMENT METHOD:

LABORATORY NAME: TestAmerica
LABORATORY ADDRESS:
LABORATORY CONTACT: Afsaneh Salimpour
LABORATORY PHONE NUMBER:

CLIENT INFORMATION:

DATE: 10/31/14 PAGE 1 OF 1
REPORTING REQUIREMENTS:
157336
GEOTRACKER REQUIRED YES [✓ NO]
SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE):

DATE	TIME	SAMPLE NUMBER	ANALYSES: Bromide	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
10/31/14	1022	BDT-injectant	X	250 mL Poly	W	N	N	Y	N	1	
	1000	BDT-background	X								
	1052	BDT-1052	X								
	1122	BDT-1122	X								
	1220	BDT-1220	X								
	1321	BDT-1321	X								
	1421	BDT-1421	X								
	1520	BDT-1520	X								
	1622	BDT-1622	X								
	1724	BDT-1724	X								
	1821	BDT-1821	X								
	1950	BDT-cal	X								

cc

cc

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE:	11/3/14	1445	SIGNATURE: EMAL	11/3/14	1445
PRINTED NAME: Abe SCHLUSEL			PRINTED NAME: ~~DS~~ Emal		
COMPANY: AMEC			COMPANY: DCS		
SIGNATURE: Emal	11/3/14	1645	SIGNATURE:	11/3/14	1645
PRINTED NAME: EMAL			PRINTED NAME: J Gonzales		
COMPANY: DCS			COMPANY: TAD		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		

TOTAL NUMBER OF CONTAINERS: 12

SAMPLING COMMENTS:

720-60983 Chain of Custody

2.7°c

amec

Login Sample Receipt Checklist

Client: AMEC Environment & Infrastructure, Inc.

Job Number: 720-60983-1

Login Number: 60983

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Gonzales, Justinn

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX C

ZVI Column Test Report

Prepared for:

AMEC
180 Grand Avenue, Suite 1100
Oakland, CA 94612

Final

Treatability Study Report

Column Study to Evaluate Remediation of Chlorinated Solvents in Groundwater Using Zero Valent Iron

Crown Chevrolet Site
Dublin, California

Prepared by:

SiREM

130 Research Lane, Suite 2
Guelph, Ontario N1G 5G3

SiREM Ref: TL0354.02

7January 2015

siremlab.com

TABLE OF CONTENTS

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LIST OF ABBREVIATIONS

cDCE	cis-1,2-dichloroethene
cVOC	chlorinated volatile organic compound
°C	degrees Celsius
°C/min	degrees Celsius per minute
cm	centimeters
°F	degrees Fahrenheit
ft	feet
ft/day	feet per day
DHG	dissolved hydrocarbon gases
DOC	dissolved organic carbon
GC	gas chromatograph
g	grams
$t_{½}$	half life
hrs	hours
IC	ion chromatograph
ICP-AES	inductively coupled plasma – atomic emission spectroscopy
MCLs	maximum contaminant levels
µg/L	micrograms per liter
µL	microliters
mg/L	milligrams per liter
mL	milliliters
mL/min	milliliters per minute
min	minute
mm	millimeters
mM	millimolar
mV	millivolts
ORP	oxidation reduction potential
%	per cent
PRB	permeable reactive barrier
RPM	revolutions per minute
QL	quantitation limit
r^2	coefficient of determination
SiO_3^{2-}	silica
SiREM	SiREM Laboratories
PCE	tetrachloroethene
TDS	total dissolved solids
TCE	trichloroethene
VC	vinyl chloride
ZVI	zero valent iron

1 Introduction

SiREM Laboratory (SiREM) was retained by AMEC to perform a bench scale treatability column study to assess the use of the zero valent iron (ZVI) permeable reactive barrier (PRB) technology for the remediation of chlorinated volatile organic compounds (cVOCs) in groundwater from the Crown Chevrolet Site located in Dublin, California (the site).

The remainder of this report contains:

- the study objectives and scope of work (Section 2);
- experimental methods (Section 3);
- cVOC results and discussion including calculation of cVOC degradation half-lives (Section 4);
- estimation of residence time required for ZVI PRB design (Section 5);
- discussion of inorganic chemistry changes during the column study (Section 6);
- the study conclusions (Section 7); and
- Report references are provided in Section 8.

2 Objectives and Scope of Work

This section provides the study objectives and the scope of work completed to satisfy the project objectives.

2.1 Objectives

The primary objectives of the laboratory ZVI column study were to:

- Determine degradation rates for the main compounds of potential concern (i.e., tetrachloroethene [PCE], trichloroethene [TCE], cis-1,2-dichloroethene [cDCE] and vinyl chloride [VC]) in site groundwater with two types of commercial granular ZVI under flowing water conditions;

- Characterize chlorinated breakdown products of cVOCs detected in the site groundwater and to quantify the rates of degradation; and

- Evaluate changes in inorganic geochemistry caused by ZVI corrosion chemistry, including possible mineral precipitation.

2.2 Scope of Work

Two ZVI columns were set up and performed using 100 per cent (%) granular ZVI and site groundwater containing cVOCs. On 27 August 2014 the granular ZVIs were packed into the columns with care. An additional column was packed with silica sand to serve as a study control. The column and ZVI materials specifications are provided in Table 1. A schematic of the column is provided in Figure 1.

The groundwater for this study was collected by AMEC personnel from the site and was received by SiREM on 28 August 2014. On 3 September 2014 (Day 0) the site groundwater was transferred into the influent reservoir with care taken to minimize volatile losses to the extent practicable. The initial PCE concentration in the influent reservoir was below the target concentrations of 2.0 milligrams per liter (mg/L). Therefore, on 3 September 2014 the influent reservoir water was amended with 24 microliters (µL) of PCE to achieve the target concentration. Additional reservoir bags were filled and spiked with PCE on 7 October 2014 and 12 November 14, respectively. During the final reservoir bag fill and PCE spike an inadvertent inclusion of TCE (~ 2.0 mg/L) occurred which accounts for the increase in TCE concentrations at the endpoint sampling.

On 12 September 2014 the pump was started to feed the water from the influent reservoir vertically upward through the column for a period of seven weeks. A flow velocity of approximately 1.6 feet/day was selected in consultation with AMEC to allow the study to be completed in a reasonable time.

Water samples were collected from seven sampling ports located along the column length as well as from the column influent and effluent for analysis of pH, oxidation-reduction potential (ORP), cVOCs, dissolved hydrocarbon gases (DHGs), cations, anions, alkalinity, and dissolved and total organic carbon (DOC/TOC) according to the schedule presented in Table 2.

The cVOC concentration trends from the column study were used to calculate the degradation rates for each compound detected using a multicomponent first-order kinetic model. The degradation rates obtained, expressed as half-lives, were then corrected for groundwater temperature and used to calculate the residence time required in the field to achieve the regulatory criteria for all compounds. Finally, the column water chemistry data were used to assess the potential effects of water chemistry on the long-term reactivity of ZVI under site conditions.

3 Study Methods and Materials

This section describes the methods and materials used to construct and operate the columns, and to collect water samples for analysis during the ZVI column treatability study.

3.1 Column Construction

The column study consisted of a control column packed with silica sand, one column containing 100% granular ZVI (CC-1004) provided by Connelly-GPM Inc. (Chicago, IL) and one column containing 100% granular ZVI provided by Peerless Metal Powders (Detroit, MI). These commercial ZVI sources have been used for numerous ZVI PRB applications (Gillham et al., 2010). Based on the manufacturer's specifications, the granular ZVI used in the column study has a particle size range from 0.25 to 2.0 millimeters (8 to 50 US Mesh). Silica sand used in the control column had a particle size of 0.21 mm (70 US Mesh).

The columns are constructed of Plexiglas™ with a length of 1.64 feet (ft) (50 centimeters [cm]) and an internal diameter of 0.12 ft (1.5 inches, 3.8 cm) (Figure 1). Seven sampling ports were positioned vertically along the central axis of the columns at distances of 0.08, 0.16, 0.33, 0.50, 0.66, 1.0 and 1.3 ft from the influent end. The column influent and effluent ports were also sampled. All sampling ports within the columns (excluding influent and effluent) were constructed using a nylon Swagelok compression fitting tapped into the column. A 16 gauge needle was positioned through the fitting and secured by tightening the ferrule. Glass wool was threaded through the needle to ensure minimal particulates from entering the samples. Each sample port was then fitted with a Luer-Lock™ fitting so that a glass syringe could be attached to the port for collection of water samples.

To ensure a homogeneous column material bed, the ZVI materials and sand were packed vertically in the column in 100 gram (g) increments. Values of bulk density, porosity, and pore volume were determined by weight and are provided in Table 1. The column study was performed at room temperature (22±1 degrees Celsius [ºC]).

A Masterflex® peristaltic pump was used to feed site water vertically upwards through the column. The pump tubing consisted of Viton® 2-stop tubing. All other tubing was 1/16 inch inside diameter Teflon® tubing.

3.2 Site Groundwater Storage and Usage

Seventeen 1-gallon bottles containing groundwater collected from the Site were received by SiREM personnel on 28 August 2014 and stored in cold storage (4°C) until study commencement. A Chain of Custody Record for the water received from the site is provided in Appendix A. Site water was siphoned into the influent reservoir (i.e., a Teflon® bag) with minimal headspace. The influent reservoir contained two Swagelok fittings with Teflon® septa.

3.3 Sampling Procedure

After removing the stagnant water from the sampling needles, 4.0 mL samples were collected from the sampling ports using glass on glass syringes. A 250 µL to 1 mL water sample (depending on the sample location and dilution required) was removed from the glass syringe and transferred immediately into an autosampler vial for gas chromatograph (GC) analysis of cVOCs/DHGs. The remaining sample volume was transferred into a 5 mL plastic vial for ORP and pH measurement. When anion sample collection was required a 0.5 mL sample was transferred to 1.5 mL eppendorf tubes, which were stored frozen until time of analysis.

Water samples for cation, alkalinity, DOC/TOC analyses were collected from the column influent and effluent only. For cations, a 50 mL unfiltered sample was collected into a 110 mL bottle and acidified to a pH of 2 with nitric acid. For alkalinity and TDS 100 mL unfiltered samples were collected into 110 mL bottles and left unpreserved. For metals a 75 mL unfiltered sample was collected into a 110 mL bottle and acidified to pH 2 with nitric acid. Confirmatory samples for cVOC analysis were also collected from the influent and effluent into 2.8 mL vials and 40 mL VOA vials preserved with hydrochloric acid.

Water samples for cation, anion, alkalinity and DOC/TOC, and confirmatory cVOC analyses were placed in coolers with ice packs and shipped under chain of custody to ALS Environmental in Waterloo, Ontario, Canada for analysis.

3.4 Analytical Methods

This section describes the methods of analysis for pH, ORP, cVOCs, DHGs, cations, anions, alkalinity and DOC/TOC.

3.4.1 Analysis of ORP and pH

The ORP measurements were performed at SiREM using a Corning 313 meter with double junction ORP electrode (Ag/AgCl reference). A 3.0 mL sample was collected (as described in section 2.3) and the ORP probe was inserted into the sample vial on the lab bench. A single point calibration of the meter was performed at each sampling event with Zobell ORP calibration solution.

The pH measurements were performed using an Oakton pH spear with a combination pH electrode (Oakton, Vernon Hills, IL). Immediately after ORP measurement the pH probe was inserted into the same sample vial on the lab bench for pH measurement. The pH spear was calibrated at each sampling event according to the manufacturer’s instructions using pH 4.0, 7.0 and 10 standards.

3.4.2 Analysis of cVOCs and Dissolved Hydrocarbon Gases

Water sample cVOC and DHG (i.e., ethene, ethane and methane) analyses were performed at SiREM using a Hewlett-Packard (Hewlett Packard 7890) GC equipped with an auto sampler (Hewlett Packard G1888) programmed to heat each sample vial to 75°C for 45 min prior to headspace injection into a GSQ Plot column (0.53 millimeters x 30 meters, J&W) and a flame ionization detector. Sample vials were heated to ensure that all cVOCs in the aqueous sample would partition into the headspace. The injector temperature was 200°C, and the detector temperature was 250°C. The oven temperature was programmed as follows: 35°C for 2 min, increased to 100°C at 50 degrees Celsius per minute (°C/min), then increased to 185°C at 25°C/min and held at 185°C for 6.80 min. The carrier gas was helium at a flow rate of 11 milliliters per minute (mL/min).

After withdrawing a 250 µL to 1 mL sample, the sample was injected into a 10 mL auto sampler vial containing between 5.75 and 5.0 mL of acidified deionized water (pH ~2). The water was acidified to inhibit microbial activity between microcosm sampling and GC analysis. The vial was sealed with an inert Teflon®-lined septum and aluminum crimp cap for automated injection of 3 mL of headspace onto the GC. One cVOC standard was analyzed with each set of samples to verify the instrument five-point calibration curve using methanolic stock solutions containing known concentrations of the target analytes. Calibration was performed using external standards purchased as standard solutions (Sigma, St Louis, Missouri), where known volumes of standard solutions were added to acidified water in auto sampler vials and analyzed as described above for column samples. The calibration concentrations range from 10 to 10,000 µg/L. Data were integrated using Chemstation Software (Agilent Technologies, Santa Clara, California).

The quantitation limits (QL) for the cVOCs and DHGs were typically 10 µg/L to 20 µg/L based on the lowest concentration standards that were included in the linear calibration trend and the dilution factor applied for a particular sample.

As outlined in the sampling plan, samples from the influent and effluent and one column sampling port for each ZVI column were collected twice at the end of the test and sent to ALS Environmental (Waterloo, ON, Canada) for cVOC analyses using EPA Method 8260B

3.4.3 Analysis of Major Anions

Anion (chloride, nitrate-nitrogen [nitrate], nitrite-nitrogen [nitrite], phosphate and sulfate) analyses were performed at SiREM on a Dionex DX-600 ion chromatograph (IC) equipped with a Dionex AS-40 auto sampler and an AS18 column, the sample loop volume was 25 µL. An isocratic separation was performed using 33 millimolar (mM) reagent grade sodium hydroxide (Fisher Scientific, Ottawa, ON) eluent for 13 min. One standard was analysed with each set of samples tested in order to verify the seven-point calibration using external standards of known concentrations. External standards were prepared gravimetrically using chemicals of the highest purity available (Sigma St Louis, MO or Bioshop, Burlington, ON). Data were integrated using Peaknet Chromatography software (Dionex, Oakville, ON). The calibration concentrations ranged from 100 to 10,000 µg/L.

A 0.5 mL sample was withdrawn, after which the sample was placed in a 1.5 mL micro-centrifuge tube. Samples were centrifuged for five minutes at 13,000 revolutions per minute (RPM) to remove solids. The supernatant was removed, diluted 50-fold in deionized water and placed in a Dionex auto sampler vial with a cap that filters the sample during automated injection onto the IC.

3.4.4 Analysis of Cations, Anions, Alkalinity, TOC and DOC

Water sample cation, anions, alkalinity, DOC/TOC analyses were performed by ALS Environmental of Waterloo, Ontario, Canada. Cations were analyzed using inductively coupled plasma atomic emission spectroscopy (ICP-AES) (US EPA Method 6020A). Carbonate alkalinity (expressed as milligrams $CaCO_3$ per liter) in water was determined using method US EPA Method SM 2320B. Major anions were determined using ion chromatography by US Method EPA Method 300.0 (IC). DOC and TOC were detected in accordance with Method APHA 5310 B-INSTRUMENTAL.

4 cVOC Results, Reaction Pathways and Degradation Parameters

This section discusses the observed water cVOC concentration trends. The column data are then quantified in terms of anticipated cVOC degradation pathways and kinetic rates.

4.1 cVOC Results

Approximately 64 pore volumes (PVs) of groundwater passed through the Connelly and Peerless ZVI columns during the test and approximately 60 PVs passed through the sand controls column. One pore volume corresponded to a residence time of approximately 27 hrs and 26 hrs the Connelly and Peerless ZVI columns, respectively. The water sample cVOC compounds detected (PCE, TCE, cDCE and VC) as well as dechlorination products (ethene and ethane) and methane data from both columns are provided in Tables 3, 4 and 5. Concentration trends for cVOCs and DHGs from the last sampling events in the Connelly and Peerless ZVI columns are presented in Figures 2 and 3. As noted in the method section, the influent reservoir water was refilled two times with site water spiked with PCE. In the last influent reservoir refill performed prior the final cVOC profiles were collected, both PCE and TCE were spiked inadvertently to approximately 2 mg/L.

The influent PCE concentrations decreased slightly along the sand control column throughout the test, likely due to adsorption (Table 2). Decreases in concentrations of minor cVOC were also observed in the sand control column. No change in DHG were detected, indicating that adsorption or volatile losses were likely responsible for the partial cVOC losses in the control column.

At the end of the test, an influent PCE concentration of approximately 2.67 mg/L was degraded to a non-detectable value at a residence time of 10.8 hrs in the Connelly column. PCE concentrations decreased more gradually in the Peerless column to a minimum concentration of 0.037 mg/L measured in the effluent of the Peerless column at a residence time of 25.5 hrs. The TCE concentration decreased from an influent value of 2.23 mg/L to a non-detectable value at a residence time of approximately 10 hrs in both columns. Low concentration of DCE-isomers and VC were degraded within the initial part of both columns, along with PCE and TCE.

As a result of the complete dechlorination of PCE and TCE, up to 0.289 mg/L of ethene and up to 0.238 mg/L of ethane were created in the Connelly column in the last sampling event. The maximum amount of ethene and ethane generated in the Peerless column were 0.127 and 0.091 mg/L, respectively. Using the cumulative molar concentrations of ethene and ethane as products of dechlorination and the molar amounts of degraded cVOCs, the calculated carbon mass balance ranged from 37% to 60% in the Connelly ZIV and 17% to 48% in the Peerless column. These relatively incomplete mass balances are thought to be due to losses in DHG concentrations during column sampling. As indicated in Section 6.1, concentrations of chloride increased by approximately 3 mg/L in both ZVI columns, corresponding to the amount of chloride generated by complete dechlorination of the influent cVOCs. This confirms the influent cVOC were degraded, rather than adsorbed or lost to volatilization in the ZVI columns.

4.2 Quality Control cVOC Analyses

Confirmatory cVOC samples analyzed by US EPA Method 8260B were collected two times before the conclusion of the test. Table 6 presents the cVOC analytical data from SiREM and ALS Environmental. In general, the PCE, TCE, cDCE and VC concentrations measured by SiREM in the influent samples were 13% to 40% higher than those measured by ALS. It is common to observe higher concentrations of this magnitude for samples measured at SiREM compared to external laboratories due to volatiles losses during sample shipping and handling.

4.3 cVOC Reaction Pathways and Kinetic Expressions

Two dominant pathways of degradation of chlorinated hydrocarbon compounds by ZVI include hydrogenolysis and reductive β-elimination (Gillham et al., 2010). In the hydrogenolysis reaction, a chlorine atom is replaced by a hydrogen atom, accompanied by the addition of two electrons (from the iron). Reductive β-elimination involves release of two chlorine atoms and the formation of an additional carbon-carbon bond. Both pathways are thought to occur simultaneously (Arnold and Roberts, 2000). Figure 4 illustrates those pathways for the chlorinated ethene sequence starting from PCE, through TCE, DCE-isomers, VC and finally ethene and ethane. Both of the chlorinated acetylenes are highly unstable and degrade rapidly, primarily through reductive dechlorination to acetylene (Arnold and Roberts, 2000). Another ZVI-mediated transformation mechanism, hydrogenation, involves the addition of two hydrogen atoms across two carbon atoms with the removal of a C-C bond (e.g., reduction of acetylene to ethane, and ethene to ethane as shown in Figure 4).

Based on previous research, the VOC degradation in contact with ZVI appears to be first-order with respect to the concentration of the contaminant (pseudo first-order) (Gillham et al., 2010):

$$\frac{\partial C}{\partial t} = -kt \qquad (1)$$

After integration, the equation can be presented in the form of the exponential decay equation:

$$C = C_0 e^{-kt} \qquad (2)$$

Where: C is the concentration in solution at a particular time (t),
C_o is the initial concentration, and
k is the first-order rate constant.

The rate constant (k) is a measure of the reaction rate and can be calculated directly from Equation 2. The time at which the initial concentration declines by one-half, ($C/C_o = 0.5$), is the half-life ($t_{1/2}$).

$$t_{1/2} = \frac{\ln(2)}{k} \qquad (3)$$

4.4 Determination of Degradation Parameters from Column Data

Due to the complexity of the ZVI-induced dechlorination mechanisms (Figure 4), the laboratory data were interpreted using a multi-component kinetic model to quantify degradation rates of compounds that are present in the water initially, as well as potential degradation products. In the model, potential breakdown products are concurrently produced and degraded as described by first-order kinetic equations. Each pathway is characterized by a rate constant (k) and the mole fraction of the compound that follows that particular path (f). Since chlorinated acetylenes are unstable, short-lived, intermediates are rapidly reduced to ethene (Arnold and Roberts, 2000). These compounds are not typically detected in the solution phase and are therefore not explicitly contained in the degradation model. Therefore, first-order rate equations for each cVOC included in the model are as follows:

$$\frac{\partial PCE}{\partial t} = -k_{PCE} PCE \tag{4}$$

$$\frac{\partial TCE}{\partial t} = f_{PCE1} k_{PCE} PCE - k_{TCE} TCE \tag{5}$$

$$\frac{\partial cDCE}{\partial t} = f_{PCE2} k_{PCE} PCE + f_{TCE1} k_{TCE} TCE - k_{cDCE} cDCE \tag{6}$$

$$\frac{\partial VC}{\partial t} = f_{PCE3} k_{PCE} PCE + f_{TCE2} k_{TCE} TCE + f_{cDCE} k_{cDCE} cDCE - k_{VC} VC \tag{7}$$

These equations were adapted for the computer program Scientist® Version 3.0 (Micromath Research, 2008). The program can be used to fit the first-order equations to experimental data using the least squares best-fit method. The degradation rate and molar conversion are determined for each compound sequentially starting with the most chlorinated cVOC.

The results from the model fitting of column data include half-lives for all cVOCs selected and statistical fit data including coefficient of determination (r^2) values. The half-lives determined from the cVOC profiles from the last two sampling events are shown in Table 7, along with the corresponding r^2 values.

The degradation model provided relatively good fits to the cVOC concentration profiles with r^2 values of more than 0.96 for the PCE data (Table 7). The fits for other minor cVOCs were less good statistically due to relatively low starting concentrations with respect to the cVOC method detection limits. Based on the last cVOC profiles, the calculated half-lives for the Connelly ZVI column were 2.7 hrs for PCE, 1.9 hrs for TCE and 7.9 hrs for cDCE. The half-life values for the Peerless ZVI column were 3.9 hrs for PCE, 1.5 hrs for TCE and 0.9 hrs for cDCE. VC was detected sporadically in the columns and those detections were followed by a non-detectable value in the next downgradient sampling port. Based on a decrease in the influent VC concentration from 0.19 mg/L to a non-detectable value in the first sampling port (i.e., a residence time of 2.5 to 2.6 hr) in the third sampling event in both columns (Tables 3 and 4), the VC half-lives were calculated to be approximately 0.6 hr or less in both columns. The cVOC degradation half-lives values achieved at the end of this study were within the range of values observed for commercial ZVI studies at room temperature for these compounds (Gillham et al., 2010 and unpublished data). In previous comparative tests performed by SiREM, Connelly ZVI had higher degradation rates for chlorinated ethenes, compared to Peerless ZVI. However, in the case of PCE, the half-lives obtained for both materials were higher than those typically obtained in previous tests. The lower degradation rates were likely related to the composition of the Site groundwater. In particular, the relatively high concentrations of carbonate alkalinity and calcium may have influenced the ZVI degradation chemistry, as described in Section 6.

5 Field Scale PRB Design Considerations

The laboratory half-lives were obtained at a temperature of 22°C (72 degrees Fahrenheit [°F]). Field groundwater temperature was not provided at the time of this report. For the purpose of this evaluation, we have assumed the minimum field groundwater temperature is approximately 16°C (61°F). Based on the previous research, cVOC degradation half-lives increase by 100% per every 6°C to 8°C temperature decrease within a temperature range of 5 to 25°C (O'Hannesin et al., 2004). Therefore, the laboratory half-life values were increased by a factor of 2 to obtain the anticipated field values (Table 8).

The residence time calculations for the field ZVI PRB were performed assuming the cVOC concentration values in the water used for the bench scale study and using the temperature corrected laboratory half-lives obtained at the end of the study (Table 8). The Scientist® program described in Section 4.4 was used to simulate the change in cVOC concentrations over time using the first-order kinetic equations. In simulation mode, the model calculates the cVOC concentrations over time, from which the time required for the cVOCs to degrade to their regulatory criteria can be determined.

Based on the simulations performed, the residence time required to achieve California drinking water maximum contaminant levels (MCLs) in a PRB at the site are 49 hrs for Connelly GPM ZVI and 70 hrs for Peerless ZVI hours (Table 8). The required ZVI thickness can be obtained by multiplying the residence time required by the groundwater flow rate anticipated in the location of the proposed PRB. Inclusion of a design safety factor for the ZVI PRB thickness is recommended to account for ZVI reactivity losses expected in a long-term operation, as described in Section 6.

6 Inorganic Chemistry Results and Discussion

Previous research has shown that the inorganic composition of the treated groundwater can have a profound influence on the reactivity of commercial granular ZVI materials. Most of these effects are related to long-term performance. Therefore, evaluation of changes in inorganic chemistry along the flow path through the ZVI column is a crucial component of design considerations for a ZVI PRB.

6.1 Column Data

Values of pH and ORP were measured for each cVOC sample collected during the test (Table 9). Major anion samples were collected at baseline and in three sampling events during the test period (Table 10). Major cations, alkalinity, TOC and DOC were measured at baseline and at the end of the test (Table 11). Laboratory reports of analysis for the cations, alkalinity, DOC and TOC are compiled in Appendix B.

When iron is exposed to water, several reactions occur as a result of iron corrosion:

$$Fe^{\circ} \rightarrow Fe^{2+} + 2e^{-} \qquad (8)$$

This iron corrosion drives the geochemical changes that occur as groundwater flows through the PRB. When groundwater first contacts the granular iron, any dissolved oxygen present is consumed via iron corrosion:

$$4Fe^{\circ} + 3O_{2(aq)} + 12H^{+} \rightarrow 4Fe^{3+} + 6H_2O \qquad (9)$$

After the initial, rapid depletion of any dissolved oxygen and other oxidizers (e.g., nitrate which was not present in the site water), the water corrosion of iron dominates to produce hydrogen and hydroxide resulting in an increase in pH and decline in Eh:

$$Fe^{\circ} + 2H_2O \rightarrow Fe^{2+} + H_{2(aq)} + 2OH^{-} \qquad (10)$$

The ORP and pH profiles within the columns are presented in Table 9, and Figures 5 and 6. In the last sampling event, the ORP decreased within the columns from approximately +100 milliVolts (mV) in the influent to -422 and -709 mV in the Connelly and Peerless columns, respectively. The pH values increased from an influent value of 7.2 to up to approximately 9.4 in both columns. The changes in ORP and pH observed along the ZVI columns were the expected results of ZVI corrosion, described in reactions shown in Eq. 8 and 10.

Dechlorination of cVOCs is a redox reaction, whereby ZVI acts as an electron donor and cVOC compounds are electron acceptors. For example, dechlorination of PCE can be represented by the following reaction:

$$4Fe^{0} + C_2Cl_4 + 4H^{+} \rightarrow C_2H_4 + 4Fe^{2+} + 4Cl^{-} \qquad (11)$$

Therefore, degradation of cVOCs consumes ZVI and generates dissolved iron. As shown in Table 11, dissolved iron was not detected in the effluents of both ZVI columns, which indicates that the created oxidized iron contributed to the creation of secondary precipitates on ZVI grains, as described below. Some iron minerals created by oxidized iron may be passivating (hematite/goethite or siderite), while other mineral phases such as magnetite or green rust allow electron transfer from the core of ZVI grains to aqueous phase and do not impede ZVI corrosion substantially (Gillham et al., 2010). Green rust is an iron corrosion product containing mixed Fe(II)/Fe(III) hydroxide layers which alternate with negatively charged interlayers containing carbonate, chloride or sulfate anions (Guilbaud et al., 2013). Identification of oxidation product was not included in the scope of this study. However, given the observed losses in carbonate alkalinity and sulfate and the relatively unchanged ZVI degradation rates within the test period, the latter types of iron mineral phases were likely formed which maintained transfer of electrons from the core of ZVI grains to the surface.

The influent calcium concentration of 145 mg/L decreased to 6.0 mg/L and 4.5 mg/L in the effluents of the Connelly and Peerless columns, respectively (Table 11). Losses in magnesium were also observed, from 35 mg/L in the influent to 10 and 23 mg/L in the effluents of the Connelly and Peerless columns, respectively. Carbonate alkalinity was detected in the influent water at a concentration of 459 mg/L, which is relatively high compared to other site waters tested previously by SiREM for ZVI PRB applications. The alkalinity in the ZVI column effluents could not be measured due to analytical interferences. Based on previous results from ZVI columns, most of carbonate alkalinity was lost due to precipitation of calcium, magnesium and iron carbonate minerals:

$$\text{Aragonite/Calcite: } Ca^{2+} + CO_3^{2-} \rightarrow CaCO_{3(s)} \qquad (12)$$

$$\text{Siderite: } Fe^{2+} + CO_3^{2-} \rightarrow FeCO_{3(s)} \qquad (13)$$

Sodium behaves as a conservative tracer in ZVI systems and, as expected, its concentration remained essentially unchanged within the columns (Table 11). A small increase in chloride concentrations from 91 mg/L in the influent to 94 mg/L in the effluent of both columns were likely due to the generation of chloride from the dechlorination of influent cVOCs. Increases in chloride concentrations within both columns were also observed in the column profile sampling (Table 10).

As illustrated in Table 11, the influent nitrate concentration in the influent of 2.3 mg/L (as N) decreased to non-detectable concentrations in both columns. Nitrate reduction in ZVI results in the production of ammonia/ammonium:

$$NO_3^- + 9\,H^+ + 4Fe^0 \rightarrow NH_3 + 3H_2O + 4Fe^{2+} \qquad (14)$$

It is believed that the nitrate reduction results in the formation of iron oxyhydroxides precipitates on the surface of the granular iron, which in turn passivate the iron surface, reducing the surface area available for nitrate and cVOC reduction. However, given the relatively low nitrate concentration in the site water, this process will not likely influence the long-term performance of the ZVI in Site groundwater.

The concentration of sulfate of 60 mg/L in the influent decreased to a non-detectable value in the Connelly ZVI and 35 mg/L in the Peerless ZVI (Table 11). At the low redox potential (Eh) created by ZVI corrosion, sulfate may be reduced to sulfide (H_2S or HS^-):

$$SO_4^{2-} + 9H^+ + 8e^- \rightarrow HS^- + 4H_2O \quad (15)$$

In the presence of dissolved iron produced by ZVI corrosion, the hydrogen sulfide produced precipitates out of solution.

$$Fe^{2+} + HS^- \rightarrow FeS_{(s)} + H^+ \quad (16)$$

Typically, sulfate concentrations do not change in ZVI column testing. Microbially mediated sulfate reduction has been observed in long-term ZVI columns and in mature ZVI PRBs (Battelle, 2002; Wilkin et al., 2003). Given the relatively high pH values measured in both columns which would likely be inhibitory to microbial activity, along with the relatively low dissolved carbon concentrations and lack of indications of anaerobic microbial activity (i.e. methane gas generation), it is believed that the losses of sulfate observed in the test were due to abiotoic processes, likely the formation of sulfate green rust, as discussed above.

Silicon was present in the influent at a concentration of 10 mg/L that decreased to below detection limit (1 mg/L) in both ZVI column effluents in response to geochemical conditions created by ZVI corrosion. Silica (SiO_3^{2-}) is thought to precipitate or adsorb on ZVI surfaces leading to the formation of a silica film or gel on the ZVI surface that may hinder contaminant access to active sites (Klausen et al., 2003).

The influent concentration of DOC and TOC were 2.0 mg/L and 3.5 mg/L, respectively, and both compounds were not detected in the column effluents, including the control, likely due to adsorption onto the materials (Table 11). Previous research suggests that accumulation of certain types of organic matter, such as humic acids, on the surface of ZVI particles can inhibit electron transfer between the underlying metal and the contaminant, resulting in surface passivation and decreasing rates of contaminant reduction (Tratnyek et al., 2001). Another process postulated to inhibit the rates of cVOC degradation is hydrophobic partitioning, whereby hydrophobic contaminants (e.g. chlorinated hydrocarbons) are preferentially partitioned to micelle or membrane-like hydrophobic interiors formed by surfactant aggregates.

6.2 Possible Mineral Precipitates and Their Effect

Iron corrosion reactions (Equations 8-10) promote the reductive dechlorination reactions, but at the same time are sources of ferrous iron and alkalinity. The relatively low dissolved iron that was detected in the column effluent suggests that the iron (oxy) hydroxides and green rust were likely formed in the column, along with carbonates. However, because these hydroxides ultimately transform to magnetite, which is electron-conducting, they do not substantially reduce the reactivity of the iron and the rate of formation is not expected to cause a significant decline in permeability (Gillham et al., 2010).

The observed levels of carbonate alkalinity in Site groundwater, iron and calcium carbonate precipitation, and possibly silica and organic carbon solid phases on ZVI grains are expected to be the main process influencing the ZVI longevity in PRB at the Site. While there is little doubt that inorganic precipitates (mostly iron oxyhydroxides and carbonates) will form over time in a ZVI PRB at the site, their impact will be proportional to the groundwater velocity. The use of a design safety factor is recommended to account for those ZVI aging process in a long term. Typical design safety factors applied at other ZVI PRB sites ranged from 2 to 3, depending on site conditions.

7 Summary and Conclusions

Bench-scale column treatability testing using site water indicated that:

i) Connelly and Peerless ZVIs degraded the cVOCs present in the site water. The degradation half-lives generated in the study for the main cVOC, PCE were within the range of values observed for these ZVI sources, but higher than typical values obtained for other groundwaters with comparable cVOC composition. Connelly ZVI was more reactive towards PCE than Peerless ZVI, which is in agreement with previous comparative column test results.

ii) Based on the anticipated half-lives at site field groundwater temperature (61ºF/16ºC) obtained at the end of the study and the cVOC concentrations tested, residence times of 49 hrs and 70 hours would be required in a ZVI PRB to achieve the California MCLs using Connelly and Peerless ZVI, respectively.

iii) Geochemical gradients created by ZVI corrosion resulted in losses in dissolved concentrations of calcium, alkalinity, sulfate, silica and DOC/TOC. This indicates precipitation of various minerals or adsorbed phases likely occurred on ZVI grains, including iron (oxy)hydroxides, green rust, calcium and iron carbonates, silica mineral phases and organic carbon films. Mineral phases such as iron (oxy)hydroxides and green rust are electron-conducting, and therefore do not substantially reduce the reactivity.

iv) Formation of other types of mineral precipitation such as carbonates, along with silica and organic carbon films (i.e., phases that block the transfer of electrons to the surface of ZVI grains, is expected to affect the long-term performance of the ZVI PRB at this site. Therefore, it is recommended that an engineering safety factor be included in ZVI thickness design calculations for the proposed PRB to assure long-term efficiency.

8 References

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TABLES

TABLE 1
COLUMN AND MATERIALS SPECIFICATIONS
Crown Chevrolet, Dublin, CA

Column Material Type	Connelly GPM	Peerless Metal Powders	Silica Sand
Particles Size Range	US Mesh 8 to 50 (0.25 - 2.0 millimeters)		NA
Content	100 percent		
Dry Weight	1,800 g	1,741 g	819 g
Column Length	1.64 feet (50 centimeters)		
Column Inside Diameter	0.12 feet (3.8 centimeters)		
Measured Pore Volume	251 mL	266 mL	276 mL
Volume of Column	567 cubic centimeters		
Porosity	0.44	0.47	0.49
Bulk Density	3.17 g/cm3	3.12 g/cm^3	1.44 g/cm^3
ZVI:Solution Ratio	7.15 g/mL	6.55 g/mL	NA
Average Residence Time	27.1 hrs	25.5 hrs	28.5 hrs

Notes:

g/cm^3 - grams per cubic centimeter

g/mL - grams per milliliter

ZVI - zero valent iron

TABLE 2
ZVI COLUMN SAMPLING SCHEDULE
Crown Chevrolet, Dublin, CAt

Parmeters Samples		**cVOCs, DHCs , pH and ORP**			**Major Anions**			**Anions, Cations, Alkalinity and DOC/TOC**		
Sample Location		**Connelly ZVI column**	**Peerless ZVI column**	**Sand Control column**	**Connelly ZVI column**	**Peerless ZVI column**	**Sand Control column**	**Connelly ZVI column**	**Peerless ZVI column**	**Sand Control column**
No. of Sampling Events		**5**			**3**			**2**		
Column Influent		●	●	●	●	●	●	●	●	●
Sampling Ports	**A**	●	●		●	●				
	B	●	●		●	●				
	C	●	●		●	●				
	D	●	●		●	●				
	E	●	●		●	●				
	F	●	●		●	●				
	G	●	●		●	●				
Column Effluent		●	●	●	●	●	●	●	●	●

Notes:

[a] Major anions, cations, alkalinity, and TDS

cVOCs - chlorinated volatile organic compounds

DHGs - dissolved hydrocarbon gases

ORP - oxidation-reduction potential

DOC/TOC - dissolved organic carbon / total organic carbon

ZVI - zero valent iron

● indicates sample collected

TABLE 3
SAND CONTROL COLUMN - WATER SAMPLE cVOC AND DHG RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		**Influent**	**Effluent**
Column Distance (feet)		**0.00**	**1.64**
Residence Time (hours)		**0.00**	**28.5**
Compound	PV	Concentration (mg/L)	
PCE	0.0	1.46	--
	6.0	1.62	1.37
	17.1	2.57	2.27
	28.8	1.82	1.60
	48.1	2.13	2.24
	59.8	2.67	2.28
TCE	0.0	0.026	--
	6.0	0.058	0.024
	17.1	0.046	<0.010
	28.8	0.051	0.031
	48.1	0.213	0.028
	59.8	2.23	1.79
cis-1,2-DCE	0.0	0.067	--
	6.0	<0.010	<0.010
	17.1	0.027	<0.010
	28.8	0.032	<0.010
	48.1	0.004	0.013
	59.8	0.016	<0.01
VC	0.0	0.000	--
	6.0	<0.010	<0.010
	17.1	<0.010	<0.010
	28.8	0.185	<0.010
	48.1	<0.010	<0.010
	59.8	<0.010	<0.010
Ethene	0.0	<0.010	--
	2.2	<0.010	<0.010
	8.9	<0.010	<0.010
	20.9	<0.010	<0.010
	46.4	<0.010	<0.010
	56.3	<0.010	<0.010
Ethane	0.0	<0.010	--
	2.2	<0.010	<0.010
	8.9	<0.010	<0.010
	20.9	<0.010	<0.010
	46.4	<0.010	<0.010
	56.3	<0.010	<0.010
Methane	0.0	0.019	--
	2.2	0.018	0.017
	8.9	0.019	0.018
	20.9	0.017	0.017
	46.4	0.017	0.018
	56.3	0.018	0.019

Notes:
-- - sample not collected
< - compound not detected, the associated value is the quantitation limit
μg/L - micrograms per liter
cis 1,2-DCE - cis-1,2-dichloroethene
trans 1,2-DCE - trans1,2-dichloroethene
cVOC - chlorinated volatile organic compounds
DHG - dissolved hydrocarbon gases
PCE - tetrachloroethene
PV - pore volumes
TCE - trichloroethene
VC - vinyl chloride

TABLE 4
CONNELLY ZVI COLUMN - WATER SAMPLE cVOC AND DHG RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		**Influent**	**Port A**	**Port B**	**Port C**	**Port D**	**Port E**	**Port F**	**Port G**	**Effluent**
Column Distance (feet)		**0.00**	**0.16**	**0.33**	**0.49**	**0.66**	**0.82**	**0.98**	**1.31**	**1.64**
Residence Time (hours)		**0.00**	**2.6**	**5.4**	**8.1**	**10.8**	**13.5**	**16.2**	**21.6**	**27.1**
Compound	PV	Concentration (mg/L)								
PCE	0	1.464	--	--	--	--	--	--	--	--
	6	1.618	0.559	0.183	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	18	2.566	<0.010	0.490	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	31	1.818	0.832	0.493	0.021	<0.010	<0.010	<0.010	0.021	<0.010
	48	2.132	1.120	0.706	0.030	<0.010	<0.010	0.027	<0.010	<0.010
	57	2.340	--	--	--	--	--	<0.010	--	<0.010
	64	2.671	1.239	1.039	0.105	<0.010	0.017	<0.010	<0.010	<0.010
TCE	0	0.026	--	--	--	--	--	--	--	--
	6	0.058	0.019	<0.010	0.204	0.059	<0.010	<0.010	<0.010	<0.010
	18	0.046	<0.010	0.175	0.007	<0.010	<0.010	<0.010	0.082	<0.010
	31	0.051	0.029	0.034	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
	48	0.213	0.020	0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	57	1.540	--	--	--	--	--	<0.010	--	<0.010
	64	2.230	0.865	0.556	0.021	<0.010	0.020	<0.010	<0.010	<0.010
cis-1,2-DCE	0	0.067	--	--	--	--	--	--	--	--
	6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	18	0.027	0.020	0.011	0.020	<0.010	<0.010	<0.010	<0.010	<0.010
	31	0.032	0.026	0.020	<0.010	0.033	0.038	0.034	<0.010	<0.010
	48	<0.010	<0.010	0.014	0.016	<0.010	<0.010	<0.010	<0.010	<0.010
	57	<0.010	--	--	--	--	--	0.026	--	<0.010
	64	0.016	0.027	0.056	0.064	0.059	0.037	0.027	0.016	<0.010
VC	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	31	0.19	<0.010	<0.010	<0.010	<0.010	<0.010	0.07	0.062	<0.010
	48	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	57	<0.010	--	--	--	--	--	<0.010	--	<0.010
	64	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ethene	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	0.053	0.064	0.048	0.041	0.043	0.045	0.031	0.024
	18	<0.010	0.055	0.079	0.055	0.034	0.028	0.023	0.019	0.009
	31	<0.010	0.036	0.051	0.052	0.032	0.027	0.022	0.012	0.005
	48	<0.010	0.022	0.048	0.071	0.062	0.057	0.043	0.032	0.013
	57	--	--	--	--	--	--	--	--	--
	64	<0.010	0.110	0.162	0.289	0.282	0.242	0.258	0.222	0.148
Ethane	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	0.027	0.030	0.034	0.032	0.035	0.035	0.021	0.016
	18	<0.010	0.148	0.134	0.148	0.156	0.163	0.177	0.185	0.223
	31	<0.010	0.068	0.073	0.095	0.091	0.109	0.179	0.128	0.125
	48	<0.010	0.027	0.048	0.081	0.115	0.170	0.140	0.162	0.198
	57	--	--	--	--	--	--	--	--	--
	64	<0.010	0.069	0.089	0.170	0.186	0.199	0.237	0.234	0.238
Methane	0	0.02	--	--	--	--	--	--	--	--
	6	0.02	0.027	0.029	0.030	0.031	0.036	0.037	0.037	0.038
	18	0.02	0.027	0.027	0.027	0.027	0.029	0.029	0.033	0.038
	31	0.02	0.022	0.023	0.024	0.023	0.025	0.030	0.026	0.026
	48	0.02	0.021	0.021	0.023	0.025	0.027	0.026	0.025	0.027
	57	--	--	--	--	--	--	--	--	--
	64	0.02	0.022	0.025	0.028	0.027	0.027	0.028	0.027	0.025

Notes:

-- - sample not collected
< - compound not detected, the associated value is the quantitation limit
µg/L - micrograms per liter
cis 1,2-DCE - cis-1,2-dichloroethene
trans 1,2-DCE - trans1,2-dichloroethene
cVOC - chlorinated volatile organic compounds
DHG - dissolved hydrocarbon gases
PCE - tetrachloroethene
PV - pore volumes
TCE - trichloroethene
VC - vinyl chloride

TABLE 5
PEERLESS ZVI COLUMN - WATER SAMPLE cVOC AND DHG RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		**Influent**	**Port A**	**Port B**	**Port C**	**Port D**	**Port E**	**Port F**	**Port G**	**Effluent**
Column Distance (feet)		**0.00**	**0.16**	**0.33**	**0.49**	**0.66**	**0.82**	**0.98**	**1.31**	**1.64**
Residence Time (hours)		**0.00**	**2.5**	**5.1**	**7.7**	**10.2**	**12.8**	**15.3**	**20.4**	**25.5**
Compound	PV	Concentration (mg/L)								
PCE	0	1.464	--	--	--	--	--	--	--	--
	6	1.618	0.520	0.271	0.087	0.013	0.003	0.003	<0.010	<0.010
	19	1.464	0.501	0.224	0.117	0.067	0.032	<0.01	0.965	0.490
	32	1.818	0.657	0.606	0.399	0.270	0.175	0.159	0.091	0.159
	48	2.132	0.952	0.776	0.494	0.281	0.202	0.114	0.056	<0.010
	57	2.340	--	--	--	--	--	<0.010	--	0.036
	64	2.671	1.57	1.20	0.669	0.377	0.236	0.150	0.107	0.037
TCE	0	0.026	--	--	--	--	--	--	--	--
	6	0.058	0.051	0.049	<0.010	<0.010	0.002	<0.010	<0.010	0.013
	19	0.026	0.032	0.029	<0.010	<0.010	0.005	0.031	0.033	0.175
	32	0.051	0.019	0.014	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
	48	0.213	0.020	0.015	<0.010	<0.010	<0.010	<0.010	0.011	<0.010
	57	1.544	--	--	--	--	--	<0.010	--	<0.010
	64	2.230	0.746	0.277	0.040	0.010	<0.010	<0.010	0.019	<0.010
cis-1,2-DCE	0	0.067	--	--	--	--	--	--	--	--
	6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	19	0.027	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
	32	0.032	<0.010	<0.010	0.026	<0.010	<0.010	<0.010	0.010	<0.01
	48	<0.010	<0.010	<0.010	<0.010	0.022	<0.010	<0.010	<0.010	0.090
	57	<0.010	--	--	--	--	--	<0.010	--	<0.010
	64	0.016	0.013	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
VC	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	19	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	32	0.190	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	48	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.018
	57	<0.010	--	--	--	--	--	<0.010	--	<0.010
	64	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ethene	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	0.041	0.044	0.045	0.058	0.050	0.044	0.035	0.023
	19	<0.010	0.058	0.061	0.047	0.054	0.059	0.057	0.049	0.079
	32	<0.010	0.031	0.031	0.034	0.038	0.032	0.040	0.036	0.040
	48	<0.010	0.040	0.033	0.037	0.038	0.040	0.041	0.039	0.039
	57	--	--	--	--	--	--	--	--	--
	64	<0.010	0.127	0.105	0.089	0.083	0.084	0.082	0.087	0.079
Ethane	0	<0.010	--	--	--	--	--	--	--	--
	6	<0.010	0.020	0.020	0.021	0.026	0.021	0.017	0.026	0.008
	19	<0.010	0.040	0.042	0.029	0.032	0.035	0.032	0.095	0.134
	32	<0.010	0.028	0.028	0.030	0.028	0.025	0.030	0.024	0.030
	48	<0.010	0.034	0.034	0.036	0.034	0.037	0.037	0.035	0.033
	57	--	--	--	--	--	--	--	--	--
	64	<0.010	0.091	0.074	0.074	0.066	0.068	0.064	0.069	0.062
Methane	0	0.019	--	--	--	--	--	--	--	--
	6	0.018	0.035	0.034	0.034	0.039	0.037	0.033	0.036	0.028
	19	0.019	0.032	0.032	0.028	0.029	0.030	0.031	0.025	0.027
	32	0.017	0.030	0.027	0.028	0.026	0.027	0.029	0.026	0.029
	48	0.017	0.034	0.031	0.031	0.030	0.031	0.030	0.030	0.029
	57	--	--	--	--	--	--	--	--	--
	64	0.018	0.047	0.039	0.036	0.033	0.034	0.033	0.033	0.032

Notes:
-- - sample not collected
< - compound not detected, the associated value is the quantitation limit
µg/L - micrograms per liter
cis 1,2-DCE - cis-1,2-dichloroethene
trans 1,2-DCE - trans1,2-dichloroethene
cVOC - chlorinated volatile organic compounds
DHG - dissolved hydrocarbon gases
PCE - tetrachloroethene
PV - pore volumes
TCE - trichloroethene
VC - vinyl chloride

TABLE 6
cVOC ANALYTICAL RESULTS COMPARISON BETWEEN SIREM AND ALS LABORATORIES
Crown Chevrolet, Dublin, CA

Analyte		**SIREM**			**ALS**		
		Influent	***Port F***	***Effluent***	***Influent***	***Port F***	***Effluent***
		Concentration (mg/L)					
57 PVs (Nov. 17th, 2014)	**Peerless ZVI**						
	PCE	2.34	<0.01	0.036	1.650	0.0867	0.0195
	TCE	1.54	<0.01	<0.01	0.931	<0.0005	<0.0005
	cis-1,2-DCE	<0.01	<0.01	<0.01	0.00244	0.00235	0.00179
	VC	<0.01	<0.01	<0.01	<0.0005	<0.0005	<0.0005
	Connelly ZVI						
	PCE	2.34	<0.01	<0.01	1.650	<0.0005	<0.0005
	TCE	1.54	<0.01	<0.01	0.931	<0.0005	<0.0005
	cis-1,2-DCE	<0.01	0.026	<0.01	0.00244	0.0115	<0.0005
	VC	<0.01	<0.01	<0.01	<0.0005	<0.0005	<0.0005
64 PVs (Nov. 27th, 2014)	**Peerless ZVI**						
	PCE	2.67	0.15	0.037	1.73	--	0.0283
	TCE	2.23	<0.01	<0.01	1.93	--	<0.005
	cis-1,2-DCE	0.016	<0.01	<0.01	<0.005	--	<0.005
	VC	<0.01	<0.01	<0.01	<0.005	--	<0.005
	Connelly ZVI						
	PCE	2.67	<0.010	<0.01	1.73	--	<0.005
	TCE	2.23	<0.010	<0.01	1.93	--	<0.005
	cis-1,2-DCE	0.016	0.027	<0.01	<0.005	--	<0.005
	VC	<0.01	<0.010	<0.01	<0.005	--	<0.005

mg/L - milligrams per liter

< - compound not detected, the associated value is the quantitation limit

cVOC - chlorinated volatile organic compounds

TABLE 7
CALCULATED cVOC HALF-LIFE VALUES
Crown Chevrolet, Dublin, CA

Compound	Pore Volume	Influent Concentration (mg/L)	Half-life[a] (hours)	r^2	Conversion (%mol)
Connelly					
Tetrachloroethene	48.2	2.132	2.7	0.976	--
	63.9	2.671	2.7	0.965	--
Trichoroethene					PCE=>TCE
	48.2	0.213	0.5	0.989	10%
	63.9	2.230	1.9	0.987	10%
cis 1,2-Dichloroethene					TCE=>cDCE
	48.2	0.004	6.9	0.595	6%
	63.9	0.016	7.9	0.726	6%
Peerless					
Tetrachloroethene	48.4	2.132	3.3	0.974	--
	63.6	2.671	3.9	0.993	--
Trichoroethene					PCE=>TCE
	48.4	0.213	0.5	0.495	11%
	63.6	2.230	1.5	0.999	5%
cis 1,2-Dichloroethene					TCE=>cDCE
	48.4	0.004	NA	NA	NA
	63.6	0.016	0.9	0.489	4%

Notes:

[a] Half-life calculated based on test temperature of 22 °C; μg/L - milligrams per liter
cVOC - chlorinated volatile organic compound; r2 - coefficient of determination
mol - mole; NA - not applicable; % - percent

TABLE 8
RESIDENCE TIME CALCULATIONS FOR PRB DESIGN
Crown Chevrolet, Dublin, CA

Compound	Anticipated Influent Concentration[a] (mg/L)	Target Level [b] (mg/L)	Connelly ZVI		Peerless ZVI	
			Field Anticipated Half-lives [c] (hrs)	Residence time (hrs)	Field Anticipated Half-lives [c] (hrs)	Residence time (hrs)
Tetrachloroethene	2.700	0.005	5.4	49	7.7	70
Trichloroethene	0.213	0.005	3.8		3.1	
cis 1,2-Dichloroethene	0.016	0.006	15.8		1.7	

Notes:

PRB -permeable reactive barrier
mg/L - milligrams per liter
[a] Concentrations in the Site water sample provided for the test
[b] California Drinking Water Maximum Contaminant Levels (MCLs)
[c] Laboratory values at end of test (Table 7) corrected by a factor of 2 to simulate a temperature of 16°C (61°F)

TABLE 9
WATER SAMPLE ORP AND pH RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		**Influent**	**Port A**	**Port B**	**Port C**	**Port D**	**Port E**	**Port F**	**Port G**	**Effluent**
Column Distance (feet)		**0.00**	**0.08**	**0.16**	**0.33**	**0.49**	**0.66**	**0.98**	**1.31**	**1.64**
Analyte	PV	Instrument Readings								
CONNELLY										
pH	0	7.14	--	--	--	--	--	--	--	--
	6	7.16	7.87	8.19	8.73	8.77	8.44	8.13	8.51	8.16
	18	7.20	7.39	7.82	8.37	8.99	9.04	8.80	8.41	8.42
	31	7.24	7.37	7.60	8.84	8.67	8.58	8.99	8.96	8.62
	48	7.17	7.21	7.28	8.87	9.04	8.95	8.92	9.02	8.46
	64	7.15	7.51	7.59	9.11	9.28	9.34	9.34	9.26	9.38
ORP (mV)	0	184	--	--	--	--	--	--	--	--
	6	68	-47	-57	-63	-116	-156	-125	-56	-32
	18	45	-290	-426	-423	-345	-322	-381	-209	-178
	31	173	-299	-351	-425	-240	-475	-450	-444	-188
	48	104	-430	-436	-460	-473	-483	-676	-462	-543
	64	99	-135	-101	-118	-71	-45	-293	-150	-422
PEERLESS										
pH	0	7.14	--	--	--	--	--	--	--	--
	6	7.16	7.78	8.29	8.91	9.13	9.04	9.06	8.85	8.47
	19	7.20	7.38	7.69	8.78	9.10	9.02	9.16	9.14	9.12
	32	7.24	7.33	7.43	8.03	8.59	8.75	8.94	9.03	9.01
	48	7.17	7.17	7.44	8.08	8.58	8.58	8.85	8.99	9.02
	64	7.15	7.19	7.77	--	8.88	9.08	9.16	9.58	9.37
ORP (mV)	0	184	--	--	--	--	--	--	--	--
	6	68	-320	-350	-352	-370	-226	-155	-110	-96
	19	45	-372	-458	-433	-376	-369	-448	-354	-353
	32	173	-393	-455	-417	-411	-501	-592	-524	-324
	48	104	-440	-456	-520	-544	-522	-653	-553	-580
	64	99	-456	-370	-383	-515	-514	-555	-709	-520
SAND CONTROL										
pH	0	7.14	--	--	--	--	--	--	--	--
	6	7.16	--	--	--	--	--	--	--	7.14
	17	7.20	--	--	--	--	--	--	--	7.12
	29	7.24	--	--	--	--	--	--	--	7.08
	48	7.17	--	--	--	--	--	--	--	7.36
	60	7.15	--	--	--	--	--	--	--	7.33
ORP (mV)	0	184	--	--	--	--	--	--	--	--
	6	68	--	--	--	--	--	--	--	52
	17	45	--	--	--	--	--	--	--	17
	29	173	--	--	--	--	--	--	--	120
	48	104	--	--	--	--	--	--	--	115
	60	99	--	--	--	--	--	--	--	52

mV - millivolts
ORP - Oxidation Reduction Potential
PV - pore volumes
-- - sample not collected

TABLE 10
WATER SAMPLE ANION RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		Influent	Port A	Port B	Port C	Port D	Port E	Port F	Port G	Effluent
Column Distance (feet)		**0.00**	**0.08**	**0.16**	**0.33**	**0.49**	**0.66**	**0.98**	**1.31**	**1.64**
Analyte	PV	Concentration (mg/L)								
CONNELLY ZVI										
Chloride	0	86	--	--	--	--	--	--	--	--
	6	88	91	90	95	85	103	--	--	102
	48	84	83	87	101	80	87	100	89	93
	64	84	88	89	98	95	74	96	89	93
Nitrite-Nitrogen	0	<0.09	--	--	--	--	--	--	--	--
	6	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	--	--	<0.09
	48	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
	64	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Nitrate-Nitrogen	0	2.4	--	--	--	--	--	--	--	--
	6	2.7	0.22	0.98	0.59	0.78	0.87	--	--	0.30
	48	2.3	0.12	0.12	0.16	0.23	0.19	0.41	0.32	0.17
	64	2.4	0.11	0.15	0.72	0.19	0.26	0.17	0.19	0.19
Sulfate	0	0.00	--	--	--	--	--	--	--	--
	6	64	64	64	65	77	84	--	--	24
	48	49	45	49	43	34	36	33	30	29
	64	56	44	38	25	15	22	1.9	2.1	29
Phosphate	0	0.00	--	--	--	--	--	--	--	--
	6	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	--	--	<0.07
	48	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	0.64	0.62
	64	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
PEERLESS ZVI										
Chloride	0	86	--	--	--	--	--	--	--	--
	6	88	75	59	76	73	85	77	85	87
	48	84	92	89	86	79	86	92	91	93
	64	84	76	91	89	88	82	83	87	89
Nitrite-Nitrogen	0	<0.09	--	--	--	--	--	--	--	--
	6	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
	48	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
	64	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Nitrate-Nitrogen	0	2.4	--	--	--	--	--	--	--	--
	6	2.7	0.63	0.64	1.1	1.0	0.68	1.1	0.84	0.99
	48	2.3	0.42	0.17	0.18	0.27	0.22	0.22	0.22	0.14
	64	2.4	0.20	0.24	0.57	0.15	0.12	0.14	1.5	0.17
Sulfate	0	58	--	--	--	--	--	--	--	--
	6	64	54	41	53	51	59	54	61	61
	48	49	57	63	60	49	58	69	61	61
	64	56	43	53	53	50	46	46	50	40
Phosphate	0	<0.07	--	--	--	--	--	--	--	--
	6	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
	48	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
	64	<0.07	0.00	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07

TABLE 10
WATER SAMPLE ANION RESULTS
Crown Chevrolet, Dublin, CA

Sample Location		Influent	Port A	Port B	Port C	Port D	Port E	Port F	Port G	Effluent
Column Distance (feet)		**0.00**	**0.08**	**0.16**	**0.33**	**0.49**	**0.66**	**0.98**	**1.31**	**1.64**
Analyte	PV	Concentration (mg/L)								
SAND CONTROL										
Chloride	0	0.00	--	--	--	--	--	--	--	--
	6	88	--	--	--	--	--	--	--	--
	48	84	--	--	--	--	--	--	--	84
	60	88	--	--	--	--	--	--	--	87
Nitrite-Nitrogen	0	<0.09	--	--	--	--	--	--	--	--
	6	<0.09	--	--	--	--	--	--	--	--
	48	<0.09	--	--	--	--	--	--	--	<0.09
	60	<0.09	--	--	--	--	--	--	--	<0.09
Nitrate-Nitrogen	0	2.4	--	--	--	--	--	--	--	--
	6	2.7	--	--	--	--	--	--	--	--
	48	2.3	--	--	--	--	--	--	--	2.3
	60	2.4	--	--	--	--	--	--	--	2.4
Sulfate	0	58	--	--	--	--	--	--	--	--
	6	56	--	--	--	--	--	--	--	--
	48	49	--	--	--	--	--	--	--	50
	60	56	--	--	--	--	--	--	--	57
Phosphate	0	<0.07	--	--	--	--	--	--	--	--
	6	<0.07	--	--	--	--	--	--	--	--
	48	<0.07	--	--	--	--	--	--	--	<0.07
	60	<0.07	--	--	--	--	--	--	--	<0.07

Notes:

mg/L - milligrams per liter

PV - pore volumes

-- - sample not collected

< - compount not detected, the associated value is the quantitation limit

TABLE 11
WATER SAMPLE MAJOR ANION, CATION, ALKALINITY AND TDS RESULTS
Crown Chevrolet, Dublin, CA

Analyte	Reporting Limit (µg/L)	Baseline	Column Results			
			Influent	Connelly ZVI Effluent	Peerless ZVI Effluent	Sand Control Effluent
	Concentration (mg/L)					
Calcium	0.500	169	145	5.97	4.46	140
Iron	0.050	<0.050	<0.050	0.117	<0.050	<0.050
Magnesium	0.500	36.4	35.4	10.3	23.2	36.0
Manganese	0.001	0.559	0.101	0.0471	0.0635	0.0120
Potassium	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silicon	1.0	11.2	10.4	<1.0	<1.0	10.9
Sodium	0.50	74.6	75.1	75.1	73.5	76.8
Strontium	0.001	1.46	1.38	0.0329	0.0191	1.43
Chloride	10	92	90.7	94.1	94.2	91.0
Nitrate-N	0.50	2.10	2.25	<0.10	<0.10	2.27
Sulfate	10	60	59.8	<2.0	34.6	62.0
Alkalinity, Total (as CaCO3)	10	478	459	NA	NA	430
Dissolved Organic Carbon	1.0	2.0	<1.0	<1.0	<1.0	<1.0
Total Organic Carbon	1.0	3.5	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids	20	708	694	262	288	704

Notes:

µg/L - micrograms per liter

< - compound not detected, the associated value is the reporting limit

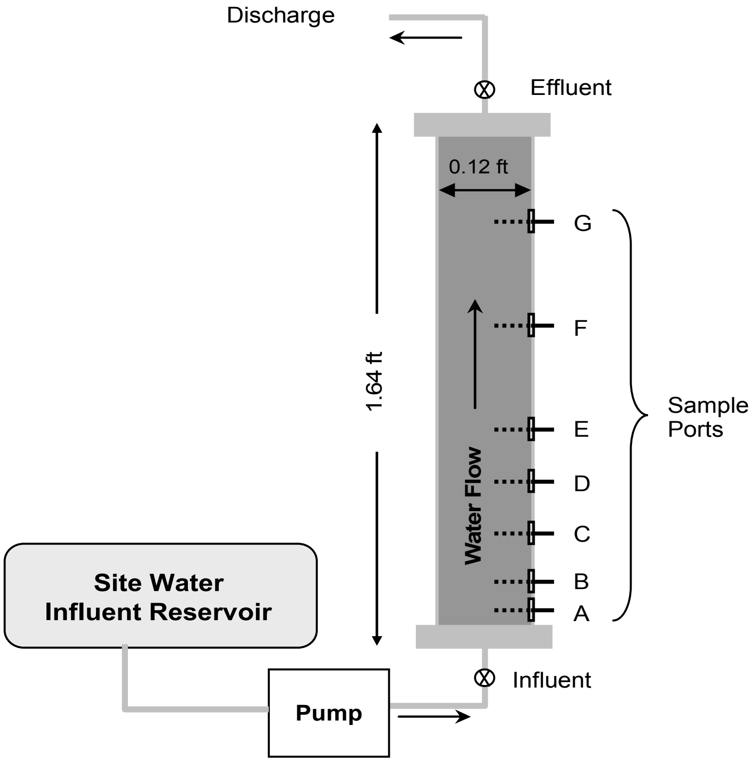
NA - sample not analyzed due to analytical interference

CON - Connelly

PL - Peerless

TDS - total dissolved solids

FIGURES



Notes:
ft - feet

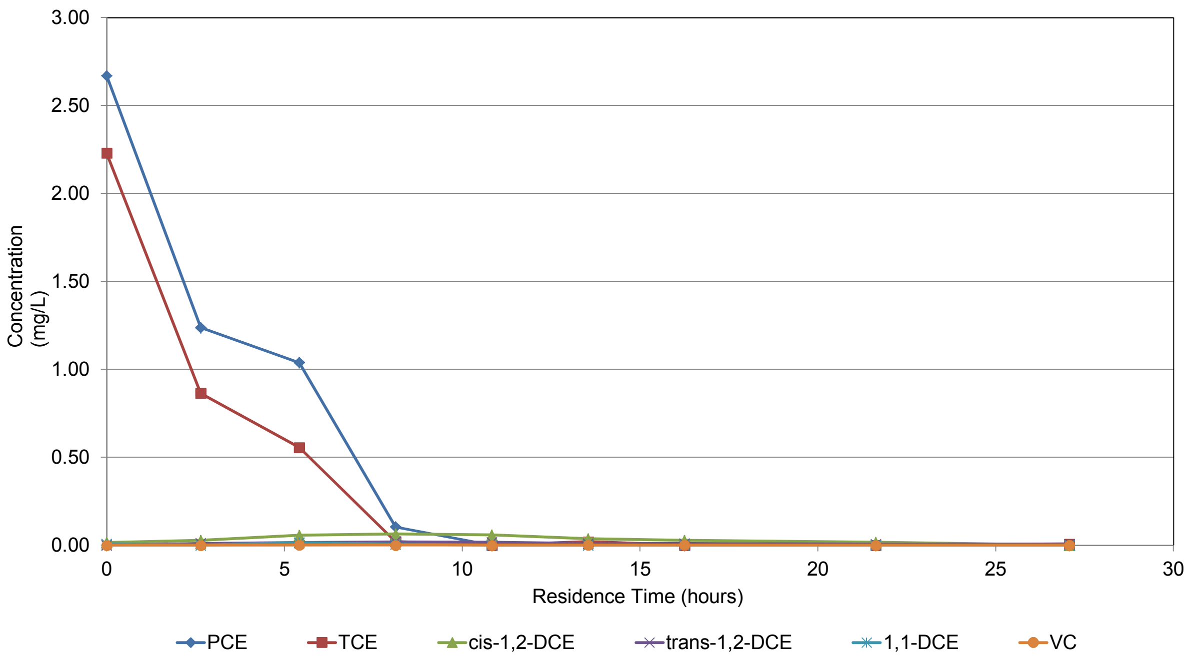
Schematic of Column Study Set Up

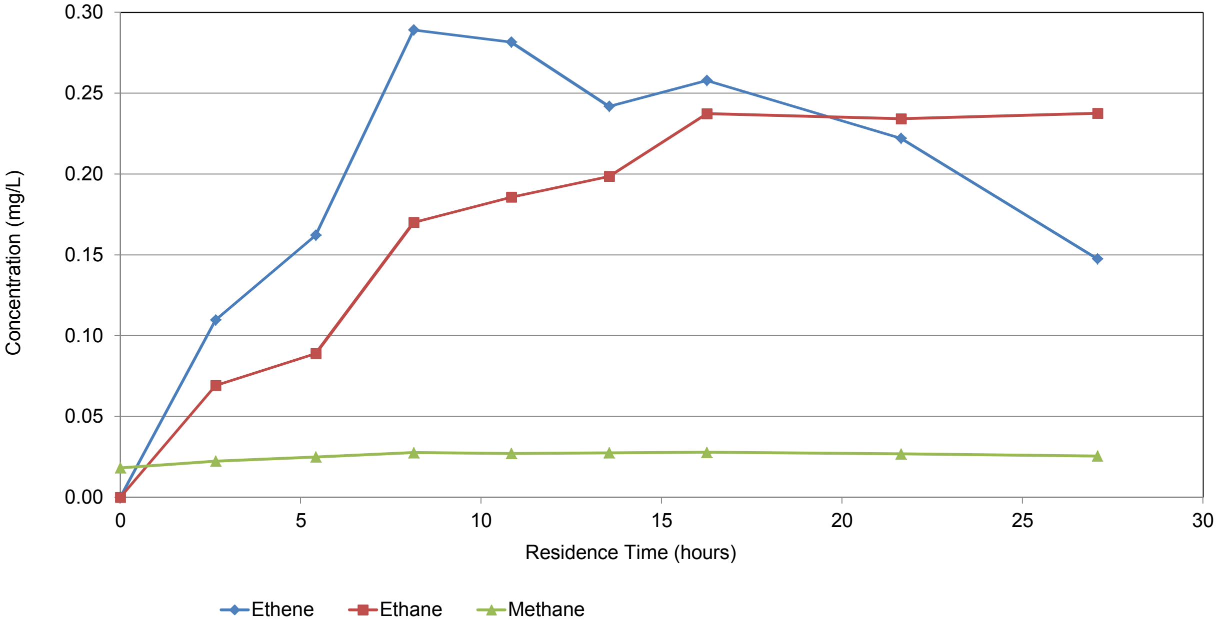
Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **1**





