FORMER ACCO BRANDS
BROWNFIELD CLEANUP PROGRAM
SITE No. C241061

32-00 Skillman Ave, Long Island City, New York
Queens Co. Block 245, Lot 9

REMEDIAL INVESTIGATION WORK PLAN

Prepared for

Beam Suntory, Inc.
149 Happy Hollow Road
Clermont, KY 40110

Submitted to

New York State Department of Environmental Conservation
Division of Environmental Remediation
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by

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October 30, 2019

Qualified Environmental Professional Certification

Former ACCO Brands
Brownfield Cleanup Program
Site No. C241061
Block 245, Lot 9
Long Island City, New York

I, Mark Hutson, PG, certify that I am currently a Qualified Environmental Professional as defined by 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statues and regulations and in substantial conformance with DER Technical Guidance for Site investigation and remediation (DER-10).

I, Mark Hutson, P.G. certify that this Remedial Investigation Work Plan was prepared by me or persons working under my direct supervision.

10/30/19
Date

Mark Hutson
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FIGURES

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1.0 INTRODUCTION AND OBJECTIVE

1.1. INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared by Arnold F. Fleming, P.E. and Fleming Lee-Shue, Inc. (FLS) for Beam Suntory Inc. (the Participant) to investigate the Former ACCO Brands, Brownfield Cleanup Program (BCP) Site No. C241151, following a meeting with New York State Department of Environmental Conservation (NYSDEC) on July 14, 2019.

As of the date of this work plan, the BCP Site has not achieved the remedial goal of 100 ppb (µg/L) in groundwater as stated in the 2015 BCP Decision Document and Remedial Action Work Plan (RAWP). As stated in the June 2019 *Supplemental Site Investigation Report*, Electrical Resistance Heating (ERH) did not achieve the remedial goal and contamination remains on Site at concentrations several orders-of-magnitude above the remedial goal. This contamination is at concentrations that indicate source contamination in the form of Dense Non-aqueous Phase Liquid (DNAPL) remains on Site and within the treatment area.

As per the 2015 BCP Decision Document, FLS will evaluate the application of *in situ* Biological Remediation (bioremediation). FLS will utilize the information gathered from this proposed investigation to further delineate the remaining on-Site chlorinated solvent contamination. The information gathered from this investigation will be used to further develop the appropriate scope of work for the full-scale application of bioremediation.

The formerly ACCO Brands (“Site”) is located in Long Island City, Queens County, New York. The Site is bound by Skillman Avenue to the north, Van Dam Street to the west, Queens Boulevard to the south, and 32nd Place to the east. The Site is defined by the limits of the basement footprint on the south end of the building and is approximately 0.72 acres (31,372 square feet) with the top of basement slab at an approximate elevation of 25 ft. North American Vertical Datum of 1988 (NAVD 88). Figure 1 shows the Site Location. Figure 2 is a Site Plan.

The Site is currently developed with a 4-story commercial and light industrial building occupied by multiple commercial tenants, including a newspaper printing facility on the ground floor and a tennis and racquet ball club on the upper floors. Historically, the principal activity was manufacturing. The former owner and operator, ACCO Brands Inc. (ACCO), manufactured staplers and stapler components, which involved the use of various paints, thinners, solvents and cleaners including trichloroethylene (TCE). TCE has impacted soils and groundwater beneath the Site. Prior to construction of the current building in 1950, the property was subdivided into multiple lots utilized for agriculture, single family dwellings and workshops.

In response to NYSDEC comments provided in the meeting on July 14, 2019, this RIWP has been prepared to provide a plan to further investigate whether other contaminant sources may be present on-Site and to install additional monitoring components to better define the limits of the on-Site contaminant plume and possible residual source contamination. The proposed investigation goal is to collect additional information that will aid in development of a remedy to address remaining TCE in groundwater/soil below the Site. As requested in the NYSDEC letter dated September 17, 2019, a work plan for limited sampling for specified emerging contaminants has been developed, and the sampling is anticipated to be completed separate from this investigation to adhere to the specific emerging contaminants sampling procedures. As per NYSDEC comments provided on October 4, 2019 telephone conversation the twenty Site monitoring wells (including wells to be installed as per this investigation) will be sampled for emerging contaminant parameters. The following sections of the RIWP describe the proposed monitoring well and soil boring locations, sampling matrices, and chemical analyses proposed to attain the RIWP goals and objectives.

1.2 OBJECTIVES

Several investigations and sampling events have been conducted since 2000, focusing attention on subsurface soils, groundwater, and soil vapor samples both on and off-Site. Following recent remediation via Electrical Resistance Heating (ERH) technology, the Site has been significantly remediated and an updated environmental site characterization is needed to assess remaining contaminants, better define the limits of potential source material, enhance the exposure assessment, and augment the existing information dataset that will assist in remediation of the remaining impacted groundwater on-Site.

The objectives of this RIWP are to further characterize conditions within BCP Site No. C241061 and include the following scope:

- Collect soil and groundwater data to increase coverage along the eastern upgradient portion of the treatment area and better characterize TCE groundwater concentrations in this area;
- Delineate areas of Chlorinated Volatile Organic Compounds (CVOCs), specifically TCE and its breakdown products within and along the eastern side of the treatment area; and
- Identify potential TCE source areas and/or re-distributed TCE following ERH.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

The Site is located at 32-00 Skillman Avenue, Long Island City, Queens County, New York and is identified as Block 245, Lot 9 on the Queens County Tax Map. The Site is defined by the limits of the basement footprint on the south end of the building, and is approximately 0.72 acres. Figure 1 shows the Site Location.

2.2 SITE DESCRIPTION

The Site is bound by Skillman Avenue to the north, Van Dam Street to the west, Queens Blvd. to the south and 32nd Place to the east in the Long Island City section of Queens, New York. The Site is currently developed with a four-story commercial and light industrial building occupied by multiple tenants, including a newspaper printing facility on the ground floor and CityView Racquet Club on the upper floors. The Site is zoned as M1-4 for industrial and manufacturing land use by the New York City Department of City Planning. Figure 2 shows the Site Plan.

2.3 SITE HISTORY

ACCO Brands Inc. occupied the Site from 1952 until 1998 and manufactured stapler and stapler components, which required the use of various paints, thinners, solvents and cleaners (degreasers). ACCO sold the property in July 1999 to Swingstell, LLC (Swingstell), and the facility ceased operations in September 1999. An inspection of the Site conducted during facility closure revealed a small unlined sump in the basement adjacent to a former degreasing operations area, chlorinated solvent contamination in the subsurface soils, and groundwater contamination attributable to the former manufacturing operations.

Following the property sale, Swingstell entered the Site into the NYSDEC Voluntary Cleanup Program (VCP Site No. V00331) to investigate the nature and extent of this contamination and to conduct any necessary remediation. ACCO agreed to lease the basement of the Site building from Swingstell for the purposes of conducting these activities. Fortune Brands, Inc. acquired the Site through a purchase of certain ACCO assets in approximately 2007 and subsequently changed its name to Beam, Inc. in 2011. In 2014, Beam, Inc. was acquired by Suntory Holdings and is now known as Beam Suntory, Inc. On January 12, 2018, the Site was officially transferred to the BCP, Site No. C241061 (BCA Index No. C241061-10-17).

During the Site's history in the VCP, several Remedial Investigations were performed to characterize the nature and extent of contamination at the Site (as high as 460,000 µg/L in 2002), and Interim Remedial Measures (IRMs) were implemented throughout the Site's history. The IRMs include soil vapor extraction, ambient air sparging, ozone oxidation, *in situ* permanganate oxidation, and a sub-slab depressurization system (SSDS). The SSDS continues to operate maintaining a negative pressure below the building slab within and around the Site. Two off-Site SSDSs are operated and maintained at the adjacent YMCA upgradient across 32nd Place and the mixed-use commercial building downgradient across Van Dam Street.

In 2015, FLS prepared a Remedial Action Work Plan (RAWP) proposing Site treatment using Electrical Resistive Heating (ERH) followed by enhanced *in situ* bioremediation to remove remaining on-Site and associated off-Site contamination. The design of the ERH remediation system focused on removing TCE from soil and groundwater under the Site by generating heat in the subsurface, converting soil moisture to steam, resulting in steam stripping and degradation of subsurface volatile organic compounds. The TRS Group Inc. (TRS) treated vapors collected from the vapor recovery wells using vapor phase granular activated carbon (VGAC).

TRS operated the ERH system from mid-September 2017 through August 31, 2018, heating the subsurface to temperatures high enough to strip TCE and other chlorinated ethenes from the soil and groundwater, and remove them through an SVE system. During ERH, an appreciable amount of TCE mass was removed, an estimated 5,000 pounds.

On August 31, 2018, the ERH system on Site was de-energized on account of the diminishing removal of material observed during the final months of ERH operations (particularly in light of the extraordinary cost of energy necessary for the ERH operations). As of the date of this report, the ERH system is being demobilized, following Department approval. The investigation presented in this workplan aims to further characterize and delineate the on-Site TCE and evaluate the application of In-Situ Enhanced Biological Remediation to further remove TCE within the Site.

2.4 DESCRIPTION OF SURROUNDING PROPERTIES

The properties surrounding the Site are primarily used for manufacturing, commercial and transportation purposes, with some education and recreation uses. To the south of the Site lies New York City Transit Authority (NYCTA) elevated tracks of the No. 7 train line and Queens Boulevard. Across Queens Boulevard, to the south, are LaGuardia Community College, and multi-story office/school buildings with first floor commercial fronts. To the north of the Site lies Skillman Avenue and the Long Island railroad (LIRR) tracks and Sunnyside train yards. West of the Site are Van Dam Street, Luxor car sales/rental, automobile service garage and Sleep Lab sleep clinic. Further west lies Queens Boulevard, a BP gas station, Days Inn Long Island City, Versailles Furniture Corp, and Tower Auto Mall car rental. To the east of the Site is 32nd Place, the Long Island City YMCA, a hotel under construction and 33rd Street-Rawson Street Subway station.

2.5 GEOLOGIC CONDITIONS

2.5.1 Topography

Based on information published by the United States Geological Survey 7.5 Minute Series Topographic Map of Brooklyn New York Quadrangle, the Site is located at approximately 10 to 15 feet above North American Vertical Datum 88 (NAVD88). The Site topographic gradient and the surrounding area gradually slopes south-southwest towards Dutch Kills, a tributary to Newtown Creek.

2.5.2 Regional Geology

The regional geology of Queens County is comprised of sequences of Wisconsin age Upper Pleistocene glacial moraine (northern part) and glacial outwash (southern part) deposits (sand, gravel, cobbles, silt and clay); glacial-drift materials (lacustrine deposits, till, sand, gravel, and in some areas, fossil plant material disseminated in fine grained deposits); Upper Pleistocene deposits comprised of pre-Sangamon age Jameco gravel unit unconformably overlain by Gardiner's clay of Sangamon age; and Cretaceous age deposits of continental origin consisting of the Raritan Formation, the Magothy Formation – Matawan Group Undifferentiated (Soren 1978). Pre-Cambrian metamorphic bedrock underlying Queens is comprised of folded and faulted Ravenswood Granodiorite, and in some areas, Proterozoic Fordham Gneiss (Roberts – Dolgin 1989). Historically the Dutch Kills drainage basin was located west of the Site with wetlands and streams flowing southwest towards the current Newton Creek (29th Street and 47th Avenue). The majority of this drainage basin has been filled as this area was developed.

2.5.3 Local Geology

The Site subsurface consists of interbedded sand and silt units that overlie a clay unit. The sand/silt unit ranges from approximately 33 to 43 feet below the basement slab finished surface. The underlying clay unit was not penetrated during the earlier FLS investigation, but based upon boring logs from prior investigations; it is believed that the clay unit is approximately 5 to 10 feet thick. Both the sand/silt and clay units dip to the south-southwest.

2.5.4 Hydrogeology

The groundwater table lies at a depth of approximately 14 to 15 feet below the basement slab finished surface. Groundwater flow is to the south-southwest towards Dutch Kills and Newtown Creek. At ERH's peak performance, on-Site groundwater temperatures were elevated (i.e. greater than 100° C). Since ERH was deenergized in August 2018, on-Site groundwater temperatures within the treatment area have decreased to approximately 70° C as of the date of this report. Groundwater under the eastern portion of the Site has been recorded at ambient temperature of 17° C. During ERH, while groundwater temperatures were high, groundwater formed a mound that moved groundwater radially from the treatment area. A groundwater elevation contours for the shallow and intermediate zones are presented as Figures 3a and 3b and temperature isopleths are presented as Figures 4a and 4b.

2.6 NATURE & EXTENT OF CONTAMINATION

2.6.1 Previous Investigations

Seven previous environmental investigations and sampling events beginning in 1999 consisted of varying levels of environmental, soil, soil vapor and groundwater investigations. The main class of contamination on-Site is Volatile Organic Compounds (VOCs) and the contaminant of concern is TCE and breakdown products. It was determined that chlorinated solvents entered the subsurface through an unlined pit located adjacent to a degreasing process during historic on-Site operations. Some previous investigations included the following:

1. *Phase I Environmental Site Assessment*, Dames and Moore, 1999
2. *Remedial Investigation Report*, First Environment, 2001
3. *Off-Site Investigation and Groundwater Monitoring Report*, First Environment, 2002
4. *Remedial Investigation Results Report*, Groundwater & Environmental Services (GES) 2007
5. *Supplemental Remedial Investigation Report – OU1*, Fleming-Lee Shue, Inc., 2014
6. *Soil Investigation*, Fleming-Lee Shue, Inc., 2016
7. *Supplemental Site Investigation*, Fleming-Lee Shue, Inc., 2019

Based on current and historic sampling data, FLS has developed a Site Conceptual Model, provided as Appendix A.

2.6.2 Soil Contamination

Soil investigations were reported in the original Supplemental Remedial Investigation in 2014 and the Soil Investigation in 2016, both conducted by FLS. The primary soil contaminant is the chlorinated solvent volatile organic compound TCE. The investigation in 2014 revealed that soil contamination was detected from approximately 25-46 ft. below grade, primarily in the silt formation. In 2016, on-Site soil samples revealed concentrations of TCE above the Commercial Use Soil Cleanup Objectives (CUSCO) on-Site, with a maximum concentration found in the northern portion of the Site (542 mg/kg).

It is FLS's current interpretation of the data that during ERH operation, elevated subsurface temperatures may have dispersed DNAPL within the Site. ERH operation was successful in mobilizing and removing volatilized TCE through the subsurface, but did not fully remove the remaining source via vapor recovery. FLS interprets this data to indicate a redistribution of DNAPL in the Site subsurface and a subsequent increase of TCE concentrations in the Site groundwater.

Post-ERH, FLS conducted two soil investigations as a part of the June 2019 Supplemental Site Investigation. TCE in the 20 soil samples collected from beneath the sidewalk (off-Site) ranged from non-detect to 27.5 mg/kg and had a median concentration of 0.281 µg/kg. TCE in the 18 saturated basement (Site) samples ranged from non-detect to 6.550 mg/kg and had a median concentration of 0.247 mg/kg. These soil samples were collected from within the ERH treatment area biased to areas exhibiting elevated concentrations of TCE in groundwater. Still, the findings of this investigation show a notable disparity between comparatively low TCE concentrations in soil versus the high levels found in the performance groundwater monitoring wells. This trend was discussed in a July 2019 meeting with NYSDEC where it was agreed that TCE soil concentrations appear to not serve as a reliable indicator of TCE source material, and therefore more weight should be given to groundwater results in the effort to delineate source TCE on-Site.

2.6.3 Groundwater

Groundwater on and off-Site was sampled regularly as a part of remedial performance documentation during the various remedial strategies historically implemented on-Site (e.g. permanganate injections, air sparging, and ERH etc.). Historically, groundwater has shown elevated concentrations of TCE within the monitoring well network, concentrated primarily in the southwestern portion of the Site. Off-Site groundwater concentrations of TCE have been variable, but approximately an order-of-magnitude or more, lower than Site wells. Elevated TCE concentrations have been documented in downgradient wells MWR-7S and MWR-7 located within the off-Site sidewalk but within the ERH treatment area. The majority of downgradient off-Site wells display concentrations around or below the 100 ug/L TCE Site cleanup goal.

The most recent groundwater monitoring event was conducted in July 2019 and included four shallow wells on-Site that had not been sampled since ERH remedy was applied to this Site. Figures 5a and 5b display TCE concentrations in groundwater for the Shallow and Intermediate aquifers respectively. Groundwater sampling results from the July 2019 event are summarized in Tables 1 and 2. A full Laboratory Analytical Report is included as Appendix E.

On-Site TCE groundwater concentrations were variable across the Site during the July 2019 sampling event and exceeded the 100 ug/L cleanup goal in the ERH performance monitoring wells. Consistent with prior sampling events throughout 2018, the highest TCE concentrations were identified in the southwestern portion of the Site, concentrating near the MWR-4 well cluster (MWR-4I: 232,000 ug/L; MWR-4S: 70,700). Concentrations of TCE appear to taper off from this location downgradient towards the MWR-3, MWR-2 and MWR-7 well clusters where concentrations ranged from 5,000 ug/L to 21,000 ug/L. Wells near the perimeter of the ERH treatment area (i.e. MW-1, MW-4) were sampled during this event and displayed relatively lower TCE concentrations (360 ug/L and 2,310 ug/L respectively) indicating that high level contamination appears to be primarily located in the center and western areas of the Site. Monitoring wells, MW-5 and MW-16, located at the eastern edge of the Site indicated low concentrations at 2.1 ug/L and 184 ug/L, respectively (Figures 6A and 6B).

Similarly, concentrations of TCE daughter products, (i.e. dichloroethene (DCE) stereoisomers, vinyl chloride, etc.) were variable across the monitoring well network. The highest concentrations were again found in the center and southwestern portion of the ERH treatment area, where degradation of source TCE and downgradient dispersal of the resultant daughter products is evident. Concentrations in perimeter wells outside of the treatment area and off-Site were largely non-detect.

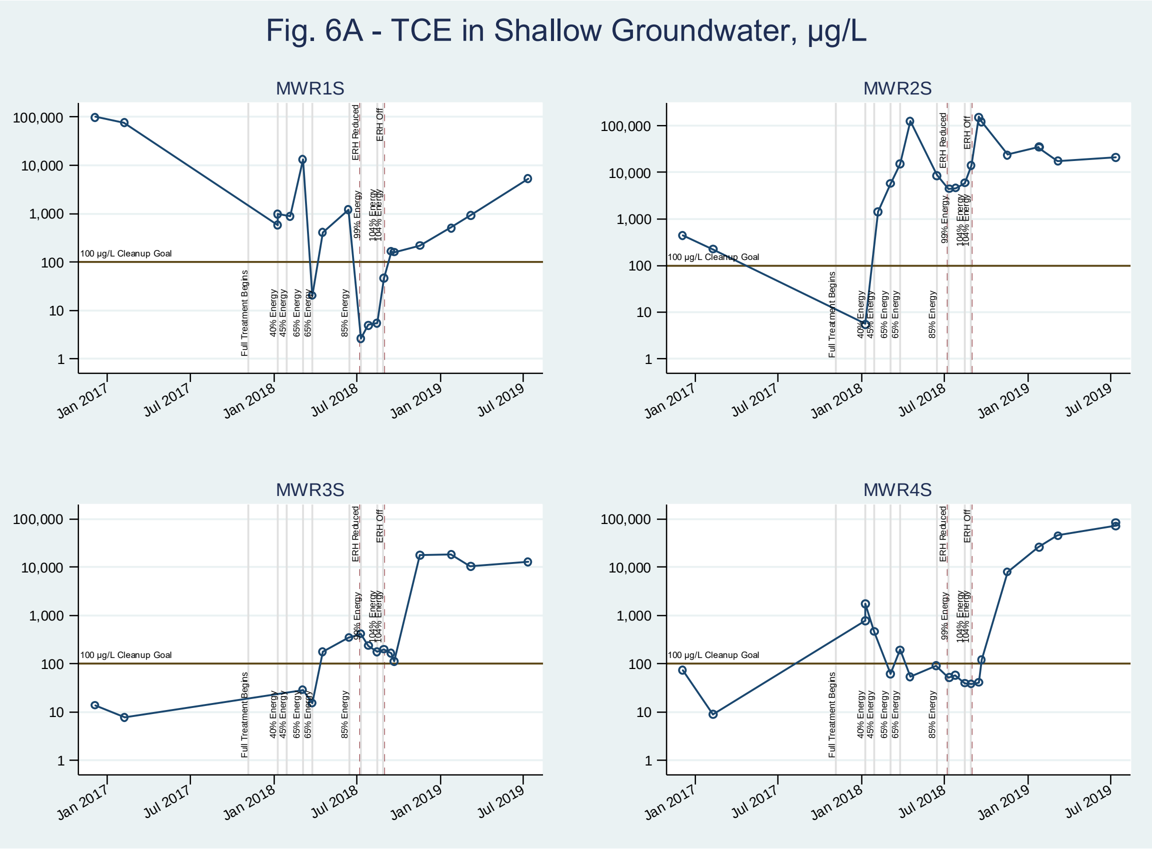


Fig. 6A - TCE in Shallow Groundwater, µg/L

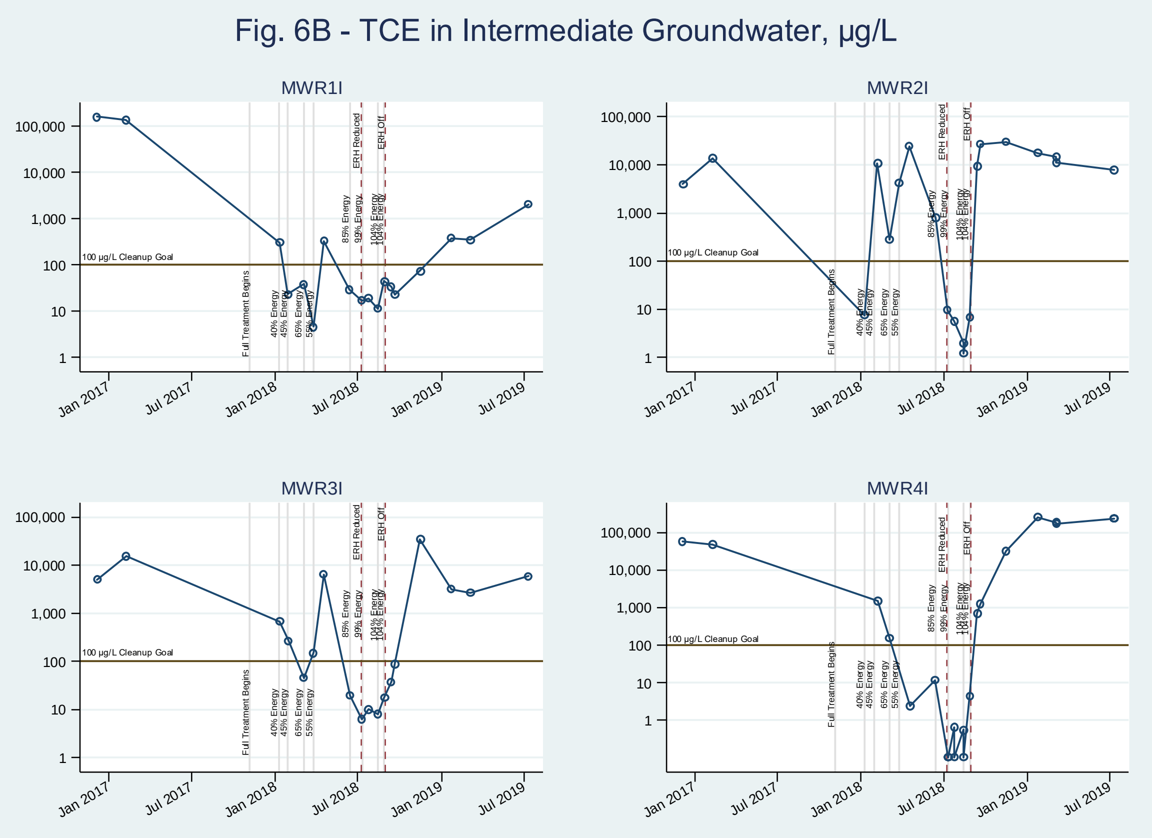


Fig. 6B - TCE in Intermediate Groundwater, µg/L

2.6.4 Other Environmental Conditions

Sub-Slab Vapor and Indoor Air Findings

Due to the concentrations of VOCs in on-Site groundwater, a soil vapor extraction system continually operates to mitigate any potential vapor intrusion by maintaining sufficient negative pressure below the basement slab. Monitoring points installed around the basement floor are periodically measured to ensure sufficient negative pressure. Indoor air is screened with a PID during routine site inspections including maintenance and monitoring of the SSDS.