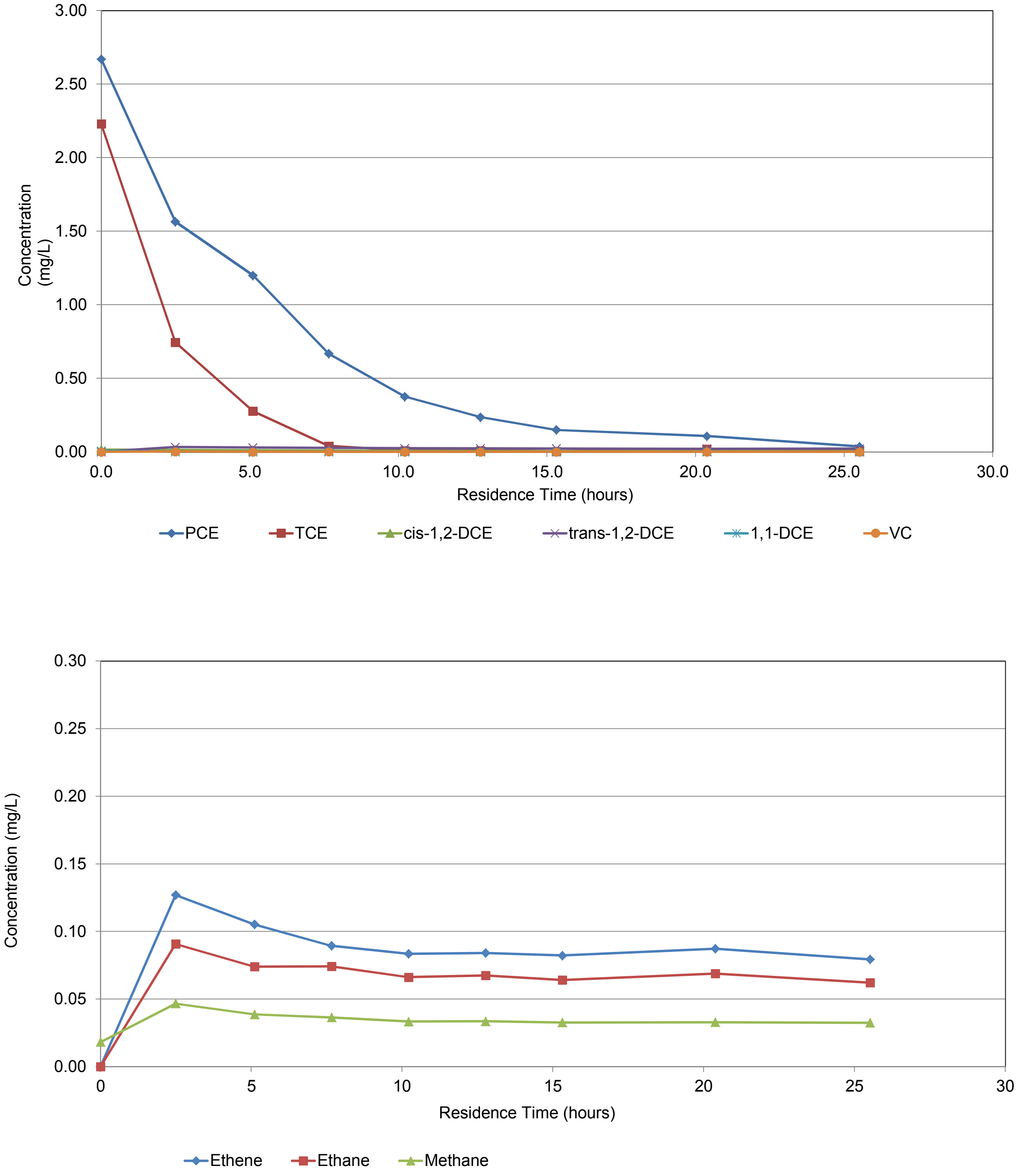
Connelly ZVI Column Water cVOC and DHG Concentrations Versus Residence Time at End of Test
Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **2**

cVOC - chlorinated volatile organic compound
DHG - dissolved hydrocarbon gases



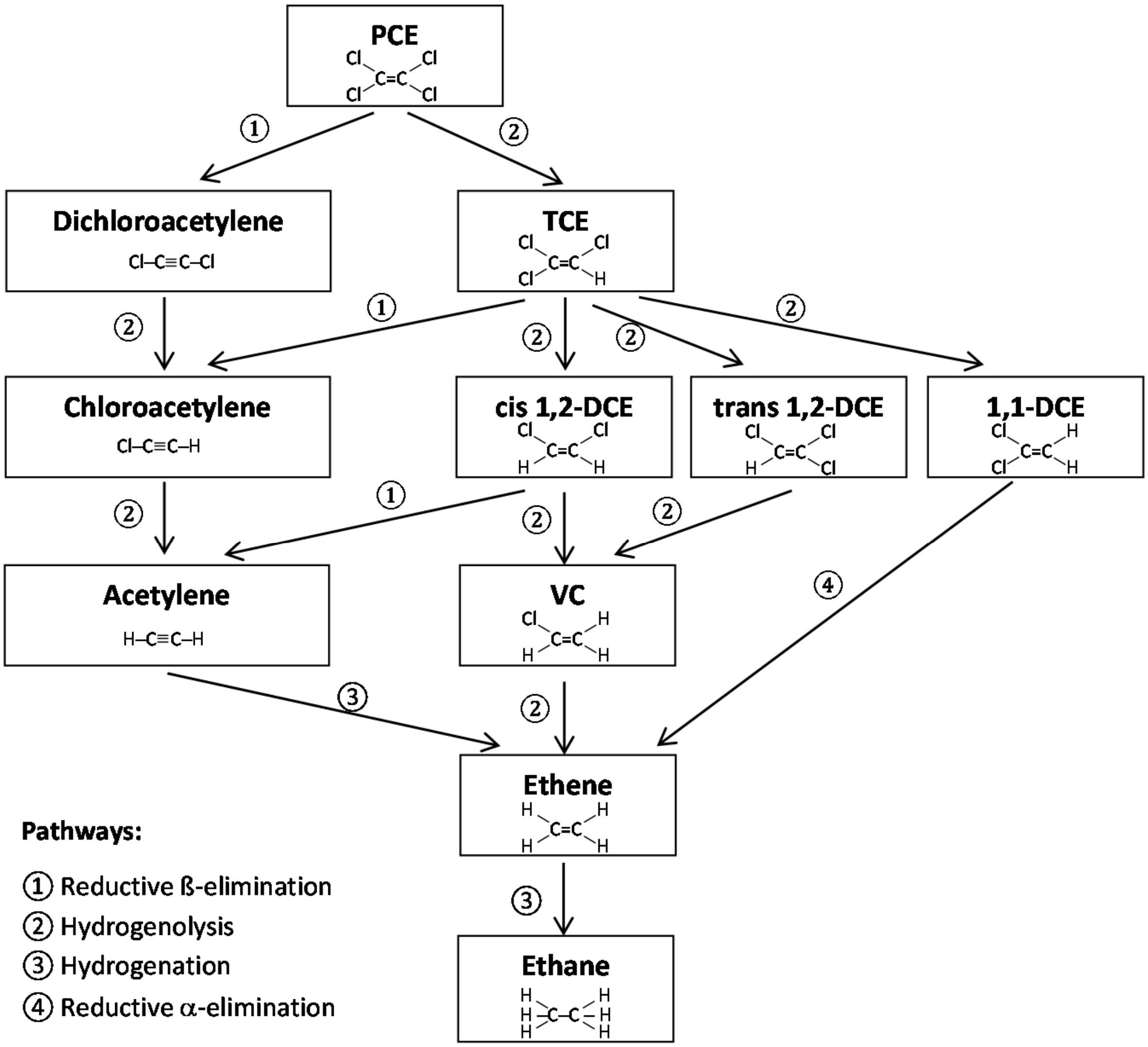
cVOC - chlorinated volatile organic compound
DHG - dissolved hydrocarbon gases

Peerless ZVI Column Water cVOC and DHG Concentrations Versus Residence Time at End of Test
Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **3**



(modified from Arnold and Roberts, 2000)

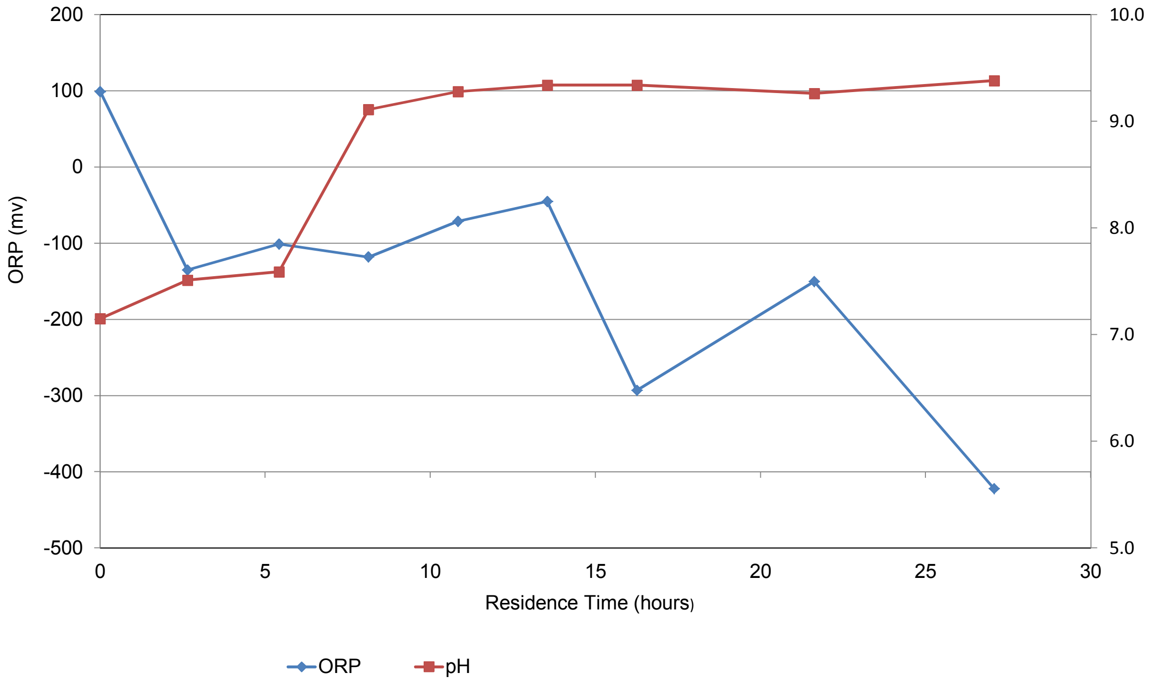
Chlorinated Ethene Degradation Pathways with ZVI

Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **4**



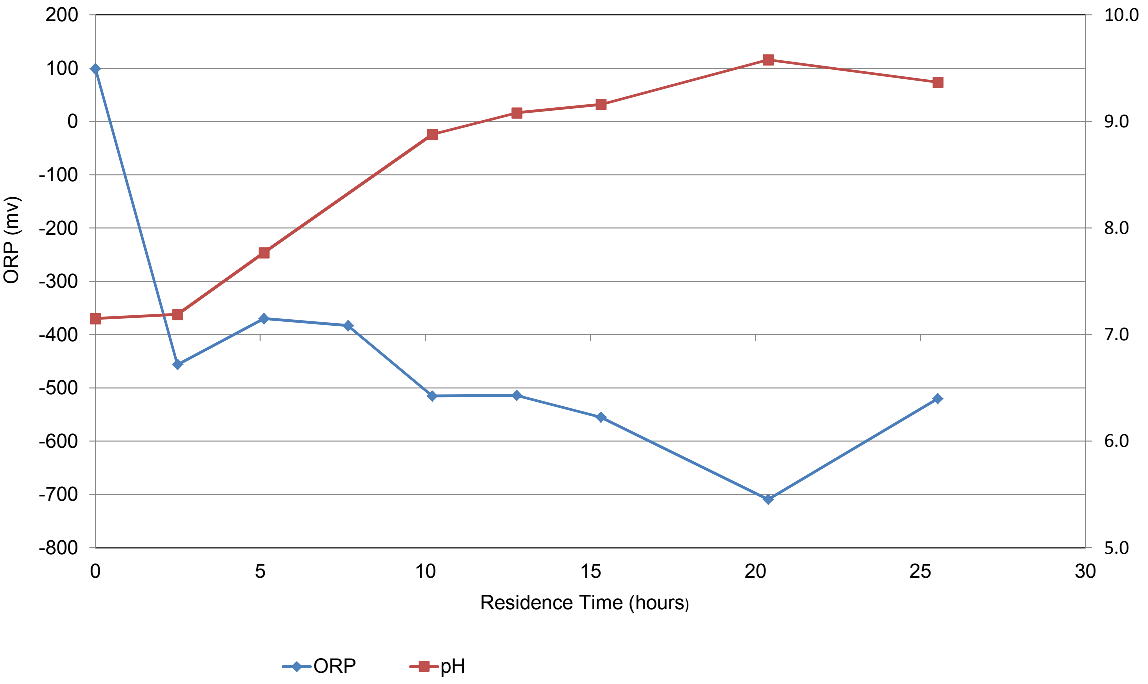
Connelly ZVI Column Water ORP and pH Values
Versus Residence Time at End of Test
Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **5**

mV - millivolts
ORP - oxidation reduction potential



Peerless ZVI Column Water ORP and pH Values
Versus Residence Time at End of Test
Crown Chevrolet, Dublin, CA

SiREM

January 2015

Figure: **6**

mV - millivolts
ORP - oxidation reduction potential

APPENDIX A
CHAIN OF CUSTODY RECORD

CHAIN-OF-CUSTODY RECORD

15106

PROJECT NAME: Crown Chevrolet
DATE: 8-25-14 PAGE 1 OF 1
PROJECT NUMBER: 0D10160070.00012.C
LABORATORY NAME: Sirem
CLIENT INFORMATION:
REPORTING REQUIREMENTS: S-3316
RESULTS TO: Greg Stemler
LABORATORY ADDRESS:
TURNAROUND TIME: standard
SAMPLE SHIPMENT METHOD: ~~Fed~~ UPS
LABORATORY CONTACT:
LABORATORY PHONE NUMBER:
GEOTRACKER REQUIRED YES [✓ NO]
SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE): R David Pearson

DATE	TIME	SAMPLE NUMBER	ANALYSES															CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
			Destructive analysis																						
8-25-14	1530	MW-01	X															1gal. Poly	W			X		17	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY: ~~Alicia~~	DATE	TIME
SIGNATURE: R David Pearson PRINTED NAME: R David Pearson COMPANY: Amec	8/26/14	0550	SIGNATURE: PRINTED NAME: Alicia Quintanilla COMPANY: SIREM	28th Aug 2014	3:15 pm
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 17
SAMPLING COMMENTS:

amec

APPENDIX B:
EXTERNAL LABORATORY REPORTS

SIREM
ATTN: JASON WHITE
130 Research Lane
Suite 2
Guelph ON N1G 5G3

Date Received:	12-SEP-14
Report Date:	23-SEP-14 14:15 (MT)
Version:	FINAL

Client Phone: 519-822-2265

Certificate of Analysis

Lab Work Order #:	**L1517047**
Project P.O. #:	NOT SUBMITTED
Job Reference:	
C of C Numbers:	14-398293
Legal Site Desc:	

Mathumai Ganeshakumar
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1517047-1 S-3316-110914-B							
Sampled By: J. WHITE on 11-SEP-14 @ 12:00							
Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		12-SEP-14	R2946906
Conductivity	1230		3.0	umhos/cm		12-SEP-14	R2947389
pH	7.44		0.10	pH units		12-SEP-14	R2947370
Total Dissolved Solids	708		20	mg/L	13-SEP-14	16-SEP-14	R2948404
Turbidity	0.26		0.10	NTU	12-SEP-14	12-SEP-14	R2946040
Anions and Nutrients							
Alkalinity, Bicarbonate (as CaCO3)	477		10	mg/L	16-SEP-14	16-SEP-14	R2949383
Alkalinity, Carbonate (as CaCO3)	<10		10	mg/L	16-SEP-14	16-SEP-14	R2949383
Alkalinity, Hydroxide (as CaCO3)	<10		10	mg/L	16-SEP-14	16-SEP-14	R2949383
Alkalinity, Total (as CaCO3)	478		10	mg/L	16-SEP-14	16-SEP-14	R2949383
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-SEP-14	R2948475
Bromide	<0.50		0.50	mg/L		16-SEP-14	R2950311
Chloride	92		10	mg/L		16-SEP-14	R2950311
Computed Conductivity	1130			uS/cm		17-SEP-14	
Conductivity % Difference	-8.3			%		17-SEP-14	
Fluoride	<0.50		0.50	mg/L		16-SEP-14	R2950311
Hardness (as CaCO3)	571			mg/L		17-SEP-14	
Ion Balance	124			%		17-SEP-14	
Langelier Index	0.8					17-SEP-14	
Nitrate and Nitrite as N	2.1		1.0	mg/L		17-SEP-14	
Nitrate-N	2.10		0.50	mg/L		16-SEP-14	R2950311
Nitrite-N	<0.50		0.50	mg/L		16-SEP-14	R2950311
Saturation pH	6.61			pH		17-SEP-14	
Phosphate-P (ortho)	0.122		0.0030	mg/L		16-SEP-14	R2951214
TDS (Calculated)	728			mg/L		17-SEP-14	
Sulphate	60		10	mg/L		16-SEP-14	R2950311
Anion Sum	11.9			me/L		17-SEP-14	
Cation Sum	14.7			me/L		17-SEP-14	
Cation - Anion Balance	10.6			%		17-SEP-14	
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.0		1.0	mg/L	16-SEP-14	16-SEP-14	R2949524
Total Organic Carbon	3.5		1.0	mg/L	16-SEP-14	16-SEP-14	R2949525
Inorganic Parameters							
Silica	24.0		2.1	mg/L		17-SEP-14	
Total Metals							
Aluminum (Al)-Total	0.013		0.010	mg/L	15-SEP-14	17-SEP-14	R2948455
Antimony (Sb)-Total	<0.0050		0.0050	mg/L	15-SEP-14	17-SEP-14	R2948455
Arsenic (As)-Total	0.0014		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Barium (Ba)-Total	0.157		0.010	mg/L	15-SEP-14	17-SEP-14	R2948455
Beryllium (Be)-Total	<0.0010		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Bismuth (Bi)-Total	<0.0010		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Boron (B)-Total	0.591		0.050	mg/L	15-SEP-14	17-SEP-14	R2948455

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1517047-1 S-3316-110914-B Sampled By: J. WHITE on 11-SEP-14 @ 12:00 Matrix: WATER							
Total Metals							
Cadmium (Cd)-Total	0.000241		0.000090	mg/L	15-SEP-14	17-SEP-14	R2948455
Calcium (Ca)-Total	169		0.50	mg/L	15-SEP-14	17-SEP-14	R2948455
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-SEP-14	17-SEP-14	R2948455
Cobalt (Co)-Total	0.00070		0.00050	mg/L	15-SEP-14	17-SEP-14	R2948455
Copper (Cu)-Total	<0.0010		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Iron (Fe)-Total	<0.050		0.050	mg/L	15-SEP-14	17-SEP-14	R2948455
Lead (Pb)-Total	<0.0010		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Magnesium (Mg)-Total	36.4		0.50	mg/L	15-SEP-14	17-SEP-14	R2948455
Manganese (Mn)-Total	0.559		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Molybdenum (Mo)-Total	0.0019		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Nickel (Ni)-Total	0.0057		0.0020	mg/L	15-SEP-14	17-SEP-14	R2948455
Phosphorus (P)-Total	0.135		0.050	mg/L	15-SEP-14	17-SEP-14	R2948455
Potassium (K)-Total	<1.0		1.0	mg/L	15-SEP-14	17-SEP-14	R2948455
Selenium (Se)-Total	0.00060		0.00040	mg/L	15-SEP-14	17-SEP-14	R2948455
Silicon (Si)-Total	11.2		1.0	mg/L	15-SEP-14	17-SEP-14	R2948455
Silver (Ag)-Total	<0.00010		0.00010	mg/L	15-SEP-14	17-SEP-14	R2948455
Sodium (Na)-Total	74.6		0.50	mg/L	15-SEP-14	17-SEP-14	R2948455
Strontium (Sr)-Total	1.46		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Thallium (Tl)-Total	<0.00030		0.00030	mg/L	15-SEP-14	17-SEP-14	R2948455
Tin (Sn)-Total	<0.0010		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Titanium (Ti)-Total	<0.0020		0.0020	mg/L	15-SEP-14	17-SEP-14	R2948455
Tungsten (W)-Total	<0.010		0.010	mg/L	15-SEP-14	17-SEP-14	R2948455
Uranium (U)-Total	<0.0050		0.0050	mg/L	15-SEP-14	17-SEP-14	R2948455
Vanadium (V)-Total	0.0053		0.0010	mg/L	15-SEP-14	17-SEP-14	R2948455
Zinc (Zn)-Total	0.0040		0.0030	mg/L	15-SEP-14	17-SEP-14	R2948455
Zirconium (Zr)-Total	<0.0040		0.0040	mg/L	15-SEP-14	17-SEP-14	R2948455
Volatile Organic Compounds							
Acetone	<20		20	ug/L		16-SEP-14	R2948515
Benzene	<0.50		0.50	ug/L		16-SEP-14	R2948515
Bromodichloromethane	<1.0		1.0	ug/L		16-SEP-14	R2948515
Bromoform	<1.0		1.0	ug/L		16-SEP-14	R2948515
Bromomethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
Carbon Disulfide	<1.0		1.0	ug/L		16-SEP-14	R2948515
Carbon tetrachloride	<0.50		0.50	ug/L		16-SEP-14	R2948515
Chlorobenzene	<0.50		0.50	ug/L		16-SEP-14	R2948515
Dibromochloromethane	<1.0		1.0	ug/L		16-SEP-14	R2948515
Chloroethane	<1.0		1.0	ug/L		16-SEP-14	R2948515
Chloroform	<1.0		1.0	ug/L		16-SEP-14	R2948515
Chloromethane	<1.0		1.0	ug/L		16-SEP-14	R2948515
1,2-Dibromoethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,2-Dichlorobenzene	<0.50		0.50	ug/L		16-SEP-14	R2948515

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1517047-1 S-3316-110914-B Sampled By: J. WHITE on 11-SEP-14 @ 12:00 Matrix: WATER							
Volatile Organic Compounds							
1,3-Dichlorobenzene	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,4-Dichlorobenzene	<0.50		0.50	ug/L		16-SEP-14	R2948515
Dichlorodifluoromethane	<1.3	DLB	1.3	ug/L		16-SEP-14	R2948515
1,1-Dichloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,2-Dichloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,1-Dichloroethylene	<0.50		0.50	ug/L		16-SEP-14	R2948515
cis-1,2-Dichloroethylene	<0.50		0.50	ug/L		16-SEP-14	R2948515
trans-1,2-Dichloroethylene	<0.50		0.50	ug/L		16-SEP-14	R2948515
Dichloromethane	<2.0		2.0	ug/L		16-SEP-14	R2948515
1,2-Dichloropropane	<0.50		0.50	ug/L		16-SEP-14	R2948515
cis-1,3-Dichloropropene	<0.50		0.50	ug/L		16-SEP-14	R2948515
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		16-SEP-14	R2948515
Ethyl Benzene	<0.50		0.50	ug/L		16-SEP-14	R2948515
n-Hexane	<0.50		0.50	ug/L		16-SEP-14	R2948515
2-Hexanone	<20		20	ug/L		16-SEP-14	R2948515
Methyl Ethyl Ketone	<20		20	ug/L		16-SEP-14	R2948515
Methyl Isobutyl Ketone	<20		20	ug/L		16-SEP-14	R2948515
MTBE	<0.50		0.50	ug/L		16-SEP-14	R2948515
Styrene	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
Toluene	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,1,1-Trichloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
1,1,2-Trichloroethane	<0.50		0.50	ug/L		16-SEP-14	R2948515
Trichloroethylene	0.64		0.50	ug/L		16-SEP-14	R2948515
Trichlorofluoromethane	<1.0		1.0	ug/L		16-SEP-14	R2948515
Vinyl chloride	<0.50		0.50	ug/L		16-SEP-14	R2948515
o-Xylene	<0.50		0.50	ug/L		16-SEP-14	R2948515
m+p-Xylenes	<1.0		1.0	ug/L		16-SEP-14	R2948515
Xylenes (Total)	<1.1		1.1	ug/L		16-SEP-14	
Surrogate: 4-Bromofluorobenzene	109.4		70-130	%		16-SEP-14	R2948515
Surrogate: 1,4-Difluorobenzene	98.8		70-130	%		16-SEP-14	R2948515
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		16-SEP-14	
L1517047-2 S-3316-110914-B2 Sampled By: J. WHITE on 11-SEP-14 @ 12:15 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<20		20	ug/L		23-SEP-14	R2955757
Benzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
Bromodichloromethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
Bromoform	<1.0		1.0	ug/L		23-SEP-14	R2955757

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1517047-2 S-3316-110914-B2							
Sampled By: J. WHITE on 11-SEP-14 @ 12:15							
Matrix: WATER							
Volatile Organic Compounds							
Bromomethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
Carbon Disulfide	<1.0		1.0	ug/L		23-SEP-14	R2955757
Carbon tetrachloride	<0.50		0.50	ug/L		23-SEP-14	R2955757
Chlorobenzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
Dibromochloromethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
Chloroethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
Chloroform	<1.0		1.0	ug/L		23-SEP-14	R2955757
Chloromethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
1,2-Dibromoethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,2-Dichlorobenzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,3-Dichlorobenzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,4-Dichlorobenzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
Dichlorodifluoromethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
1,1-Dichloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,2-Dichloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,1-Dichloroethylene	<0.50		0.50	ug/L		23-SEP-14	R2955757
cis-1,2-Dichloroethylene	<0.50		0.50	ug/L		23-SEP-14	R2955757
trans-1,2-Dichloroethylene	<0.50		0.50	ug/L		23-SEP-14	R2955757
Dichloromethane	<2.0		2.0	ug/L		23-SEP-14	R2955757
1,2-Dichloropropane	<0.50		0.50	ug/L		23-SEP-14	R2955757
cis-1,3-Dichloropropene	<0.50		0.50	ug/L		23-SEP-14	R2955757
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		23-SEP-14	R2955757
Ethyl Benzene	<0.50		0.50	ug/L		23-SEP-14	R2955757
n-Hexane	<0.50		0.50	ug/L		23-SEP-14	R2955757
2-Hexanone	<20		20	ug/L		23-SEP-14	R2955757
Methyl Ethyl Ketone	<20		20	ug/L		23-SEP-14	R2955757
Methyl Isobutyl Ketone	<20		20	ug/L		23-SEP-14	R2955757
MTBE	<0.50		0.50	ug/L		23-SEP-14	R2955757
Styrene	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
Tetrachloroethylene	1220	AWHS	13	ug/L		23-SEP-14	R2955757
Toluene	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,1,1-Trichloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
1,1,2-Trichloroethane	<0.50		0.50	ug/L		23-SEP-14	R2955757
Trichloroethylene	0.62		0.50	ug/L		23-SEP-14	R2955757
Trichlorofluoromethane	<1.0		1.0	ug/L		23-SEP-14	R2955757
Vinyl chloride	<0.50		0.50	ug/L		23-SEP-14	R2955757
o-Xylene	<0.50		0.50	ug/L		23-SEP-14	R2955757
m+p-Xylenes	<1.0		1.0	ug/L		23-SEP-14	R2955757
Xylenes (Total)	<1.1		1.1	ug/L		23-SEP-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1517047-2 S-3316-110914-B2 Sampled By: J. WHITE on 11-SEP-14 @ 12:15 Matrix: WATER							
Volatile Organic Compounds							
Surrogate: 4-Bromofluorobenzene	103.8		70-130	%		23-SEP-14	R2955757
Surrogate: 1,4-Difluorobenzene	95.8		70-130	%		23-SEP-14	R2955757
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		23-SEP-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Dichlorodifluoromethane	DLB	L1517047-1
Matrix Spike	Aluminum (Al)-Total	MS-B	L1517047-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L1517047-1
Matrix Spike	Iron (Fe)-Total	MS-B	L1517047-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1517047-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L1517047-1
Matrix Spike	Potassium (K)-Total	MS-B	L1517047-1
Matrix Spike	Silicon (Si)-Total	MS-B	L1517047-1
Matrix Spike	Sodium (Na)-Total	MS-B	L1517047-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L1517047-1
Matrix Spike	Phosphate-P (ortho)	MS-B	L1517047-1
Method Blank	Dichlorodifluoromethane	RRQC	L1517047-1

Comments: RRQC-Method blank positive; related samples have been qualified accordingly.

Sample Parameter Qualifier key listed:

Qualifier	Description
AWHS	Additional Analytical Performed on Sample With Headspace
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRQC	Refer to report remarks for information regarding this QC result.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SPEC-WT	Water	Speciated Alkalinity	EPA 310.2
ANIONS-WT	Water	Anion Scan (IC)	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

ALS Test Code	Matrix	Test Description	Method Reference**
COLOUR-WT	Water	Colour	APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

ALS Test Code	Matrix	Test Description	Method Reference**
EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ALS Test Code	Matrix	Test Description	Method Reference**
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-SILICA-CALC-WT	Water	Calculate from SI-TOT-WT	EPA 200.8
IONBALANCE-OP03-WT	Water	Detailed Ion Balance Calculation	APHA 1030E, 2330B, 2510A
MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

ALS Test Code	Matrix	Test Description	Method Reference**
NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

ALS Test Code	Matrix	Test Description	Method Reference**
P-ORTHO-LOW-WT	Water	Phosphorus-P (ortho)	APHA 4500-P B E
PH-ALK-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5°C overnight and then 180–10°C for 1hr.

Reference Information

THM-SUM-PPB-CALC-WT	Water	Total Trihalomethanes (THMs)	CALCULATION

Total Trihalomethanes (THMs) represents the sum of bromodichloromethane, bromoform, chlorodibromomethane and chloroform. For the purpose of calculation, results less than the detection limit (DL) are treated as zero.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260

Aqueous samples are analyzed by headspace-GC/MS.

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

14-398293

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SPEC-WT	**Water**							
Batch R2949383								
WG1952263-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			107.6		%		80-120	16-SEP-14
WG1952263-2 CVS								
Alkalinity, Total (as CaCO3)			97.2		%		85-115	16-SEP-14
WG1952263-4 DUP		**L1516394-1**						
Alkalinity, Total (as CaCO3)		401	395		mg/L	1.5	20	16-SEP-14
Alkalinity, Bicarbonate (as CaCO3)		400	394		mg/L	1.5	25	16-SEP-14
Alkalinity, Carbonate (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	25	16-SEP-14
Alkalinity, Hydroxide (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	25	16-SEP-14
WG1952263-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	16-SEP-14
ANIONS-WT	**Water**							
Batch R2950311								
WG1951924-2 LCS								
Chloride			101.9		%		85-115	16-SEP-14
Bromide			101.3		%		85-115	16-SEP-14
Fluoride			103.0		%		85-115	16-SEP-14
Nitrite-N			103.5		%		85-115	16-SEP-14
Nitrate-N			100.5		%		85-115	16-SEP-14
Sulphate			102.0		%		85-115	16-SEP-14
WG1951924-3 LCSD		**WG1951924-2**						
Chloride		101.9	101.9		%	0.0	25	16-SEP-14
Bromide		101.3	101.3		%	0.0	25	16-SEP-14
Fluoride		103.0	103.2		%	0.2	25	16-SEP-14
Nitrite-N		103.5	102.9		%	0.5	25	16-SEP-14
Nitrate-N		100.5	100.6		%	0.2	25	16-SEP-14
Sulphate		102.0	102.0		%	0.0	25	16-SEP-14
WG1951924-1 MB								
Chloride			<2.0		mg/L		2	16-SEP-14
Bromide			<0.10		mg/L		0.1	16-SEP-14
Fluoride			<0.10		mg/L		0.1	16-SEP-14
Nitrite-N			<0.10		mg/L		0.1	16-SEP-14
Nitrate-N			<0.10		mg/L		0.1	16-SEP-14
Sulphate			<2.0		mg/L		2	16-SEP-14
C-DIS-ORG-WT	**Water**							

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	**Water**							
Batch R2949524								
WG1951964-2 DUP		**L1516838-1**						
Dissolved Organic Carbon		8.1	7.8		mg/L	3.8	20	16-SEP-14
WG1951964-3 LCS								
Dissolved Organic Carbon			100.0		%		80-120	16-SEP-14
WG1951964-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-SEP-14
WG1951964-4 MS		**L1516838-1**						
Dissolved Organic Carbon			99.5		%		70-130	16-SEP-14
COLOUR-WT	**Water**							
Batch R2946906								
WG1950424-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			102.1		%		80-120	12-SEP-14
WG1950424-2 CVS								
Color, Apparent			108.6		%		85-115	12-SEP-14
WG1950424-4 DUP		**L1517047-1**						
Color, Apparent		<1.0	<1.0	RPD-NA	C.U.	N/A	20	12-SEP-14
WG1950424-1 MB								
Color, Apparent			<1.0		C.U.		1	12-SEP-14
EC-WT	**Water**							
Batch R2947389								
WG1950342-3 CVS								
Conductivity			100.3		%		90-110	12-SEP-14
WG1950342-4 DUP		**L1516721-1**						
Conductivity		486	483		umhos/cm	0.6	10	12-SEP-14
WG1950342-1 MB								
Conductivity			<3.0		umhos/cm		3	12-SEP-14
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951192-1 CVS								
Aluminum (Al)-Total			101.3		%		80-120	15-SEP-14
Antimony (Sb)-Total			101.6		%		80-120	15-SEP-14
Arsenic (As)-Total			99.7		%		80-120	15-SEP-14
Barium (Ba)-Total			98.5		%		80-120	15-SEP-14
Beryllium (Be)-Total			101.6		%		80-120	15-SEP-14
Bismuth (Bi)-Total			99.4		%		80-120	15-SEP-14
Boron (B)-Total			101.1		%		80-120	15-SEP-14
Cadmium (Cd)-Total			99.4				80-120	

ALS Environmental

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951192-1 CVS								
Cadmium (Cd)-Total			99.4		%		80-120	15-SEP-14
Calcium (Ca)-Total			106.8		%		80-120	15-SEP-14
Chromium (Cr)-Total			100.1		%		80-120	15-SEP-14
Cobalt (Co)-Total			99.2		%		80-120	15-SEP-14
Copper (Cu)-Total			100.5		%		80-120	15-SEP-14
Iron (Fe)-Total			100.6		%		80-120	15-SEP-14
Lead (Pb)-Total			98.2		%		80-120	15-SEP-14
Magnesium (Mg)-Total			97.6		%		80-120	15-SEP-14
Manganese (Mn)-Total			100.8		%		80-120	15-SEP-14
Molybdenum (Mo)-Total			98.5		%		80-120	15-SEP-14
Nickel (Ni)-Total			98.9		%		80-120	15-SEP-14
Phosphorus (P)-Total			100.8		%		80-120	15-SEP-14
Potassium (K)-Total			101.3		%		80-120	15-SEP-14
Selenium (Se)-Total			101.0		%		80-120	15-SEP-14
Silicon (Si)-Total			105.5		%		80-120	15-SEP-14
Silver (Ag)-Total			104.1		%		80-120	15-SEP-14
Sodium (Na)-Total			101.1		%		80-120	15-SEP-14
Strontium (Sr)-Total			105.9		%		80-120	15-SEP-14
Thallium (Tl)-Total			98.8		%		80-120	15-SEP-14
Tin (Sn)-Total			99.6		%		80-120	15-SEP-14
Titanium (Ti)-Total			101.5		%		80-120	15-SEP-14
Tungsten (W)-Total			95.8		%		80-120	15-SEP-14
Uranium (U)-Total			95.8		%		80-120	15-SEP-14
Vanadium (V)-Total			101.6		%		80-120	15-SEP-14
Zinc (Zn)-Total			94.9		%		80-120	15-SEP-14
Zirconium (Zr)-Total			100.7		%		80-120	15-SEP-14
WG1951192-3 CVS								
Aluminum (Al)-Total			101.7		%		80-120	17-SEP-14
Antimony (Sb)-Total			98.5		%		80-120	17-SEP-14
Arsenic (As)-Total			98.0		%		80-120	17-SEP-14
Barium (Ba)-Total			99.1		%		80-120	17-SEP-14
Beryllium (Be)-Total			100.2		%		80-120	17-SEP-14
Bismuth (Bi)-Total			104.3		%		80-120	17-SEP-14
Boron (B)-Total			99.6		%		80-120	17-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951192-3 CVS								
Cadmium (Cd)-Total			101.0		%		80-120	17-SEP-14
Calcium (Ca)-Total			106.3		%		80-120	17-SEP-14
Chromium (Cr)-Total			99.0		%		80-120	17-SEP-14
Cobalt (Co)-Total			95.7		%		80-120	17-SEP-14
Copper (Cu)-Total			97.9		%		80-120	17-SEP-14
Iron (Fe)-Total			100.9		%		80-120	17-SEP-14
Lead (Pb)-Total			102.6		%		80-120	17-SEP-14
Magnesium (Mg)-Total			98.5		%		80-120	17-SEP-14
Manganese (Mn)-Total			99.1		%		80-120	17-SEP-14
Molybdenum (Mo)-Total			98.7		%		80-120	17-SEP-14
Nickel (Ni)-Total			97.9		%		80-120	17-SEP-14
Phosphorus (P)-Total			99.9		%		80-120	17-SEP-14
Potassium (K)-Total			106.0		%		80-120	17-SEP-14
Selenium (Se)-Total			98.4		%		80-120	17-SEP-14
Silicon (Si)-Total			103.8		%		80-120	17-SEP-14
Silver (Ag)-Total			105.0		%		80-120	17-SEP-14
Sodium (Na)-Total			96.4		%		80-120	17-SEP-14
Strontium (Sr)-Total			102.9		%		80-120	17-SEP-14
Thallium (Tl)-Total			102.3		%		80-120	17-SEP-14
Tin (Sn)-Total			99.3		%		80-120	17-SEP-14
Titanium (Ti)-Total			102.8		%		80-120	17-SEP-14
Tungsten (W)-Total			100.5		%		80-120	17-SEP-14
Uranium (U)-Total			99.2		%		80-120	17-SEP-14
Vanadium (V)-Total			101.8		%		80-120	17-SEP-14
Zinc (Zn)-Total			92.5		%		80-120	17-SEP-14
Zirconium (Zr)-Total			99.95		%		80-120	17-SEP-14
WG1951192-4 CVS								
Aluminum (Al)-Total			101.8		%		80-120	18-SEP-14
Antimony (Sb)-Total			97.2		%		80-120	18-SEP-14
Arsenic (As)-Total			98.5		%		80-120	18-SEP-14
Barium (Ba)-Total			102.0		%		80-120	18-SEP-14
Beryllium (Be)-Total			102.7		%		80-120	18-SEP-14
Bismuth (Bi)-Total			99.0		%		80-120	18-SEP-14
Boron (B)-Total			102.3		%		80-120	18-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951192-4 CVS								
Cadmium (Cd)-Total			101.4		%		80-120	18-SEP-14
Calcium (Ca)-Total			97.0		%		80-120	18-SEP-14
Chromium (Cr)-Total			97.8		%		80-120	18-SEP-14
Cobalt (Co)-Total			97.4		%		80-120	18-SEP-14
Copper (Cu)-Total			97.8		%		80-120	18-SEP-14
Iron (Fe)-Total			101.4		%		80-120	18-SEP-14
Lead (Pb)-Total			95.6		%		80-120	18-SEP-14
Magnesium (Mg)-Total			100.3		%		80-120	18-SEP-14
Manganese (Mn)-Total			100.5		%		80-120	18-SEP-14
Molybdenum (Mo)-Total			97.3		%		80-120	18-SEP-14
Nickel (Ni)-Total			97.4		%		80-120	18-SEP-14
Phosphorus (P)-Total			99.8		%		80-120	18-SEP-14
Potassium (K)-Total			105.4		%		80-120	18-SEP-14
Selenium (Se)-Total			98.1		%		80-120	18-SEP-14
Silicon (Si)-Total			99.96		%		80-120	18-SEP-14
Silver (Ag)-Total			96.3		%		80-120	18-SEP-14
Sodium (Na)-Total			102.3		%		80-120	18-SEP-14
Strontium (Sr)-Total			101.6		%		80-120	18-SEP-14
Thallium (Tl)-Total			97.9		%		80-120	18-SEP-14
Tin (Sn)-Total			99.8		%		80-120	18-SEP-14
Titanium (Ti)-Total			102.6		%		80-120	18-SEP-14
Tungsten (W)-Total			96.2		%		80-120	18-SEP-14
Uranium (U)-Total			95.5		%		80-120	18-SEP-14
Vanadium (V)-Total			98.6		%		80-120	18-SEP-14
Zinc (Zn)-Total			92.2		%		80-120	18-SEP-14
Zirconium (Zr)-Total			95.8		%		80-120	18-SEP-14
WG1951155-4 DUP		**WG1951155-3**						
Aluminum (Al)-Total		4.27	4.01		mg/L	6.1	20	15-SEP-14
Antimony (Sb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-SEP-14
Arsenic (As)-Total		0.0019	0.0019		mg/L	0.3	20	15-SEP-14
Barium (Ba)-Total		0.0645	0.0640		mg/L	0.8	20	15-SEP-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-SEP-14
Bismuth (Bi)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951155-4 DUP		**WG1951155-3**						
Boron (B)-Total		0.047	0.047		mg/L	1.0	20	15-SEP-14
Cadmium (Cd)-Total		0.000131	0.000133		mg/L	1.4	20	15-SEP-14
Calcium (Ca)-Total		65.0	66.3		mg/L	2.0	20	15-SEP-14
Chromium (Cr)-Total		0.00555	0.00546		mg/L	1.6	20	15-SEP-14
Cobalt (Co)-Total		0.00175	0.00173		mg/L	0.9	20	15-SEP-14
Copper (Cu)-Total		0.0078	0.0078		mg/L	0.3	20	15-SEP-14
Iron (Fe)-Total		4.47	4.35		mg/L	2.8	20	15-SEP-14
Lead (Pb)-Total		0.00499	0.00508		mg/L	1.8	20	15-SEP-14
Magnesium (Mg)-Total		11.2	11.5		mg/L	3.1	20	15-SEP-14
Manganese (Mn)-Total		0.209	0.211		mg/L	1.1	20	15-SEP-14
Molybdenum (Mo)-Total		0.00085	0.00086		mg/L	0.7	20	15-SEP-14
Nickel (Ni)-Total		0.0049	0.0048		mg/L	2.4	20	15-SEP-14
Phosphorus (P)-Total		0.423	0.441		mg/L	4.1	20	15-SEP-14
Potassium (K)-Total		6.1	6.3		mg/L	3.5	20	15-SEP-14
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	15-SEP-14
Silicon (Si)-Total		12.2	11.0		mg/L	10	20	15-SEP-14
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-14
Sodium (Na)-Total		12.0	12.6		mg/L	5.2	20	15-SEP-14
Strontium (Sr)-Total		0.303	0.307		mg/L	1.4	20	15-SEP-14
Thallium (Tl)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	15-SEP-14
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-SEP-14
Titanium (Ti)-Total		0.147	0.125		mg/L	16	20	15-SEP-14
Tungsten (W)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-SEP-14
Uranium (U)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-SEP-14
Vanadium (V)-Total		0.00899	0.00878		mg/L	2.3	20	15-SEP-14
Zinc (Zn)-Total		0.0289	0.0293		mg/L	1.5	20	15-SEP-14
Zirconium (Zr)-Total		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	15-SEP-14
WG1951155-2 LCS								
Aluminum (Al)-Total			96.3		%		80-120	15-SEP-14
Antimony (Sb)-Total			101.6		%		80-120	15-SEP-14
Arsenic (As)-Total			96.8		%		80-120	15-SEP-14
Barium (Ba)-Total			99.5		%		80-120	15-SEP-14
Beryllium (Be)-Total			88.4		%		80-120	15-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951155-2 LCS								
Bismuth (Bi)-Total			97.0		%		80-120	15-SEP-14
Boron (B)-Total			85.1		%		80-120	15-SEP-14
Cadmium (Cd)-Total			97.5		%		80-120	15-SEP-14
Calcium (Ca)-Total			97.5		%		80-120	15-SEP-14
Chromium (Cr)-Total			94.6		%		80-120	15-SEP-14
Cobalt (Co)-Total			96.1		%		80-120	15-SEP-14
Copper (Cu)-Total			97.8		%		80-120	15-SEP-14
Iron (Fe)-Total			97.4		%		80-120	15-SEP-14
Lead (Pb)-Total			99.1		%		80-120	15-SEP-14
Magnesium (Mg)-Total			92.9		%		80-120	15-SEP-14
Manganese (Mn)-Total			96.6		%		80-120	15-SEP-14
Molybdenum (Mo)-Total			98.7		%		80-120	15-SEP-14
Nickel (Ni)-Total			96.9		%		80-120	15-SEP-14
Phosphorus (P)-Total			92.9		%		80-120	15-SEP-14
Potassium (K)-Total			88.2		%		80-120	15-SEP-14
Selenium (Se)-Total			96.3		%		80-120	15-SEP-14
Silicon (Si)-Total			96.4		%		80-120	15-SEP-14
Silver (Ag)-Total			101.8		%		80-120	15-SEP-14
Sodium (Na)-Total			90.4		%		80-120	15-SEP-14
Strontium (Sr)-Total			101.9		%		80-120	15-SEP-14
Thallium (Tl)-Total			98.5		%		80-120	15-SEP-14
Tin (Sn)-Total			97.8		%		80-120	15-SEP-14
Titanium (Ti)-Total			93.5		%		80-120	15-SEP-14
Tungsten (W)-Total			94.4		%		80-120	15-SEP-14
Uranium (U)-Total			96.0		%		80-120	15-SEP-14
Vanadium (V)-Total			97.5		%		80-120	15-SEP-14
Zinc (Zn)-Total			99.8		%		80-120	15-SEP-14
Zirconium (Zr)-Total			96.3		%		80-120	15-SEP-14
WG1951155-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	15-SEP-14
Antimony (Sb)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Arsenic (As)-Total			<0.0010		mg/L		0.001	15-SEP-14
Barium (Ba)-Total			<0.0020		mg/L		0.002	15-SEP-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	15-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951155-1 MB								
Bismuth (Bi)-Total			<0.0010		mg/L		0.001	15-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	15-SEP-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	15-SEP-14
Calcium (Ca)-Total			<0.50		mg/L		0.5	15-SEP-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	15-SEP-14
Iron (Fe)-Total			<0.050		mg/L		0.05	15-SEP-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Magnesium (Mg)-Total			<0.50		mg/L		0.5	15-SEP-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	15-SEP-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	15-SEP-14
Phosphorus (P)-Total			<0.050		mg/L		0.05	15-SEP-14
Potassium (K)-Total			<1.0		mg/L		1	15-SEP-14
Selenium (Se)-Total			<0.00040		mg/L		0.0004	15-SEP-14
Silicon (Si)-Total			<1.0		mg/L		1	15-SEP-14
Silver (Ag)-Total			<0.00010		mg/L		0.0001	15-SEP-14
Sodium (Na)-Total			<0.50		mg/L		0.5	15-SEP-14
Strontium (Sr)-Total			<0.0010		mg/L		0.001	15-SEP-14
Thallium (Tl)-Total			<0.00030		mg/L		0.0003	15-SEP-14
Tin (Sn)-Total			<0.0010		mg/L		0.001	15-SEP-14
Titanium (Ti)-Total			<0.0020		mg/L		0.002	15-SEP-14
Tungsten (W)-Total			<0.010		mg/L		0.01	15-SEP-14
Uranium (U)-Total			<0.0010		mg/L		0.001	15-SEP-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	15-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-SEP-14
Zirconium (Zr)-Total			<0.0040		mg/L		0.004	15-SEP-14
WG1951155-5 MS		**WG1951155-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	15-SEP-14
Antimony (Sb)-Total			86.0		%		70-130	15-SEP-14
Arsenic (As)-Total			102.1		%		70-130	15-SEP-14
Barium (Ba)-Total			115.5		%		70-130	15-SEP-14
Beryllium (Be)-Total			85.5		%		70-130	15-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R2948455								
WG1951155-5 MS		**WG1951155-3**						
Bismuth (Bi)-Total			97.1		%		70-130	15-SEP-14
Boron (B)-Total			81.1		%		70-130	15-SEP-14
Cadmium (Cd)-Total			98.1		%		70-130	15-SEP-14
Calcium (Ca)-Total			N/A	MS-B	%		-	15-SEP-14
Chromium (Cr)-Total			98.7		%		70-130	15-SEP-14
Cobalt (Co)-Total			97.2		%		70-130	15-SEP-14
Copper (Cu)-Total			97.3		%		70-130	15-SEP-14
Iron (Fe)-Total			N/A	MS-B	%		-	15-SEP-14
Lead (Pb)-Total			94.3		%		70-130	15-SEP-14
Magnesium (Mg)-Total			N/A	MS-B	%		-	15-SEP-14
Manganese (Mn)-Total			N/A	MS-B	%		-	15-SEP-14
Molybdenum (Mo)-Total			99.1		%		70-130	15-SEP-14
Nickel (Ni)-Total			96.9		%		70-130	15-SEP-14
Phosphorus (P)-Total			95.7		%		70-130	15-SEP-14
Potassium (K)-Total			N/A	MS-B	%		-	15-SEP-14
Selenium (Se)-Total			100.1		%		70-130	15-SEP-14
Silicon (Si)-Total			N/A	MS-B	%		-	15-SEP-14
Silver (Ag)-Total			99.5		%		70-130	15-SEP-14
Sodium (Na)-Total			N/A	MS-B	%		-	15-SEP-14
Strontium (Sr)-Total			N/A	MS-B	%		-	15-SEP-14
Thallium (Tl)-Total			95.4		%		70-130	15-SEP-14
Tin (Sn)-Total			85.0		%		70-130	15-SEP-14
Titanium (Ti)-Total			97.9		%		70-130	15-SEP-14
Tungsten (W)-Total			90.7		%		70-130	15-SEP-14
Uranium (U)-Total			97.8		%		70-130	15-SEP-14
Vanadium (V)-Total			102.5		%		70-130	15-SEP-14
Zinc (Zn)-Total			100.5		%		70-130	15-SEP-14
Zirconium (Zr)-Total			85.3		%		70-130	15-SEP-14
NH3-WT	**Water**							
Batch R2948475								
WG1951238-2 CVS								
Ammonia, Total (as N)			99.6		%		85-115	15-SEP-14
WG1951238-3 DUP		**L1516382-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R2948475								
WG1951238-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	15-SEP-14
WG1951238-4 MS		**L1516382-1**						
Ammonia, Total (as N)			97.4		%		75-125	15-SEP-14
P-ORTHO-LOW-WT	**Water**							
Batch R2951214								
WG1952124-3 DUP		**L1517047-1**						
Phosphate-P (ortho)		0.122	0.122		mg/L	0.2	20	16-SEP-14
WG1952124-2 LCS								
Phosphate-P (ortho)			100.9		%		80-120	16-SEP-14
WG1952124-1 MB								
Phosphate-P (ortho)			<0.0030		mg/L		0.003	16-SEP-14
WG1952124-4 MS		**L1517047-1**						
Phosphate-P (ortho)			N/A	MS-B	%		-	16-SEP-14
PH-ALK-WT	**Water**							
Batch R2947370								
WG1950327-2 DUP		**L1516721-1**						
pH		7.68	7.69	J	pH units	0.00	0.2	12-SEP-14
WG1950327-5 DUP		**WG1950327-4**						
pH		7.93	7.96	J	pH units	0.03	0.2	12-SEP-14
WG1950327-1 LCS								
pH			6.93		pH units		6.9-7.1	12-SEP-14
SOLIDS-TDS-WT	**Water**							
Batch R2948404								
WG1950587-3 DUP		**L1516394-6**						
Total Dissolved Solids		<20	<20	RPD-NA	mg/L	N/A	20	16-SEP-14
WG1950587-2 LCS								
Total Dissolved Solids			94.8		%		85-115	16-SEP-14
WG1950587-1 MB								
Total Dissolved Solids			<20		mg/L		20	16-SEP-14
TOC-WT	**Water**							
Batch R2949525								
WG1951968-7 DUP		**L1517281-35**						
Total Organic Carbon		2.5	2.3		mg/L	8.3	20	16-SEP-14
WG1951968-8 LCS								
Total Organic Carbon			102.0		%		80-120	16-SEP-14
WG1951968-6 MB								

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R2949525								
WG1951968-6 MB								
Total Organic Carbon			<1.0		mg/L		1	16-SEP-14
WG1951968-9 MS		**L1517281-35**						
Total Organic Carbon			102.5		%		70-130	16-SEP-14
TURBIDITY-WT	**Water**							
Batch R2946040								
WG1950209-2 CVS								
Turbidity			112.0		%		85-115	12-SEP-14
WG1950209-4 DUP		**L1516721-1**						
Turbidity		5.65	5.64		NTU	0.2	15	12-SEP-14
WG1950209-1 MB								
Turbidity			<0.10		NTU		0.1	12-SEP-14
VOC-ROU-HS-WT	**Water**							
Batch R2948515								
WG1949741-1 CVS								
1,1,1,2-Tetrachloroethane			94.8		%		70-130	16-SEP-14
1,1,2,2-Tetrachloroethane			92.2		%		70-130	16-SEP-14
1,1,1-Trichloroethane			94.6		%		70-130	16-SEP-14
1,1,2-Trichloroethane			96.3		%		70-130	16-SEP-14
1,2-Dibromoethane			96.4		%		70-130	16-SEP-14
1,1-Dichloroethane			96.4		%		70-130	16-SEP-14
1,1-Dichloroethylene			91.0		%		70-130	16-SEP-14
1,2-Dichlorobenzene			98.9		%		70-130	16-SEP-14
1,2-Dichloroethane			96.7		%		70-130	16-SEP-14
1,2-Dichloropropane			95.3		%		70-130	16-SEP-14
1,3-Dichlorobenzene			98.8		%		70-130	16-SEP-14
1,4-Dichlorobenzene			103.1		%		70-130	16-SEP-14
2-Hexanone			94.9		%		60-140	16-SEP-14
Acetone			105.4		%		60-140	16-SEP-14
Benzene			96.6		%		70-130	16-SEP-14
Bromodichloromethane			91.2		%		70-130	16-SEP-14
Bromoform			91.6		%		70-130	16-SEP-14
Bromomethane			97.4		%		60-140	16-SEP-14
Carbon Disulfide			109.3		%		70-130	16-SEP-14
Carbon tetrachloride			95.0		%		70-130	16-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2948515								
WG1949741-1 CVS								
Chlorobenzene			98.6		%		70-130	16-SEP-14
Chloroethane			101.7		%		70-130	16-SEP-14
Chloroform			97.3		%		70-130	16-SEP-14
Chloromethane			109.9		%		60-140	16-SEP-14
cis-1,2-Dichloroethylene			94.3		%		70-130	16-SEP-14
cis-1,3-Dichloropropene			98.5		%		70-130	16-SEP-14
Dibromochloromethane			95.8		%		70-130	16-SEP-14
Dichlorodifluoromethane			119.4		%		60-140	16-SEP-14
Dichloromethane			95.3		%		70-130	16-SEP-14
Ethyl Benzene			100.5		%		70-130	16-SEP-14
m+p-Xylenes			100.5		%		70-130	16-SEP-14
Methyl Ethyl Ketone			92.6		%		60-140	16-SEP-14
Methyl Isobutyl Ketone			97.4		%		60-140	16-SEP-14
n-Hexane			104.5		%		70-130	16-SEP-14
MTBE			92.6		%		70-130	16-SEP-14
o-Xylene			103.0		%		70-130	16-SEP-14
Styrene			103.2		%		70-130	16-SEP-14
Toluene			100.9		%		70-130	16-SEP-14
trans-1,2-Dichloroethylene			92.0		%		70-130	16-SEP-14
trans-1,3-Dichloropropene			93.8		%		70-130	16-SEP-14
Trichloroethylene			92.2		%		70-130	16-SEP-14
Trichlorofluoromethane			103.1		%		60-140	16-SEP-14
Vinyl chloride			107.3		%		60-140	16-SEP-14
WG1949741-4 DUP		**L1517047-1**						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,2-Dibromoethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2948515								
WG1949741-4 DUP		**L1517047-1**						
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	16-SEP-14
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	16-SEP-14
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Carbon tetrachloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Chloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
cis-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Dichlorodifluoromethane		<1.3	<1.4	RPD-NA	ug/L	N/A	30	16-SEP-14
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Ethyl Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
m+p-Xylenes		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	16-SEP-14
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	16-SEP-14
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
o-Xylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
trans-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
Trichloroethylene		0.64	0.62		ug/L	3.2	30	16-SEP-14
Trichlorofluoromethane		<1.0	<1.0		ug/L			16-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2948515								
WG1949741-4 DUP		**L1517047-1**						
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-SEP-14
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-SEP-14
WG1949741-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	16-SEP-14
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	16-SEP-14
1,1,1-Trichloroethane			<0.50		ug/L		0.5	16-SEP-14
1,1,2-Trichloroethane			<0.50		ug/L		0.5	16-SEP-14
1,2-Dibromoethane			<0.50		ug/L		0.5	16-SEP-14
1,1-Dichloroethane			<0.50		ug/L		0.5	16-SEP-14
1,1-Dichloroethylene			<0.50		ug/L		0.5	16-SEP-14
1,2-Dichlorobenzene			<0.50		ug/L		0.5	16-SEP-14
1,2-Dichloroethane			<0.50		ug/L		0.5	16-SEP-14
1,2-Dichloropropane			<0.50		ug/L		0.5	16-SEP-14
1,3-Dichlorobenzene			<0.50		ug/L		0.5	16-SEP-14
1,4-Dichlorobenzene			<0.50		ug/L		0.5	16-SEP-14
2-Hexanone			<20		ug/L		20	16-SEP-14
Acetone			<20		ug/L		20	16-SEP-14
Benzene			<0.50		ug/L		0.5	16-SEP-14
Bromodichloromethane			<1.0		ug/L		1	16-SEP-14
Bromoform			<1.0		ug/L		1	16-SEP-14
Bromomethane			<0.50		ug/L		0.5	16-SEP-14
Carbon Disulfide			<1.0		ug/L		1	16-SEP-14
Carbon tetrachloride			<0.50		ug/L		0.5	16-SEP-14
Chlorobenzene			<0.50		ug/L		0.5	16-SEP-14
Chloroethane			<1.0		ug/L		1	16-SEP-14
Chloroform			<1.0		ug/L		1	16-SEP-14
Chloromethane			<1.0		ug/L		1	16-SEP-14
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	16-SEP-14
cis-1,3-Dichloropropene			<0.50		ug/L		0.5	16-SEP-14
Dibromochloromethane			<1.0		ug/L		1	16-SEP-14
Dichlorodifluoromethane			1.3	RRQC	ug/L		1	16-SEP-14
Dichloromethane			<2.0		ug/L		2	16-SEP-14
Ethyl Benzene			<0.50		ug/L		0.5	16-SEP-14
m+p-Xylenes			<1.0		ug/L		1	16-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2948515								
WG1949741-2 MB								
Methyl Ethyl Ketone			<20		ug/L		20	16-SEP-14
Methyl Isobutyl Ketone			<20		ug/L		20	16-SEP-14
n-Hexane			<0.50		ug/L		0.5	16-SEP-14
MTBE			<0.50		ug/L		0.5	16-SEP-14
o-Xylene			<0.50		ug/L		0.5	16-SEP-14
Styrene			<0.50		ug/L		0.5	16-SEP-14
Toluene			<0.50		ug/L		0.5	16-SEP-14
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	16-SEP-14
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	16-SEP-14
Trichloroethylene			<0.50		ug/L		0.5	16-SEP-14
Trichlorofluoromethane			<1.0		ug/L		1	16-SEP-14
Vinyl chloride			<0.50		ug/L		0.5	16-SEP-14
Surrogate: 1,4-Difluorobenzene			98.1		%		70-130	16-SEP-14
Surrogate: 4-Bromofluorobenzene			106.8		%		70-130	16-SEP-14
COMMENTS: RRQC-Method blank positive; related samples have been qualified accordingly.								
Batch R2955757								
WG1956858-1 CVS								
1,1,1,2-Tetrachloroethane			94.4		%		70-130	23-SEP-14
1,1,2,2-Tetrachloroethane			102.0		%		70-130	23-SEP-14
1,1,1-Trichloroethane			101.0		%		70-130	23-SEP-14
1,1,2-Trichloroethane			98.4		%		70-130	23-SEP-14
1,2-Dibromoethane			97.2		%		70-130	23-SEP-14
1,1-Dichloroethane			102.4		%		70-130	23-SEP-14
1,1-Dichloroethylene			96.3		%		70-130	23-SEP-14
1,2-Dichlorobenzene			100.7		%		70-130	23-SEP-14
1,2-Dichloroethane			104.3		%		70-130	23-SEP-14
1,2-Dichloropropane			101.5		%		70-130	23-SEP-14
1,3-Dichlorobenzene			96.1		%		70-130	23-SEP-14
1,4-Dichlorobenzene			102.5		%		70-130	23-SEP-14
2-Hexanone			97.0		%		60-140	23-SEP-14
Acetone			109.6		%		60-140	23-SEP-14
Benzene			102.6		%		70-130	23-SEP-14
Bromodichloromethane			99.7		%		70-130	23-SEP-14
Bromoform			97.0		%		70-130	23-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2955757								
WG1956858-1 CVS								
Bromomethane			98.5		%		60-140	23-SEP-14
Carbon Disulfide			112.3		%		70-130	23-SEP-14
Carbon tetrachloride			102.0		%		70-130	23-SEP-14
Chlorobenzene			100.0		%		70-130	23-SEP-14
Chloroethane			105.7		%		70-130	23-SEP-14
Chloroform			105.3		%		70-130	23-SEP-14
Chloromethane			107.8		%		60-140	23-SEP-14
cis-1,2-Dichloroethylene			101.3		%		70-130	23-SEP-14
cis-1,3-Dichloropropene			98.4		%		70-130	23-SEP-14
Dibromochloromethane			97.4		%		70-130	23-SEP-14
Dichlorodifluoromethane			111.1		%		60-140	23-SEP-14
Dichloromethane			102.1		%		70-130	23-SEP-14
Ethyl Benzene			101.5		%		70-130	23-SEP-14
m+p-Xylenes			102.5		%		70-130	23-SEP-14
Methyl Ethyl Ketone			90.5		%		60-140	23-SEP-14
Methyl Isobutyl Ketone			98.6		%		60-140	23-SEP-14
n-Hexane			109.1		%		70-130	23-SEP-14
MTBE			102.0		%		70-130	23-SEP-14
o-Xylene			103.0		%		70-130	23-SEP-14
Styrene			101.7		%		70-130	23-SEP-14
Tetrachloroethylene			91.8		%		70-130	23-SEP-14
Toluene			101.1		%		70-130	23-SEP-14
trans-1,2-Dichloroethylene			96.8		%		70-130	23-SEP-14
trans-1,3-Dichloropropene			88.2		%		70-130	23-SEP-14
Trichloroethylene			97.3		%		70-130	23-SEP-14
Trichlorofluoromethane			110.9		%		60-140	23-SEP-14
Vinyl chloride			107.2		%		60-140	23-SEP-14
WG1956858-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	23-SEP-14
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	23-SEP-14
1,1,1-Trichloroethane			<0.50		ug/L		0.5	23-SEP-14
1,1,2-Trichloroethane			<0.50		ug/L		0.5	23-SEP-14
1,2-Dibromoethane			<0.50		ug/L		0.5	23-SEP-14
1,1-Dichloroethane			<0.50		ug/L		0.5	23-SEP-14

Quality Control Report

Workorder: L1517047 Report Date: 23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2955757								
WG1956858-2 MB								
1,1-Dichloroethylene			<0.50		ug/L		0.5	23-SEP-14
1,2-Dichlorobenzene			<0.50		ug/L		0.5	23-SEP-14
1,2-Dichloroethane			<0.50		ug/L		0.5	23-SEP-14
1,2-Dichloropropane			<0.50		ug/L		0.5	23-SEP-14
1,3-Dichlorobenzene			<0.50		ug/L		0.5	23-SEP-14
1,4-Dichlorobenzene			<0.50		ug/L		0.5	23-SEP-14
2-Hexanone			<20		ug/L		20	23-SEP-14
Acetone			<20		ug/L		20	23-SEP-14
Benzene			<0.50		ug/L		0.5	23-SEP-14
Bromodichloromethane			<1.0		ug/L		1	23-SEP-14
Bromoform			<1.0		ug/L		1	23-SEP-14
Bromomethane			<0.50		ug/L		0.5	23-SEP-14
Carbon Disulfide			<1.0		ug/L		1	23-SEP-14
Carbon tetrachloride			<0.50		ug/L		0.5	23-SEP-14
Chlorobenzene			<0.50		ug/L		0.5	23-SEP-14
Chloroethane			<1.0		ug/L		1	23-SEP-14
Chloroform			<1.0		ug/L		1	23-SEP-14
Chloromethane			<1.0		ug/L		1	23-SEP-14
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	23-SEP-14
cis-1,3-Dichloropropene			<0.50		ug/L		0.5	23-SEP-14
Dibromochloromethane			<1.0		ug/L		1	23-SEP-14
Dichlorodifluoromethane			<1.0		ug/L		1	23-SEP-14
Dichloromethane			<2.0		ug/L		2	23-SEP-14
Ethyl Benzene			<0.50		ug/L		0.5	23-SEP-14
m+p-Xylenes			<1.0		ug/L		1	23-SEP-14
Methyl Ethyl Ketone			<20		ug/L		20	23-SEP-14
Methyl Isobutyl Ketone			<20		ug/L		20	23-SEP-14
n-Hexane			<0.50		ug/L		0.5	23-SEP-14
MTBE			<0.50		ug/L		0.5	23-SEP-14
o-Xylene			<0.50		ug/L		0.5	23-SEP-14
Styrene			<0.50		ug/L		0.5	23-SEP-14
Tetrachloroethylene			<0.50		ug/L		0.5	23-SEP-14
Toluene			<0.50		ug/L		0.5	23-SEP-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R2955757								
WG1956858-2 MB								
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	23-SEP-14
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	23-SEP-14
Trichloroethylene			<0.50		ug/L		0.5	23-SEP-14
Trichlorofluoromethane			<1.0		ug/L		1	23-SEP-14
Vinyl chloride			<0.50		ug/L		0.5	23-SEP-14
Surrogate: 1,4-Difluorobenzene			95.3		%		70-130	23-SEP-14
Surrogate: 4-Bromofluorobenzene			106.0		%		70-130	23-SEP-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: JASON WHITE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1517047-COFC

COC Number: 14 - 398293

Page 1 of 1

Report To: Jason White
Company: JiREM
Contact:
Address: 130 RESEARCH LN, SUITE 2
GUELPH, ON N1G 5G3
Phone: 519-822-2265

Report Format / D
Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☒ Yes ☐ No
☐ Criteria on Report - provide details below if box checked
Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: jjwhite@siremlab.com
Email 2: jroberts@siremlab.com

low (Rush Turnaround Time (TAT) is not available for all tests)
R ☐ Regular (Standard TAT if received by 3pm)
P ☐ Priority (2-4 business days if received by 3pm)
E ☐ Emergency (1-2 business days if received by 3pm)
E2 ☐ Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Specify Date Required for E2,E or P:

Invoice To Same as Report To ☒ Yes ☐ No
Copy of Invoice with Report ☒ Yes ☐ No
Company: JiREM
Contact: Karen Broersma

Invoice Distribution
Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: KBroersma@Geosyntec.com
Email 2:

Project Information
ALS Quote #:
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)
Approver ID:
Cost Center:
GL Account:
Routing Code:
Activity Code:
Location:

ALS Lab Work Order # (lab use only): L1517047 3780
ALS Contact: Laura Ermeta
Sampler: J. White

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	cVOC's (EPA 8260B)	Alk-Spec, Colour, EC, TDS, pH, Turbidity	NH3, TOC	Metals (total) EPA 6010/6020	Anions	DOC									Number of Containers
					P		P	P											
1	S-3316-110914-B	11-09-14	12:00	GW	2X	1X	1X	1X	1X	1X									
2	S-3316-110914-B2	11-09-14	12:15	GW	1X														

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System?
☐ Yes ☒ No
Are samples for human drinking water use?
☐ Yes ☒ No

Special Instructions / Specify Criteria to add on report (client Use)
- for cVOC's please duplicate sample S-3316-110914-B
- for cVOCs please single sample S-3316-110914-B2

SAMPLE CONDITION AS RECEIVED (lab use only)
Frozen ☐
Ice packs Yes ☑ No ☐
Cooling Initiated ☐
SIF Observations Yes ☐ No ☒
Custody seal intact Yes ☐ No ☒

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			3.5		

SHIPMENT RELEASE (client use)
Released by: J. White
Date: 12-09-14
Time: 10:00am

INITIAL SHIPMENT RECEPTION (lab use only)
Received by:
Date:
Time:

FINAL SHIPMENT RECEPTION (lab use only)
Received by: MM
Date: Sep 12/14
Time: 15:35

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v08 Front/03 October 2013

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

SIREM
ATTN: Jeff Roberts
130 Research Lane
Suite 2
Guelph ON N1G 5G3

Date Received: 21-NOV-14
Report Date: 27-NOV-14 09:12 (MT)
Version: FINAL

Client Phone: 519-515-0840

Certificate of Analysis

Lab Work Order #:	**L1549724**
Project P.O. #:	NOT SUBMITTED
Job Reference:	
C of C Numbers:	
Legal Site Desc:	

Mathumai Ganeshakumar
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-1	S-3316-11192014-CONNELLY-EFF							
Sampled By:	JASON WHITE on 19-NOV-14 @ 09:30							
Matrix:	WATER							
Volatile Organic Compounds								
Acetone		<20		20	ug/L		24-NOV-14	R3101153
Benzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Bromodichloromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromoform		<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromomethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
Carbon Disulfide		<1.0		1.0	ug/L		24-NOV-14	R3101153
Carbon tetrachloride		<0.50		0.50	ug/L		24-NOV-14	R3101153
Chlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dibromochloromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroform		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
1,2-Dibromoethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,3-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,4-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichlorodifluoromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
1,1-Dichloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichloroethane		1.34		0.50	ug/L		24-NOV-14	R3101153
1,1-Dichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,2-Dichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,2-Dichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichloromethane		13.5		2.0	ug/L		24-NOV-14	R3101153
1,2-Dichloropropane		<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,3-Dichloropropene		<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,3-Dichloropropene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Ethyl Benzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
n-Hexane		<0.50		0.50	ug/L		24-NOV-14	R3101153
2-Hexanone		<20		20	ug/L		24-NOV-14	R3101153
Methyl Ethyl Ketone		<20		20	ug/L		24-NOV-14	R3101153
Methyl Isobutyl Ketone		<20		20	ug/L		24-NOV-14	R3101153
MTBE		<0.50		0.50	ug/L		24-NOV-14	R3101153
Styrene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1,2-Tetrachloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2,2-Tetrachloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
Tetrachloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Toluene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1-Trichloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2-Trichloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichlorofluoromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-1	S-3316-11192014-CONNELLY-EFF							
Sampled By:	JASON WHITE on 19-NOV-14 @ 09:30							
Matrix:	WATER							
Volatile Organic Compounds								
Vinyl chloride		<0.50		0.50	ug/L		24-NOV-14	R3101153
o-Xylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
m+p-Xylenes		<1.0		1.0	ug/L		24-NOV-14	R3101153
Xylenes (Total)		<1.1		1.1	ug/L		24-NOV-14	
Surrogate: 4-Bromofluorobenzene		89.3		70-130	%		24-NOV-14	R3101153
Surrogate: 1,4-Difluorobenzene		93.7		70-130	%		24-NOV-14	R3101153
Trihalomethanes								
Total THMs		<2.0		2.0	ug/L		24-NOV-14	
L1549724-2	S-3316-11192014-PEERLESS-EFF							
Sampled By:	JASON WHITE on 19-NOV-14 @ 09:30							
Matrix:	WATER							
Volatile Organic Compounds								
Acetone		<20		20	ug/L		24-NOV-14	R3101153
Benzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Bromodichloromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromoform		<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromomethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
Carbon Disulfide		<1.0		1.0	ug/L		24-NOV-14	R3101153
Carbon tetrachloride		<0.50		0.50	ug/L		24-NOV-14	R3101153
Chlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dibromochloromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroform		<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloromethane		1.3		1.0	ug/L		24-NOV-14	R3101153
1,2-Dibromoethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,3-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,4-Dichlorobenzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichlorodifluoromethane		<1.0		1.0	ug/L		24-NOV-14	R3101153
1,1-Dichloroethane		<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichloroethane		1.25		0.50	ug/L		24-NOV-14	R3101153
1,1-Dichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,2-Dichloroethylene		1.79		0.50	ug/L		24-NOV-14	R3101153
trans-1,2-Dichloroethylene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichloromethane		11.6		2.0	ug/L		24-NOV-14	R3101153
1,2-Dichloropropane		<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,3-Dichloropropene		<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,3-Dichloropropene		<0.50		0.50	ug/L		24-NOV-14	R3101153
Ethyl Benzene		<0.50		0.50	ug/L		24-NOV-14	R3101153
n-Hexane		<0.50		0.50	ug/L		24-NOV-14	R3101153
2-Hexanone		<20		20	ug/L		24-NOV-14	R3101153
Methyl Ethyl Ketone		<20		20	ug/L		24-NOV-14	R3101153

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-2 S-3316-11192014-PEERLESS-EFF Sampled By: JASON WHITE on 19-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Methyl Isobutyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
MTBE	<0.50		0.50	ug/L		24-NOV-14	R3101153
Styrene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Tetrachloroethylene	19.5		0.50	ug/L		24-NOV-14	R3101153
Toluene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichlorofluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Vinyl chloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
o-Xylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
m+p-Xylenes	<1.0		1.0	ug/L		24-NOV-14	R3101153
Xylenes (Total)	<1.1		1.1	ug/L		24-NOV-14	
Surrogate: 4-Bromofluorobenzene	87.9		70-130	%		24-NOV-14	R3101153
Surrogate: 1,4-Difluorobenzene	94.2		70-130	%		24-NOV-14	R3101153
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		24-NOV-14	
L1549724-3 S-3316-11202014-CONNELLY-PORT F Sampled By: JASON WHITE on 20-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<20		20	ug/L		24-NOV-14	R3101153
Benzene	0.54		0.50	ug/L		24-NOV-14	R3101153
Bromodichloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromoform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromomethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Carbon Disulfide	<1.0		1.0	ug/L		24-NOV-14	R3101153
Carbon tetrachloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
Chlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dibromochloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloromethane	1.2		1.0	ug/L		24-NOV-14	R3101153
1,2-Dibromoethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,3-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,4-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichlorodifluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
1,1-Dichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichloroethane	1.24		0.50	ug/L		24-NOV-14	R3101153

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-3 S-3316-11202014-CONNELLY-PORT F Sampled By: JASON WHITE on 20-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
1,1-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,2-Dichloroethylene	11.5		0.50	ug/L		24-NOV-14	R3101153
trans-1,2-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichloromethane	<2.0		2.0	ug/L		24-NOV-14	R3101153
1,2-Dichloropropane	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Ethyl Benzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
n-Hexane	<0.50		0.50	ug/L		24-NOV-14	R3101153
2-Hexanone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Ethyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Isobutyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
MTBE	<0.50		0.50	ug/L		24-NOV-14	R3101153
Styrene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Tetrachloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Toluene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichlorofluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Vinyl chloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
o-Xylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
m+p-Xylenes	<1.0		1.0	ug/L		24-NOV-14	R3101153
Xylenes (Total)	<1.1		1.1	ug/L		24-NOV-14	
Surrogate: 4-Bromofluorobenzene	85.6		70-130	%		24-NOV-14	R3101153
Surrogate: 1,4-Difluorobenzene	93.6		70-130	%		24-NOV-14	R3101153
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		24-NOV-14	
L1549724-4 S-3316-11202014-PEERLESS-PORT F Sampled By: JASON WHITE on 20-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<20		20	ug/L		24-NOV-14	R3101153
Benzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Bromodichloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromoform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromomethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Carbon Disulfide	<1.0		1.0	ug/L		24-NOV-14	R3101153
Carbon tetrachloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
Chlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-4 S-3316-11202014-PEERLESS-PORT F Sampled By: JASON WHITE on 20-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Dibromochloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
1,2-Dibromoethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,3-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,4-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichlorodifluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
1,1-Dichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichloroethane	1.53		0.50	ug/L		24-NOV-14	R3101153
1,1-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,2-Dichloroethylene	2.35		0.50	ug/L		24-NOV-14	R3101153
trans-1,2-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichloromethane	5.3		2.0	ug/L		24-NOV-14	R3101153
1,2-Dichloropropane	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Ethyl Benzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
n-Hexane	<0.50		0.50	ug/L		24-NOV-14	R3101153
2-Hexanone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Ethyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Isobutyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
MTBE	<0.50		0.50	ug/L		24-NOV-14	R3101153
Styrene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Tetrachloroethylene	86.7		0.50	ug/L		24-NOV-14	R3101153
Toluene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichlorofluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Vinyl chloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
o-Xylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
m+p-Xylenes	<1.0		1.0	ug/L		24-NOV-14	R3101153
Xylenes (Total)	<1.1		1.1	ug/L		24-NOV-14	
Surrogate: 4-Bromofluorobenzene	84.9		70-130	%		24-NOV-14	R3101153
Surrogate: 1,4-Difluorobenzene	92.5		70-130	%		24-NOV-14	R3101153
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		24-NOV-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-5 S-3316-11212014-CROWN CHEVY-INF Sampled By: JASON WHITE on 21-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<20		20	ug/L		24-NOV-14	R3101153
Benzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Bromodichloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromoform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Bromomethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Carbon Disulfide	<1.0		1.0	ug/L		24-NOV-14	R3101153
Carbon tetrachloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
Chlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dibromochloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloroform	<1.0		1.0	ug/L		24-NOV-14	R3101153
Chloromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
1,2-Dibromoethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,3-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,4-Dichlorobenzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichlorodifluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153
1,1-Dichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,2-Dichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,2-Dichloroethylene	2.44		0.50	ug/L		24-NOV-14	R3101153
trans-1,2-Dichloroethylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Dichloromethane	<2.0		2.0	ug/L		24-NOV-14	R3101153
1,2-Dichloropropane	<0.50		0.50	ug/L		24-NOV-14	R3101153
cis-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		24-NOV-14	R3101153
Ethyl Benzene	<0.50		0.50	ug/L		24-NOV-14	R3101153
n-Hexane	<0.50		0.50	ug/L		24-NOV-14	R3101153
2-Hexanone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Ethyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
Methyl Isobutyl Ketone	<20		20	ug/L		24-NOV-14	R3101153
MTBE	<0.50		0.50	ug/L		24-NOV-14	R3101153
Styrene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Tetrachloroethylene	1650	DLA	10	ug/L		26-NOV-14	R3101153
Toluene	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,1-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
1,1,2-Trichloroethane	<0.50		0.50	ug/L		24-NOV-14	R3101153
Trichloroethylene	931	DLA	10	ug/L		26-NOV-14	R3101153
Trichlorofluoromethane	<1.0		1.0	ug/L		24-NOV-14	R3101153

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1549724-5 S-3316-11212014-CROWN CHEVY-INF Sampled By: JASON WHITE on 21-NOV-14 @ 09:30 Matrix: WATER							
Volatile Organic Compounds							
Vinyl chloride	<0.50		0.50	ug/L		24-NOV-14	R3101153
o-Xylene	<0.50		0.50	ug/L		24-NOV-14	R3101153
m+p-Xylenes	<1.0		1.0	ug/L		24-NOV-14	R3101153
Xylenes (Total)	<1.1		1.1	ug/L		26-NOV-14	
Surrogate: 4-Bromofluorobenzene	87.4		70-130	%		24-NOV-14	R3101153
Surrogate: 1,4-Difluorobenzene	92.5		70-130	%		24-NOV-14	R3101153
Trihalomethanes							
Total THMs	<2.0		2.0	ug/L		26-NOV-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
THM-SUM-PPB-CALC-WT	Water	Total Trihalomethanes (THMs)	CALCULATION
Total Trihalomethanes (THMs) represents the sum of bromodichloromethane, bromoform, chlorodibromomethane and chloroform. For the purpose of calculation, results less than the detection limit (DL) are treated as zero.			
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
Aqueous samples are analyzed by headspace-GC/MS.			
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1549724 Report Date: 27-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R3101153								
WG2000652-1 CVS								
1,1,1,2-Tetrachloroethane			113.3		%		70-130	24-NOV-14
1,1,2,2-Tetrachloroethane			103.1		%		70-130	24-NOV-14
1,1,1-Trichloroethane			115.5		%		70-130	24-NOV-14
1,1,2-Trichloroethane			108.1		%		70-130	24-NOV-14
1,2-Dibromoethane			105.1		%		70-130	24-NOV-14
1,1-Dichloroethane			106.3		%		70-130	24-NOV-14
1,1-Dichloroethylene			103.4		%		70-130	24-NOV-14
1,2-Dichlorobenzene			114.1		%		70-130	24-NOV-14
1,2-Dichloroethane			104.1		%		70-130	24-NOV-14
1,2-Dichloropropane			103.6		%		70-130	24-NOV-14
1,3-Dichlorobenzene			115.9		%		70-130	24-NOV-14
1,4-Dichlorobenzene			112.8		%		70-130	24-NOV-14
2-Hexanone			78.6		%		60-140	24-NOV-14
Acetone			101.8		%		60-140	24-NOV-14
Benzene			106.8		%		70-130	24-NOV-14
Bromodichloromethane			74.0		%		70-130	24-NOV-14
Bromoform			104.1		%		70-130	24-NOV-14
Bromomethane			108.4		%		60-140	24-NOV-14
Carbon Disulfide			106.3		%		70-130	24-NOV-14
Carbon tetrachloride			116.2		%		70-130	24-NOV-14
Chlorobenzene			113.3		%		70-130	24-NOV-14
Chloroethane			115.0		%		70-130	24-NOV-14
Chloroform			110.6		%		70-130	24-NOV-14
Chloromethane			111.9		%		60-140	24-NOV-14
cis-1,2-Dichloroethylene			107.5		%		70-130	24-NOV-14
cis-1,3-Dichloropropene			78.7		%		70-130	24-NOV-14
Dibromochloromethane			107.5		%		70-130	24-NOV-14
Dichlorodifluoromethane			117.4		%		60-140	24-NOV-14
Dichloromethane			107.5		%		70-130	24-NOV-14
Ethyl Benzene			107.1		%		70-130	24-NOV-14
m+p-Xylenes			117.6		%		70-130	24-NOV-14
Methyl Ethyl Ketone			90.5		%		60-140	24-NOV-14
Methyl Isobutyl Ketone			77.3		%		60-140	24-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R3101153								
WG2000652-1 CVS								
n-Hexane			116.0		%		70-130	24-NOV-14
MTBE			113.2		%		70-130	24-NOV-14
o-Xylene			114.8		%		70-130	24-NOV-14
Styrene			112.6		%		70-130	24-NOV-14
Tetrachloroethylene			118.8		%		70-130	24-NOV-14
Toluene			107.3		%		70-130	24-NOV-14
trans-1,2-Dichloroethylene			104.6		%		70-130	24-NOV-14
trans-1,3-Dichloropropene			97.3		%		70-130	24-NOV-14
Trichloroethylene			110.7		%		70-130	24-NOV-14
Trichlorofluoromethane			123.3		%		60-140	24-NOV-14
Vinyl chloride			112.5		%		60-140	24-NOV-14
WG2000652-4 DUP		**WG2000652-3**						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,2-Dibromoethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	24-NOV-14
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	24-NOV-14
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Carbon tetrachloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14

Quality Control Report

Workorder: L1549724 Report Date: 27-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R3101153								
WG2000652-4 DUP		**WG2000652-3**						
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Chloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
cis-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Ethyl Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
m+p-Xylenes		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	24-NOV-14
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	24-NOV-14
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
o-Xylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
trans-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-NOV-14
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	24-NOV-14
WG2000652-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	24-NOV-14
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	24-NOV-14
1,1,1-Trichloroethane			<0.50		ug/L		0.5	24-NOV-14
1,1,2-Trichloroethane			<0.50		ug/L		0.5	24-NOV-14
1,2-Dibromoethane			<0.50		ug/L		0.5	24-NOV-14
1,1-Dichloroethane			<0.50		ug/L		0.5	24-NOV-14
1,1-Dichloroethylene			<0.50		ug/L		0.5	24-NOV-14
1,2-Dichlorobenzene			<0.50		ug/L		0.5	24-NOV-14
1,2-Dichloroethane			<0.50		ug/L		0.5	24-NOV-14

Quality Control Report

Workorder: L1549724 Report Date: 27-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R3101153								
WG2000652-2 MB								
1,2-Dichloropropane			<0.50		ug/L		0.5	24-NOV-14
1,3-Dichlorobenzene			<0.50		ug/L		0.5	24-NOV-14
1,4-Dichlorobenzene			<0.50		ug/L		0.5	24-NOV-14
2-Hexanone			<20		ug/L		20	24-NOV-14
Acetone			<20		ug/L		20	24-NOV-14
Benzene			<0.50		ug/L		0.5	24-NOV-14
Bromodichloromethane			<1.0		ug/L		1	24-NOV-14
Bromoform			<1.0		ug/L		1	24-NOV-14
Bromomethane			<0.50		ug/L		0.5	24-NOV-14
Carbon Disulfide			<1.0		ug/L		1	24-NOV-14
Carbon tetrachloride			<0.50		ug/L		0.5	24-NOV-14
Chlorobenzene			<0.50		ug/L		0.5	24-NOV-14
Chloroethane			<1.0		ug/L		1	24-NOV-14
Chloroform			<1.0		ug/L		1	24-NOV-14
Chloromethane			<1.0		ug/L		1	24-NOV-14
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	24-NOV-14
cis-1,3-Dichloropropene			<0.50		ug/L		0.5	24-NOV-14
Dibromochloromethane			<1.0		ug/L		1	24-NOV-14
Dichlorodifluoromethane			<1.0		ug/L		1	24-NOV-14
Dichloromethane			<2.0		ug/L		2	24-NOV-14
Ethyl Benzene			<0.50		ug/L		0.5	24-NOV-14
m+p-Xylenes			<1.0		ug/L		1	24-NOV-14
Methyl Ethyl Ketone			<20		ug/L		20	24-NOV-14
Methyl Isobutyl Ketone			<20		ug/L		20	24-NOV-14
n-Hexane			<0.50		ug/L		0.5	24-NOV-14
MTBE			<0.50		ug/L		0.5	24-NOV-14
o-Xylene			<0.50		ug/L		0.5	24-NOV-14
Styrene			<0.50		ug/L		0.5	24-NOV-14
Tetrachloroethylene			<0.50		ug/L		0.5	24-NOV-14
Toluene			<0.50		ug/L		0.5	24-NOV-14
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	24-NOV-14
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	24-NOV-14
Trichloroethylene			<0.50		ug/L		0.5	24-NOV-14

Quality Control Report

Workorder: L1549724 Report Date: 27-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R3101153								
WG2000652-2 MB								
Trichlorofluoromethane			<1.0		ug/L		1	24-NOV-14
Vinyl chloride			<0.50		ug/L		0.5	24-NOV-14
Surrogate: 1,4-Difluorobenzene			95.8		%		70-130	24-NOV-14
Surrogate: 4-Bromofluorobenzene			87.0		%		70-130	24-NOV-14

Quality Control Report

Workorder: L1549724 Report Date: 27-NOV-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

C of C #

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

ALS

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page ___ of ___

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested			
5 day (regular)	X	Next day TAT (100%)	
3-4 day (25%)		Same day TAT (200%)	
		2 day TAT (50%)	

COMPANY NAME: SiREM
OFFICE: 130 RESEARCH LN. SUITE 2 GUELPH, ON N1G 5G3
PROJECT MANAGER: Jeff Roberts
PROJECT #
PHONE: 519-515-0840
FAX
ACCOUNT #
QUOTATION #
PO #

CRITERIA Criteria on report YES ✓ NO___
Reg 153/04 Reg 511/09
Table 1 2 3
TCLP _____ MISA _____ PWQO _____
ODWS _____ OTHER _____

REPORT FORMAT/DISTRIBUTION
EMAIL _____ FAX _____ BOTH ✓
SELECT: PDF _____ DIGITAL _____ BOTH ✓
EMAIL 1 ____________
EMAIL 2 jwhite@siremlab.com

ANALYSIS REQUEST: VOCs (8260) X

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <------ (F, P, F/P)

SUBMISSION #: L1549724
ENTERED BY:
DATE/TIME ENTERED: 21/11/14
BIN #: —

SAMPLING INFORMATION

Date (dd-mm-yy)	Time (24hr) (hh:mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	VOCs (8260)	COMMENTS	LAB ID
11 19 2014	9:30am			X			S-3316 - 11192014 - Connelly Eff	2	X		1
11-19 2014				X			S-3316 - 11192014 - [illegible] Eff	2	X		2
11-20-2014				X			S-3316 - 11202014 - Connelly Post F	2	X		3
11-20-2014				X			S-3316 - 11202014 - Peerless Post F	2	X		4
11-21-2014				X			S-3316 - 11212014 - Connelly - INFL	2	X		5
~~11-21-2014~~											

L1549724-COFC

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ___ No ___
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ___ No ___

SAMPLE CONDITION
___ FROZEN
___ COLD
___ COOLING INITIATED
___ AMBIENT
MEAN TEMP: 2.6
OBSERVATIONS Yes ___ No ___ If yes add SIF
INIT

SAMPLED BY: Jason White
DATE & TIME
RECEIVED BY:
DATE & TIME
RELINQUISHED BY: Jason White
DATE & TIME
RECEIVED AT LAB BY:
DATE & TIME: 21 Nov 14 15:30

Notes
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

SIREM
ATTN: Jeff Roberts
130 Research Lane
Suite 2
Guelph ON N1G 5G3

Date Received: 04-DEC-14
Report Date: 11-DEC-14 14:14 (MT)
Version: FINAL

Client Phone: 519-515-0840

Certificate of Analysis

Lab Work Order #:	**L1554928**
Project P.O. #:	NOT SUBMITTED
Job Reference:	S-3316 CROWN CHEVY
C of C Numbers:	
Legal Site Desc:	

Mathumai Ganeshakumar
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-1 S-3316-11282104-CONNELLY EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	3.4		1.0	C.U.		05-DEC-14	R3116433
pH	9.56		0.10	pH units	05-DEC-14	05-DEC-14	R3115689
Total Dissolved Solids	262		20	mg/L	05-DEC-14	05-DEC-14	R3116163
Turbidity	0.74	PEHR	0.10	NTU	05-DEC-14	05-DEC-14	R3115934
Anions and Nutrients							
Ammonia, Total (as N)	0.638		0.050	mg/L		05-DEC-14	R3115695
Bromide	0.21		0.10	mg/L		05-DEC-14	R3116782
Chloride	94.1		2.0	mg/L		05-DEC-14	R3116782
Fluoride	0.15		0.10	mg/L		05-DEC-14	R3116782
Nitrate and Nitrite as N	<0.2		0.20	mg/L		08-DEC-14	
Nitrate-N	<0.10		0.10	mg/L		05-DEC-14	R3116782
Nitrite-N	<0.10		0.10	mg/L		05-DEC-14	R3116782
Phosphate-P (ortho)	0.0033		0.0030	mg/L		05-DEC-14	R3116825
Sulphate	<2.0		2.0	mg/L		05-DEC-14	R3116782
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117110
Total Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117112
Inorganic Parameters							
Silica	<2.1		2.1	mg/L		08-DEC-14	
Total Metals							
Aluminum (Al)-Total	0.026		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Antimony (Sb)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Arsenic (As)-Total	0.0742		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Barium (Ba)-Total	0.073		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Beryllium (Be)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Bismuth (Bi)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Boron (B)-Total	0.549		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	04-DEC-14	08-DEC-14	R3116494
Calcium (Ca)-Total	5.97		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Iron (Fe)-Total	0.117		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Lead (Pb)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Magnesium (Mg)-Total	10.3		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Manganese (Mn)-Total	0.0471		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Molybdenum (Mo)-Total	0.0532		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Phosphorus (P)-Total	0.093		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Potassium (K)-Total	<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Selenium (Se)-Total	<0.00040		0.00040	mg/L	04-DEC-14	08-DEC-14	R3116494
Silicon (Si)-Total	<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-1 S-3316-11282104-CONNELLY EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Total Metals							
Silver (Ag)-Total	<0.00010		0.00010	mg/L	04-DEC-14	08-DEC-14	R3116494
Sodium (Na)-Total	75.1		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Strontium (Sr)-Total	0.0329		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Thallium (Tl)-Total	<0.00030		0.00030	mg/L	04-DEC-14	08-DEC-14	R3116494
Tin (Sn)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Titanium (Ti)-Total	<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Tungsten (W)-Total	<0.010		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Uranium (U)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Vanadium (V)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Zinc (Zn)-Total	0.0033		0.0030	mg/L	04-DEC-14	08-DEC-14	R3116494
Zirconium (Zr)-Total	<0.0040		0.0040	mg/L	04-DEC-14	08-DEC-14	R3116494
L1554928-2 S-3316-11282104-PEERLESS EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	2.7		1.0	C.U.		05-DEC-14	R3116433
pH	9.42		0.10	pH units	05-DEC-14	05-DEC-14	R3115689
Total Dissolved Solids	288		20	mg/L	05-DEC-14	05-DEC-14	R3116163
Turbidity	0.30	PEHR	0.10	NTU	05-DEC-14	05-DEC-14	R3115934
Anions and Nutrients							
Ammonia, Total (as N)	0.351		0.050	mg/L		05-DEC-14	R3115695
Bromide	0.19		0.10	mg/L		05-DEC-14	R3116782
Chloride	94.2		2.0	mg/L		05-DEC-14	R3116782
Fluoride	0.10		0.10	mg/L		05-DEC-14	R3116782
Nitrate and Nitrite as N	<0.2		0.20	mg/L		08-DEC-14	
Nitrate-N	<0.10		0.10	mg/L		05-DEC-14	R3116782
Nitrite-N	<0.10		0.10	mg/L		05-DEC-14	R3116782
Phosphate-P (ortho)	<0.0030		0.0030	mg/L		05-DEC-14	R3116825
Sulphate	34.6		2.0	mg/L		05-DEC-14	R3116782
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117110
Total Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117112
Inorganic Parameters							
Silica	<2.1		2.1	mg/L		08-DEC-14	
Total Metals							
Aluminum (Al)-Total	0.013		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Antimony (Sb)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Arsenic (As)-Total	0.0016		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Barium (Ba)-Total	0.015		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Beryllium (Be)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Bismuth (Bi)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Boron (B)-Total	0.299		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-2 S-3316-11282104-PEERLESS EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Total Metals							
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	04-DEC-14	08-DEC-14	R3116494
Calcium (Ca)-Total	4.46		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Iron (Fe)-Total	<0.050		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Lead (Pb)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Magnesium (Mg)-Total	23.2		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Manganese (Mn)-Total	0.0635		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Molybdenum (Mo)-Total	0.0042		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Phosphorus (P)-Total	0.053		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Potassium (K)-Total	<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Selenium (Se)-Total	<0.00040		0.00040	mg/L	04-DEC-14	08-DEC-14	R3116494
Silicon (Si)-Total	<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Silver (Ag)-Total	<0.00010		0.00010	mg/L	04-DEC-14	08-DEC-14	R3116494
Sodium (Na)-Total	73.5		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Strontium (Sr)-Total	0.0191		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Thallium (Tl)-Total	<0.00030		0.00030	mg/L	04-DEC-14	08-DEC-14	R3116494
Tin (Sn)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Titanium (Ti)-Total	<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Tungsten (W)-Total	<0.010		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Uranium (U)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Vanadium (V)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	04-DEC-14	08-DEC-14	R3116494
Zirconium (Zr)-Total	<0.0040		0.0040	mg/L	04-DEC-14	08-DEC-14	R3116494
L1554928-3 S-3316-11282104-CONTROL EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		05-DEC-14	R3116433
pH	7.97		0.10	pH units	05-DEC-14	05-DEC-14	R3115689
Total Dissolved Solids	704		20	mg/L	05-DEC-14	05-DEC-14	R3116163
Turbidity	0.10	PEHR	0.10	NTU	05-DEC-14	05-DEC-14	R3115934
Anions and Nutrients							
Alkalinity, Bicarbonate (as CaCO3)	430		10	mg/L		08-DEC-14	R3117065
Alkalinity, Carbonate (as CaCO3)	<10		10	mg/L		08-DEC-14	R3117065
Alkalinity, Hydroxide (as CaCO3)	<10		10	mg/L		08-DEC-14	R3117065
Alkalinity, Total (as CaCO3)	430		10	mg/L		08-DEC-14	R3117065
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-DEC-14	R3115695
Bromide	0.14		0.10	mg/L		05-DEC-14	R3116782
Chloride	91.0		2.0	mg/L		05-DEC-14	R3116782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-3	S-3316-11282104-CONTROL EFFL.							
Sampled By:	J. WHITE on 28-NOV-14							
Matrix:	WATER							
Anions and Nutrients								
Fluoride		0.40		0.10	mg/L		05-DEC-14	R3116782
Nitrate and Nitrite as N		2.27		0.20	mg/L		08-DEC-14	
Nitrate-N		2.27		0.10	mg/L		05-DEC-14	R3116782
Nitrite-N		<0.10		0.10	mg/L		05-DEC-14	R3116782
Phosphate-P (ortho)		0.0662		0.0030	mg/L		05-DEC-14	R3116825
Sulphate		62.0		2.0	mg/L		05-DEC-14	R3116782
Organic / Inorganic Carbon								
Dissolved Organic Carbon		<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117110
Total Organic Carbon		<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117112
Inorganic Parameters								
Silica		23.2		2.1	mg/L		08-DEC-14	
Total Metals								
Aluminum (Al)-Total		0.025		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Antimony (Sb)-Total		<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Arsenic (As)-Total		0.0053		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Barium (Ba)-Total		0.158		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Beryllium (Be)-Total		<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Bismuth (Bi)-Total		<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Boron (B)-Total		0.336		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cadmium (Cd)-Total		<0.000090		0.000090	mg/L	04-DEC-14	08-DEC-14	R3116494
Calcium (Ca)-Total		140		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Chromium (Cr)-Total		<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cobalt (Co)-Total		<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Copper (Cu)-Total		<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Iron (Fe)-Total		<0.050		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Lead (Pb)-Total		<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Magnesium (Mg)-Total		36.0		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Manganese (Mn)-Total		0.0120		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Molybdenum (Mo)-Total		0.0019		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Nickel (Ni)-Total		0.0022		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Phosphorus (P)-Total		0.099		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Potassium (K)-Total		<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Selenium (Se)-Total		0.00062		0.00040	mg/L	04-DEC-14	08-DEC-14	R3116494
Silicon (Si)-Total		10.9		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Silver (Ag)-Total		<0.00010		0.00010	mg/L	04-DEC-14	08-DEC-14	R3116494
Sodium (Na)-Total		76.8		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Strontium (Sr)-Total		1.43		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Thallium (Tl)-Total		<0.00030		0.00030	mg/L	04-DEC-14	08-DEC-14	R3116494
Tin (Sn)-Total		<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Titanium (Ti)-Total		<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Tungsten (W)-Total		<0.010		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Uranium (U)-Total		<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-3 S-3316-11282104-CONTROL EFFL. Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Total Metals							
Vanadium (V)-Total	0.0043		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	04-DEC-14	08-DEC-14	R3116494
Zirconium (Zr)-Total	<0.0040		0.0040	mg/L	04-DEC-14	08-DEC-14	R3116494
L1554928-4 S-3316-11282104-INFLUENT Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	1.1		1.0	C.U.		05-DEC-14	R3116433
pH	7.60		0.10	pH units	05-DEC-14	05-DEC-14	R3115689
Total Dissolved Solids	694		20	mg/L	05-DEC-14	05-DEC-14	R3116163
Turbidity	1.14	PEHR	0.10	NTU	05-DEC-14	05-DEC-14	R3115934
Anions and Nutrients							
Alkalinity, Bicarbonate (as CaCO3)	459		10	mg/L		08-DEC-14	R3117065
Alkalinity, Carbonate (as CaCO3)	<10		10	mg/L		08-DEC-14	R3117065
Alkalinity, Hydroxide (as CaCO3)	<10		10	mg/L		08-DEC-14	R3117065
Alkalinity, Total (as CaCO3)	459		10	mg/L		08-DEC-14	R3117065
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-DEC-14	R3115695
Bromide	0.14		0.10	mg/L		05-DEC-14	R3116782
Chloride	90.7		2.0	mg/L		05-DEC-14	R3116782
Fluoride	0.42		0.10	mg/L		05-DEC-14	R3116782
Nitrate and Nitrite as N	2.25		0.20	mg/L		08-DEC-14	
Nitrate-N	2.25		0.10	mg/L		05-DEC-14	R3116782
Nitrite-N	<0.10		0.10	mg/L		05-DEC-14	R3116782
Phosphate-P (ortho)	0.119		0.0030	mg/L		05-DEC-14	R3116825
Sulphate	59.8		2.0	mg/L		05-DEC-14	R3116782
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117110
Total Organic Carbon	<1.0		1.0	mg/L	06-DEC-14	06-DEC-14	R3117112
Inorganic Parameters							
Silica	22.2		2.1	mg/L		08-DEC-14	
Total Metals							
Aluminum (Al)-Total	0.012		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Antimony (Sb)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Arsenic (As)-Total	0.0014		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Barium (Ba)-Total	0.145		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Beryllium (Be)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Bismuth (Bi)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Boron (B)-Total	0.310		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	04-DEC-14	08-DEC-14	R3116494
Calcium (Ca)-Total	145		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	04-DEC-14	08-DEC-14	R3116494

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-4 S-3316-11282104-INFLUENT Sampled By: J. WHITE on 28-NOV-14 Matrix: WATER							
Total Metals							
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Iron (Fe)-Total	<0.050		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Lead (Pb)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Magnesium (Mg)-Total	35.4		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Manganese (Mn)-Total	0.101		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Molybdenum (Mo)-Total	0.0015		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Nickel (Ni)-Total	0.0027		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Phosphorus (P)-Total	0.122		0.050	mg/L	04-DEC-14	08-DEC-14	R3116494
Potassium (K)-Total	<1.0		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Selenium (Se)-Total	0.00060		0.00040	mg/L	04-DEC-14	08-DEC-14	R3116494
Silicon (Si)-Total	10.4		1.0	mg/L	04-DEC-14	08-DEC-14	R3116494
Silver (Ag)-Total	<0.00010		0.00010	mg/L	04-DEC-14	08-DEC-14	R3116494
Sodium (Na)-Total	75.1		0.50	mg/L	04-DEC-14	08-DEC-14	R3116494
Strontium (Sr)-Total	1.38		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Thallium (Tl)-Total	<0.00030		0.00030	mg/L	04-DEC-14	08-DEC-14	R3116494
Tin (Sn)-Total	<0.0010		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Titanium (Ti)-Total	<0.0020		0.0020	mg/L	04-DEC-14	08-DEC-14	R3116494
Tungsten (W)-Total	<0.010		0.010	mg/L	04-DEC-14	08-DEC-14	R3116494
Uranium (U)-Total	<0.0050		0.0050	mg/L	04-DEC-14	08-DEC-14	R3116494
Vanadium (V)-Total	0.0049		0.0010	mg/L	04-DEC-14	08-DEC-14	R3116494
Zinc (Zn)-Total	0.0038		0.0030	mg/L	04-DEC-14	08-DEC-14	R3116494
Zirconium (Zr)-Total	<0.0040		0.0040	mg/L	04-DEC-14	08-DEC-14	R3116494
L1554928-5 S-3316-4122104-CONNELLY EFFL. Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<200		200	ug/L		11-DEC-14	R3118854
Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromochloromethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromodichloromethane	<20		20	ug/L		11-DEC-14	R3118854
Bromoform	<10		10	ug/L		11-DEC-14	R3118854
Bromomethane	<10		10	ug/L		11-DEC-14	R3118854
n-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
sec-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
tert-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Carbon Disulfide	<20		20	ug/L		11-DEC-14	R3118854
Carbon tetrachloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
Chlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromochloromethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroform	<10		10	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-5 S-3316-4122104-CONNELLY EFFL. Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
Chloromethane	<10		10	ug/L		11-DEC-14	R3118854
2-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
4-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromo-3-chloropropane	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromoethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromomethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,4-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichlorodifluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,1-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichloromethane	<50		50	ug/L		11-DEC-14	R3118854
1,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Ethyl Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Hexachlorobutadiene	<50		50	ug/L		11-DEC-14	R3118854
n-Hexane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2-Hexanone	<200		200	ug/L		11-DEC-14	R3118854
Isopropylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Isopropyltoluene	<50		50	ug/L		11-DEC-14	R3118854
Methyl Ethyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
Methyl Isobutyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
MTBE	<20		20	ug/L		11-DEC-14	R3118854
Naphthalene	<100		100	ug/L		11-DEC-14	R3118854
n-Propylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Styrene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,1,2-Tetrachloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2,2-Tetrachloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Tetrachloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Toluene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,3-Trichlorobenzene	<100		100	ug/L		11-DEC-14	R3118854
1,2,4-Trichlorobenzene	<100		100	ug/L		11-DEC-14	R3118854
1,1,1-Trichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-5 S-3316-4122104-CONNELLY EFFL.							
Sampled By: J. WHITE on 04-DEC-14							
Matrix: WATER							
Volatile Organic Compounds							
1,1,2-Trichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichlorofluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,2,3-Trichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,4-Trimethylbenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3,5-Trimethylbenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Vinyl chloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
o-Xylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
m+p-Xylenes	<10		10	ug/L		11-DEC-14	R3118854
Surrogate: 4-Bromofluorobenzene	90.6		70-130	%		11-DEC-14	R3118854
Surrogate: 1,4-Difluorobenzene	96.5		70-130	%		11-DEC-14	R3118854
L1554928-6 S-3316-4122104-PEERLESS EFFL.							
Sampled By: J. WHITE on 04-DEC-14							
Matrix: WATER							
Volatile Organic Compounds							
Acetone	<200		200	ug/L		11-DEC-14	R3118854
Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromochloromethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromodichloromethane	<20		20	ug/L		11-DEC-14	R3118854
Bromoform	<10		10	ug/L		11-DEC-14	R3118854
Bromomethane	<10		10	ug/L		11-DEC-14	R3118854
n-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
sec-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
tert-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Carbon Disulfide	<20		20	ug/L		11-DEC-14	R3118854
Carbon tetrachloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
Chlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromochloromethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroform	<10		10	ug/L		11-DEC-14	R3118854
Chloromethane	<10		10	ug/L		11-DEC-14	R3118854
2-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
4-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromo-3-chloropropane	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromoethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromomethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,4-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichlorodifluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,1-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-6 S-3316-4122104-PEERLESS EFFL. Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
1,2-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichloromethane	<50		50	ug/L		11-DEC-14	R3118854
1,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Ethyl Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Hexachlorobutadiene	<50		50	ug/L		11-DEC-14	R3118854
n-Hexane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2-Hexanone	<200		200	ug/L		11-DEC-14	R3118854
Isopropylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Isopropyltoluene	<50		50	ug/L		11-DEC-14	R3118854
Methyl Ethyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
Methyl Isobutyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
MTBE	<20		20	ug/L		11-DEC-14	R3118854
Naphthalene	<100		100	ug/L		11-DEC-14	R3118854
n-Propylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Styrene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,1,2-Tetrachloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2,2-Tetrachloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Tetrachloroethylene	28.3		5.0	ug/L		11-DEC-14	R3118854
Toluene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,3-Trichlorobenzene	<100		100	ug/L		11-DEC-14	R3118854
1,2,4-Trichlorobenzene	<100		100	ug/L		11-DEC-14	R3118854
1,1,1-Trichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2-Trichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichlorofluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,2,3-Trichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,4-Trimethylbenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3,5-Trimethylbenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Vinyl chloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
o-Xylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
m+p-Xylenes	<10		10	ug/L		11-DEC-14	R3118854
Surrogate: 4-Bromofluorobenzene	91.2		70-130	%		11-DEC-14	R3118854
Surrogate: 1,4-Difluorobenzene	95.6		70-130	%		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-6 S-3316-4122104-PEERLESS EFFL. Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
L1554928-7 S-3316-4122104-CONTROL EFFL. Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
Acetone	<200		200	ug/L		11-DEC-14	R3118854
Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromochloromethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromodichloromethane	<20		20	ug/L		11-DEC-14	R3118854
Bromoform	<10		10	ug/L		11-DEC-14	R3118854
Bromomethane	<10		10	ug/L		11-DEC-14	R3118854
n-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
sec-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
tert-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Carbon Disulfide	<20		20	ug/L		11-DEC-14	R3118854
Carbon tetrachloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
Chlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromochloromethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroform	<10		10	ug/L		11-DEC-14	R3118854
Chloromethane	<10		10	ug/L		11-DEC-14	R3118854
2-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
4-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromo-3-chloropropane	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromoethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromomethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,4-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichlorodifluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,1-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichloromethane	<50		50	ug/L		11-DEC-14	R3118854
1,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-7	S-3316-4122104-CONTROL EFFL.							
Sampled By:	J. WHITE on 04-DEC-14							
Matrix:	WATER							
Volatile Organic Compounds								
Ethyl Benzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
Hexachlorobutadiene		<50		50	ug/L		11-DEC-14	R3118854
n-Hexane		<5.0		5.0	ug/L		11-DEC-14	R3118854
2-Hexanone		<200		200	ug/L		11-DEC-14	R3118854
Isopropylbenzene		<50		50	ug/L		11-DEC-14	R3118854
Isopropyltoluene		<50		50	ug/L		11-DEC-14	R3118854
Methyl Ethyl Ketone		<200		200	ug/L		11-DEC-14	R3118854
Methyl Isobutyl Ketone		<200		200	ug/L		11-DEC-14	R3118854
MTBE		<20		20	ug/L		11-DEC-14	R3118854
Naphthalene		<100		100	ug/L		11-DEC-14	R3118854
n-Propylbenzene		<50		50	ug/L		11-DEC-14	R3118854
Styrene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,1,2-Tetrachloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2,2-Tetrachloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
Tetrachloroethylene		1480		5.0	ug/L		11-DEC-14	R3118854
Toluene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,3-Trichlorobenzene		<100		100	ug/L		11-DEC-14	R3118854
1,2,4-Trichlorobenzene		<100		100	ug/L		11-DEC-14	R3118854
1,1,1-Trichloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2-Trichloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichloroethylene		1530		5.0	ug/L		11-DEC-14	R3118854
Trichlorofluoromethane		<10		10	ug/L		11-DEC-14	R3118854
1,2,3-Trichloropropane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,4-Trimethylbenzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3,5-Trimethylbenzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
Vinyl chloride		<5.0		5.0	ug/L		11-DEC-14	R3118854
o-Xylene		<5.0		5.0	ug/L		11-DEC-14	R3118854
m+p-Xylenes		<10		10	ug/L		11-DEC-14	R3118854
Surrogate: 4-Bromofluorobenzene		88.3		70-130	%		11-DEC-14	R3118854
Surrogate: 1,4-Difluorobenzene		94.7		70-130	%		11-DEC-14	R3118854
L1554928-8	S-3316-4122104-INFLUENT							
Sampled By:	J. WHITE on 04-DEC-14							
Matrix:	WATER							
Volatile Organic Compounds								
Acetone		<200		200	ug/L		11-DEC-14	R3118854
Benzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromobenzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromochloromethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
Bromodichloromethane		<20		20	ug/L		11-DEC-14	R3118854
Bromoform		<10		10	ug/L		11-DEC-14	R3118854
Bromomethane		<10		10	ug/L		11-DEC-14	R3118854
n-Butylbenzene		<50		50	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-8 S-3316-4122104-INFLUENT Sampled By: J. WHITE on 04-DEC-14 Matrix: WATER							
Volatile Organic Compounds							
sec-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
tert-Butylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Carbon Disulfide	<20		20	ug/L		11-DEC-14	R3118854
Carbon tetrachloride	<5.0		5.0	ug/L		11-DEC-14	R3118854
Chlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromochloromethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroethane	<10		10	ug/L		11-DEC-14	R3118854
Chloroform	<10		10	ug/L		11-DEC-14	R3118854
Chloromethane	<10		10	ug/L		11-DEC-14	R3118854
2-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
4-Chlorotoluene	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromo-3-chloropropane	<200		200	ug/L		11-DEC-14	R3118854
1,2-Dibromoethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dibromomethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,4-Dichlorobenzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichlorodifluoromethane	<10		10	ug/L		11-DEC-14	R3118854
1,1-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2-Dichloroethane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,2-Dichloroethylene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Dichloromethane	<50		50	ug/L		11-DEC-14	R3118854
1,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2,2-Dichloropropane	<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
cis-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
trans-1,3-Dichloropropene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Ethyl Benzene	<5.0		5.0	ug/L		11-DEC-14	R3118854
Hexachlorobutadiene	<50		50	ug/L		11-DEC-14	R3118854
n-Hexane	<5.0		5.0	ug/L		11-DEC-14	R3118854
2-Hexanone	<200		200	ug/L		11-DEC-14	R3118854
Isopropylbenzene	<50		50	ug/L		11-DEC-14	R3118854
Isopropyltoluene	<50		50	ug/L		11-DEC-14	R3118854
Methyl Ethyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
Methyl Isobutyl Ketone	<200		200	ug/L		11-DEC-14	R3118854
MTBE	<20		20	ug/L		11-DEC-14	R3118854
Naphthalene	<100		100	ug/L		11-DEC-14	R3118854
n-Propylbenzene	<50		50	ug/L		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1554928-8	S-3316-4122104-INFLUENT							
Sampled By:	J. WHITE on 04-DEC-14							
Matrix:	WATER							
Volatile Organic Compounds								
Styrene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,1,2-Tetrachloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2,2-Tetrachloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
Tetrachloroethylene		1730		5.0	ug/L		11-DEC-14	R3118854
Toluene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,3-Trichlorobenzene		<100		100	ug/L		11-DEC-14	R3118854
1,2,4-Trichlorobenzene		<100		100	ug/L		11-DEC-14	R3118854
1,1,1-Trichloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,1,2-Trichloroethane		<5.0		5.0	ug/L		11-DEC-14	R3118854
Trichloroethylene		1930		5.0	ug/L		11-DEC-14	R3118854
Trichlorofluoromethane		<10		10	ug/L		11-DEC-14	R3118854
1,2,3-Trichloropropane		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,2,4-Trimethylbenzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
1,3,5-Trimethylbenzene		<5.0		5.0	ug/L		11-DEC-14	R3118854
Vinyl chloride		<5.0		5.0	ug/L		11-DEC-14	R3118854
o-Xylene		<5.0		5.0	ug/L		11-DEC-14	R3118854
m+p-Xylenes		<10		10	ug/L		11-DEC-14	R3118854
Surrogate: 4-Bromofluorobenzene		88.2		70-130	%		11-DEC-14	R3118854
Surrogate: 1,4-Difluorobenzene		96.0		70-130	%		11-DEC-14	R3118854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Aluminum (Al)-Total	MS-B	L1554928-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L1554928-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L1554928-1, -2, -3, -4
Matrix Spike	Chloride	MS-B	L1554928-1, -2, -3, -4
Matrix Spike	Phosphate-P (ortho)	MS-B	L1554928-1, -2, -3, -4

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SPEC-MANUAL-WT	Water	Speciated Alkalinity	APHA 2320B
ALK-SPEC-WT	Water	Speciated Alkalinity	EPA 310.2
ANIONS-WT	Water	Anion Scan (IC)	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-SILICA-CALC-WT	Water	Calculate from SI-TOT-WT	EPA 200.8
MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
NH3-WT	Water	Ammonia, Total as N	EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.			
P-ORTHO-LOW-WT	Water	Phosphorus-P (ortho)	APHA 4500-P B E
PH-ALK-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.			
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5°C overnight and then 180–10°C for 1hr.			
TOC-WT	Water	Total Organic Carbon	APHA 5310B
Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
TURBIDITY-WT	Water	Turbidity	APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.			
VOC-ROU1-HS-WT	Water	Volatile Organic Compounds	SW846 8260
Aqueous samples are analyzed by headspace-GC/MS.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Location

Reference Information

Laboratory Definition Code

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SPEC-WT	**Water**							
Batch R3117065								
WG2009836-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			114.7		%		80-120	08-DEC-14
WG2009836-2 CVS								
Alkalinity, Total (as CaCO3)			103.3		%		85-115	08-DEC-14
WG2009836-4 DUP		**L1554347-1**						
Alkalinity, Total (as CaCO3)		156	152		mg/L	2.5	20	08-DEC-14
WG2009836-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	08-DEC-14
ANIONS-WT	**Water**							
Batch R3116782								
WG2008852-4 DUP		**WG2008852-3**						
Chloride		93.9	93.9		mg/L	0.0	20	05-DEC-14
Bromide		0.21	0.21		mg/L	0.2	20	05-DEC-14
Fluoride		0.15	0.15		mg/L	1.9	20	05-DEC-14
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	05-DEC-14
Nitrate-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	05-DEC-14
Sulphate		<2.0	<2.0	RPD-NA	mg/L	N/A	20	05-DEC-14
WG2008852-2 LCS								
Chloride			103.1		%		90-110	05-DEC-14
Bromide			97.3		%		85-115	05-DEC-14
Fluoride			101.3		%		90-110	05-DEC-14
Nitrite-N			105.5		%		90-110	05-DEC-14
Nitrate-N			102.1		%		90-110	05-DEC-14
Sulphate			102.8		%		90-110	05-DEC-14
WG2008852-1 MB								
Chloride			<2.0		mg/L		2	05-DEC-14
Bromide			<0.10		mg/L		0.1	05-DEC-14
Fluoride			<0.10		mg/L		0.1	05-DEC-14
Nitrite-N			<0.10		mg/L		0.1	05-DEC-14
Nitrate-N			<0.10		mg/L		0.1	05-DEC-14
Sulphate			<2.0		mg/L		2	05-DEC-14
WG2008852-5 MS		**WG2008852-3**						
Chloride			N/A	MS-B	%		-	05-DEC-14
Bromide			89.2		%		75-125	05-DEC-14
Fluoride			98.5		%		75-125	05-DEC-14
Nitrite-N			103.5		%		75-125	05-DEC-14

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-WT	**Water**							
Batch R3116782								
WG2008852-5 MS		**WG2008852-3**						
Nitrate-N			98.8		%		75-125	05-DEC-14
Sulphate			101.3		%		75-125	05-DEC-14
C-DIS-ORG-WT	**Water**							
Batch R3117110								
WG2009569-3 DUP		**L1553811-1**						
Dissolved Organic Carbon		6.1	6.5		mg/L	6.3	20	06-DEC-14
WG2009569-2 LCS								
Dissolved Organic Carbon			93.0		%		80-120	06-DEC-14
WG2009569-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	06-DEC-14
WG2009569-4 MS		**L1553811-1**						
Dissolved Organic Carbon			106.0		%		70-130	06-DEC-14
COLOUR-WT	**Water**							
Batch R3116433								
WG2008751-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			97.2		%		80-120	05-DEC-14
WG2008751-2 CVS								
Color, Apparent			99.7		%		85-115	05-DEC-14
WG2008751-4 DUP		**L1554463-1**						
Color, Apparent		49.8	44.3		C.U.	12	20	05-DEC-14
WG2008751-1 MB								
Color, Apparent			<1.0		C.U.		1	05-DEC-14
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008899-1 CVS								
Aluminum (Al)-Total			104.2		%		80-120	05-DEC-14
Antimony (Sb)-Total			98.3		%		80-120	05-DEC-14
Arsenic (As)-Total			97.4		%		80-120	05-DEC-14
Barium (Ba)-Total			96.4		%		80-120	05-DEC-14
Beryllium (Be)-Total			100.7		%		80-120	05-DEC-14
Bismuth (Bi)-Total			99.1		%		80-120	05-DEC-14
Boron (B)-Total			100.8		%		80-120	05-DEC-14
Cadmium (Cd)-Total			100.1		%		80-120	05-DEC-14
Calcium (Ca)-Total			95.6		%		80-120	05-DEC-14
Chromium (Cr)-Total			98.8		%		80-120	05-DEC-14

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008899-1 CVS								
Cobalt (Co)-Total			97.8		%		80-120	05-DEC-14
Copper (Cu)-Total			99.3		%		80-120	05-DEC-14
Iron (Fe)-Total			96.3		%		80-120	05-DEC-14
Lead (Pb)-Total			101.4		%		80-120	05-DEC-14
Magnesium (Mg)-Total			101.2		%		80-120	05-DEC-14
Manganese (Mn)-Total			96.2		%		80-120	05-DEC-14
Molybdenum (Mo)-Total			98.5		%		80-120	05-DEC-14
Nickel (Ni)-Total			100.5		%		80-120	05-DEC-14
Phosphorus (P)-Total			99.1		%		80-120	05-DEC-14
Potassium (K)-Total			97.3		%		80-120	05-DEC-14
Selenium (Se)-Total			97.9		%		80-120	05-DEC-14
Silicon (Si)-Total			96.4		%		80-120	05-DEC-14
Silver (Ag)-Total			100.6		%		80-120	05-DEC-14
Sodium (Na)-Total			98.4		%		80-120	05-DEC-14
Strontium (Sr)-Total			97.9		%		80-120	05-DEC-14
Thallium (Tl)-Total			100.6		%		80-120	05-DEC-14
Tin (Sn)-Total			98.6		%		80-120	05-DEC-14
Titanium (Ti)-Total			96.9		%		80-120	05-DEC-14
Tungsten (W)-Total			99.9		%		80-120	05-DEC-14
Uranium (U)-Total			98.3		%		80-120	05-DEC-14
Vanadium (V)-Total			100.4		%		80-120	05-DEC-14
Zinc (Zn)-Total			92.0		%		80-120	05-DEC-14
Zirconium (Zr)-Total			99.1		%		80-120	05-DEC-14
WG2008899-3 CVS								
Aluminum (Al)-Total			99.8		%		80-120	08-DEC-14
Antimony (Sb)-Total			96.5		%		80-120	08-DEC-14
Arsenic (As)-Total			96.0		%		80-120	08-DEC-14
Barium (Ba)-Total			94.3		%		80-120	08-DEC-14
Beryllium (Be)-Total			98.0		%		80-120	08-DEC-14
Bismuth (Bi)-Total			96.3		%		80-120	08-DEC-14
Boron (B)-Total			99.0		%		80-120	08-DEC-14
Cadmium (Cd)-Total			99.4		%		80-120	08-DEC-14
Calcium (Ca)-Total			92.0		%		80-120	08-DEC-14
Chromium (Cr)-Total			99.0		%		80-120	08-DEC-14

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008899-3 CVS								
Cobalt (Co)-Total			97.3		%		80-120	08-DEC-14
Copper (Cu)-Total			99.1		%		80-120	08-DEC-14
Iron (Fe)-Total			98.6		%		80-120	08-DEC-14
Lead (Pb)-Total			97.8		%		80-120	08-DEC-14
Magnesium (Mg)-Total			98.4		%		80-120	08-DEC-14
Manganese (Mn)-Total			98.2		%		80-120	08-DEC-14
Molybdenum (Mo)-Total			98.7		%		80-120	08-DEC-14
Nickel (Ni)-Total			97.7		%		80-120	08-DEC-14
Phosphorus (P)-Total			97.0		%		80-120	08-DEC-14
Potassium (K)-Total			98.0		%		80-120	08-DEC-14
Selenium (Se)-Total			97.9		%		80-120	08-DEC-14
Silicon (Si)-Total			94.8		%		80-120	08-DEC-14
Silver (Ag)-Total			98.8		%		80-120	08-DEC-14
Sodium (Na)-Total			97.0		%		80-120	08-DEC-14
Strontium (Sr)-Total			99.98		%		80-120	08-DEC-14
Thallium (Tl)-Total			97.5		%		80-120	08-DEC-14
Tin (Sn)-Total			97.6		%		80-120	08-DEC-14
Titanium (Ti)-Total			100.9		%		80-120	08-DEC-14
Tungsten (W)-Total			98.2		%		80-120	08-DEC-14
Uranium (U)-Total			95.5		%		80-120	08-DEC-14
Vanadium (V)-Total			99.4		%		80-120	08-DEC-14
Zinc (Zn)-Total			93.5		%		80-120	08-DEC-14
Zirconium (Zr)-Total			100.1		%		80-120	08-DEC-14
WG2008715-4 DUP		**WG2008715-3**						
Aluminum (Al)-Total		0.299	0.304		mg/L	1.7	20	05-DEC-14
Antimony (Sb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	05-DEC-14
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-DEC-14
Barium (Ba)-Total		0.0180	0.0172		mg/L	4.4	20	05-DEC-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	05-DEC-14
Bismuth (Bi)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-DEC-14
Boron (B)-Total		0.016	0.015		mg/L	2.8	20	05-DEC-14
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	05-DEC-14
Calcium (Ca)-Total		37.8	36.8		mg/L	2.7	20	05-DEC-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008715-4 DUP		**WG2008715-3**						
Chromium (Cr)-Total		0.00061	0.00056		mg/L	8.7	20	05-DEC-14
Cobalt (Co)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	05-DEC-14
Copper (Cu)-Total		0.0017	0.0017		mg/L	1.3	20	05-DEC-14
Iron (Fe)-Total		0.425	0.419		mg/L	1.5	20	05-DEC-14
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	05-DEC-14
Magnesium (Mg)-Total		9.45	9.27		mg/L	1.9	20	05-DEC-14
Manganese (Mn)-Total		0.0284	0.0271		mg/L	4.6	20	05-DEC-14
Molybdenum (Mo)-Total		0.00058	0.00056		mg/L	4.6	20	05-DEC-14
Nickel (Ni)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-DEC-14
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	05-DEC-14
Potassium (K)-Total		1.2	1.2		mg/L	0.3	20	05-DEC-14
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	05-DEC-14
Silicon (Si)-Total		1.8	1.7		mg/L	5.8	20	05-DEC-14
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	05-DEC-14
Sodium (Na)-Total		6.41	6.26		mg/L	2.4	20	05-DEC-14
Strontium (Sr)-Total		0.494	0.475		mg/L	3.9	20	05-DEC-14
Thallium (Tl)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	05-DEC-14
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-DEC-14
Titanium (Ti)-Total		0.0070	0.0070		mg/L	1.0	20	05-DEC-14
Tungsten (W)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	05-DEC-14
Uranium (U)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-DEC-14
Vanadium (V)-Total		0.00086	0.00088		mg/L	2.5	20	05-DEC-14
Zinc (Zn)-Total		0.0072	0.0073		mg/L	0.9	20	05-DEC-14
Zirconium (Zr)-Total		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	05-DEC-14
WG2008715-2 LCS								
Aluminum (Al)-Total			107.0		%		80-120	05-DEC-14
Antimony (Sb)-Total			99.2		%		80-120	05-DEC-14
Arsenic (As)-Total			99.1		%		80-120	05-DEC-14
Barium (Ba)-Total			96.4		%		80-120	05-DEC-14
Beryllium (Be)-Total			101.6		%		80-120	05-DEC-14
Bismuth (Bi)-Total			99.98		%		80-120	05-DEC-14
Boron (B)-Total			98.5		%		80-120	05-DEC-14
Cadmium (Cd)-Total			98.3		%		80-120	05-DEC-14

Quality Control Report

Workorder: L1554928   Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008715-2 LCS								
Calcium (Ca)-Total			98.2		%		80-120	05-DEC-14
Chromium (Cr)-Total			99.0		%		80-120	05-DEC-14
Cobalt (Co)-Total			97.0		%		80-120	05-DEC-14
Copper (Cu)-Total			99.7		%		80-120	05-DEC-14
Iron (Fe)-Total			97.6		%		80-120	05-DEC-14
Lead (Pb)-Total			101.9		%		80-120	05-DEC-14
Magnesium (Mg)-Total			99.2		%		80-120	05-DEC-14
Manganese (Mn)-Total			96.8		%		80-120	05-DEC-14
Molybdenum (Mo)-Total			97.3		%		80-120	05-DEC-14
Nickel (Ni)-Total			99.7		%		80-120	05-DEC-14
Phosphorus (P)-Total			104.1		%		80-120	05-DEC-14
Potassium (K)-Total			100.9		%		80-120	05-DEC-14
Selenium (Se)-Total			98.2		%		80-120	05-DEC-14
Silicon (Si)-Total			102.3		%		80-120	05-DEC-14
Silver (Ag)-Total			100.1		%		80-120	05-DEC-14
Sodium (Na)-Total			98.2		%		80-120	05-DEC-14
Strontium (Sr)-Total			99.5		%		80-120	05-DEC-14
Thallium (Tl)-Total			102.2		%		80-120	05-DEC-14
Tin (Sn)-Total			96.5		%		80-120	05-DEC-14
Titanium (Ti)-Total			95.1		%		80-120	05-DEC-14
Tungsten (W)-Total			101.2		%		80-120	05-DEC-14
Uranium (U)-Total			100.2		%		80-120	05-DEC-14
Vanadium (V)-Total			100.3		%		80-120	05-DEC-14
Zinc (Zn)-Total			100.6		%		80-120	05-DEC-14
Zirconium (Zr)-Total			97.3		%		80-120	05-DEC-14
WG2008715-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	05-DEC-14
Antimony (Sb)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Arsenic (As)-Total			<0.0010		mg/L		0.001	05-DEC-14
Barium (Ba)-Total			<0.0020		mg/L		0.002	05-DEC-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Bismuth (Bi)-Total			<0.0010		mg/L		0.001	05-DEC-14
Boron (B)-Total			<0.010		mg/L		0.01	05-DEC-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	05-DEC-14

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008715-1 MB								
Calcium (Ca)-Total			<0.50		mg/L		0.5	05-DEC-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	05-DEC-14
Iron (Fe)-Total			<0.050		mg/L		0.05	05-DEC-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Magnesium (Mg)-Total			<0.50		mg/L		0.5	05-DEC-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	05-DEC-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	05-DEC-14
Phosphorus (P)-Total			<0.050		mg/L		0.05	05-DEC-14
Potassium (K)-Total			<1.0		mg/L		1	05-DEC-14
Selenium (Se)-Total			<0.00040		mg/L		0.0004	05-DEC-14
Silicon (Si)-Total			<1.0		mg/L		1	05-DEC-14
Silver (Ag)-Total			<0.00010		mg/L		0.0001	05-DEC-14
Sodium (Na)-Total			<0.50		mg/L		0.5	05-DEC-14
Strontium (Sr)-Total			<0.0010		mg/L		0.001	05-DEC-14
Thallium (Tl)-Total			<0.00030		mg/L		0.0003	05-DEC-14
Tin (Sn)-Total			<0.0010		mg/L		0.001	05-DEC-14
Titanium (Ti)-Total			<0.0020		mg/L		0.002	05-DEC-14
Tungsten (W)-Total			<0.010		mg/L		0.01	05-DEC-14
Uranium (U)-Total			<0.0010		mg/L		0.001	05-DEC-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	05-DEC-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	05-DEC-14
Zirconium (Zr)-Total			<0.0040		mg/L		0.004	05-DEC-14
WG2008715-5 MS		**WG2008715-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	05-DEC-14
Antimony (Sb)-Total			98.1		%		70-130	05-DEC-14
Arsenic (As)-Total			99.8		%		70-130	05-DEC-14
Barium (Ba)-Total			95.6		%		70-130	05-DEC-14
Beryllium (Be)-Total			100.9		%		70-130	05-DEC-14
Bismuth (Bi)-Total			98.9		%		70-130	05-DEC-14
Boron (B)-Total			97.4		%		70-130	05-DEC-14
Cadmium (Cd)-Total			95.9		%		70-130	05-DEC-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3116494								
WG2008715-5 MS		**WG2008715-3**						
Calcium (Ca)-Total			N/A	MS-B	%		-	05-DEC-14
Chromium (Cr)-Total			97.0		%		70-130	05-DEC-14
Cobalt (Co)-Total			95.4		%		70-130	05-DEC-14
Copper (Cu)-Total			96.2		%		70-130	05-DEC-14
Iron (Fe)-Total			96.5		%		70-130	05-DEC-14
Lead (Pb)-Total			99.7		%		70-130	05-DEC-14
Magnesium (Mg)-Total			95.1		%		70-130	05-DEC-14
Manganese (Mn)-Total			95.4		%		70-130	05-DEC-14
Molybdenum (Mo)-Total			97.9		%		70-130	05-DEC-14
Nickel (Ni)-Total			97.3		%		70-130	05-DEC-14
Phosphorus (P)-Total			108.0		%		70-130	05-DEC-14
Potassium (K)-Total			96.0		%		70-130	05-DEC-14
Selenium (Se)-Total			97.5		%		70-130	05-DEC-14
Silicon (Si)-Total			101.5		%		70-130	05-DEC-14
Silver (Ag)-Total			100.0		%		70-130	05-DEC-14
Sodium (Na)-Total			95.4		%		70-130	05-DEC-14
Strontium (Sr)-Total			N/A	MS-B	%		-	05-DEC-14
Thallium (Tl)-Total			98.8		%		70-130	05-DEC-14
Tin (Sn)-Total			95.6		%		70-130	05-DEC-14
Titanium (Ti)-Total			97.2		%		70-130	05-DEC-14
Tungsten (W)-Total			101.7		%		70-130	05-DEC-14
Uranium (U)-Total			99.7		%		70-130	05-DEC-14
Vanadium (V)-Total			100.4		%		70-130	05-DEC-14
Zinc (Zn)-Total			116.9		%		70-130	05-DEC-14
Zirconium (Zr)-Total			96.0		%		70-130	05-DEC-14
NH3-WT	**Water**							
Batch R3115695								
WG2008846-2 CVS								
Ammonia, Total (as N)			97.9		%		85-115	05-DEC-14
WG2008846-3 DUP		**L1554634-1**						
Ammonia, Total (as N)		0.068	0.069		mg/L	1.9	20	05-DEC-14
WG2008846-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	05-DEC-14
WG2008846-4 MS		**L1554634-1**						

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R3115695								
WG2008846-4 MS		**L1554634-1**						
Ammonia, Total (as N)			113.2		%		75-125	05-DEC-14
P-ORTHO-LOW-WT	**Water**							
Batch R3116825								
WG2008902-3 DUP		**L1554668-8**						
Phosphate-P (ortho)		0.508	0.573		mg/L	12	20	05-DEC-14
WG2008902-2 LCS								
Phosphate-P (ortho)			108.8		%		80-120	05-DEC-14
WG2008902-1 MB								
Phosphate-P (ortho)			<0.0030		mg/L		0.003	05-DEC-14
WG2008902-4 MS		**L1554668-8**						
Phosphate-P (ortho)			N/A	MS-B	%		-	05-DEC-14
PH-ALK-WT	**Water**							
Batch R3115689								
WG2009024-3 DUP		**WG2009024-2**						
pH		7.25	7.25	J	pH units	0.00	0.2	05-DEC-14
WG2009024-1 LCS								
pH			6.97		pH units		6.9-7.1	05-DEC-14
SOLIDS-TDS-WT	**Water**							
Batch R3116163								
WG2008795-3 DUP		**L1554463-1**						
Total Dissolved Solids		272	292		mg/L	7.1	20	05-DEC-14
WG2008795-2 LCS								
Total Dissolved Solids			97.3		%		85-115	05-DEC-14
WG2008795-1 MB								
Total Dissolved Solids			<20		mg/L		20	05-DEC-14
TOC-WT	**Water**							
Batch R3117112								
WG2009571-3 DUP		**L1554347-1**						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	06-DEC-14
WG2009571-2 LCS								
Total Organic Carbon			93.0		%		80-120	06-DEC-14
WG2009571-1 MB								
Total Organic Carbon			<1.0		mg/L		1	06-DEC-14
WG2009571-4 MS		**L1554347-1**						
Total Organic Carbon			103.5		%		70-130	06-DEC-14

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	**Water**							
Batch R3115934								
WG2009253-2 CVS								
Turbidity			99.0		%		85-115	05-DEC-14
WG2009253-4 DUP		**L1554928-1**						
Turbidity		0.74	0.72		NTU	2.7	15	05-DEC-14
WG2009253-1 MB								
Turbidity			<0.10		NTU		0.1	05-DEC-14
VOC-ROU1-HS-WT	**Water**							
Batch R3118854								
WG2011926-1 CVS								
1,1,1,2-Tetrachloroethane			123.6		%		70-130	11-DEC-14
1,1,2,2-Tetrachloroethane			127.9		%		70-130	11-DEC-14
1,1,1-Trichloroethane			115.4		%		70-130	11-DEC-14
1,1,2-Trichloroethane			125.0		%		70-130	11-DEC-14
1,1-Dichloroethane			114.5		%		70-130	11-DEC-14
1,1-Dichloroethylene			105.4		%		70-130	11-DEC-14
1,1-Dichloropropene			101.4		%		70-130	11-DEC-14
1,2,3-Trichloropropane			118.4		%		70-130	11-DEC-14
1,2,3-Trichlorobenzene			115.6		%		70-130	11-DEC-14
1,2,4-Trichlorobenzene			106.0		%		70-130	11-DEC-14
1,2,4-Trimethylbenzene			110.6		%		70-130	11-DEC-14
1,2-Dibromo-3-chloropropane			124.9		%		70-130	11-DEC-14
1,2-Dibromoethane			124.1		%		70-130	11-DEC-14
1,2-Dichlorobenzene			113.9		%		70-130	11-DEC-14
1,2-Dichloroethane			122.9		%		70-130	11-DEC-14
1,2-Dichloropropane			118.5		%		70-130	11-DEC-14
1,3,5-Trimethylbenzene			106.0		%		70-130	11-DEC-14
1,3-Dichlorobenzene			107.9		%		70-130	11-DEC-14
1,3-Dichloropropane			122.9		%		70-130	11-DEC-14
1,4-Dichlorobenzene			106.2		%		70-130	11-DEC-14
2,2-Dichloropropane			97.7		%		70-130	11-DEC-14
2-Chlorotoluene			111.3		%		70-130	11-DEC-14
2-Hexanone			112.8		%		70-130	11-DEC-14
4-Chlorotoluene			106.0		%		70-130	11-DEC-14
Acetone			120.1		%		70-130	11-DEC-14
Benzene			114.6		%		70-130	11-DEC-14

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU1-HS-WT	**Water**							
Batch R3118854								
WG2011926-1 CVS								
Bromobenzene			114.5		%		70-130	11-DEC-14
Bromochloromethane			122.4		%		70-130	11-DEC-14
Bromodichloromethane			103.0		%		70-130	11-DEC-14
Bromoform			122.8		%		70-130	11-DEC-14
Bromomethane			102.3		%		70-130	11-DEC-14
Carbon Disulfide			100.7		%		70-130	11-DEC-14
Carbon tetrachloride			114.6		%		70-130	11-DEC-14
Chlorobenzene			115.4		%		70-130	11-DEC-14
Chloroethane			114.1		%		70-130	11-DEC-14
Chloroform			118.9		%		70-130	11-DEC-14
Chloromethane			108.5		%		70-130	11-DEC-14
cis-1,2-Dichloroethylene			115.6		%		70-130	11-DEC-14
cis-1,3-Dichloropropene			103.0		%		70-130	11-DEC-14
Dibromochloromethane			123.8		%		70-130	11-DEC-14
Dibromomethane			120.4		%		70-130	11-DEC-14
Dichlorodifluoromethane			90.3		%		70-130	11-DEC-14
Dichloromethane			117.8		%		70-130	11-DEC-14
Ethyl Benzene			110.2		%		70-130	11-DEC-14
Hexachlorobutadiene			103.6		%		70-130	11-DEC-14
n-Hexane			110.1		%		70-130	11-DEC-14
Isopropylbenzene			110.2		%		70-130	11-DEC-14
Isopropyltoluene			105.4		%		70-130	11-DEC-14
m+p-Xylenes			113.2		%		70-130	11-DEC-14
Methyl Ethyl Ketone			124.0		%		70-130	11-DEC-14
Methyl Isobutyl Ketone			112.1		%		70-130	11-DEC-14
MTBE			106.7		%		70-130	11-DEC-14
Naphthalene			121.8		%		70-130	11-DEC-14
n-Butylbenzene			101.4		%		70-130	11-DEC-14
n-Propylbenzene			107.4		%		70-130	11-DEC-14
o-Xylene			111.3		%		70-130	11-DEC-14
sec-Butylbenzene			111.1		%		70-130	11-DEC-14
Styrene			113.6		%		70-130	11-DEC-14
tert-Butylbenzene			105.4		%		70-130	11-DEC-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU1-HS-WT	**Water**							
Batch R3118854								
WG2011926-1 CVS								
Tetrachloroethylene			107.6		%		70-130	11-DEC-14
Toluene			113.4		%		70-130	11-DEC-14
trans-1,2-Dichloroethylene			105.9		%		70-130	11-DEC-14
trans-1,3-Dichloropropene			105.2		%		70-130	11-DEC-14
Trichloroethylene			110.0		%		70-130	11-DEC-14
Trichlorofluoromethane			112.7		%		70-130	11-DEC-14
Vinyl chloride			104.1		%		70-130	11-DEC-14
WG2011926-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	11-DEC-14
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	11-DEC-14
1,1,1-Trichloroethane			<0.50		ug/L		0.5	11-DEC-14
1,1,2-Trichloroethane			<0.50		ug/L		0.5	11-DEC-14
1,1-Dichloroethane			<0.50		ug/L		0.5	11-DEC-14
1,1-Dichloroethylene			<0.50		ug/L		0.5	11-DEC-14
1,1-Dichloropropene			<0.50		ug/L		0.5	11-DEC-14
1,2,3-Trichloropropane			<0.50		ug/L		0.5	11-DEC-14
1,2,3-Trichlorobenzene			<10		ug/L		10	11-DEC-14
1,2,4-Trichlorobenzene			<10		ug/L		10	11-DEC-14
1,2,4-Trimethylbenzene			<0.50		ug/L		0.5	11-DEC-14
1,2-Dibromo-3-chloropropane			<20		ug/L		20	11-DEC-14
1,2-Dibromoethane			<0.50		ug/L		0.5	11-DEC-14
1,2-Dichlorobenzene			<0.50		ug/L		0.5	11-DEC-14
1,2-Dichloroethane			<0.50		ug/L		0.5	11-DEC-14
1,2-Dichloropropane			<0.50		ug/L		0.5	11-DEC-14
1,3,5-Trimethylbenzene			<0.50		ug/L		0.5	11-DEC-14
1,3-Dichlorobenzene			<0.50		ug/L		0.5	11-DEC-14
1,3-Dichloropropane			<0.50		ug/L		0.5	11-DEC-14
1,4-Dichlorobenzene			<0.50		ug/L		0.5	11-DEC-14
2,2-Dichloropropane			<0.50		ug/L		0.5	11-DEC-14
2-Chlorotoluene			<20		ug/L		20	11-DEC-14
2-Hexanone			<20		ug/L		20	11-DEC-14
4-Chlorotoluene			<20		ug/L		20	11-DEC-14
Acetone			<20		ug/L		20	11-DEC-14
Benzene			<0.50		ug/L		0.5	11-DEC-14

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU1-HS-WT	**Water**							
Batch R3118854								
WG2011926-2 MB								
Bromobenzene			<0.50		ug/L		0.5	11-DEC-14
Bromochloromethane			<0.50		ug/L		0.5	11-DEC-14
Bromodichloromethane			<2.0		ug/L		2	11-DEC-14
Bromoform			<1.0		ug/L		1	11-DEC-14
Bromomethane			<1.0		ug/L		1	11-DEC-14
Carbon Disulfide			<2.0		ug/L		2	11-DEC-14
Carbon tetrachloride			<0.50		ug/L		0.5	11-DEC-14
Chlorobenzene			<0.50		ug/L		0.5	11-DEC-14
Chloroethane			<1.0		ug/L		1	11-DEC-14
Chloroform			<1.0		ug/L		1	11-DEC-14
Chloromethane			<1.0		ug/L		1	11-DEC-14
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	11-DEC-14
cis-1,3-Dichloropropene			<0.50		ug/L		0.5	11-DEC-14
Dibromochloromethane			<1.0		ug/L		1	11-DEC-14
Dibromomethane			<0.50		ug/L		0.5	11-DEC-14
Dichlorodifluoromethane			<1.0		ug/L		1	11-DEC-14
Dichloromethane			<5.0		ug/L		5	11-DEC-14
Ethyl Benzene			<0.50		ug/L		0.5	11-DEC-14
Hexachlorobutadiene			<5.0		ug/L		5	11-DEC-14
n-Hexane			<0.50		ug/L		0.5	11-DEC-14
Isopropylbenzene			<5.0		ug/L		5	11-DEC-14
Isopropyltoluene			<5.0		ug/L		5	11-DEC-14
m+p-Xylenes			<1.0		ug/L		1	11-DEC-14
Methyl Ethyl Ketone			<20		ug/L		20	11-DEC-14
Methyl Isobutyl Ketone			<20		ug/L		20	11-DEC-14
MTBE			<2.0		ug/L		2	11-DEC-14
Naphthalene			<10		ug/L		10	11-DEC-14
n-Butylbenzene			<5.0		ug/L		5	11-DEC-14
n-Propylbenzene			<5.0		ug/L		5	11-DEC-14
o-Xylene			<0.50		ug/L		0.5	11-DEC-14
sec-Butylbenzene			<5.0		ug/L		5	11-DEC-14
Styrene			<0.50		ug/L		0.5	11-DEC-14
tert-Butylbenzene			<5.0		ug/L		5	11-DEC-14

Quality Control Report

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU1-HS-WT	**Water**							
Batch R3118854								
WG2011926-2 MB								
Tetrachloroethylene			<0.50		ug/L		0.5	11-DEC-14
Toluene			<0.50		ug/L		0.5	11-DEC-14
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	11-DEC-14
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	11-DEC-14
Trichloroethylene			<0.50		ug/L		0.5	11-DEC-14
Trichlorofluoromethane			<1.0		ug/L		1	11-DEC-14
Vinyl chloride			<0.50		ug/L		0.5	11-DEC-14
Surrogate: 1,4-Difluorobenzene			96.6		%		70-130	11-DEC-14
Surrogate: 4-Bromofluorobenzene			85.6		%		70-130	11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1554928 Report Date: 11-DEC-14

Client: SIREM
130 Research Lane Suite 2
Guelph ON N1G 5G3
Contact: Jeff Roberts

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Colour							
	1	28-NOV-14	05-DEC-14 05:27	48	162	hours	EHTR
	2	28-NOV-14	05-DEC-14 05:27	48	162	hours	EHTR
	3	28-NOV-14	05-DEC-14 05:27	48	162	hours	EHTR
	4	28-NOV-14	05-DEC-14 05:27	48	162	hours	EHTR
Turbidity							
	1	28-NOV-14	05-DEC-14 16:22	48	172	hours	EHTR
	2	28-NOV-14	05-DEC-14 16:24	48	172	hours	EHTR
	3	28-NOV-14	05-DEC-14 16:25	48	172	hours	EHTR
	4	28-NOV-14	05-DEC-14 16:26	48	172	hours	EHTR
pH							
	1	28-NOV-14	05-DEC-14 13:53	4	7	days	EHTR
	2	28-NOV-14	05-DEC-14 13:54	4	7	days	EHTR
	3	28-NOV-14	05-DEC-14 13:55	4	7	days	EHTR
	4	28-NOV-14	05-DEC-14 13:56	4	7	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1554928 were received on 04-DEC-14 15:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