Indoor air sampling conducted in October 2018 and documented in the June 2019 Supplemental Site Investigation Report monitored vapor intrusion on-Site. As per NYSDOH requirements, prior to indoor air sampling the SVE system and indoor air circulating fans were shut down to ensure collection of representative samples. Indoor air TCE, PCE, and methylene chloride concentrations were all below their NYSDOH ambient air guidelines of 2 ug/m^3, 30 ug/m^3, and 60 ug/m^3, respectively, during the October 22, 2018 sampling event. Compared with the ambient outside air, the Site's indoor air results collected from the basement during this investigation, while higher, are not too different than the ambient air sample collected outside in the fenced in area along Van Dam Street. This suggests that the indoor air is comparable to the ambient background air and that the SVE system is operating satisfactorily to maintain indoor air quality. The SSDS continues to operate and is maintained and monitored on a periodic basis.

3.0 REMEDIAL INVESTIGATION TASKS

This section summarizes the remedial investigation tasks proposed to fulfill the stated objectives. The tasks are separated in three sections: 1) Project Planning and Preparation, and 2) Site Investigation and Characterization. As set forth in Section 3.2.1, FLS proposes five (5) soil borings and nine (9) groundwater monitoring wells east of the ERH treatment area. As previously mentioned, ERH likely mobilized and dispersed remnant DNAPL on-Site. This sampling event will aim to delineate the extent on-Site and identify remaining TCE source areas post-ERH. Additional soil borings and/or monitoring wells may be added based on field observations.

3.1 PROJECT PLANNING AND PREPARATION

3.1.1 Site Inspection, Geophysical Survey, Utility Clearance and Permitting

Prior to initiating the field work, a field inspection will be carried out to inspect the work area to assess current conditions, evaluate equipment access, and check the viability of existing monitoring wells. FLS will prepare an inventory of any drums or other conditions that warrant removal or other appropriate action. The reconnaissance will check for USTs or aboveground storage tanks (ASTs) and collect indoor air instrument measurements.

A geophysical survey will be conducted to mark out any subsurface structures and pre-clear the drilling locations. If any USTs/ASTs are discovered, the contents will be sampled and analyzed for profiling and proper disposal.

The environmental consultant will coordinate with the various agencies to obtain the necessary permits and notifications prior to conducting any subsurface intrusive work.

3.1.2 Managing Documents

As a part of this investigation, FLS has developed managing documents to ensure worker safety and data quality. The Managing Documents section includes the preparation of the Quality Assurance Project Plan (QAPP) and the Site Health and Safety Plan (HASP) documents for the project.

Quality Assurance Project Plan (QAPP)

A QAPP was prepared to ensure that samples are collected and handled in accordance with NYCDEC protocols. The QAPP contains all relevant Standard Operating Procedures to the project. A full Site Quality Assurance Project Plan (QAPP) is provided as Appendix B. An Emerging Contaminants Sampling QAPP is provided as Appendix C.

Health and Safety Plan (HASP)

A Site-Specific Health and Safety Plan (HASP) has been prepared for FLS employees. All work is expected to be performed in Level D personal protective equipment (PPE) with field personnel monitoring the work space. PPE upgrades will be implemented as necessary. The HASP is included as Appendix D.

3.2 SITE INVESTIGATION AND CHARACTERIZATION

3.2.1 Soil and Groundwater Analysis Plan

Soil Investigation

Soil Boring Installation

FLS plans to install five (5) soil borings within the Site east of the former ERH treatment area to evaluate source material on the eastern side of the treatment area/Site and in the area of a pit formerly located in vicinity of MW-1. Since the general subsurface geology consists of fill, silty sand, and silt, a Geoprobe drill rig with augers will be used for sampling purposes due to stratigraphy and equipment access limitations.

The proposed soil boring locations are presented in Figure 7a and Figure 7b. The locations were selected to fulfill the objectives listed in Section 1.2. The rationale for each boring is presented in Table 3.

Soil Screening

Soils will be field screened using a photoionization detector (PID) and generally described using the Unified Soil Classification system along the vertical soil column of each boring. PID readings will be recorded on the boring logs along with visual, olfactory and lithology observations.

Soil Sampling and Analysis

Soil samples will be obtained primarily using the Geoprobe with dedicated 2-inch-diameter (stainless steel and/or acetate), 4-foot-long core barrels. All in-ground sampling equipment will be thoroughly cleaned before and between sample collection. Table 3 lists the proposed boring depths.

In general, three to five soil samples per boring will be collected. The samples will be collected from a 1-foot interval at the following locations:

- The samples sample will be collected from the depth interval exhibiting the highest PID reading, visual or olfactory observations of contamination (i.e. stained soils, unusual odors, free product, etc.), and the field geologist’s judgment and discretion.
- Additional samples may be collected at the field geologist’s discretion including at the borders between geological stratifications and at random intervals to prevent data bias.

All samples will be collected according to FLS SOPs and environmental best practices including those delineated in Section 4.0. and the Site QAPP included as Appendix B. Emerging Contaminants sampling specific QAPP include as Appendix C. Generally, each sample will be labeled (e.g., name of boring and sample interval; SB-1 (12.5’-13.5’), sealed, and placed in a chilled cooler for shipment to the laboratory. Samples will be analyzed for VOCs Method 8260 via Encore samples, Total Organic Content, and Total Petroleum Hydrocarbons gasoline range organics, bulk density, and diesel range organics (GRO/DRO).

Groundwater Investigation

Monitoring Well Installation

FLS plans to convert the aforementioned borings into monitoring wells in order to investigate groundwater conditions within the Site boundaries east of the ERH treatment area and to further delineate the contaminant plume upgradient and side gradient boundaries within the Site area. Monitoring wells are planned to be installed in locations detailed on Figure 7a and 7b. FLS plans to install the following:

- One (1) 'intermediate aquifer' monitoring well is planned to be installed adjacent to the existing shallow aquifer well MW-1. Intermediate aquifer monitoring wells will be constructed with well screens within the intermediate aquifer at approximately 30 ft. – 40 ft.
- Four (4) additional well clusters containing both a shallow and intermediate aquifer well in locations along the eastern treatment area boundary as detailed on Figure 7a and 7b.

A machine-slotted, 2-inch-diameter Schedule 80 PVC well screen will be installed to the desired depth. A No. 1 Morie Sand or equivalent sand pack will be placed into the annular space 1 to 2 feet above the top of the well screen. A minimum 1-foot-thick bentonite seal will be installed above the sand pack. The bentonite seal is to be wetted with potable water and allowed to expand for a minimum of one-half hour before filling the overlying annular space. The remaining annular space will be tremied to grade with a Portland cement-bentonite mix.

The well surface will be completed as either a flush-mounted, watertight manhole or stick-up protective casing depending on development status and field conditions. This will be a field decision. The monitoring wells will be developed by pumping with a submersible pump until the discharge is silt-free or demonstrates no further improvement in turbidity. Well construction diagrams of the newly installed wells along with the existing ones will be provided in the final report. The wells will be allowed to equilibrate for a minimum of one week prior to sampling.

The wells will be surveyed by a New York State Licensed Surveyor. The top of casing elevations will be surveyed into NAVD88. A round of synoptic water level measurements from the monitoring well network will be completed and a groundwater contour map prepared.

Groundwater Sampling and Analysis

One groundwater sample will be collected from each of the wells within the monitoring well network using low-flow sampling methods, including the following:

- Twelve (12) existing on-Site wells;
- Nine (9) newly installed on-Site wells; and the

- Three (3) off-Site wells located along Van Dam Street.

The groundwater samples will be analyzed for the following parameters:

- TCL VOCs by EPA Method 8260;
- Methane, Ethane, Ethene, and Carbon Dioxide by EPA Method RSK-175;
- TAL metals by EPA Method 6010/7000;
- Basic groundwater parameters: nitrite, nitrate, sulfate, sulfide, iron II, iron III, chloride, and alkalinity.
- Chemical Oxygen Demand and Biological Oxygen Demand

3.2.2 Emerging Contaminants Sampling

The NYSDEC letter dated September 17, 2019 requests groundwater sampling for Polyfluoroalkyl Substances (PFAS) and 1, 4-Dioxane on New York State remediation sites. We understand this request is to evaluate "emerging contaminants" that have not historically been evaluated in the case of PFAS or have not been evaluated at lower detection limits as with 1,4-Dioxane in light of the recent identification of these contaminants in drinking water sources in New York state.

On September 17, 2019, the Department requested a sampling plan proposing a select number of groundwater monitoring wells for sampling these emerging contaminants of concern. As required by NYSDEC, we propose the sampling will take place within five days of the VOC groundwater sampling. The table below lists the Former ACCO Brands Site wells proposed for PFAS and 1,4-Dioxane sampling. As required by NYSDEC all on-Site monitoring wells will be samples for emerging contaminants. Figure 2 shows the proposed well locations.

Proposed PFAS/1,4-Dioxane Samples

Well ID	TCE Concentration (July 2019) (ug/L)	Temperature (August 2019) (C)
MWR-1I	2,000	50.42
MWR-1S	5,390	54.50
MWR-2I	7,790	53.05
MWR-2S	21,100	55.27
MWR-3I	5,840	60.31
MWR-3S	12,800	63.18
MWR-4I	232,000	58.46
MWR-4S	70,700	60.14
MW-1	360	24.35
MW-1I	tbd	tbd
MWR-5S	tbd	tbd
MWR-5I	tbd	tbd

MWR-6S	tbd	tbd
MWR-6I	tbd	tbd
MWR-8S	tbd	tbd
MWR-8I	tbd	tbd
MWR-9S	tbd	tbd
MWR-9I	tbd	tbd

Groundwater from the proposed wells will be sampled according to the analytical methods listed in table below. One field duplicate, one duplicate, and one matrix spike/matrix spike duplicate sample will also be collected for these parameters.

Proposed Analytical Methods

Analyte	Analytical Method	Reporting Limit
PFAS	EPA Method 537 Modified	≤ 2 ηg/L
1,4-Dioxane	EPA Method 8270	≤ 0.28 µg/L

Sampling for PFAS compounds will follow the Collection of Groundwater Samples for Perfluorooctanic Acid (PFOA) and Perfluorinated Compounds (PFCs) from Monitoring Wells Sample Protocol that accompanied the Department’s September 17, 2019 letter and will be conducted within 5 days of the VOC groundwater sampling as required by NYSDEC in their October 4, 2019 telephone conversation. A Quality Assurance Project Plan for Emerging Contaminant Sampling is included as Appendix C. Beam does not own the BCP Site and will require advance notice to the property owner of the NYSDEC request to conduct the emerging contaminant sampling, which, to Beam’s knowledge, has no relation to the contaminants of concern (namely TCE) that have been subject to Beam’s on-going investigation and remedial activity.

4.0 REMEDIAL INVESTIGATION REPORT

A Remedial Investigation Report (RIR) will be prepared upon completion of all fieldwork and review of analytical results. The RIR will include the following components:

- Description of field activities
- Summaries of field measurements and analytical data
- Conclusions and recommendation section
- Soil boring and monitoring well logs
- Laboratory and field level monitoring summary tables
    - Tables summarizing sample results, applicable standards for all sampled media
    - Table summarizing the construction details of new and existing monitoring wells (screen elevations, date of construction, geologic interval screened, and current status, i.e., destroyed, intact, etc.)

- Maps/Drawings, including:

    - A site map showing the final sample locations
    - Spider diagrams of analytical results
    - Groundwater contour map
    - Site map(s) showing layout and sampling locations

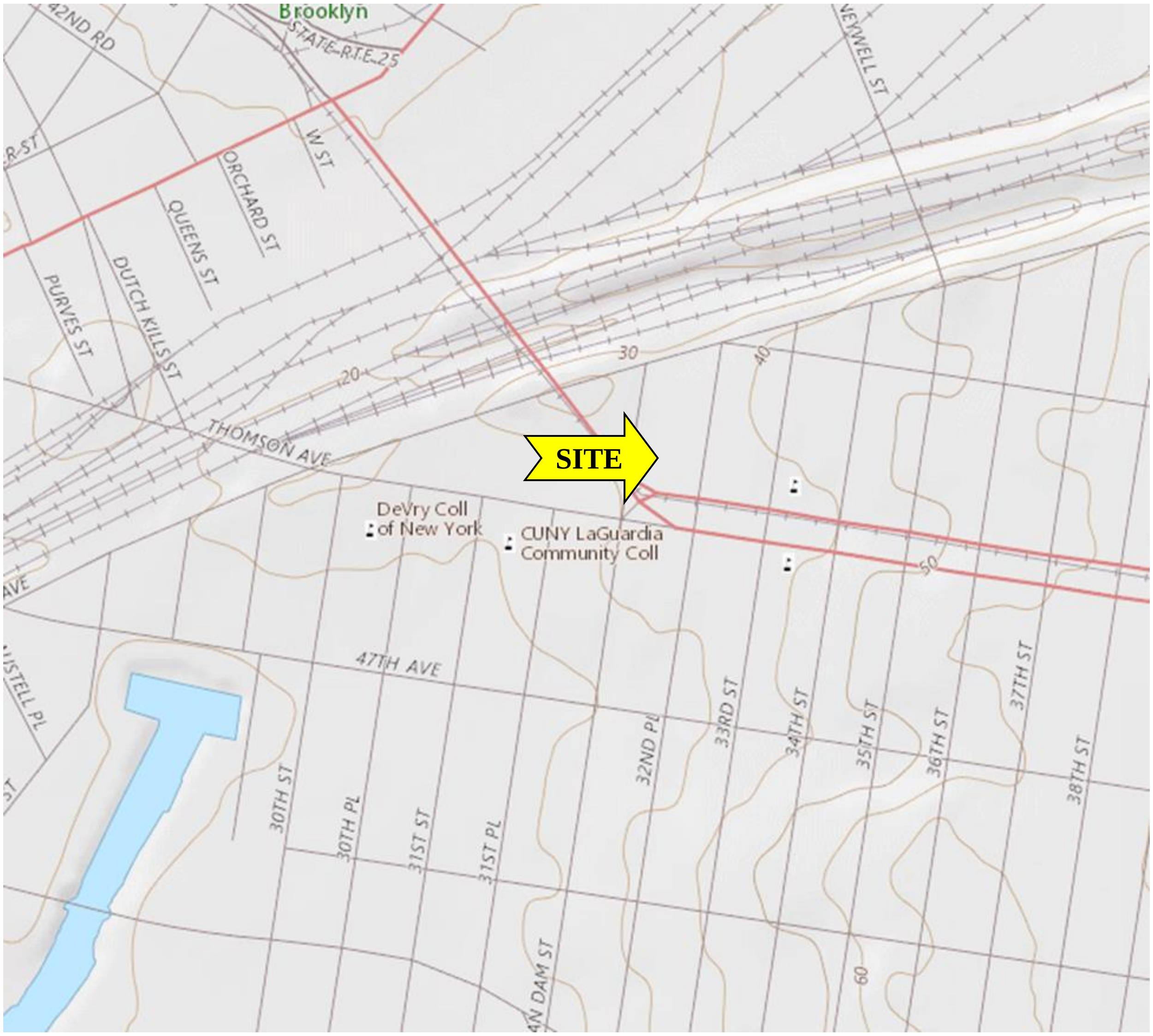
- Data validation results (DUSRs)

5.0 SCHEDULE

Brownfield Cleanup Program Remedial Investigation Schedule

Item	Duration/Date
Submit Revised RIWP with EC Sampling	10/30/2019
Initiate installation of monitoring wells and soil sampling	10/8/2019 – 10/19/2019
NYSDEC approval of EC Sampling (estimate)	11/4/2019
Initiate Groundwater Sampling for VOC and ECs (estimate)	11/11/2019
Complete Remedial Investigation Field Work	11/18/2019
Submit Remedial Investigation Report	12/9/2019

Figures



Central Park Quadrant 7.5 Minute Topographic Map, published by the USGS, and obtained from USGS The National Map

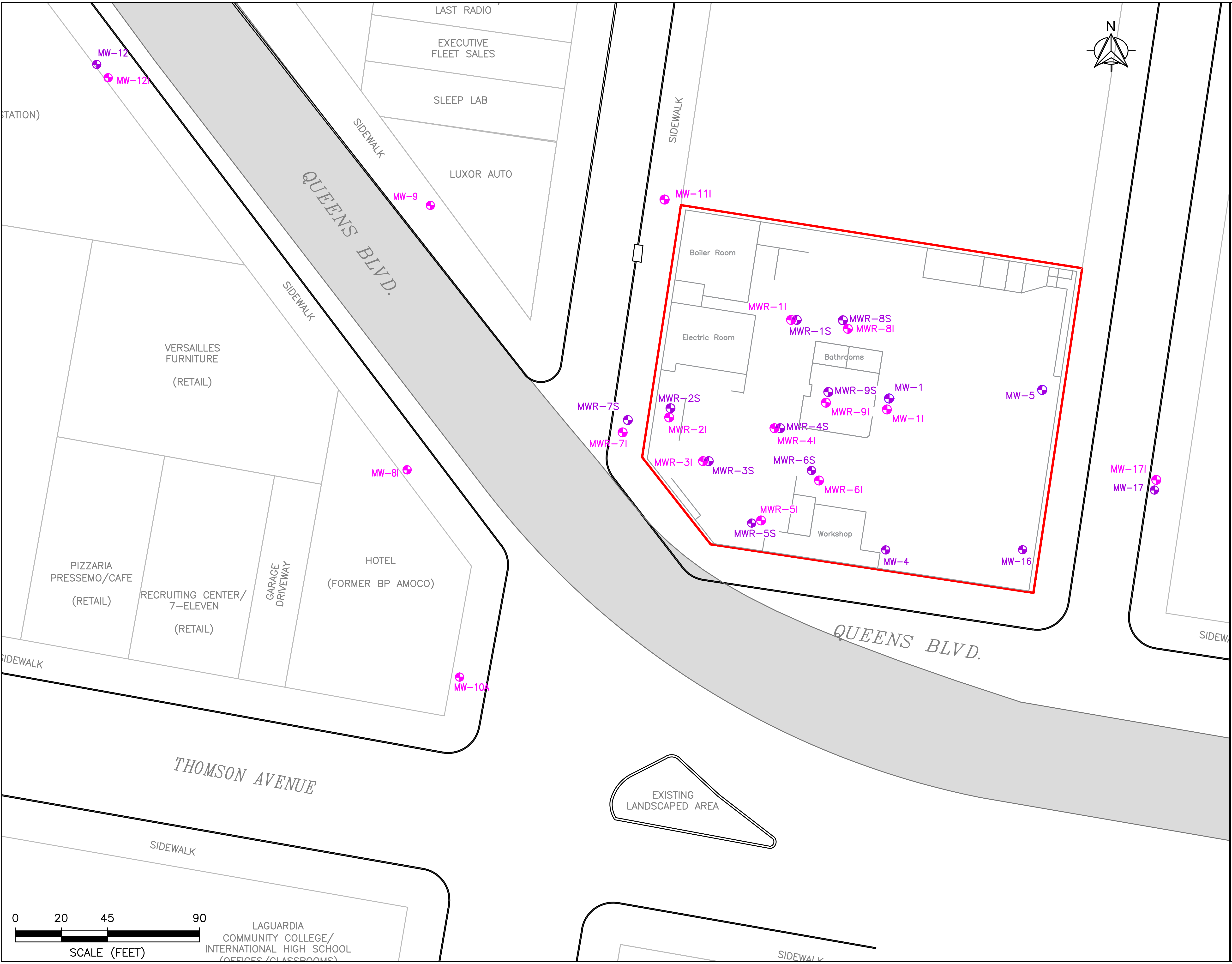
FIGURE 1: SITE LOCATION MAP

Fleming Lee Shue

SITE: Former ACCO Brands
32-00 Skillman Ave
Long Island City, NY 11101

CLIENT: Beam Suntory, Inc.