C of C #

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

ALS

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested			
		2 day TAT (50%)	
5 day (regular)	X	*Next day TAT (100%)*	
3-4 day (25%)		*Same day TAT (200%)*	

COMPANY NAME: SiREM
OFFICE: 130 RESEARCH LN - SUITE 2 Guelph, ON N1G 5G3
PROJECT MANAGER: Jeff Roberts
PROJECT #: S-3316 Crown Chevy
PHONE: 519-822-2265
FAX:
ACCOUNT #:
QUOTATION #:
PO #:

CRITERIA — Criteria on report YES Y NO__
Reg 153/04 Reg 511/09
Table 1 2 3
TCLP ____ MISA _____ PWQO _____
ODWS ____ OTHER _____

REPORT FORMAT/DISTRIBUTION
EMAIL X FAX _______ BOTH _______
SELECT: PDF ____ DIGITAL ____ BOTH X
EMAIL 1 jwhite@siremlab.com
EMAIL 2 jroberts@siremlab.com

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <------ (F, P, F/P)

SUBMISSION #: L1554098
ENTERED BY: ay
DATE/TIME ENTERED: 4/12/14 18:57
BIN #: B394

SAMPLING INFORMATION

Date (dd-mm-yy)	Time (24hr) (hh:mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS (Total)	CVOC's (EPA 8260B)	Alk, Spec, Colour, EC, TDS, pH, Turbidity	NH3, TOC	metals (Total) EPA 6010/6020	Anions	DOC					COMMENTS	LAB ID
									P		P	P								
11/28/2014		X		X			S-3316-1128 2104 - Connelly EFFL	5		X	X	X	X	X						1
							S-3316-1128 2104 - Peerless EFFL.	5		X	X	X	X	X						2
							S-3316-1128 2104 - Control EFFL	5		X	X	X	X	X						3
							S-3316-11282014 - Influent	5		X	X	X	X	X						4
12/4/2014		X		X			S-3316-412 2104 - Connelly Effl	2	X											5
							S-3316-412 2104 - Peerless Effl	2	X											6
							S-3316-412 2104 - Control Effl	1	X											7
							S-3316-4122109 - Influent	2	X											8

L1554928-COFC

SPECIAL INSTRUCTIONS/COMMENTS
Please use General Package #3

THE QUESTIONS BELOW MUST BE ANSWERED
Are any samples taken from a regulated DW System? Yes ___ No ___
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ___ No ___

SAMPLE CONDITION
__ FROZEN
__ COLD
__ COOLING INITIATED
__ AMBIENT
MEAN TEMP 5.1

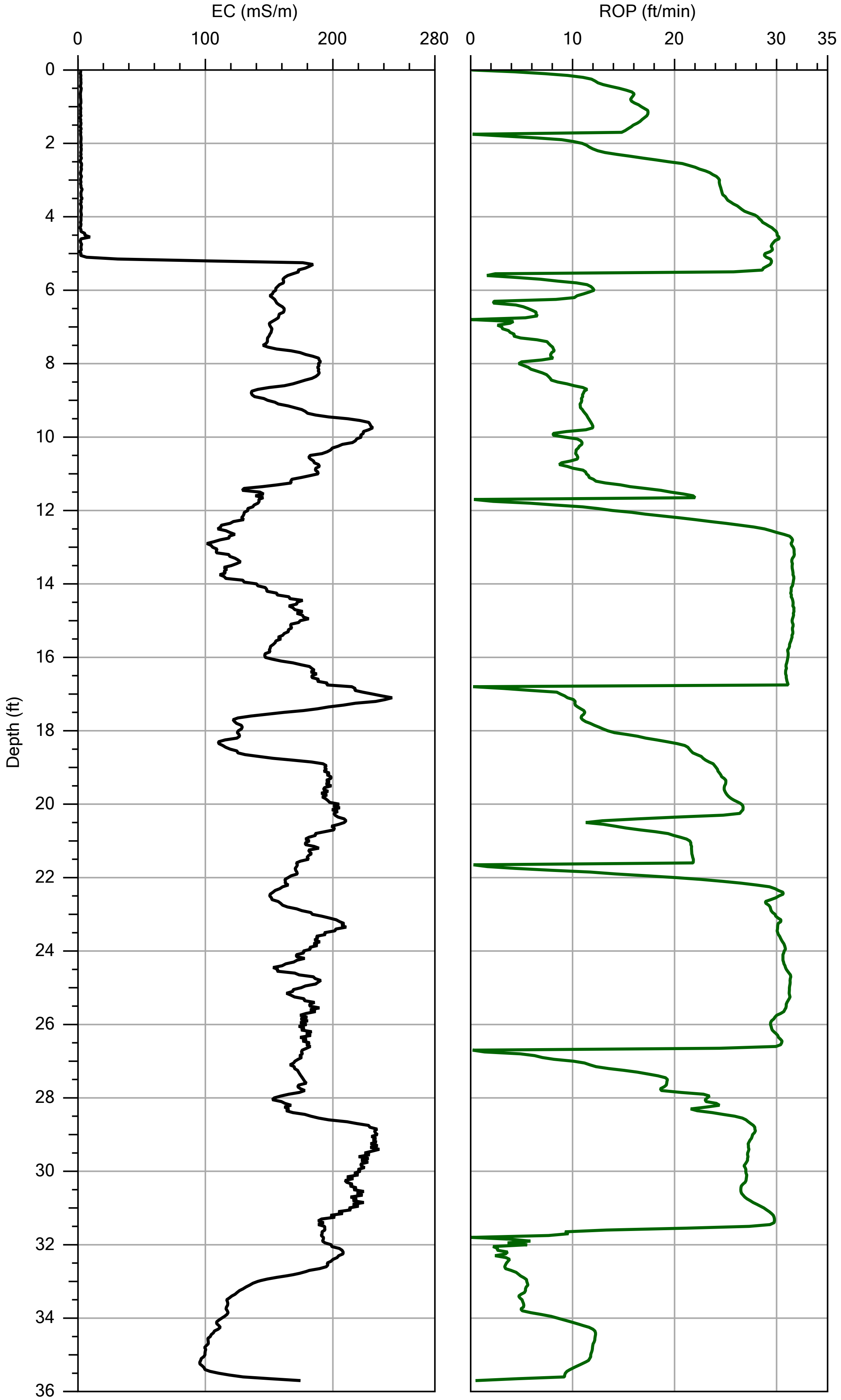
SAMPLED BY: J.White see above
DATE & TIME:
RECEIVED BY:
DATE & TIME:
RELINQUISHED BY: J.White
DATE & TIME: 12/4/14 10:30
RECEIVED AT LAB BY: Aley
DATE & TIME: 4/12/14 15:15
OBSERVATIONS Yes ___ No ___ If yes add SIF
INIT JH

Notes

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

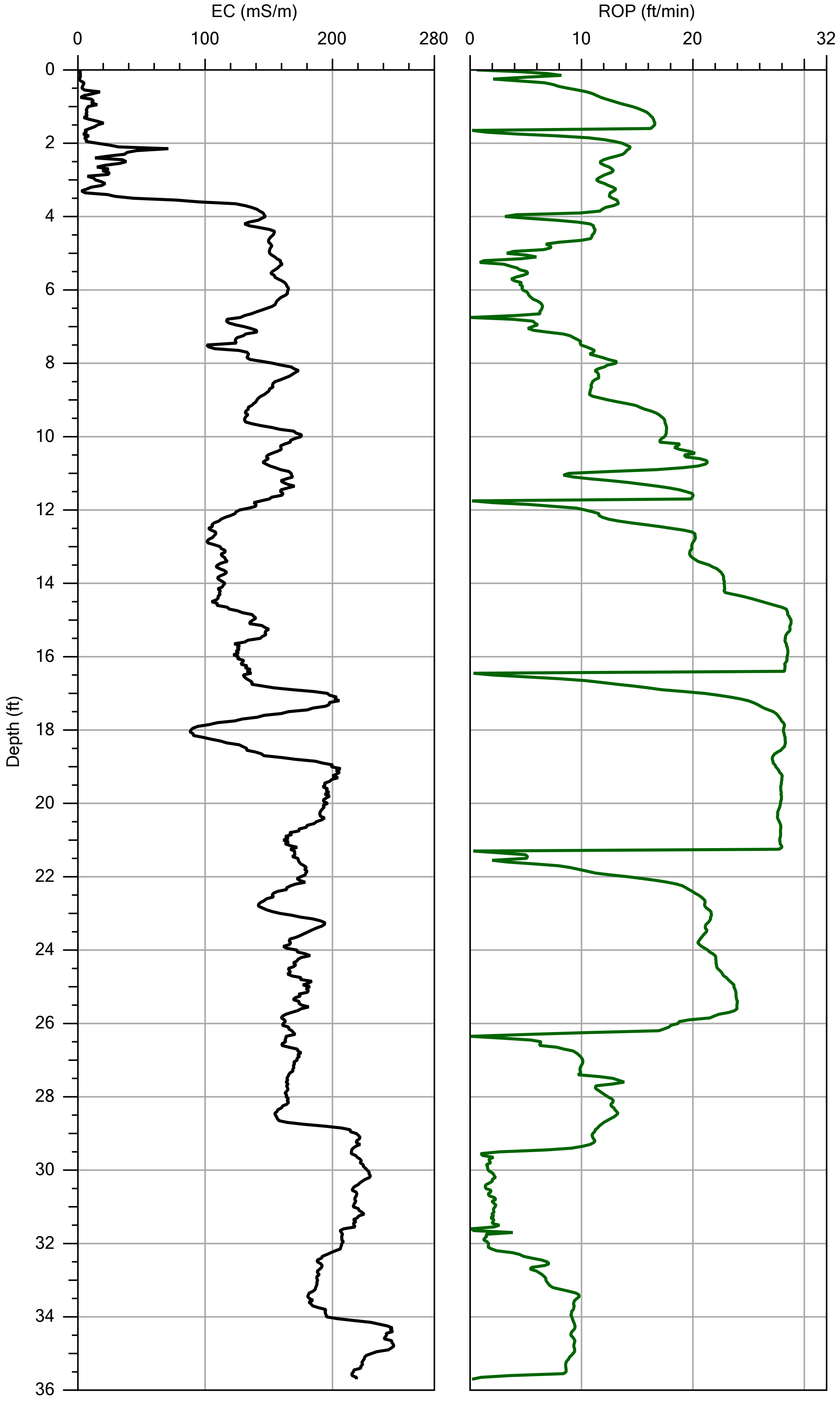
APPENDIX D

Electrical Conductivity Probe Logs

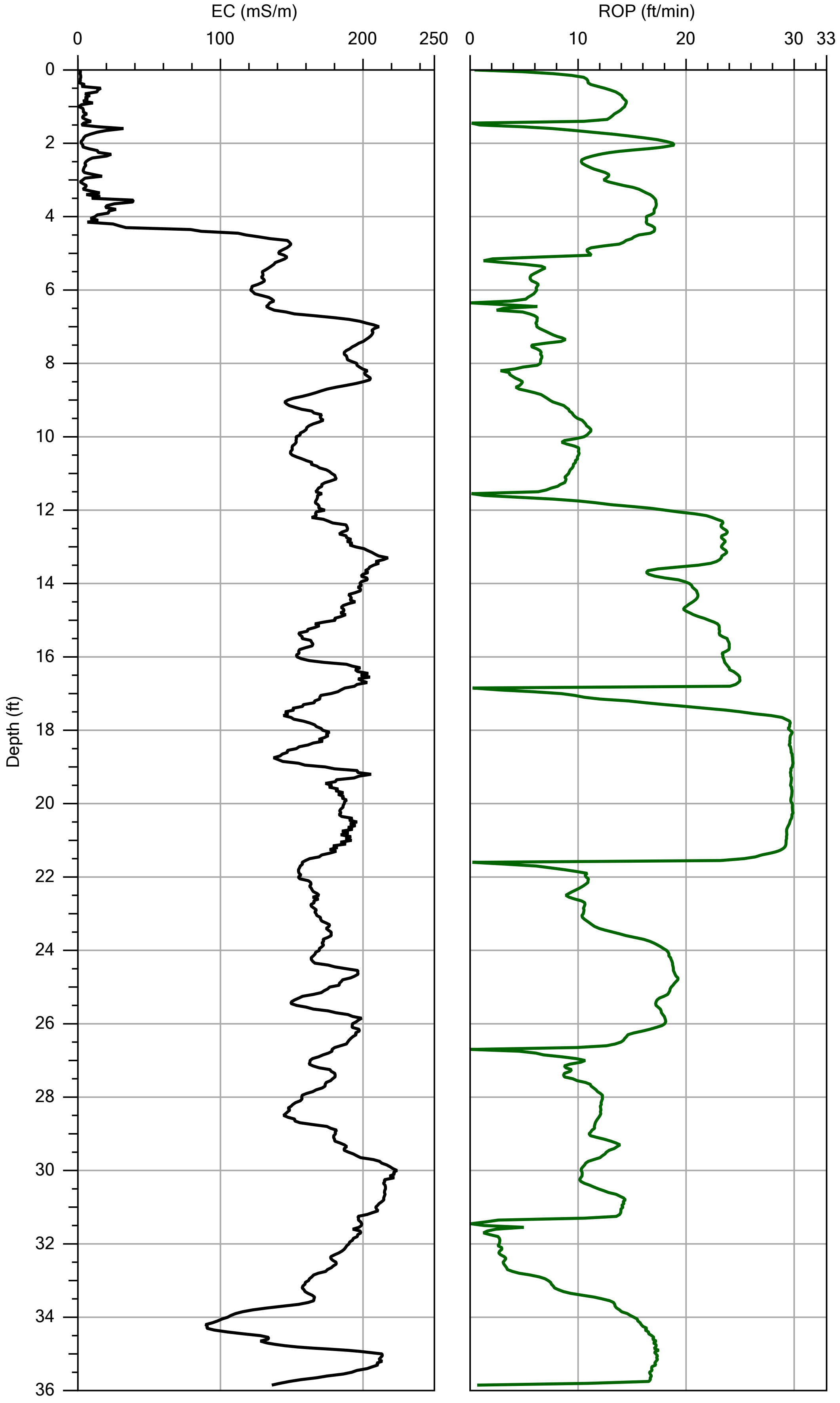


National
EXPLORATION • WELLS • PUMPS

		File: AEC.EC
Company: National EWP	Operator: E Jasso	Date: 8/20/2014
Project ID: 40003.883	Client: AMEC	Location:



		File: BEC.EC
Company: National EWP	Operator: E Jasso	Date: 8/20/2014
Project ID: 40003.833	Client: AMEC	Location:



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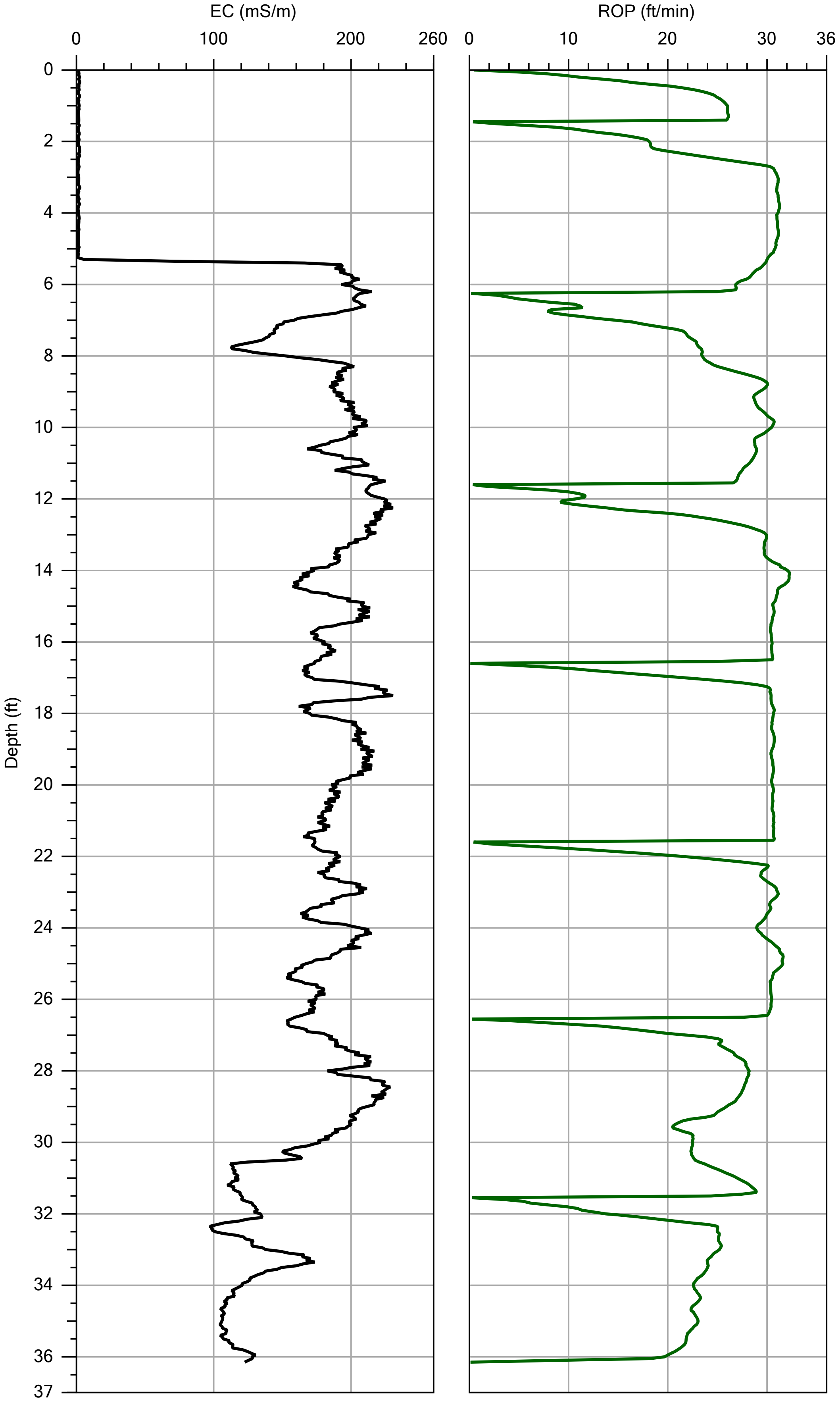
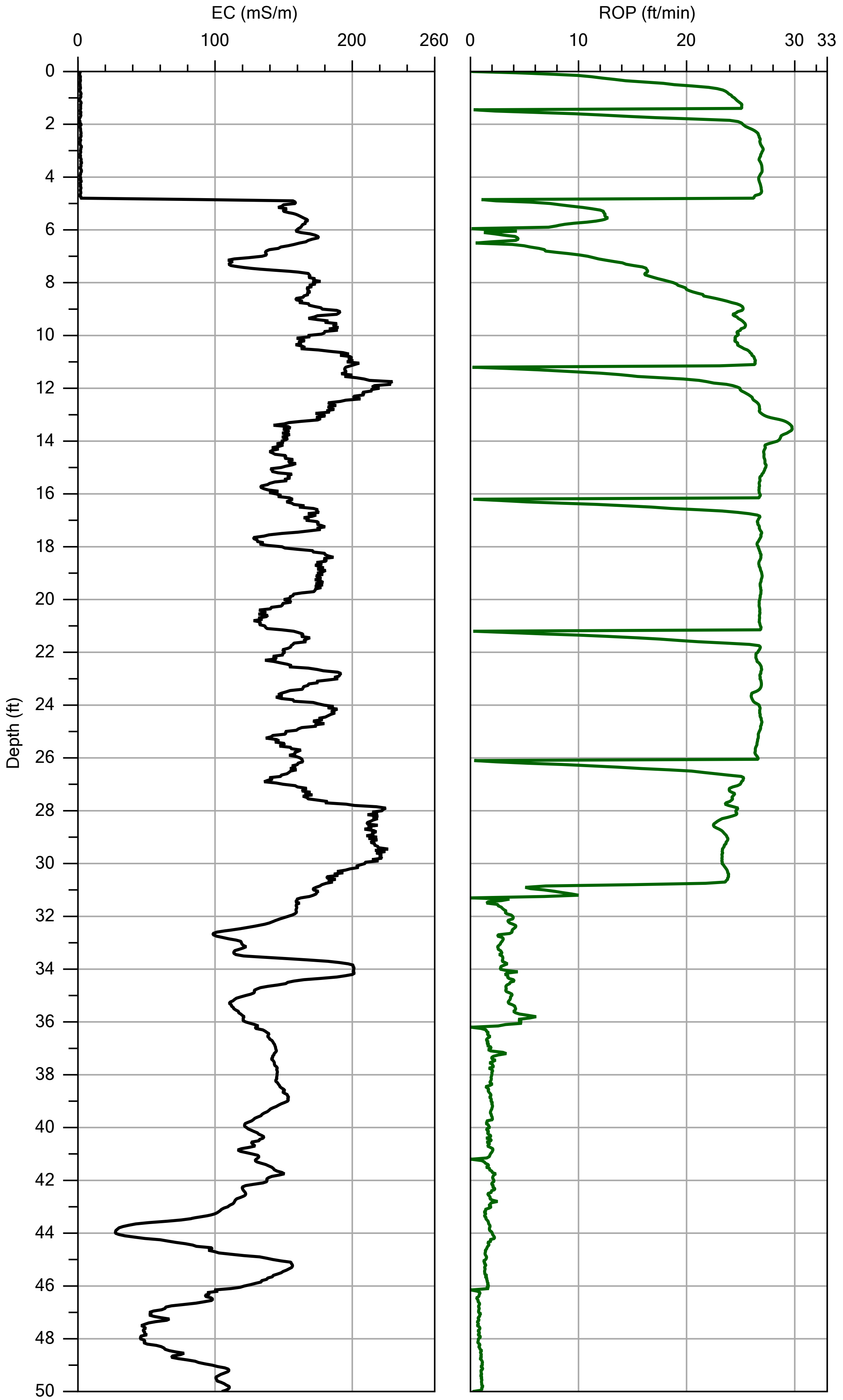
Company: National EWP	Operator: E Jasso	Date: 8/20/2014
Project ID: 40003.883	Client: AMEC	Location:

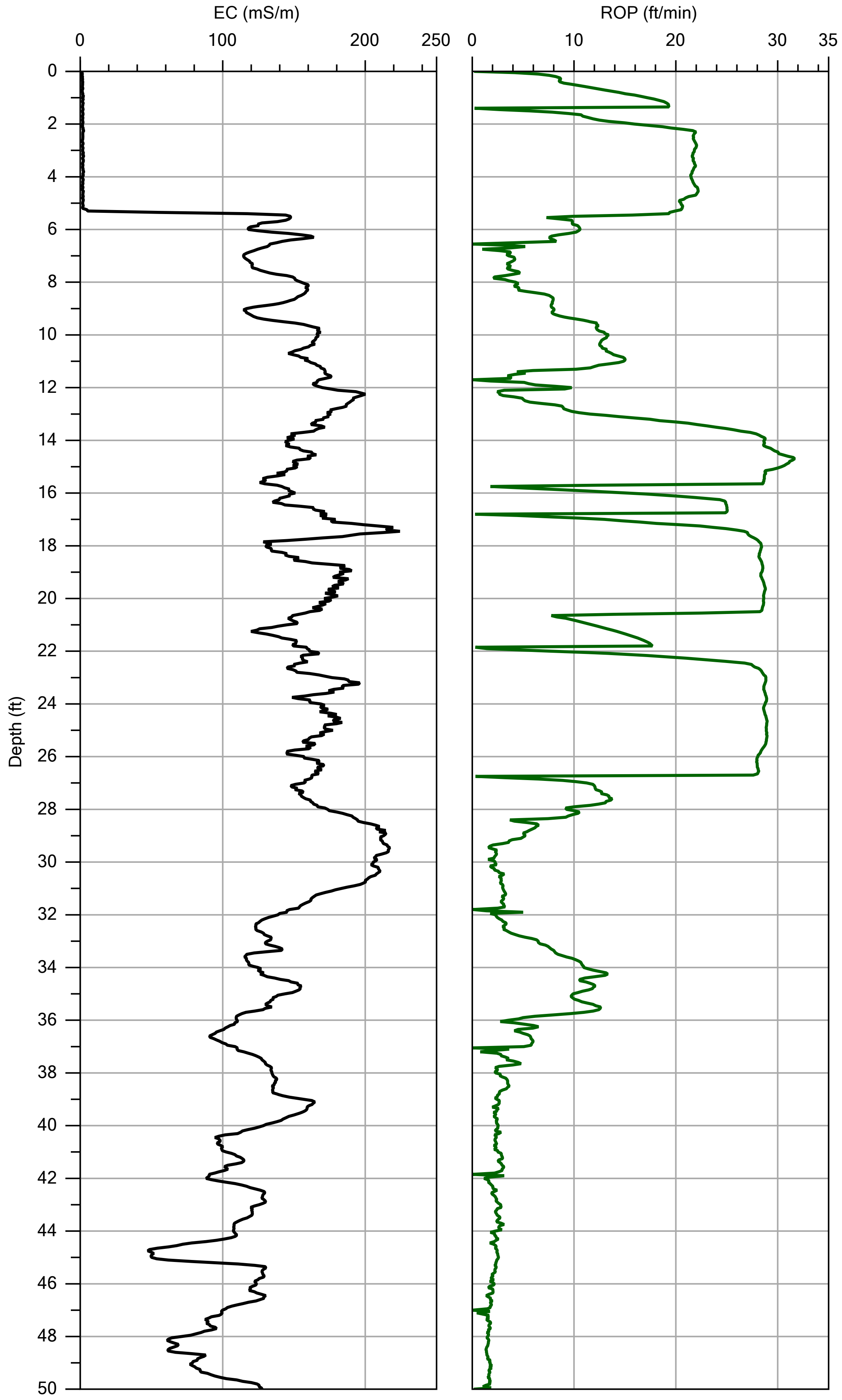


EXPLORATION • WELLS • PUMPS

		File: DEC.EC
Company: National EWP	Operator: E Jasso	Date: 8/26/2014
Project ID: 40003.833	Client: AMEC	Location:



		File: EEC.EC
Company: National EWP	Operator: E Jasso	Date: 8/26/2014
Project ID: 40003.833	Client: AMEC	Location:



National
EXPLORATION • WELLS • PUMPS

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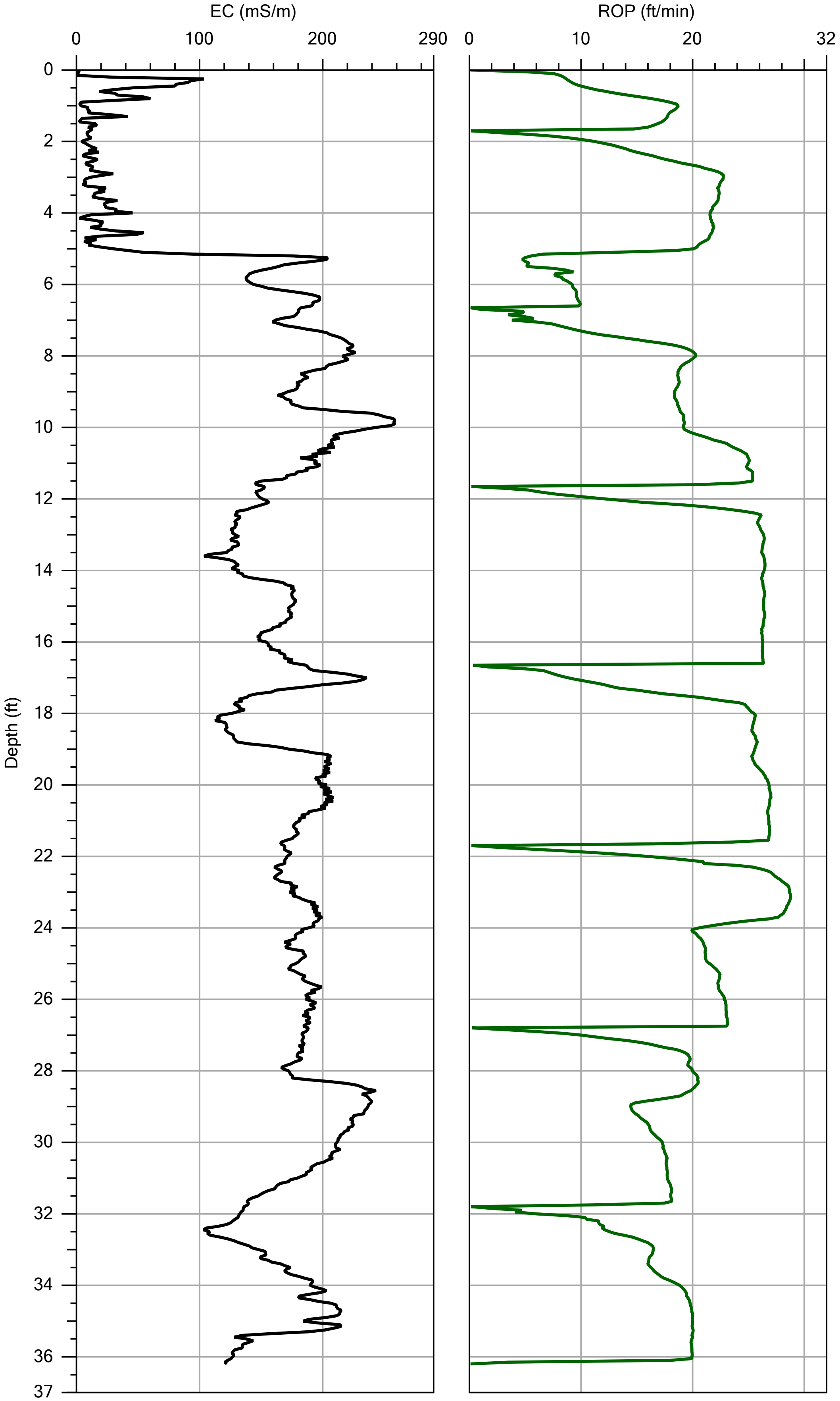
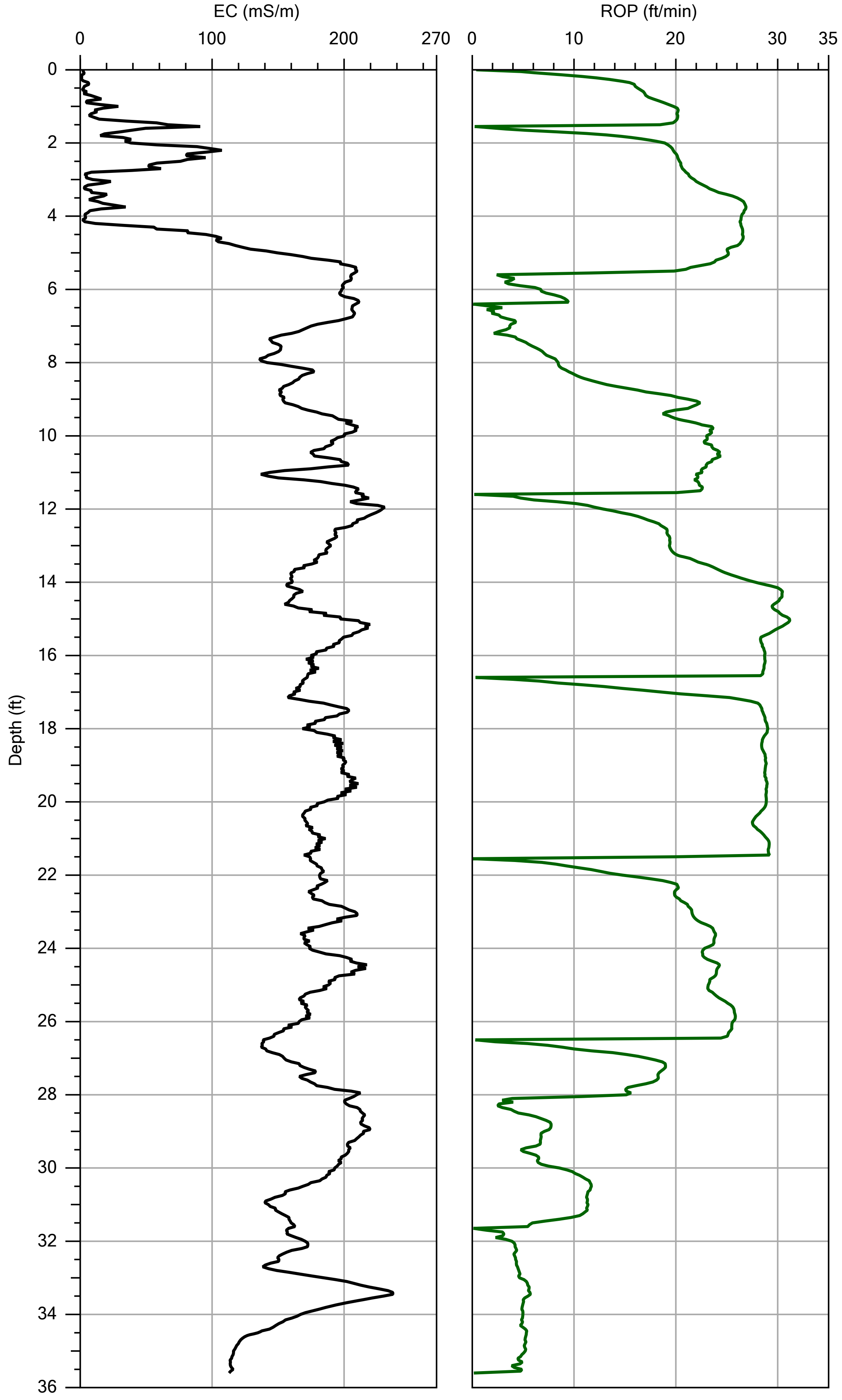
Company: National EWP	Operator: E Jasso	Date: 8/26/2014
Project ID: 40003.833	Client: AMEC	Location:

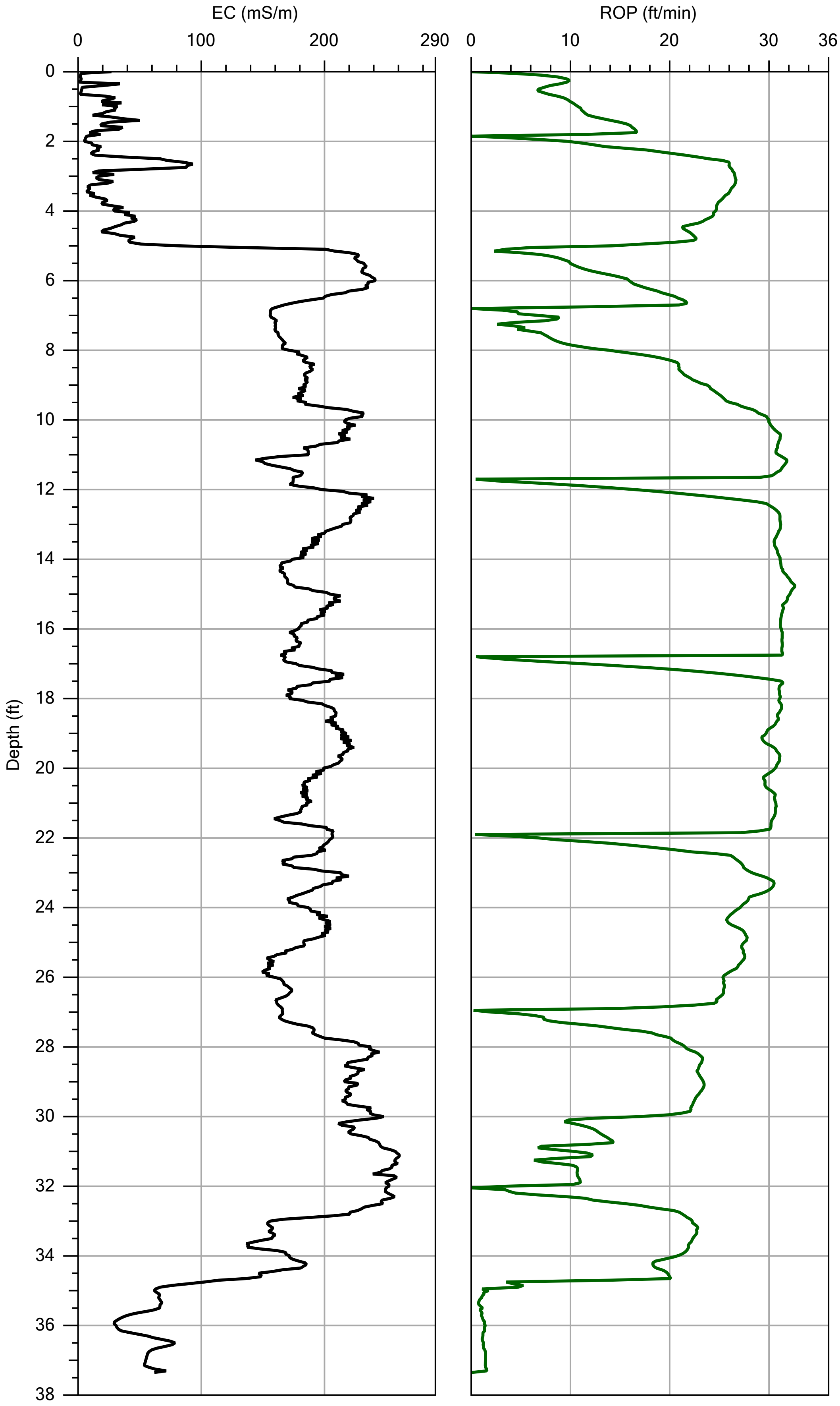


National
EXPLORATION·WELLS·PUMPS

		File: P01EC.EC
Company: NATIONAL EWP	Operator: E JASSO	Date: 8/20/2014
Project ID: 40003.883	Client: AMEC	Location:

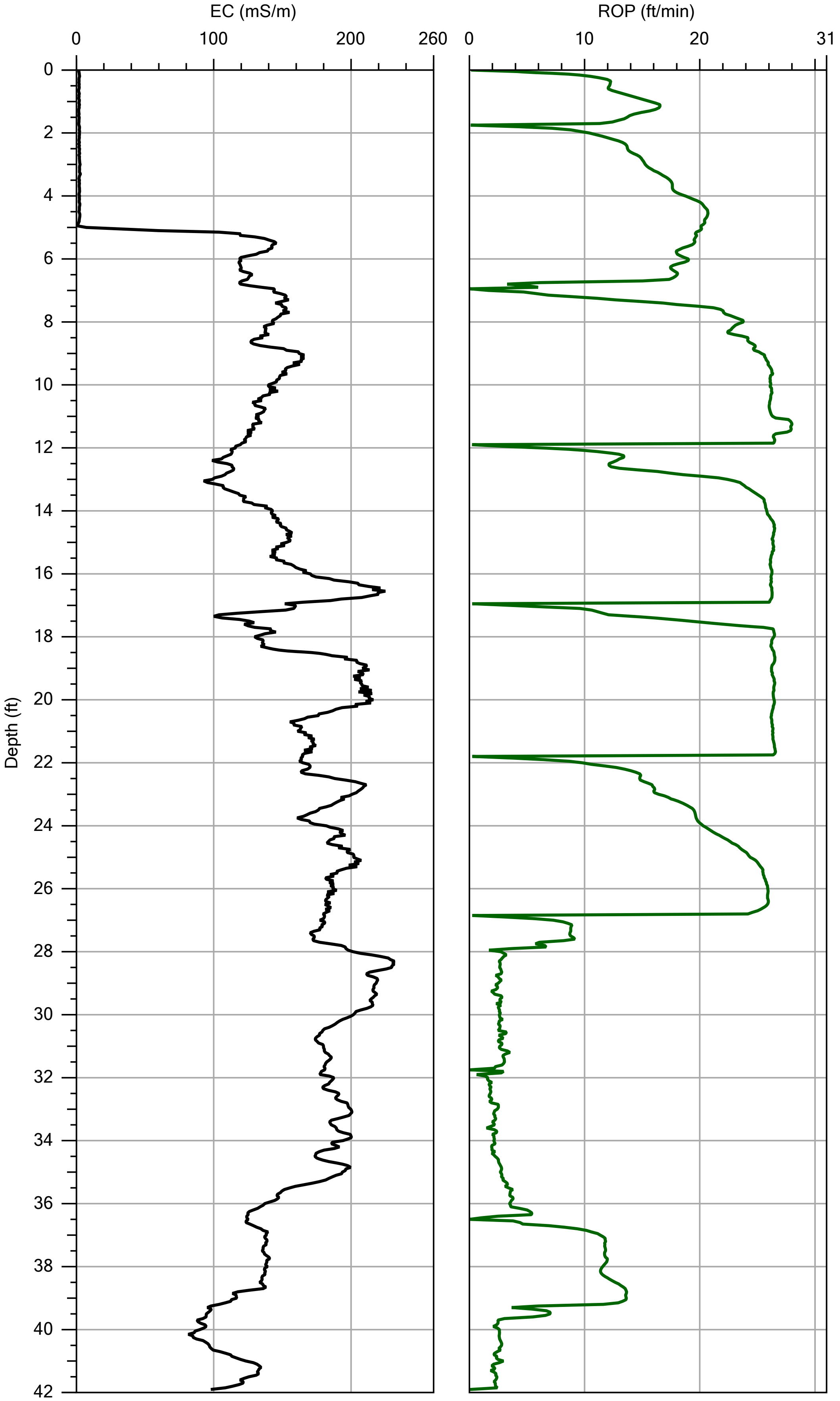


		File: P02EC.EC
Company: NATIONAL EWP	Operator: E JASSO	Date: 8/20/2014
Project ID: 40003.883	Client: AMEC	Location:



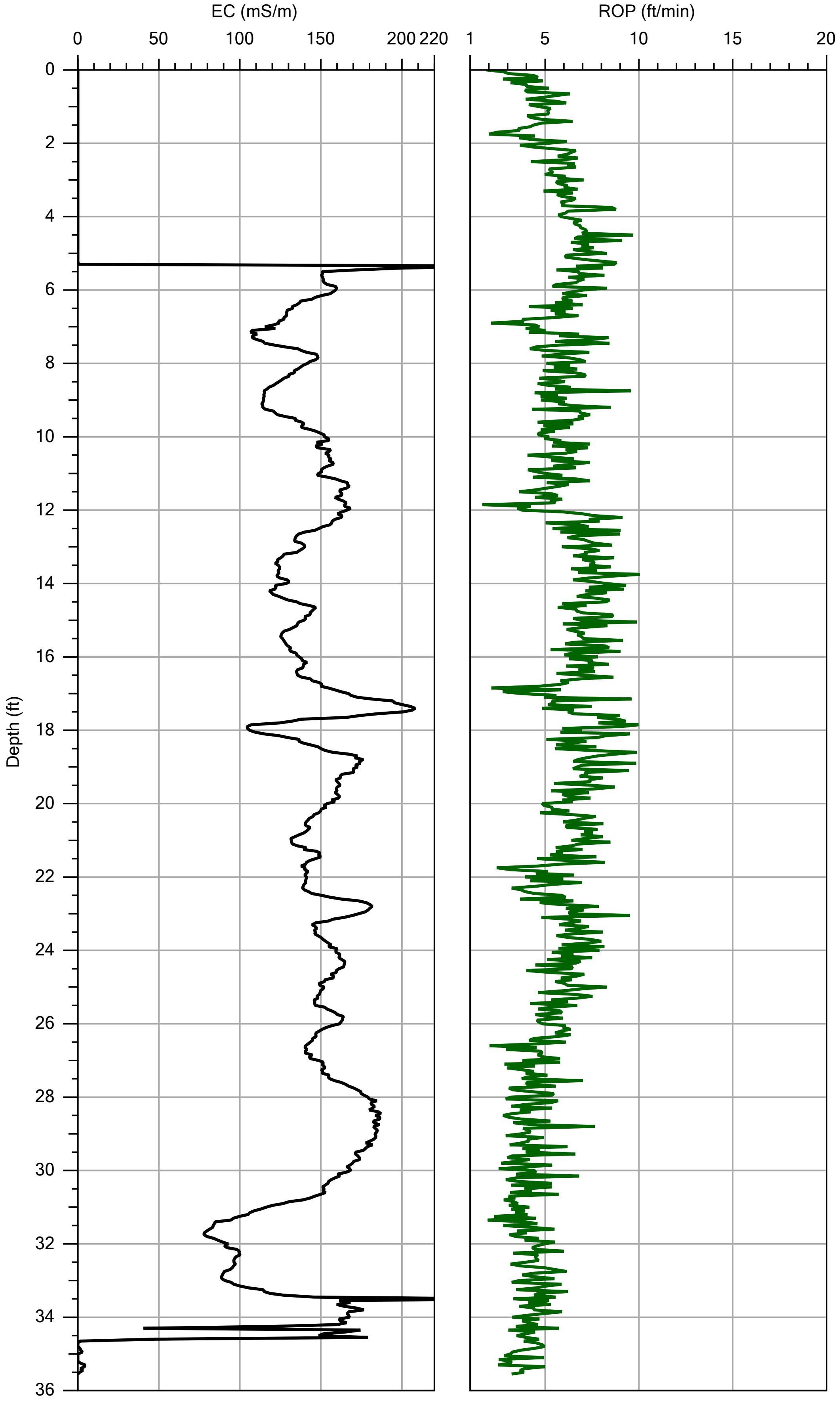
National
EXPLORATION • WELLS • PUMPS

		File: P03EC EDIT2A.TXT
Company: National EWP	Operator: E Jasso	Date:
Project ID: 40003.833	Client: AMEC	Location:



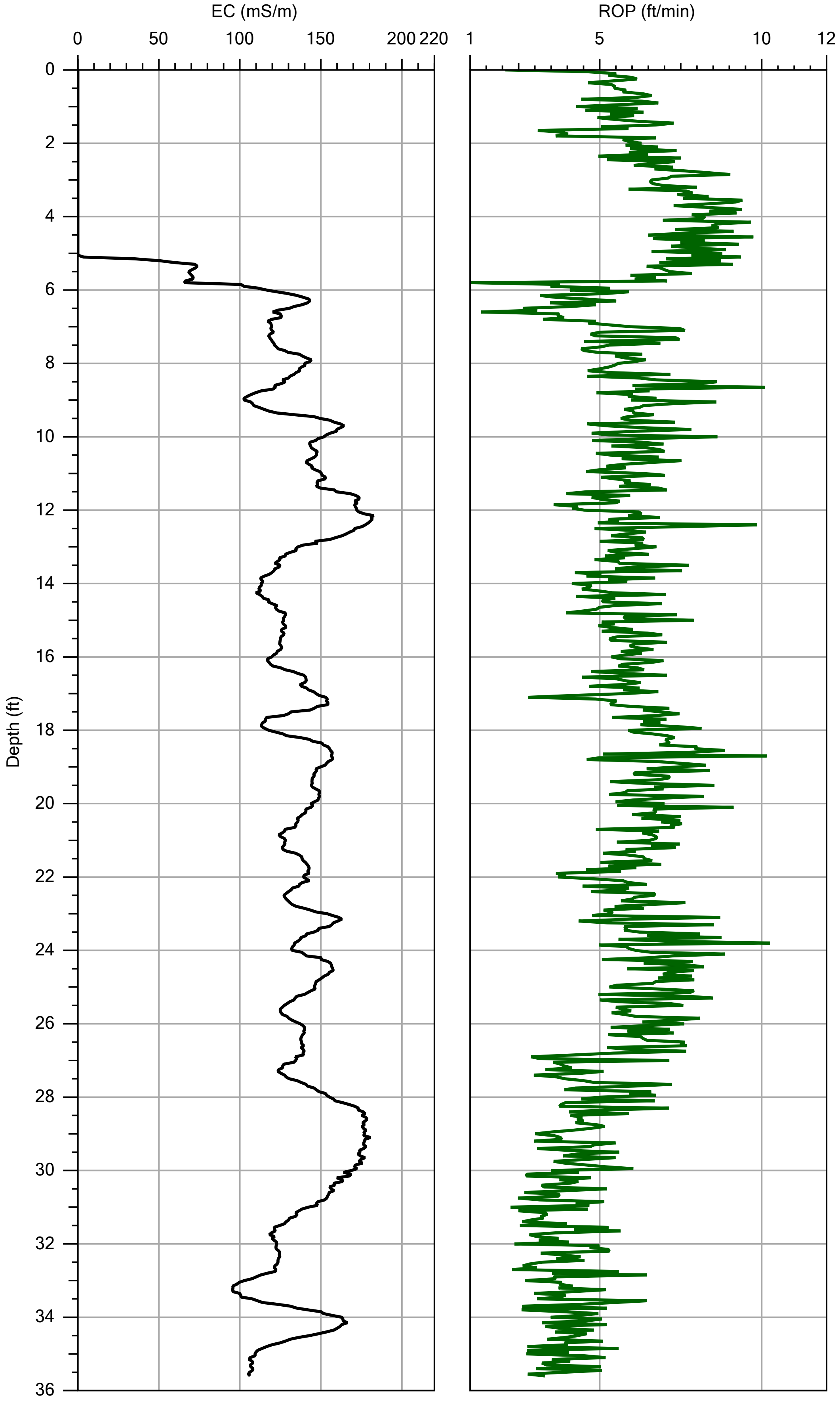
EXPLORATION • WELLS • PUMPS

		File: PRB01EC.EC
Company: NATIONAL EWP	Operator: E JASSO	Date: 8/20/2014
Project ID: 40003.883	Client: AMEC	Location:

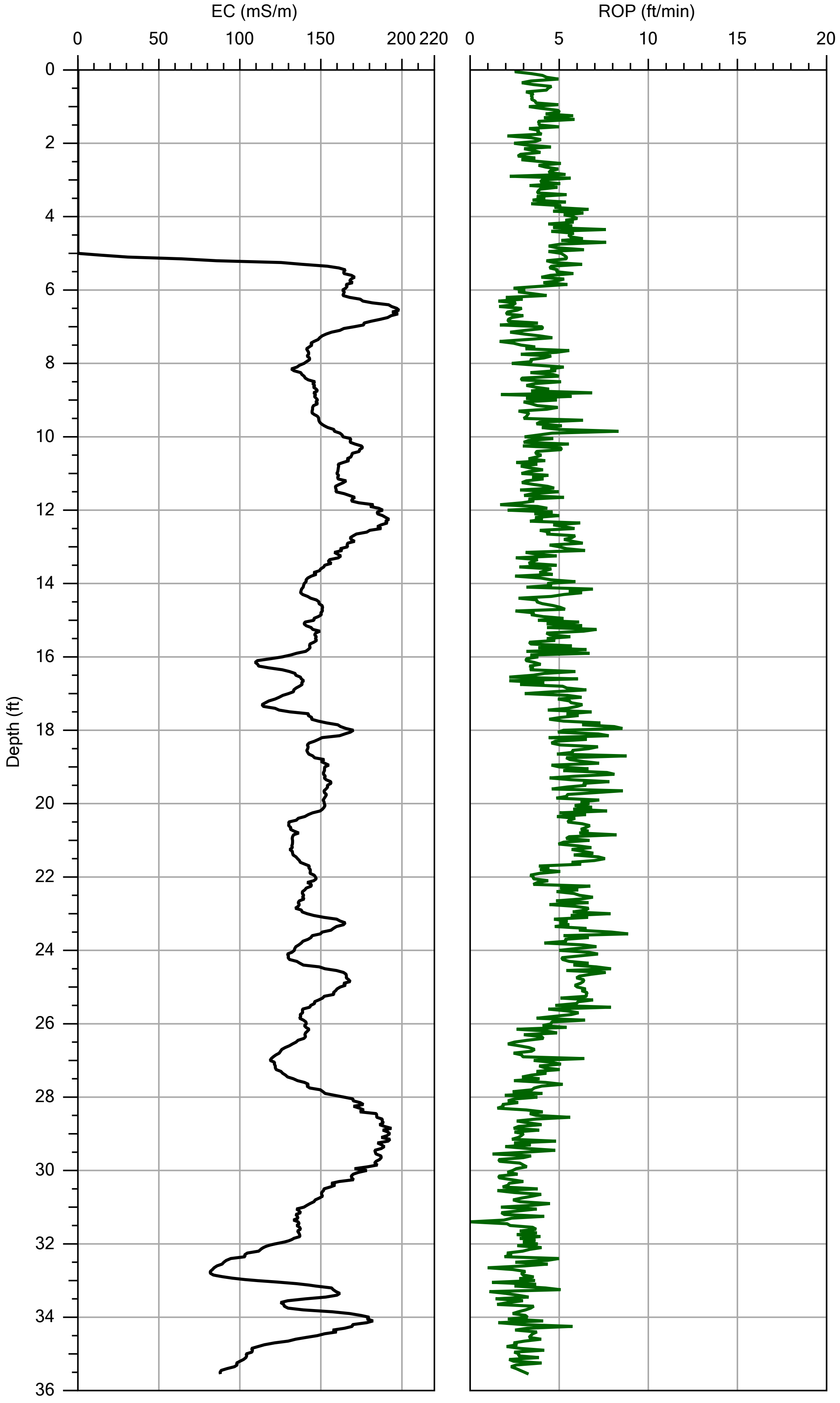


National
EXPLORATION • WELLS • PUMPS

		File: PRB02EC.DAT
Company: National EWP, Inc	Operator: R Estrada	Date: 1/1/1999
Project ID: 40003.883	Client: AMEC	Location:



		File: PRB03EC.DAT
Company: National EWP, Inc	Operator: R Estrada	Date: 1/1/1999
Project ID: 40003.883	Client: AMEC	Location:



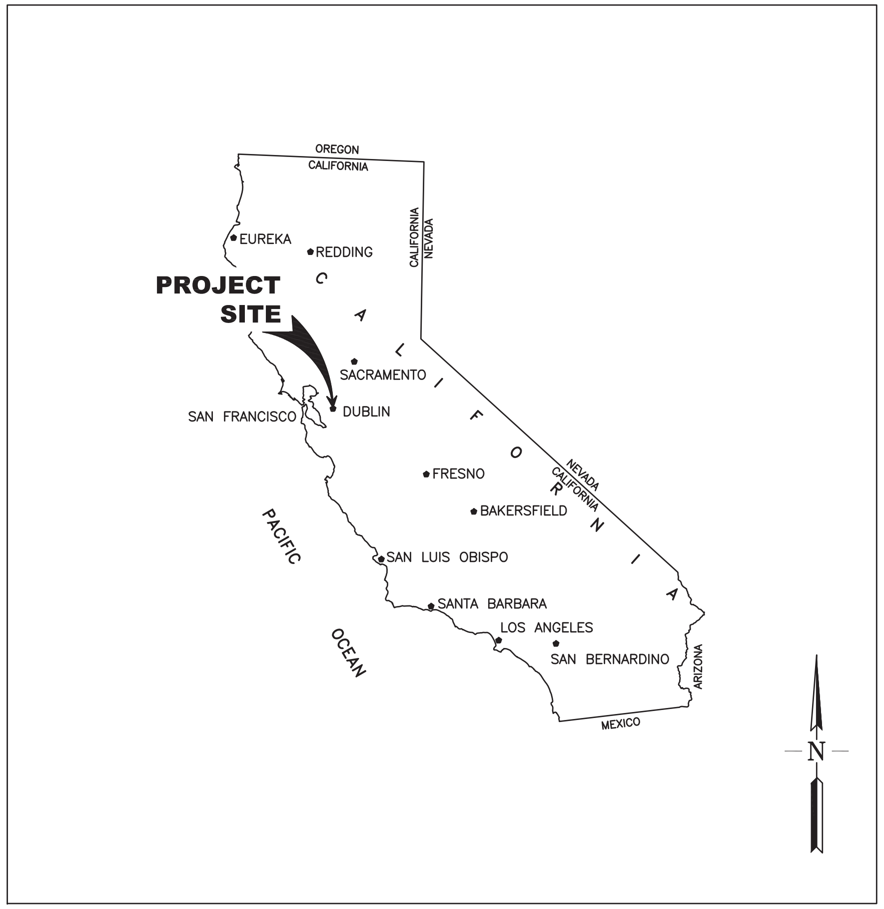
Company: National EWP	Operator: R. Estrada	File: PRB04EC.DAT Date: 8/18/2014
Project ID: 40003.883	Client: AMEC	Location:

```
        TEST            VALUE        P/F

INSTRUMENT CALIBRATION TESTS
         10 OHM:        9.1 OHMS     PASS
        100 OHM:       98.3 OHMS     PASS
       1000 OHM:     1065.3 OHMS     FAIL

PROBE CONTINUITY TESTS      >8 OHMS FAILS
            R-R:        2.0 OHMS     PASS
            W-W:        1.9 OHMS     PASS
            G-G:        1.8 OHMS     PASS
            B-B:        1.9 OHMS     PASS

PROBE ISOLATION TESTS      <10 KOHMS FAILS
    RED-NEUTRAL:      406  KOHMS     PASS
      RED-WHITE:      392  KOHMS     PASS
      RED-GREEN:      443  KOHMS     PASS
      RED-BLACK:      392  KOHMS     PASS
  WHITE-NEUTRAL:      441  KOHMS     PASS
    WHITE-GREEN:      419  KOHMS     PASS
    WHITE-BLACK:      449  KOHMS     PASS
  GREEN-NEUTRAL:      459  KOHMS     PASS
    GREEN-BLACK:      411  KOHMS     PASS
  BLACK-NEUTRAL:      445  KOHMS     PASS


PRB04EC.INF



SITE INFORMATION -- DIRECT IMAGE CONDUCTIVITY PROBE

LOG UNITS:  ENGLISH
PROBE AND ARRAY:  SC-500  WITH WENNER
100 INCH STRING POT USED
LOG START TIME:   Mon Aug 18 2014  12:00
EC LOW QUALITY ENTRIES:
2.00ft to 3.00ft    0.00%
3.00ft to 4.00ft    5.00%
4.00ft to 5.00ft    15.00%
LOG END DEPTH: 35.55 FEET 10.836 METERS

LATITUDE:  0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.00 METERS;  0.00 FEET
UNABLE TO ESTABLISH A FIX


LOG END TIME:   Mon Aug 18 2014  13:19
```

APPENDIX E

VMS Design Drawings and Technical Specifications

VAPOR MITIGATION SYSTEM (VMS)
DUBLIN APARTMENTS - CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA



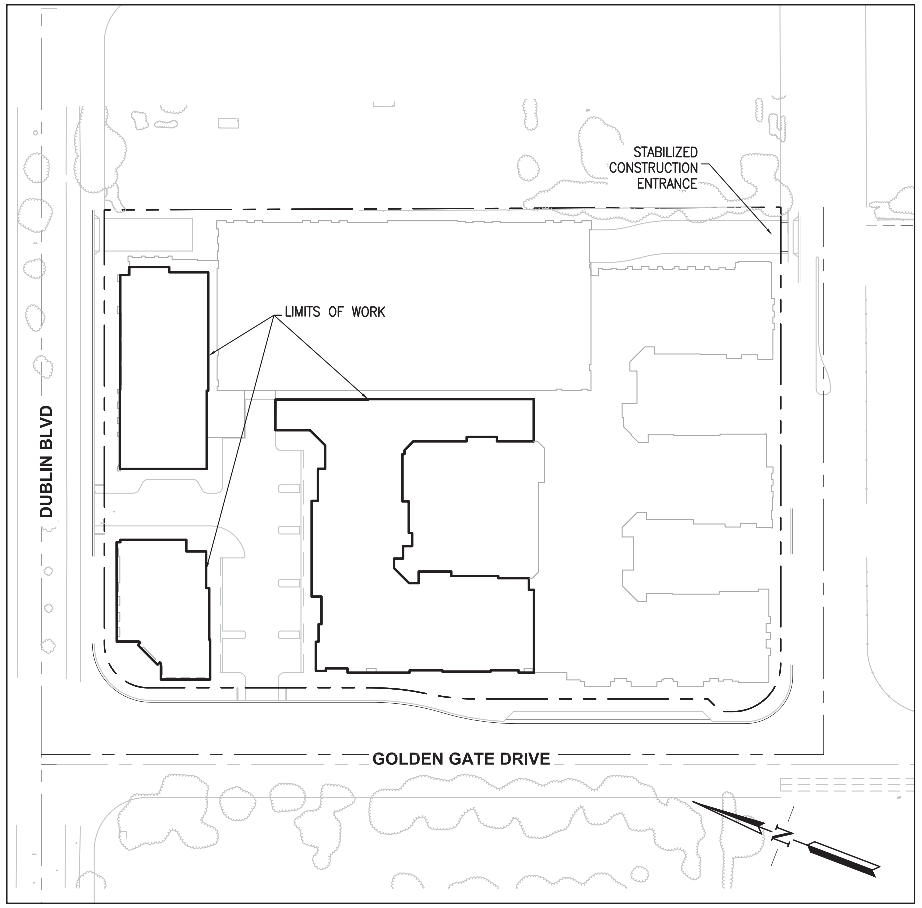
SITE LOCATION MAP

NOT TO SCALE

SITE VICINITY MAP

1000 0 1000 2000

APPROXIMATE SCALE IN FEET



SITE MAP

60 0 60 120

APPROXIMATE SCALE IN FEET

LIST OF DRAWINGS

SHT NO.	DWG NO.	DWG NAME
1	G–1	LIST OF DRAWINGS, SITE VICINITY, AND LOCATION MAPS
2	G–2	GENERAL NOTES AND ABBREVIATIONS
3	VMS–1A	MEMBRANE AND SUB–SLAB VENTING SYSTEM PLAN
4	VMS–1B	RISER VENT PLAN – 1st FLOOR
5	VMS–1C	RISER VENT PLAN – 2nd FLOOR
6	VMS–2	PODIUM MEMBRANE INSTALLATION DETAILS
7	VMS–3	PT SLAB MEMBRANE INSTALLATION DETAIL
8	VMS–4	SUB–SLAB VENTING SYSTEM DETAILS
9	VMS–5	SUB–SLAB VENTING SYSTEM DETAILS

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

LIST OF DRAWINGS
SITE VICINITY
AND SITE LOCATION MAPS

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 946120619
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE 06/08/15
PROJECT NO. OD14170800
DWG G-1
SHEET 1 OF 9

FILE NAME: S:\OD14\170800\task_03\15_0601-100desgn\SHTS-VMS\G-001-02 vms cover.dwg PLOT DATE: Wed, 10 Jun 2015 PLOT TIME: 12:23 PM

GENERAL NOTES

GENERAL NOTES:

1. FOR THE PURPOSE OF THE VAPOR MITIGATION SYSTEM (VMS) DRAWING SET, THE FOLLOWING DEFINITIONS APPLY:

   A. OWNER / CONSTRUCTION MANAGER:
   BAY WEST DEVELOPMENT (BWD DUBLIN)
   2 HENRY ADAMS STREET, SUITE 450
   SAN FRANCISCO, CA 94103

   B. VMS ENGINEER:
   AMEC FOSTER WHEELER
   180 GRAND AVENUE, SUITE 1100
   OAKLAND, CA 94612

   C. CIVIL ENGINEER:
   CARLSON, BARBEE & GIBSON, INC
   2633 CAMINO RAMON, SUITE 350
   SAN RAMON, CA 94583

   D. ARCHITECT:
   BDE ARCHITECTURE
   950 HOWARD STREET
   SAN FRANCISCO, CA 94103

2. COORDINATE USE OF SITE WITH OWNER AND CONSTRUCTION MANAGER.
3. THE CONTRACTOR SHALL VISUALLY INSPECT THE SITE TO ASCERTAIN THE CONDITION OF EXISTING FEATURES AND FAMILIARIZE THEMSELVES WITH THE PROPOSED WORK.
4. THE CONTRACTOR SHALL VERIFY THAT ALL NECESSARY PERMITS FROM THE CITY OF DUBLIN AND ALAMEDA COUNTY ENVIRONMENTAL HEALTH (ACEH) FOR THE INSTALLATION OF THE VAPOR MITIGATION SYSTEM (VMS) HAVE BEEN SECURED.
5. RELEVANT KNOWN AND PROPOSED UNDERGROUND UTILITIES AND STRUCTURES ARE SHOWN ON THE DRAWINGS. THE LOCATION OF THESE EXISTING AND PROPOSED UTILITIES SHOULD BE CONSIDERED APPROXIMATE. PRIOR TO THE COMMENCEMENT OF SITE ACTIVITIES, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES OR STRUCTURES IN THE AREAS OF WORK AND NOTIFY UNDERGROUND SERVICES ALERT ([USA ALERT] 811; 800-227-2600) AT LEAST TWO BUSINESS DAYS PRIOR TO COMMENCEMENT OF WORK.
6. CONTRACTOR SHALL BE REQUIRED TO MAINTAIN THE INTEGRITY OF STRUCTURES, UTILITIES AND OTHER SITE FEATURES AND REPAIR ANY DAMAGE AT NO ADDITIONAL COST.
7. THE CONTRACTOR SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE STATE CONSTRUCTION SAFETY ORDER.
8. ALL SPECIFIED WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND ORDINANCES.
9. COORDINATE WORK WITH OTHER TRADES. DRAWINGS ARE DIAGRAMMATIC. INDICATED LOCATIONS OF PENETRATIONS, OFF-SETS, BENDS, OR UNIONS ARE NOT EXACT.
10. THE CONTRACTOR SHALL NOT BLOCK EXISTING ACCESS ROADS DURING CONSTRUCTION.
11. PROPOSED BUILDING CONDITIONS SHOWN IN DRAWINGS ARE BASED ON INFORMATION PROVIDED BY THE CIVIL ENGINEER AND THE ARCHITECT. A COMPLETE DUBLIN APARTMENTS DESIGN SET, INCLUDING ALL TRADES AND PROPOSED BUILDING CONSTRUCTION, IS AVAILABLE FROM THE OWNER.
12. THE VMS ENGINEER ASSUMES NO RESPONSIBILITY BEYOND THE ADEQUACY OF VMS DESIGN CONTAINED HEREIN.

VAPOR MITIGATION MEMBRANE NOTES

1. VAPOR MITIGATION SYSTEM MEMBRANE SHALL BE GEO-SEAL MANUFACTURED BY LAND SCIENCE TECHNOLOGIES OR APPROVED EQUIVALENT.
2. THE CONTRACTOR SHALL BE A LAND SCIENCE TECHNOLOGIES CERTIFIED INSTALLER FOR THE INSTALLATION OF THE VAPOR MITIGATION MEMBRANE.
3. THE CONTRACTOR SHALL INSTALL THE VMS MEMBRANE IN ACCORDANCE WITH THESE DRAWINGS, RELEVANT SPECIFICATIONS, AND AS RECOMMENDED BY THE MEMBRANE MANUFACTURER. THE CONTRACTOR SHALL INFORM THE OWNER AND VMS ENGINEER OF DISCREPANCIES BETWEEN THESE DRAWINGS, THE SPECIFICATIONS, OR THE MANUFACTURE'S RECOMMENDATIONS PRIOR TO COMMENCING WORK.
4. VMS MEMBRANE GEO-SEAL CORE SHALL BE APPLIED TO A MINIMUM THICKNESS OF 60 MIL.
5. THE CONTRACTOR SHALL CONDUCT QUALITY CONTROL (QC) TESTING IN ACCORDANCE WITH THE PROJECT CONSTRUCTION QUALITY ASSURANCE PLAN, THE CONTRACTOR'S CONSTRUCTION QUALITY CONTROL PLAN SPECIFICATIONS AND MANUFACTURER RECOMMENDATIONS. QC TESTING SHALL INCLUDE, BUT NOT LIMITED TO, SMOKE TESTING OF THE INSTALLED VAPOR MITIGATION MEMBRANE. IDENTIFIED DEFICIENCIES IN THE MEMBRANE SHALL BE REPAIRED FOLLOWING MANUFACTURER'S RECOMMENDED REPAIR PROCEDURES.
6. GRADATION REQUIREMENTS FOR PERMEABLE BASE MATERIAL ARE AS FOLLOWS (PER GEOTECHNICAL REPORT):

SIEVE SIZE	PERCENTAGE PASSING SIEVE
GRAVEL OR CRUSHED ROCK	
1 INCH	90-100
3/4 INCH	30-100
1/2 INCH	5-25
3/8 INCH	0-6

SUB-SLAB VENTING SYSTEM NOTES

1. VAPOR COLLECTION PIPING SHALL BE VAPOR-VENT MANUFACTURED BY LAND SCIENCE TECHNOLOGIES OR APPROVED EQUIVALENT.
2. THE CONTRACTOR SHALL INSTALL THE VAPOR COLLECTION PIPING IN ACCORDANCE WITH THESE DRAWINGS, RELEVANT SPECIFICATIONS, AND AS RECOMMENDED BY THE PIPING MANUFACTURER. THE CONTRACTOR SHALL INFORM THE OWNER AND VMS ENGINEER OF DISCREPANCIES BETWEEN THESE DRAWINGS, THE SPECIFICATIONS, AND THE MANUFACTURER'S RECOMMENDATIONS PRIOR TO COMMENCING WORK.
3. COORDINATE WITH STRUCTURAL SECTION OF WORK FOR PIPING THROUGH CONCRETE FOUNDATIONS.
4. VENT RISER VERTICAL PIPING SHALL BE CENTERED IN THE PARTY/DEMISING WALL AIR GAP
5. FOR VENT RISER PLACED WITHIN NON-STRUCTURAL WALLS; THE PIPE SHALL BE ATTACHED TO THE FRAMING OF THE NON-STRUCTURAL WALL IT IS LOCATED IN.
6. INSTALL VENT RISER GUARDS AS NECESSARY TO PROTECT EXPOSED VERTICAL PIPING NOT INSTALLED WITHIN WALLS
7. DO NOT ALLOW THE PIPING, PIPE CONNECTORS, PIPE HANGERS OR STRAPS TO DIRECTLY TOUCH THE STRUCTURE, STUDS, GYPSUM BOARD, OR OTHER PIPES.
8. SUPPORT PIPING AS REQUIRED BY 2013 CALIFORNIA PLUMBING CODE OR AS SPECIFIED BY PIPE SUPPORT MANUFACTURER WHICHEVER IS MORE STRINGENT.
9. LOCATION OF ROOF VENTS SHALL COMPLY WITH MINIMUM CLEARANCES AND SETBACKS AS REQUIRED BY 2013 CALIFORNIA PLUMBING CODE, SECTION 906.2.
10. VENT RISER MAY BE RELOCATED TO SUIT FIELD CONDITIONS. CONTRACTOR SHALL OBTAIN THE OWNER AND THE VMS ENGINEER APPROVAL PRIOR TO ANY RELOCATION.
11. BUILDING FOUNDATION FEATURES SHOWN ON THESE DRAWINGS ARE DIAGRAMMATIC ONLY AND DO NOT REFLECT ACTUAL FOUNDATION DIMENSIONS.

ABBREVIATIONS

A.B.	ANCHOR BOLT
APVD	APPROVED
ARCH.	ARCHITECTURAL
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BWD	BAY WEST DEVELOPMENT
CHCK	CHECKED
CLR.	CLEARANCE
DSGN	DESIGNED
DRFT	DRAFTED
DWG	DRAWING
FTG.	FOOTING
HD	HIGH DENSITY
HR	HOUR
ID	INNER DIAMETER
LLC	LIMITED LIABILITY COMPANY
MAX	MAXIMUM
MIN	MINIMUM
NO	NUMBER
NOM	NOMINAL
OD	OUTER DIAMETER
PT	POST-TENSIONING
PVC	POLYVINYL CHLORIDE
QC	QUALITY CONTROL
REINF.	REINFORCEMENT
SCH	SCHEDULE
S.O.G.	SLAB ON GRADE
STRUCT.	STRUCTURAL
THK.	THICK
TYP	TYPICAL
VMS	VAPOR MITIGATION SYSTEM

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN A. ANG
DRFT J. GRAUL
CHK F. SZERDY
APVD D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

GENERAL NOTES AND ABBREVIATIONS

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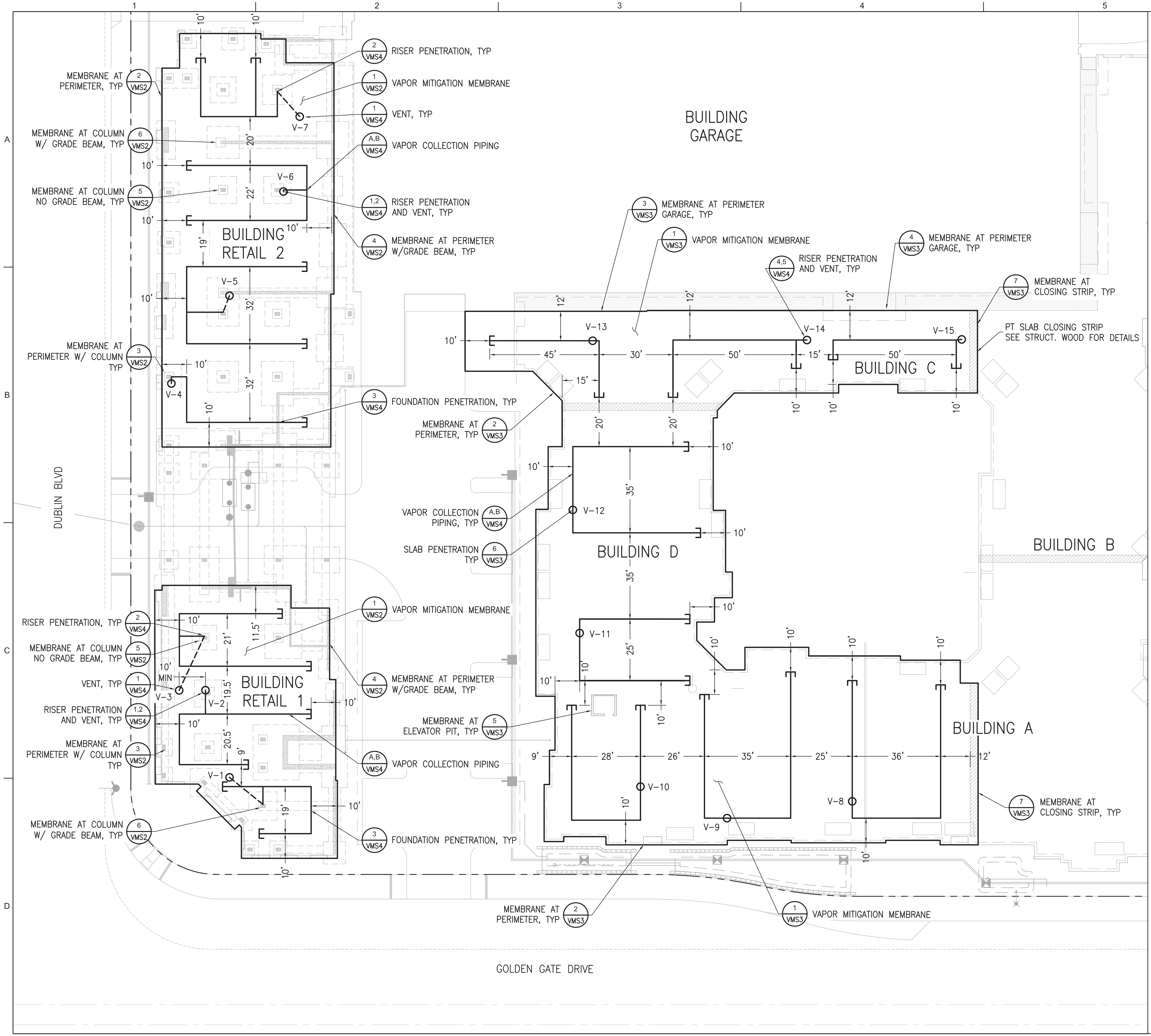
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ▬ 1"

DATE 06/08/15
PROJECT NO. OD14170800
DWG G-2
SHEET 2 OF 9

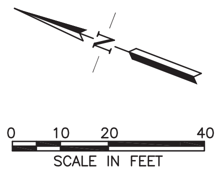


LEGEND

━━━━━┫	SUB-SLAB VENTING SYSTEM PIPE AND END CAP
V-1 - - - -○	ABOVE GROUND RISER PIPING AND VENT
▭	VAPOR MITIGATION MEMBRANE, LIMITS OF WORK
— — —	PROPERTY LINE
⬚	BUILDING FOUNDATION
⊡	PODIUM COLUMN AND FOOTING
	FIRE HYDRANT
■	SD CATCH BASIN
⊠	SD FIELD INLET
●	SS MANHOLE
	ELECTRICAL
	WATER VALVE BOX
	BACKFLOW PREVENTOR

NOTE

1. ALL DIMENSIONS AND VENT RISER LOCATIONS ARE APPROXIMATE. FINAL LOCATION OF VAPOR COLLECTION PIPING, SLAB PENETRATIONS, AND VENT RISER VERTICAL ROUTING SHALL BE COORDINATED WITH OTHER TRADES TO CONFIRM ABSENCE OF CONFLICTS BETWEEN VMS PIPING AND OTHER NEW/PROPOSED CONSTRUCTION.
2. VENT LOCATIONS SHOWN ARE REPRESENTATIVE OF FOUNDATION ELEVATION.
3. VERTICAL VENT RISER PIPES SHALL BE CENTERED IN THE PARTY WALL AIR GAP.



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REGISTERED PROFESSIONAL ENGINEER
DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL
STATE OF CALIFORNIA
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

MEMBRANE AND SUB-SLAB VENTING SYSTEM PLAN

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VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ▬▬▬ 1"

DATE	06/08/15
PROJECT NO.	OD14170800
DWG	VMS-1A
SHEET	3 OF 9

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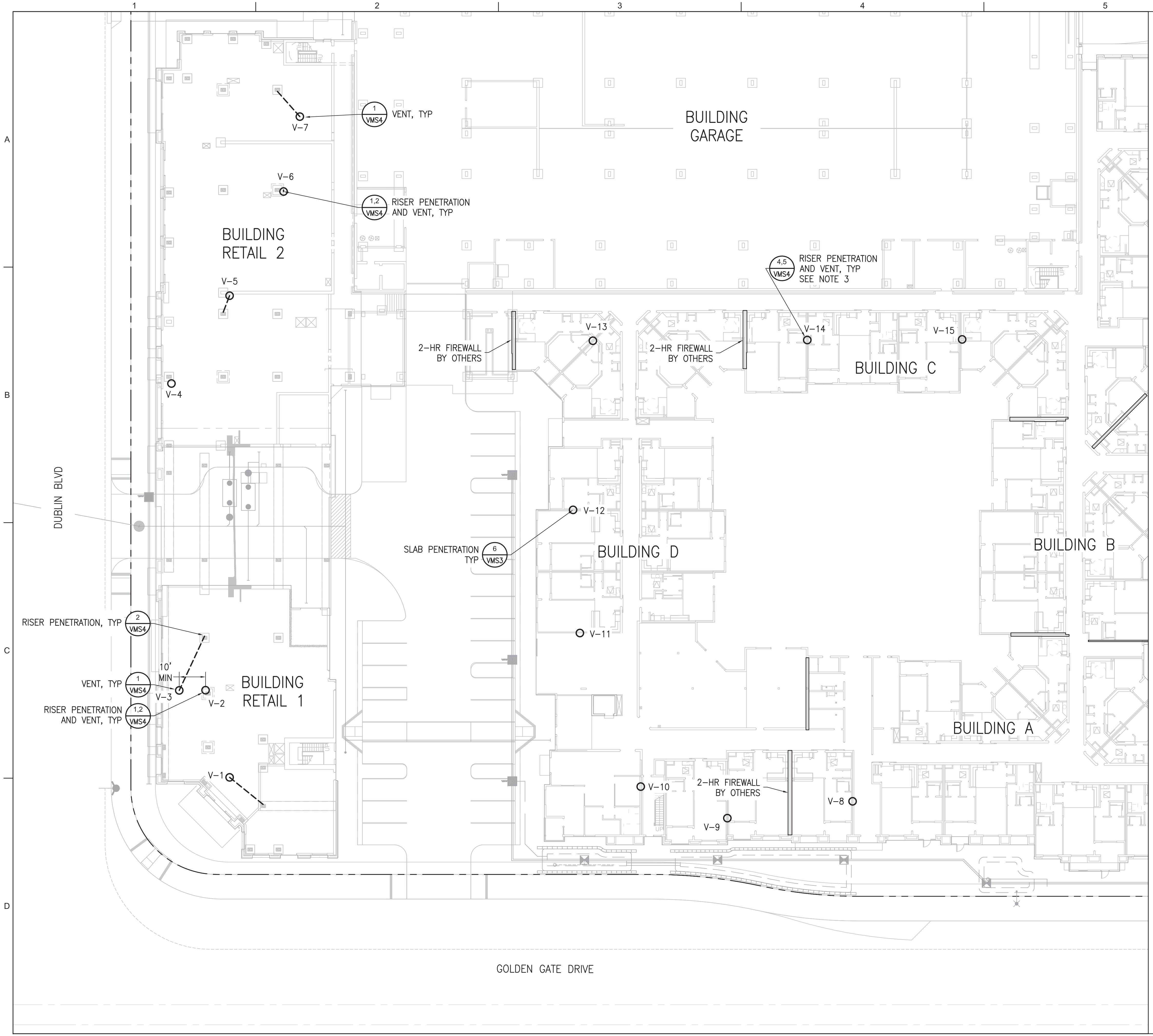

LEGEND

- V-1 ABOVE GROUND RISER PIPING AND VENT
- PROPERTY LINE
- PODIUM COLUMN
- FIRE HYDRANT
- SD CATCH BASIN
- SD FIELD INLET
- SS MANHOLE
- ELECTRICAL
- WATER VALVE BOX
- BACKFLOW PREVENTOR

NOTE

1. ALL DIMENSIONS AND VENT RISER LOCATIONS ARE APPROXIMATE. FINAL LOCATION OF VAPOR COLLECTION PIPING, SLAB PENETRATIONS, AND VENT RISER VERTICAL ROUTING SHALL BE COORDINATED WITH OTHER TRADES TO CONFIRM ABSENCE OF CONFLICTS BETWEEN VMS PIPING AND OTHER NEW/PROPOSED CONSTRUCTION.
2. VENT LOCATIONS SHOWN ARE REPRESENTATIVE OF FIRST FLOOR ELEVATION.
3. VERTICAL VENT RISER PIPES SHALL BE CENTERED TO THE PARTY WALL AIR GAP.

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

RISER VENT PLAN
1st FLOOR

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TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

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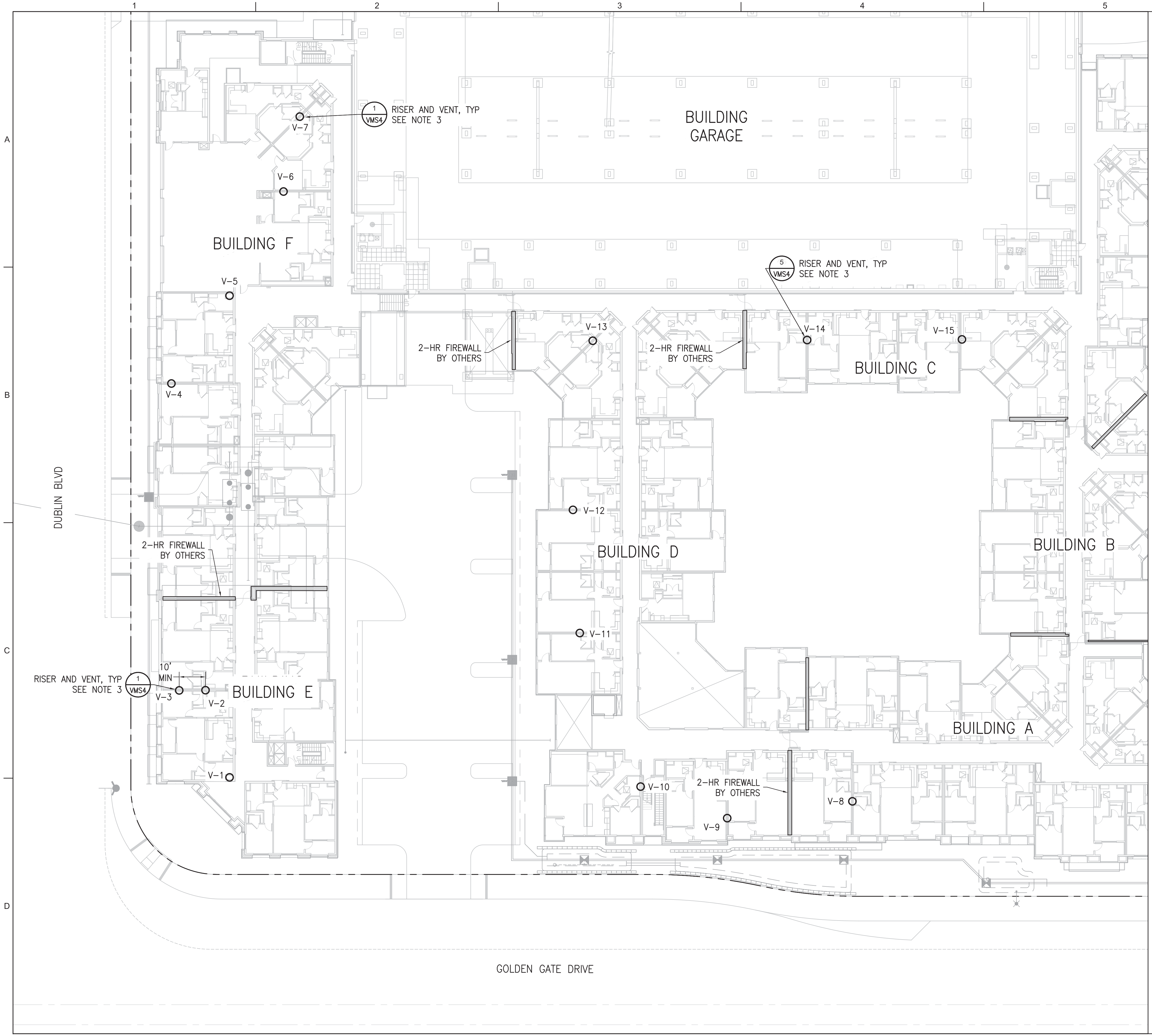
DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-1B
SHEET 4 OF 9

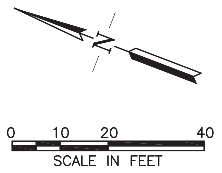


LEGEND

V-1 ○ RISER AND VENT
— — — PROPERTY LINE
FIRE HYDRANT
SD CATCH BASIN
SD FIELD INLET
SS MANHOLE
ELECTRICAL
WATER VALVE BOX
BACKFLOW PREVENTOR

NOTE

1. ALL DIMENSIONS AND VENT RISER LOCATIONS ARE APPROXIMATE. FINAL LOCATION OF VAPOR COLLECTION PIPING, SLAB PENETRATIONS, AND VENT RISER VERTICAL ROUTING SHALL BE COORDINATED WITH OTHER TRADES TO CONFIRM ABSENCE OF CONFLICTS BETWEEN VMS PIPING AND OTHER NEW/PROPOSED CONSTRUCTION.
2. VENT LOCATIONS SHOWN ARE REPRESENTATIVE OF SECOND FLOOR AND ROOF ELEVATIONS.
3. VERTICAL VENT RISER PIPES SHALL BE CENTERED TO THE PARTY WALL AIR GAP.



100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C. BABLITCH
No. C64096
EXP. 09-30-16

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

RISER VENT PLAN
2nd FLOOR

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VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ▬ 1"

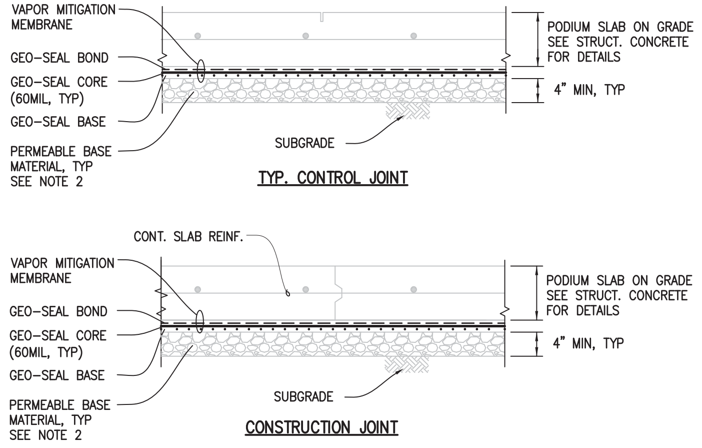
DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-1C
SHEET 5 OF 9

FILE NAME: S:\OD14\170800\task_03\15_0601-100desgn\SHTS-VMS\VMS-01 ABC.dwg PLOT DATE: Wed, 10 Jun 2015 PLOT TIME: 12:22 PM

NOTES

1. GEO-SEAL CORE MEMBRANE SHALL BE INSTALLED AT A MIN. 60 MIL THICKNESS AT ALL LOCATIONS.

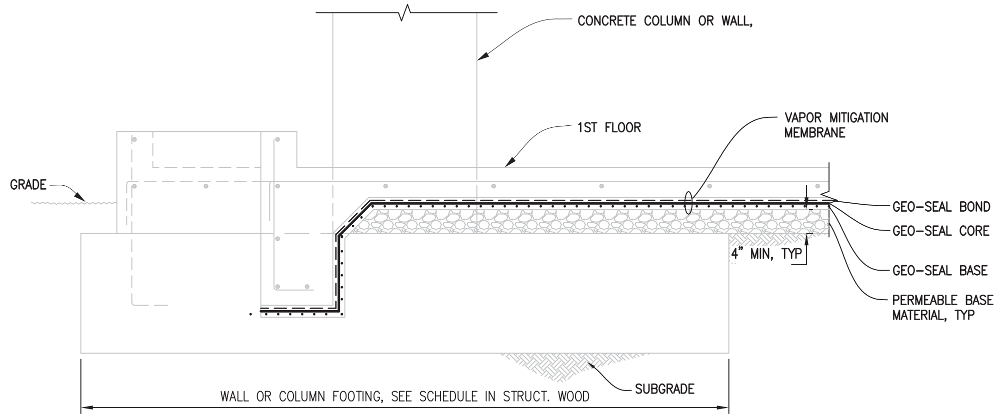
2. FOR PERMEABLE BASE MATERIAL SPECIFICATIONS, SEE VAPOR MITIGATION MEMBRANE NOTES, DWG G-2. 4" MINIMUM THICKNESS PER GEOTECHNICAL REPORT. SEE BUILDING DRAWINGS FOR ACTUAL SECTION REQUIREMENTS.



TYP. CONTROL JOINT

CONSTRUCTION JOINT

MEMBRANE BELOW PODIUM SLAB 1 VMS1A
NOT TO SCALE



MEMBRANE AT PODIUM PERIMETER FOOTING 2 VMS1A
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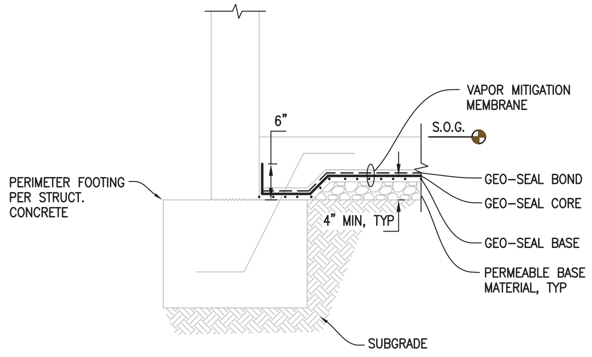

MEMBRANE AT PODIUM PERIMETER FOOTING WITH COLUMN 3 VMS1A
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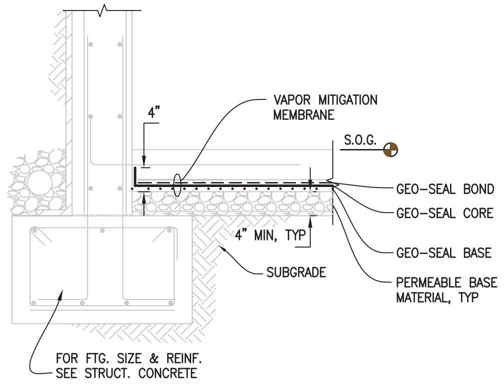
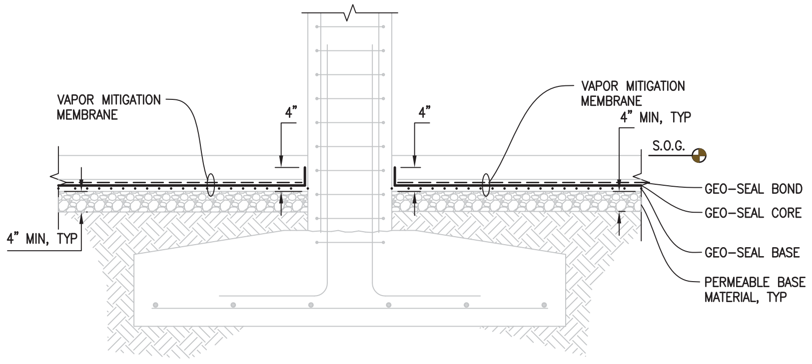
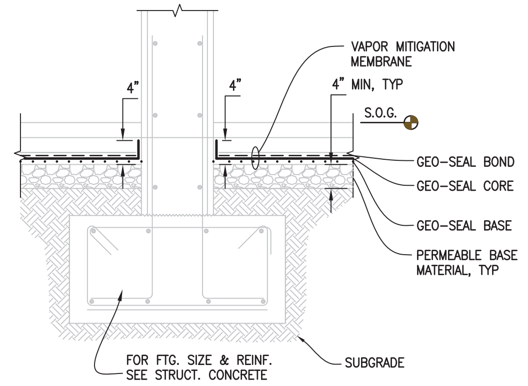


MEMBRANE AT PODIUM PERIMETER WITH COLUMN AND GRADE BEAM 4 VMS1A
NOT TO SCALE



MEMBRANE AT PODIUM CONCENTRIC COLUMN (NO GRADE BEAM) 5 VMS1A
NOT TO SCALE



MEMBRANE AT PODIUM CONCENTRIC COLUMN AND GRADE BEAM 6 VMS1A
NOT TO SCALE

100% DESIGN SUBMITTAL JUNE 2015

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL
STATE OF CALIFORNIA
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A.ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

PODIUM MEMBRANE INSTALLATION DETAILS

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 9461208619
TELEPHONE: (510) 663-4100
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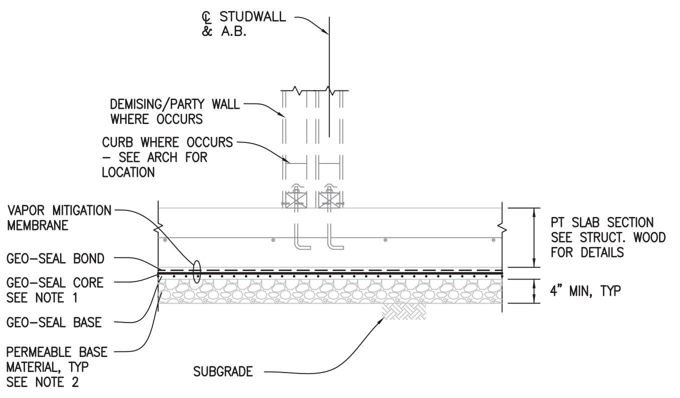
VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

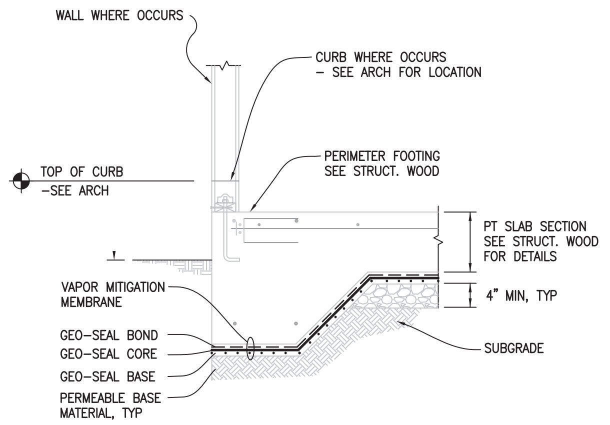
DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-2
SHEET 6 OF 9



MEMBRANE BELOW PT SLAB

NOT TO SCALE

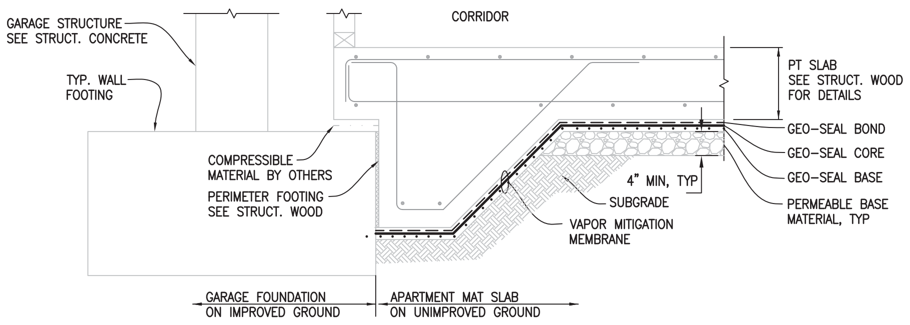
1 VMS1A



MEMBRANE AT PERIMETER FOOTING

NOT TO SCALE

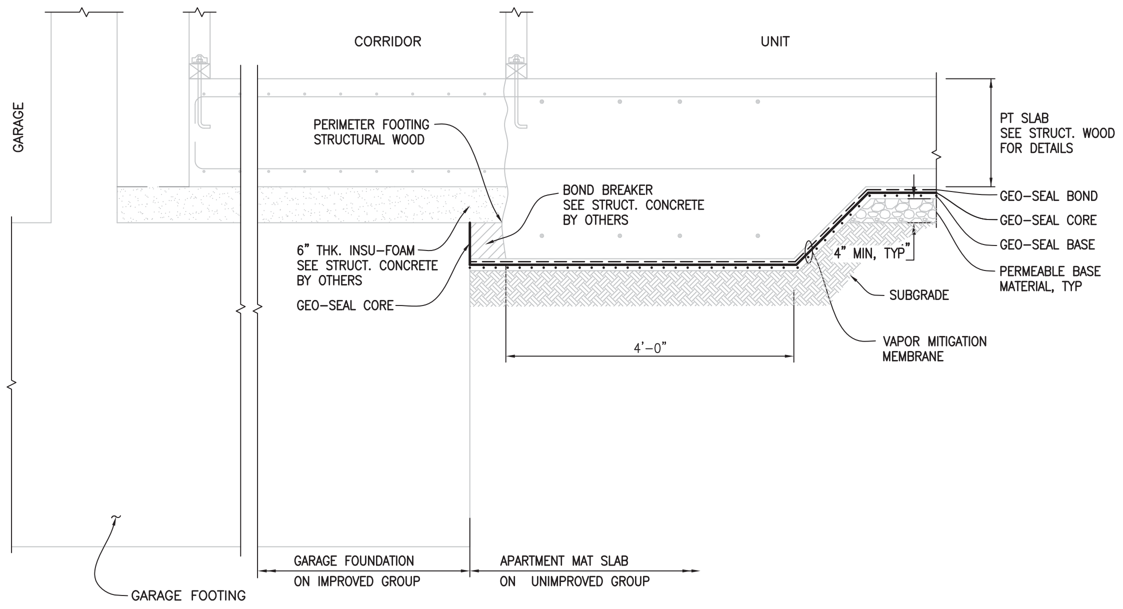
2 VMS1A



MEMBRANE AT GARAGE PERIMETER FOOTING

NOT TO SCALE

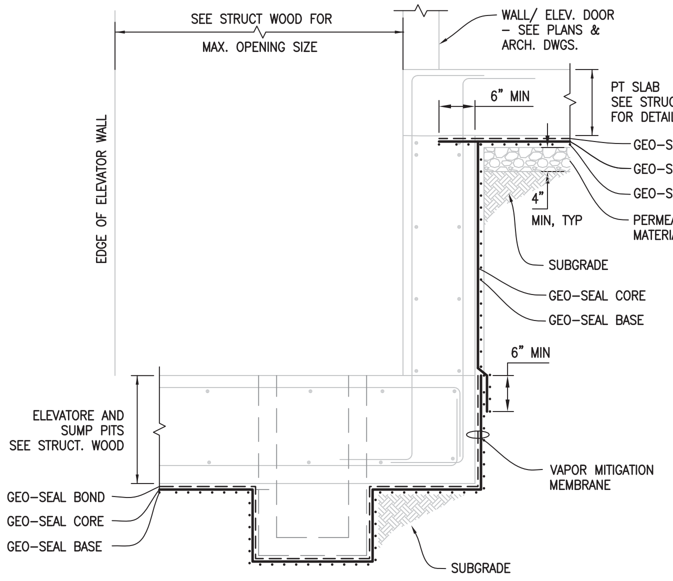
3 VMS1A



MEMBRANE AT GARAGE PERIMETER FOOTING

NOT TO SCALE

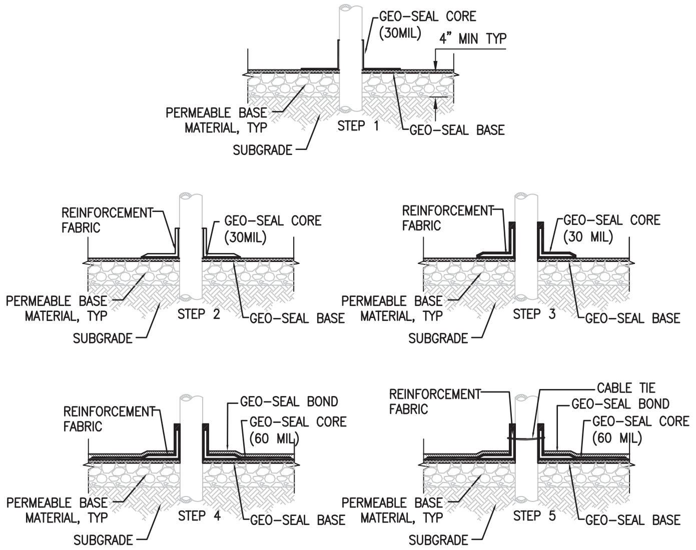
4 VMS1A



MEMBRANE AT ELEVATOR PIT

NOT TO SCALE

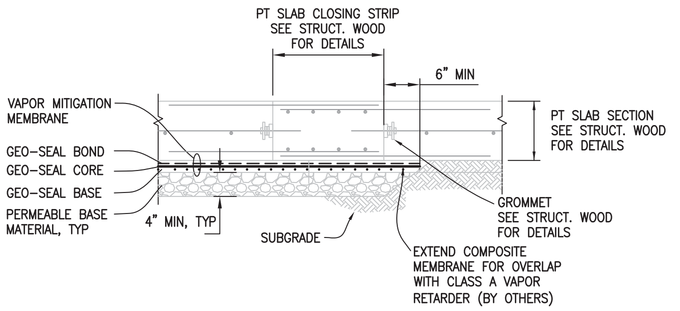
5 VMS1A



MEMBRANE INSTALLATION AT PENETRATIONS

NOT TO SCALE

6 VMS1A,1B VMS4



MEMBRANE AT CLOSING STRIP

NOT TO SCALE

7 VMS1A

NOTES

1. GEO–SEAL CORE MEMBRANE SHALL BE INSTALLED AT A MIN. 60 MIL THICKNESS AT ALL LOCATIONS.
2. FOR PERMEABLE BASE MATERIAL SPECIFICATIONS, SEE VAPOR MITIGATION MEMBRANE NOTES, DWG G–2. 4" MINIMUM THICKNESS PER GEOTECHNICAL REPORT. SEE BUILDING DRAWINGS FOR ACTUAL SECTION REQUIREMENTS.

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16

NO.	DATE	REVISION	BY	APVD
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DSGN A. ANG
DRFT J. GRAUL
CHK F. SZERDY
APVD D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

PT SLAB MEMBRANE INSTALLATION DETAILS

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 9461208619
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

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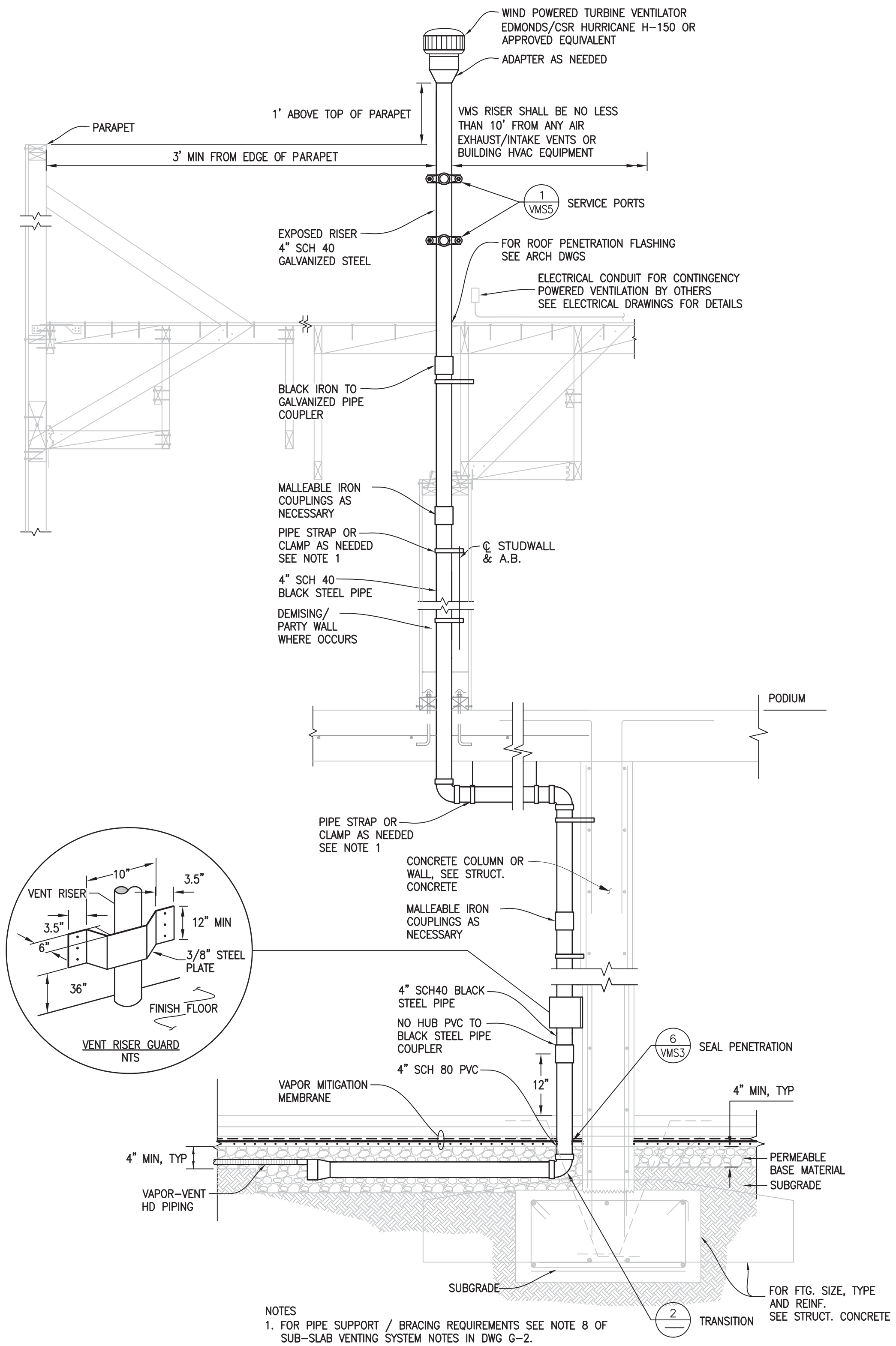
DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-3
SHEET 7 OF 9

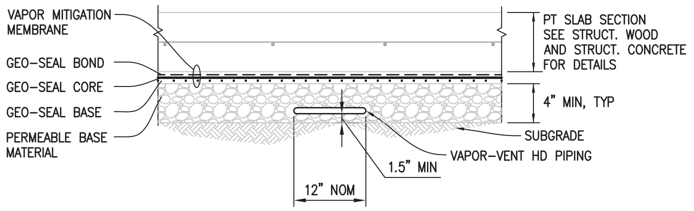


NOTES
1. FOR PIPE SUPPORT / BRACING REQUIREMENTS SEE NOTE 8 OF SUB-SLAB VENTING SYSTEM NOTES IN DWG G-2.

PODIUM SOIL VAPOR COLLECTION VENT RISER

NOT TO SCALE

1
VMS1A,1B,1C



SOIL VAPOR COLLECTION

NOT TO SCALE

A
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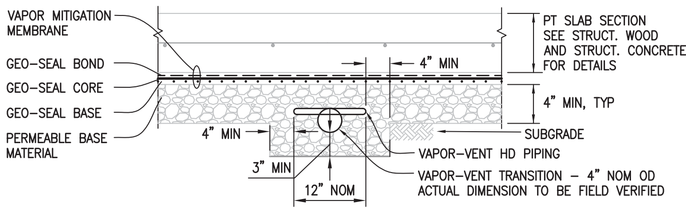
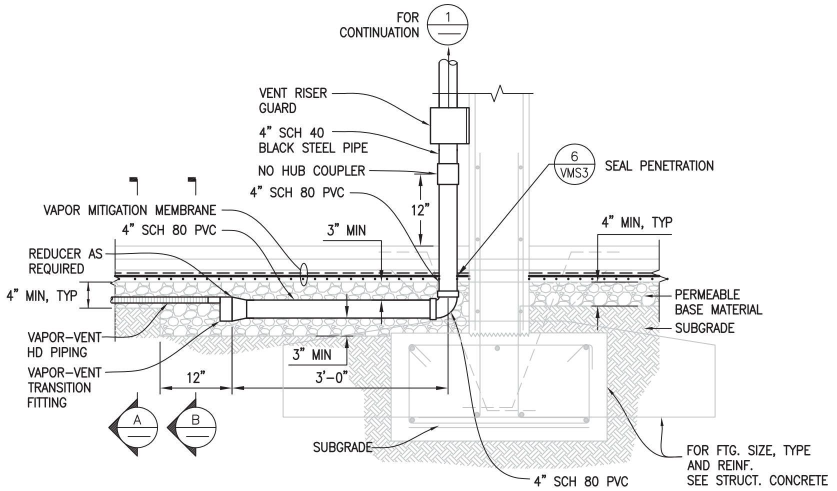


SOIL VAPOR COLLECTION END CONNECTION

NOT TO SCALE

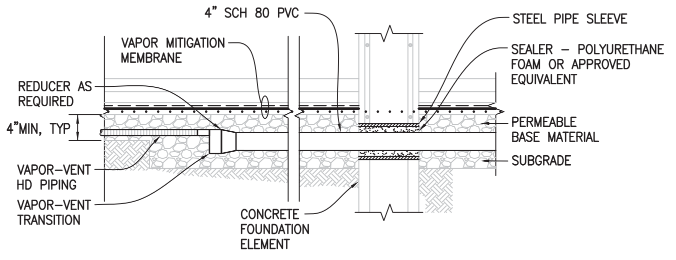
B
–



PODIUM SOIL VAPOR COLLECTION PIPE TRANSITION

NOT TO SCALE

2
VMS1A,1B

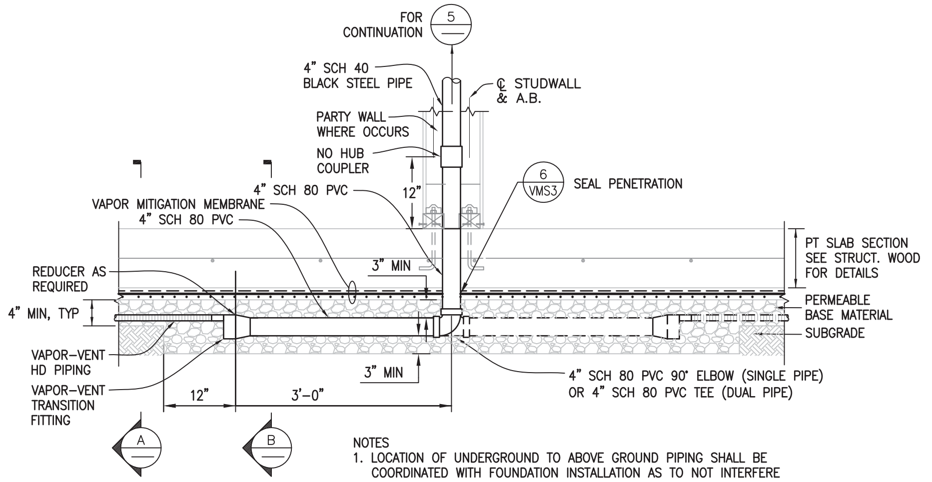


NOTES
1. SLEEVE ID MUST BE NOMINALLY 2 INCHES GREATER THAN PIPE OD.
2. SLEEVES SHALL BE STEEL PIPE MEETING ASTM A53, TYPE E, GRADE A, SCH 40, GALVANIZED WITH PLAIN ENDS.

VAPOR COLLECTION PIPING THROUGH FOUNDATION ELEMENT

NOT TO SCALE

3
VMS1A

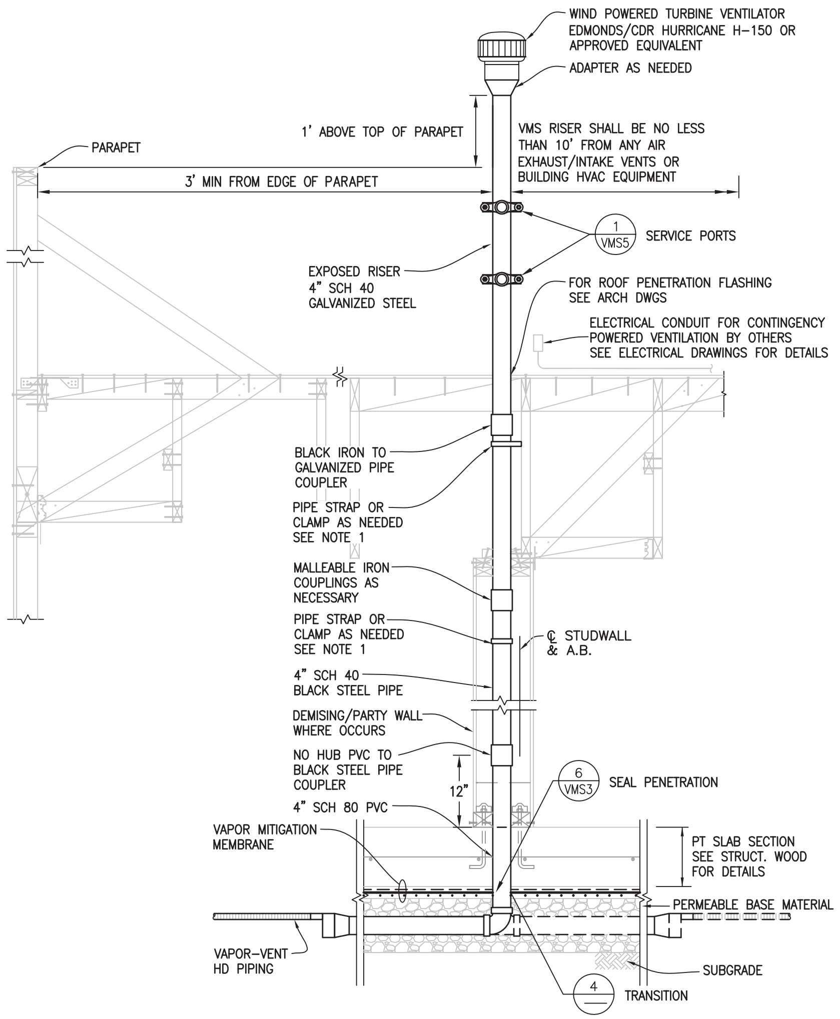


NOTES
1. LOCATION OF UNDERGROUND TO ABOVE GROUND PIPING SHALL BE COORDINATED WITH FOUNDATION INSTALLATION AS TO NOT INTERFERE WITH PARTY WALL ANCHORAGE TO PT SLAB.
2. VERTICAL RISER PIPES SHALL BE CENTERED IN THE PARTY WALL AIR GAP.

PT SLAB SOIL VAPOR COLLECTION PIPE TRANSITION

NOT TO SCALE

4
VMS1A,1B



NOTES
1. FOR PIPE SUPPORT / BRACING REQUIREMENTS SEE NOTE 8 OF SUB-SLAB VENTING SYSTEM IN DWG G-2.
2. VERTICAL RISER PIPES SHALL BE CENTERED IN THE PARTY WALL AIR GAP.

PT SLAB SOIL VAPOR COLLECTION VENT RISER

NOT TO SCALE

5
VMS1A,1B,1C

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

SUB-SLAB VENTING SYSTEM DETAILS

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
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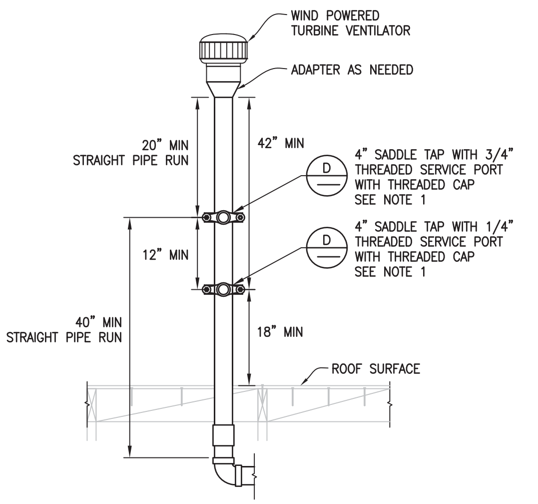
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ▬ 1"

DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-4
SHEET 8 OF 9

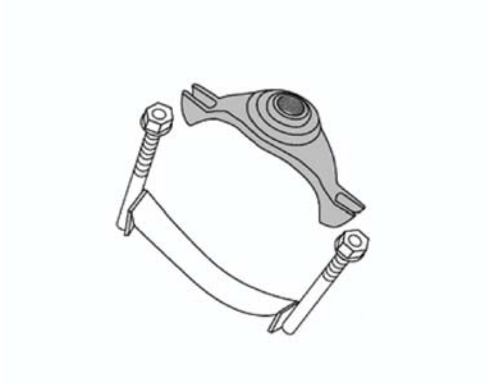


NOTES
1. SADDLE BODY SHALL BE NYLON COATED DUCTILE IRON WITH STAINLESS STEEL STRAP AND BOLTING HARDWARE, ROMAC OR APPROVED EQUIVALENT.

RISER VENT SERVICE PORTS

NOT TO SCALE

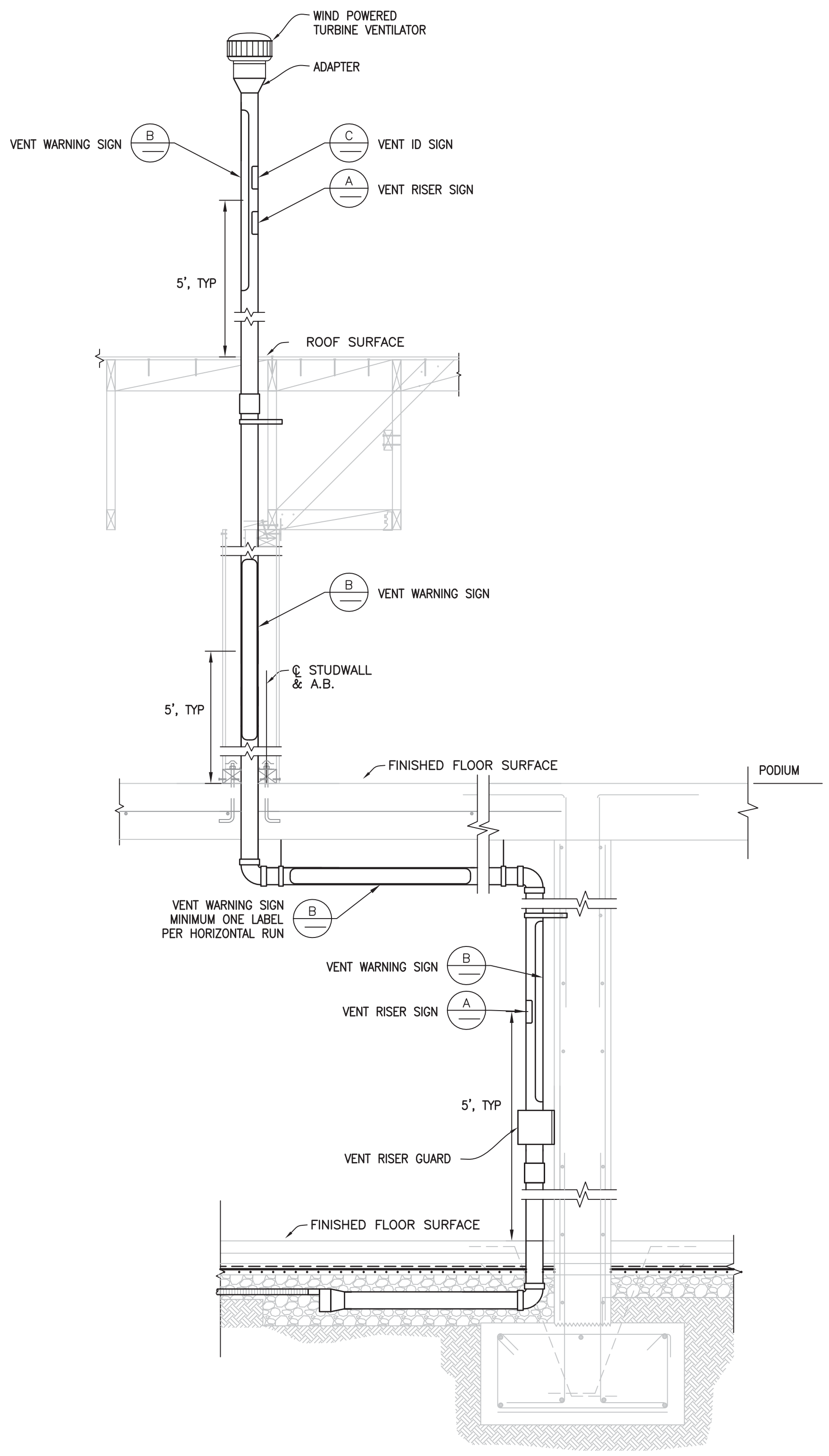
1 / –



SADDLE TAP, TYP

NOT TO SCALE

D / –



NOTES
1. VENT RISER SHOWN FOR PODIUM INSTALLATION. SIMILAR SIGNAGE REQUIRED FOR PT SLAB VENT INSTALLATION.
2. SIGNS INSTALLED AT ROOF LEVEL ON EXPOSED PIPING SHALL HAVE ADDITIONAL LAMINATION TO REDUCE ULTRAVIOLET LIGHT INDUCED FADING.

VENT RISER SIGNAGE

NOT TO SCALE

2 / –

NOTES
1. ALL SIGNS SHALL BE ADHESIVE BACKED PLASTIC AND A MINIMUM 3" HIGH X 4" WIDE. LETTERING SHALL BE A MINIMUM 1/4" HIGH, BLACK LETTER ON SAFETY YELLOW BACKGROUND.
2. THE SIGN SHALL BE APPLIED TO EACH VENT RISER NEAR THE TOP (ABOVE ROOF LEVEL) AND ALSO NEAR THE BASE OF EXPOSED RISERS.

VENT RISER SIGN

NOT TO SCALE

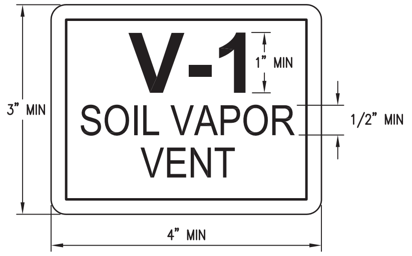
A / –

NOTES
1. ALL SIGNS SHALL BE ADHESIVE BACKED PLASTIC AND A MINIMUM 6" HIGH. LETTERING SHALL BE A MINIMUM 1" HIGH, BLACK LETTERING ON SAFETY YELLOW BACKGROUND.
2. THE SIGN SHALL BE APPLIED TO EACH VENT RISER INCLUDING THOSE ENCASED IN PARTY WALLS OR OTHER ENCLOSURES.
3. THE SIGN SHALL BE APPLIED TO THE FRONT AND BACK OF EACH VENT RISER PIPE AT EACH FLOOR AND AT ROOF LEVEL.
4. THE SIGN SHALL BE CENTERED FIVE FEET ABOVE THE FLOOR/ROOF SURFACE.

VENT WARNING SIGN

NOT TO SCALE

B / –



NOTES
1. ALL SIGNS SHALL BE ADHESIVE BACKED PLASTIC AND A MINIMUM 3" HIGH X 4" WIDE. LETTERING SHALL BE A MINIMUM 1/2" HIGH, WHITE LETTERS ON BLUE BACKGROUND.
2. THE SIGN SHALL BE APPLIED TO EACH VENT RISER NEAR THE TOP (ABOVE ROOF LEVEL).
3. REFER TO PLAN VMS-1A FOR VENT RISER LOCATION AND NUMBER.

VENT IDENTIFICATION SIGN

NOT TO SCALE

C / –

**100% DESIGN
SUBMITTAL
JUNE 2015**

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL

Douglas C. Bablitch

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DSGN	DRFT	CHK	APVD
A. ANG	J. GRAUL	F. SZERDY	D. BABLITCH

SOIL VAPOR MITIGATION SYSTEM
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

SUB-SLAB
VENTING SYSTEM
DETAILS

amec foster wheeler
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180 GRAND AVENUE, SUITE 1100
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DATE 06/08/15
PROJECT NO. OD14170800
DWG VMS-5
SHEET 9 OF 9

SECTION 31 21 16

SOIL VAPOR MITIGATION MEMBRANE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Substrate preparation:
2. Vapor mitigation barrier components:
3. Seam sealer and accessories.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Section 01 74 19 – Construction Waste Management
2. Section 03 30 00 – Cast-in-Place Concrete
3. Section 31.21.16.13 – Sub-Slab Venting System

1.3 PERFORMANCE REQUIREMENTS

A. General: The Contractor shall provide a vapor mitigation barrier system that prevents the passage of methane gas and/or volatile organic compound vapors and complies with physical requirements as demonstrated by testing performed by an independent testing agency of vapor mitigation barrier.

1.4 SUBMITTALS

A. The Contractor shall submit product data for each type of vapor mitigation barrier, including manufacturer's printed instructions for evaluating and preparing the substrate, technical data, and tested physical and performance properties.

B. Samples – The Contractor shall submit representative samples of the following for approval:

1. Vapor mitigation barrier components.

C. Certified Installer Certificates – The Contractor shall submit certificates signed by manufacturer certifying that Contractor or installer is a certified installer and comply with requirements under the "Quality Assurance" article.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The Contractor or installer shall be an experienced installer who has been trained and certified in writing by the membrane manufacturer, Land Science Technologies™ for the installation of the Geo-Seal® System.

B. Manufacturer Qualification: The Contractor shall obtain vapor mitigation barrier materials and system components from Land Science Technologies.

C. Field Sample: The Contractor shall prepare a 100 ft^2 (9.3 m^2) of field area as field sample to demonstrate application, detailing, thickness, texture, and standard of workmanship.

1. Notify engineer or special inspector one week in advance of the dates and times when field sample will be prepared.

2. If engineer or special inspector determines that field sample does not meet requirements, reapply field sample until field sample is approved.

3. Retain and maintain approved field sample during construction in an undisturbed condition as a standard for judging the completed vapor mitigation barrier. An undamaged field sample may become part of the completed work.

D. Pre-installation Conference: The Contractor shall attend a pre-installation conference with the Engineer, other trades influenced by vapor mitigation barrier installation and special inspector (if any) to assure proper site and installation conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials to project site as specified by manufacturer labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. The Contractor shall store materials as specified by the manufacturer in a clean, dry, protected location and within the temperature range required by manufacturer. Contractor shall protect stored materials from direct sunlight. If freezing temperatures are expected, Contractor shall take necessary steps to prevent the freezing of the Geo-Seal CORE and Geo-Seal CORE Detail components.

C. The Contractor shall remove and replace material that cannot be applied within its stated shelf life.

1.7 PROJECT CONDITIONS

A. The Contractor shall protect all adjacent areas not to be installed on. Where necessary, apply masking to prevent staining of surfaces to remain exposed wherever membrane abuts to other finish surfaces.

B. The Contractor shall perform work only when existing and forecasted weather conditions are within manufacturer's recommendations for the material and application method used.

C. Minimum vertical clearance of 24 inches is required for application of product. For areas with less than 24-inch clearance, the membrane may be applied by hand using Geo-Seal CORE Detail.

D. Ambient temperature shall be within manufacturer's specifications (greater than +45ºF/+7ºC.). Contractor shall consult manufacturer for the proper requirements when desiring to apply Geo-Seal CORE below 45ºF/7ºC. Contractor shall provide the Engineer manufacturer's approval for installation of the Geo-Seal Core below recommended ambient temperatures and prior installation.

E. The Contractor shall verify that all plumbing, electrical, mechanical and structural items to be under or passing through the vapor mitigation barrier system are positively secured in their proper positions and appropriately protected prior to membrane application. The Contractor shall notify the Owner and Engineer of any deficiencies found with the installed plumbing, electrical, mechanical and structural items that might affect installation of the vapor mitigation barrier.

F. The Contractor shall install the vapor mitigation barrier before placement of reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by Contractor prior to membrane application.

G. Stakes used to secure the concrete forms shall not penetrate the vapor mitigation barrier system after it has been installed. If stakes puncture the vapor mitigation barrier system after it has been installed, the Contractor shall perform necessary penetration repairs.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this article shall not deprive the Owner of other rights the Owner may have under other provisions of the contract documents, and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the contract documents.

B. Special Warranty: Contractor shall submit a written warranty signed by vapor mitigation barrier manufacturer agreeing to repair or replace vapor mitigation barrier that does not meet requirements or that does not remain volatile organic compound vapor tightness within the specified warranty period.

1. Warranty Period: 1 year after date of substantial completion.

C. Contractor shall also provide labor and material warranties as provided by the manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Soil vapor mitigation membrane shall be Geo-Seal by Land Science Technologies™, San Clemente, CA. (949) 481-8118 ,and consist of the following:

1. Geo-Seal BASE sheet layer
2. Geo-Seal CORE spray layer and Geo-Seal CORE Detail
3. Geo-Seal BOND protection layer

2.2 VAPOR MITIGATION BARRIER SPRAY MATERIALS

A. Fluid applied vapor mitigation barrier system – Geo-Seal CORE; a single course, high build, polymer modified, asphalt emulsion. Waterborne and spray applied at ambient temperatures. A nominal thickness of 60 dry mils, unless specified otherwise. Non-toxic and odorless. Geo-Seal CORE Detail has similar properties with greater viscosity and is roller or brush applied. Manufactured by Land Science Technologies.

B. Fluid applied vapor mitigation barrier physical properties.

Geo-Seal CORE – TYPICAL CURED PROPERTIES

Properties	**Test Method**	**Results**
Tensile Strength - CORE only	ASTM 412	32 psi
Tensile Strength - Geo-Seal System	ASTM 412	662 psi
Elongation	ASTM 412	4140%
Resistance to Decay	ASTM E 154 Section 13	4% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	.026 g/ft^2/hr
Hydrostatic Water Pressure	ASTM D 751	26 psi
Perm rating	ASTM E 96 (US Perms)	0.21
Methane transmission rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836 & ASTM C 704	11 lbf./inch
Hardness	ASTM C 836	80
Crack Bridging	ASTM C 836	No Cracking
Heat Aging	ASTM D 4068	Passed
Environmental Stress Cracking	ASTM D 1693	Passed
Oil Resistance	ASTM D543	Passed
Soil Burial	ASTM D 4068	Passed
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20°C
Resistance to Acids:		
Acetic		30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F

Geo-Seal CORE Detail – TYPICAL CURED PROPERTIES

Properties	**Test Method**	**Results**
Tensile Strength	ASTM 412	32 psi
Elongation	ASTM 412	3860%
Resistance to Decay	ASTM E 154 Section 13	9% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	.026 g/ft^2/hr
Hydrostatic Water Pressure	ASTM D 751	28 psi
Perm rating (US Perms)	ASTM E 96	0.17
Methane transmission rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836	7 lbf./inch
Hardness	ASTM C 836	85
Crack Bridging	ASTM C 836	No Cracking
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20ºC
Resistance to Acids:		
Acetic	-	30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F

2.3 VAPOR MITIGATION BARRIER SHEET MATERIALS

A. The Geo-Seal BASE layer and Geo-Seal BOND layer are chemically resistant sheets comprised of a 5 mil high density polyethylene sheet thermally bonded to a 3 ounce non woven geotextile.

B. Sheet Course Usage

1. As foundation base layer, The Contractor shall use Geo-Seal BASE course.

2. As top protective layer, the Contractor shall use Geo-Seal BOND layer.

C. Geo-Seal BOND and Geo-Seal BASE physical properties.

Properties	Test Method	Results
Film Thickness		5 mil
Composite Thickness		18 mil
Water Vapor Permeability	ASTM E 96	0.214
Adhesion to Concrete	ASTM D 1970	9.2 lbs/inch^2
Dart Impact	ASTM D 1790	>1070 gms, method A
		594 gms, method B
Puncture Properties Tear	ASTM B 2582 MD	11,290 gms
	ASTM B 2582 TD	13,150 gms

2.4 AUXILLARY MATERIALS

A. Sheet Flashing: 60-mil reinforced modified asphalt sheet good with double-sided adhesive.

B. Reinforcing Strip: Manufacturer’s recommended polypropylene and polyester fabric.

C. Gas Venting Materials: Geo-Seal Vapor-Vent HD and associated fittings.

D. Seam Detailing Sealant Mastic: Geo-Seal CORE Detail, a high or medium viscosity polymer modified water based asphalt material.

1. Back Rod: Closed-cell polyethylene foam.

PART 3 – EXECUTION

3.1 AUXILIARY MATERIALS

A. The Contractor shall examine substrates, areas, and conditions under which vapor mitigation barrier will be applied for compliance with requirements and manufacturer recommendations. The Contractor shall repair and correct deficiencies prior to proceeding with installation.

3.2 SUBSTRATE SURFACE PREPARATION

A. Geo-Seal shall only be installed on the following approved substrates: 1) compacted earth, 2) sand, and/or 3) aggregate. The Contractor shall inspect the installed substrate as follows:

1. Compacted Earth: Remove pieces of debris, gravel and/or any other material that can potentially puncture the Geo-Seal BASE. Remove any debris from substrate that can potentially puncture the Geo-Seal system prior to application.

2. Sand: A sand subgrade requires no additional preparation, provided any material that can potentially puncture the Geo-Seal BASE layer is not present.

4. Aggregate: The gravel layer must be compacted and rolled flat**.** The gravel substrate shall be as specified in the Drawings and related Section 31.21.16.13 – Sub-Slab Venting System

B. Should the substrate condition not meet manufacturer's recommendations, the Contractor shall perform or coordinate with substrate installer for necessary repairs. On a horizontal surface, the substrate should be free from material that can potentially puncture the vapor mitigation barrier. The Contractor might install additional protection or cushion layers as required if the gravel substrate contains too many jagged points and edges that could puncture one or more of the system components. As necessary, the Contractor shall contact manufacturer to confirm substrate meets manufacturer's recommendations.

C. The Contractor shall mask off adjoining surface not receiving the vapor mitigation barrier system to prevent the spillage or over spray affecting other construction.

3.3 CONCRETE SURFACE PREPARATION

A. The Contractor shall clean and prepare concrete surfaces to manufacturer's recommendations. In general, only apply the Geo-Seal CORE material to dry, clean and uniform substrates. Concrete surfaces must be a light trowel, light broom or equivalent finish. Remove fins, ridges and other projections and fill honeycomb, aggregate pockets, grout joints and tie holes, and other voids with hydraulic cement or rapid-set grout. The Contractor shall be responsible to point out unacceptable substrate conditions to the Owner and Engineer and ensure the proper repairs are made.

B. When applying the Geo-Seal CORE or Geo-Seal CORE Detail material to concrete, the Contractor shall not apply the product over standing water. Applying over standing water will result in the membrane not setting up properly on the substrate. The Contractor shall be responsible for removal of all standing water and drying (as necessary) of concrete surfaces.

C. The Contractor shall wipe down or clean surfaces (as necessary) prior to application of the Geo-Seal CORE or Geo-Seal CORE Detail. This includes, but is not limited to, the removal of forming oils, concrete curing agents, dirt accumulation, and other debris. Contractor shall contact form release agent manufacturer or concrete curing agent manufacturer for VOC content and proper methods for removing the respective agent.

D. Applying the Geo-Seal CORE to "green" concrete is acceptable and can be advantageous in creating a superior bond to the concrete surface. To help reduce blistering, The Contractor shall apply a primer coat of only the asphalt component of the Geo-Seal CORE system. Some blistering of the membrane will occur and may be more severe on surfaces exposed to direct sunlight. Blistering is normal and will subside over time. The Contractor shall use a needle nose depth gauge to confirm that the specified mil thickness has been applied.

3.4 PREPARATIONS AND TREATMENT OF TERMINATIONS

A. The Contractor shall prepare the substrate surface in accordance with Section 3.3 of this specification. Concrete surfaces that are not a light trowel, light broom or equivalent finish, will need to be repaired.

B. Terminations on horizontal and vertical surfaces should extend 6" onto the termination surface or as specified in the Drawings.

C. The Contractor shall apply 30 mils of Geo-Seal CORE to the terminating surface and then embed the Geo-Seal BASE layer by pressing it firmly into the Geo-Seal CORE layer. Next, apply 60 mils of Geo-Seal CORE to the BASE layer. When complete, apply the Geo-Seal BOND layer. After the placement of the Geo-Seal BOND layer is complete, The Contractor shall apply a final 30 mil seal of the Geo-Seal CORE layer over the edge of the termination.

D. The Contractor shall terminate the membrane onto exterior footings, pile caps, interior footings and grade beams. The Contractor shall implement similar termination process at stem walls and/or vertical surfaces.

3.5 PREPARATIONS AND TREATMENT OF PENETRATIONS

A. The Contractor shall verify that all pipe penetrations are secured in place prior to the installation of the Geo-Seal system. The Contractor shall inform the Owner and Engineer of loose penetrations, as loose penetrations could potentially exert pressure on the membrane and damage the membrane after installation. The Contractor shall coordinate with the appropriate trade for repairs of loose penetrations.

B. To properly seal around penetrations, the Contractor shall cut a piece of the Geo-Seal BASE layer that will extend 6" beyond the outside perimeter of the penetration. The Contractor shall cut a hole in the Geo-Seal BASE layer just big enough to slide over the penetration, ensuring the Geo-Seal BASE layer fits snug against the penetration, this can be done by cutting an "X" no larger than the inside diameter of the penetration. The Contractor shall ensure that there is no gap larger than a 1/8" is between the Geo-Seal BASE layer and the penetration. Other methods can also be utilized, provided, there is not a gap larger than 1/8" between the Geo-Seal BASE layer and the penetration.

C. The Contractor shall seal the Geo-Seal BASE layer using Geo-Seal CORE or Geo-Seal CORE Detail to the underlying Geo-Seal BASE layer.

D. The Contractor shall apply one coat of Geo-Seal CORE Detail or Geo-Seal CORE spray to the Geo-Seal BASE layer and around the penetration at a thickness of 30 mils. The Contractor shall treat penetrations in a 6-inch radius around penetration and 3 inches onto penetrating object.

E. The Contractor shall embed a fabric reinforcing strip after the first application of the Geo-Seal CORE spray or Geo-Seal CORE Detail material and then apply a second 30 mil coat over the embedded joint reinforcing strip ensuring its complete saturation of the embedded strip and tight seal around the penetration.

F. After the placement of the Geo-Seal BOND layer, the Contractor shall install a cable tie around the finished penetration. The cable tie should be snug, but not overly tight so as to slice into the finished seal.

OPTION: A final application of Geo-Seal CORE may be used to provide a finishing seal after the Geo-Seal BOND layer has been installed.

NOTE: Metal or other slick penetration surfaces may require treatment in order to achieve proper adhesion. For plastic pipes, The Contractor may utilize sand paper to achieve a profile, or emery cloth for metal surfaces. An emery cloth should also be used to remove any rust on metal surfaces.

3.6 GEO-SEAL BASE LAYER INSTALLATION

A. The Contractor shall install the Geo-Seal BASE layer over substrate material in one direction with six-inch overlaps and the geotextile (fabric side) facing down.

B. The Contractor shall secure the Geo-Seal BASE seams by applying 60 mils of Geo-Seal CORE between the 6" overlapped sheets with the geotextile side down.

C. The Contractor shall visually verify there are no gaps/fish-mouths in seams.

D. The Contractor shall install an equal amount of Geo-Seal BASE and Geo-Seal CORE in one day. Leaving unsprayed Geo-Seal BASE overnight might allow excess moisture to collect on the Geo-Seal BASE. If excess moisture collects, it needs to be removed.

NOTE: In windy conditions it might be necessary to encapsulate the seam by spraying the Geo-Seal CORE layer over the completed Geo-Seal BASE seam.

3.7 GEO-SEAL CORE APPLICATION

A. The Contractor shall set up spray equipment according to manufacturer's instructions.

B. The Contractor shall mix and prepare materials according to manufacturer's instructions.

C. The two catalyst nozzles (8001) should be adjusted to cross at about 18" from the end of the wand. This apex of catalyst and emulsion spray should then be less than 24" but greater than 12" from the desired surface when spraying. When properly sprayed the fan pattern of the catalyst should range between 65° and 80°.

D. The Contractor shall adjust the amount of catalyst used based on the ambient air temperature and surface temperature of the substrate receiving the membrane as recommended by the manufacturer. In hot weather use less catalyst as hot conditions will quickly "break" the emulsion and facilitate the curing of the membrane. In cold conditions and on vertical surfaces use more catalyst to "break" the emulsion quicker to expedite curing and set up time in cold conditions.

E. The Contractor shall apply one spray coat of Geo-Seal CORE to obtain a seamless membrane free from pinholes or shadows, with a minimum dry film thickness of 60 mils (1.52 mm).

F. The Contractor shall apply the Geo-Seal CORE layer in a spray pattern that is perpendicular to the application surface to limit voids and thin spots, and create a uniform and consistent membrane.

G. The Contractor shall verify film thickness of vapor mitigation barrier every 500 ft^2. (46.45 m^2), for information regarding Geo-Seal quality control measures, refer to the quality control procedures in Section 3.9 of this specification.

H. The membrane will generally cure in 24 to 48 hours. As a rule, when temperature decreases or humidity increases, the curing of the membrane will be prolonged. The membrane does not need to be fully cured prior the placement of the Geo-Seal BOND layer, provided mil thickness has been verified and a smoke test has been conducted.

I. When applying to a vertical concrete wall, the Contractor shall apply Geo-Seal CORE directly to concrete surface and use manufacturer's recommended protection material based on site specific conditions. If applying Geo-Seal against shoring, the Contractor shall contact manufacturer for site specific installation instructions.

J. Do not penetrate membrane after it has been installed. If membrane is penetrated after the membrane is installed, the Contractor shall be responsible for performing repairs as indicated by the Owner and/or Engineer.

NOTE: Care should be taken to not trap moisture between the layers of the membrane. Trapping moisture may occur from applying a second coat prior to the membrane curing. Repairs and detailing may be done over the Geo-Seal CORE layer when not fully cured.

3.8 GEO-SEAL BOND PROTECTION COURSE INSTALLATION

A. The Contractor shall Install Geo-Seal BOND protection course perpendicular to the direction of the Geo-Seal BASE course with overlapped seams over nominally cured membrane no later than recommended by manufacturer and before starting subsequent construction operations.

B. The Contractor shall sweep off any water that has collected on the surface of the Geo-Seal CORE layer, prior to the placement of the Geo-Seal BOND layer.

C. The Contractor shall overlap and seam the Geo-Seal BOND layer in the same manner as the Geo-Seal BASE layer.

D. To expedite the construction process, the Contractor might place the Geo-Seal BOND layer over the Geo-Seal CORE immediately after the spray application is complete, provided the Geo-Seal CORE mil thickness has been verified.

3.9 QUALITY ASSURANCE

A. The Geo-Seal system shall be installed by a trained and certified installer approved by Land Science Technologies.

B. The Contractor shall arrange for a manufacturer's representative or manufacturer certified 3rd party inspector to inspect and verify that the membrane has been installed per the manufacturer's recommendations.