Environmental Management & Consulting, 158 West 29th Street, New York, NY 10001



FILE: P:\10195 – ACCO – Jim Beam\Figures\Groundwater\FLS Base Map\Site Plan – Monitoring Wells.dwg DATE: 10/30/2019

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Long Island City, NY

Figure 2

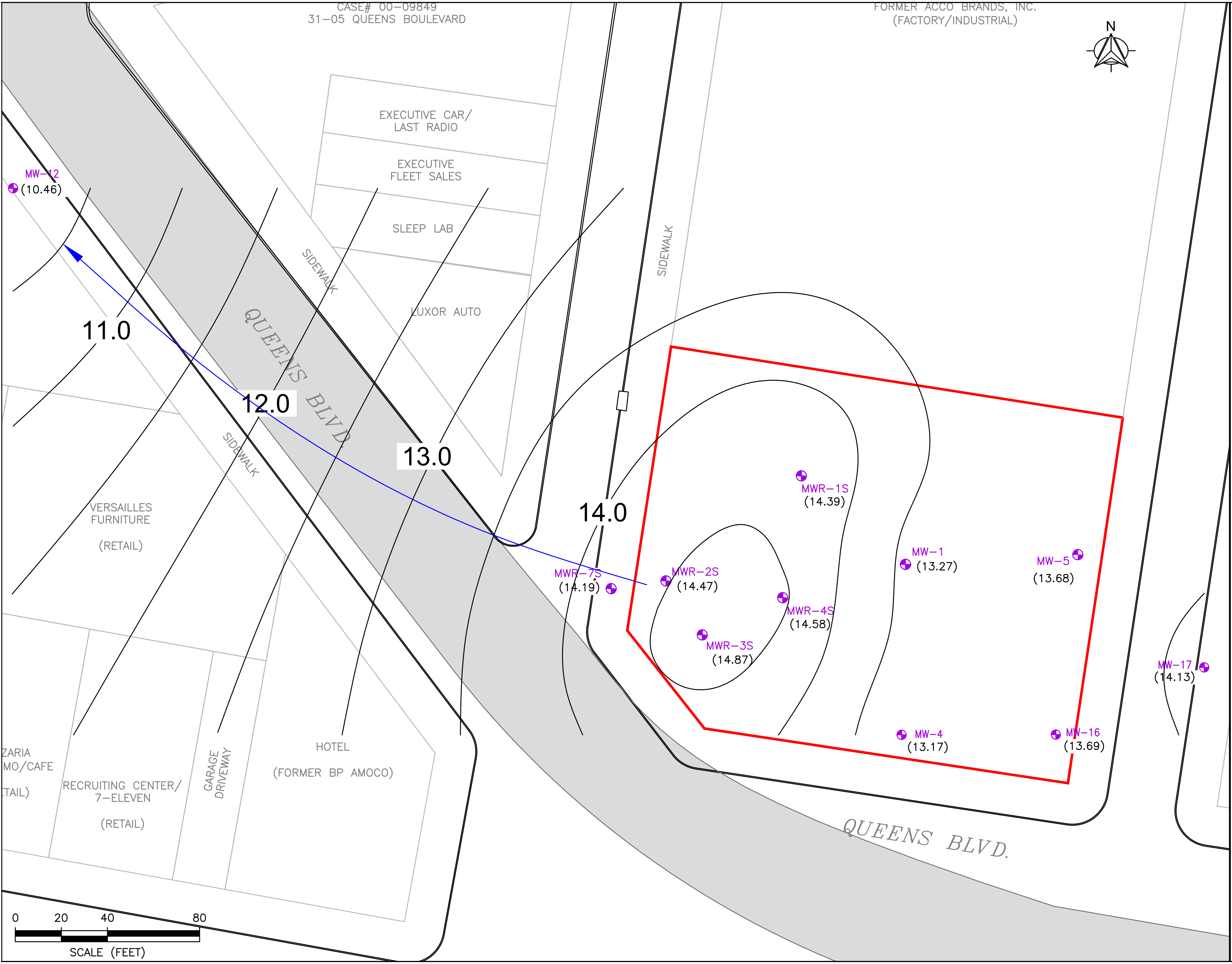
Site Plan - Monitoring Wells

October 2019

Project Number
10195-002

LEGEND

- SITE BOUNDARY
- ● SHALLOW MONITORING WELL
- ● INTERMEDIATE MONITORING WELL



FILE: P:\10195 – ACCO – Jim Beam\Figures\Groundwater\GW Elevation Contours and Isopleths\2019-07-08 GW Elevation Contours\2019-07-08 Shallow Contours v2.dwg DATE: 8/8/2019

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Figure 3a

Shallow Groundwater Contours

August 2019

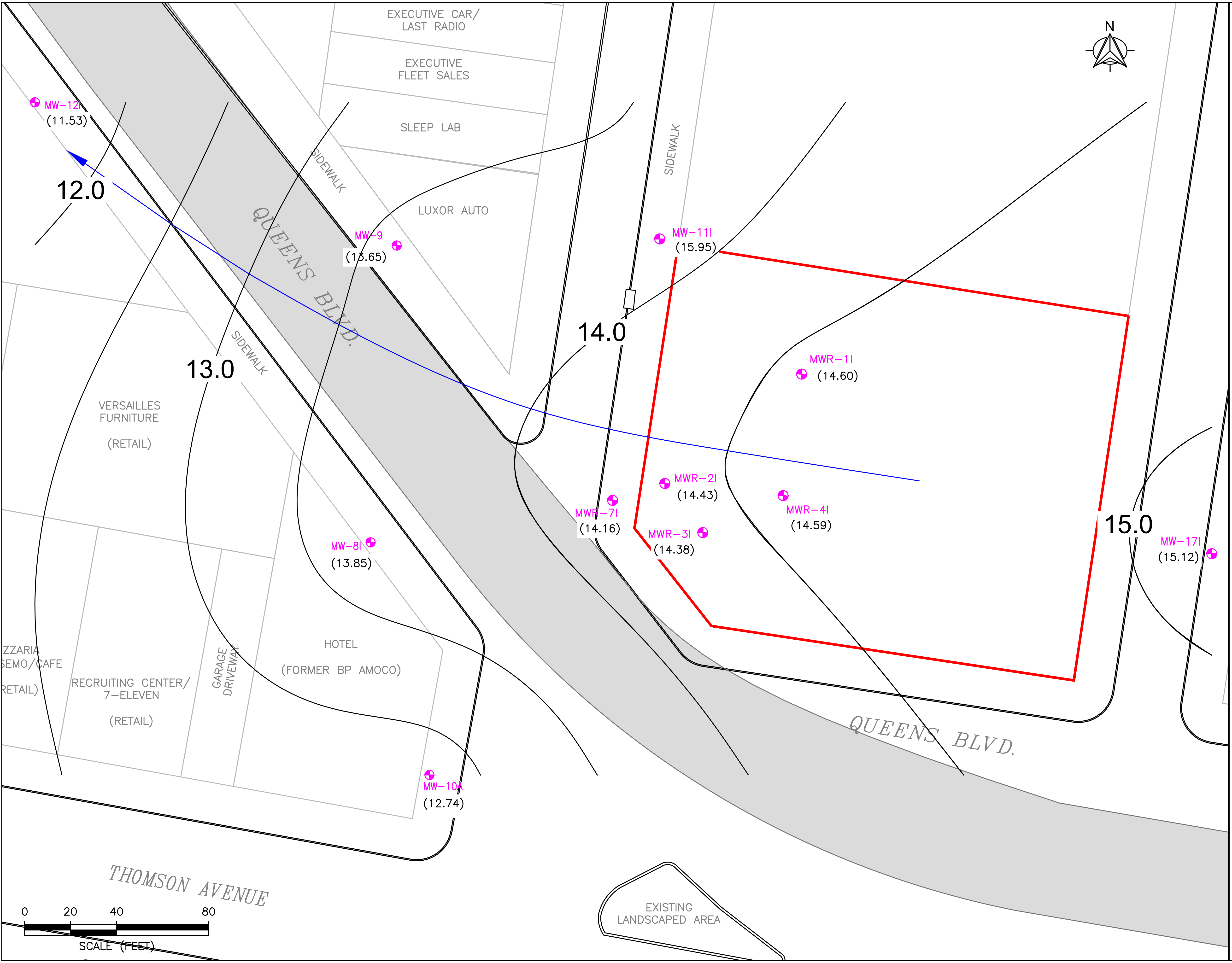
Project Number
10195-001

LEGEND

🟥	SITE BOUNDARY
●	SHALLOW MONITORING WELL
▬	GROUNDWATER CONTOUR
▬	GROUNDWATER FLOW DIRECTION

DEPTH TO WATER MEASURED on 7/8/2019 and 7/23/2019

SOURCE: CONTROL POINT ASSOCIATES SURVEY 03-18-19



FILE: P:\10195 – ACCO – Jim Beam\Figures\Groundwater\GW Elevation Contours and Isopleths\2019-07-08 GW Elevation Contours\2019-07-08 Intermediate Contours.dwg DATE: 8/8/2019

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Long Island City, NY

FIGURE 3b

Intermediate Groundwater Contours

August 2019

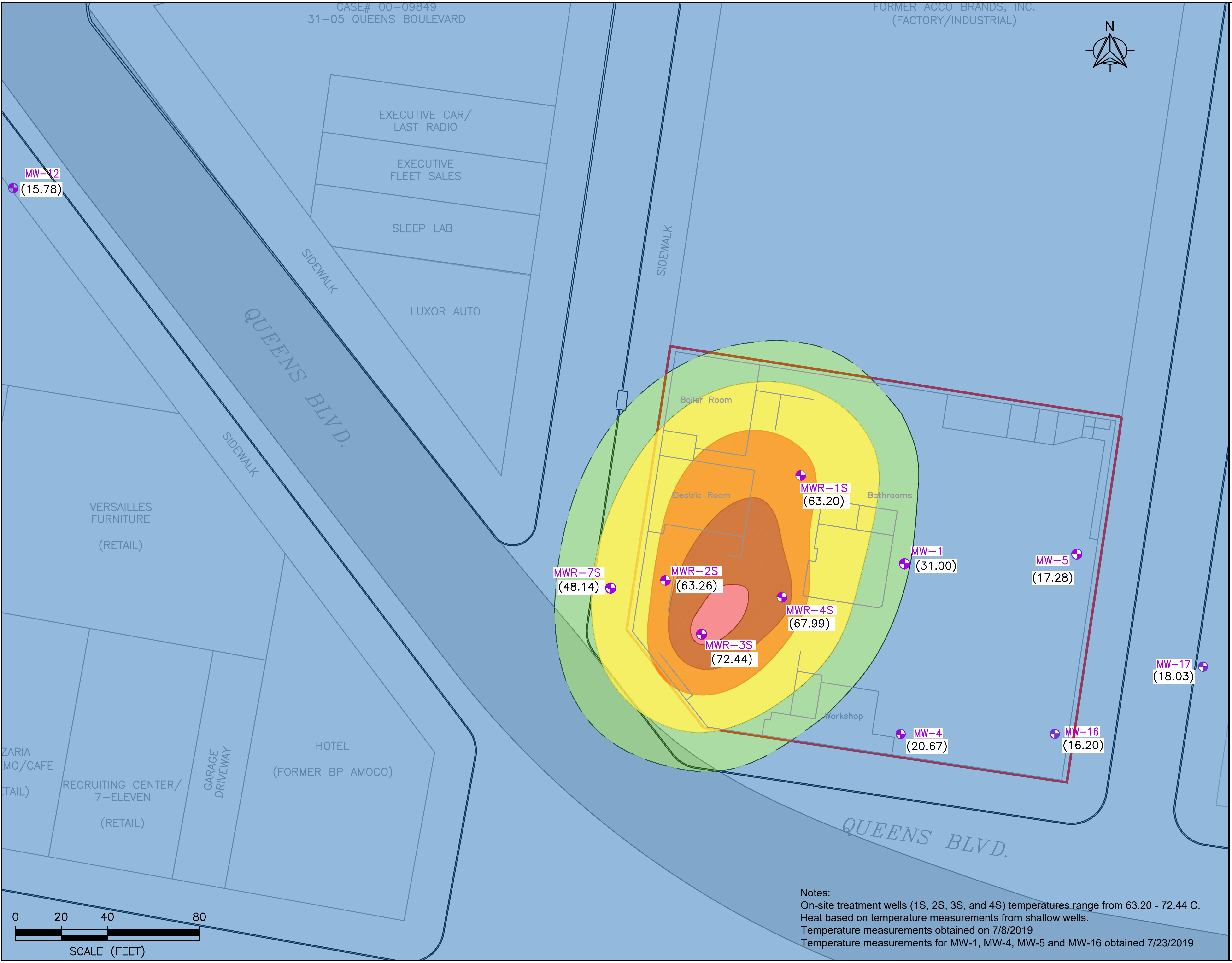
Project Number
10195-001

LEGEND

🟥	SITE BOUNDARY
●	INTERMEDIATE MONITORING WELL
▬	GROUNDWATER CONTOUR
▬	GROUNDWATER FLOW DIRECTION

DEPTH TO WATER MEASURED on 7/8/2019

SOURCE: CONTROL POINT ASSOCIATES SURVEY 03-18-19



Notes:
On-site treatment wells (1S, 2S, 3S, and 4S) temperatures range from 63.20 - 72.44 C.
Heat based on temperature measurements from shallow wells.
Temperature measurements obtained on 7/8/2019
Temperature measurements for MW-1, MW-4, MW-5 and MW-16 obtained 7/23/2019

FILE: P:\10195 – ACCO – Jim Beam\Figures\Groundwater\Temperature Contours\July 2019\Shallow Contours 7.8.19 v4.dwg DATE: 8/8/2019

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Figure 4a

Temperature Isopleth - Shallow Groundwater

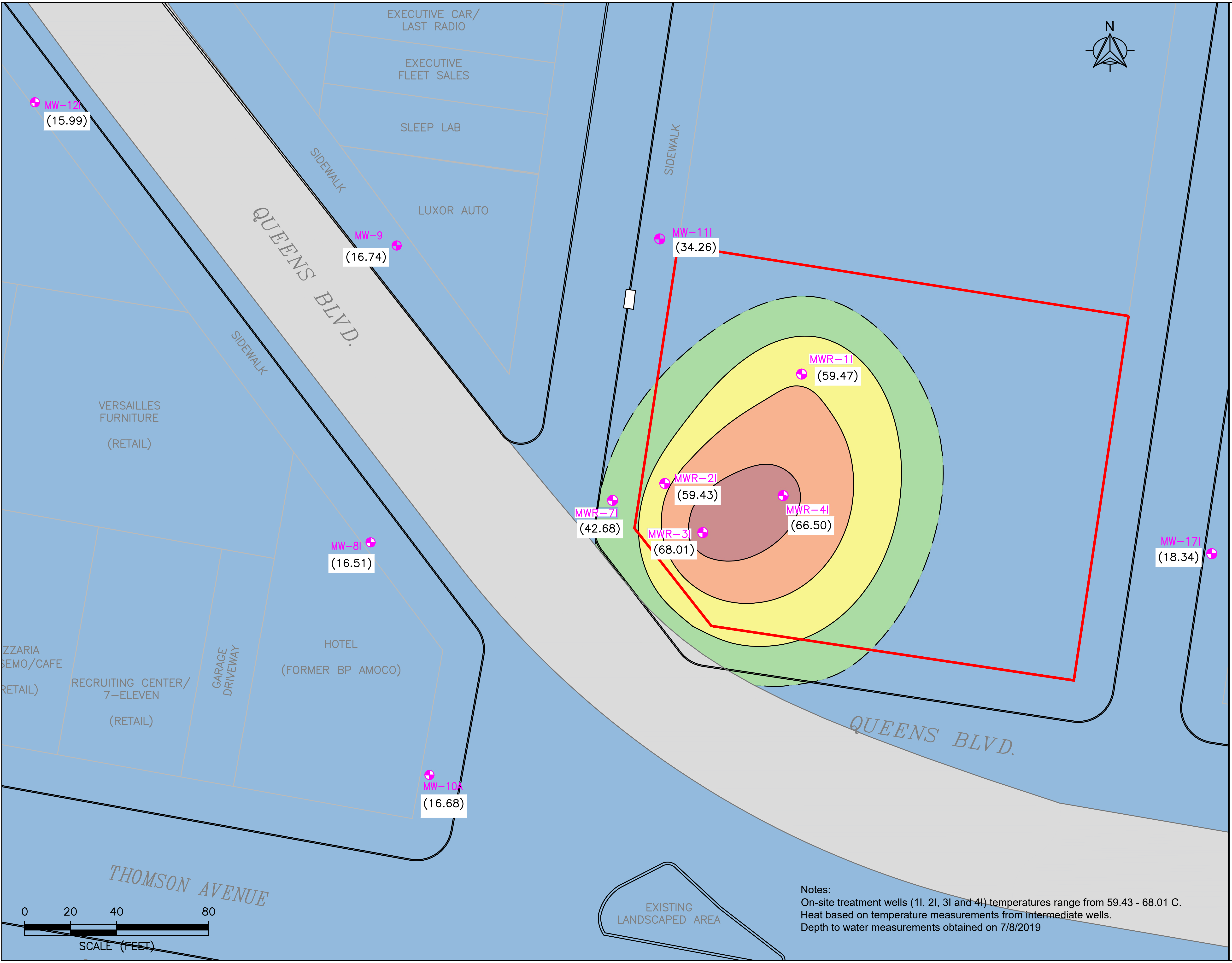
August 2019

Project Number
10195-001

LEGEND

🟥	SITE BOUNDARY
●	SHALLOW MONITORING WELL
—	TEMPERATURE CONTOUR (Dashed where inferred)
🟥	>70 DEGREES C
🟫	65–70 DEGREES C
🟧	60–65 DEGREES C
🟨	60–40 DEGREES C
🟩	40–30 DEGREES C
🟦	AMBIENT GROUNDWATER TEMPERATURE (~20 C)

SOURCE: CONTROL POINT
ASSOCIATES SURVEY 03-18-19



Notes:
On-site treatment wells (1I, 2I, 3I and 4I) temperatures range from 59.43 - 68.01 C.
Heat based on temperature measurements from intermediate wells.
Depth to water measurements obtained on 7/8/2019

FILE: P:\10195 – ACCO – Jim Beam\Figures\Groundwater\Temperature Contours\July 2019\Intermediate Contours 7.8.19.dwg DATE: 8/8/2019

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FIGURE 4b

Temperature Isopleth Gradient - Intermediate Groundwater

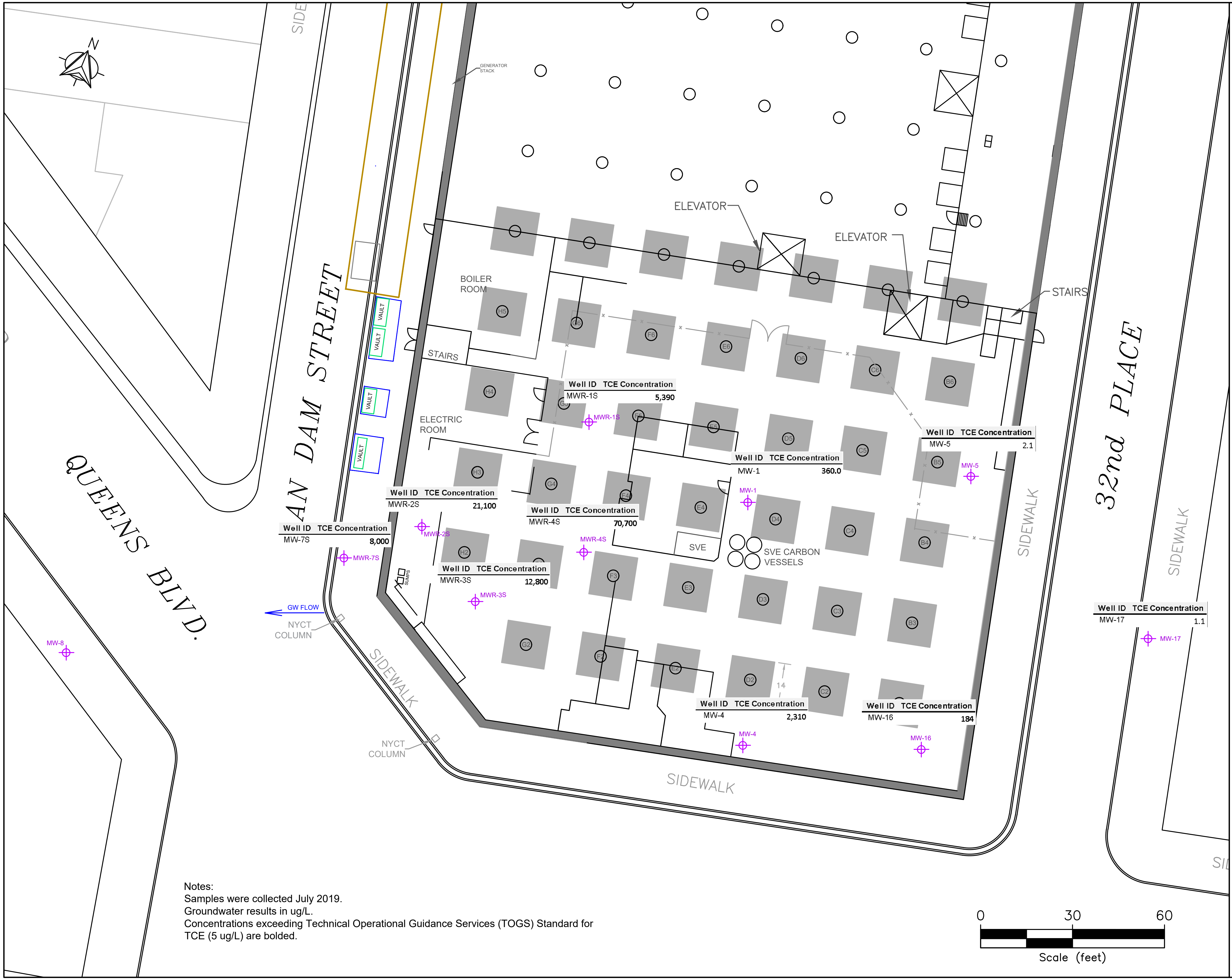
August 2019

Project Number
10195-001

LEGEND

🟥	SITE BOUNDARY
●	INTERMEDIATE MONITORING WELL
—	TEMPERATURE CONTOUR (Dashed where inferred)
🟫	>65 DEGREES C
🟧	60–65 DEGREES C
🟨	55–60 DEGREES C
🟩	40–55 DEGREES C
🟦	AMBIENT GROUNDWATER TEMPERATURE

SOURCE: CONTROL POINT
ASSOCIATES SURVEY 03-18-19



Notes:
Samples were collected July 2019.
Groundwater results in ug/L.
Concentrations exceeding Technical Operational Guidance Services (TOGS) Standard for TCE (5 ug/L) are bolded.