The certified installer is responsible for contacting the inspector for inspection. Prior to application of the membrane, a notice period for inspection should be agreed upon between the applicator and inspector.

C. The Contractor shall utilize the following required measurement tools to verify the thickness of the Geo-Seal CORE layer.

1. Mil reading caliper: Calipers are used to measure the thickness of coupon samples. To measure coupon samples correctly, the thickness of the Geo-Seal sheet layers (18 mils each) must be taken into account. Mark sample area for repair.

2. Wet mil thickness gauge: A wet mil thickness gauge may be used to quickly measure the mil thickness of the Geo-Seal CORE layer. The thickness of the Geo-Seal sheet layers do not factor into the mil thickness reading.

   NOTE: When first using a wet mil thickness gauge on a project, collect coupon samples to verify the wet mil gauge thickness readings.

3. Needle nose digital depth gauge: A needle nose depth gauge should be used when measuring the Geo-Seal CORE thickness on vertical walls or in field measurements. Mark measurement area for repair.

To obtain a proper wet mil thickness reading, take into account the 5 to 10 percent shrinkage that will occur as the membrane fully cures. Not taking into account the thickness of the sheet layers, a freshly sprayed membrane should have a minimum wet thickness of 63 (5%) to 66 (10%) mils.

The Contractor shall be experienced with the methods on how to properly conduct Geo-Seal CORE thickness sampling as recommended by Land Science Technologies.

D. The Contractor shall be responsible for repair of areas where coupon samples have been removed.

E. The Contractor shall be responsible for performing Smoke Testing to test the overall integrity of the installed membrane and the seals around penetrations and terminations. The Contractor shall perform Smoke Testing by pumping non-toxic smoke underneath the Geo-Seal vapor mitigation barrier and then repairing the areas where smoke appears. The Contractor shall follow smoke testing protocols by Land Science Technologies and set forth in related quality construction assurance and quality control documents.

F. The Contractor shall perform a visual inspections prior to placement of concrete, but after the installation of concrete reinforcing, to identify any punctures that may have occurred during the installation of rebar, post tension cables, etc. Punctures in the Geo-Seal system should be easy to indentify due to the color contrasting layers of the system. The Contractor shall perform necessary repairs to the Geo-Seal system at the direction of the Owner and/or Engineer.

3.10 CONSTRUCTION WASTE MANAGEMENT

A. General: The Contractor shall comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. The Contractor shall separate and recycle waste materials to the maximum extent possible.

SECTION 31 21 16.13

SUB-SLAB VENTING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Substrate preparation.
2. Vapor-Vent™ HD installation.
3. Vapor-Vent HD accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 01 74 19 – Construction Waste Management
2. Section 03 30 00 – Cast-in-Place Concrete
3. Section 26 05 00 – Common Work Results for Plumbing
4. Section 31.21.16 – Soil Vapor Mitigation Membrane
5. Section 31 21 16.16 – Sub Slab Vent Risers

1.3 PERFORMANCE REQUIREMENTS

A. General: The Contractor shall provide a sub-slab gas venting system installed within a permeable material layer that collects gas vapors and directs them to a discharge or collection point (vent riser) as specified in the Drawings and that complies with the physical requirements set forth by the manufacturer. This specification covers installation of the sub-slab venting system up to the riser vent penetration terminated through building slab. Specifications for vent riser construction are presented in Section 31 21 16.16 – Sub Slab Vent Risers

1.4 SUBMITTALS

A. The Contractor shall submit Product Data for each component of the sub-slab venting system specified, including manufacturer's specifications.

B. Sample – The Contractor shall submit representative samples of the following for approval:

1. Gas venting piping, Vapor-Vent HD.
2. Vapor-Vent HD accessories.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The Contractor or installer shall be an experienced installer certified by manufacturer Land Science Technologies (LST) for the installation of the Vapor-Vent sub-slab gas venting system.

B. Manufacturer Qualification: The Contractor shall obtain Vapor –Vent™ gas venting system components from LST.

C. Pre-installation Conference: The Contractor shall attend a pre-installation conference with Engineer, other trades influenced by sub-slab venting system installation and special inspector (if any) to assure proper site and installation conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall ensure all materials are delivered to project site as specified by manufacturer, are labeled with manufacturer’s name, product brand name and type, date of manufacture, shelf life, and directions for handling.

B. The Contractor shall store materials as specified by the manufacturer in a clean, dry, protected location and within the temperature range required by manufacturer. The Contractor shall protect stored materials from direct sunlight.

C. The Contractor shall repair or remove and replace material that is damaged.

PART 2 – PRODUCTS

2.1 PERMEABLE MATERIAL (SUBSTRATE)

A. Permeable layer material shall be as specified in the Geotechnical Report

2.2 SUB-SLAB GAS VENT MATERIALS

A. Vapor-Vent HD– low profile, trenchless, flexible, sub slab vapor collection system manufactured by Land Science Technologies, San Clemente, CA (949) 481-8118

B. Vapor-Vent HD physical properties

VENT PROPERTIES	**TEST METHOD**	**VAPOR-VENT HD**
Material		HDPE
Comprehensive Strength	ASTM D-1621	11,400 lbs / ft^2
In-plane flow (Hydraulic gradient-0.1)	ASTM D-4716	30 gpm / ft of width
Chemical Resistance		Excellent
FABRIC PROPERTIES	**TEST METHOD**	**VAPOR-VENT**
Grab Tensile Strength	ASTM D-4632	110 lbs.
Puncture Strength	ASTM D-4833	30 lbs.
Mullen Burst Strength	ASTM D-3786	90 PSI
AOS	ASTM D-4751	50 U.S. Sieve
Flow Rate	ASTM D-4491	95 gpm / ft^2
UV Stability (500 hours)	ASTM D-4355	70% Retained
DIMENSIONAL DATA		
Thickness		1”
Standard Widths		12”
Roll Length		165 ft
Roll Weight		68 lbs

C. Riser pipe transition shall be schedule (SCH) 80, polyvinyl chloride (PVC) pipe meeting American Society for Testing and Materials (ASTM) D1785-12 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

2.3 AUXILIARY MATERIALS

A. Vapor-Vent HD fittings including end outs, end caps, elbows and tees supplied by Land Science Technologies.

B. Reinforced Tape as recommended by manufactured for connection between Vapor-Vent pipe and round PVC pipe.

C. SCH 80, PVC fittings meeting ASTM D2467-13a - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.

D. PVC primer and glue and meeting ASTM F656-1 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings and ASTM D2564-12 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems, respectively.

E. Pipe Sleeves shall be SCH 40, galvanized steel pipes meeting ASTM A53, Type E, Grade A, with plain ends.

F. Pipe Sleeve Sealant shall be aerosol polyurethane foam sealant meeting ASTM C1620-12 or approved equivalent.

PART 3 – EXECUTION

3.1 EXAMINATION

A. The Contractor shall examine substrates, areas, and conditions under which gas vent system will be installed, with installer present, for compliance with requirements. The Contractor shall not proceed with installation until unsatisfactory conditions have been corrected.

3.2 SUBSTRATE PREPARATION

A. The Contractor shall verify substrate is prepared according to project requirements.

3.3 PREPARATION FOR VAPOR-VENT HD

A. The Contractor shall mark the layout of Vapor-Vent HD piping as shown in Drawings.

3.4 VAPOR-VENT HD INSTALLATION

A. The Contractor shall install Vapor-Vent over substrate material where designated on drawings with the flat base of the core placed down and shall be overlapped in accordance with manufacturer’s recommendations.

B. At areas where Vapor-Vent HD strips intersect, the Contractor shall cut and fold back fabric to expose the dimpled core. The Contractor shall arrange the strips so that the top strip interconnects into the bottom strip. The Contractor shall unfold fabric to cover the core and use reinforcing tape, as approved by the manufacturer, to seal the connection to prevent sand or gravel from entering the core.

C. When crossing Vapor-Vent over footings or grade beams, the Contractor shall coordinate with the structural engineer for appropriate use and placement of solid PVC pipe materials per the Drawings. The Contractor shall place solid pipe over or through the foundation concrete element (e.g., and attach a Vapor-Vent End Out at both ends of the pipe before connecting back the Vapor-Vent HD piping.. The Contractor shall seal the Vapor-Vent HD piping to the Vapor-Vent End Out fitting using fabric reinforcement tape.

D. The Contractor shall install sleeves for pipes passing through concrete foundation walls as follows:

  1. Cut sleeves to length for mounting flush with both surfaces.

  2. Build sleeves into new walls as work progresses.

  3. Install large enough sleeve to provide 1-inch annular space between sleeve and pipe.

E. The Contractor shall place vent risers per the Drawings. The Contractor shall connect Vapor-Vent to Vapor-Vent End Out and seal with fabric reinforced tape. The Contractor shall use Vapor-Vent End Out with the specified diameter piping as shown in the Drawings.

3.5 PLACEMENT OF OVERLYING AND ADJACENT MATERIALS

A. The Contractor shall place or install all overlying and adjacent permeable layer material using approved procedures and guidelines to prevent damage to the Vapor-Vent HD piping and related installations..

B. Equipment shall not be directly driven over and stakes or any other materials may not be driven through the Vapor-Vent HD.

3.6 CONSTRUCTION WASTE MANAGEMENT

A. General: The Contractor shall comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. The Contractor shall separate and recycle waste materials to the maximum extent possible.

SECTION 31 21 16.16

SUB-SLAB VENT RISERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Vent Riser installation.
2. Wind driven turbine ventilator.
3. Sampling Ports
4. Vent Riser signage.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 01 74 19 – Construction Waste Management
2. Section 26 05 00 – Common Work Results for Plumbing
3. Section 31.21.16.13 – Sub Slab Venting System

1.3 PERFORMANCE REQUIREMENTS

A. General: The Contractor shall provide vent risers for the sub-slab gas venting system as specified in the Drawings and comply with the installation requirements set forth in this specification. This specification cover installation of the vent riser from the penetration terminated through building slab to its termination discharge point at the roof. Specifications for sub-slab gas venting system construction are presented in Section 31 21 16.13 – Sub Slab Venting System

1.4 SUBMITTALS

A. The Contractor shall submit Product Data for each component of the vent riser specified, including manufacturer’s specifications.

B. Sample – The Contractor shall submit representative samples of the following for approval:

1. Samples of color, lettering style, and other graphic representation required for each identification material and device.

C. As necessary, welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" Article of this specification.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The Contractor or installer shall be an experienced installer for the installation of vent risers for sub-slab venting systems. The Contractor shall possess a current contractor license issued by the California Contractor State License Board.

B. As necessary, qualify welding processes and operators for piping according to American Society of Mechanical Engineers (ASME) "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."

2. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved and that certification is current.

C. To the extent possible, Contractor shall follow ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Pre-installation Conference: The Contractor shall attend a pre-installation conference with Engineer, other trades influenced by vent riser installations and special inspector (if any) to assure proper site and installation conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall ensure all materials are delivered to project site are labeled with manufacturer's name, product brand name and type, and directions for handling.

B. The Contractor shall ensure delivery of pipes and tubes with factory-applied end-caps. The Contractor shall maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture

C. The Contractor shall protect stored pipes, fittings, piping specialties, and equipment from moisture and dirt. As necessary, the contractor shall keep material elevated above grade. When stored inside, the Contractor shall verify that the stored materials and equipment do not exceed structural capacity of the floor.

D. The Contractor shall repair or remove and replace material and equipment that is damaged.

1.7 SEQUENCING AND SCHEDULING

The Contractor shall:

A. Coordinate vent-riser equipment installation with other building components.

B. Arrange for chases, slots, and openings in building structure during progress of construction, to allow for vent riser installations.

C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of vent risers and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building

E. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Steel Pipe: ASTM A 53, Type S, Grade A, Schedule 40, seamless, black, plain ends.

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, seamless, black, carbon-steel pipe.

2. Vent riser pipe installed outdoors shall be galvanized steel ASTM A 53.

3. Vent riser steel piping 4” and smaller shall be threaded with screw fittings. Piping 5” and larger shall be welded.

4. Apply polytetrafluoroethylene (PTFE) pipe joint compound on all threaded connections.

B. No Hub Couplers: Stainless steel cover ASTM C 564 neoprene sleeves with 24 gauge stainless steel bands with worm drive clamps conforming to Cast Iron Soil Pipe Institute (CISPI) 310-12.

C. Pipe Hangers/Support: Refer to Section 26 05 00 – Common Work Results for Plumbing for piping support requirements.

D. Piping Specialties: Refer to Section 26 05 00 – Common Work Results for Plumbing for piping specialties including pipe isolators, vent riser flashing materials, pipe sleeves and wall sleeves common to all plumbing work.

E. Service Ports: Nylon coated, ductile iron saddle tap and stainless steel trap and bolting hardware by Romac Industries, Inc, or approved equivalent.

F. Vent Riser Ventilator: Ventilator shall be wind driven turbine by a Hurricane Ventilator Model H150 manufactured by Edmonds/CSR or demonstrated equal.

G. Vent Riser Signs: Waterproof plastic cloth, all-temperature and self-adhering. Labels on exposed piping shall have additional coating for ultraviolet protection. Size, color, and letters as indicated in the Drawings and the following schedule:

Vent Rise Sign Schedule			
Sign Type	Legend	Color	Letter
Vent Riser Sign	CAUTION SOIL VAPOR VENT IF DAMAGED IMMEDIATELY NOTIFY BUILDING MANAGEMENT	Yellow	Black
Vent Warning Sign	SOIL VAPOR VENT POTENTIALLY HAZARDOUS VOLATILE COMPOUNDS	Yellow	Black
Vent ID Sign	V-1* SOIL VAPOR VENT	Blue	White

* See Drawings for Vent Riser number designation

PART 3 – EXECUTION

3.1 VENT RISER PIPING

A. General: The Contractor shall install riser vents as described in Drawings, common requirements for plumbing installation in Section 26 05 00 – Common Work Results for Plumbing, and this specification.

B. General Locations and Arrangements: Drawings indicate general location and typical arrangement of vent riser systems. Contractor shall coordinate with all trades for routing of vent riser piping exposed and within party walls. If conflicts are discovered, a set of prints marked with red pencil showing recommended installation shall be submitted to the Construction Manager and the Design Engineer for approval prior to installation or work in question.

C. Vent riser installed within party walls shall be centered to the party wall air gap.

D. Vent riser shall not be installed within any fire rated wall.

E. Install pipe free of sags and bends.

F. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal run are prohibited, except where indicated.

G. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

H. Install sleeves for pipes passing through concrete and masonry walls, concrete floor and roof slabs, and where indicated. Use the following sleeve materials:

   1. Steel Pipe Sleeves: For pipes smaller than 6 inches.

I. Sleeves are not required for core drilled holes.

J. Piping Joint Construction: Join pipe and fittings as follows:

   1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

   2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

   3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:

      a. Note the internal length of threads in fittings and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

      b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).

      c. Align threads at point of assembly.

      d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.

      e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

K. The Contractor shall coordinate final location of the vent riser stacks at roof level to maintain minimum setbacks and clearances for roof vents per 2013 California Plumbing Code, Section 906.2.

L. Service Port Installations: Install saddle taps in accordance to manufacturer’s recommended installation instructions.

3.2 VENTILATOR INSTALLATION

A. The Contractor shall install the ventilator level and plumb at the top of the riser vent.

B. The Contractor shall cut, fit, and place miscellaneous metal supports and adapters accurately in location, alignment, and elevation to support and anchor the ventilator to the vent riser pipe. The Contractor shall block the ventilator vents until equipment startup is requested.

C. On completion of installation, the Contractor shall clean the fans according to manufacturer's recommended instructions, remove foreign material and construction debris, and vacuum fan wheel and enclosure.

D. Prior to equipment startup, the Contractor shall verify that any shipping blocking and bracing has been removed, the unit is secured on mountings and supporting devices, and that lubrication for bearings and other moving parts (as necessary) is complete.

E. The Contractor shall schedule a startup and training session with Owner and Design Engineer to review troubleshooting, servicing, and maintaining equipment and materials for the installed ventilator.

3.3 LABELING AND IDENTIFYING

A. The Contractor shall install vent riser labels and markers at locations indicated in the Drawings.

B. Application: The Contractor shall apply labels and markers on clean surfaces free of dust, grease, oil or any material that will prevent proper adhesion. Replace all non-adhering or curling labels with new labels.

1. As necessary, use spray adhesive in addition to adhesive on labels to attach to pipes.

2. Finish exposed signs with one coat of lacquer.

3.4 CONSTRUCTION WASTE MANAGEMENT

A. General: The Contractor shall comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. The Contractor shall separate and recycle waste materials to the maximum extent possible.

APPENDIX F

VMS Design Calculations

TABLE F-1

AVERAGE TOTAL CONCENTRATION

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

VMS Area	Soil Vapor Sample Location	Compound	Detected Concentration^{1,2} (µg/m^3)	Average Compound Concentration^2 (µg/m^3)	Average Compound Concentration (lbs/ft^3)	Combined Average Concentration (lbs/ft^3)
Building Retail 1/ Building E	SV-24	PCE	9,600	PCE - 5,960 TCE - 4,755 Vinyl Chloride - 258	PCE - 0.000000371 TCE - 0.000000297 Vinyl Chloride - 0.000000016	0.00000056
		TCE	410			
		Vinyl chloride	5.2			
	SV-23	PCE	2,300			
		TCE	9,100			
		Vinyl chloride	510			
Building Retail 2/ Building F	SV-13	PCE	7,300	PCE - 4,045 TCE - 10,150 Vinyl Chloride - 500	PCE - 0.000000253 TCE - 0.000000634 Vinyl Chloride - 0.000000031	
		TCE	12,000			
		Vinyl chloride	500			
	SV-14	PCE	790			
		TCE	8,300			
		Vinyl chloride	500			
Residential (Building D, Building A [Partial], Building C [Partial])	SG-04	PCE	1,400	PCE - 385 TCE - 836 Vinyl Chloride - 22	PCE - 0.000000024 TCE - 0.000000052 Vinyl Chloride - 0.000000001	
		TCE	5,800			
		Vinyl chloride	130			
	SG-05	PCE	100			
		TCE	5.7			
		Vinyl chloride	3.8			
	SG-06	PCE	730			
		TCE	6.4			
		Vinyl chloride	3.0			
	SG-07	PCE	160			
		TCE	9.2			
		Vinyl chloride	3.0			
	SV-08	PCE	14			
		TCE	11			
		Vinyl chloride	5.2			
	SV-10	PCE	280			
		TCE	11			
		Vinyl chloride	5.2			
	SV-21	PCE	14			
		TCE	11			
		Vinyl chloride	5.2			

Notes

1. Concentrations from AMEC Environment & Infrastructure, Inc. (AMEC), 2012, Soil, Groundwater, and Soil Vapor Investigation Report, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin, California, October 19.
2. Average concentrations calculated using reporting limits for compounds not detected at or above the laboratory reporting limit.

Abbreviations

µg/m^3 = micrograms per cubic meter
lbs/ft^3 = pounds per cubic foot
PCE = tetrachloroethene
TCE = trichloroethene
VMS = vapor mitigation system

TABLE F-2

DESIGN FLOW RATE AND CALCULATED EMISSIONS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Maximum Allowable Vent Flow					
Combined Average Concentration (lbs/ft^3) from Table F-1	**Combined Flow Rate (ft^3/min)**	**Calculated Emmisions (lbs/minute)**	**Calculated Emmisions (lbs/day)**	**Total Number of Vents**	**Flow Rate per Vent (ft^3/min)**
0.00000056	1230	0.00069	**0.99**	15	**82**

Enviromental Conditions[1]				
		Stack Effect Only	**Wind Effect Only**	**Combined Effect**
Air density	kg/m^3	1.2	1.2	1.2
Stack height	feet	66	66	66
Ambient temperature	°F	50	59	59
Subslab temperature	°F	55	55	55
Temperature differential	°F	5	-5 (N/A)	4
Wind velocity	mph	0	16	16
	m/s	0	6.9	6.9

Tested coefficients and ventilator size[2]		
C_d	C_f	$D_{throat,}$ (mm)
0.63	0.18	155

$$Qc = F\,X\left(\frac{2\sum Pc}{\rho}\right)^{1/2}$$

where:

Qc= combined volume flow rate (m^3/s)
F= effective aerodynamic area of ventilator fan (m^2)
$\sum Pc = Pw + Ps$ (Pa)
ρ = air density at ambient temperature (kg/m^3)

Environmental Condition	Flow Rates Calculations[3]							
	F(m^2)	**P_s(Pa)**	**Q_s(m^3/s)**	**P_w(Pa)**	**Q_w(m^3/s)**	**Q_c(m^3/s)**	**Q_c(m^3/hour)**	**Q_c(ft^3/min)**
Stack	0.012	2.5	0.024	0.00	0.000	0.024	87	**51**
Wind	0.012	0.0	0.000	1.88	0.021	0.021	76	**45**
Combined effect	0.012	2.5	0.024	1.88	0.021	0.032	115	**68**

Environmental Condition	Emissions at Design Flow Rates					
	Calculated Average Vent Flow Rate (ft^3/min)	**Number of Vents**	**Total Flow Rate (ft^3/min)**	**Average Compound Concentration (lbs/ft^3)**	**Calculated Emmisions (lbs/minute)**	**Calculated Emmisions (lbs/day)**
Stack	51	15	771	0.00000056	0.00043	**0.62**
Wind	45	15	668	0.00000056	0.00037	**0.54**
Combined effect	68	15	1,015	0.00000056	0.00057	**0.82**

< 1 lbs/day (meets BAAQMD Regulation 8, Rule 47, Section 8-47-11)

TABLE F-2

DESIGN FLOW RATE AND CALCULATED EMISSIONS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Notes

1. Average Ambient Temperature and Wind Velocity obtained from www.usa.com for the City of Dublin, California (accessed in February 2015).
2. Ventilator coefficient values as provided by ventilator manufacturer CSR/Edmonds for ventilator Hurricaine Model H-150 in January 2015.
3. Australian/New Zealand Standard (AS/NZS), 2000. Australian/New Zealand Standard AS/NZS 4740:2000, Natural Ventilators – Classification and Performance, March 30.

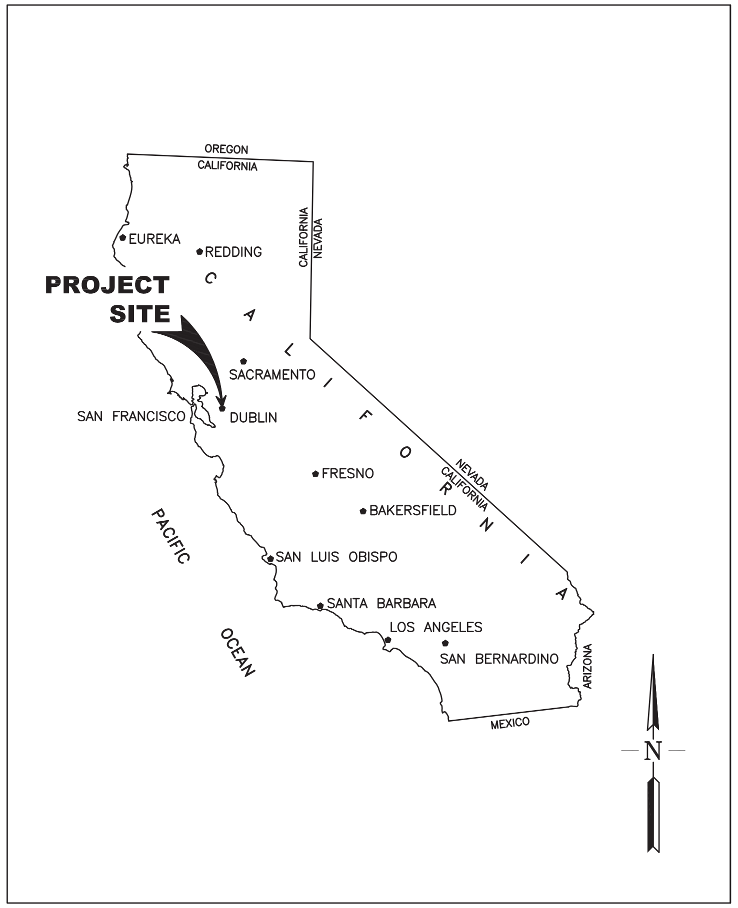
Abbreviations

BAAQMD = Bay Area Air Quality Management District
C_d = ventilator discharge coefficient
C_f = ventilator flow coefficient
ºC = degrees Celsius
ºF = degrees Farenheit
F = effective ventilator area
ft^3/min = cubic feet per minute
kg/m^3 = kilograms per cubic meter
lbs/ft^3 = pounds per cubic foot
lbs/day = pounds per day
lbs/min = pounds per minute
m = meter
mm = millimeter
m^2 = square meter
m^3 = cubic meter
m^3/hour = cubic meter per hour
m^3/s= cubic meter per second
m/s = meters per second
N/A = not applicable
Pa = pascals
Ps = stack pressure
Pw = wind siphoning pressure
Qs = stack pressure flow rate
Qw = wind siphoning pressure flow rate
Qc = combined flow rate

APPENDIX G

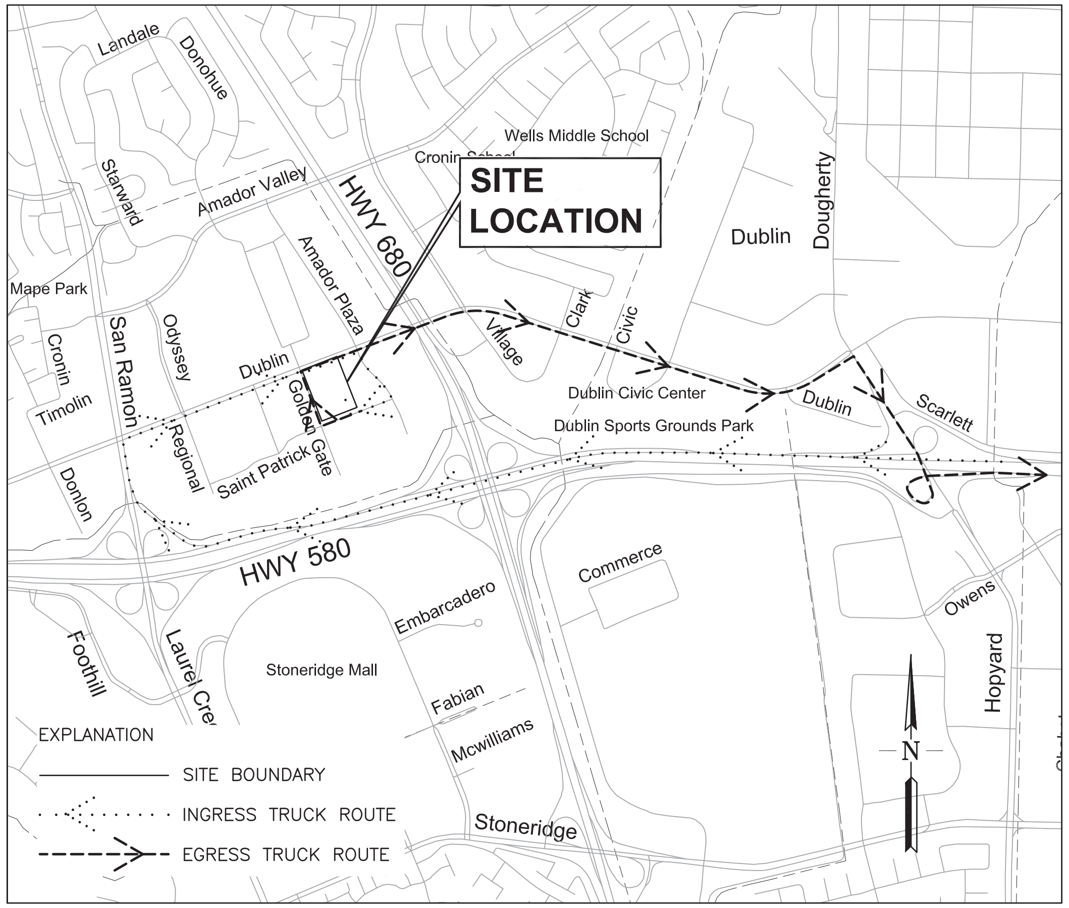
PRB Design Drawings and Technical Specifications

PERMEABLE REACTIVE BARRIER (PRB)
DUBLIN APARTMENTS - CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA



SITE LOCATION MAP

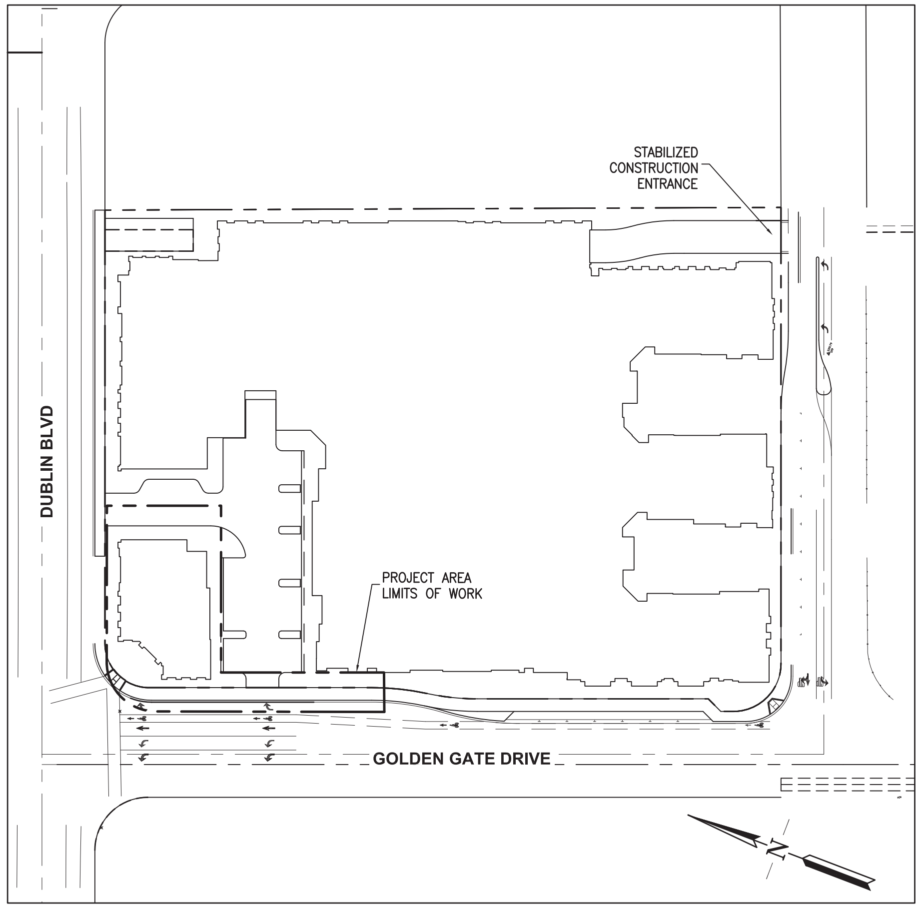
NO SCALE



SITE VICINITY MAP AND TRUCK ROUTES

1000 0 1000 2000

APPROXIMATE SCALE IN FEET



SITE MAP

60 0 60 120

APPROXIMATE SCALE IN FEET

LIST OF DRAWINGS (PRB)

SHT NO.	DWG NO.	DWG NAME
1	G–1	LIST OF DRAWINGS, SITE VICINITY, AND SITE LOCATION MAPS
2	G–2	LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
3	G–3	TEMPORARY FACILITIES AND ENVIRONMENTAL CONTROLS
4	C–1	EXISTING SITE CONDITIONS, UTILITY IDENTIFICATION, AND SELECTIVE DEMOLITION
5	C–2	FUTURE SITE PLAN AND PRB ALIGNMENT
6	C–3	PRB PLAN AND PROFILE
7	C–4	PRB DETAILS

100% DESIGN SUBMITTAL JUNE 2015

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL
STATE OF CALIFORNIA

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

LIST OF DRAWINGS,
SITE VICINITY,
AND SITE LOCATION MAPS

ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 9461208619
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE 06/09/15
PROJECT NO. OD14170800
DWG G-1
SHEET 1 OF 7

GENERAL NOTES

1. FOR THE PURPOSE OF THE PERMEABLE REACTIVE BARRIER DRAWING SET, THE FOLLOWING DEFINITIONS APPLY:

   A. OWNER / CONSTRUCTION MANAGER:
   BAY WEST DEVELOPMENT (BWD DUBLIN)
   2 HENRY ADAMS STREET, SUITE 450
   SAN FRANCISCO, CA 94103

   B. PRB ENGINEER:
   AMEC FOSTER WHEELER
   180 GRAND AVENUE, SUITE 1100
   OAKLAND, CA 94612

   C. CIVIL ENGINEER:
   CARLSON, BARBEE & GIBSON, INC
   2633 CAMINO RAMON, SUITE 350
   SAN RAMON, CA 94583

   D. ARCHITECT:
   BDE ARCHITECTURE
   950 HOWARD STREET
   SAN FRANCISCO, CA 94103

2. COORDINATE USE OF SITE WITH OWNER AND CONSTRUCTION MANAGER.

3. THE CONTRACTOR SHALL VISUALLY INSPECT THE SITE TO ASCERTAIN THE CONDITION OF EXISTING FEATURES AND FAMILIARIZE THEMSELVES WITH THE PROPOSED WORK.

4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM THE CITY OF DUBLIN AND ALAMEDA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH (ACDEH) FOR THE INSTALLATION OF THE PERMEABLE REACTIVE BARRIER (PRB) AND RELATED SITE WORKS.

5. RELEVANT KNOWN AND FUTURE UNDERGROUND UTILITIES AND STRUCTURES ARE SHOWN ON THE DRAWINGS. THE LOCATION OF THESE EXISTING AND FUTURE UTILITIES SHOULD BE CONSIDERED APPROXIMATE. PRIOR TO THE COMMENCEMENT OF SITE ACTIVITIES, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES OR STRUCTURES IN THE AREAS OF WORK AND NOTIFY UNDERGROUND SERVICES ALERT ([USA ALERT] 811; 800–227–2600) AT LEAST TWO BUSINESS DAYS PRIOR TO COMMENCEMENT OF WORK.

6. IF UTILITIES ARE TO REMAIN IN PLACE, PROVIDE ADEQUATE MEANS OF PROTECTION. THE CONTRACTOR SHALL CONFIRM THAT ANY ABANDONED UTILITIES WITHIN THE LIMITS OF WORK HAVE BEEN ABANDONED IN ACCORDANCE WITH THE REQUIREMENT OF THE UTILITY OWNERS AND THE CITY OF DUBLIN.

7. SHOULD UNCHARTED, OR INCORRECTLY CHARTED UTILITIES OR OTHER UTILITIES BE ENCOUNTERED DURING PERFORMANCE OF WORK, CONSULT THE UTILITY COMPANY, OWNER AND CONSTRUCTION MANAGER, AND PRB ENGINEER IMMEDIATELY FOR DIRECTION. COOPERATE WITH THE UTILITY COMPANIES IN KEEPING RESPECTIVE FACILITIES IN OPERATION. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES TO SATISFACTION OF THE UTILITY OWNER AND THE CITY OF DUBLIN.

8. OVERHEAD UTILITY LINES: CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING AND MAINTAINING SAFE CLEARANCES FROM OVERHEAD UTILITIES AT ALL TIMES AND, WHERE HAZARDOUS CONDITIONS EXIST, FOR TAKING THE NECESSARY PRECAUTIONS AGAINST INJURY AND DAMAGE

9. ALL SPECIFIED WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND ORDINANCES. THE CONTRACTOR SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE STATE CONSTRUCTION SAFETY ORDER.

10. CONTRACTOR SHALL ESTABLISH AN EXCLUSION ZONE AROUND THE TRENCHING WORK AREA PRIOR TO BEGINNING EXCAVATION. ALL WORKERS WITHIN THE EXCLUSION ZONE MUST MAINTAIN CURRENT 40 HOUR HAZWOPER SAFETY TRAINING.

11. THE CONTRACTOR SHALL DESIGNATE A TEMPORARY VEHICLE AND EQUIPMENT DECONTAMINATION/STAGING AREA. VEHICLES AND EQUIPMENT SHALL BE RESTRICTED TO DEFINED AND MARKED ROUTES. VEHICLE AND EQUIPMENT CLEANING, FUELING, AND MAINTENANCE WILL BE PERFORMED ONLY IN THE DESIGNATED AREA, IN ACCORDANCE WITH CASQA DETAILS NS–8, NS–9, AND NS–10.

12. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE CIVIL ENGINEER'S SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ALL AMENDMENTS. WASTE DISCHARGER IDENTIFICATION (WDID) NUMBER 2 01C371103; NOTICE OF INTENT APPROVED 10/08/14.

13. CONTRACTOR SHALL BE REQUIRED TO MAINTAIN THE INTEGRITY OF STRUCTURES, UTILITIES AND OTHER SITE FEATURES AND REPAIR ANY DAMAGE AT NO ADDITIONAL COST.

14. FUTURE BUILDINGS AND EXISTING SITE CONDITIONS SHOWN IN DRAWINGS ARE BASED ON INFORMATION PROVIDED BY THE CIVIL ENGINEER AND THE ARCHITECT. A COMPLETE DUBLIN APARTMENTS DESIGN SET, INCLUDING ALL TRADES AND BUILDING CONSTRUCTION, IS AVAILABLE FROM THE OWNER AND CONSTRUCTION MANAGER.

15. THE PRB ENGINEER ASSUMES NO RESPONSIBILITY BEYOND THE ADEQUACY OF THE PRB DESIGN CONTAINED HEREIN.

16. FOR THE PURPOSES OF THIS PRB DRAWING SET, NOT IN CONTRACT (NIC) REFERS TO WORK THAT MAY BE A PART OF THE DUBLIN APARTMENTS PROJECT DESIGNED BY OTHERS, BEYOND THE SCOPE OF THE PRB DESIGN, AND IS PROVIDED FOR REFERENCE.

17. ELEVATIONS SHOWN ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

18. ALL SURVEY AND BASE MAPS SHOWN ARE PREPARED AND PROVIDED BY CIVIL ENGINEER. CITY OF DUBLIN BENCHMARK "DUB–680" CHISELED T PAINTED YELLOW ON TOP CENTER NORTHERLY CURB ABOVE DRAIN INLET 121.5 +/– FEET WESTERLY OF THE CENTERLINE OF I–680, NORTH SIDE OF DUBLIN BOULEVARD ELEVATION 331.597 FEET (NGVD29). BASIS OF BEARING MARKS FOR THIS SURVEY IS THE CENTERLINE OF DUBLIN BOULEVARD AS SHOWN ON PARCEL MAP 8876 9294 PM 40). THE BEARING BEING N69°08'15" E.

19. THE CONTRACTOR SHALL MAINTAIN AND NOT BLOCK EXISTING ACCESS ROADS DURING CONSTRUCTION.

20. DURING SOIL EXCAVATION ACTIVITIES ADJACENT TO AND AT ELEVATIONS BELOW ACTIVE/OCCUPIED EXISTING UTILITIES OR STRUCTURES, THE UTILITIES OR STRUCTURES SHALL BE MONITORED FOR SIGNS OF SOIL DISPLACEMENT OR MOVEMENT THAT WOULD INDICATE LOSS OF SOIL SUPPORT OR SETTLEMENT.

21. THE CONTRACTOR SHALL MANAGE ALL CONSTRUCTION MATERIALS AND WASTES IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND REQUIREMENTS, INCLUDING CASQA DETAILS WM–1, WM–2, WM–3, WM–4, WM–7, WM–8, AND WM–10, AND IN ACCORDANCE WITH THE PRB SPECIFICATIONS.

22. CONTRACTOR SHALL CONTRACT SOIL AND/OR DEBRIS TRANSPORTATION AND DISPOSAL DIRECTLY WITH THE DISPOSAL FACILITY. THE CONTRACTOR SHALL ARRANGE/PREPARE THE DISPOSAL CHARACTERIZATION AND DOCUMENTATION (I.E., MANIFESTS, LABORATORY ANALYSIS) REQUIRED BY THE DISPOSAL FACILITY.

PERMEABLE REACTIVE BARRIER NOTES

1. ZERO VALENT IRON (ZVI) SHALL BE –8/+50 GRANULAR IRON FILINGS, PRODUCT: ETI CC–1004 MANUFACTURED BY CONNELLY GPM INC. OF CHICAGO, IL. ZVI WILL BE DELIVERED TO THE SITE IN 1–TON (APPROX) SUPER SACKS.

2. CONTRACTOR SHALL COORDINATE ZVI DELIVERY WITH THE OWNER AND CONSTRUCTION MANAGER AND SHALL BE RESPONSIBLE FOR RECEIVING DELIVERY, OFF–LOADING, STORING, HANDLING, AND PREPARATION OF ZVI/SAND MIX WITH CONTRACTOR SUPPLIED SAND.

3. SAND SHALL BE CLEAN AND FROM A VIRGIN SOURCE, WITH UNIFORM GRAIN SIZE SIMILAR TO GRANULAR IRON, AS APPROVED BY PRB ENGINEER. SAND SHALL BE FREE OF STONES, FINES, CLAY PARTICLES, DEBRIS, AND ORGANIC OR DELETERIOUS MATERIAL. DREDGE OR RECYCLED SAND SHALL NOT BE ALLOWED.

4. THE CONTRACTOR SHALL INSTALL THE PRB IN ACCORDANCE WITH THESE DRAWINGS AND RELEVANT SPECIFICATIONS. THE CONTRACTOR SHALL INFORM THE OWNER AND CONSTRUCTION MANAGER AND PRB ENGINEER OF DISCREPANCIES BETWEEN THESE DRAWINGS AND THE SPECIFICATIONS PRIOR TO COMMENCING WORK.

5. PRB SHALL BE INSTALLED USING EITHER BIO–POLYMER SLURRY TRENCH CONSTRUCTION OR SINGLE–PASS TRENCHING TECHNIQUES. USE OF SHORING OR TRENCH BOXES SHALL NOT BE ALLOWED.

6. PRB CONTRACTOR SHALL BE QUALIFIED AND EXPERIENCED IN PRB CONSTRUCTION TECHNIQUES. CONTRACTOR SHALL PROVIDE A PRB INSTALLATION WORK PLAN OUTLINING THE MEANS AND METHODS TO BE USED, INCLUSIVE OF ZVI/SAND MIX PREPARATION.

7. THE CONTRACTOR SHALL CONDUCT QUALITY CONTROL (QC) TESTING IN ACCORDANCE WITH THE PROJECT CONSTRUCTION QUALITY ASSURANCE PLAN.

8. THE CONTRACTOR SHALL DESIGNATE A CDF (CONCRETE) TRUCK WASHOUT AREA. ALL CDF (CONCRETE) WASTE MANAGEMENT WILL COMPLY WITH CASQA FACT SHEET WM–8.

ABBREVIATIONS

AC	ASPHALTIC CONCRETE
ACDEH	ALAMEDA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
BGS	BELOW GROUND SURFACE
BLVD	BOULEVARD
BMPS	BEST MANAGEMENT PRACTICES
BWD	BAY WEST DEVELOPMENT
CASQA	CALIFORNIA STORMWATER QUALITY ASSOCIATION
CB	CATCH BASIN
CDF	CONTROLLED DENSITY FILL
CHCK	CHECKED
CP	CONTROL POINT
CY	CUBIC YARDS
DI	DROP INLET
DRFT	DRAFTED
DSGN	DESIGNED
DWG	DRAWING
(E)	EXISTING
E	EASTING
FT	FEET
LLC	LIMITED LIABILITY COMPANY
MIN	MINIMUM
(N)	NEW
N	NORTHING
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PIP	PROTECT IN PLACE
PL	PROPERTY LINE
PRB	PERMEABLE REACTIVE BARRIER
QC	QUALITY CONTROL
SD	STORM DRAIN
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
TYP	TYPICAL
WDID	WASTE DISCHARGER IDENTIFICATION
ZVI	ZERO VALENT IRON

LEGEND

— — —	PROPERTY LINE
—x—x—	FENCE LINE
⌖	MONITORING POINT CASING
◈	MONITORING WELL, NIC
▬■	SD CATCH BASIN OR DROP INLET
CP–1	CONTROL POINT

100% DESIGN
SUBMITTAL
JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN A.OKADA
DRFT J. GRAUL
CHK F. SZERDY
APVD D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES

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SHEET 2 OF 7

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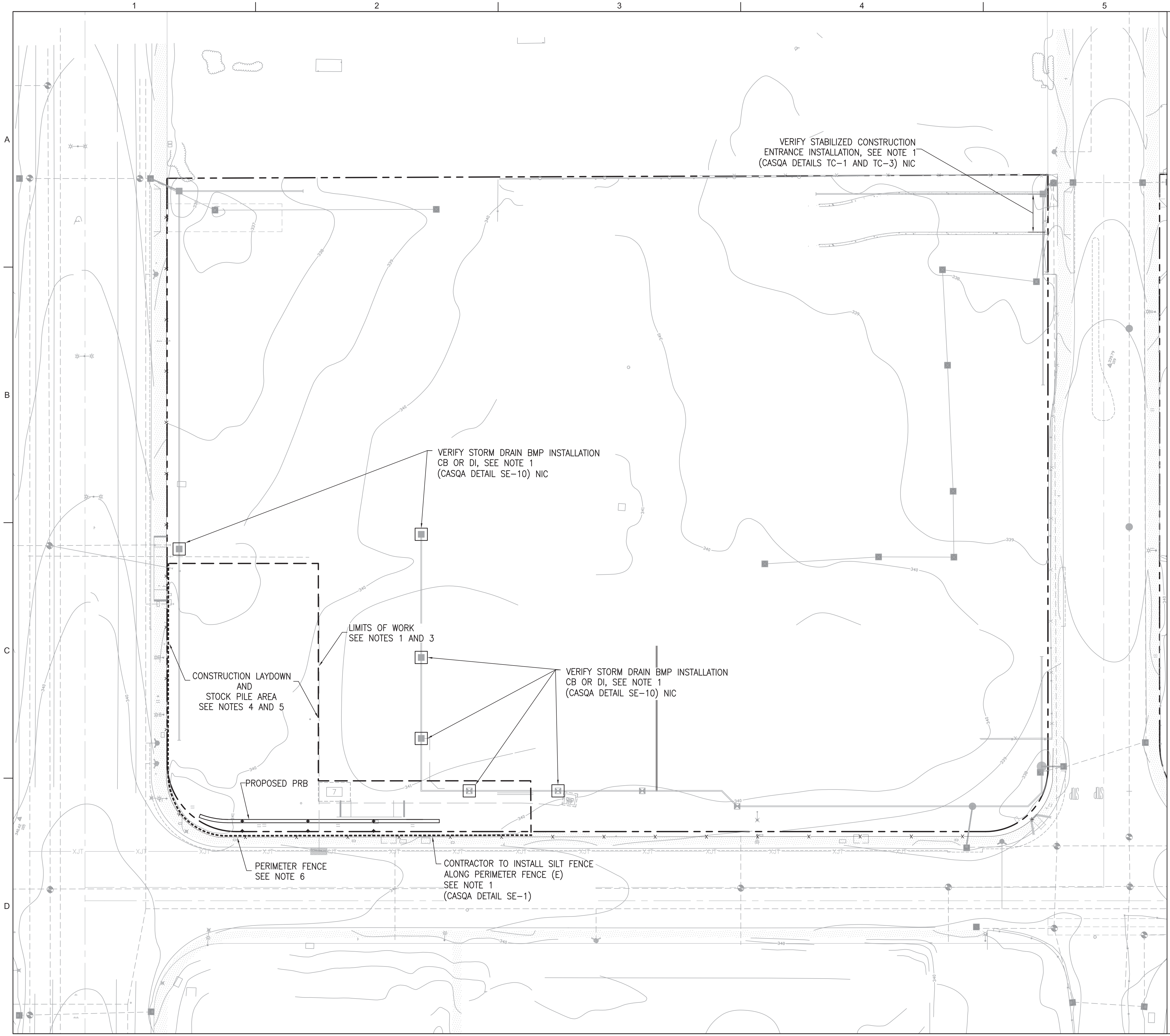

NOTES

1. REFER TO EROSION CONTROL PLAN (SHEET NUMBER 7) OF THE ROUGH GRADING PLAN BY CIVIL ENGINEER, FOR SITE–WIDE EROSION CONTROL / STORM WATER BMPS. SILT FENCE SHOWN HERE IS SUPPLEMENTAL TO THE SITE–WIDE BMPS. CONTRACTOR SHALL VERIFY SITE–WIDE BMPS (NIC) APPLICABLE TO THE SCOPE AND LIMITS OF WORK HAVE BEEN INSTALLED BEFORE COMMENCING WORK. THIS INCLUDES BUT IS NOT LIMITED TO STABILIZED CONSTRUCTION ENTRANCE INSTALLATION, STORM DRAIN INLET PROTECTION (PAVED AND UNPAVED SURFACES), STRAW WATTLE INSTALLATION, AND DESIGNATION OF VEHICLE MAINTENANCE/FUELING AREAS.
2. CONTRACTOR TO PROVIDE ALL REQUIRED UTILITIES (E.G., POWER AND WATER) REQUIRED FOR CONSTRUCTION AS NONE WILL BE AVAILABLE ON SITE.
3. LIMITS OF WORK EXTEND ALONG DUBLIN BLVD AND GOLDEN GATE DRIVE, FOLLOWING THE PERIMETER FENCE (FOR CLARITY, BOUNDARY IS NOT DRAWN). THIS SEGMENT OF PERIMETER FENCE IS SUBJECT TO RELOCATION AS DETERMINED BY CONTRACTOR, PER NOTE 6, TO ALLOW FOR OPERATIONAL CLEARANCE. LIMITS OF WORK WITHIN THE PERIMETER FENCE ARE AS DRAWN.
4. CONTRACTOR TO CONFIRM SPECIFIC EXTENTS OF CONSTRUCTION LAYDOWN AND STOCK PILE AREA WITH OWNER AND CONSTRUCTION MANAGER PRIOR TO MOBILIZATION.
5. CONTRACTOR SHALL PROVIDE CONTROLS AND BMPS FOR STOCKPILE AREA (PLASTIC GROUND COVER, STOCKPILE COVER, AND STRAW WATTLE PERIMETER BERM) PER THE SPECIFICATIONS. STOCKPILE COVER AND STRAW WATTLE PERIMETER BERM SURROUNDING STOCKPILE ARE REQUIRED PER CASQA DETAILS WM–3 AND WM–7. PLASTIC GROUND COVER WILL BE IN ADDITION TO CASQA REQUIREMENTS.
6. CONTRACTOR IS RESPONSIBLE FOR EVALUATING OPERATIONAL CLEARANCE FOR TRENCHING EQUIPMENT RELATIVE TO THE PERIMETER FENCE AND RELOCATING TEMPORARILY IF NEEDED. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND IMPLEMENTING ALL APPLICABLE PERMITS (E.G., ENCROACHMENT PERMIT AND TRAFFIC CONTROL PERMIT) REQUIRED FOR CONSTRUCTION, TRAFFIC, AND PEDESTRIAN SAFETY AND SECURITY.

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SCALE IN FEET

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

TEMPORARY FACILITIES AND ENVIRONMENTAL CONTROLS

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DWG	G-3
SHEET	3 OF 7

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FOR REFERENCE ONLY

NOT IN CONTRACT

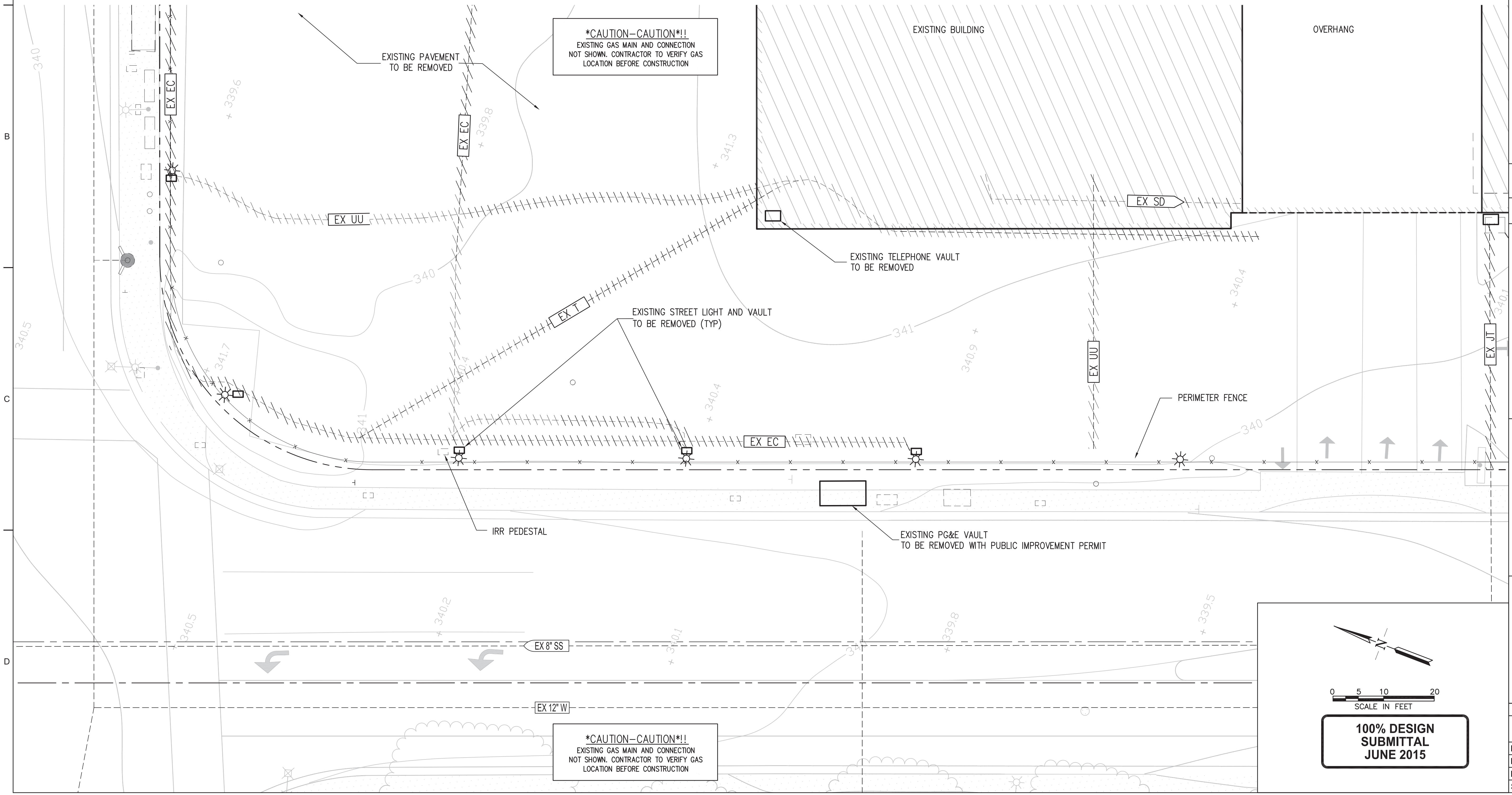
THE DRAWING AND ACCOMPANYING LEGEND INDICATE SITE DEMOLITION THAT IS NOT IN CONTRACT. CONTRACTOR WILL NOT PERFORM THE SITE DEMOLITION SHOWN BELOW. CONTRACTOR WILL REVIEW THIS SITE DEMOLITION AND SUPPLEMENTAL NOTES PROVIDED BY PRB ENGINEER, AND COORDINATE WITH OWNER AND CONSTRUCTION MANAGER TO ENSURE THAT ALL DEMOLITION REQUIRED FOR PRB CONSTRUCTION IS COMPLETED BY OTHERS PRIOR TO MOBILIZATION.

LEGEND:

EX SD	EXISTING ON-SITE UTILITY TO BE REMOVED
☼	STREET LIGHT TO BE REMOVED
○	MONITOR WELL TO BE REMOVED PRIOR TO SITE DEMO
▭	ELECTRICAL VAULT TO BE REMOVED
▨	EXISTING BUILDINGS TO BE REMOVED
EX SD	STORM DRAIN TO BE REMOVED
EX EC	ELECTRICAL LINE TO BE REMOVED
EX T	TELECOMMUNICATIONS LINE TO BE REMOVED
EX UU	UNDIFFERENTIATED UTILITY TO BE REMOVED
EX W	WATER LINE TO BE REMOVED

NOTES:

1. SITE DEMOLITION INFORMATION PROVIDED BY CIVIL ENGINEER, FOR CONSTRUCTION COORDINATION ONLY (NIC). CONTACT SITE OWNER FOR FULL ROUGH GRADING PLAN CONSTRUCTION DRAWINGS AND/OR AS-BUILT DRAWINGS (IF AVAILABLE).
2. PRB CONSTRUCTION MAY OCCUR WHILE OTHER WORK INCLUDING SITE DEMOLITION SHOWN HERE (NIC) IS PERFORMED ON SITE. CONTACT SITE OWNER FOR FULL CIVIL/ARCHITECTURAL DRAWINGS AS APPROPRIATE.
3. THE LOCATION AND EXTENT OF ALL EXISTING ON-SITE UTILITIES HAVE NOT BEEN CONFIRMED. EXISTING UTILITIES HAVE BEEN SHOWN WHERE BELIEVED TO EXIST BASED ON AVAILABLE RECORD DRAWINGS AND PHYSICAL EVIDENCE.
4. CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING THE LOCATION AND STATUS OF ALL UTILITIES WITHIN THE LIMITS OF WORK IN ACCORDANCE WITH THE GENERAL NOTES.
5. ALL EXISTING BUILDINGS HAVE BEEN DEMOLISHED AS OF DECEMBER 2014.



CAUTION–CAUTION!!
EXISTING GAS MAIN AND CONNECTION
NOT SHOWN. CONTRACTOR TO VERIFY GAS
LOCATION BEFORE CONSTRUCTION

CAUTION–CAUTION!!
EXISTING GAS MAIN AND CONNECTION
NOT SHOWN. CONTRACTOR TO VERIFY GAS
LOCATION BEFORE CONSTRUCTION

100% DESIGN SUBMITTAL JUNE 2015

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL
STATE OF CALIFORNIA
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

EXISTING SITE CONDITIONS, UTILITY IDENTIFICATION, AND SELECTIVE DEMO

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VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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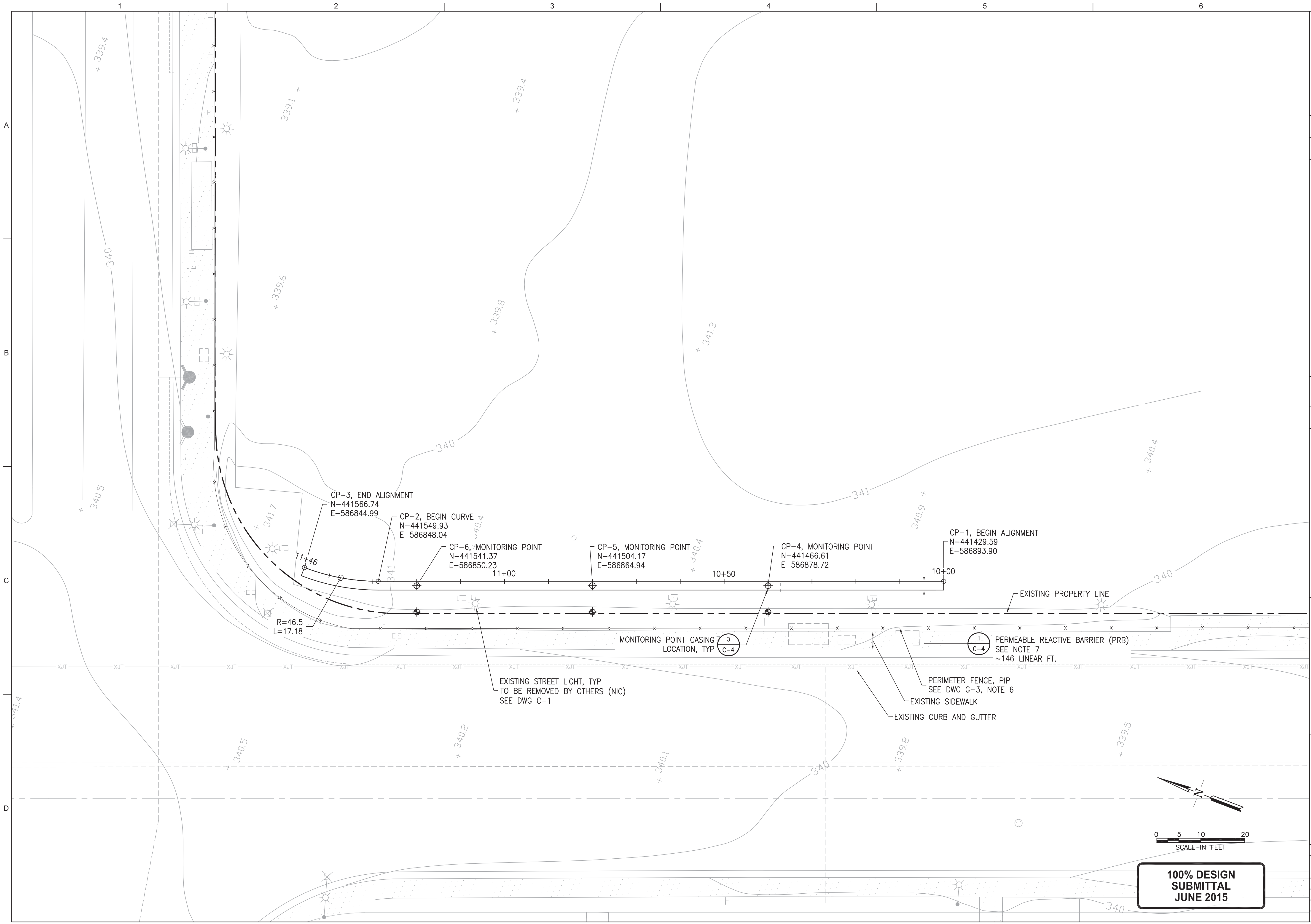
PROJECT NO.	OD14170800
DWG	C-1
SHEET	4 OF 7

FILE NAME: S:\OD14\170800\task_03\15_0601-100desgn\SHTS-PRB\C-001 prb.dwg PLOT DATE: Wed, 10 Jun 2015 PLOT TIME: 12:17 PM



100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09-30-16
CIVIL

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

PROPOSED SITE PLAN AND PRB ALIGNMENT

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 9461208619
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
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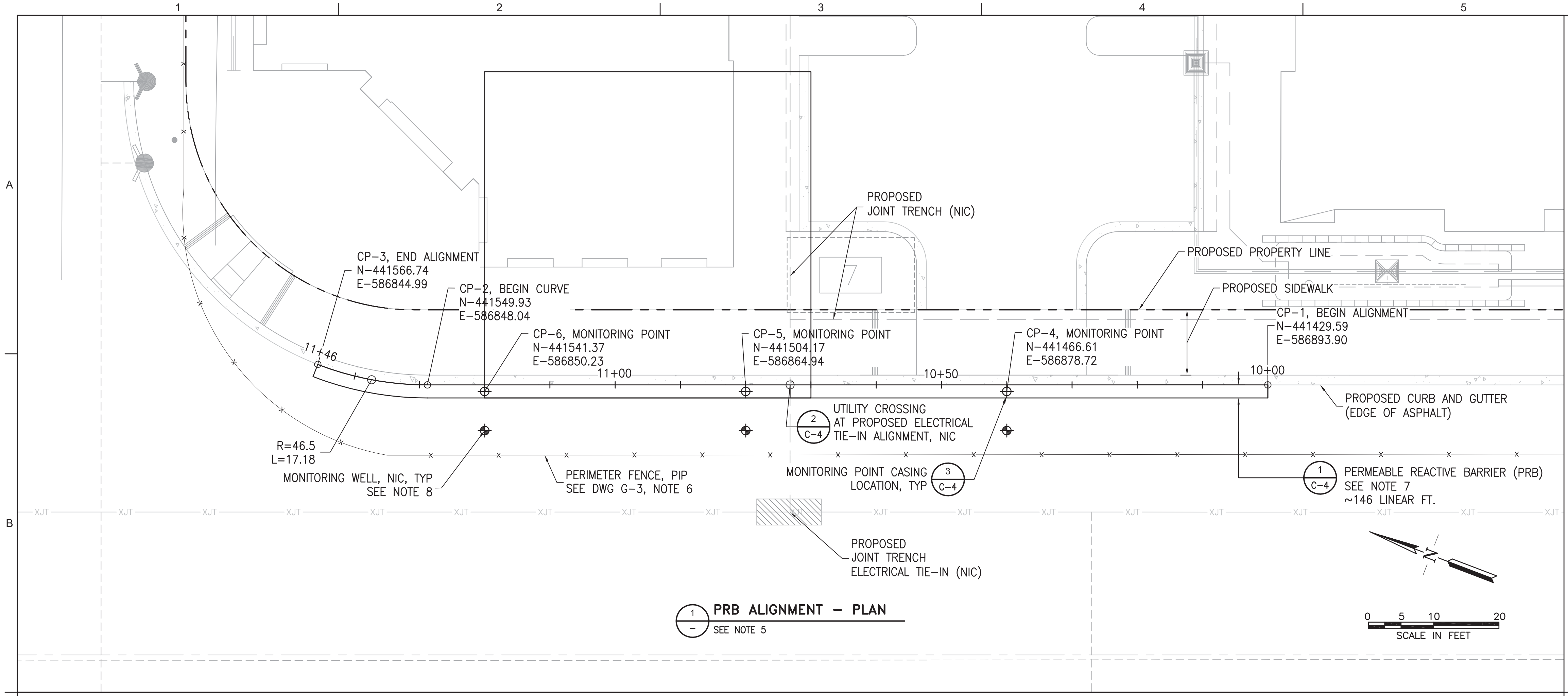
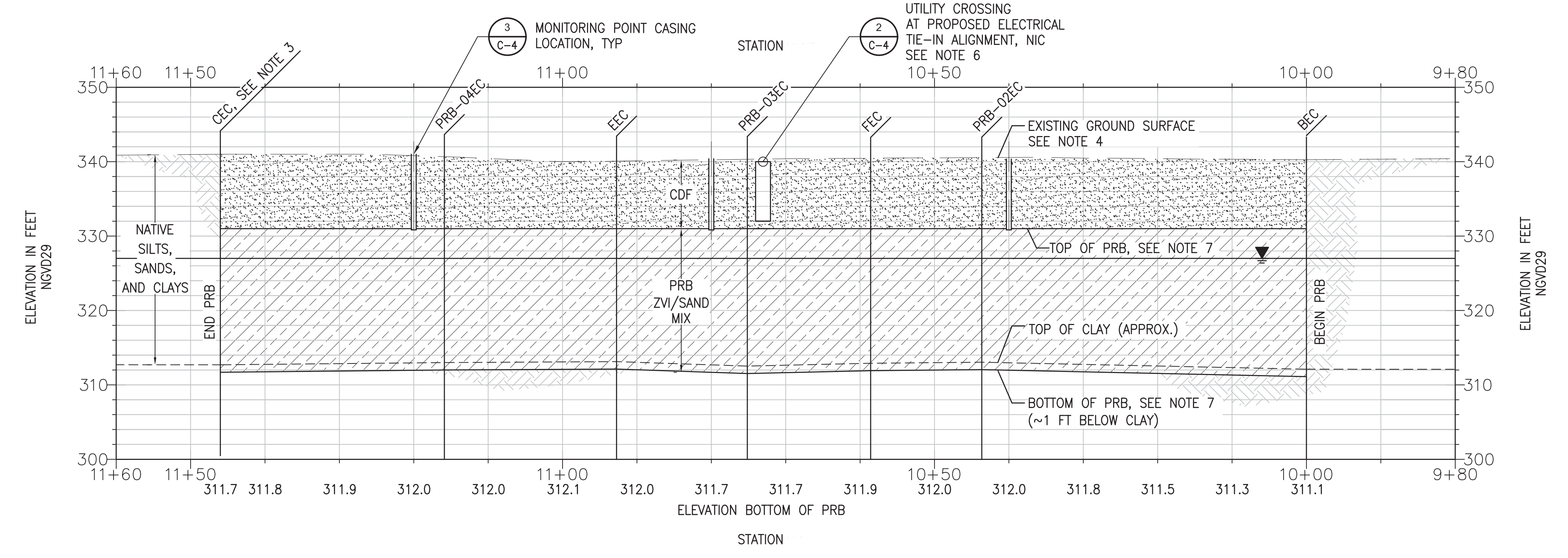
DATE 06/09/15
PROJECT NO. OD14170800
DWG C-2
SHEET 5 OF 7

FILE NAME: S:\OD14\170800\task_03\15_0601-100desgn\SHTS-PRB\C-002-04 prb.dwg PLOT DATE: Wed, 10 Jun 2015 PLOT TIME: 12:16 PM



① PRB ALIGNMENT – PLAN
SEE NOTE 5



Ⓐ PRB ALIGNMENT – PROFILE

NOTES

1. GROUND SURFACE ELEVATIONS SHOWN ON PROFILE ARE APPROXIMATE AND PROVIDED FOR REFERENCE ONLY. UTILIZE ELEVATIONS PROVIDED IN TABLE FOR PRB INSTALLATION (NOT DEPTH BELOW GROUND SURFACE).

2. APPROXIMATE WATER ELEVATION = 327 FT (NGVD29) AS OBSERVED APRIL, 2014.

3. REFER TO GEOLOGIC CROSS SECTIONS IN BASIS OF DESIGN REPORT FOR DETAILED SOIL AND SOIL BORING INFORMATION.

4. EXISTING GROUND SURFACE PRIOR TO SITE DEMOLITION AND ROUGH GRADING.

5. PROPOSED PUBLIC IMPROVEMENTS WORK IS NIC AND REPRESENTATIVE OF FUTURE WORK TO BE COMPLETED BY OTHERS. FUTURE WORK IS SHOWN FOR PROVIDING CONTEXT FOR THE PERMIT APPLICATION PROCESS ONLY.

6. EXCAVATION SETBACKS ABOVE AND/OR ADJACENT TO THE PRB ARE AS FOLLOWS:

   6.1 EXCAVATIONS AND/OR TEMPORARY SHORING ABOVE THE PRB SHALL EXTEND NO DEEPER THAN 332 FT (NGVD29) TO MAINTAIN 1 FT MINIMUM OF CDF ABOVE THE PRB. SEE DETAIL 2 ON SHEET C-4. ALL BACKFILL EXCAVATED ABOVE PRB FOR UTILITY CROSSINGS SHALL BE REPLACED IN KIND WITH CDF.

   6.2 EXCAVATIONS ADJACENT TO THE PRB DEEPER THAN 332 FT (NGVD29) SHALL BE NO DEEPER THAN 332 FT LESS THE MINIMUM DISTANCE OF THE EXCAVATION FROM THE PRB. (EXAMPLE: FOR AN EXCAVATION LOCATED 10 FT FROM THE PRB, THE MAXIMUM PERMISSIBLE DEPTH SHALL BE 332 FT – 10 FT = 322 FT.)

7. CONSTRUCTION TOLERANCES FOR PRB TOP AND BOTTOM ELEVATIONS IS –0.1/+0.5 FT, AND FOR PRB WIDTH IS –0.0/+0.5 FT.

8. PRB MONITORING WELLS TO BE INSTALLED BY OTHERS FOLLOWING COMPLETION OF THE PUBLIC IMPROVEMENTS AND LOT LINE ADJUSTMENT. REFER TO APPENDIX L OF THE BASIS OF DESIGN REPORT (AMEC FOSTER WHEELER, JUNE 2015).

STATION	ELEVATION (NGVD29)		
	TOP OF PRB	TOP OF CLAY	BOTTOM OF PRB
10+00	331.0	312.1	311.1
10+10		312.3	311.3
10+20		312.5	311.5
10+30		312.8	311.8
10+40		313.0	312.0
10+50		313.0	312.0
10+60		312.9	311.9
10+70		312.7	311.7
10+80		312.7	311.7
10+90		313.0	312.0
11+00		313.1	312.1
11+10		313.0	312.0
11+20		313.0	312.0
11+30		312.9	311.9
11+40		312.8	311.8
11+45.96		312.7	311.7

ESTIMATED QUANTITIES

ITEM	QTY	UNIT	NOTE
EXCAVATED SOIL	315	CY	IN PLACE
	551	TONS	ASSUMED 1.8 TONS/CY
ZVI/SAND MIX	208	CY	55%/45% BY VOLUME; IN PLACE
ZVI	231	TONS	ASSUMED 2.0 TONS/CY
SAND	93	CY	IN PLACE
CDF	107	CY	IN PLACE

NOTE
ESTIMATED QUANTITIES ARE PROVIDED FOR REFERENCE ONLY AND WERE CALCULATED ON PROPOSED TRENCH EXTENTS WITH NO ALLOWANCE FOR OVEREXCAVATION. ACTUAL QUANTITIES MAY VARY.