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Figure 5a

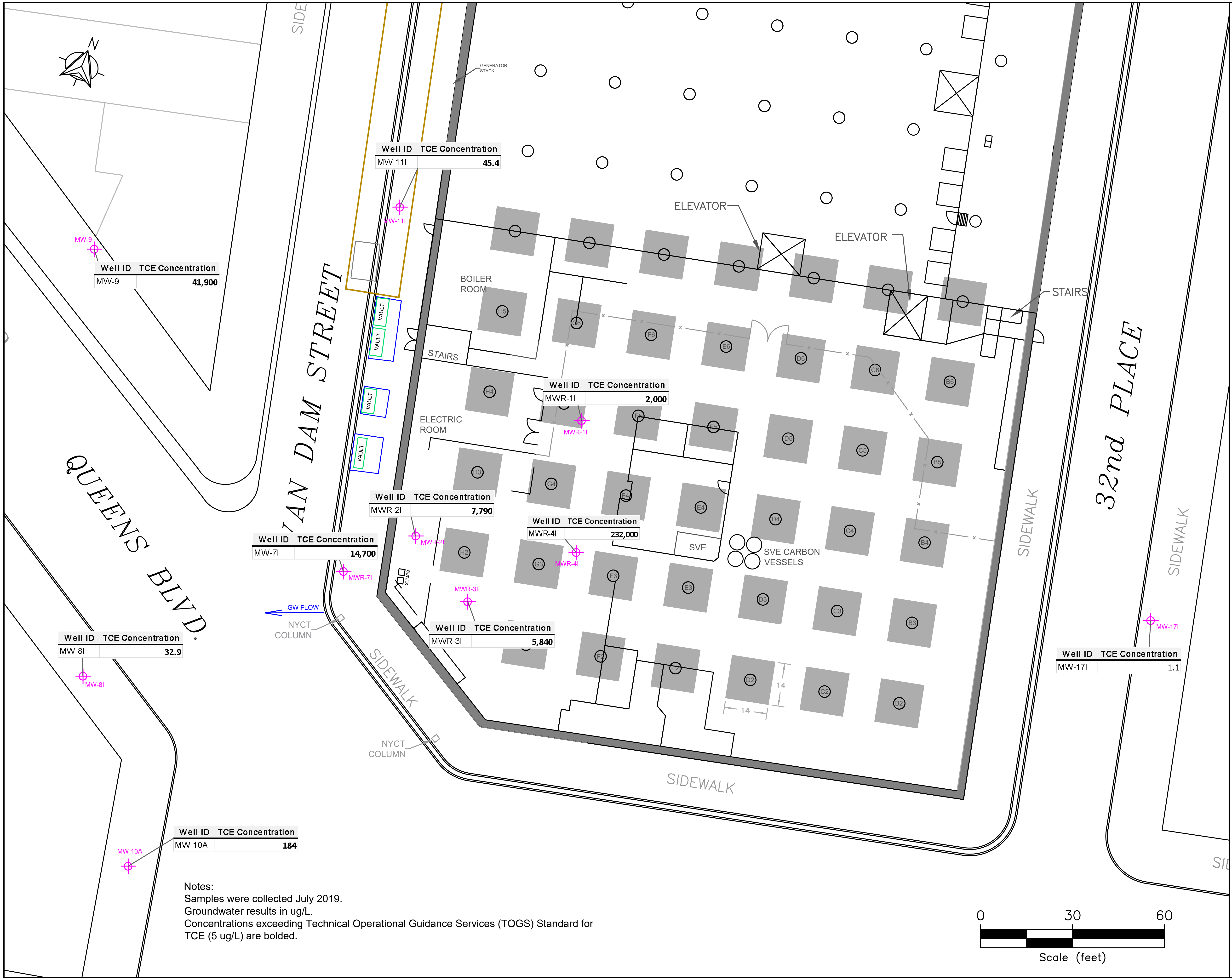
TCE Concentrations Shallow Aquifer

July 2019

Project Number
10195-001

LEGEND

⊕ Intermediate Monitoring Well
⊕ Shallow Monitoring Well
⊕ Deep Monitoring Well



Well ID	TCE Concentration
MW-11I	**45.4**

Well ID	TCE Concentration
MW-9	**41,900**

Well ID	TCE Concentration
MWR-1I	**2,000**

Well ID	TCE Concentration
MWR-2I	**7,790**

Well ID	TCE Concentration
MWR-4I	**232,000**

Well ID	TCE Concentration
MW-7I	**14,700**

Well ID	TCE Concentration
MW-8I	**32.9**

Well ID	TCE Concentration
MWR-3I	**5,840**

Well ID	TCE Concentration
MW-17I	1.1

Well ID	TCE Concentration
MW-10A	**184**

Notes:
Samples were collected July 2019.
Groundwater results in ug/L.
Concentrations exceeding Technical Operational Guidance Services (TOGS) Standard for TCE (5 ug/L) are bolded.

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Figure 5b

TCE Concentrations Intermediate Aquifer

July 2019

Project Number
10195-001

LEGEND

⌖ Intermediate Monitoring Well
⌖ Shallow Monitoring Well

FILE: P:\10195 – ACCO – Jim Beam\Figures\2019 RIWP\Fig. 4 Groundwater Exceedances Int\Fig.5b Groundwater Exceedances Intermediate.dwg DATE: 8/8/2019

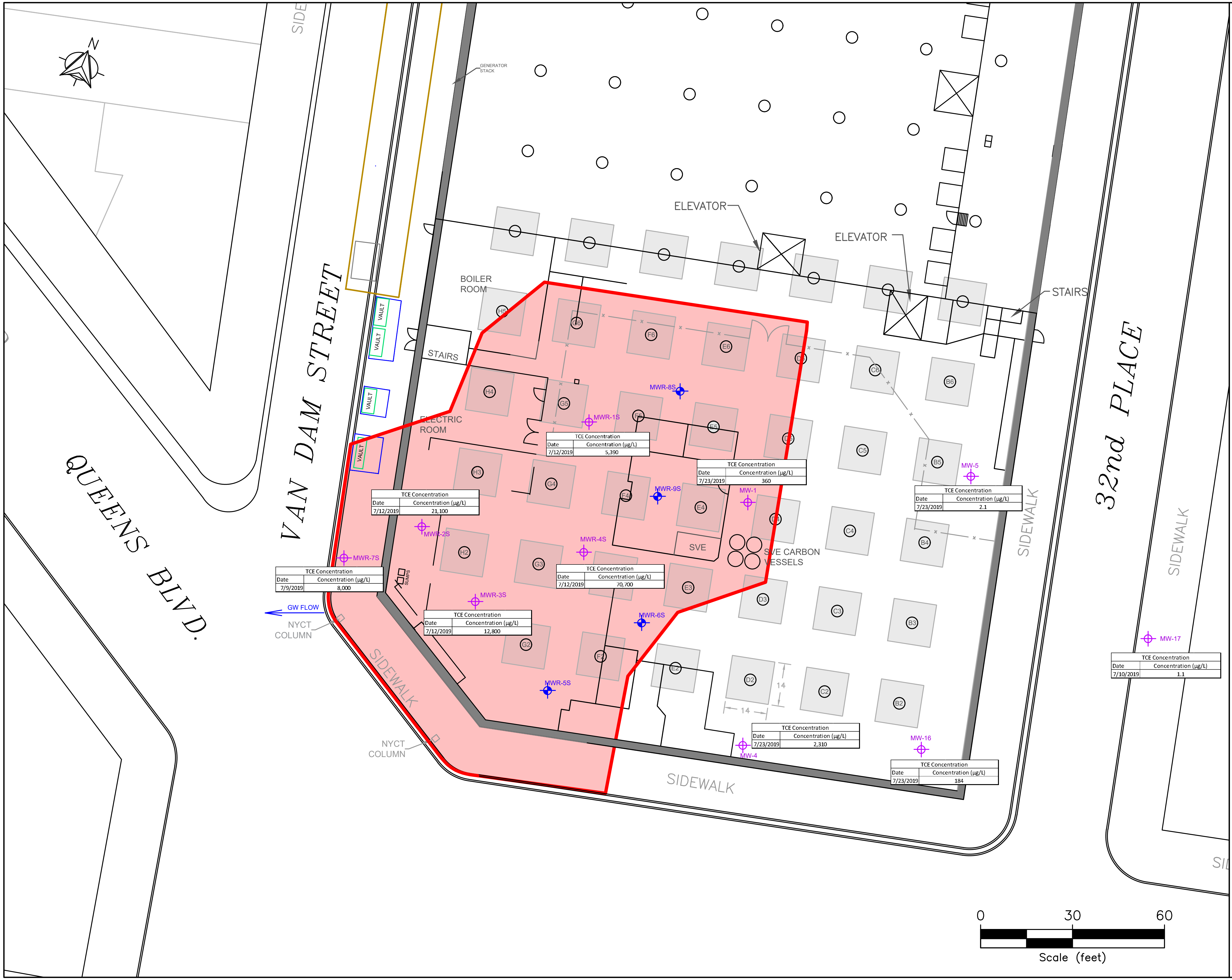

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Figure 7a

Proposed Boring and Shallow Monitoring Well Locations

August 2019

Project Number
10195-001

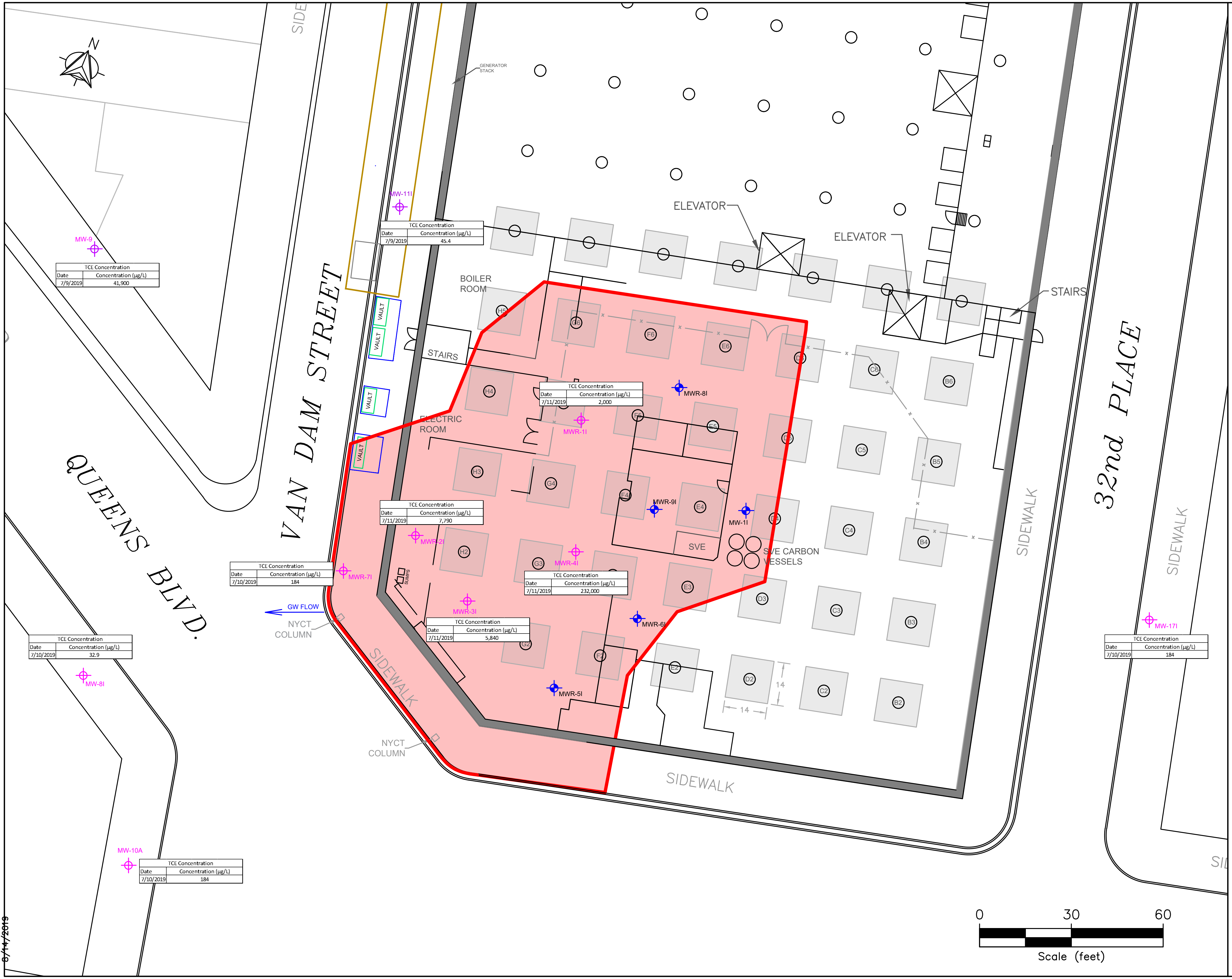
LEGEND

⌖ Shallow Monitoring Well

⊕ Proposed Soil Boring and Permanent Monitoring Well Location

🟥 ERH Treatment Area

FILE: P:\10195 - ACCO - Jim Beam\Figures\2019 RIWP\Fig. 9 Proposed Boring and Monitoring Well Location Map\Fig.7a Proposed Boring and MW Location Plan (Shallow).dwg DATE: 8/14/2019



FILE: P:\10195 – ACCO – Jim Beam\Figures\2019 RIWP\Fig. 9 Proposed Boring and Monitoring Well Location Map\Fig.7b Proposed Boring and MW Location Plan (Intermediate).dwg DATE: 8/14/2019

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Figure 7b

Proposed Boring and Intermediate Monitoring Well Locations

August 2019

Project Number
10195-001

LEGEND

⌖	Intermediate Monitoring Well
⌖	Proposed Soil Boring and Permanent Monitoring Well Location
🟥	ERH Treatment Area

Tables

Table 1.
Summary of Groundwater Analytical Results - July 2019
Former ACCO Brands Site

		NY TOGS Class GA GW Standards (NYSDEC 6/2004)1	**Off-Site Monitoring Wells - Downgradient**							**Off-Site - Treatment Area Wells**					**Off-Site Upgradient**	
Client Sample ID:			**MW-8I**	**MW-9**	**MW-9-DUP**	**MW-10A**	**MW-11I**	**MW-12**	**MW-12I**	**MWR-7S**	**MWR-7I**	**MWR-7I-DUP**	**MWR-7I-UNPRES**	**MWR-7I-DUP-UNPRES**	**MW-17**	**MW-17I**
Lab Sample ID:			**JC91330-5**	**JC91333-1**	**JC91333-2**	**JC91330-7**	**JC91330-3**	**JC91330-9**	**JC91330-22**	**JC91330-1**	**JC91330-2**	**JC91330-10**	**JC91330-11**	**JC91330-12**	**JC91330-6**	**JC91330-8**
Date Sampled:			**7/10/2019**	**7/9/2019**	**7/9/2019**	**7/10/2019**	**7/9/2019**	**7/10/2019**	**7/11/2019**	**7/9/2019**	**7/9/2019**	**7/9/2019**	**7/10/2019**	**7/10/2019**	**7/10/2019**	**7/10/2019**
Matrix:			**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**
MS Volatiles (SW846 8260C)																
Tetrachloroethene	ug/l	5	ND (0.90)	**73.2**	**76.8**	2	ND (0.90)	ND (1.8)	ND (0.90)	ND (45)	ND (90)	ND (45)	ND (45)	ND (45)	ND (0.90)	ND (0.90)
Trichloroethene	ug/l	5	**32.9**	**41900**	**42800**	**184**	**45.4**	1.6 J	ND (0.53)	**8000**	**14700**	**15600**	**17400**	**17800**	1.1	ND (0.53)
1,1-Dichloroethene	ug/l	5	ND (0.59)	ND (30)	ND (30)	ND (0.59)	1.5	ND (1.2)	ND (0.59)	**31.4 J**	ND (59)	ND (30)	ND (30)	ND (30)	ND (0.59)	ND (0.59)
cis-1,2-Dichloroethene	ug/l	5	2.9	**35.0 J**	**31.3 J**	ND (0.51)	**40.1**	ND (1.0)	ND (0.51)	**188**	**263**	**242**	**242**	**233**	ND (0.51)	ND (0.51)
trans-1,2-Dichloroethene	ug/l	5	ND (0.54)	ND (27)	ND (27)	ND (0.54)	**6.4**	ND (1.1)	ND (0.54)	ND (27)	ND (54)	ND (27)	ND (27)	ND (27)	ND (0.54)	ND (0.54)
Vinyl chloride	ug/l	2	ND (0.79)	ND (39)	ND (39)	ND (0.79)	**54.9**	ND (1.6)	ND (0.79)	ND (39)	ND (79)	ND (39)	ND (39)	ND (39)	ND (0.79)	ND (0.79)
Ethene	ug/l	-	ND (0.072)	ND (0.072)	-	ND (0.072)	27	-	-	4.8	8.9	-	-	-	ND (0.072)	ND (0.072)
Chloride	ug/l	250000	**791000**	**842000**	-	**891000**	84200	-	-	**1900000**	**1380000**	-	-	-	**776000**	**887000**
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.65)	ND (33)	ND (33)	ND (0.65)	ND (0.65)	ND (1.3)	ND (0.65)	ND (33)	ND (65)	ND (33)	ND (33)	ND (33)	ND (0.65)	ND (0.65)
1,1,1-Trichloroethane	ug/l	5	ND (0.54)	ND (27)	ND (27)	ND (0.54)	ND (0.54)	ND (1.1)	ND (0.54)	ND (27)	ND (54)	ND (27)	ND (27)	ND (27)	ND (0.54)	ND (0.54)
1,1,2-Trichloroethane	ug/l	1	ND (0.53)	ND (27)	ND (27)	**8.5**	ND (0.53)	ND (1.1)	ND (0.53)	ND (27)	ND (53)	ND (27)	ND (27)	ND (27)	ND (0.53)	ND (0.53)
1,1-Dichloroethane	ug/l	5	ND (0.57)	ND (28)	ND (28)	ND (0.57)	ND (0.57)	ND (1.1)	ND (0.57)	ND (28)	ND (57)	ND (28)	ND (28)	ND (28)	ND (0.57)	ND (0.57)
1,2-Dichloroethane	ug/l	0.6	ND (0.60)	ND (30)	ND (30)	**1.3**	ND (0.60)	ND (1.2)	ND (0.60)	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (0.60)	ND (0.60)
Chloroethane	ug/l	5	ND (0.73)	ND (36)	ND (36)	ND (0.73)	2.3	ND (1.5)	ND (0.73)	ND (36)	ND (73)	ND (36)	ND (36)	ND (36)	ND (0.73)	ND (0.73)
Ethane	ug/l	-	ND (0.099)	ND (0.099)	-	ND (0.099)	10.5	-	-	5.4	5.2	-	-	-	ND (0.099)	ND (0.099)
Benzene	ug/l	1	0.5	ND (21)	ND (21)	ND (0.43)	ND (0.43)	**130**	**20.4**	**44.9**	ND (43)	**25.4**	**25.3**	**23.0 J**	ND (0.43)	ND (0.43)
Ethylbenzene	ug/l	5	ND (0.60)	ND (30)	ND (30)	ND (0.60)	ND (0.60)	**347**	**8.7**	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (0.60)	ND (0.60)
Toluene	ug/l	5	ND (0.53)	ND (27)	ND (27)	ND (0.53)	ND (0.53)	**14.2**	2.3	ND (27)	ND (53)	ND (27)	ND (27)	ND (27)	ND (0.53)	ND (0.53)
m,p-Xylene	ug/l	-	ND (0.78)	ND (39)	ND (39)	ND (0.78)	ND (0.78)	607	25.6	ND (39)	ND (78)	ND (39)	ND (39)	ND (39)	ND (0.78)	ND (0.78)
o-Xylene	ug/l	5	ND (0.59)	ND (30)	ND (30)	ND (0.59)	ND (0.59)	**66.3**	2.5	ND (30)	ND (59)	ND (30)	ND (30)	ND (30)	ND (0.59)	ND (0.59)
Xylene (total)	ug/l	5	ND (0.59)	ND (30)	ND (30)	ND (0.59)	ND (0.59)	**673**	**28.1**	ND (30)	ND (59)	ND (30)	ND (30)	ND (30)	ND (0.59)	ND (0.59)
Isopropylbenzene	ug/l	5	1.5	ND (32)	ND (32)	ND (0.65)	ND (0.65)	**149**	**90.5**	ND (32)	ND (65)	ND (32)	ND (32)	ND (32)	ND (0.65)	ND (0.65)
Methyl Tert Butyl Ether	ug/l	10	ND (0.51)	ND (25)	ND (25)	ND (0.51)	ND (0.51)	ND (1.0)	ND (0.51)	ND (25)	ND (51)	ND (25)	ND (25)	ND (25)	ND (0.51)	ND (0.51)

Table 1.
Summary of Groundwater Analytical Results - July 2019
Former ACCO Brands Site

			Site - ERH Performance Area Wells											Site - Eastern Shallow Wells (older)				
Client Sample ID:		**NY TOGS Class GA GW Standards (NYSDEC 6/2004)1**	**MWR-1S**	**MWR-2S**	**MWR-3S**	**MWR-4S**	**MWR-4S-DUP**	**MWR-1I**	**MWR-2I**	**MWR-2I-DUP**	**MWR-3I**	**MWR-4I**	**MWR-4I-DUP**	**MW-1**	**MW-1 DUP**	**MW-4**	**MW-5**	**MW-16**
Lab Sample ID:			**JC91330-24**	**JC91330-25**	**JC91330-23**	**JC91330-26**	**JC91330-27**	**JC91330-15**	**JC91330-18**	**JC91330-19**	**JC91330-14**	**JC91330-16**	**JC91330-17**	**JC92094-2**	**JC92094-3**	**JC92094-1**	**JC92094-4**	**JC92094-7**
Date Sampled:			**7/12/2019**	**7/12/2019**	**7/12/2019**	**7/12/2019**	**7/12/2019**	**7/11/2019**	**7/11/2019**	**7/11/2019**	**7/11/2019**	**7/11/2019**	**7/11/2019**	**7/23/2019**	**7/23/2019**	**7/23/2019**	**7/23/2019**	**7/23/2019**
Matrix:			**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**	**Ground Water**
MS Volatiles (SW846 8260C)																		
Tetrachloroethene	ug/l	5	ND (9.0)	ND (45)	ND (18)	ND (180)	ND (180)	**5.9**	ND (45)	ND (45)	ND (9.0)	**519**	**508**	**10.6**	**10.5**	ND (9.0)	ND (0.90)	1.2
Trichloroethene	ug/l	5	**5390**	**21100**	**12800**	**70700**	**82300**	**2000**	**7790**	**7740**	**5840**	**232000**	**238000**	**360**	**459**	**2310**	2.1	**184**
1,1-Dichloroethene	ug/l	5	ND (5.9)	ND (30)	**14.2 J**	ND (120)	ND (120)	ND (3.0)	ND (30)	ND (30)	**7.1 J**	ND (300)	ND (300)	ND (0.59)	ND (0.59)	**6.6 J**	ND (0.59)	ND (0.59)
cis-1,2-Dichloroethene	ug/l	5	**79.7**	**385**	**688**	ND (100)	ND (100)	**40.4**	**254**	**254**	**2370**	ND (250)	ND (250)	ND (0.51)	ND (0.51)	ND (5.1)	ND (0.51)	ND (0.51)
trans-1,2-Dichloroethene	ug/l	5	ND (5.4)	ND (27)	ND (11)	ND (110)	ND (110)	ND (2.7)	ND (27)	ND (27)	**15.5**	ND (270)	ND (270)	ND (0.54)	ND (0.54)	ND (5.4)	ND (0.54)	ND (0.54)
Vinyl chloride	ug/l	2	ND (7.9)	ND (39)	ND (16)	ND (160)	ND (160)	ND (3.9)	ND (39)	ND (39)	ND (7.9)	ND (390)	ND (390)	ND (0.79)	ND (0.79)	ND (7.9)	ND (0.79)	ND (0.79)
Ethene	ug/l	-	0.93	29	6.2	12.2	-	0.35	1.1	-	ND (0.072)	1.4	-	ND (0.072)	-	ND (0.072)	ND (0.072)	ND (0.072)
Chloride	ug/l	250000	**1540000**	**2710000**	**2630000**	**1570000**	-	**1210000**	**2140000**	-	**2160000**	**1060000**	-	**1120000**	-	**2170000**	**599000**	**594000**
1,1,2,2-Tetrachloroethane	ug/l	5	ND (6.5)	ND (33)	ND (13)	ND (130)	ND (130)	ND (3.3)	ND (33)	ND (33)	ND (6.5)	ND (330)	ND (330)	ND (0.65)	ND (0.65)	ND (6.5)	ND (0.65)	ND (0.65)
1,1,1-Trichloroethane	ug/l	5	ND (5.4)	ND (27)	ND (11)	ND (110)	ND (110)	ND (2.7)	ND (27)	ND (27)	ND (5.4)	ND (270)	ND (270)	ND (0.54)	ND (0.54)	ND (5.4)	ND (0.54)	ND (0.54)
1,1,2-Trichloroethane	ug/l	1	ND (5.3)	ND (27)	ND (11)	ND (110)	ND (110)	ND (2.7)	ND (27)	ND (27)	ND (5.3)	ND (270)	ND (270)	ND (0.53)	ND (0.53)	ND (5.3)	ND (0.53)	ND (0.53)
1,1-Dichloroethane	ug/l	5	ND (5.7)	ND (28)	ND (11)	ND (110)	ND (110)	ND (2.8)	ND (28)	ND (28)	ND (5.7)	ND (280) ^{c}	ND (280)	ND (0.57)	ND (0.57)	ND (5.7)	ND (0.57)	ND (0.57)
1,2-Dichloroethane	ug/l	0.6	ND (6.0)	ND (30)	ND (12)	ND (120)	ND (120)	ND (3.0)	ND (30)	ND (30)	ND (6.0)	ND (300)	ND (300)	ND (0.60)	ND (0.60)	ND (6.0)	ND (0.60)	ND (0.60)
Chloroethane	ug/l	5	ND (7.3)	ND (36)	ND (15)	ND (150)	ND (150)	ND (3.6) ^{b}	ND (36)	ND (36)	ND (7.3)	ND (360)	ND (360) ^{b}	ND (0.73)	ND (0.73)	ND (7.3)	ND (0.73)	ND (0.73)
Ethane	ug/l	-	0.44	9.8	4.2	14.7	-	ND (0.099)	0.42	-	ND (0.099)	2.5	-	ND (0.099)	-	ND (0.099)	ND (0.099)	ND (0.099)
Benzene	ug/l	1	**10**	**24.7 J**	**127**	ND (85)	ND (85)	**33.3**	**31.7**	**32.3**	**12.4**	ND (210)	ND (210)	ND (0.43)	ND (0.43)	ND (4.3)	ND (0.43)	ND (0.43)
Ethylbenzene	ug/l	5	ND (6.0)	ND (30)	ND (12)	ND (120)	ND (120)	ND (3.0)	ND (30)	ND (30)	ND (6.0)	ND (300)	ND (300)	ND (0.60)	ND (0.60)	ND (6.0)	ND (0.60)	ND (0.60)
Toluene	ug/l	5	ND (5.3)	ND (27)	ND (11)	ND (110)	ND (110)	ND (2.7)	ND (27)	ND (27)	ND (5.3)	ND (270)	ND (270)	ND (0.53)	ND (0.53)	ND (5.3)	ND (0.53)	ND (0.53)
m,p-Xylene	ug/l	-	ND (7.8)	ND (39)	ND (16)	ND (160)	ND (160)	ND (3.9)	ND (39)	ND (39)	ND (7.8)	ND (390)	ND (390)	ND (0.78)	ND (0.78)	ND (7.8)	ND (0.78)	ND (0.78)
o-Xylene	ug/l	5	ND (5.9)	ND (30)	ND (12)	ND (120)	ND (120)	ND (3.0)	ND (30)	ND (30)	ND (5.9)	ND (300)	ND (300)	ND (0.59)	ND (0.59)	ND (5.9)	ND (0.59)	ND (0.59)
Xylene (total)	ug/l	5	ND (5.9)	ND (30)	ND (12)	ND (120)	ND (120)	ND (3.0)	ND (30)	ND (30)	ND (5.9)	ND (300)	ND (300)	ND (0.59)	ND (0.59)	ND (5.9)	ND (0.59)	ND (0.59)
Isopropylbenzene	ug/l	5	ND (6.5)	ND (32)	ND (13)	ND (130)	ND (130)	ND (3.2)	ND (32)	ND (32)	ND (6.5)	ND (320)	ND (320)	ND (0.65)	ND (0.65)	ND (6.5)	ND (0.65)	ND (0.65)
Methyl Tert Butyl Ether	ug/l	10	ND (5.1)	ND (25)	ND (10)	ND (100)	ND (100)	ND (2.5)	ND (25)	ND (25)	ND (5.1)	ND (250)	ND (250)	ND (0.51)	ND (0.51)	ND (5.1)	ND (0.51)	ND (0.51)

Table 2.
Summarey of Geochemical Analytical Results - July 2019
Former ACCO Brands Site

		Off-Site Monitoring Wells - Downgradient				Off-Site - Treatment Area Wells		Off-Site Upgradient		Site - ERH Performance Area Wells								Site - Eastern Shallow Wells (older)			
Client Sample ID:		MW-8I	MW-9	MW-10A	MW-11I	MWR-7S	MWR-7I	MW-17	MW-17I	MWR-1S	MWR-2S	MWR-3S	MWR-4S	MWR-1I	MWR-2I	MWR-3I	MWR-4I	MW-1	MW-4	MW-5	MW-16
Lab Sample ID:		JC91330-5	JC91333-1	JC91330-7	JC91330-3	JC91330-1	JC91330-2	JC91330-6	JC91330-8	JC91330-24	JC91330-25	JC91330-23	JC91330-26	JC91330-15	JC91330-18	JC91330-14	JC91330-16	JC92094-2	JC92094-1	JC92094-4	JC92094-7
Date Sampled:		7/10/2019	7/9/2019	7/10/2019	7/9/2019	7/9/2019	7/9/2019	7/10/2019	7/10/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/11/2019	7/11/2019	7/11/2019	7/11/2019	7/23/2019	7/23/2019	7/23/2019	7/23/2019
Matrix:		Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC Volatiles (RSK-175)																					
Methane	ug/l	15.8	ND (0.060)	1.1	1320	0.84	15.1	ND (0.060)	ND (0.060)	5.2	5.8	2.8	2.8	4.9	0.57	0.25	0.33	0.2	0.56	0.19	0.15
Carbon Dioxide	ug/l	10100	8270	8240	6650	2160	28400	11400	11400	43400	776	1290	906	22100	2840	3970	30600	2160	16700	3240	2860
Metals Analysis																					
Calcium	ug/l	122000	251000	111000	59300	244000	220000	161000	181000	316000	453000	621000	249000	283000	264000	325000	128000	248000	320000	189000	92800
Iron	ug/l	ND (100)	ND (100)	ND (100)	34300	118	ND (100)	ND (100)	ND (100)	142	ND (100)	141	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	139	ND (100)
Magnesium	ug/l	41100	83500	35000	ND (25000)	87000	61200	42700	55700	112000	41500	37200	30600	91400	71300	214000	88200	27700	68400	32600	18700
Manganese	ug/l	1380	31	1980	8040	5110	1910	ND (15)	ND (15)	1100	369	411	243	1250	160	4120	271	18600	36.4	ND (15)	ND (15)
Potassium	ug/l	22100	17800	32500	ND (50000)	22600	16000	ND (10000)	ND (10000)	17700	101000	93800	20900	17900	48900	69500	14900	13700	16800	ND (10000)	ND (10000)
Sodium	ug/l	641000	330000	646000	ND (50000)	1110000	985000	588000	590000	688000	1110000	1180000	835000	600000	1300000	793000	689000	502000	1170000	524000	589000
General Chemistry																					
Alkalinity, Carbonate	ug/l	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)	ND (5000)
Alkalinity, Total as CaCO3	ug/l	408000 [e]	331000 [e]	470000 [e]	165000 [e]	105000 [e]	505000 [e]	510000 [e]	530000 [e]	360000 [e]	70000 [e]	67000 [e]	62500 [e]	241000 [e]	105000 [e]	120000 [e]	390000 [e]	75000 [e]	362000 [e]	281000 [e]	490000 [e]
Iron, Ferric	ug/l	ND (300) [f]	ND (300) [f]	ND (300) [f]	33900 [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]	ND (300) [f]
Iron, Ferrous	ug/l	ND (200) [g]	ND (200) [g]	ND (200) [g]	380 [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]	ND (200) [g]
Nitrogen, Ammonia	ug/l	ND (200)	ND (200)	ND (200)	6200	530	ND (200)	ND (200)	ND (200)	ND (200)	500	340	ND (200)	ND (200)	360	220	ND (200)	540	ND (200)	ND (200)	ND (200)
Nitrogen, Nitrate	ug/l	290 [h]	6700 [h]	1200 [h]	ND (110) [h]	ND (110) [h]	710 [h]	7900 [h]	10300 [h]	ND (110) [h]	ND (110) [h]	ND (110) [h]	5000 [h]	2100 [h]	190 [h]	ND (110) [h]	7600 [h]	5500 [h]	9900 [h]	29200 [h]	6300 [h]
Nitrogen, Nitrate + Nitrite	ug/l	290	6700	1200	ND (100)	ND (100)	1400	7900	10300	ND (100)	ND (100)	ND (100)	7700	3200	210	ND (100)	8000	6000	9900	29200	6300
Nitrogen, Nitrite	ug/l	ND (10)	ND (10)	ND (10)	ND (10)	10	690	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	2700	1100	23	ND (10)	390	520	ND (10)	ND (10)	ND (10)
Phosphate, Ortho	ug/l	77	ND (50)	50	240	62	ND (50)	ND (50)	ND (50)	100	ND (50)	ND (50)	ND (50)	91	ND (50)	ND (50)	130	ND (50)	400	66	180
Phosphorus, Total	ug/l	ND (50)	ND (50)	ND (50)	560	80	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	87	ND (50)	ND (50)	ND (50)	ND (50)
Sulfate	ug/l	66600	60600	61800	3200	272000	151000	95300	123000	101000	173000	178000	68600	120000	238000	68600	73600	92300	66800	351000	47400
Sulfide	ug/l	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)

Table 3 - Soil Boring & Monitoring Well Locations & Rationale

Boring Name	Area	Sample	Boring Depth	Convert to GW Well	Well Names	Well Depth	Rationale
SB-1	Eastern Treatment Area Boundary. Directly adjacent to MW-1	Soil / GW	35' (confining clay layer)	X	MW-1I	Intermediate	Assess extent of TCE contamination at boundary of treatment area, near former dumping pit. Permanent monitoring well will aide in evaluation of contaminant concentrations in intermediate aquifer.
SB-2	Eastern Treatment Area Boundary. Near columns E3 and E2.	Soil / GW	35' (confining clay layer)	X	MWR-6S 'MWR-6I	Shallow Intermediate	Assess extent of TCE contamination at boundary of treatment area. Fill in data gaps within southern portion of the Site to aid in plume delineation. Permanent monitoring wells will aide in evaluation of contaminant concentrations in shallow and intermediate aquifers.
SB-3	Southwestern Treatment Area Boundary. Directly adjacent to existing MWR-5D.	Soil / GW	35' (confining clay layer)	X	MW-5S 'MW-5I	Shallow Intermediate	Assess extent of TCE contamination at boundary of treatment area, near southwest edge of Site. Permanent monitoring wells will aide in evaluation of contaminant concentrations in the shallow and intermediate aquifers.
SB-4	Northeastern Treatment Area Boundary. Near the center of columns F6 and E5. North of bathroom area.	Soil / GW	35' (confining clay layer)	X	MWR-8S 'MWR-8I	Shallow Intermediate	Assess extent of TCE contamination at boundary of treatment area. Fill in data gaps within northern portion of the Site to aid in plume delineation. Permanent monitoring wells will aide in evaluation of contaminant concentrations in the shallow and intermeidate aquifers.
SB-5	Within SVE Blower Room in the center of the treatment area. Slightly upgradient of suspected DNAPL source area.	Soil / GW	35' (confining clay layer)	X	MWR-9S MWR-9I	Shallow Intermediate	Assess extent of TCE contamination within the treatment area near suspected source DNAPL area previously not sampled for groundwater. Fill in data gaps within the suspected source area of the Site to aid in plume delineation. Permanent monitoring wells will aide in evaluation of contaminant concentrations in the shallow and intermediate aquifer.

ft-bg, feet below grade

Table 4 - Laboratory Analytical Methods and Holding Times for Samples

Matrix	Quantity (approx.)	Analysis	Method or Technique	Preservative	Volume	Holding Time
SOIL	TBD	TCL VOCs	EPA 8260	None	3 x Encore	48 Hours for preservation by Method 5035A; 14 Days for Analysis
		Total Organic Content	ASTM D2974	None	1 x 16oz	14 Days Extraction 40 Days Analysis
		Bulk Density	EPA 6010 / 7000	None	1 x 32oz	14 Days Extraction 40 Days Analysis
		Gasoline Range Organics /Diesel Range Organics	EPA 8015D	None	1 x 16oz	14 Days Extraction 40 Days Analysis
WATER	TBD	TCL VOCs	EPA 8260	HCl	3 x 40ml.	14 Days
		Methane Ethane Ethene Carbon Dioxide	RSK 175	None	2 x1000 mL	7 Days Extraction 40 Days Analysis
		Alkalinity Chloride	SM4500 EPA 300	Unpreserved Unpreserved	1x 500 mL	14 Days
		Iron II Iron III	SM3500	HNO3	2X 250 mL	6 Months
		Nitrite Nitrate	SM4500 EPA 353	Unpreserved H2SO4	500ml Plastic Each	6 Months
		Sulfate Sulfide	EPA 300 SM4500S2	Unpreserved NaOH +Zn Acetate	2x 500mL	7 Days

Appendix A

Site Conceptual Model

ACCO Site Conceptual Model

	ACCO Site Description	Data Gaps	Work to Fill Data Gaps
	This is an updated Site Conceptual Model dated July 2019 following termination of ERH on August 31, 2018. Rev 8/15/2019		
Summary	ERH operated for approximately one full year except for temporary shut downs, or short periods due to maintenance and treatment unit modifications. Based on daily vapor PID measurements collected from sampling ports on the SVE system, we estimate that approximately 5,000 pounds of TCE was removed during this time. Although ERH removed an estimated 5,000 pounds of TCE mass, groundwater measurements show TCE concentrations as of July 2019 above the remedial objective of 100 ug/L. Prior to ERH, the Site was treated using several remedial approaches between 1999-2012 including: potassium permanganate injection, soil vapor extraction, air sparging, and ozone treatment which remove over an estimated 3,0000 – 5,000 lbs. of contaminant mass according to the TRS	NA	NA
Groundwater Conditions Summary	Following ERH treatment TCE levels in groundwater on-Site are elevated and have increased significantly (i.e., increases ranging from approximately 6-fold to more than 1,300-fold) in most wells following shut off of the ERH system. As of July 2019, TCE at MWR-4I was 184,000 and 232,000 µg/L and was elevated in the other performance monitoring wells. A few of the TCE concentrations were well above the one percent threshold indicative of dense non-aqueous phase liquid (DNAPL), meaning there is ample evidence of DNAPL in the subsurface.	Shallow: TCE groundwater concentrations to the north on-Site. Between the ERH shallow performance wells and the eastern Site monitoring wells. Intermediate: TCE groundwater concentrations immediately east of the former ERH treatment area	Shallow: Work with property owner to remove obstructions to MW-2 located north of MWR-1S. Install additional shallow monitoring wells to further isolate source area based on groundwater concentrations. Intermediate: Install additional monitoring wells within the eastern fringe of the ERH treatment area to further isolate the know source area based on groundwater concentrations.

ACCO Site Conceptual Model

	ACCO Site Description	Data Gaps	Work to Fill Data Gaps
Current Contamination Mechanism	The Site groundwater temperatures remain significantly heated from the ERH operations (i.e., median temperature of 79° C as of March 2019). This leads to another implication: because groundwater temperatures are above the boiling point of TCE (i.e., 73° C), we reasonably expect that DNAPL exists and has effectively been dispersed within the treatment area on Site, resulting in the high concentrations currently identified in the on-Site groundwater—those above one percent solubility. This is further supported by the speed with which such increases were observed (i.e., between September 2018 and November 2018 after the ERH system was de-energized). TCE groundwater levels ≥ 1% (11,100 ug/L), potential DNAPL source areas, occur as of July 2019 in site wells MWR-3S, MWR-2S, MWR-4S, MWR-4I; in sidewalk wells MWR-7S and MWR-7I and in MW-9. The TCE/DNAPL architecture in soil is unknown as of July 2019. The July 2019 (and earlier) post-ERH TCE groundwater concentrations indicate source DNAPL remains within the treatment area. The likely location of DNAPL based on TCE >11,000 µg/L indicates that DNAPL occurs consistently in wells MWR-2, MWR-3, and MWR-4 in a narrow band trending east-west across the site.	On-site TCE source within ERH treatment area and immediately upgradient on-Site TCE groundwater concentrations upgradient of MWR-1, 3 and 4 clusters and within treatment area east of MWR-3 and south of MWR-4 clusters. Distribution of TCE ganglia in shallow and intermediate zones, as this is the remaining source material mass contamination that needs to be targeted and treated.	Possibly sample piezometers 46, 47, 48, if still accessible Install shallow screened wells upgradient of treatment area to address data gaps between MWR-3S and MW-4, MWR-4S and MW-1, and MWR-1S and MW-1 and MW-2. Note MW-2 is currently not accessible due to building owner equipment in the way. Install intermediate screened wells upgradient of treatment area to address data gaps between MWR-1I, MWR-3I and 4I and MW-17I located across 32nd Place. Possible investigation tools to further define lateral and vertical profile of DNAPL source, if any, on-Site: • High resolution soil vapor survey • Membrane Interface Probe • Additional monitoring wells

ACCO Site Conceptual Model

	ACCO Site Description	Data Gaps	Work to Fill Data Gaps
Background	**Historical Contamination Scenario/Source Area (Release history, Structure, Mechanics)** *Release History* The release history is believed to have originated from intermittent and continuous leaks into a sump within the treatment area over several decades. The sump is believed above the water table. Similar TCE releases are believed to occur in the general area from historic use dating back to 1950. TCE use was discontinued in 1999. *Dissolved Plume* As of July 2019, the dissolved plume centers in the treatment area in vincity of MWR-4..	Assumption that a former pit located in vicinity of MW-1 within the Site basement may have been a point for the release of TCE to subsurface. Current data indicates source remains within west central part of the Site and extending from MW-1 west-southwest to the edge of the site. Further delineation of current extent of TCE impacted groundwater needed to the east, south east and north east to confirm no other source outside treatment area and confirm TCE plume remains within former ERH treatment area.	RIWP August 2019 – Investigate former pit located in vicinity of MW-1 with soil borings and a monitoring well screened n intermediate zone. TCE concentration s in groundwater at MW-1 (shallow well) were not indicative of a source. Intermediate screened well proposed in 8/2019 RIWP will confirm TCE concentrations in groundwater in this zone.
Site Setting/Status	**Site Geology**		
	<u>Geology</u> Site soils beneath the basement slab consisted predominantly of non-plastic, reddish brown very fine to fine sand with traces of silt and clay and lenses of sandy silt from basement grade to 43 feet below grade. Soil compaction increased markedly at approximately 20 to 24 feet below grade. Underlying these strata is a brown, moderately plastic clayey silt. Off-Site Sidewalk soils consisted predominantly of non-plastic, orange to reddish brown to brown silty sand to silt with sand from sidewalk grade (~5 feet above basement grade) to 52 to 54 feet below grade. Soil compaction increased markedly at approximately 16 feet below grade. Underlying these strata at 52 to 54 feet is a reddish brown, very compact, plastic, clay. In general, sidewalk soils, although very close to the basement, were finer with more silt.	None	NA

	ACCO Site Description	Data Gaps	Work to Fill Data Gaps
	Hydrogeology Groundwater flow is to the west and southwest, with occasional deflections to the northwest. During and after ERH heating, groundwater mounds were observed over the treatment area, most likely form expansion of heated groundwater, which caused localized radial flow. As groundwater cooled, the mound appears to be subsiding. Hydraulic conductivity ranged from 4.1 x 10-5 cm/sec to 4.3 x 10-4 cm/sec and averaged 1.5 x 10-4 cm/sec. Overall seepage velocity ranged from 4.33 x 10-6 (0.012 ft./day)	None	NA
	Geochemistry Geochemical conditions on Site indicate that ERH was effective at catalyzing abiotic breakdown of TCE. Exponential increases in ionic chlorine indicate mass reduction of TCE and corresponding lack of TCE daughter species indicate a fast/complete abiotic breakdown of highly-substituted chlorinated alkyl groups during ERH treatment. Post ERH, geochemical conditions appear to favor microbial reductive dechlorination of TCE. Competing electron acceptor groups are in low concentrations (exception of variable sulfate) and general parameters support the reductive pathway. However, key geochemical parameters (e.g. alkalinity, carbon dioxide) indicate this activity is not currently on-going. In fact, with the exception of some potential light methanogenesis-driven reduction (indicated by the high methane and methanogen bacteria colony concentrations), it appears that microbial degradation of TCE onsite is being inhibited. The most likely source of inhibition is the high onsite temperatures. This is supported by the microbial data, which found very low concentrations of dehalococcoides bacteria capable of reducing TCE. We would expect as temperatures fall below 45º C for reduction to kickstart. However, sulfate concentrations have generally increased within the treatment area as a result of ERH. The mechanism for this is not known, but it is possible the superheated subsurface catalyzed sulfate mineral dissolution. If high sulfate concentrations persist, as a competing electron acceptor, it could inhibit natural contaminant reduction Post ERH.	Eastern boundary of the treatment area does not have geochemical conditions reported for intermediate aquifer.	Install and sample wells in the intermediate aquifer along the eastern boundary of the treatment area.