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C. BABLITCH
No. C64096
EXP. 09-30-16
Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

PRB
PLAN AND PROFILE

amec foster wheeler
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180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 946120819
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VERIFY SCALE
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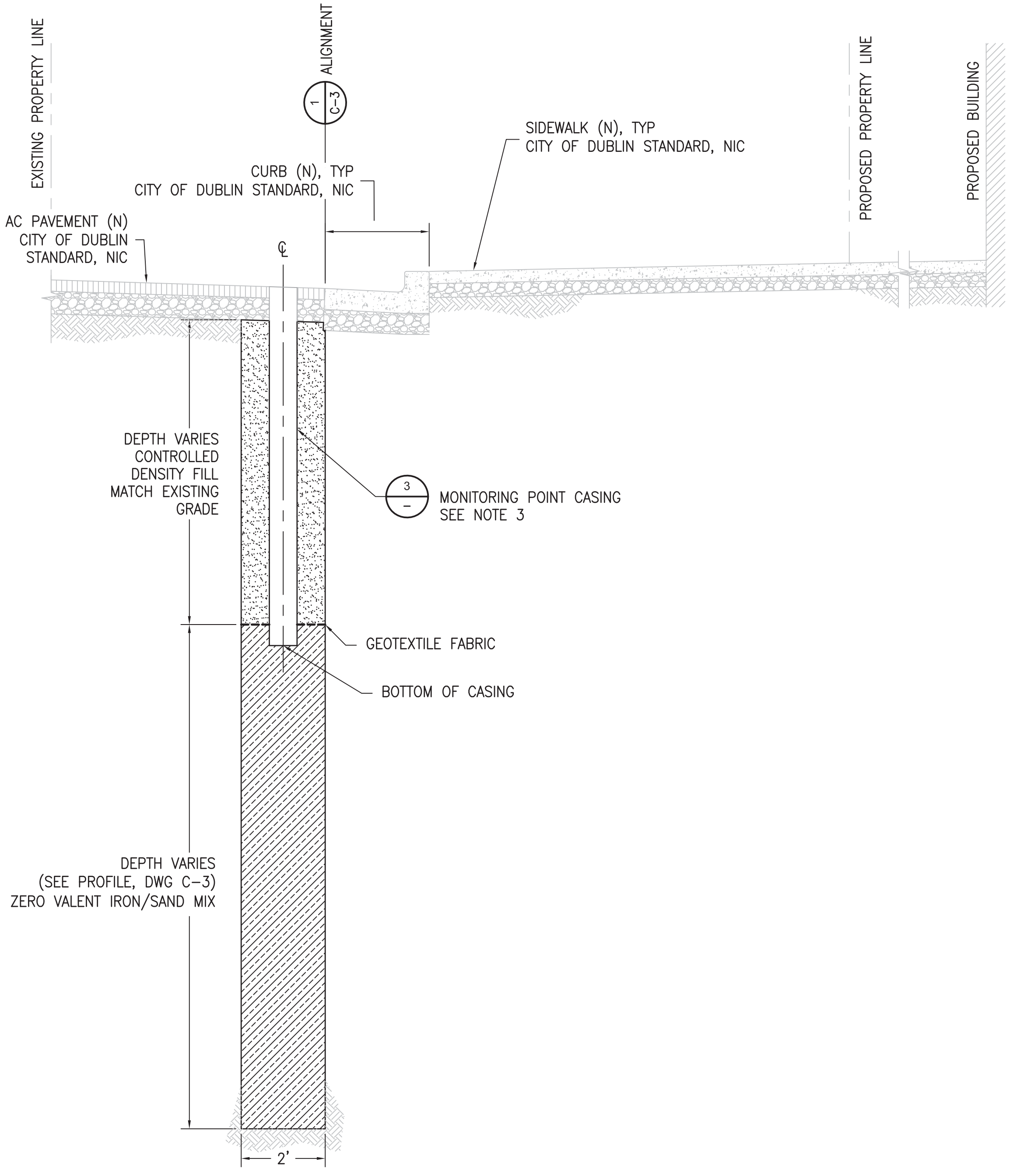
DATE	06/09/15
PROJECT NO.	OD14170800
DWG	C-3
SHEET	6 OF 7

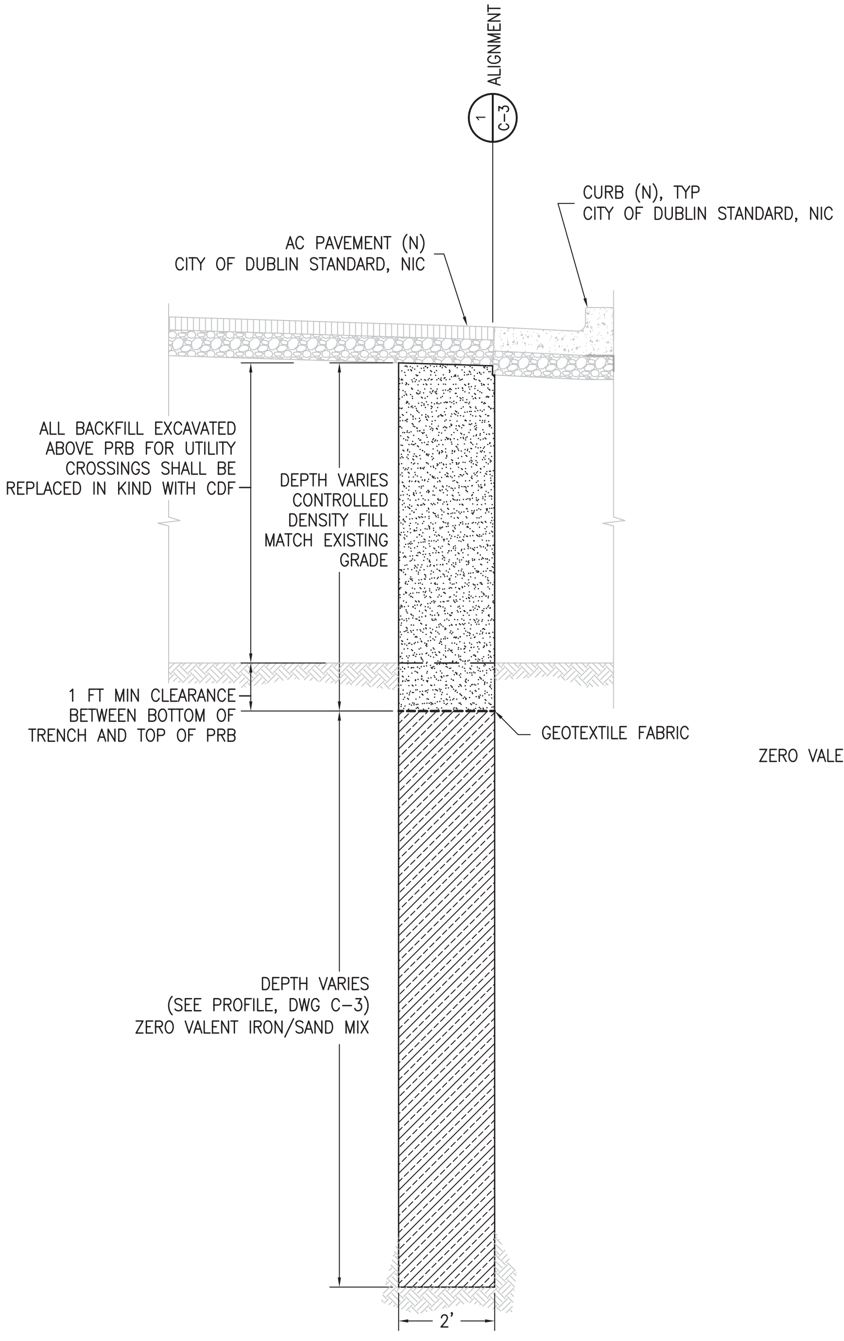


1 / –

PRB SECTION, TYP.

SEE NOTE 1

NTS

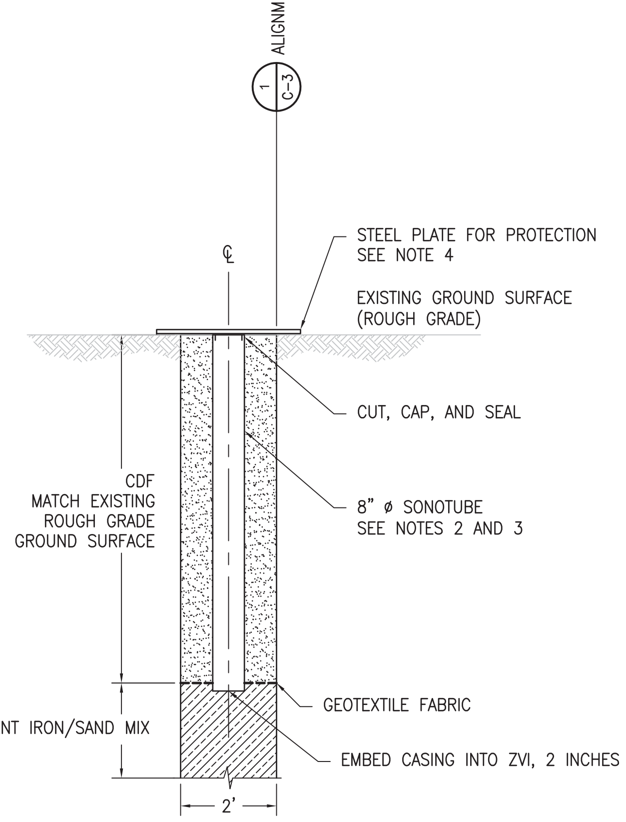


2 / –

PRB UTILITY CROSSING

SEE NOTE 1

NTS



3 / –

MONITORING POINT CASING, TYP

NTS

NOTES

1. ALL SITE IMPROVEMENTS ABOVE SUBGRADE TO BE CONSTRUCTED BY OTHERS (NOT IN CONTRACT) AND ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR TO BACKFILL ABOVE GEOTEXTILE FABRIC WITH CONTROLLED DENSITY FILL TO MATCH EXISTING ROUGH GRADE AT TIME OF PRB CONSTRUCTION OR AS OTHERWISE APPROVED BY CIVIL AND PRB ENGINEERS.

2. CASINGS WILL BE USED TO FACILITATE INSTALLATION OF PERFORMANCE MONITORING WELLS IN THE FUTURE, (BY OTHERS).

3. INSTALL MONITORING POINT CASING AT LOCATIONS SHOWN ON C–3 BEFORE PLACEMENT OF CDF. CASING SHALL BE PLUMB AND CENTERED WITHIN THE TRENCH. CONTRACTOR SHALL SECURE THE CASING DURING BACKFILL AND DEMONSTRATE VERTICALITY AFTER CDF IS PLACED.

4. CONTRACTOR SHALL PROVIDE 3' DIA TRAFFIC RATED STEEL PLATE AND FOUR SAFETY POSTS, BARRICADES, OR HEAVY DUTY CONES TO PROTECT CASING AT SURFACE AT EACH MONITORING POINT LOCATION.

100% DESIGN SUBMITTAL JUNE 2015

DOUGLAS C BABLITCH
No. C64096
EXP. 09–30–16
CIVIL

Douglas C. Bablitch

NO.	DATE	REVISION	BY	APVD
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DSGN	DRFT	CHK	APVD
A. OKADA	J. GRAUL	F. SZERDY	D. BABLITCH

PERMEABLE REACTIVE BARRIER
DUBLIN APARTMENTS
CROWN CHEVROLET NORTH PARCEL
7544 DUBLIN BLVD., DUBLIN, CALIFORNIA

PRB
DETAILS

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE, Inc.
180 GRAND AVENUE, SUITE 1100
OAKLAND, CALIFORNIA 946120861
TELEPHONE: (510) 663-4100
FAX: (510) 663-4141

VERIFY SCALE

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DATE 03/13/15
PROJECT NO. OD14170800
DWG C-4
SHEET 7 OF 7

FILE NAME: S:\OD14\170800\task_03\15_0601-100desgn\SHTS-PRB\C-002-04 prb.dwg PLOT DATE: Wed, 10 Jun 2015 PLOT TIME: 12:17 PM

SECTION 02 50 10

PERMEABLE REACTIVE BARRIER

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General Conditions, Supplemental Conditions (if any), and General Requirements, apply to the work specified in this Section.

B. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by basic designation only.

1. American Society for Testing and Materials (ASTM):
   - a. ASTM D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
   - b. ASTM D2216: Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
   - c. ASTM D2434: Standard Test method for Permeability of Granular Soils (Constant Head).
   - d. ASTM D4044: Standard Test method for (Field Procedure) Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers.
   - e. ASTM D7263: Standard Test Method for Laboratory Determination of Density (Unit Weight) of Soil Specimens.
   - f. ASTM D854: Standard Test Method for Specific Gravity of Soil Solids by Water Pyncnometer.
   - g. California Test 202: Method of test for sieve analysis of fine and coarse aggregates.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 01 11 00 - Summary of Work
B. Section 01 33 00 – Submittal Procedures
C. Section 01 35 29 - Health and Safety Requirement for Remediation
D. Section 01 50 00 - Temporary Facilities and Controls
E. Section 01 74 21 - Waste Management and Disposal for Remediation
F. Section 31 23 10 – Excavation for Remediation

1.3 DESCRIPTION OF WORK

A. Confirm adequacy of site demolition, erosion and sediment controls within the PRB limits of work as shown on the drawings.

B. Furnish the specified PRB Media

C. Construct a trench using biopolymer slurry trench method to construct a permeable reactive barrier (PRB).

D. Perform PRB installation monitoring and PRB Media testing in accordance with this Section.

E. Perform all required QC testing as described herein.

F. Perform any necessary corrective actions during the warranty period until PRB achieves the specified performance criteria in this Section.

1.4 SUBMITTALS

A. Bid Submittal Requirements: Bidders shall submit the following with their bid. The submittals will be used to evaluate bids and to expedite the permitting process prior to contract award. The submittals are listed below.

1. Statement of Qualification: Provide summary of PRB installation experience using the proposed methods including the names of individuals maintaining the experience and their role on this project.
2. PRB Construction Narrative. The PRB Construction Narrative shall include:
   a. A description of proposed methods and sequencing of operations for PRB construction including a detailed description of any proposed alternative construction methods.
   b. Proposed earth moving and PRB installation equipment to be used.
   c. Estimated quantity of liquid and solid spoils that will be generated.
   d. Estimated quantity of PRB Media required.
   e. Proposed means of demonstrating that no permanent decrease in hydraulic conductivity has occurred using the biopolymer slurry trench method following backfill including the minimum field tests specified in this Section. Include the test methods, approximate number of test locations and proposed sequence of testing.
   f. Anticipated construction schedule using Microsoft Project including total project duration, start- and finish-dates, and major milestones of work.

3. Proposed methods for biopolymer slurry preparation.

4. Proposed PRB Media Mix Components.
   a. Manufacturer specifications and engineering data for the zero valent iron (ZVI) and sand including gradation confirmation test results. Include quarry source for sand.
   b. Statement certifying the sand is from a virgin source and is free of contamination and deleterious material and meets the requirements of these Specifications.
   c. Estimated quantities of ZVI and sand.
   d. Proposed methods for re-crushing the ZVI to manufacturer gradation requirements should condensation within super sacks cause corrosion that cements ZVI particles together.

5. PRB Media Preparation Plan:
   a. Proposed method and equipment for mixing ZVI and sand.
   b. Proposed methods for handling PRB Media materials.
   c. Bidder’s anticipated mix design (% ZVI and sand) and installation thickness to meet the required design ZVI thicknesses, including calculations and supporting documentation.
   d. QA/QC methods for ensuring proper mix is installed at a minimum following the requirements specified in Material Quality Control and Field Quality Control in this Section.
   e. Field sampling procedures to be implemented to ensure that ZVI and sand percentages are compliant with the basis of design.

6. Proposed biopolymer slurry, enzyme breaking agents and other proposed slurry additives.
   a. Manufacturer’s specifications and engineering data.
   b. Documentation and test results indicating that the biopolymer slurry, enzymes and other additives have been used successfully in previous PRB installations with no impact to ZVI reactivity or permeability.
   c. Documentation of biopolymer slurry and enzyme breaking agent acceptability of use by local regulatory agencies.
   d. Estimated quantity of each to be used per day and total for the project.
   e. Provide statement of whether Contractor is intending to use biocides (or microbicides) to slow the breakdown of biopolymer slurry during the

construction process and confirmation that biocides are accepted for use by the local regulatory agency.

7. Proposed Biopolymer Slurry Breakdown Method
    a. Description of the proposed methods and sequence of operations for breaking down the biopolymer slurry within the trench. Details shall include a description of enzyme injection and recirculation, injection and recirculation point information including location and approximate spacing, diameter, total length, screen length, and proposed abandonment methods.
    b. Bids shall be based on the assumption that injection and recirculation points will be abandoned by tremieing PRB Media into the well for the full length of the well screen and plugging the remaining portion of the well riser to the ground surface with bentonite and grout.

B. Submittals Prior to Installation. Contractor shall submit the following submittals promptly in accordance with the Submittal Schedule. Updates to Bid Submittals shall include all items provided in the original submittal, with updates based on any new information provided and final contract negotiations:

1. PRB Construction Plan - Update. Provide updated PRB Construction narrative that Contractor submitted with Bid Submittal (Section 1.4 A.2) and shall include the following additional items.:
    a. A Survey Control Plan proposed to control and document PRB placement.

2. Proposed methods for biopolymer slurry preparation updated Bid Submittal (Section 1.4 A.3), .

3. Proposed PRB Media mix components updated Bid Submittal (Section 1.4 A.4).

4. PRB Media - updated Bid Submittal (Section 1.4 A.5):

5. Proposed Biopolymer Slurry, Enzyme Breaking Agents and other proposed slurry additives, updated Bid Submittal (Section 1.4 A.6).

6. Proposed Biopolymer Slurry Breakdown Method - updated Bid Submittal (Section 1.4 A.7)

7. Methods for determining that specified PRB base elevation has been achieved and method proposed for ensuring continuous media emplacement and integrity for its full length, width and depth.
    a. Measures proposed to cross and protect the existing underground and aboveground utilities and structures from damage, where encountered and indicated on the drawings to be retained.
    b. Contingencies and corrective actions in the event of substantial slurry loss and/or trench sloughing.
    c. Contingencies that will be implemented in the event cobbles or boulders are encountered
    d. Contingencies to be implemented in case of inclement weather or equipment breakdown including how ZVI in various stages of placement will be handled to avoid oxidation.

8. Calculations, stamped by a geotechnical engineer registered in the State of California, demonstrating that trench stability can be maintained during all phases of trench construction using the Contractor’s proposed biopolymer slurry. Calculations shall address stability against blow-in or bottom heave, adjacent surface loads (such as from construction equipment, and protection of adjacent

structures from settlement). A geotechnical report on subsurface information is included in the bid package for bidders own interpretation.

9. Identify required permits and licenses.

10. Security to be implemented to protect Contractor's and/or subcontractor's work and material storage areas and to control access to the work area. Refer to Section 01 50 00 "Temporary Facilities and Controls" for minimum site security requirements.

11. Setup of temporary facilities specific to the PRB installation, waste material disposal (construction debris, trash and brush) and material storage areas. Refer to Section 01 50 00 "Temporary Facilities and Controls" for minimum requirements.

12. Erosion/runoff control procedures. Refer to the Project Storm Water Pollution Prevention Plan (SWPPP) for minimum requirements.

13. Field organization and identification of personnel and their responsibilities. Identification of subcontractors.

14. PRB Construction Layout: Drawings showing the layout of the storage areas, PRB Media mixing area, biopolymer slurry preparation areas, spoil stockpile areas, location and sizes of stationary equipment, pumps, valves, hoses; and safety considerations to be implemented.

15. Contractor Quality Control (CQC) Plan: Detailed construction quality control requirements to ensure and document the quality of work during the installation of the PRB. (Refer to Part 3, paragraph entitled Field Quality Control for additional details).

16. Material Testing: Proposed testing procedures for material quality control and test results as detailed in the paragraph entitled Material Quality Control in Part 2 of this section. Engineer reserves the right to collect split samples of any media or materials.
17. Contractor Health and Safety Plan for PRB installation.
18. Materials Inspection Report. Submit a report detailing inspection of construction materials prior to installation to ensure that they comply with this Section. Include a certificate of compliance indicating all materials comply with this Section and Related Sections.
19. Construction Completion Report (after final acceptance)
    a. Narrative of installation activities including problems encountered such as boulders during excavation, trench cave-ins, biopolymer slurry quality control issues, iron emplacement issues and how these problems were resolved.
    b. QC inspection data.
    c. PRB continuity testing results.
    d. Final hydraulic conductivity demonstration results.
    e. As-built survey record drawings (prints and magnetic media) depicting horizontal extent and vertical profile of the PRB, the locations of QC tests, the locations of boulders and other complications encountered during the installation; and plan location of installed monitoring wells.
    f. Documentation of the quantity of materials installed (ZVI, biopolymer slurry, enzyme additives).
    g. Construction photographs/video (DVD format).

1.5 QUALITY CONTROL/QUALITY ASSURANCE:

A. Contractor shall demonstrate experience installing PRBs using the proposed methods.

B. Contractor shall implement a comprehensive quality control (QC) program to verify that the intent of the specifications is met. Quality control will be provided by the Contractor. Quality assurance (QA) activities will be performed by the Engineer.

C. Quality Control:

1. The Contractor shall prepare and implement a Construction Quality Control Plan (CQC) for the PRB wall construction. Refer to paragraphs in this Section entitled “Material Quality Control” in Part 2 and “Field Quality Control” under Part 3.

D. Quality Assurance: The Engineer and/or Owner will provide quality assurance services in accordance with the project Construction Quality Assurance Plan and at the Engineer’s/Owner’s discretion. The quality assurance program will be independent of the quality control program and shall in no way reduce the Contractor's requirements for quality control. The Contractor shall review a copy of the Project CQA Plan (AMEC 2015); a copy is provided by owner.

E. Pre-installation Conference: Contractor shall conduct a conference at the Site prior to performing PRB installation activities. This conference may be conducted in conjunction or coordination with conferences required by other Relevant Sections.

1. Review methods and procedures related to excavation including, but not limited to, the following:
    a. Health and Safety
    b. Sequencing.
    c. Media Mixing.
    d. QC Testing and Inspection coordination.
    e. Proposed equipment.
    f. Working area location and stability.
    g. Soil stockpiles management.
    h. Liquids management.
    i. Environmental controls

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall furnish, unload, and store all ZVI and sand media materials.

B. Contractor shall protect ZVI from contact with water. Do not store ZVI directly on the ground.

1.7 SYSTEM INSTALLATION PERFORMANCE

A. Ensure continuous PRB Media installation and integrity of the PRB for its full length, depth and width using approved testing methods. Contractor is to describe method proposed for integrity testing in accordance with submittal requirements.

B. Ensure that no permanent decrease in the hydraulic conductivity has occurred from construction of the PRB. Contractor shall demonstrate that there is no permanent decrease in hydraulic conductivity by:

1. Conducting viscosity measurements within the PRB Media at minimum of 1 well per 25 feet of PRB installed. To achieve substantial completion, viscosity measurements using the Marsh Funnel Test, or equal, shall be equal to background measurements as determined by Contractor and approved by Engineer.
2. Verifying that water levels in the existing monitoring wells and hydraulic gradients in the vicinity of the PRB have returned to natural conditions.
3. Collecting TOC data from PRB recirculation wells for comparison with background concentrations or Engineer approved equal data to assist in assessing biopolymer breakdown.
4. If, in the opinion of the Engineer, any of the above investigation results indicate that the biopolymer slurry has not fully broken or a potential loss in hydraulic conductivity exist, Contactor shall drive a minimum of 1 screened well point per 25-foot length of PRB installed within the PRB to perform slug testing. Slug tests shall be performed

in accordance with ASTM D 4044 or other Engineer approved method proposed by Contractor. If slug testing indicates that the hydraulic conductivity of the in-place PRB Media is less than 142 ft/day, substantial completion has not yet been achieved. Contractor shall be required to inject additional breaking agent, continue recirculation, or other approve actions, at no additional cost to Owner, until the PRB has been demonstrated to meet the hydraulic conductivity requirements.

1.8 DESIGN CONDITIONS AND PERFORMANCE

A. PRB Dimensions

1. Design wall width, depth, height and length: As shown on the drawings.
2. For bidding purposes, bidders shall base their bid on the design quantity of PRB Media (length x width x depth) plus any additional amount of PRB Media required for Bidder's installation method (i.e., the need for overlapping panels, or difficulty in achieving PRB continuity at depth, if applicable).

1.9 PERFORMANCE WARRANTY

B. The Contractor shall warrant that within a 1-year period following substantial completion that there will be no permanent decrease in the hydraulic conductivity due to the construction of the PRB (e.g., excavation methods and biopolymer slurry use) and that there will be no differential settlement.

PART 2 PRODUCTS

2.1 ZERO VALENT GRANULAR IRON (ZVI)

A. The ZVI shall be Iron Aggregate product number ETI CC-1004 with the specified gradation supplied by Connelly-GPM Inc. Chicago, IL; (773) 247-7231.

B. The ZVI shall have the following gradation (-8/+50 mesh):

US Standard Sieve Size	Percent Passing by Weight
Number 8	95-100
Number 16	75-90
Number 30	25-45
Number 50	0-10
Number 100	0-5

C. Contractor shall have the ZVI tested for the specified gradation by a state licensed laboratory using California Test 202. The Contractor shall submit the gradation test results in accordance with the Submittal requirements. The test results shall be approved by the Engineer.

2.2 SAND

A. Grain size: Clean sand with no fines and shall have the same gradation as the ZVI.

B. Sand shall be from a virgin source known to be free contamination and contain no recycled materials.

C. The sand shall be free of stones, clay particles, debris, and organic or deleterious material.

D. The sand shall be dry (5 percent moisture content or less by mass as determined by ASTM 2216 or other Engineer approved method). Contractor's use of sand with greater than 5 percent moisture content must be approved by the Engineer prior to mixing with the ZVI. Refer to the paragraph entitled Mixing in Part 3 for maximum storage times of PRB Media for different sand moisture contents.

E. The sand shall tested for the specified gradation using Test Method No. California 202 by a state certified laboratory. The Contractor shall submit the gradation test results in accordance with the Submittal requirements. The test results shall be approved by the Engineer.

F. Tests: Refer to paragraph entitled Quality Control/Quality Assurance.

G. Owner will not pay for excess sand materials that remain unused at the end of construction.

2.3 BIOPOLYMER SLURRY AND ENZYMES

A. The biopolymer slurry shall be comprised of fully biodegradable G150 Bio-Polymer guar gum or Engineer approved alternative and potable water.

B. Enzymes approved by Engineer shall be used to speed the natural biodegradation processes. Enzymes shall not negatively impact ZVI reactivity or down gradient water quality and must be approved for use by the oversight agency.

C. Chemical constituents and breakdown products shall not present a threat to down gradient groundwater quality, the reactivity of the ZVI, or the hydraulic conductivity of the ZVI or groundwater.

D. Tests: See paragraph entitled Material Quality Control.

E. Owner will not pay for excess biopolymer slurry and enzyme materials that remain unused at the end of the project.

F. Use of biocides to slow the breakdown of biopolymer slurry during the construction process is prohibited unless approved for use by the Engineer and oversight agency prior to construction.

2.4 PRB MEDIA

A. ZVI and sand mixes shall contain not less than 55% ZVI by volume or approximately 60% ZVI by weight (assuming bulk unit weight of 2 tons/CY).

B. Contractor shall specify whether the proportion of ZVI used in the mixture and verified through quality control testing is given as a weight percentage or volume percentage.

C. Quality Control Testing: See paragraphs entitled Material Quality Control and Field Quality Control.

2.5 MATERIAL QUALITY CONTROL

A. Biopolymer Slurry Stability and Compatibility Test: Testing (i.e., viscosity, density, filtrate loss, pH, or other Engineer approved parameters) shall be performed by the Contractor prior to construction to confirm the stability of the mix for trench stability. Testing shall demonstrate that the mix is compatible with the site water chemistry and is stable during the trench construction. Results of this testing will be used as a benchmark for field quality control testing during excavation and PRB Media instalation. Details of proposed testing and the desired design parameters shall be submitted for review and approval by the Engineer prior to the tests being conducted. Test results shall be submitted for review and approval by the Engineer prior to installation.

B. Biopolymer Breakdown Test: Refer to Bid Submittal Requirements. Bidders are required to provide evidence of successful use of their selected biopolymer and breaking agent on past projects including past test results. If required by Engineer, upon award Contractor shall also perform biopolymer breakdown tests using site water. Engineer will furnish water. Testing will utilize the same parameters as are proposed in the field and will be performed at groundwater temperatures.

C. ZVI Reactivity Testing (Exposure to Biopolymer Slurry): Refer to Bid Submittal Requirements. Bidders are required to provide evidence of successful use of their selected biopolymer and breaking agent on past projects that demonstrate that iron reactivity has not been impacted. If required by Engineer, upon award, Contractor shall also perform reactivity jar tests at an independent laboratory using site water and Contractor's proposed biopolymer and breaking agent at groundwater temperatures. Analysis would be for initial and final concentrations of vinyl chloride and cis-DCE and compared with a control jar without biopolymer.

D. Sand Gradation: Contractor shall submit sand grain size analysis results on representative samples of sand proposed for the mix design.

E. Permeability Test (ZVI and PRB Media mixes): Prior to installation, demonstrate by ASTM D 2434 methods that the hydraulic conductivity of the PRB Media will be equal to or greater than a minimum of 142 ft/day. Samples shall be compacted to 90 percent of optimum dry density as obtained using the Modified Proctor Compaction Test (ASTM D 1557). The sand selected for testing shall be the sand that will be available for use and approved by the Engineer in the construction of the PRB. Conduct tests on 100% iron as a baseline and two additional tests at 33% (23% Alt E) and 75% iron by volume.

F. Porosity Test (ZVI and PRB Media mixes): Prior to installation, demonstrate by ASTM D7263 and D 854 or other approved method that the mixes exceed 40% porosity. The sand selected for testing shall be the sand that will be available for use and approved by the Engineer in construction of the PRB. Conduct tests on 100% ZVI as a baseline and two additional tests at 55% and 45% ZVI by volume.

G. Bulk Density: Perform bulk density tests for 100% ZVI, 100% Sand, and 55% ZVI/45% Sand. Provide natural water content for sand source.

2.6 BACKFILL MATERIAL:

A. Controlled Density Fill and Geotextile: Refer to Section 31 23 10 Excavation for Remediation

PART 3 EXECUTION

3.1 INSPECTION

A. Contractor shall visually inspect the site prior to mobilization to review the existing conditions and confirm with the Construction Manager that project stormwater BMPs are in place and that the Site demolition by others has been completed.

B. Inspect materials prior to installation to ensure that they comply with this Section and submit inspection results for Engineer's approval.

C. Allow Engineer to inspect equipment and materials at any time at the site,

D. Remove oil or other rust inhibitors from equipment that will contact the ZVI prior to emplacement to the Engineer's satisfaction.

3.2 BIOPOLYMER SLURRY MIXING

A. Contractor shall mix the biopolymer slurry on-site using a slurry mixing plant consisting of a five cubic yard high-speed colloidal shear mixer, transfer pump and electrical generator. The biopolymer slurry mixture ratio shall be 50 to 60 pounds of G150 Bio-Polymer guar gum to approximately 1000 gallons of potable water. The biopolymer slurry shall viscous and sufficiently dense to suspend the maximum size ZVI particle yet capable of being readily pumped by a 6 inch trash pump.

3.3 PRB MEDIA MIX PREPARATION

A. Contractor shall utilize a Volumetric Mixer (e.g., Elkin) Truck or approved equivalent to mix the PRB Media mix.

B. Ensure that all equipment used to mix the PRB Media mix is free of foreign materials such as soil, stones, or cement.

C. PRB Media

   1. Mix the ZVI and sand to obtain the desired ZVI and sand ratio that is compliant with Engineer approved Contractor calculations and achieve a homogeneous consistency.

2. Sand moisture content shall not exceed 5 percent by mass as determined by ASTM 2216 or other Engineer approved method. Contractor's use of sand with greater than 5 percent moisture content must be approved by the Engineer prior to mixing with the ZVI. Store PRB Media mix as specified for ZVI. The PRB Media mix shall be stored no longer than indicated in the following table. If additional water is added during mixing, the PRB Media mixture shall be used within 8 hours.

Sand Moisture Content (percent)	**PRB Media Mixture Maximum Allowed Storage Time (hr)**
0 to 3	72
3 to 6	48
6 to 9	24
Greater than 9	8

3. During transport and handling, care shall be taken to minimize vertical drop and vibration of the finished product to prevent separation/segregation.
4. Prior to emplacement, Contractor shall demonstrate to the Engineer for his approval that the PRB Media mix meets these specifications. Refer to QC testing requirements.
5. Minimize PRB Media mix and biopolymer slurry contact prior to installation and ensure that the ZVI and sand do not separate during placement.

3.4 PRB INSTALLATION

A. The biopolymer slurry trench shall be excavated to allow placement of the PRB Media to the required alignment, grades and dimensions.

B. PRB Installation Tolerances. PRB installation tolerances shall be maintained at all points along the entire length of the PRB. The PRB shall be constructed as shown on the drawings and shall not deviate by more than:

1. Alignment, -/+0.5 feet.
2. Depth -0.1/+0.5 feet.
3. Width -0.0/-0.5 feet.

C. Biopolymer slurry shall be introduced into the trench at the time excavation begins and the level of biopolymer slurry shall be maintained to prevent trench cave-in to permit even installation of the PRB Media. The Contractor shall control surcharges from all excavation and backfilling equipment, waste, berm construction, stockpiles, and any other loading situations that may affect trench stability. In the event of failure of the trench walls prior to completion of the PRB Media installation, the Contractor shall re-excavate the failed length of trench removing all material displaced into the failed trench section and replace the PRB Media at no additional cost to the contract. Engineer shall be informed of any voids or discontinuities in PRB Media installation that are noted by the Contractor.

D. Biopolymer slurry installation requirements:

1. Partially saturate the PRB Media with water immediately prior to installation in the trench in order to minimize biopolymer slurry infiltration into the PRB Media. Place the PRB Media into the trench through the biopolymer utilizing an 18" tremie tube placed immediately above the current PRB media elevation to minimize the possible segregation of PRB Media and contact with the biopolymer slurry.
2. As PRB Media is being placed, excess biopolymer shall be pumped out of the trench into a frac tank or other Engineer-approved storage container for sampling and disposal.

E. Minimum Installation Verification Requirements

1. The elevation excavation bottom shall be verified by the Contractor an interval of every 10 linear feet. The Contractor shall record each elevation measurement for approval by the Engineer.

2. Contractor shall verify the depth of the trench immediately prior to backfilling with the PRB Media. Backfilling of the trench may commence after excavation of the section of the trench is complete and the depth and width are verified by the Contractor and approved by the Engineer.
3. The Contractor shall record the volume and weight of PRB Media installed each day for review and approval by the Engineer.
4. The Contractor shall not deviate from the design alignment, depth and width more than the allowable installation tolerances. The Contractor shall stop PRB installation activities immediately upon the direction of the CQA Manager should the CQA Manager observe an installation deviation greater than the specified installation tolerances.

F. Biopolymer Slurry Breakdown Method.

1. Enzyme injection points/recirculation well locations shall be adequate to recirculate fluid through the entire length and depth of the PRB. Locations shall be approved by the Engineer prior to implementing biopolymer slurry breakdown procedures.
2. Contractor shall break down the biopolymer slurry within the trench using the approved enzyme additive following completion of the PRB Media installation to a marsh funnel viscosity of less than 30 seconds. The trench shall then be flushed and pumping and circulating the biopolymer slurry left in the trench.
3. Recirculation wells will be abandoned by tremieing the ZVI media into the well for the full length of the well screen and plugging the remaining portion of the well riser to the ground surface with bentonite and grout.
4. Conductor casings for future performance monitoring wells shall not be used for recirculation points without written approval from the Engineer.

G. PRB Completion

1. Install conductor casings within the trench to facilitate future monitoring well installation (to be performed by others) as shown on the Drawings.
2. Contractor shall cover the finished PRB with geotextile material and backfill the remaining excavation with controlled density fill as specified in Section 31 23 10 Excavation for Remediation.

3.5 FIELD QUALITY CONTROL

A. Submit for Engineer’s approval a Contractor Quality Control (CQC) Plan for the installation of the PRB. The CQC Plan shall include a description of the quality control procedures, personnel, and inspection procedures to be implemented for the work specified. Contractor shall certify that the Plan has been implemented during the PRB installation. All QA/QC records shall be submitted to the Engineer for review and confirmation that the CQC Plan is being adhered to. The Plan shall identify the following:

1. An individual within the Contractor's organization, the Quality Control Manager, who will be responsible for quality control during the work. The responsible individual shall be qualified and have a minimum of 5 years of experience with the type of work tasks specified herein, and shall demonstrate his/her ability to perform correctly the duties required to the satisfaction of the Engineer. The Quality Control Manager shall be on site whenever work is in progress.
2. A schedule for collection, submittal and review of quality control data. The schedule will specify who is responsible for review of the data. State what correction procedures will be used if deficiencies are noted and who will be responsible for implementing the corrections.
3. Plans for measurements and testing shall include:
    j. A Survey Control Plan used during construction to assure that:
        (1) the media is being placed to the required alignment, grades, depths, and dimensions.
        (2) Biopolymer slurry, ZVI and total PRB Media volumes are monitored at regular specified frequency (no less than once every 25 feet).

k. A materials installation quality control plan to include:
    (1) Field sampling and frequency requirements to ensure that chemical and geotechnical characteristics of biopolymer slurry mixes are sufficient for excavation wall support prior to installation.
    (2) Field sampling of PRB Media ZVI and sand percentages to ensure compliance with the basis of design (i.e., required percentage of ZVI) prior to installation and during installation. Testing shall consist of separation of the mixed material using a magnet and accurately measuring each material to ensure it falls within the specification. Contractor shall complete a Magnetic Separation Test Record (MSTR) for each test. Each MSTR shall be approved by the Engineer. The MSTR is included with the Construction Documents as an attachment.
    (3) Field sampling for analysis of moisture content of the sand from selected stockpiles prior to mixing. Sand shall contain 5 percent moisture or less.

l. An installment verification plan to verify the installed continuity of the PRB.

B. Contractor shall perform quality control tests, survey control, and installment verification testing in accordance with the approved CQC Plan and ensure that the work is performed to the specifications established in this Section. Refer to paragraph entitled Material Quality Control for testing requirements of materials prior to installation. If survey control or installment verification testing reveals possible discontinuous placement, Engineer may require that the Contractor replace or add additional iron to the affected portion of the PRB at no additional cost.

C. Contractor shall maintain records for all testing, measurements, observations and inspections. These QA/QC records shall be submitted to the Engineer for review each workday on a form acceptable to the Engineer, and also retained for submission in the Construction Completion Report.

D. Contractor shall prepare and maintain daily installation logs for daily review and approval by Engineer. The daily installation logs shall include:
1. Project name/date.
2. Installation equipment used.
3. Activities performed during the day/linear distance of PRB installed.
4. Records/photographs documenting unusual phenomena or changes in soil conditions.
5. Quantities of ZVI, sand, biopolymer slurry used per installed section of PRB.
6. Quantity of spoils generated per day.
7. Deficiencies noted and how corrected.
8. Accidents and safety-related incidents.

D. If the Engineer notifies the Contractor of any non-compliance with the foregoing requirements or approved CQC Plan:
1. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site, shall be deemed sufficient for the purpose of notification.
2. Any deficiency corrections shall be accomplished within the time stated by the Contractor and approved by the Engineer for completion of the work. If the Contractor fails to comply, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken.
3. No part of the time lost due to any such stop orders shall be made the subject of claim for extension of time or for excess cost damages by the Contractor.

3.6 FIELD DEMONSTRATION

A. For field demonstrations, refer to paragraph in Part 1 entitled “System Installation Performance” regarding conductivity demonstration for Substantial Completion.

3.7 DOCUMENTATION

A. Provide all test records, volumes, weights and quantities of materials used.

B. Provide as-built survey for the final installed extents of the PRB:

    a. Clearly indicate corners, centerline, and curve points.
    b. Provide survey point data at least every 25 feet along each side of the PRB.
    c. Provide surface elevation of final CDF surface. Locate conductor casings installed within the CDF backfill for future monitoring well installation.

3.8 PROTECTION OF COMPLETED PRB

A. Following completion of the PRB installation, the excavation setbacks above and/or adjacent to the PRB are as follows:
    a. Excavations and/or temporary shoring above the PRB will extend no deeper than 332 feet (NGVD 29) to maintain 1 foot minimum of CDF above the PRB. See Detail 2 on Sheet C-4.
    b. Excavations adjacent to the PRB deeper than 332 feet (NGVD 29) will be no deeper than 332 feet less the minimum distance of the excavation from the PRB. (Example: for an excavation located 10 feet from the PRB, the maximum permissible depth will be 332 feet - 10 feet = 322 feet.)

END OF SECTION

APPENDIX H

PRB Thickness Design Calculations

TABLE H-1

PERMEABLE REACTIVE BARRIER THICKNESS DESIGN CALCULATIONS

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Constituent of Concern	**Influent Concentration C_{Inf} (µg/L)**	**Effluent Goal C_{Eff} (µg/L)**	**Laboratory determined 1/2 life [1] $t_{1/2}$ (hours)**	**Laboratory determined 1/2 life [1] $t_{1/2}$ (days)**	**Laboratory determined First-order Decay Rate [2] k_0 (day$^{-1)}$**	**Field (Adjusted) First-order Decay Rate [3] k_1 (day^{-1})**	**Field Residence Time (utilizing k_1) T (hours)**	**Groundwater Seepage Velocity [4] V (ft/day)**	**Estimated Thickness L (ft)**	**Factor of Safety [5]**	**Design ZVI Thickness (effective) (ft)**
PCE	250	63	2.7	0.11	6.16	3.08	10.7	0.8	**0.36**	3.0	1.1
TCE[6]	213	130	1.9	0.079	8.75	4.38	2.7	0.8	0.095	--	--
cis-1,2-DCE[6]	40	3100	7.9	0.33	2.11	1.05	--	0.8	--	--	--
Vinyl chloride[6]	1	1.8	0.6	0.025	27.72	13.86	--	0.8	--	--	--

Notes

1. COC half-lives were determined by SiREM using zero-valent iron column studies.
2. Laboratory determined first-order decay rate is calculated as $k_0 = \ln(C_{Inf}/C_{1/2}) / t_{1/2} = \ln(2) / t_{1/2}$, where ln(2) represents a reduction of concentration by half (i.e., half-life).
3. The laboratory first-order decay rate was adjusted by a 50% reduction to account for lower temperatures in the field in comparison with the laboratory (DTSC, 2008).
4. The groundwater seepage velocity was determined using a borehole dilution test (BOD Report, Appendix B).
5. A factor of safety is applied to account for field uncertainties (ITRC, 2011).
6. Thickness calculations are not required for COCs other than PCE.

Abbreviations

µg/L = micrograms per liter
cis-1,2-DCE = cis-1,2-dichloroethene
COC = constituent of concern
ft = feet
ft/day = feet per day
PCE = tetrachloroethene
TCE = trichloroethene

APPENDIX I

Construction Quality Assurance Plan, Vapor Mitigation System

and

Construction Quality Assurance Plan, Permeable Reactive Barrier

Construction Quality Assurance Plan
Vapor Mitigation System

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

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APPENDIX I-2

CONSTRUCTION QUALITY ASSURANCE PLAN
VAPOR MITIGATION SYSTEM

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

I1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (“Amec Foster Wheeler”) on behalf of Bay West Development Dublin, LLC (“BWD Dublin”) has prepared this Construction Quality Assurance (CQA) Plan for construction of the vapor mitigation system (VMS) portion of the approved remedy at the Former Crown Chevrolet facility, located in Dublin, California (the “site”; Figure I-2-1). The CQA Plan describes quality assurance activities that will be performed by the CQA Manager before and during construction to insure that the project fulfills the requirements for quality presented in the Construction Documents.

The site is bound by Dublin Boulevard to the north, Golden Gate Drive to the west, St. Patrick Way to the south and retail businesses to the east, as shown on Figure I-2-2. The site is a rectangular-shaped parcel with plan dimensions of approximately 400 feet by 550 feet.

The primary elements of the approved remedy consists of installation of a VMS and a permeable reactive barrier (PRB). The scope of this document includes quality assurance for construction of the VMS only (the “Project”). Quality assurance for construction of the PRB is addressed in a separate document. CQA requirements for other construction activities at the site are not included in the scope of this document.

I1.1 BACKGROUND

The site was developed in 1968 as a car dealership called Crown Chevrolet Cadillac Isuzu that included an auto body repair shop. Operations as a car dealership and auto body repair shop occurred from 1968 until 2014. Site remedial activities were performed between 2011 and 2015 and included removal of contaminated soil, underground storage tanks (USTs), utilities, and subsurface features from the northern area of the site. From December 2014 through March 2015 select redevelopment activities were completed, including demolition of buildings, foundations, and hardscapes. The site is currently in the process of being redeveloped into a mixed use commercial/residential apartment complex. Additional site background information is presented within the *Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report* (“Design Report;” Amec Foster Wheeler, 2015).

I1.2 PURPOSE

This CQA Plan has been prepared to meet the quality assurance requirements set forth in the following Project documents:

- Construction Documents.
- An August 16, 2013 Letter from the Alameda County Environmental Health (“ACDEH Letter;” ACDEH, 2013).
- The *Final Feasibility Study and Corrective Action Plan* (AMEC, 2014), and
- The Design Report.

The CQA Plan presents the quality assurance activities that will be performed by the CQA Manager before and during construction of the Project to insure that the Project fulfills the requirements for quality presented in the documents listed above. Although the design and construction of the VMS are part of a larger commercial/residential development project, the scope of this CQA Plan only addresses requirements specific to the VMS.

The Project Construction Documents have been prepared to meet the requirements of the Corrective Action Objectives (CAOs) and functional objectives, which were developed to mitigate risks associated with contaminated groundwater and soil vapor. The CAOs and functional objectives are presented in the Design Report and the ACDEH Letter.

I1.3 DEFINITIONS

For the purpose of this CQA Plan, the following definitions will apply.

I1.3.1 Construction Quality Management Program

The Construction Quality Management Program (CQMP) is comprised of the CQA Plan and the Construction Quality Control (CQC) Plan. The CQMP defines the roles, responsibilities, and procedures required of the parties involved before, during and after construction of the VMS to ensure that the work is performed in accordance with the design intent and requirements of the Construction Documents.

I1.3.2 Construction Quality Assurance Plan

The CQA Plan has been prepared by the Engineer and will be implemented by the CQA Manager. The CQA Plan presents a planned system of quality assurance activities that will provide the Owner and the Regulator assurances that the construction meets the requirements of the Construction Documents. These requirements include qualifications and experience necessary for contractors and inspectors involved in the construction of the VMS, as well as performance criteria for construction monitoring and documentation, construction inspections, and as-built documentation.

I1.3.3 Construction Quality Control Plan

The CQC Plan is prepared and implemented by the Contractor. The CQC Plan is a planned system of inspections and tests to monitor and verify that construction workmanship is meeting the requirements of the Construction Documents for the Project. The inspections and tests are performed by the Contractor and associated subcontractors throughout construction, as required, to confirm the final constructed product is compliant with the Construction Documents.

I1.3.4 Manufacturer Quality Control

The Manufacturer Quality Control (MQC) program is a planned system of monitoring, inspecting, and testing performed by the manufacturer of construction materials to ensure that the manufactured product meets the required specified values.

I1.3.5 Owner

The Owner is the party with whom the Owner’s Representative has entered into an agreement and for whom the Project work is to be provided. The Owner coordinates with the Regulatory Agency and makes decisions related to the design and construction of the Project, in consultation with the Design Engineer. The Owner is Dublin Apartment Properties, LLC.

I1.3.6 Construction Manager

The Construction Manager is the Owner’s Representative who oversees construction activities. The Construction Manager is BWD Dublin, LLC.

I1.3.7 Regulatory Agency

ACDEH is the regulatory agency that reviews and approves the Design Report, Construction Documents and the Construction Completion Report.

I1.3.8 Design Engineer

The Design Engineer is the Engineer of record for the firm responsible for the completed Project Construction Documents. Amec Foster Wheeler is the firm responsible for the completed Construction Documents. For clarity, the designation “VMS Engineer” has been used within the Construction Documents to differentiate between other engineering and/or architectural entities that have contributed to the overall BWD Dublin Apartments design and associated construction documents.

I1.3.9 CQA Manager

The CQA Manager is responsible for performance of the quality assurance activities identified in the CQA Plan. A professional engineer from Amec Foster Wheeler will be the CQA Manager for the Project.

I1.3.10 Contractor

The Contractor is the party that is hired by the Owner to provide the completed Project. ZCon Builders of Oakland, California, is the Contractor responsible for providing the Project in accordance with the Construction Documents and the Contractor's CQC Plan.

I1.3.11 Subcontractor

A Subcontractor is the party with whom the Contractor has entered into an agreement to provide some or all of the construction work described in the Construction Documents. No Subcontractors have been identified for the Project. Subcontractors for construction of the Project will have to meet the minimum requirements for qualifications and experience described in this CQA plan and within the Construction Documents. The Contractor will be responsible for Subcontractor performance and management.

I1.3.12 Construction Documents

The documents prepared by the Design Engineer on behalf of the Owner for the purpose of conveying the Project to the Contractor. The construction documents include the construction specifications and construction drawings for the VMS only and provide a description of the work and the technical construction requirements.

I2.0 RESPONSIBILITIES AND AUTHORITY

The CQMP includes the parties shown on the Quality Program Organizational Chart (Figure I-2-3). The associated responsibilities and authority for each party are described in the following sections.

I2.1 OWNER

The Owner makes the decisions on the Project and selects all associated parties (with the exception of the regulatory agency) to assist them in the execution of the work associated with the Project. Specific responsibilities and authorities include:

- Selecting the Construction Manager.
- Selecting the Design Engineer.
- Stopping the Contractor's work if it is found to be defective or out of compliance with the Construction Documents.
- Approving changes to the Construction Documents including all Addenda, Change in Work Directives/Field Orders, and Change Orders.
- Providing final documentation to the Regulatory Agency to support construction certification.
- Communicating with the Regulatory Agency, the Design Engineer and Construction Manager throughout design, construction, and certification.
- Construction Manager and CQA Manager invoice management and payment.

I2.2 CONSTRUCTION MANAGER

The Construction Manager has the following specific responsibilities and authorities:

- Manages and represents the interests of the Owner during construction.
- Retains the Contractor under contract to provide the Project.
- Contractor invoice management and payment.
- Communicating with the Owner, Contractor, and Subcontractor regularly throughout construction.
- Stopping the Contractor’s work if it is found to be defective or out of compliance with the Construction Documents.
- Performing daily construction administration and management on behalf of the Owner.
- Reviewing and approving the Contractor’s submittals, requests, invoices, and completed work.
- Observing the Contractor’s measurement of material quantities to determine appropriate payment.
- Maintaining all required project documentation that permits review by the Regulatory Agency.
- Observing and documenting that the work of the Contractor meets the technical specifications in the Construction Documents.
- Managing, scheduling, and coordinating the required CQA activities with the CQA Manager.
- Reviewing MQC and CQC test results, data, and installed work to verify compliance with the Project requirements.
- Preparing CQA Certification in coordination with CQA Manager for submittal to the Regulatory Agency.

I2.3 REGULATORY AGENCY

The Regulatory Agency has the following specific responsibilities and authorities:

- Reviewing, providing comments on, and approving the corrective action design documents submitted by (or on behalf of) the Owner including the Design Report and Construction Documents.
- Providing remedial design approval and authorization for implementing the remedial action.
- Reviewing and accepting CQA Certification at Project completion.

I2.4 DESIGN ENGINEER

The Design Engineer has the following specific responsibilities and authorities:

- Assisting the Owner with preparation of the regulatory documents.
- Preparing Construction Documents for the Project as the Engineer of Record for the Project.

- Assisting the Construction Manager in reviewing the Contractor's technical submittals during construction, especially those that are requesting deviations from the Construction Documents such as material substitutions or changes in specified methods of construction.
- Providing responses to requests for information or clarification from the Owner, Construction Manager, Contractor and Subcontractor's.
- Consulting with the Owner and Construction Manager, as required, during construction to address unforeseen or appreciably differing conditions, and any technical issue that affects the design for the Project.
- Assisting the Construction Manager in issuing Field Orders or Change in Work Directives to document and approve design modifications associated with unforeseen conditions, material/product substitutions, or Contractor and/or Subcontractor requests.

I2.5 CQA MANAGER

The CQA Manager has the following specific responsibilities and authorities:

- Implementing the CQA Plan.
- Coordinating implementation of the CQA Plan with the Construction Manager.
- Reviewing and approving the Contractor CQC Plan.
- Performing audits of CQC and CQA Plan performance.
- Reviewing CQC and CQA Plan reporting.
- Providing CQA Certification to the Regulatory Agency.

I2.6 CONTRACTOR

The Contractor has the following specific responsibilities and authorities:

- Performing daily construction administration and management.
- Communicating with the Construction Manager regularly throughout construction.
- Preparing and complying with the CQC Plan, which presents procedures for documenting compliance with construction requirements.
- Stopping the work if it is found to be defective or out of compliance with the Construction Documents.
- Maintaining all required Project documentation that permits review by the Owner, CQA Manager, Design Engineer, Construction Manager and authorized representatives of the Regulatory Agency.
- Contracting with and managing qualified Subcontractors to perform specialty work and installation.
- Observing and documenting that the work practices of the Subcontractor follow the Construction Documents.
- Managing, scheduling, and coordinating the required CQC and CQA Plan activities with the Design Engineer, CQA Manager and Construction Manager.

- Reviewing MQC and CQC Plan test results, data, and installed work to verify compliance with the project requirements.
- Submittal of all MQC and CQC Plan test results and data to the Construction Manager.
- Preparing CQA Certification in coordination with the CQA Manager, Design Engineer and Construction Manager for submittal to the Regulatory Agency.

I2.7 SUBCONTRACTOR

The Subcontractor has the following specific responsibilities and authorities:

- Communicating with the Contractor as appropriate throughout construction.
- Constructing the project in accordance with the Construction Documents including equipment and material specification.
- Informing the Contractor of changes required to the Construction Documents due to product/material substitutions or differing/unforeseen conditions.
- Documenting CQC Plan activities, measurements, test results, and inspections.

I3.0 COMMUNICATIONS AND MEETINGS

The lines of communication for the Project are shown on Figure I-2-3. The lines of communication were developed to facilitate dialogue between the respective parties leading to collaboration and resolution of design, construction, and regulatory issues.

I3.1 CHAIN OF COMMAND AND COMMUNICATION

The identified lines of communication ensure that the appropriate chain-of-command is followed to allow consistent and accurate dissemination of information and decision making. Other direct lines of communications, if requested, will be reviewed and approved by the Owner on a case by case basis.

It is expected that informal communications will occur on a daily basis during execution of the Project. Formal communications in the form of meetings and inspections will be performed at prescribed Project milestones to provide important coordination, documentation of progress, and discussion of non-conforming work and required corrective actions.

I3.2 PRE-CONSTRUCTION MEETINGS

Pre-construction meetings will be held prior to the start of VMS construction, respectively, after the associated contracts have been awarded. Each meeting will be attended by the Owner, Design Engineer, Construction Manager, CQA Manager, Contractor, and Subcontractors. A representative of ACDEH may also attend and will be notified at least one week prior to the scheduled meeting.

The pre-construction meeting provides the opportunity to introduce the individuals involved in the project and to make sure the responsibilities and authority of each individual are clearly understood. The minimum agenda will include:

- Organizational arrangement of the Contractor’s workforce and personnel, and those of subcontractors, suppliers, and the Construction Manager.
- Channels and procedures for communications.
- Sequence of critical work, such as installation of VMS membrane.
- Discussion of the Project and how it is depicted in the Construction Documents, including distribution of original documents and revisions.
- Design features, construction methods, and open discussion of potential construction problems and any other concerns.
- The proposed construction schedule.
- The role and requirements of the CQA Plan and CQC Plan prior to, during and after construction.
- Review process for submittals including shop drawings and other data.
- The submittal schedule including Design Engineer review and response time.
- Procedures for testing and potential implications of the test results.
- Procedures for documentation.
- A tour of the construction site.

I3.3 CONSTRUCTION PROGRESS AND COORDINATION MEETINGS

Once construction is started, construction progress and coordination meetings will be held weekly or as required by the Construction Manager. Construction progress and coordination meetings will be used to discuss coordination items, schedules, problems encountered in the field, existing or pending issues that may require proactive planning and response, and to, resolve outstanding issues. The meetings will be attended by the Construction Manager, CQA Manager, Contractor, and the Subcontractor. The Owner or its agents will attend when appropriate and ACDEH may attend. Contractors performing other work at the site may also attend as appropriate. Meeting dates and times will be set at the pre-construction meeting. Minutes of the meetings will be taken and distributed by the Construction Manager.

Construction progress and coordination meetings also may be held with little prior notice, if necessary, to allow discussion of immediate tasks or issues.

The meeting agenda will include:

- Review, revise as necessary, and approve minutes of previous meeting.
- Review of work progress.
- Identification of problems.
- Development of corrective measures and procedures for the identified problems.
- Other current construction business.
- Coordination of the collection of material samples and performing laboratory testing.

- Coordination and scheduling of field testing.
- Discussion of the submission of test results and reports (daily and weekly).
- Implementation of non-conformance action plans to remedy problems detected through failing tests.
- Status of CQC and CQA submittals for approval.

I4.0 VAPOR MITIGATION SYSTEM QUALITY ASSURANCE

This section presents specific CQA Plan activities associated with construction of the VMS.

I4.1 CONTRACTOR QUALIFICATION

The Contractor will provide certification of licensure to perform construction at the site and the appropriate health and safety certifications as required by local, state and federal agencies for both the Contractor and Subcontractor as appropriate.

The Contractor will provide documentation demonstrating that the Contractor or Subcontractor meets the experience and qualification requirements specified in the Construction Documents for the successful installation of the Geo-Seal® membrane and Vapor-Vent™ systems. Contractor will provide documentation that they or their Subcontractor are a manufacturer certified installer.

I4.2 SUBGRADE PREPARATION

The subgrade surface must be prepared in accordance with the Construction Documents prior to placement of Vapor-Vent™ system and Geo-Seal membrane. The Contractor will provide documentation confirming that the chemical and geotechnical properties of the subgrade meet the requirements of the Construction Documents. The laboratory testing results and permeable material certifications will be reviewed and evaluated by the Contractor and submitted to the Construction Manager, Design Engineer and CQA Manager for review and approval. The Construction Manager must inspect and approve the final prepared subgrade surface prior to Vapor-Vent system installation. The Construction Manager will provide final acceptance of the prepared subgrade before Geo-Seal membrane installation can occur.

I4.3 INSTALLATIONS

The VMS will consist of Vapor-Vent system and Geo-Seal membrane technologies. The installation of the Vapor-Vent venting system and the Geo-Seal membrane will be performed in accordance with the Construction Documents, the manufacturer's recommendations, and industry-accepted standards.

Installation of Vapor-Vent and Geo-Seal are considered specialty construction that must be completed by a Certified Installer. If necessary, the Contractor will subcontract a Certified Installer to perform the installation and associated QC testing for the Vapor-Vent venting system and Geo-Seal membrane. The Contractor will be responsible for Subcontractor performance and management.

I4.3.1 Manufacturer Quality Control

The Vapor-Vent system and Geo-Seal membrane manufacturer will provide testing data and certification from their MQC program indicating the material meets or exceeds the specified performance requirements. The testing data and associated certification will be submitted by the Contractor to the Construction Manager, Design Engineer and CQA Manager for review and approval prior to delivery of the material to the site. The MQC testing data and certifications must be for material from the same lot or production run as the material designated for the Project. The required testing data to be included on the MQC certifications for each material are described in the technical specifications for Vapor-Vent and Geo-Seal, which are part of the Construction Documents.

I4.3.2 Handling and Storage

The Contractor will inform, and coordinate with the Construction Manager of the delivery schedule for the Vapor-Vent and Geo-Seal material and related equipment. Upon delivery, the Contractor will inspect the materials and confirm they are in accordance with the Specifications before accepting the materials for delivery. Damaged materials not meeting the specifications will be segregated and tagged for repair or replacement.

The storage and handling of Vapor-Vent and Geo-Seal materials will be the responsibility of the Contractor. Storage and handling will follow guidelines set forth in the Construction Documents, including ensuring that materials are stored in a clean, dry, and protected location and within the temperature range required by the manufacturer. The Contractor will provide the Construction Manager and CQA Manager documentation that the Vapor-Vent and Geo-Seal® materials were inspected and delivered in accordance with the Specifications.

I4.3.3 Vapor-Vent and Vent Risers Construction Quality Control Inspection

The Contractor will inspect the installed Vapor-Vent and associated vent risers to ensure the installation is in accordance with Construction Documents. The inspection will include the following:

- Condition of the trench bottom prior to placement of Vapor-Vent bedding.
- Thickness of the Vapor-Vent bedding.
- Line and grade (horizontal and vertical alignment) of the installed Vapor-Vent™.
- Location of slab penetrations in accordance with the Construction Documents.
- Jointing of the Vapor-Vent.
- Adequacy (material, depth, and width) of haunching and initial backfill of Vapor-Vent bedding.

- Measuring setbacks and clearances for roof vents.

The Contractor will also complete an as-built survey location of the Vapor-Vent, including horizontal location, pipe invert, and slab penetrations.

Inspections will be documented by the Contractor, verified by the Construction Manager and submitted to the CQA Manager for review and approval. The inspections will also be included in a final Vapor-Vent and Vent Riser Construction Certification Report for submittal to and approval by the CQA Manager.

I4.3.4 Geo-Seal Construction Quality Control Testing and Inspection

The Contractor will implement the manufacturer’s QC procedures for field QC testing and inspection of the installed Geo-Seal membrane. The manufacturer’s QC procedures are presented in the Geo-Seal specifications within the Construction Documents. The Geo-Seal Specifications identifies each classification of testing and testing frequency, and summarizes the specific testing requirements.

Inspection of the installed Geo-Seal membrane will be performed to identify nonconforming areas that require repair or replacement. A manufacturer’s representative or manufacturer certified third party inspector will be present during QC testing to verify the Geo-Seal membrane has been installed per the manufacturer’s specifications and the Construction Documents. Installed material not meeting the manufacturer or Construction Document requirements will be repaired or removed and replaced by the Contractor and retested accordingly. The Contractor is responsible for scheduling the manufacturer or certified inspector for field QC testing of the membrane. Field QC testing will also be witnessed by the Construction Manager and upon request by the CQA Manager.

The Contractor will document all of the Geo-Seal® field QC test results, verifications, and inspections in a final Geo-Seal® Construction Certification Report for submittal to and approval by the CQA Manager.

I4.3.5 Conformance Quality Assurance Testing and Inspection

The Contractor will observe the installation of Vapor-Vent and inspect the completed work at prescribed intervals, including the following:

- The excavated trench bottom.
- The installed Vapor-Vent prior to backfilling.
- The installed Vapor-Vent bedding/cover.
- The installed Vapor-Vent vent riser slab penetrations.

The Contractor will inspect the completed work at prescribed intervals including the following:

- At each floor elevation.
- At each roof penetration.

Field inspection reports will be submitted to the Construction Manager and CQA Manager for review and approval no later than 24 hours after the inspection.

The Contractor will inspect and verify that permeable layer material thickness, Vapor-Vent layout and placement within the permeable material layer, and vent riser penetration locations are in accordance with Construction Documents.

During vertical construction of the vent risers, the Contractor will inspect the installation the risers and verify their construction within the designated party walls and per Construction Documents.

Field QC inspections will be conducted by the CQA Manager at selected intervals during the installation of the system.

I4.4 REPAIRS

The installed VMS including Vapor-Vent and Geo-Seal will be periodically inspected by the Construction Manager for damage or non-conforming installations. Areas identified by the Construction Manager as nonconforming will be repaired or replaced by the Contractor in accordance with the manufacturers' specifications or the Construction Documents until approved by the Construction Manager.

I4.5 INSTALLATION ACCEPTANCE

The Design Engineer will review the Contractor as-built drawings, the Vapor-Vent and Vent Riser Construction Certification Report, and the Geo-Seal Construction Certification Report at the end of the Project to confirm the Vapor-Vent system and Geo-Seal membrane installations were in accordance with the Construction Documents and the CQA and CQC Plans.

I5.0 NON-CONFORMANCE ACTION PLAN

Non-conforming materials or work are defined as material provided or work completed that does not comply with the requirements/specifications of the Construction Documents.

I5.1 NON-CONFORMANCE IDENTIFICATION AND REPORTING

When either of the following two conditions exist, a Non-Conformance Action Plan should be initiated:

- Repeated attempts to construct a component of the work yields a non-conforming product as documented by CQC testing and/or inspection and documentation by the CQC Team.

- CQA monitoring, inspection, or testing verifies that materials or completed work do not meet the minimum requirements specified for the Project.

I5.2 NON-CONFORMANCE ACTION PLAN

In general, the Non-Conformance Action Plan consists of the following:

- Define the problem.
- Verify that the testing or observations which identify the problem are accurate.
- Define extent of the non-conformance using the available test information or by completing additional tests.
- Resolve the problem through additional work, re-work, or material replacement to the limits of the non-conforming area.

The first step identifies a potential problem found by inspection, and then testing further defines the problem. The second step is to verify that the original result is representative of the construction materials or in-place conditions. Test results that are not in compliance with the Construction Documents could be caused by a problem with sampling, instrument calibration, or laboratory testing errors. For in-place field testing, two additional tests will be taken within a few feet of the failed test location to verify that the test result is correct. When verification testing shows that the initial result seems to be in error, the initial result can be considered an outlier, and documented as such. If the original test result is verified, then additional testing may be conducted to define the limits of the area that is in non-conformance. Repairs or replacement will then be made to the area that is in non-conformance. Results of all testing (non-conformance, verification, and final acceptance) will be reported to the CQA Manager.

I5.3 CORRECTIVE ACTION ACCEPTANCE

A corrective action that is implemented must be confirmed successful through supporting verification testing and/or inspection/measurement. Reported non-conformances must be remedied by accepted corrective actions reviewed and approved by the CQA Manager.

I6.0 DOCUMENTATION

The Project is not considered complete until the Owner grants the Contractor Final Completion and the Construction Completion Report documenting performance of the Project is approved by the regulator.

I6.1 FINAL COMPLETION

A final inspection of the site is required to confirm Final Completion of the contractual requirements between the Contractor and the Owner. Upon notice from the Contractor that the Project is complete, the Owner, the Contractor, Design Engineer and the Construction Manager will visit the site and inspect the Project. A punch list of incomplete work items will be developed for the Contractor to complete prior to Owner granting Final Completion.

I6.2 CONSTRUCTION COMPLETION REPORT

After the Owner and Construction Manager grant Final Completion status to the Contractor, the Contractor will complete and submit all record documents for the Project to the Owner and Design Engineer. The Contractor will prepare the Construction Completion Report for review and approval by the Owner, Design Engineer and CQA Manager. The report will include the following:

- A description of the work.
- A chronology of the VMS installation.
- Photographic documentation, showing significant stages of construction.
- Record Documents.
- A statement, bearing the seal and signature of the CQA Manager and Design Engineer, certifying that the completed Project conforms to the Construction Documents including this CQA Plan.

The certified Construction Completion Report will be submitted to the ACDEH for review and approval.

I6.3 RECORD DOCUMENTS

Record documents will include field changes, change orders, test reports, material certification documents, Record Drawings, and other documents necessary to accurately define the actual constructed work. The Record Documents will be submitted by the Contractor to the Owner and Design Engineer upon completion of construction. This documentation will also be used in the preparation of the Construction Completion Report for submission to the regulator as described above.

I6.4 STORAGE AND RETENTION

All record documents will be maintained by the Owner and Design Engineer in accordance with the required legal statutes.

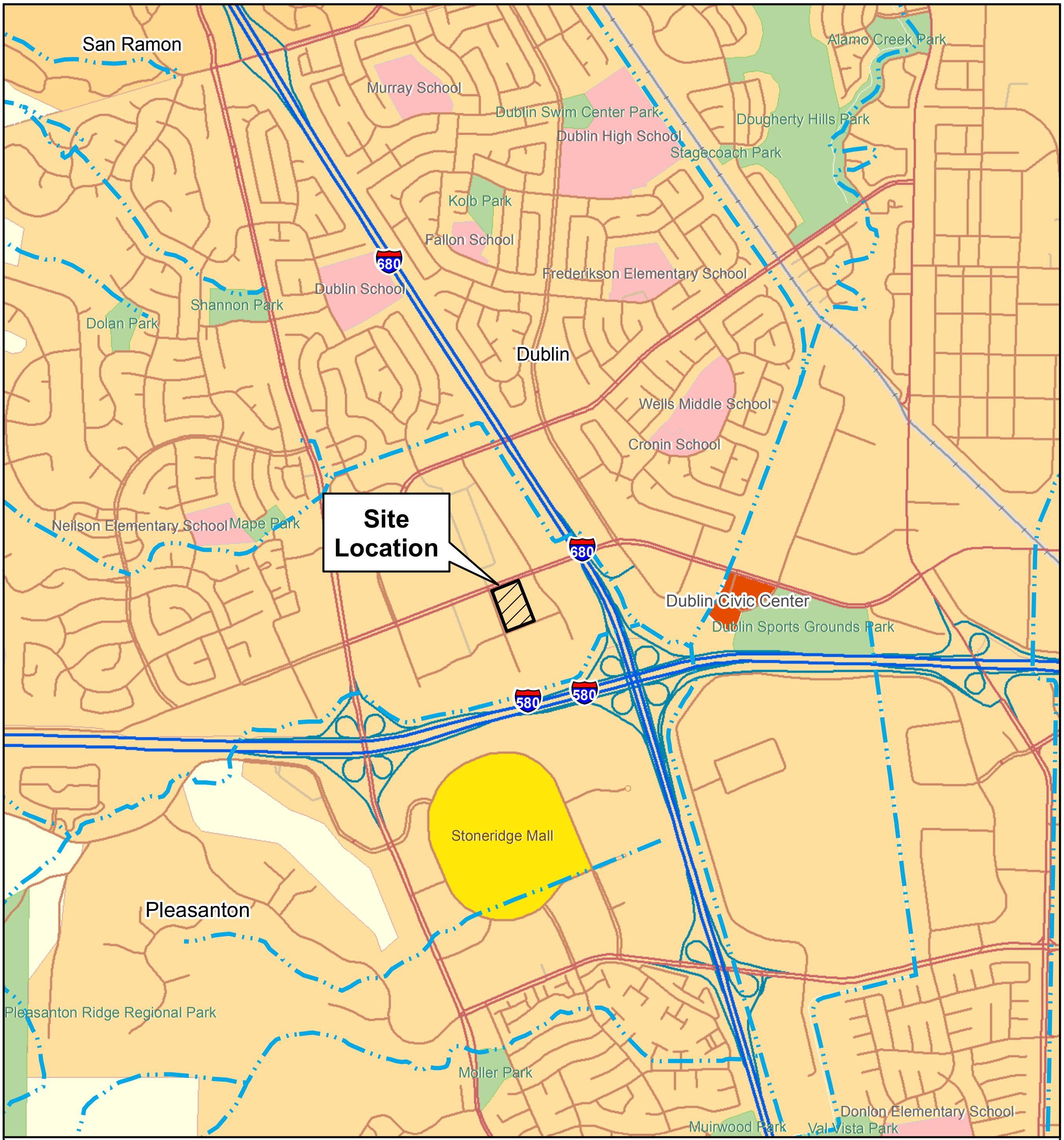
I7.0 REFERENCES

Alameda County Health Care Services Agency, 2013. Fuel Leak Case No. RO0003014 and GeoTracker Global ID T00000001616, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin, California, 94568, August 16.

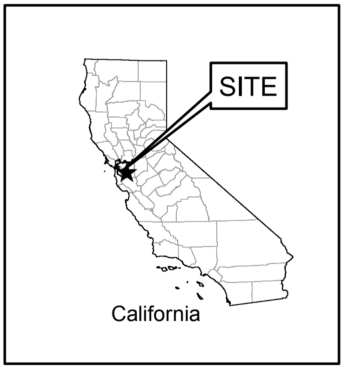
AMEC Environment & Infrastructure, Inc. (AMEC), 2014a. Final Feasibility Study and Corrective Action Plan, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin, California, Fuel Leak Case No. RO003014, May 1.

Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler), 2015. Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin California, March 19.

FIGURES



Street map from ESRI, 2007.



SITE LOCATION MAP
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 06/01/2015

Project No. OD14170800

amec foster wheeler

Figure
I-2-1

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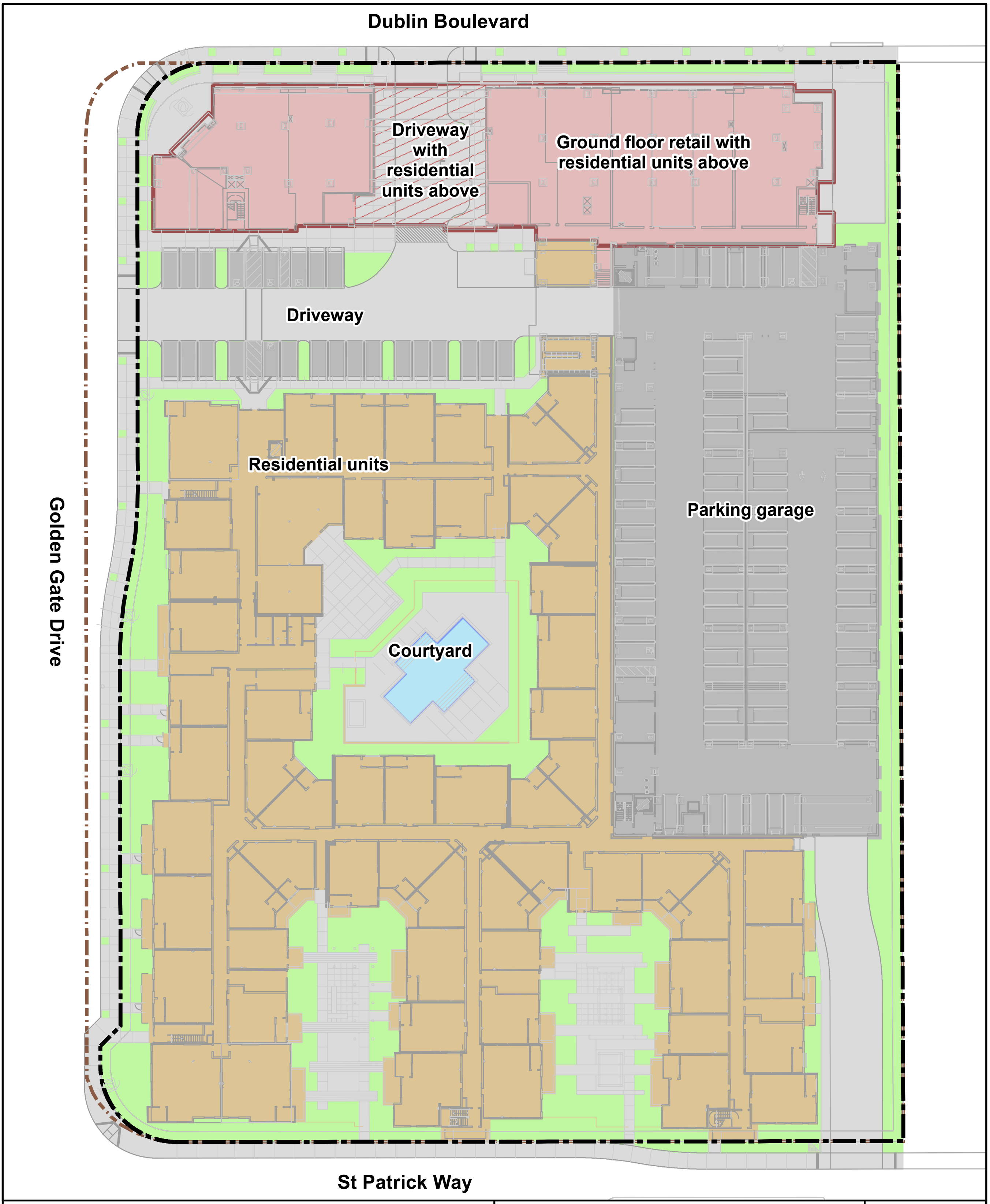

SITE PLAN WITH PLANNED
NEW CONSTRUCTION
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 06/01/2015

Project No. OD14170800

amec
foster
wheeler

Figure
I-2-2

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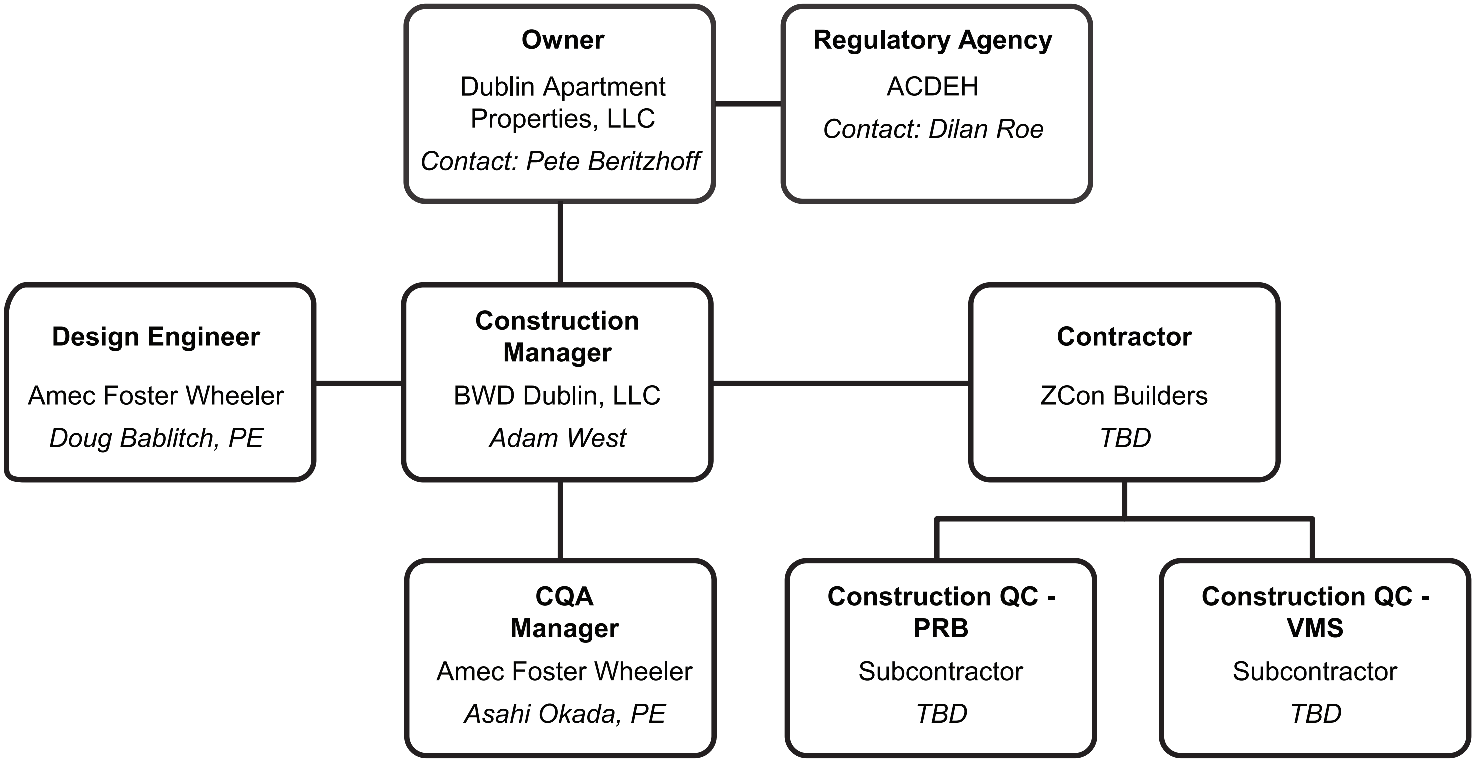

Abbreviations

ACDEH = Alameda County Department of Environmental Health
CQA = Construction Quality Assurance
PRB = Permeable Reactive Barrier
QC = Quality Control
TBD = To Be Determined
VMS = Vapor Mitigation System

QUALITY PROGRAM
ORGANIZATIONAL CHART
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 06/01/2015 | Project No. OD14170800

amec foster wheeler

Figure
I-2-3

Construction Quality Assurance Plan
Permeable Reactive Barrier

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

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APPENDIX I-1

CONSTRUCTION QUALITY ASSURANCE PLAN
PERMEABLE REACTIVE BARRIER
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

I1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (“Amec Foster Wheeler”) on behalf of Bay West Development Dublin, LLC (“BWD Dublin”) has prepared this Construction Quality Assurance (CQA) Plan for construction of the permeable reactive barrier (PRB) portion of the approved remedy at the Former Crown Chevrolet facility, located in Dublin, California (the “site”; Figure I-1-1). The CQA Plan describes quality assurance activities that will be performed by the CQA Manager before and during construction to insure that the project fulfills the requirements for quality presented in the Construction Documents.

The site is bound by Dublin Boulevard to the north, Golden Gate Drive to the west, St. Patrick Way to the south and retail businesses to the east, as shown on Figure I-1-2. The site is a rectangular-shaped parcel with plan dimensions of approximately 400 feet by 550 feet.

The primary elements of the approved remedy consists of installation of a vapor mitigation system (VMS) and a PRB. The scope of this document includes quality assurance for construction of the PRB only (the “Project”). Quality assurance for construction of the VMS is addressed in a separate document. CQA requirements for other construction activities at the site are not included in the scope of this document.

I1.1 BACKGROUND

The site was developed in 1968 as a car dealership called Crown Chevrolet Cadillac Isuzu that included an auto body repair shop. Operations as a car dealership and auto body repair shop occurred from 1968 until 2014. Site remedial activities were performed between 2011 and 2015 and included removal of contaminated soil, underground storage tanks (USTs), utilities, and subsurface features from the northern area of the site. From December 2014 through March 2015 select redevelopment activities were completed, including demolition of buildings, foundations, and hardscapes. The site is currently in the process of being redeveloped into a mixed use commercial/residential apartment complex. Additional site background information is presented within the *Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report* (“Design Report;” Amec Foster Wheeler, 2015).

I1.2 PURPOSE

This CQA Plan has been prepared to meet the quality assurance requirements set forth in the following Project documents:

- Construction Documents.
- An August 16, 2013 Letter from the Alameda County Environmental Health ("ACDEH Letter;" ACDEH, 2013).
- The *Final Feasibility Study and Corrective Action Plan* (AMEC, 2014), and
- The Design Report.

The CQA Plan presents the quality assurance activities that will be performed by the CQA Manager before and during construction of the Project to insure that the Project fulfills the requirements for quality presented in the documents listed above. Although the design and construction of the PRB are part of a larger commercial/residential development project, the scope of this CQA Plan only addresses requirements specific to the PRB.

The Project Construction Documents have been prepared to meet the requirements of the Corrective Action Objectives (CAOs) and functional objectives, which were developed to mitigate risks associated with contaminated groundwater and soil vapor. The CAOs and functional objectives are presented in the Design Report and the ACDEH Letter.

I1.3 DEFINITIONS

For the purpose of this CQA Plan, the following definitions will apply.

I1.3.1 Construction Quality Management Program

The Construction Quality Management Program (CQMP) is comprised of the CQA Plan and the Construction Quality Control (CQC) Plan. The CQMP defines the roles, responsibilities, and procedures required of the parties involved before, during and after construction of the PRB to ensure that the work is performed in accordance with the design intent and requirements of the Construction Documents.

I1.3.2 Construction Quality Assurance Plan

The CQA Plan has been prepared by the Engineer and will be implemented by the CQA Manager. The CQA Plan presents a planned system of quality assurance activities that will provide the Owner and the Regulator assurances that the construction meets the requirements of the Construction Documents. These requirements include qualifications and experience necessary for contractors and inspectors involved in the construction of the PRB, as well as performance criteria for construction monitoring and documentation, construction inspections, and as-built documentation.

I1.3.3 Construction Quality Control Plan

The CQC Plan is prepared and implemented by the Contractor. The CQC Plan is a planned system of inspections and tests to monitor and verify that construction workmanship is meeting the requirements of the Construction Documents for the Project. The inspections and tests are performed by the Contractor and associated subcontractors throughout construction, as required, to confirm the final constructed product is compliant with the Construction Documents.

I1.3.4 Manufacturer Quality Control

The Manufacturer Quality Control (MQC) program is a planned system of monitoring, inspecting, and testing performed by the manufacturer of construction materials to ensure that the manufactured product meets the required specified values.

I1.3.5 Owner

The Owner is the party with whom the Owner’s Representative has entered into an agreement and for whom the Project work is to be provided. The Owner coordinates with the Regulatory Agency and makes decisions related to the design and construction of the Project, in consultation with the Design Engineer. The Owner is Dublin Apartment Properties, LLC.

I1.3.6 Construction Manager

The Construction Manager is the Owner’s Representative who oversees construction activities. The Construction Manager is BWD Dublin, LLC.

I1.3.7 Regulatory Agency

ACDEH is the regulatory agency that reviews and approves the Design Report, Construction Documents and the Construction Completion Report.

I1.3.8 Design Engineer

The Design Engineer is the Engineer of record for the firm responsible for the completed Project Construction Documents. Amec Foster Wheeler is the firm responsible for the completed Construction Documents. For clarity, the designation “PRB Engineer” has been used within the Construction Documents to differentiate between other engineering and/or architectural entities that have contributed to the overall BWD Dublin Apartments design and associated construction documents.

I1.3.9 CQA Manager

The CQA Manager is responsible for performance of the quality assurance activities identified in the CQA Plan. A professional engineer from Amec Foster Wheeler will be the CQA Manager for the Project.

I1.3.10 Contractor

The Contractor is the party that is hired by the Owner to provide the completed Project. ZCon Builders of Oakland, California, is the Contractor responsible for providing the Project in accordance with the Construction Documents and the Contractor's CQC Plan.

I1.3.11 Subcontractor

A Subcontractor is the party with whom the Contractor has entered into an agreement to provide some or all of the construction work described in the Construction Documents. No Subcontractors have been identified for the Project. Subcontractors for construction of the Project will have to meet the minimum requirements for qualifications and experience described in this CQA plan and within the Construction Documents. The Contractor will be responsible for Subcontractor performance and management.

I1.3.12 Construction Documents

The documents prepared by the Design Engineer on behalf of the Owner for the purpose of conveying the Project to the Contractor. The construction documents include the construction specifications and construction drawings for the PRB only and provide a description of the work and the technical construction requirements.

I2.0 RESPONSIBILITIES AND AUTHORITY

The CQMP includes the parties shown on the Quality Program Organizational Chart (Figure I-1-3). The associated responsibilities and authority for each party are described in the following sections.

I2.1 OWNER

The Owner makes the decisions on the Project and selects all associated parties (with the exception of the regulatory agency) to assist them in the execution of the work associated with the Project. Specific responsibilities and authorities include:

- Selecting the Construction Manager.
- Selecting the Design Engineer.
- Stopping the Contractor's work if it is found to be defective or out of compliance with the Construction Documents.
- Approving changes to the Construction Documents including all Addenda, Change in Work Directives/Field Orders, and Change Orders.
- Providing final documentation to the Regulatory Agency to support construction certification.
- Communicating with the Regulatory Agency, the Design Engineer and Construction Manager throughout design, construction, and certification.
- Construction Manager and CQA Manager invoice management and payment.

I2.2 CONSTRUCTION MANAGER

The Construction Manager has the following specific responsibilities and authorities:

- Manages and represents the interests of the Owner during construction.
- Retains the Contractor under contract to provide the Project.
- Contractor invoice management and payment.
- Communicating with the Owner, Contractor, and Subcontractor regularly throughout construction.
- Stopping the Contractor’s work if it is found to be defective or out of compliance with the Construction Documents.
- Performing daily construction administration and management on behalf of the Owner.
- Reviewing and approving the Contractor’s submittals, requests, invoices, and completed work.
- Observing the Contractor’s measurement of material quantities to determine appropriate payment.
- Maintaining all required project documentation that permits review by the Regulatory Agency.
- Observing and documenting that the work of the Contractor meets the technical specifications in the Construction Documents.
- Managing, scheduling, and coordinating the required CQA activities with the CQA Manager.
- Reviewing MQC and CQC test results, data, and installed work to verify compliance with the Project requirements.
- Preparing CQA Certification in coordination with CQA Manager for submittal to the Regulatory Agency.

I2.3 REGULATORY AGENCY

The Regulatory Agency has the following specific responsibilities and authorities:

- Reviewing, providing comments on, and approving the corrective action design documents submitted by (or on behalf of) the Owner including the Design Report and Construction Documents.
- Providing remedial design approval and authorization for implementing the remedial action.
- Reviewing and accepting CQA Certification at Project completion.

I2.4 DESIGN ENGINEER

The Design Engineer has the following specific responsibilities and authorities:

- Assisting the Owner with preparation of the regulatory documents.
- Preparing Construction Documents for the Project as the Engineer of Record for the Project.

- Assisting the Construction Manager in reviewing the Contractor's technical submittals during construction, especially those that are requesting deviations from the Construction Documents such as material substitutions or changes in specified methods of construction.
- Providing responses to requests for information or clarification from the Owner, Construction Manager, Contractor and Subcontractor's.
- Consulting with the Owner and Construction Manager, as required, during construction to address unforeseen or appreciably differing conditions, and any technical issue that affects the design for the Project.
- Assisting the Construction Manager in issuing Field Orders or Change in Work Directives to document and approve design modifications associated with unforeseen conditions, material/product substitutions, or Contractor and/or Subcontractor requests.

I2.5 CQA MANAGER

The CQA Manager has the following specific responsibilities and authorities:

- Implementing the CQA Plan.
- Coordinating implementation of the CQA Plan with the Construction Manager.
- Reviewing and approving the Contractor CQC Plan.
- Performing audits of CQC and CQA Plan performance.
- Reviewing CQC and CQA Plan reporting.
- Providing CQA Certification to the Regulatory Agency.

I2.6 CONTRACTOR

The Contractor has the following specific responsibilities and authorities:

- Performing daily construction administration and management.
- Communicating with the Construction Manager regularly throughout construction.
- Preparing and complying with the CQC Plan, which presents procedures for documenting compliance with construction requirements.
- Stopping the work if it is found to be defective or out of compliance with the Construction Documents.
- Maintaining all required Project documentation that permits review by the Owner, CQA Manager, Design Engineer, Construction Manager and authorized representatives of the Regulatory Agency.
- Contracting with and managing qualified Subcontractors to perform specialty work and installation.
- Observing and documenting that the work practices of the Subcontractor follow the Construction Documents.
- Managing, scheduling, and coordinating the required CQC and CQA Plan activities with the Design Engineer, CQA Manager and Construction Manager.

- Reviewing MQC and CQC Plan test results, data, and installed work to verify compliance with the project requirements.
- Submittal of all MQC and CQC Plan test results and data to the Construction Manager.
- Preparing CQA Certification in coordination with the CQA Manager, Design Engineer and Construction Manager for submittal to the Regulatory Agency.

I2.7 SUBCONTRACTOR

The Subcontractor has the following specific responsibilities and authorities:

- Communicating with the Contractor as appropriate throughout construction.
- Constructing the project in accordance with the Construction Documents including equipment and material specification.
- Informing the Contractor of changes required to the Construction Documents due to product/material substitutions or differing/unforeseen conditions.
- Documenting CQC Plan activities, measurements, test results, and inspections.

I3.0 COMMUNICATIONS AND MEETINGS

The lines of communication for the Project are shown on Figure I-1-3. The lines of communication were developed to facilitate dialogue between the respective parties leading to collaboration and resolution of design, construction, and regulatory issues.

I3.1 CHAIN OF COMMAND AND COMMUNICATION

The identified lines of communication ensure that the appropriate chain-of-command is followed to allow consistent and accurate dissemination of information and decision making. Other direct lines of communications, if requested, will be reviewed and approved by the Owner on a case by case basis.

It is expected that informal communications will occur on a daily basis during execution of the Project. Formal communications in the form of meetings and inspections will be performed at prescribed Project milestones to provide important coordination, documentation of progress, and discussion of non-conforming work and required corrective actions.

I3.2 PRE-CONSTRUCTION MEETINGS

Pre-construction meetings will be held prior to the start of PRB construction, respectively, after the associated contracts have been awarded. Each meeting will be attended by the Owner, Design Engineer, Construction Manager, CQA Manager, Contractor, and Subcontractors. A representative of ACDEH may also attend and will be notified at least one week prior to the scheduled meeting.

The pre-construction meeting provides the opportunity to introduce the individuals involved in the project and to make sure the responsibilities and authority of each individual are clearly understood. The minimum agenda will include:

- Organizational arrangement of the Contractor’s workforce and personnel, and those of subcontractors, suppliers, and the Construction Manager.
- Channels and procedures for communications.
- Sequence of critical work, such as installation of PRB Media.
- Discussion of the Project and how it is depicted in the Construction Documents, including distribution of original documents and revisions.
- Design features, construction methods, and open discussion of potential construction problems and any other concerns.
- The proposed construction schedule.
- The role and requirements of the CQA Plan and CQC Plan prior to, during and after construction.
- Review process for submittals including shop drawings and other data.
- The submittal schedule including Design Engineer review and response time.
- Procedures for testing and potential implications of the test results.
- Procedures for documentation.
- A tour of the construction site.

I3.3 CONSTRUCTION PROGRESS AND COORDINATION MEETINGS

Once construction is started, construction progress and coordination meetings will be held weekly or as required by the Construction Manager. Construction progress and coordination meetings will be used to discuss coordination items, schedules, problems encountered in the field, existing or pending issues that may require proactive planning and response, and to, resolve outstanding issues. The meetings will be attended by the Construction Manager, CQA Manager, Contractor, and the Subcontractor. The Owner or its agents will attend when appropriate and ACDEH may attend. Contractors performing other work at the site may also attend as appropriate. Meeting dates and times will be set at the pre-construction meeting. Minutes of the meetings will be taken and distributed by the Construction Manager.

Construction progress and coordination meetings also may be held with little prior notice, if necessary, to allow discussion of immediate tasks or issues.

The meeting agenda will include:

- Review, revise as necessary, and approve minutes of previous meeting.
- Review of work progress.
- Identification of problems.
- Development of corrective measures and procedures for the identified problems.
- Other current construction business.
- Coordination of the collection of material samples and performing laboratory testing.

- Coordination and scheduling of field testing.
- Discussion of the submission of test results and reports (daily and weekly).
- Implementation of non-conformance action plans to remedy problems detected through failing tests.
- Status of CQC and CQA submittals for approval.

I4.0 PERMEABLE REACTIVE BARRIER QUALITY ASSURANCE

This section presents specific CQA Plan activities associated with construction of the PRB.

I4.1 CONTRACTOR QUALIFICATION

The Contractor will provide certification of licensure to perform construction at the site and the appropriate health and safety certifications as required by local, state and federal agencies for both the Contractor and Subcontractor as appropriate.

The Contractor will provide documentation demonstrating that the Contractor or Subcontractor meets the experience and qualification requirements specified in the Construction Documents for the successful installation of a PRB.

I4.2 SITE PREPARATION

The Construction Manager will confirm that the Contractor has prepared the site in accordance with the Contractor's PRB Construction Plan submittal, the Contractor's PRB Trench Construction Layout (Layout) and the Construction Documents. Site preparation includes designating the following areas prior to receipt and placement of materials and arrival of equipment:

- The mixing area.
- Slurry preparation areas.
- Spoil stockpile areas.
- Equipment location areas.

I4.3 INSTALLATION

The Contractor will submit to the Construction Manager, CQA Manager, and Design Engineer for review and approval a PRB Construction Plan prior to installation. The PRB Construction Plan will be prepared in accordance with the Specifications and will include a description of the following:

- PRB construction methods and sequencing.
- Biopolymer slurry preparation.
- Estimated quantity of liquid and solid spoils.
- Means of demonstrating that no permanent decrease in hydraulic conductivity of the aquifer has occurred from PRB installation using the biopolymer slurry trench method including the minimum field tests specified in this Section. Include the test

methods, approximate number of sample locations and proposed sequence of testing.

- Anticipated construction schedule.
- Survey control plan to control and document PRB placement.

During installation the CQA Manager will inspect and approve the following installation equipment and monitoring parameters at the frequencies specified:

- On-board weighing system (e.g. bucket scales) or other method to verify weight/volume of media mix.
- Volume of media emplacement a minimum of every 25 linear feet.
- Depth and width of the excavation every 25 feet.

The CQA Manager will alert the Construction Manager if the PRB installation monitoring results are not in accordance with the Construction Documents.

I4.3.1 MATERIAL QUALITY ASSURANCE

Materials used in the installation of the PRB will include biopolymer slurry, slurry breaking agents and a PRB media mix of sand and granular zero valent iron (ZVI; collectively called “PRB Media”).

The Contractor will select a biopolymer and breaking agent that meets the specified project performance standards. The Contractor will submit the following materials to the CQA Manager and Design Engineer for review and approval prior to construction:

- Manufacturer specifications and engineering data for both the biopolymer slurry and breaking agent.
- The results of a biopolymer slurry stability and compatibility test to confirm the biopolymer slurry mix is compatible with the site’s water chemistry and will be stable during PRB construction.
- Evidence of the successful use of the selected biopolymer slurry and breaking agent on past ZVI PRB projects including past test results and documentation/tests that the biopolymer slurry and breaking agent have been used in previous ZVI installations with no impact to ZVI reactivity or permeability.
- Details of the proposed biopolymer slurry and breaking agent ZVI compatibility testing will be submitted for review and approval prior to the tests being conducted.

The PRB media mix will be comprised of ZVI and sand as specified in the Construction Documents. The Contractor will submit the PRB Media mix design to the CQA Manager and Design Engineer for review and approval prior to construction:

- Certification that the sand is provided from a virgin source and is free of contamination.
- Sand and ZVI grain size analysis results on representative samples proposed for the mix design.

- PRB permeability and porosity tests.

I4.3.2 HANDLING AND STORAGE

The Contractor will inform, and coordinate with the Construction Manager of the PRB Media materials and related equipment delivery schedule. Upon delivery, the Contractor will inspect the materials and confirm they are in accordance with the Specifications before accepting the materials for delivery. Damaged materials not meeting the specifications will be segregated and tagged for return and replacement.

The storage and handling of PRB Media materials will be the responsibility of the Contractor. Storage and handling will follow guidelines set forth in the Construction Documents, including ensuring that materials are stored in a clean, dry, and protected location and within the temperature range required by the manufacturer. The Contractor will provide documentation to the Construction Manager and CQA Manager that the PRB Media materials were inspected and delivered in accordance with the Specifications.

I4.3.3 PERFORMANCE QUALITY ASSURANCE

The Contractor will submit to the CQA Manager and Design Engineer for review and approval the following performance quality assurance plans, calculations and warranty:

- Calculations performed by a State of California licensed geotechnical engineer demonstrating that the stability of the trench excavation will be maintained during all phases of construction using the Contractor’s proposed biopolymer slurry.
- A PRB Demonstration Plan identifying procedures and field test methods to demonstrate that no permanent decrease in hydraulic conductivity of the aquifer has occurred from construction of the PRB.
- Warranty that there will be no permanent decrease in the hydraulic conductivity associated with the biopolymer construction of the PRB and that there will be no differential settlement within a 1-year period of completion of the PRB.

I4.4 CONSTRUCTION QUALITY CONTROL TESTING AND INSPECTION

The Contractor will submit for the Design Engineers review and approval a CQC Plan for installation of the PRB. The CQC Plan will include a survey control plan, a materials installation quality control plan and an installation verification plan. The CQC will also include all personnel and inspection procedures to be implemented by the Contractor for the specified work.

The Contractor will submit QC records including testing, measurements, observations and inspections to the CQA Manager for review at the end of each workday. The CQA Manager will also maintain daily installation logs including:

- Project name/date.
- Installation equipment used.

- Activities performed during the day (including linear distance of PRB installed, as applicable).
- Records and photographs documenting unusual phenomena or changes in soil conditions.
- Quantities of PRB Media, biopolymer slurry and breaking agent.
- All QC monitoring and testing forms and results.
- Quantity of spoils generated per day.
- Deficiencies noted and how corrected.
- Accidents and safety-related incidents.

A sample form to record PRB Media mix testing by magnetic separation is included as Attachment I-1 and a sample form to record PRB Media installation volume is included as Attachment I-2.

I4.5 INSTALLATION ACCEPTANCE

The CQA Manager and Design Engineer will review the Construction Completion Report (including the Record Drawings) at the end of the Project to confirm the PRB installation was in accordance with the Construction Documents and the CQA and CQC Plans.

I5.0 NON-CONFORMANCE ACTION PLAN

Non-conforming materials or work are defined as material provided or work completed that does not comply with the requirements/specifications of the Construction Documents.

I5.1 NON-CONFORMANCE IDENTIFICATION AND REPORTING

When either of the following two conditions exist, a Non-Conformance Action Plan should be initiated:

- Repeated attempts to construct a component of the work yields a non-conforming product as documented by CQC testing and/or inspection and documentation by the CQC Team.
- CQA monitoring, inspection, or testing verifies that materials or completed work do not meet the minimum requirements specified for the Project.

I5.2 NON-CONFORMANCE ACTION PLAN

In general, the Non-Conformance Action Plan consists of the following:

- Define the problem.
- Verify that the testing or observations which identify the problem are accurate.
- Define extent of the non-conformance using the available test information or by completing additional tests.
- Resolve the problem through additional work, re-work, or material replacement to the limits of the non-conforming area.

The first step identifies a potential problem found by inspection, and then testing further defines the problem. The second step is to verify that the original result is representative of the construction materials or in-place conditions. Test results that are not in compliance with the Construction Documents could be caused by a problem with sampling, instrument calibration, or laboratory testing errors. For in-place field testing, two additional tests will be taken within a few feet of the failed test location to verify that the test result is correct. When verification testing shows that the initial result seems to be in error, the initial result can be considered an outlier, and documented as such. If the original test result is verified, then additional testing may be conducted to define the limits of the area that is in non-conformance. Repairs or replacement will then be made to the area that is in non-conformance. Results of all testing (non-conformance, verification, and final acceptance) will be reported to the CQA Manager.

I5.3 CORRECTIVE ACTION ACCEPTANCE

A corrective action that is implemented must be confirmed successful through supporting verification testing and/or inspection/measurement. Reported non-conformances must be remedied by accepted corrective actions reviewed and approved by the CQA Manager.

I6.0 DOCUMENTATION

The Project is not considered complete until the Owner grants the Contractor Final Completion and the Construction Completion Report documenting performance of the Project is approved by the regulator.

I6.1 FINAL COMPLETION

A final inspection of the site is required to confirm Final Completion of the contractual requirements between the Contractor and the Owner. Upon notice from the Contractor that the Project is complete, the Owner, the Contractor, Design Engineer and the Construction Manager will visit the site and inspect the Project. A punch list of incomplete work items will be developed for the Contractor to complete prior to Owner granting Final Completion.

I6.2 CONSTRUCTION COMPLETION REPORT

After the Owner and Construction Manager grant Final Completion status to the Contractor, the Contractor will complete and submit all record documents for the Project to the Owner and Design Engineer. The Contractor will prepare the Construction Completion Report for review and approval by the Owner, Design Engineer and CQA Manager. The report will include the following:

- A description of the work.
- A chronology of the PRB installation.
- Photographic documentation, showing significant stages of construction.
- Record Documents.

- A statement, bearing the seal and signature of the CQA Manager and Design Engineer, certifying that the completed Project conforms to the Construction Documents including this CQA Plan.

The certified Construction Completion Report will be submitted to the ACDEH for review and approval.

I6.3 RECORD DOCUMENTS

Record documents will include field changes, change orders, test reports, material certification documents, Record Drawings, and other documents necessary to accurately define the actual constructed work. The Record Documents will be submitted by the Contractor to the Owner and Design Engineer upon completion of construction. This documentation will also be used in the preparation of the Construction Completion Report for submission to the regulator as described above.

I6.4 STORAGE AND RETENTION

All record documents will be maintained by the Owner and Design Engineer in accordance with the required legal statutes.

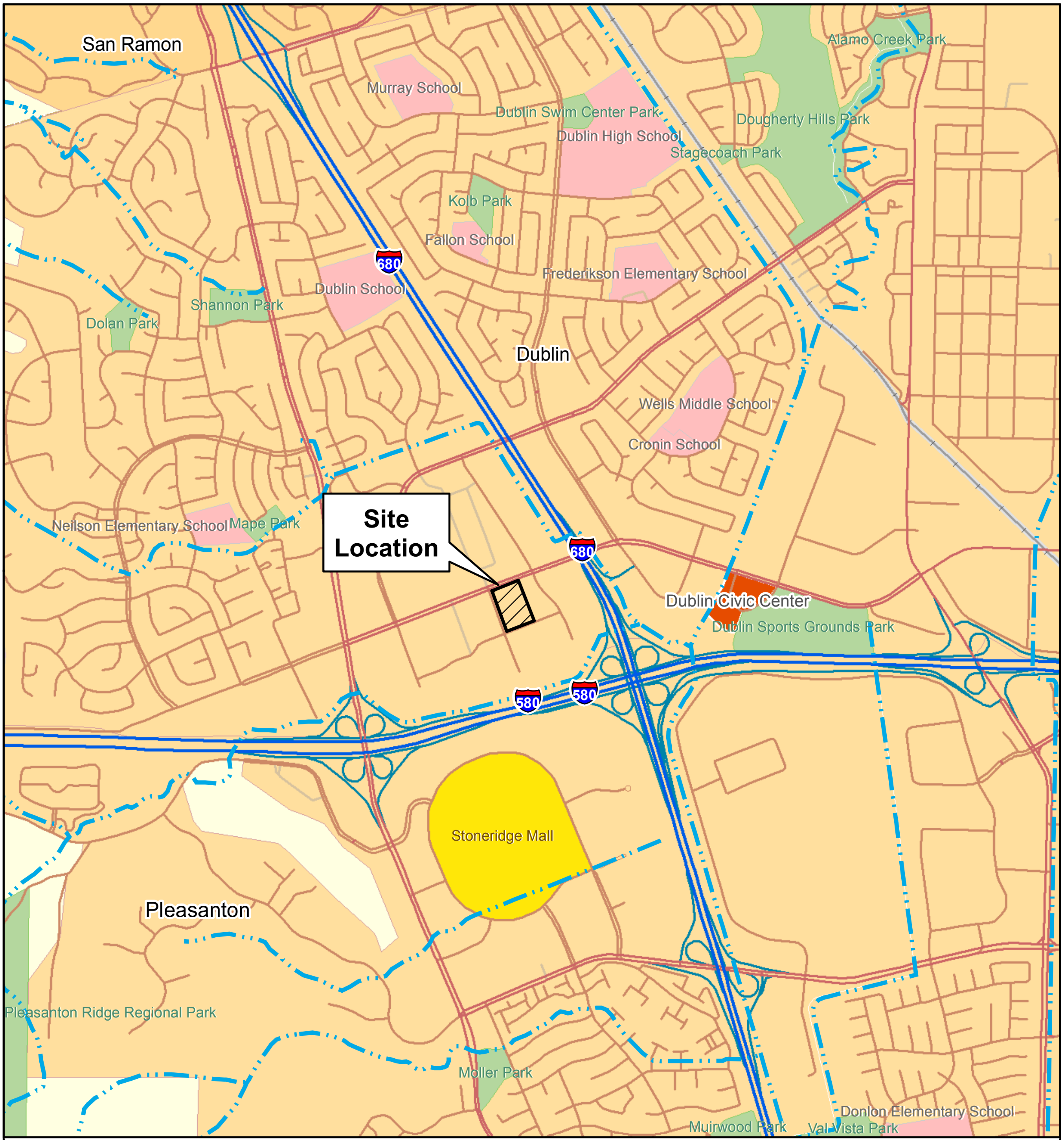
I7.0 REFERENCES

Alameda County Health Care Services Agency, 2013. Fuel Leak Case No. RO0003014 and GeoTracker Global ID T00000001616, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin, California, 94568, August 16.

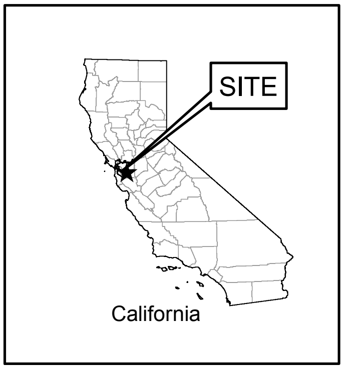
AMEC Environment & Infrastructure, Inc. (AMEC), 2014a. Final Feasibility Study and Corrective Action Plan, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin, California, Fuel Leak Case No. RO003014, May 1.

Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler), 2015. Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report, Crown Chevrolet Cadillac Isuzu, 7544 Dublin Boulevard and 6707 Golden Gate Drive, Dublin California, March 19.

FIGURES



Street map from ESRI, 2007.



SITE LOCATION MAP
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Date: 06/01/2015

Project No. OD14170800

Figure
I-1-1

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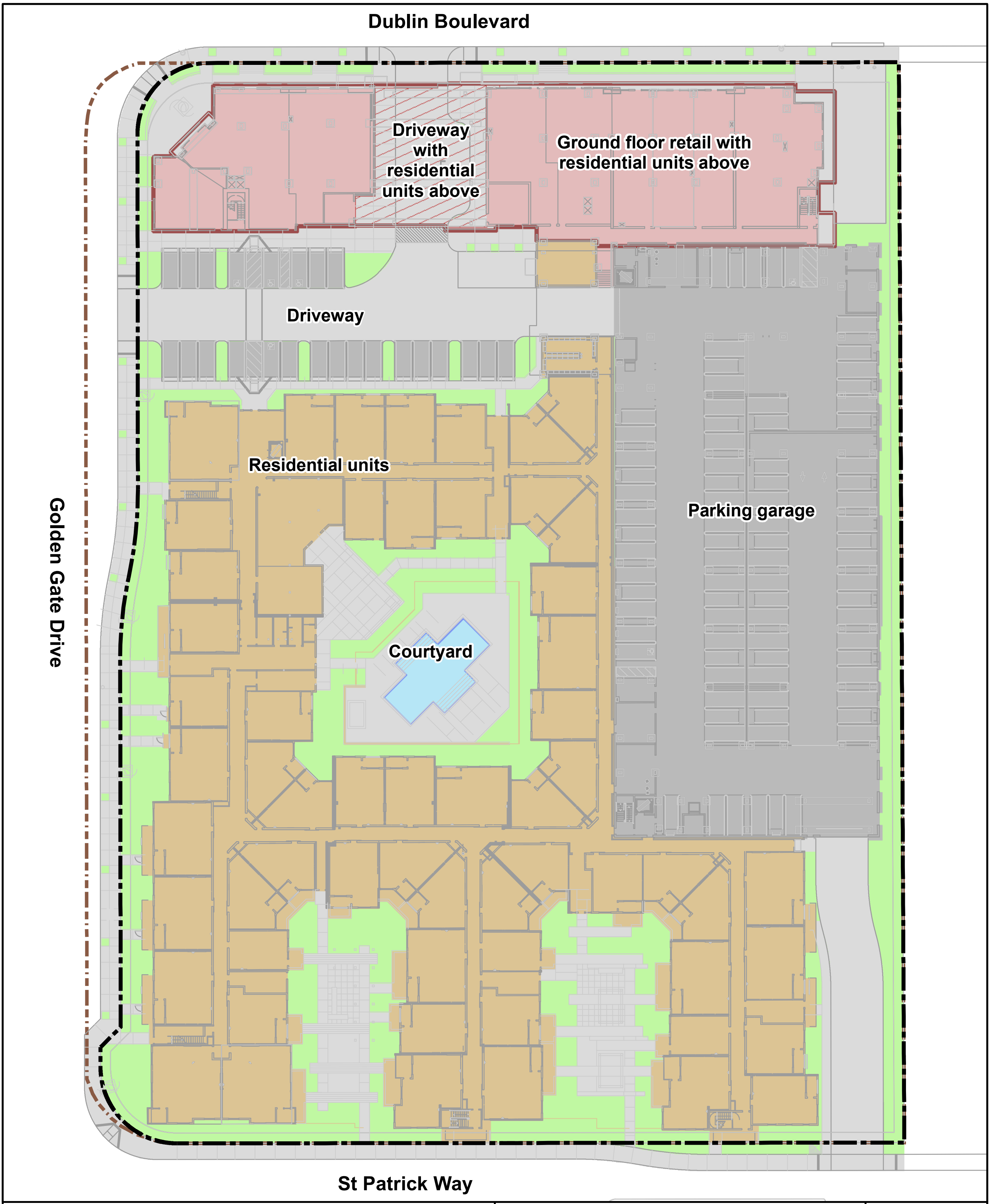

Explanation

- ▬ · ▬ Future property line
- ┅ · ┅ Existing property line

0 70

APPROXIMATE SCALE IN FEET

SITE PLAN WITH PLANNED
NEW CONSTRUCTION
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Date: 06/01/2015 | Project No. OD14170800

amec foster wheeler

Figure
I-1-2

S:\OD14\170800\task_02\15_0205_PRB_BoD_fig_I-1-02.mxd

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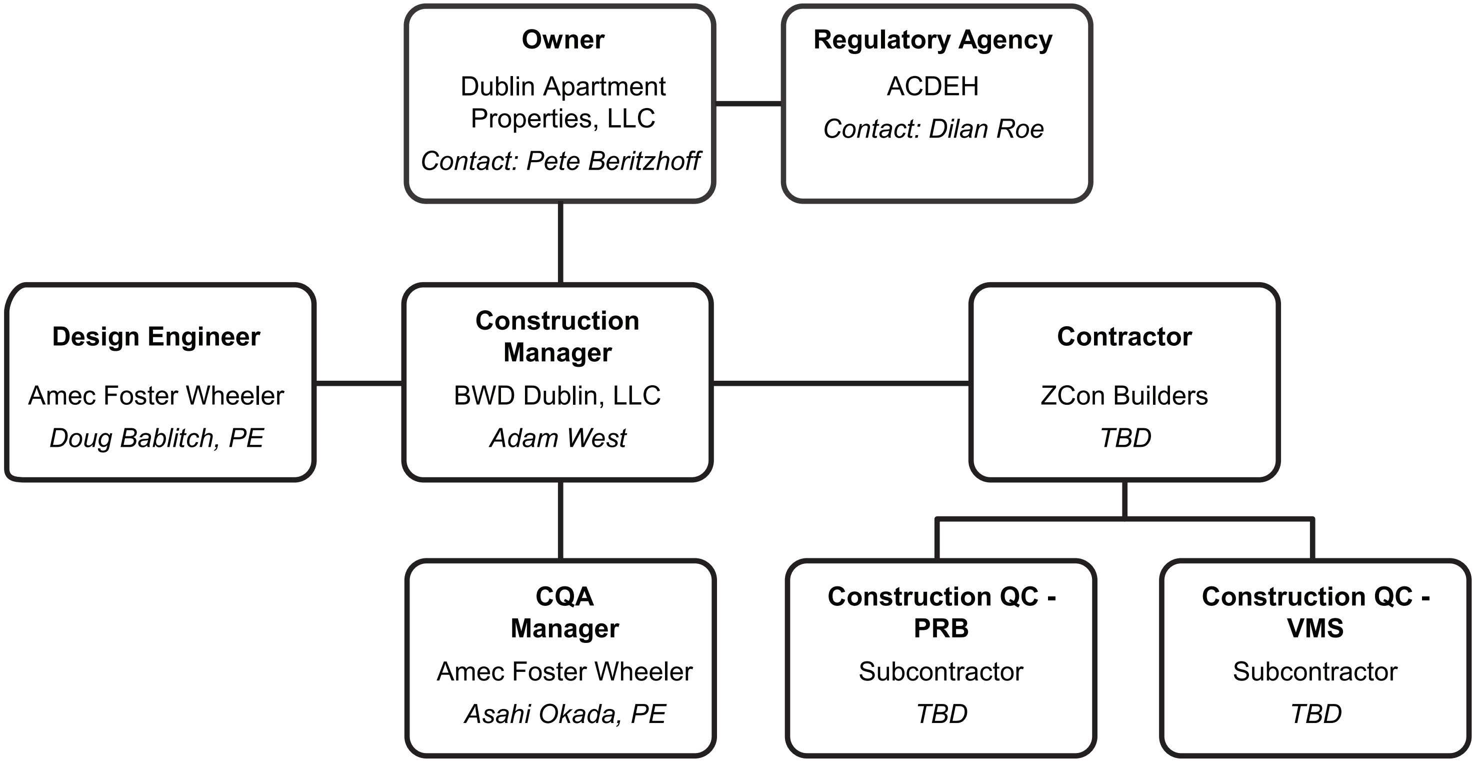

Abbreviations

ACDEH = Alameda County Department of Environmental Health
CQA = Construction Quality Assurance
PRB = Permeable Reactive Barrier
QC = Quality Control
TBD = To Be Determined
VMS = Vapor Mitigation System

QUALITY PROGRAM
ORGANIZATIONAL CHART
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Date: 06/01/2015
Project No. OD14170800

Figure
I-1-3

ATTACHMENT I-1-1

Sample Form – PRB Media Magnetic Separation Test Record

ATTACHMENT I-1

CQA PLAN - PRB MEDIA INSTALLATION VOLUME RECORD

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

MAGNETIC SEPARATION TEST RECORD

EXAMPLE RECORD FORM ONLY
NOT FOR CONSTRUCTION

Project Name: ____________________ Project Number: ____________________

Date: __________ Time: __________ Conduced by: ____________________

Mix Type: ☐ 50% ZVI ☐ 10% ZVI

(A)	Tare Weight (Container # ________)	________	g
(B)	Wet Sample + Tare Weight	________	g (~300 g)
(C)	Dry Sample + Tare Weight	________	g
	Drying Time ________ minutes		
(D)	Dry Sample Weight (C – A)	________	g
(E)	Sand, Pass 1 + Tare Weight	________	g
(F)	Sand Weight, Pass 1 (E – A)	________	g
(G)	Sand, Pass 2 + Tare Weight	________	g
(H)	Sand Weight, Pass 2 (G – A)	________	g
(I)	Sand, Pass 3 + Tare Weight	________	g
(J)	Sand Weight, Pass 3 (I – A)	________	g (stop if <2 g)
(K)	Sand, Pass 4 + Tare Weight	________	g
(L)	Sand Weight, Pass 4 (K – A)	________	g (stop if <2 g)
(M)	Sand, Pass 5 + Tare Weight	________	g
(N)	Sand Weight, Pass 5 (M – A)	________	g (stop if <2 g)
(O)	Total Sand + Tare Weight	________	g
(P)	Total Sand Weight (O – A)	________	g
(Q)	Total Sand Volume (P / 1.60)	________	mL
(R)	Total Iron + Tare Weight	________	g
(S)	Total Iron Weight	________	g
	Check: P + S should equal D P + S =	________	g
(T)	Total Iron Volume (S / 2.40)	________	mL
(U)	Percent by Volume Iron in Batch (T / [Q + T])	________	% (45 – 55%) or (8% – 12%)

☐ PASS ☐ FAIL

ATTACHMENT I-1-2

Sample Form – PRB Media Installation Volume RecordCVR-SL

ATTACHMENT I-2

CQA PLAN - PRB MEDIA INSTALLATION VOLUME RECORD

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared by: ____________________

Date: ____________________

EXAMPLE RECORD FORM ONLY
NOT FOR CONSTRUCTION

Parameters			
PRB cut width	2.25 ft		
PRB minimum treatment width	2.0 ft		
Average ZVI Supersack	1.0 ton		
ZVI Bulk Density	185 pcf	2.50 ton/cy	
Sand Bulk Density	120 pcf	1.62 ton/cy	
ZVI Proportion in ZVI/Sand Mix	0.55		
Sand Proportion in ZVI/Sand Mix	0.45		
ZVI/Sand Mix Bulk Density	155.75 pcf	2.10 ton/cy	
Soil Bulking Factor	1.2		
Required Soil Catchment Safety Factor	1.1		
ZVI, Sand, and CDF Purchase Safety Factor	1.2		

Current Estimates	
ZVI Volume^{1}	114 ecy
ZVI Weight^{1}	240 ton
Total ZVI Purchase^{2}	290 ton
Sand Volume^{1}	93 ecy
Sand Weight^{1}	197 ton
Total Sand Purchase^{2}	240 ton
Total CDF Volume^{1}	106 ecy
Total CDF Purchase^{2}	130 ecy
Soil Spoils Volume^{3}	423 lcy
Required Soil Catchment Capacity^{4}	470 lcy

Station No.	Ground Surface Elevation^{5}	PRB Bottom Elevation	Depth to PRB Bottom (bgs)	Depth, GS to GWE	Depth, GWE to PRB Bottom	Estimated Saturated Fraction	Estimated Soil Spoils^{3} (predicted)	Estimated CDF Volume^{1} (predicted)	Estimated ZVI/Sand Mix Volume^{1} (predicted)	Estimated ZVI/Sand Mix Weight^{1} (predicted)	Estimated ZVI Volume^{1} (predicted)	Estimated Sand Volume^{1} (predicted)	Estimated ZVI Weight^{1} (predicted)	Estimated Sand Weight^{1} (predicted)	ZVI/Sand Mix Added (actual)	ZVI Added (actual)	Sand Added (actual)	Field Depth (actual)	Estimated Average PRB Width^{6} (actual)	Comments
ft	ft	ft	ft	ft	ft	%	lcy	ecy	ecy	ton	ecy	ecy	ton	ton	ton	ton	ton	ft	ft	--
10+00	340.8	311.1	29.7	13.8	15.9	54%	--	--	--	--	--	--	--	--	--	--	--	--	--	
10+10	340.8	311.3	29.5	13.8	15.7	53%	29.6	7.2	14.7	30.9	8.1	6.6	17.0	13.9	--	--	--	--	--	
10+20	340.7	311.5	29.2	13.7	15.5	53%	29.3	7.2	14.5	30.6	8.0	6.5	16.8	13.7	--	--	--	--	--	
10+30	340.7	311.8	28.9	13.7	15.2	53%	29.0	7.2	14.4	30.2	7.9	6.5	16.6	13.6	--	--	--	--	--	
10+40	340.6	312.0	28.6	13.6	15.0	52%	28.7	7.1	14.2	29.8	7.8	6.4	16.4	13.4	--	--	--	--	--	
10+50	340.6	312.0	28.6	13.6	15.0	52%	28.6	7.1	14.1	29.6	7.7	6.3	16.3	13.3	--	--	--	--	--	
10+60	340.6	311.9	28.7	13.6	15.1	53%	28.6	7.1	14.1	29.6	7.8	6.3	16.3	13.3	--	--	--	--	--	
10+70	340.6	311.7	28.9	13.6	15.3	53%	28.8	7.1	14.2	29.9	7.8	6.4	16.4	13.4	--	--	--	--	--	
10+80	340.7	311.7	29.0	13.7	15.3	53%	29.0	7.1	14.3	30.1	7.9	6.4	16.5	13.5	--	--	--	--	--	
10+90	340.7	312.0	28.7	13.7	15.0	52%	28.8	7.1	14.2	29.9	7.8	6.4	16.4	13.5	--	--	--	--	--	
11+00	340.8	312.1	28.7	13.8	14.9	52%	28.7	7.2	14.1	29.6	7.7	6.3	16.3	13.3	--	--	--	--	--	
11+10	340.9	312.0	28.9	13.9	15.0	52%	28.8	7.3	14.1	29.5	7.7	6.3	16.3	13.3	--	--	--	--	--	
11+20	341.0	312.0	29.0	14.0	15.0	52%	29.0	7.3	14.1	29.7	7.8	6.3	16.3	13.3	--	--	--	--	--	
11+30	341.2	311.9	29.3	14.2	15.1	52%	29.2	7.5	14.1	29.7	7.8	6.4	16.3	13.4	--	--	--	--	--	
11+40	341.3	311.8	29.5	14.3	15.2	51%	29.4	7.6	14.2	29.9	7.8	6.4	16.4	13.4	--	--	--	--	--	
11+45.96	341.4	311.7	29.7	14.4	15.3	51%	17.7	4.6	8.5	17.9	4.7	3.8	9.8	8.0	--	--	--	'-	'-	
Totals	--	--	--	--	--	--	423	106	208	437	114	93	240	197	--	--	--	--	--	
Averages	340.8	311.8	29.1	--	--	52%	--	--	--	--	--	--	--	--	--	--	--	--	--	

Abbreviations

bgs = below grade surface
CDF = controlled density fill
cy = cubic yard
ecy = embankment cubic yard (in place, compacted)
ft = feet
GS = ground surface
GWE = groundwater elevation
lcy = loose cubic yard (bulk, not compacted)
pcf = pounds per cubic foot
PRB = permeable reactive barrier
ZVI = zero valent iron

Notes

1. Estimated ZVI, Sand, ZVI/Sand Mix, and CDF Volumes and Weights are based on the PRB mimum treatment width (2.0 ft). These numbers reflect the estimated in-place quantities. No safety factor is applied to this number.
2. Purchase estimates are based on the Weights (Volume for CDF) multiplied by the Purchase Safety Factor, rounded to the nearest 10 tons. These quantities reflects the estimated ZVI, sand, and CDF to be purchased.
3. Estimated excavated soils (spoils) volume is based on the PRB cut width (2.25 ft). A soil bulking factor of 1.2 is applied. This quantity reflects the expected soil spoils that will be generated during PRB installation. No safety factor is applied to this number.
4. Total Required Soil Catchment Capacity estimate is based on the Soil Spoils Volume multiplied by the stated Required Soil Catchment Safety Factor, rounded to the the nearest 10 lcy. This quantity reflects the total volume to be reserved for soil management.
5. Ground surface elevations per topographic survey by Kister, Savio & Rei, Inc., October 3, 2014. Elevations adjusted from NAVD88 to NGVD29 by subtracting 2.7 feet.
6. Estimated Average PRB Width is calculated by dividing the actual ZVI/Sand Mix weight added, by the product of the average trench depth for the segment, the length of the segment, and the bulk density of the ZVI/Sand Mix.

APPENDIX K

PRB Operations, Maintenance, and Monitoring Plan

(to be provided in a future addendum)

APPENDIX L

Work Plan for Monitoring Well Installation

Work Plan for Monitoring Well Installation

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

Prepared for:

BWD Dublin, LLC
Dublin, California

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

June 2015

Project No. OD14170800

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FIGURES

APPENDIX L

WORK PLAN FOR MONITORING WELL INSTALLATION

Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

L1.0 INTRODUCTION

This work plan has been prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. ("Amec Foster Wheeler") on behalf of Bay West Development Dublin, LLC ("BWD Dublin") to describe the methodology for installation of groundwater monitoring wells at the former Crown Chevrolet North Parcel located at 7544 Dublin Boulevard, Dublin, California ("the site"). The on-site monitoring wells will replace the on-site monitoring wells that were destroyed prior to the start of site redevelopment to prevent construction-related damage. The off-site monitoring wells will be used to monitor the performance of permeable reactive barrier (PRB). The PRB is part of a proposed corrective action for the site that comprises installation of a vapor mitigation system (VMS) in the northern part of the site and a PRB on the western edge of the property. This work plan has been prepared as an appendix to the *Vapor Mitigation and Permeable Reactive Barrier Basis of Design Report* ("Design Report") that describes and documents the final design for the proposed corrective action at the site.

L2.0 BACKGROUND

As described in the Design Report, the purpose of the proposed corrective action is to mitigate potential risk to future site occupants from vapor intrusion from volatile organic compounds (VOCs) in soil and groundwater beneath the site. The VMS will generally consist of a spray-applied composite membrane installed beneath future building slabs and perforated vapor collection pipes in permeable aggregate below the membrane. Vapor collection pipes will be connected to risers that will passively vent accumulated vapors to outdoor air.

The PRB will consist of a 2-foot-wide, 146-foot-long trench constructed at the upgradient boundary of the site. The PRB will be installed to approximately 29 feet bgs, including a 1-foot key into an existing clay layer observed from approximately 28 to 30 feet below ground surface (bgs). The trench will be backfilled with a mixture of zero-valent iron (ZVI) and sand collectively referred to as PRB Media) that will serve as reactive media to facilitate the reductive dechlorination of VOC-impacted groundwater that passes through the trench. The Design Report provides additional detail concerning the design and construction of the VMS and PRB.

L3.0 WELL INSTALLATION

Following installation of the PRB, six performance monitoring wells will be installed within and upgradient of the PRB to comprise the monitoring well network that will be used to assess the performance of the PRB. Three of the wells will be installed within the PRB trench (e.g., in-barrier monitoring wells) and three of the wells will be installed outside of the barrier, west and upgradient of each in-barrier well. Each upgradient well will be installed and screened at the same depth as its companion in-barrier well. Additionally, five on-site monitoring wells will be installed downgradient of the PRB to replace the previously destroyed on-site monitoring wells. The proposed monitoring well locations are shown on Figure L-1.

The six performance monitoring wells will be located in an area that will be subject to a lot-line adjustment following installation of the PRB and the widening of a portion of Golden Gate Drive. To avoid damage to the wells, the well installation activities will be scheduled following the road work within Golden Gate Drive.

The five on-site wells will be located in areas that allow for reasonable access following construction activities. The well installation activities will be scheduled following completion of site construction work that could result in damage to the monitoring wells.

The following sections describe activities that will be performed as part of installation of the 11 wells that will comprise the monitoring well network at the site.

L3.1 PRE-FIELD ACTIVITIES

Prior to well installation, drilling permits will be obtained from Zone 7 Water Agency, access and encroachment permits obtained (if the lot-line adjustment has been completed), and a site-specific health and safety plan will be prepared. Additionally, at least two business days prior to sampling, the well locations will be marked with white paint and Underground Service Alert of Northern California will be contacted, as required by law, to identify public utilities, if any, that may be in the vicinity of the proposed well locations. Finally, a private underground utility locator will mark below-grade building utilities in the vicinity of the proposed sample locations. The well installation activities may occur in separate mobilizations based on the scheduling constraints discussed in Section L3.0.

L3.2 PERFORMANCE MONITORING WELL INSTALLATION

The borings will be drilled and the wells installed by a California-licensed C-57 drilling contractor under the supervision of a California-licensed Professional Geologist. Different drilling methods will be used to advance the upgradient performance monitoring and on-site wells, and the in-barrier performance monitoring wells, as described in the following sections.

L3.2.1 Upgradient and On-site Well Installation

The three wells to be installed upgradient of the PRB and the five on-site wells will be drilled by a California-licensed contractor using a drill rig equipped with 8.25-inch-diameter hollow-stem augers. The wells will be constructed in accordance with state and Zone 7 Water Agency requirements.

The well borings will be continuously sampled to total depth by driving a core-barrel ahead of the augers. Soil retrieved from the cores will be logged following ASTM International Standard D 2488, which is based on the Unified Soil Classification System. Recovered soil will also be screened for the presence of VOCs using a photoionization detector (PID). PID readings will be recorded on the lithologic logs prepared for each boring. Field observations of the presence of any staining or odor will also be recorded on the logs.

The boring for each upgradient PRB performance monitoring well will be advanced to approximately 28 feet bgs (i.e., the top of the identified clay layer that the PRB will key into). The screen interval for the upgradient well in each pair will be determined in the field based on soils encountered in the boring. The well will be screened within the coarsest-grained soil encountered within the vertical interval of the PRB above the clay layer (which is between approximately 10 and 28 feet bgs). This coarsest-grained soil would be expected to have the highest mass flux and would allow for the most conservative evaluation of the effectiveness of the PRB. If the bottom of the screen interval of the well is selected to be shallower than 28 feet bgs, the bottom of the boring will be backfilled with bentonite. Bentonite chips will be placed in the bottom of the boring using the augers as a tremie pipe as the augers are pulled up from the boring, until the top of the pellets are at the planned well depth. The pellets will then be hydrated with potable water. The three upgradient PRB performance monitoring wells may be screened at different depths, depending on the soils encountered in each boring.

The boring for each on-site monitoring well will be advanced to approximately 15 to 20 feet bgs. The screen interval for each well will also be determined in the field based on soils encountered in the boring. Each well will be screened the coarsest-grained soil encountered shallower than 20 feet bgs. If saturated soil is not encountered during drilling, the well may be screened at a depth near the top of the expected saturated zone based on historical water level information from the site.

The monitoring wells will be constructed of 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) blank well casing and 5 feet of 0.010-inch slotted well screen that is lowered into place through the augers. The annular space between the well screen and borehole will then be backfilled from the bottom of the borehole to at least 1 foot above the well screen with #2/12 (or similar) filter pack sand. Approximately 2 feet of bentonite chips will then be placed above the filter pack sand and hydrated with clean water. The annular space above the bentonite seal will be backfilled using neat cement or a cement/bentonite grout mixture to approximately 0.5 foot bgs. All of the annual materials will be placed into the well through the augers as they are retracted.

L3.2.2 In-Barrier Performance Monitoring Well Installation

As noted in the Design Report text, three 8-inch-diameter cylindrical concrete forms (e.g., Sonotube™) will have been installed by the PRB contractor along the centerline of the PRB to provide a conductor casing through the controlled density backfill (CDF) above the PRB treatment media, facilitating the well installations within the PRB. The Sonotube forms will be installed to a depth of approximately 10 feet bgs, corresponding with the interface between the CDF and the PRB treatment media and covered with a steel plate pending installation of the monitoring wells.

A California-licensed drilling contractor will remove the steel plate covering the Sonotube casing and a direct push drill rig will be used to advance the direct push rods through the PRB media (generally starting at approximately 9 to 10 feet bgs) to a total depth that matches the depth of the corresponding upgradient well (i.e., up to 28 feet bgs). Because the grain size distribution and permeability of the ZVI/sand treatment media is expected to be similar or more permeable/coarser than typical filter pack sand, the PRB backfill material will serve as the filter pack for the in-barrier wells. After drilling to the targeted depth (equal to the depth of the bottom of the filter pack in the companion upgradient well), the well materials will be lowered into the rod string. The monitoring wells will be constructed of 1.5-inch-diameter, Schedule 40 PVC blank well casing and 5 feet of 0.010-inch slotted well screen that is lowered into place through the rods. The depth of the screened interval of each well will match that of its adjacent upgradient well.

After the well screen and casing have been placed at the appropriate depth, the rods will slowly be retracted to the depth of the PRB Media/CDF interface (approximately 9 to 10 feet bgs and the ZVI/sand material will be allowed to collapse around the well casing. The annular space will then be backfilled to at least 1 foot above the ZVI/sand interface with #2/12 (or similar) filter pack sand. Approximately 2 feet of bentonite chips will then be placed above the filter pack sand and hydrated with clean water. The annular space above the bentonite seal will be backfilled using neat cement or a cement/bentonite grout mixture to approximately 0.5 foot bgs. All of the annual materials will be placed into the well through the rods as they are retracted.

L3.2.3 Surface Completion

The wells will be completed at the ground surface using flush-mounted, traffic-rated boxes set into concrete. A locking, watertight plug will be placed in the top of each well casing.

L4.0 WELL DEVELOPMENT

The groundwater monitoring wells will be developed no sooner than 48 hours after the wells are completed. The monitoring wells will be developed by a combination of bailing, surging, and purging by pump until field parameters (e.g., dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance) are stable and the water becomes visibly clear and free of solids.

L5.0 SURVEY

The horizontal and vertical coordinates of the six wells will be surveyed by a California-licensed surveyor. The horizontal coordinates will be surveyed to an accuracy of 0.1 foot relative to City of Dublin basis of survey benchmarks and the vertical elevations of the north side of the top of the well casing and ground surface elevation will be surveyed to an accuracy of 0.01 foot relative to the National Geodetic Vertical Datum of 1929 (NGVD29).

L6.0 REPORTING

After completion of the well installation, Well Driller's Reports will be completed for each well and submitted to the California Department of Water Resources. The well survey data will also be uploaded to the State Water Resources Control Board's Geotracker database. Lithologic logs will be provided as appendices to a Construction Completion Report that will document construction of the VMS, PMB, and monitoring wells described in this appendix.

FIGURE

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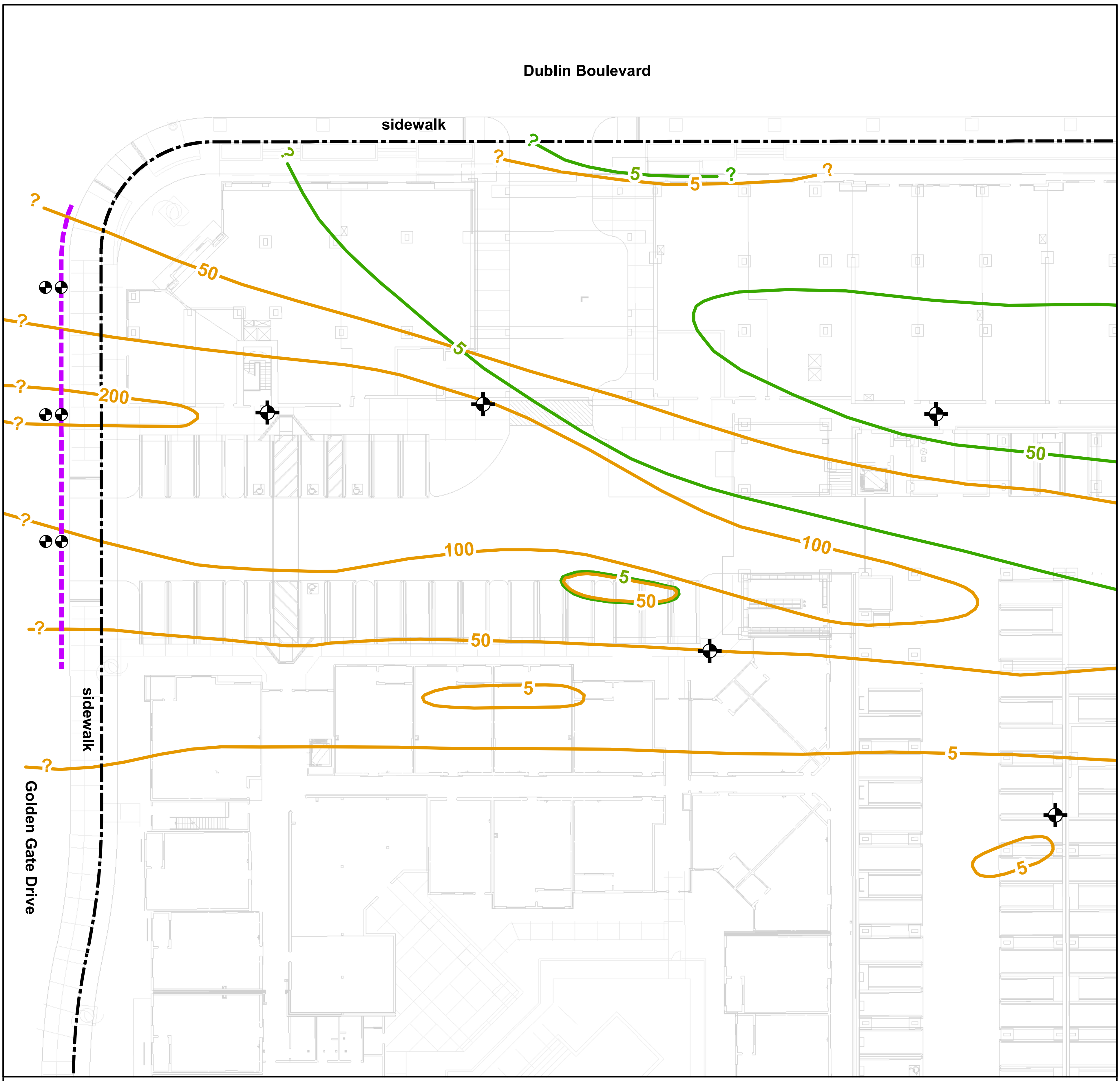
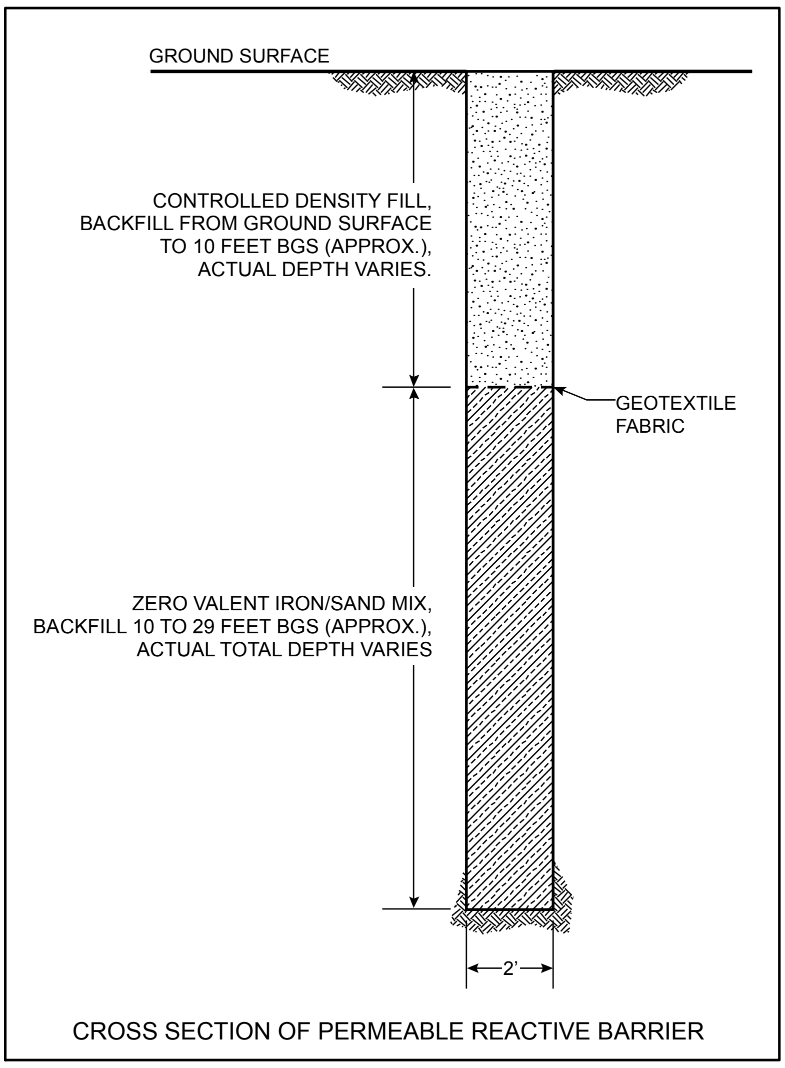




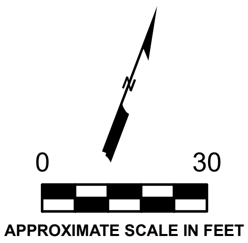
CROSS SECTION OF PERMEABLE REACTIVE BARRIER

Explanation

- ⊕ Proposed performance monitoring well location
- ⌖ Proposed on-site monitoring well location
- 50 ━━ Approximate line of equal PCE concentration (2012)
- 50 ━━ Approximate line of equal TCE concentration (2012)
- ╍╍╍ Proposed PRB
- ─·─·─ Approximate property line

Abbreviations:
PCE = tetrachloroethene
TCE = trichloroethene

Notes:
1. Units for lines of equal concentration are micrograms per liter.
2. Wells are paired, with one in barrier, and the other upgradient with an approximate 5 foot offset.



MONITORING WELL NETWORK
LAYOUT
Former Crown Chevrolet North Parcel
7544 Dublin Boulevard
Dublin, California

amec foster wheeler

Date: 06/09/2015
Project No. OD14170800

Figure
L-1