	ACCO Site Description	Data Gaps	Work to Fill Data Gaps
	Soil Vapor Soil vapor and indoor air sampling appear to show little, if any, material communication between the two media. Elevated soil vapor levels for TCE and other compounds do not exhibit elevated concentration of these compounds in indoor air. Soil vapor appears to correlate reasonably well with elevated TCE groundwater concentrations and locations where TCE exceeds 1% of its pure phase solubility, near the center of the treatment area and MWR-4.	None	NA

Exposure Assessment	Source The contaminant source is the TCE groundwater and likely TCE DNAPL that occurs in the soils below the concrete basement slab. The full extent of TCE DNAPL is not known as it is highly likely that ERH dispersed TCE throughout the treatment interval leading to more contact and higher TCE groundwater concentrations. Release & Transport Mechanism The release mechanisms are dissolution of TCE into groundwater and volatilization of TCE in the subsurface and diffusion into soil vapor. FLS sampled the indoor air on October 22, 2018. Indoor air TCE, PCE, and methylene chloride concentrations were all below their NYSDOH ambient air guidelines of 2 ug/m^3, 30 ug/m^3, and 60 ug/m^3, respectively, during the October 22, 2018 sampling event. Average indoor air concentrations were TCE, 1.2 µg/m^3; PCE, 2.9 µg/m^3; and $MeCl_2$, 2 µg/m^3. Three days prior to indoor air sampling the SVE system and indoor air circulating fans were shut down to ensure collection of representative samples. At the time of sampling subsurface temperatures were elevated (i.e. greater than 98˚ C). This was corroborated by a survey of groundwater temperatures conducted on October 9, 2018. Site groundwater temperatures in the eight treatment wells ranged from 94.3˚ C to 105.2˚ C and averaged 99˚ C. The results indicate that there is no material movement of soil vapor for these compounds into indoor air even with elevated temperatures. Exposure Points & Routes of Exposure There are no plausible exposure points or routes for human contact. The soils and groundwater are below the basement slab and are therefore inaccessible. Soil vapor does not appear to have impacted indoor air and there is an active SSDS in place to mitigate potential vapors and the only plausible exposure pathway. The basement is unoccupied and experience only intermittent, shirt-term use for storage and maintenance. Receptor Population The only potential receptor population is the occupants of the commercial building; however, these are all on the first floor and above, not in the basement, which is otherwise protected by a SSDS. There does not appear to be any complete exposure pathway.	None	NA

Appendix B

Quality Assurance Project Plan (QAPP)

Formerly ACCO Brands Inc. Site
32-00 Skillman Avenue
Long Island City, NY

NYSDEC BCP#C241061

QUALITY ASSURANCE PROJECT PLAN

Prepared for:
Beam Suntory, Inc.
149 Happy Hollow Road
Clermont, KY 40110

FLS Project Number: 10195-001

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
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August 2019

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1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) outlines the protocols and procedures that will be followed during field sampling at the former ACCO Brands site, located at 32-00 Skillman Ave., Long Island City (Queens), NY, (hereafter referred to as the “Site”). The Site is part of the Brownfield Cleanup Program (BCP# C241061) administered by the New York State Department of Environmental Conservation. A Site Location Map is included as Figure 1. A Site plan is included as figure 2. This QAPP has been prepared in order to ensure Quality Assurance (QA) and Quality Control (QC) for the environmental sampling activities which will be conducted during field sampling and to ensure the acquisition of defensible data.

2.0 PROJECT TEAM

The project team will consist of Fleming Lee-Shue Inc. (FLS) personnel and subcontractors. All field personnel and subcontractors will have completed a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and the annual HAZWOPER 8-hour refresher in accordance with the Occupational Safety and Health Administration (OSHA) regulations and will have the training required for their respective duties as outlined for this work plan. The project team qualifications are provided in Attachment I.

2.1 Remedial Engineer

The oversight of all aspects of the project will be conducted by the Remedial Engineer (RE). The RE is responsible for compliance with the RAWP or current Site management document. Mr. Arnold F. Fleming, P.E., will act as the RE for any and all investigatory and remedial actions at the Site conducted as part of the BCP.

2.2 Project Director

The general oversight of all aspects of the project will be conducted by the Project Director. Tasks include coordinating with project manager and RE on decision-making throughout the project. Mr. Mark Hutson, PG will act as the Project Director for the remediation.

2.3 Project Manager

All components of the remedial action will be directed and coordinated by the Project Manager. The Project Manager will ensure a smooth flow of information between all parties involved in the remediation by communicating regularly with professionals from the New York State Department of Environmental Conservation (NYSDEC), the BCP Participant and their representatives, the remedial engineer, contractors, Site building owner/management and all members of the FLS project team. Tasks will include the scheduling, budgeting, data management and decision-making for the field program. Mr.

Daniel DiRocco, Geologist, Senior Project Manager will act as the Project Manager for the project.

2.4 Field Team Leader

Daily onsite sampling and health and safety activities will be supervised by a Field Team Leader. The Team Leader’s responsibilities will include ensuring adherence to the RAWP and Health and Safety Plan (HASP) and regularly reporting daily progress and deviations from the RAWP to the Project Manager. FLS will assign the role of Field Team Leader to appropriate FLS personnel.

2.5 Project Quality Assurance / Quality Control Officer

Adherence to the QAPP will be ensured by a FLS QA/QC Officer. Tasks will include reviewing the QA procedures with all personnel before any fieldwork is conducted onsite as well as completing periodic site visits in order to assess the implementation of these procedures. Mr. Steven E. Panter, CGWP, P.G., Senior Consultant will act as the QA/QC officer for the remedial action.

2.6 Laboratory Quality Assurance / Quality Control Officer

Quality control procedures will be ensured by the selected laboratory, Accutest, QA/QC officer. This officer will be responsible for the adherence to laboratory protocols, quality control procedures, and checks in the laboratory. The officer will track the movement of the samples from check-in to issue of the analytical results, conducting a final check on the analytical calculations. The laboratory groups performing the respective analyses will complete their own QA/QC and sign off on the data. The Accutest QA/QC manual is attached to the end of this document.

3.0 LABORATORY PROCEDURES

3.1 Laboratory Methods

The sample container type, preservation, applicable holding time, and laboratory methods of analysis of the field samples have been included as Table 1. Holding times are based on the SW-846 analytical method which, when adjusted to account for an assumed 2-day sample shipping time, match NYSDEC Analytical Services Protocol (ASP) holding times. Sample analyses will be completed by a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and reported as NYSDEC ASP Category B deliverables.

3.2 Quality Control Sampling

Additional analysis will be conducted for quality control assurance in addition to the laboratory analysis of the field soil and groundwater samples. Quality control samples will include: equipment rinsate blanks, duplicate samples, and trip blanks. The quantities of field samples and quality control samples have been summarized in Table 2.

The equipment blank and duplicate samples will be analyzed for the same parameters as the samples, as shown on Table 1.

4.0 STANDARD OPERATING PROCEDURES

The standard operating procedures for the soil sampling, groundwater sampling, and sampling equipment decontamination have been described in the following sections. Safety monitoring will be performed in accordance with the Site-specific HASP, which mandates that all field personnel wear the appropriate personal protective equipment (PPE).

4.1 Direct Push Soil Sampling

Soil sampling will be performed using 5-foot long acetate macro-core sleeves that will be advanced continuously to the desired depth below the ground surface. Soil samples will be screened continuously using a photoionization detector (PID) for organic vapors. Organic vapor screening will be performed by puncturing holes in the acetate liners or making a small slice in the soil column with a knife or sampling tool. The PID will then be inserted to collect a headspace reading for approximately 5-10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist’s discretion. The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.)

Soil samples for laboratory analysis will be collected from the 6-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist’s judgement (field conditions may require longer that 6-inches to make a sufficient sample; however, this will be field based).

The samples will be collected by cutting the soil in two places. Soil samples for VOCs will be managed in accordance with EPA Method 5035 A – Closed System Purge-and-Trap and Extraction Procedure for Volatile Organics. A TerraCore sampler will be used to collect at least 5 grams of soil and transfer carefully in laboratory provided and sealed vials. The entire sample vial will be placed, unopened, into the instrument by the laboratory to ensure minimal loss of volatile constituents.

Other samples can be collected using stainless steel or aluminum trowel, spoon or knife and homogenized (composite) in a decontaminated stainless-steel pan before placing in the sample bottles.

Samplers will wear phthalate-free gloves such as nitrile (no latex will be used). Only decontaminated, clean metal instruments will be allowed to touch the sample. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, when appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next interval depth.

4.2 Hollow Stem Auger Sampling

Due to clearance limitations at the Site, a track-mounted Geoprobe 6620 rig will be utilized to collect the soil samples. Modifications to the rig will include a hollow stem auger (HSA) attachment for clearing the borehole followed by direct-push technology for collection of samples. In the event that a HSA rig will be utilized, augers with a minimum of 4 ¼ inches will be utilized to pre-clear the borehole. Then a direct-push sampler will be driven to desired depth.

Each macro-core sample will be screened using a PID to detect possible organic vapors. Organic vapor screening will be performed by puncturing holes in the acetate liners or by making a small slice in the soil column with a knife or sampling tool. The PID will then be inserted to collect a headspace reading for approximately 5-10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist’s discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.)

The samples will be collected by cutting the soil in two places. Soil samples for VOCs will be managed in accordance with EPA Method 5035 A – Closed System Purge-and-Trap and Extraction Procedure for Volatile Organics. A TerraCore sampler will be used to collect at least 5 grams of soil and transfer carefully in laboratory provided and sealed vials. The entire sample vial will be placed, unopened, into the instrument by the laboratory to ensure minimal loss of volatile constituents.

Other samples can be collected using stainless steel or aluminum trowel, spoon or knife and then homogenized (composite) in a decontaminated stainless-steel pan before placing in the sample bottles.

4.2 Groundwater Sampling

Groundwater samples will be collected from the monitoring wells applying the following procedures:

- If feasible, a headspace reading for vapor concentrations will be conducted. Prior to any sampling, remove the well plug slowly and measure the vapor concentrations within the well using a PID. In the instance a well is sealed and has dedicated through-tubing PID measurements will likely be infeasible.
- Measure depth-to-water using a water-level meter or an oil/water interface probe. For wells that do not have NAPL use a water level meter. For wells that historical

had NAPL, measure depth to water using an oil/water interface probe to check for light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL). If NAPL is measurable, groundwater samples will not be collected as they are not representative.

- Connect a dedicated tubing to either a peristaltic or submersible pump and lower such that the intake of the pump is set at a mid-point of the water column within the screened interval of the well. The intake should be a minimum of 2-feet above the bottom of the well screen. Record the depth of the intake in the field notes. Connect the discharge end of the tubing to the flow-through cell of multi-parameter (or equivalent) meter, such as a Horiba U-22. Connect the tubing to the output of the cell and place the discharge end of the tubing in a 5 gallon bucket.
- Low-flow purging and sampling will be implemented.
- Each monitoring well will be purged to ensure that a representative groundwater sample is obtained. Purge samples will be collected periodically (every 5 minutes) and analyzed for water-quality parameters (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity). Each well will be purged until the water-quality parameters stabilize (three successive readings) or three well volumes have been removed (see parameter stabilization criteria below). All purge water will be containerized in a 55-gallon drum.

Parameter	**Stabilization Criteria**
pH	+/- 0.1 pH units
Specific Conductance	+/- 3 % S /cm
ORP / Eh	+/- 10 mV
Turbidity	+/- 10 % NTUs (<50 NTUs)
Dissolved Oxygen	+/- 0.3 mg /L

- After purging is complete, the tubing to the flow through cell will be disconnected. The groundwater samples will be collected directly from the discharge end of the tubing into the required sample containers listed in Table 1. The containers will be labeled as described in Section 4.4.1 and stored in cooler with ice. The samples will be maintained at 4° +/- 2° C in the field and during transport.

- When the sampling is completed, the pump and tubing will be removed from the well.

- The pump, water-level meter and flow-through cell will be decontaminated as described in Section 4.5.

- All field measurements (depth-to-water, water-quality parameters), calculations (well volume) and observations will be recorded in the project logbook and on field data sheet.

4.4 Sample Handling

4.4.1 Sample Identification

All sample containers will be labeled with the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Samplers initials

Collected and labeled samples will be placed in ice-filled coolers away from direct sunlight to await shipment/delivery to the laboratory. The samples will be maintained at 4° +/- 2° C in the field and during transport.

4.4.2 Sample Preservation

During the sampling day, samples collected will be preserved by placing the containers in coolers immediately after collection. At the end of the sampling day, all field samples that are to be shipped overnight will be packaged in coolers and shipped with the appropriate chain-of-custody (COC) forms. Prior to shipment each sample will be placed in a sealable plastic bag. A fresh bag of ice, or "blue ice" blocks will be placed into the cooler along with the chain of custody (COC) form. The samples may be shipped overnight (e.g., via Federal Express) or transported by a laboratory courier. Any coolers that are shipped to the laboratory will be sealed with tape and a COC seal to ensure that the coolers remain sealed during delivery.

Each of these coolers will also contain a temperature blank so that the receiving laboratory may verify sample temperature upon receipt.

Soil Samples

Soil samples will be placed in designated sample containers and EnCore samplers.

Groundwater samples collected

Groundwater samples will be collected and directly placed in laboratory prepared sample containers with appropriate preservatives. The analytical method for VOCs calls for the addition of preservatives to the vial prior to sampling. The preservative include hydrochloric acid (HCL).

4.4.2 Sample Custody

The field personnel will be responsible for maintaining the sample coolers in a secured area until arrival at the laboratory. Sample possession record from the time of obtainment in the field to the time of delivery to the laboratory or shipping off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; signatures of individuals involved in sample transfer; and the dates and times of transfers. The laboratory personnel will examine the custody seal's condition at sample check-in.

4.5 Decontamination Procedures

Decontamination will be performed on plastic sheeting or other containment area that is deemed to prevent runoff to the ground. Prior to use onsite and between sampling locations, pump, water-level meter and other non-disposable sampling equipment will be decontaminated using the following protocol:

1. Scrub using tap water /non-phosphate detergent mixture and bristle brush.
2. Rinse with tap water.
3. Repeat step 1 and 2.
4. Final rinse with distilled water.
5. Air-dry.

4.6 Field Instrumentation

All field instruments will be calibrated at the start of each day of field work in accordance with the manufacturer's specifications. In the instance that an instrument fails calibration, the Project Manager or QA/QC Officer must be contacted so as to arrange repairs or obtain a replacement instrument. A calibration log will be maintained onsite in the field book in order to record specific details regarding instrument calibration, including: dates, problems, and corrective actions. The PID will be zeroed with ambient air and calibrated with a standard of 100 parts per million (ppm) isobutylene each day, as per manufacturer specifications.

All field personnel will be trained in the proper operation of all field instruments at the start of the field program; however, instruction manuals for all equipment will be stored onsite as a reference of the proper procedures for operation, maintenance and calibration.

5.0 DOCUMENTATION AND RECORDS

5.1 Documentation Standards

This procedure will be used for all field activities regardless of purpose. These activities may include but are not limited to; all types of media (soil, soil vapor, groundwater) sampling, GPR and all survey work, well installation, Site reconnaissance and inspection, remediation, OM&M tasks, and waste disposal and handling. The field personnel will keep an accurate written record of their daily activities in a bound field notebook sufficient to recreate the project activities without reliance on memory. All entries must be written in waterproof indelible ink. There should be no blank line. If only part of the page is used, the remainder of the page should have an "X" drawn across it.

For New Projects and New Field Books the following items must be included:

1) **Clearly written on the cover and on the binding:**

- Project Name
- FLS Project Number
- Client
- Field Book Number (applicable to projects with more than one field book)

2) **Clearly written on the inside front cover:**

- Fleming-Lee Shue, Inc, address and phone number
- Project Name
- Project Address
- FLS Project Number
- Client
- Site Contact Name and Phone Number
- Field Book Number (applicable to projects with more than one field book)

3) **Clearly written on the inside rear cover:**

- Site Location or directions to the Site from the office via car and/or public transportation
- Important Contacts with phone numbers (could include laboratory, driller, client, site contacts, etc.)

4) **Miscellaneous items to include in prominent place in field book:**

- Photocopy of Site Plan, showing monitoring wells if applicable, reduced to fit inside field book, taped into field book
- Photocopy of Monitoring Well Construction Details, reduced to fit inside field book, taped into field book
- Keys to the site should be placed in a small envelope attached to the back of the field book.

Upon arriving at the site each day, the following information should be transcribed in the field book:

1) TOP MARGIN: Project name, project number and date
2) BOTTOM MARGIN: Page number (excluding field books with preprinted numbers)
3) FIRST LINE: Time On-Site
4) Personnel On-Site, with company or agency affiliation
5) Weather and forecast (if significant), including temperature, relative humidity, atmospheric pressure (obtain from radio, internet or newspaper) and other unusual conditions, along with recent precipitation events.
6) Objective – Includes purpose of visit, intended scope of work, ***be specific and thorough*** – describe all tasks.
7) Arrival and departure of client, site contact, state regulatory agent, subcontractors, etc.
8) Significant change in weather
9) Items for future action, such as missing well caps.
10) Time field activities are conducted, such as the beginning and ending of boring installation, sampling, etc.
11) Start all entries by giving the time.
12) Record significant, pertinent observations.
13) Record measurements and other data, with units.

At the end of the field visit, note:

1) Time off-site
2) If only part of the page is used, the remainder of the page should have an "X" drawn across it.
3) Sign the end of notes at the end of each work day

Additional field records may be required for each specific field event. These other records may include:

- Soil boring logs during drilling,
- Well Construction and Development records,
- Groundwater Purge and Sample Collection Records,
- Water Level Monitoring,
- Investigation Derived Waste (IDW) Tracking Records,
- Instrument Calibration Records, and
- Health and Safety Monitoring Records and sign-off sheets.

Prior to field activities, the field sampling personnel will coordinate with the Project Manager to determine which additional records will be required for the specific field task. The type of additional records, when applicable, must be noted in the field notebook.

At the completion of the project, all original field logbooks and records will be scanned and stored in the project files. The field records will then be archived after project finalization and will be kept indefinitely in archive.

5.2 Laboratory Data Packages

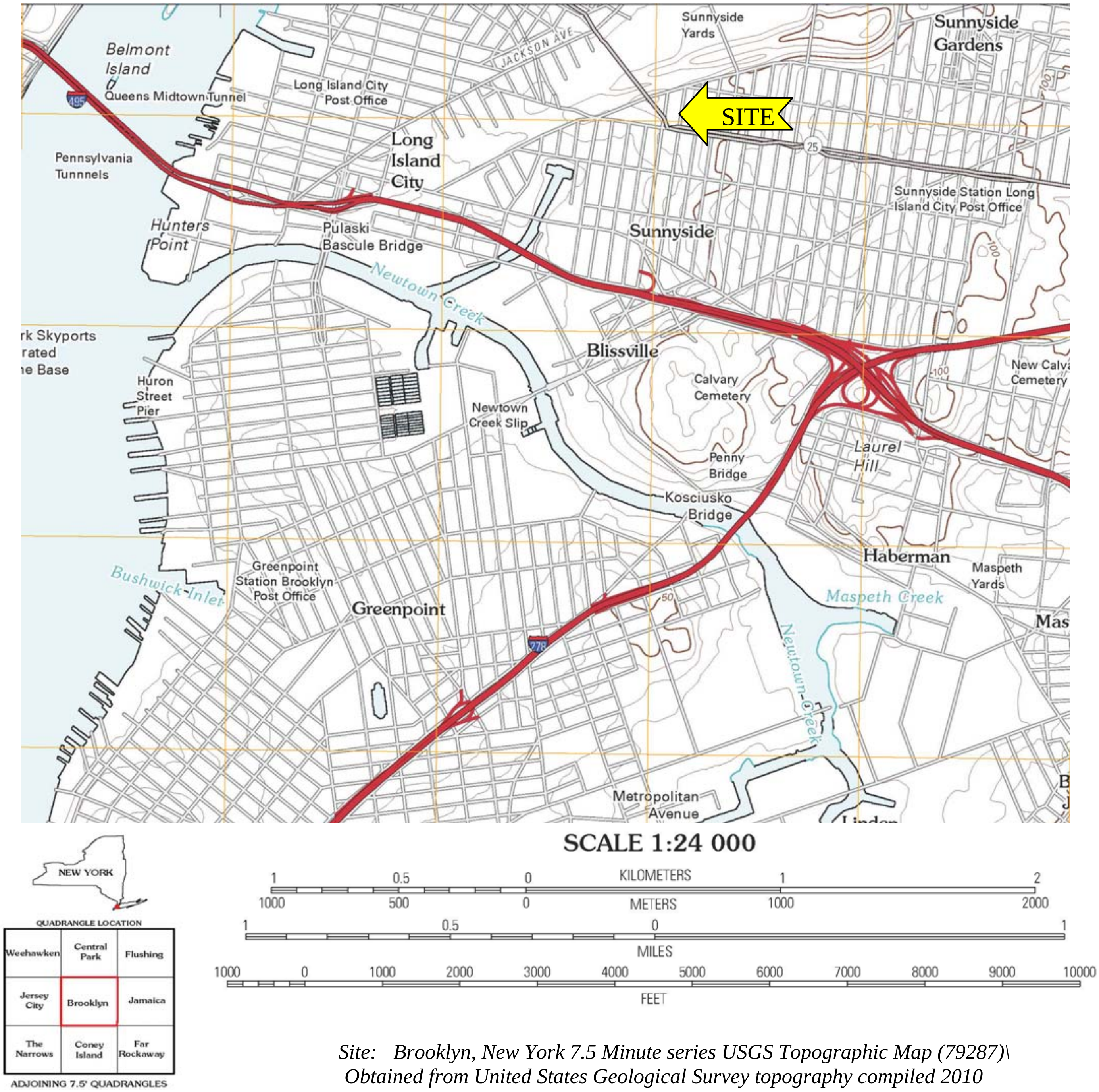
The samples collected will be sent to a NYS Environmental Laboratory Approval Program-certified laboratory for analysis and the summary data packages will be delivered in the New York State Analytical Services Protocol (NYSASP) - Category B which include the results, QC summaries, and all raw data. The full data package will contain all information required for validation.

5.3 Data Usability Summary Reports and Electronic Data Deliverable

A data usability review and validation of the laboratory analytical results will be performed by a third party. The purpose of the data usability review is to determine whether or not the data meets the Site-specific criteria for data quality and use. A Data Usability Summary Report (DUSR) will be prepared in accordance with NYSDEC DER-10 - Appendix 2B Guidance for Data Deliverables of Data Usability Summary Reports.

The data will be submitted to NYSDEC in an EQUIS Electronic Data Deliverable (EDD) format in accordance with Section 1.15 of NYSDEC's May 2010 *DER-10 Technical Guidance for Site Investigation and Remediation*.

Figures



Site: Brooklyn, New York 7.5 Minute series USGS Topographic Map (79287)
Obtained from United States Geological Survey topography compiled 2010

Fleming
Lee Shue

FIGURE 1: SITE LOCATION

SITE: FORMER ACCO BRANDS
32-00 SKILLMAN AVENUE
LONG ISLAND CITY, NEW YORK

Tables

Table 1
Summary of Analytical Methods
32-00 Skillman Avenue
Long Island City, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of Samples[1]	Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
In-Situ Grab	Soil	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace	14 days to analysis	(1) 60 mL. glass jar
In-Situ Grab	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl, Ascorbic Acid	7 days to analysis	(3) 40mL VOA Vials
In-Situ Grab	Aqueous	Alkalinity	TBD	SM2320 B-11	Cool to 4° C;	28 days to analysis	(1) 250mL plastic
In-Situ Grab	Aqueous	Chloride	TBD	300/SW846 9056A	Cool to 4° C;	14 days to analysis	(1) 250mL plastic
In-Situ Grab	Aqueous	Methane, Ethane, Ethene	TBD	RSK-175	Cool to 4° C; no headspace, HCl	14 days to analysis	(3) 40mL VOA Vials
In-Situ Grab	Aqueous	C02	TBD	RSK-175	Cool to 4° C; no headspace	7 days to analysis	(2) 40mL VOA Vials
Trip Blank	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(2) 40mL VOA Vials
Equipment Blank	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(3) 40mL VOA Vials

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations

[2] From date of sample collection, based on SW-846 and consistent with NYSDEC ASP when assuming 2 days for sample shipping

TBD - To Be Determined

TCL – Target Compound List

Table 2
Summary of Quality Control Samples
32-00 Skillman Avenue
Long Island City, New York

Sample Type	**Sample Matrix**	**Analytical Parameter**	**No. of QA/QC Samples**
Trip Blank	Water	VOCs	1 per cooler
Duplicate, MS/MSD	Soil, Post-Ex.	VOCs	1 per 20 samples
Field Blank	Water	VOCs	1 per 20 samples per equipment type used

Attachment 1

Personnel Qualifications

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Environmental Management & Consulting

Arnold F. Fleming, PE
Owner

Education

- Bachelor of Science, Civil Engineering, Manhattan College (1968)
- Masters of Engineering, Manhattan College (1969)

Professional Registration

Professional Engineer, New York

General Expertise

Arnold F. Fleming is an environmental engineer with over 30 years of experience in the areas of water quality and planning studies, domestic and industrial wastewater treatment and disposal, environmental impact analysis, contaminated materials assessment and remediation, and environmental permitting. Mr. Fleming was one of the founders of Allee King Rosen & Fleming, Inc., AKRF, Inc., and AKRF Engineering P.C. For over 20 years, Mr. Fleming has provided these firms with engineering expertise in all technical areas relating to permitting and hazardous waste assessment and management and the assessment of impacts in these technical areas. Mr. Fleming has been Principal in charge for Phase II Environmental Assessments for over 100 residential, commercial and industrial sites in the Metropolitan New York area. Duties include design of sampling program, oversight of means and methods of sample collection, and preparation of final reports including recommendations for remediation. He has also been involved with the design for over 50 remediation systems including UST tank removals, contaminated soil disposal, soil vapor extraction systems, sparged air/ soil vapor extraction systems. Remedial designs include approximately 20 sites remediated under the State of New York Voluntary Clean-up program, and two sites on the Registry of Inactive Hazardous Waste Sites. Mr. Fleming has been the Principal in charge of the preparation of Phase I Environmental Assessments for several hundred residential, commercial and industrial properties, as well as several hospitals throughout the New York Metropolitan Area. He has been the Project manager for the preparation of 208 wastewater facility planning studies, and has prepared the infrastructure and utility assessments for over 100 EIS's in the Metropolitan New York Area.

PROJECT EXPERIENCE

535 West 23rd Street Development

Prepared the Phase I and asbestos surveys for this Manhattan development site. Designed the Phase II sampling program, executed the sampling and on the basis of the findings obtained approval to remediate an extensive oil spill via bio-remediation. The system was designed and installed under the new building with operation to begin upon occupancy of the building. The approach allowed the construction schedule to proceed without delay due to the discovered contamination.

Queens West Redevelopment

Technical representative to the Queens West Development Corporation (QWDC) a subsidiary to the Empire State Development Corporation charged with developing the 78 area redevelopment of the Hunters Point waterfront into a mixed commercial/residential development. Mr. Fleming developed a model remediation plan for the first residential building in 1995 and has applied this model to the next three residential development sites in Stage 1 of the development, the first having opened for residency in the summer of 2002. Mr. Fleming is assisting QWDC in selecting a developer for Stage 2 and 4 and is advising them on the remediation of Stage 2, a former oil refinery and paint factories. Development of Stage 2 is to occur simultaneous to the remediation efforts in the refinery portion of the site.

Staten Island Muss Site Redevelopment

Managed the initial Phase II sampling for this former industrial site re-zoned for single family residential development. The site was listed on the Registry of Inactive Hazardous Waste Sites. Prepared in Remedial Investigation and Feasibility Studied that led to a Record of Decision (ROD) setting forth the remediation for the site. Prepared the remedial Design to satisfy the ROD and managed the oversight of the remediation leading up to the removal of the site from the registry. Designed a revetment system to protect the capping material that was an integral part of the remediation from storm related erosion from the adjacent Raritan Bay. Petitioned the Federal Emergency Management Agency to remove the site from the 100-year flood plain on the basis of the new elevations and erosion measures implemented on the site.

Rego Park, Queens Remediation

Prepared a Voluntary Clean-up Application, performed additional sampling and developed a remedial work plan to remove solvent contaminated soils from this development site. Designed a sparged air/ Vapor Extraction System to remediated contaminated groundwater and site soils. Operated the system for two years reducing the groundwater contamination by over 90%. The sparged air / VES was designed to be installed under the building avoiding the delay of remediation the site prior to construction.

Hudson River Park Redevelopment

For this new park stretching from Battery Park City to 59th Street, Mr. Fleming oversaw the preparation of the US Army Corps of Engineers and the New York State Department of Environmental Conservation permit application s and responses to comments leading to issuance of this waterfront development permit. This permit was unique in that it addressed the first segment that was designed and ready to be built as well as the entire park for which no design was available. To address the future segments, schematic design drawings were submitted showing conceptual designs that would be refined as the park was designed and build. A permit condition to submit each segment design for review and determination of consistency with the master permit was included to assure that no impacts were introduced in the design process. If a determination on any segment were made that the design was not consistent with the master permit, a new permit process would be initiated.

Greenpoint Brooklyn Waterfront Development Planning
For a private developer, Mr. Fleming has prepared an evaluation of the permitting concerns including a jurisdictional assessment of the existing waterfront edge, to assist in the establishing of a development plan that will be compatible with the requirements of federal and state permits.

Queens West Redevelopment
Mr. Fleming led the permitting effort to allow redevelopment of the waters edge associated with this 78 acre mixed Commercial/Residential waterfront development. The project has three stages, the first under construction and permitted in 1995. Mr. Fleming managed the permitting effort for this first waterfront permit. The current application to the state and federal permitting agencies is for a project wide permit covering the remaining 3 stages of which 2 are under design. The final stage of the project was the subject to a schematic design only. Notable in the current permit is the reconstruction of collapsed platforms that are to become a site wide park and esplanade providing water access to this portion of the east river for the first time in over a century.

West Side Ferry Terminal
For the New York City Economic Development Corporation, Mr. Fleming led the permit effort to allow a new public ferry terminal located within the bounds of the Hudson River Park. Because the ferry terminal was not approved when the Park permit was issued, this project was carved out of the park permitting process and followed a separate permit track. The permit application was assembled using updated submissions from the Park permit application and addressed the specific concerns of the State and federal permitting

Jersey City Colgate Site Redevelopment
For this mixed commercial/residential waterfront redevelopment project, Mr. Fleming prepared the state Coastal Zone Development permit and a US army Corp of Engineers dredge and fill permit to allow a marina, esplanade and a new combined sewer manifold to be built. The sewer manifold was placed in the river because of space limitations and was permitted, the first fill permit in this portion of the Hudson River in 20 years.

River East Environmental Permits for Shoreline Protection
For this 10 acre site obtained the permits to install 500 feet of revetment to allow a 1.4 million square foot residential development on a former oil terminal. Also prepared the Remedial Action Work Plan to remove historic spilled oil simultaneous to Vernon Realty shoreline construction.

Fleming
Lee Shue

Environmental Management & Consulting

Mark Hutson

Director/Senior Project Manager

Education

BIS, Geological Sciences and Applied Biological Sciences, Arizona State University, Tempe, AZ

Awards / Certifications / Training

- OSHA 40-HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- OSHA 10-Hour Construction Safety
- First Aid/CPR

General Expertise

Mark Hutson is a Director/Senior Project Manager with experience in environmental consulting, specializing in environmental liability management. Mark provides clients with innovative, cost effective strategies to manage their environmental liability and compliance issues. His expertise include site characterization, sub-surface investigations, soil and ground water remediation, remedial design and implementation, data management and interpretation, regulatory compliance and reporting, stakeholder management, cost to incident closure estimates, and insurance claim investigations. He has considerable leadership and supervisory experience including direct interface with clients, and third party stakeholders such as property owners, attorneys, real estate developers and regulatory agencies including the NYSDEC, NYCDEP, NYCOER, NYSDOH and various county health departments. Mark has worked on environmental projects in New York, New Jersey, Connecticut, Arizona, California and Nevada.

PROJECT EXPERIENCE

Project Manager, Queens Plaza Residential Development (QPRD), Long Island City, NY

Served as project manager for three separate Brownfield Cleanup Program sites associated with QPRD. Responsibilities included direct oversight and management of day to day field activities, implementation and execution of the remedial program, coordination with construction mangers, remedial contractors and several local and state agencies including NYSDEC, NYCOER, NYSDOH, and NYCTA. Remediation included the removal of over 115,000 tons of impacted soil, In-situ Soil Stabilization, NAPL recovery, collection of over 400 soil samples. Mr. Hutson's authority included directing all field efforts and acted as the primary contact for the project. Additional responsibilities included the coordination and preparation of all final reports including

SMPs and FERs. QPRD received Certificates of Completion (COCs) for all three sites in August and September of 2016.

Project Manager, Inwood Rezoning, New York

Assessed presence of hazardous materials in soil and groundwater at projected and potential development sites identified in the Inwood Rezoning proposal over a 27-block area of Inwood neighborhoods in the Manhattan Borough of New York City. Composed the hazardous materials chapter of the Environmental Impact Statement and coordinated with NYC Economic Development Corporation to address revisions and comments.

Project Manager, Retail Petroleum/Bulk Storage Facilities Portfolio, New York

Served as project manager for numerous active and former retail petroleum facilities in varying lifecycle stages including site characterization, remedial design and implementation, and closure for a major petroleum client. Responsibilities included site characterization, scope development, remedial design and implementation, data management and interpretation, UST/AST removal, budget forecasting and management, regulatory compliance and reporting, and management of project teams and subcontractors.

Project Manager/Regional Lead, Insurance Claim Investigation and Support, NY/NJ

Served as the regional lead and project manager for an international insurance company acting as environmental expert to assist the insurer in claim determinations. Responsibilities included claim investigation and technical support on projects associated with petroleum and industrial chemical releases, remediation, and UST removals in New York and New Jersey. Responsible for developing cost to incident closure estimates, determining what is reasonable and necessary regarding an insured's response to a claim, preparation of claim recommendations and reports including reviewing insured's invoices and invoice tracking.

Project Manager, Former Retail Petroleum Facility Redevelopment, Brooklyn, NY

Served as project manager for the remediation and redevelopment of a former retail petroleum facility with a open NYSDEC spill number. Remediation of the underlying soil and groundwater occurred simultaneously with the construction of a 12-story multi-use building. Remediation included the excavation of contaminated soil to 15 feet bgs followed by In Situ Chemical Oxidation of residual soil and ground water impacts. Project required interface with and coordination of numerous stakeholders and regulatory agencies including the NYSDEC, NYCOER, NYCDEP, NYCTA and NYCDOB.

Project Manager, Soil Vapor Intrusion Investigation, Brooklyn, NY

Served as project manager for a large soil vapor intrusion investigation of a former retail petroleum facility now a PETCO retail store. Responsible for the development and execution of a sampling plan in compliance with NYSDOH/EPA guidelines which included the installation of numerous subsurface soil vapor sampling points and indoor/outdoor sampling of ambient air conditions to determine potential exposure scenarios.

Project Lead, Commingled Plume Investigation/Remediation, Blythe, CA

Acted as field geologist/environmental scientist for a public municipality client responsible for a commingled gasoline/diesel plume emanating from multiple sources. Responsibilities included plume characterization, site investigation, remedial design, implementation and operation, permitting, data collection and analysis, and waste management. Oversaw the installation of five multi-phase extraction (MPE) systems and was responsible for the operation, maintenance and optimization of the MPE systems operating simultaneously.

Environmental Scientist/Field Geologist, Various Environmental Sites, AZ/CA/NV

Served as lead environmental scientist/field geologist for numerous environmental remediation sites throughout Arizona, Southern California and Nevada. Responsibilities included site characterization, sub-surface investigations, sampling of environmental media, data analysis and interpretation report preparation, and oversight of remedial contractors.

Steven E. Panter, CGWP, PG

Education

- GIS Training, Penn State University, ongoing
- Master of Science, Environmental Engineering, Concentration in Hydrogeology New Jersey Institute of Technology (1990)
- Graduate Studies, Soil Sciences, Rutgers University (1979)
- Bachelor of Science, Forest Science, University of Wisconsin (1978)

Certifications/Training

- OSHA 40-Hour HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- Fracture Trace and Lineament Analysis, April 1995
- Intensive training course in identifying fractures and lineaments in rocks of Pennsylvania.
- The course emphasized the importance of identifying these features in order to assess and understand ground water movement and to understand contaminant migration in geologic settings where these features can play a key role.
- Treatment Technology for Contaminated Soils and Ground Water, February 1995.
- Assessment, Control and Remediation of LNAPL Contaminated Sites, October 1994.
- Ground Water Flow through Fractured Media, University of Wisconsin, 1993.
- Hydrogeology of the Glacial Deposits of New Jersey: An Applied Field Course, presented by Cook College in Cooperation with Rutgers University, 1993.
- Design and Analysis of Aquifer Pumping Tests - Association of Ground Water Scientists and Engineers, Dublin, Ohio, 1991.

Professional Registrations

- Certified Ground Water Professional (CGWP No. 437) by the National Ground Water. Association (NGWA), June 1993
- Professional Geologist – New York State

General Expertise

Steven Panter is a Hydrogeologist with over 30 years of experience in environmental consulting. Mr. Panter has supervised or played a key technical role in many soil and ground water investigations involving investigations and remediation of fuel oil, PCE, TCE, polychlorinated biphenyls (PCBs), cumene, gasoline, organic compounds, metals, dioxins, and coal tar. They have been performed for landfills, chemical processing plants, underground storage tanks (UST), fuel oil terminals, manufacturing plants and power production facilities. The clients have been primarily large corporations, utilities, or municipalities, although some work has been done for small businesses. He is responsible for projects that range from less than $20K to more than $20,000,000. Mr. Panter has developed sampling and analysis programs for a variety of ground water and subsurface soil investigations. His expertise also extends to technical oversight and legal support; and environmental auditing. Mr. Panter also has worked on environmental impact statements for several proposed power plant facilities and power plant upgrades in New York State.

He has extensive experience in New York State Brownfield Cleanup Program projects. Mr. Panter has directed or played a key technical role in a number of Brownfield projects involving the investigation and remediation of petroleum and coal tar contaminated media.

PROJECT EXPERIENCE

Queens Plaza Residential Development

Mr. Panter was one of the key senior staff and the technical lead for the Brownfield remediation of a highly contaminated three-acre, parcel in New York City. The total project monetary size was 875 million dollars. The former chemical plant was incorporated into three separate Brownfield sites that required multiple investigations, remedial investigation reports, and remedial action work plans. Mr. Panter was the principal author of these reports and responsible for meeting deadlines to ensure that financing for the project remained in place. He coordinated major aspects of the project and represented the client in meetings with state officials, attorneys, insurance companies and other critical parties. Ultimately, the site successfully met the Brownfield goals and received Certificates of Completion (COC) for all three parcels allowing development to move forward. Very large tax credits then became available to the client as a result of receiving the COCs.

Queens West Parcel 8 Remediation

Mr. Panter oversaw and directed the investigation of a Brownfield Cleanup Program site contaminated with 80,000 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik®, which eliminated excavation and saved the client $7 to $9 million dollars in cleanup costs and eliminated community exposure. The treatment focused on oxidation of 47,000 pounds of coal tar contaminant in the treatment interval. This was the first remediation of its kind in New York State. NYSDEC approved the results and issued a Certificate of Completion within 14 months of the beginning of cleanup. Treatment lasted five months in one application.

Queens West Center Boulevard Remediation

Mr. Panter oversaw and directed the investigation of a Voluntary Cleanup Site contaminated with 18,500 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik®, which eliminated excavation of the street and disruption to the community and eliminated public exposure. This was the second remediation of its kind in New York State. NYSDEC review is ongoing. Treatment lasted two months in one application.

Queens West Redevelopment

Mr. Panter oversees environmental compliance for a very large scale redevelopment of the New York City waterfront, and entails remediation of numerous parcels of former industrial waterfront that are heavily contaminated with petroleum, coal tar, and numerous other wastes. The site will be redeveloped into commercial and residential space with parks and green spaces. Mr. Panter advises QWDC on all aspects of environmental compliance, contaminated site investigation, hazardous materials management, and remediation.

Long Island City, Queens, New York Redevelopment

Mr. Panter prepared a detailed assessment of soil disposal options and costs for a facility contaminated with creosote and metals. He used a statistical analysis approach to advise the client on the most cost effective means of selecting soil disposal options depending on the type and degree of soil contamination.

West 23rd Street 10th Avenue Redevelopment

On a site contaminated with gasoline and fuel oil, Mr. Panter prepared an analysis differentiating the sources of on-site and off-site contamination in order to justify closing the spill number. This was a multivariate analysis demonstrating that the on-site contamination was clearly different from the off-site contamination. What was unique about the analysis is that conventional reporting of results did not distinguish between the different sources, but the multivariate analysis—using the same data—showed a distinct difference.

West 30th Street and 11th Avenue Redevelopment

On a site contaminated with metals near a former coal gas plant slated for a major residential development, Mr. Panter analyzed groundwater issues stemming from benzene contamination and successfully predicted contaminant plume behavior during dewatering. He developed an indoor air monitoring program for a neighboring residential building as a protective measure against inducing contamination to residents. He also presented data supporting the case that chromium levels were the result of natural conditions rather than contamination.

Gansevoort Street to West 23rd Street; The High Line

Mr. Panter managed the waste characterization portion of the High Line project in New York City, where a defunct elevated industrial railway is being converted into a major urban park and green space. Mr. Panter directed testing, removal, and management of contaminated track ballast and was a key individual in planning waste management for all track bed materials. He was responsible for directing and planning inspections for hazardous materials throughout the entire program and also directed air sampling and monitoring for the construction phase.

Astoria, Queens, NY Astoria Gas Turbines Well Reconnaissance Program

Mr. Panter managed a well reconnaissance program at the Astoria Gas Turbine facility to assist the development of a remediation program to close out petroleum spills inherited from the previous site owner. The program encompassed evaluation of more than 70 monitoring wells, groundwater and product level measurements, groundwater sampling, a summary of the findings, and recommendations for improving the monitoring network and resolving ambiguities in the well information. Mr. Panter effectively coordinated meetings between station representatives, off-site NRG managers, and an independent project manager working for NRG. He also facilitated very productive meetings between the previous site owner and NRG in order to obtain additional well information and secure permission to access wells in off-site, adjacent areas.

Staten Island, NRG Arthur Kill Generating Station, Staten Island Ignition Oil Area Recovery Program
Mr. Panter has been assisting NRG at the Arthur Kill Generating Station with a product recovery/monitoring in the Ignition Oil Area. This effort entails monthly monitoring, recovery, and reporting of product levels in five recovery wells installed by a consulting firm when the plant belonged to Con Edison. At NRG's request, the program was recently extended. Station personnel often call the Mr. Panter to discuss other environmental matters because of his extensive site knowledge and excellent rapport with the Station managers and staff.

Staten Island, Transformer Explosion Remediation Program
Following a transformer fire and rupture that released PCBs in concentrations exceeding 300,000 ppm, Mr. Panter managed a major remediation program encompassing massive interior and exterior portions of the power plant including soils, pavement, and walls. This was done under a Consent Order and had potential penalties of $500,000,000. Mr. Panter oversaw and directed all aspects of the field program and represented Con Edison at numerous meetings with regulatory personnel. This portion of the remedial program lasted one year.

Staten Island, Property Sale Site Assessment
Project manager for a large-scale expedited site assessment of the Arthur Kill Generating Station as part of the property sale to Visy Paper Company and the New York City Economic Development Corporation. Directed, planned, and coordinated the investigation. Played a critical role in numerous meetings with representatives of the New York State Department of Environmental Conservation (NYSDEC) from the Acting Regional Director and Director of Hazardous Waste to NYSDEC field staff. Rapidly and thoroughly completed the site investigation and remedial assessment to a level whereby the findings and recommendations were easily accepted by NYSDEC. Acceptance of results and remedial strategies was facilitated by the excellent rapport with NYSDEC representatives.

All Boroughs, Site Investigation, New York City Housing Authority
Supervised and coordinated the investigation of 20 housing project sites with leaking USTs and pipelines for the New York City Housing Authority. Provided client contact, prepared work plans, supervised field programs, interpreted and analyzed data, and prepared final reports and recommendations. The focus of the program was to characterize and delineate the extent of oil-contaminated soils and ground water contamination, prior to remediation. Program included installation of monitoring wells and interpretation of soil and ground water contamination in a variety of geologic settings throughout the five boroughs including marine deposits, bedrock, glacial outwash and till.

Manhattan and Brooklyn, Environmental Assessment, New York City School Construction Authority
Project Manager for an environmental assessment of three properties proposed for an elementary and two middle schools in New York City. Directed technical and

administrative aspects of the project. Program consisted of installation of deep monitoring wells in glacial outwash deposits and evaluation of ground water flow and quality.

Environmental Assessment, New York City Economic Development Corporation.
Managed environmental assessments of two NYC-owned properties slated for commercial development. Directed technical aspects of the project including soil gas testing and monitoring well installation and sampling.

All Boroughs, Site Investigations, New York City Housing Authority
Supervised the investigation of 20 sites with leaking USTs for the New York City Housing Authority.

Fuel Oil Terminal Demolition, Paragon Cable Company/Rucci Oil Company
Oversaw the demolition of two fuel oil terminals in NYC. Prepared a remedial action and sampling plan to expedite the cleanup process and comply with New York State Department of Environmental Conservation regulations. Supervised and directed the activities of several contractors with field crews of 10 to 20 people. Advised corporate principals on project progress, issues and alternatives. Met with regulatory officials on behalf of the client. One facility contained more than 18 large aboveground and underground fuel oil tanks. Total storage capacity was 2.3 million gallons. The second facility had seven underground storage tanks and one aboveground tank. Total storage capacity was 385,000 gallons.

Rockaway (NJ) Borough Superfund Site Ground Water Investigation Program
Developed a ground water investigation program for a buried glacial aquifer system in northern New Jersey. Designed the investigation to examine the effect of TCE contamination on a local aquifer. The program consisted of a network of shallow, deep and intermediate level monitoring wells and associated ground water sampling.

All Boroughs, Ground Water and Soil Sampling, New York City Housing Authority
Developed a ground water and soils sampling program to assess fuel oil contamination at approximately 20 New York City Housing Authority sites.

Site Investigation, New York City School Construction Authority
Conducted site investigations of soils and ground water in Manhattan and Brooklyn.

Soil Sampling Program, Paragon Cable/Rucci Oil Company
Conducted a soil sampling program as part of the demolition of two fuel oil terminals in NYC. The program included the sampling of waste soil piles and the excavations.

Expert Witness Testimony and Report Preparation
Mr. Panter testified as an expert witness as part of a technical panel before the New York State Board of Public Utilities as part of a power plant siting hearing. In this capacity, Mr. Panter was cross-examined on his written testimony by a panel of attorney's on the side of the opposition. He testified on technical matters involving hazardous materials and contamination of soil and groundwater and the impacts to the community depending on the project. Mr. Panter also served as a fact expert for a New York State agency in a

contamination lawsuit against a Fortune 100 company. Mr. Panter was deposed as part of this case. He drafted and corroborated on two expert reports prepared and prepared counter arguments for the case. The case had a successful outcome for the client.

Publications

Mr. Panter has authored numerous technical papers on site investigation and remediation and has given technical presentations on these topics and on effective presentation of technical information.

Fleming
Lee Shue

Environmental Management & Consulting

Daniel DiRocco
Project Manager

Education

- Bachelor of Arts (BA), Environmental Science (Geology), Minor economics, Hobart College, Geneva, NY

Awards / Certifications / Training

- OSHA 40-HAZWOPER Training

General Expertise

Dan DiRocco is a Project Manager with 13 years of experience in environmental site investigation and remediation, regulatory compliance, brownfields redevelopment and hydrogeology as a project manager, supervisor and client manager for a wide range of multidisciplinary projects. Mr. DiRocco has extensive experience with sites under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Clean-up Program (BCP) and New York City Office of Environmental Remediation (OER) E-Designated sites, including hazardous materials, noise attenuation, and air quality. He has considerable leadership experience including extensive client communications, participating in negotiations with regulatory agencies, large-scale cost estimating and long term management of large development projects, and remedial design and implementation.

PROJECT EXPERIENCE

Glass Manufacturing Plant Redevelopment, Dayville, CT

Oversight of remediation of the former Glass factory converted to 25 acre mall under CTDEEP. Ecological investigation of wetland impacts and preparation of an ecological wetlands assessment. Preparation of a remedial action work plan and oversight of the remediation of wetlands impacted by former glass manufacturing operations. Oversight of the demolition, waste characterization and remedial cleanup phases of the project. Managed post groundwater monitoring.

Landfill and Glass Manufacturing Plant Redevelopment, Carteret, NJ

Preparation of a New Jersey Department of Environmental Protection (NJDEP) Landfill Closure Report and Operation & Maintenace Plan. Wetland mitigtaion and phytoremdiaiton barrier design. Environemntal Health & Safety Oversight of Construction on an environemntal impacted and senstive site.

Wetlands Restoration, Chester, NY

Assisted with the cost estimate, design and implementation of a freshwater wetlands restoration project to bring a property into compliance with NYSDEC. Property owner had illegally filled wetlands and NYSDEC required property owner to restore wetlands to an equal or higher value. Project completd in 2004 with ongoing maintenance requirements.

Mixed Use Redevelopment, Long Island City, NY (Mutiple Sites)
Conducted complete Remedial services from Phase I preliminary investigations through completion of remedial cleanup and post remediation site management at multiple Sites throughout the five boroughs under NYSDEC or NYCOER (formerly NYCDEP). With FLS conducting same remedial services on new NYC projects.

Former Asphalt Plant Waterfront Redevelopment, Queens, NY
Oversight of the remdial investigation and cleanup of a 21 acre waterfront redevelopment project in the NYSDEC Brownfield Cleanup Program.

511 West 21st Street Redevelopment
Submitted application for BCP program. Oversaw completion of RAWP and Remedial Investigation (RI) report for new residential high-rise building. Direct and oversee groundwater, soil, and soil vapor sampling and submitted reports to NYSDEC as required.

Jackson Avenue Fleet Redevelopment
Oversee the implementation the Community Air Monitoring Program according to the Remedial Action Work Plan and coordination of intricate soil disposal while site was undergoing massive excavation and foundation building.

550 W 29th Street Redevelopment
Oversaw the completion of RAWP and Remedial Investigation (RI) report for new mixed use high-rise building with a hazardous materials, air, and noise E-Designation.

Appendix C

Quality Assurance Project Plan (QAPP)

for

Emerging Contaminants Sampling

Formerly ACCO Brands Inc. Site
32-00 Skillman Avenue
Long Island City, NY

NYSDEC VCP#V00331

QUALITY ASSURANCE PROJECT PLAN
For Emerging Contaminants Sampling

Prepared for:
Beam Suntory, Inc.
149 Happy Hollow Road
Clermont, KY 40110

FLS Project Number: 10195-002

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
1 Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

Arnold F. Fleming, P.E.
&

Fleming
Lee Shue

Environmental Management & Consulting
158 West 29th Street, 9th Floor
New York, New York 10001

October 2019

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Attachment E	Alpha Analytical PFAS Sampling Procedures
Attachment F	Alpha Analytical 1,4-Dioxane Sampling Procedures
Attachment G	SGS PFAS User Guide

1.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The Quality Assurance Project Plan (QAPP) outlines the protocols and procedures that will be followed during sampling for per- and polyfluoroalkyl substances (PFAS) and 1,4-Dioxane on the Site. The QAPP has been prepared in order to ensure Quality Assurance (QA) and Quality Control (QC) for the proposed sampling.

The sample analytical reports will undergo a third-party review of the analyses conducted. The third-party data validator will produce a Data Usability Summary Report (DUSR) which will be submitted to the NYSDEC.

Project Team

The project team will consist of FLS personnel and subcontractors working under the oversight of the remedial engineer, Arnold F. Fleming, P.E. All field personnel and subcontractors will have completed a 40-hour HAZWOPER training course and the annual HAZWOPER 8-hour refresher in accordance with the Occupational Safety and Health Administration (OSHA) regulations and will have the training required for their respective duties as outlined for this investigation. Project Team resumes are included as Attachment A.

Remedial Engineer

The Remedial Engineer is a registered professional engineer (P.E.) licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program. The Remedial Engineer for this project will be Arnold F. Fleming, P.E.

Project Director

The general oversight of all aspects of the project will be conducted by the project director. Tasks will include the scheduling, budgeting, data management and decision-making for the field program. Mr. Mark Hutson, PG, will act as the Project Director for the RWP.

Project Manager

All components of the Remedial Investigation will be directed and coordinated by the Project Manager. He/she will ensure a smooth flow of information between all parties involved in the investigation by communicating regularly with professionals from the New York State Department of Environmental Conservation (NYSDEC), and all members of the FLS project team. Mr. Daniel P. DiRocco, will act as the Project Manager.

Field Team Leader

Daily on-site sampling and health and safety activities will be supervised by a Field Team Leader. The team leader’s responsibilities will include ensuring adherence to the work plan and HASP and regularly reporting daily progress and deviations from the work plan to the Project Manager. FLS will assign the role of Field Team Leader to appropriate FLS personnel each day.

Project Quality Assurance / Quality Control Officer

Adherence to the QAPP will be ensured by a FLS QA/QC Officer. Tasks will include reviewing the QA procedures with all personnel before any fieldwork is conducted on-site as well as completing periodic Brownfield Site visits in order to assess the implementation of these procedures. Mr. Joel Kane, will act as the QA/QC officer for the investigation.

Laboratory Quality Assurance / Quality Control Officer

Quality control procedures will be ensured by a laboratory QA/QC officer in the designated laboratory. This officer will be responsible for the adherence to laboratory protocols, quality control procedures, and checks in the laboratory. The officer will track the movement of the samples from check in to issue of the analytical results, conducting a final check on the analytical calculations, and signing off on the laboratory reports. The laboratory QA/QC Officer will be assigned by the laboratory for the investigation.

The sample analytical reports will undergo a third-party review of the analyses conducted. Nancy Rothman, Ph.D of New Environmental Horizons, Inc. will serve as the third party and will produce a Data Usability Summary Report (DUSR) which will be submitted to the NYSDEC. The resume for Nancy Rothman, PhD is included in Attachment A.

1.1 Project Scope and Goals

The NYSDEC as a part of its investigation into emerging contaminants, is undertaking a Statewide evaluation of remediation sites to better understand the risk posed to New Yorkers by 1,4-Dioxane and PFAS. NYSDEC has requested PFAS and 1,4-Dioxane sampling be conducted at on-Site monitoring wells as a part of this effort.

2.0 LABORATORY PROCEDURES

The sample container type, preservation, applicable holding time, and laboratory methods of analysis of the field samples have been included as Table 1. Sample analyses will be completed in a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and reported using Category B deliverables. For all instances of PFAS 1,4-Dioxane analyses, FLS will subcontract SGS Accutest or Alpha Analytical (or another qualified laboratory service). The Quality Systems Manual for Alpha Analytical are included as Attachment B.

1,4-Dioxane Analysis and Reporting

Historically, 1,4-Dioxane has not been evaluated at levels that are now thought to potentially represent a health concern. Therefore, NYSDEC has requested more sensitive analytical methods be used by laboratories. The reporting limit for analyses of 1,4-dioxane should be no higher than 0.35 µg/L (ppb). In order to get the appropriate detection limits, laboratories will need to run EPA Method 8270 in “selective ion monitoring” (SIM) mode. Generally, Method 8270 has been recommended since this method provides a more robust extraction procedure, larger sample volume, and is generally thought to be less vulnerable to interference from chlorinated solvents. The Alpha Analytical standard operating procedure for determination of 1,4-Dioxane by gas chromatography and mass spectrometry (GC/MS) in SIM is included as Attachment C.

PFAS Analysis and Reporting

Analyses for per- and polyfluoroalkyl substances (PFAS) is extremely sensitive and requires special precautions and methodology. PFAS samples can only be analyzed by an environmental laboratory certified by ELAP to use EPA Method 537 (modified) or ISO 25101. Laboratories must be able to achieve reporting limits), of 2 ng/L (parts per trillion) for all 21 PFAS compounds including perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS. Method Detection Limits (MDL) and reporting limits for PFAS analytes are summarized below. The Alpha Analytical standard operating procedure for determination of selected PFAS by solid phase extraction and liquid chromatography and mass spectrometry isotope dilution (LC/MS) is included as Attachment D.

Analyte	**RL (ng/L)**	**MDL (ng/L)**
Perfluorobutanoic Acid (PFBA)	2	0.117
Perfluoropentanoic Acid (PFPeA)	2	0.090
Perfluorobutanesulfonic Acid (PFBS)	2	0.648
Perfluorohexanoic Acid (PFHxA)	2	0.404
Perfluoroheptanoic Acid (PFHpA)	2	0.236
Perfluorohexanesulfonic Acid (PFHxS)	2	0.328
Perfluorooctanoic Acid (PFOA)	2	0.26
1H, 1H, 2H, 2H-Perfluorooctanesulfonic Acid (6:2 FTS)	2	0.175
Perfluoroheptane sulfonic Acid (PFHpS)	2	0.138
Perfluorononanoic Acid (PFNA)	2	0.256
Perfluorooctanesulfonic Acid (PFOS)	2	0.224
Perfluorodecanoic Acid (PFDA)	2	0.288
1H, 1H, 2H, 2H-Perfluorodecanesulfonic Acid (8:2FTS)	2	0.260
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA)	2	0.636
Perfluoroundecanoic Acid (PFUnA)	2	0.216
Perfluorooctanesulfonamide (FOSA)	2	0.202
Perfluorodecanesulfonic Acid (PFDS)	2	0.198
N-Ethl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2	0.596
Perflurododecanoic Acid (PFDoA)	2	0.284
Perfluorotridecanoic Acid (PFTrDA)	2	0.576
Perfluorotetradecanoic Acid (PFTA)	2	0.516

2.1 Data Quality Usability Objectives

The sample analytical reports will undergo a third-party review. The third party will produce a Data Usability Summary Report (DUSR) which will be submitted to the NYSDEC. The DUSR provides a thorough evaluation of analytical data with the primary objective to determine whether or not the data meets specific criteria for data quality and use. In this case, NYSDEC requested this sampling with the goal of “better understanding the risk posed to New Yorkers by 1,4-Dioxane and PFAS” and therefore analyte-specific objectives are not defined in this document. Instead, data quality usability objectives will be determined by the standard DUSR questions answered in the affirmative:

1. Is the data package complete as defined under the requirements for the most current DEC ASP Category B or USEPA CLP data deliverables?
2. Have all holding times been met?
3. Do all the QC data; blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
4. Have all the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?
6. Have the correct data qualifiers been used and are they consistent with the most current DEC ASP?
7. Have any quality control exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR.

Table 1. Analytical Methods/Quality Assurance Summary Table

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples[1]	Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
Groundwater/ Surface water	1,4-Dioxane	Grab	TBD	SW-846 Method 8270C Using Selective ion monitoring Reporting Limit 0.35µg/L	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater/ Surface water	PFAS	Grab	TBD	Modified EPA 537 Detection level ≤ 2 ηg/L	1.25g Trizma Cool to 4^0 C Must not exceed 10^0 C during the first 48hrs	14 days to extraction; 28 days from extraction to analysis	(3) 250 mL HDPE container

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations

[2] From date of sample collection

[3] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices

TBD - To Be Determined

3.0 QUALITY CONTROL SAMPLING

Additional analysis will be conducted for QC assurance in addition to the laboratory analysis of the field groundwater samples. QC samples will include: one equipment rinsate blank and one set of duplicate samples per twenty field samples per sample shipment (this QC sampling schedule applies to PFAS and 1,4-Dioxane sampling).

Additionally, enough quantity of PFAS and 1,4-Dioxane samples must be collected in order to produce a laboratory Matrix Spike and Matrix Spike Duplicate (MS/MSD). Due to the sensitivity of the PFAS and 1,4-Dioxane sampling method and analyses it is good practice to collect field samples specifically to serve as MS and MSD samples in the laboratory. This ensures that there is enough volume of material for all laboratory QAQC procedures. The quantities of field samples and quality control samples have been summarized in Table 2.

The equipment blank and duplicate samples will be analyzed for the same parameters as the soil and groundwater samples.

Table 2
Summary of Quality Control Samples
Former ACCO Brands

Sample Matrix	Analytical Parameter	Sample Type	No. of QA/QC Samples
Water	SVOC (1,4-Dioxane), PFAS	Duplicate	1 per 20 samples
Water	PFAS	MS/MSD	1 per 20 samples
Water	1,4-Dioxane	MS/MSD	1 per 20 samples
Water	SVOC (1,4-Dioxane), PFAS	Equipment Blank	1 per 20 samples

4.0 STANDARD OPERATING PROCEDURES

The standard operating procedures (SOPs) for groundwater sampling, sampling equipment decontamination and specific procedures for PFAS and 1,4-Dioxane sampling are described in the following sections.

Groundwater Sampling

Groundwater samples will be collected according to the USEPA guidance for low stress (low flow) purging and sampling procedure for the collection of groundwater samples from monitoring wells (https://www.epa.gov/sites/production/files/2017-10/documents/eqasop-gw4.pdf). The laboratory will supply pre-cleaned sampling containers.

PFAS Sampling

Sampling and analyses for PFAS substances is extremely sensitive and requires specific procedures. For all instances of PFAS sampling, FLS will conduct the field sampling according to the SGS Accutest and Alpha Analytical standard operating procedures, provided as Attachment E and Attachment G respectively. These procedures are in accordance with sampling and analyses specification for EPA's Modified (Low Level) Test Method 537. In general, the typical low-flow groundwater sampling procedures will be followed with the addition of the following special considerations:

Field Clothing and PPE

- No clothing or boots containing Gore-Tex®
- All Safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not use cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Wet weather gear made of polyurethane and PVC only

Field Equipment

- Must not contain Teflon® (aka PTFE) or LDPE materials.
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene.
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil cannot be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS

- Coolers filled with regular ice only. Do not use chemical (blue) ice packs.

Food Considerations

- No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area.

Sample Containers

- All sample containers made of HDPE
- Caps are unlined and made of HDPE

Equipment Decontamination

- PFAS-free water on-site for decontamination of sample equipment. No other water sources to be used.
- Only Alconox and Liquinox can be used as decontamination materials.

1, 4-Dioxane Sampling

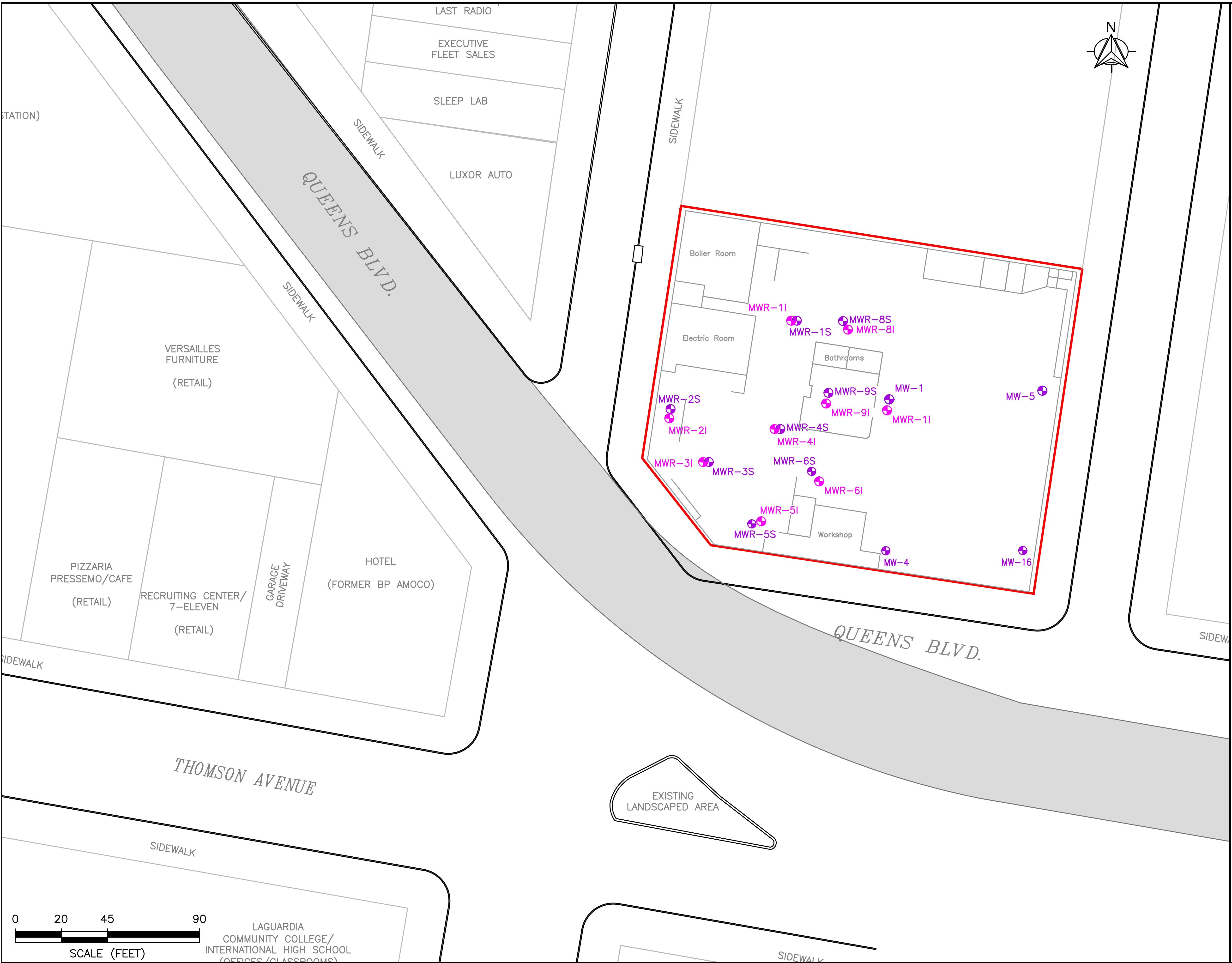
Historically, 1,4-Dioxane has not been evaluated at levels that are now thought to potentially represent a health concern. More sensitive sampling and analytical methods need to be used to detect 1,4-Dioxane at this new level. Therefore, FLS will conduct the sampling according to the Alpha Analytical and SGS Accutest standard operating procedures, provided as Attachment F and Attachment G respectively. These procedures are in accordance with sampling and analyses specification for EPA's Modified (Low Level) Test Method 537.

Decontamination Procedures

Decontamination will be performed on plastic sheeting or in another containment area that is deemed to prevent runoff to the ground. Prior to use on-site and between sampling locations, the sampling equipment and other non-disposable sampling equipment will be decontaminated using the following protocol:

1. Scrub using tap water / non-phosphate detergent mixture and bristle brush.
2. Rinse with tap water.
3. Repeat step 1 and 2
4. Final rinse with distilled water from containers not of low-density polyethylene (LDPE) or glass construction. All decon water will be supplied by the lab for PFAS sampling.
5. Air-dry the equipment.

Figures



FILE: \\ds1812\fls_files\project_files\10195 – ACCO – Jim Beam\Figures\Other\QAPP (emerging contaminants)\MW Network 10.14.19 v2.dwg DATE: 10/16/2019

Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Fl.
New York, NY 10001

32-00 Skillman Avenue
Long Island City, NY

Figure 1

PFAS & 1,4 Dioxane Sampling Locations

October 2019

Project Number
10195-001

LEGEND

🟥 SITE BOUNDARY

● SHALLOW MONITORING WELL

● INTERMEDIATE MONITORING WELL

Attachment A

Project Team Resumes

Fleming Lee Shue

Environmental Management & Consulting

Arnold F. Fleming, PE
Owner

Education

- Bachelor of Science, Civil Engineering, Manhattan College (1968)
- Masters of Engineering, Manhattan College (1969)

Professional Registration

Professional Engineer, New York

General Expertise

Arnold F. Fleming is an environmental engineer with over 40 years of experience in the areas of water quality and planning studies, domestic and industrial wastewater treatment and disposal, environmental impact analysis, contaminated materials assessment and remediation, and environmental permitting. Mr. Fleming was one of the founders of Allee King Rosen & Fleming, Inc., AKRF, Inc., and AKRF Engineering P.C. For over 20 years, Mr. Fleming has provided these firms with engineering expertise in all technical areas relating to permitting and hazardous waste assessment and management and the assessment of impacts in these technical areas. Mr. Fleming has been Principal in charge for Phase II Environmental Assessments for over 100 residential, commercial and industrial sites in the Metropolitan New York area. Duties include design of sampling program, oversight of means and methods of sample collection, and preparation of final reports including recommendations for remediation. He has also been involved with the design for over 50 remediation systems including UST tank removals, contaminated soil disposal, soil vapor extraction systems, sparged air/ soil vapor extraction systems. Remedial designs include approximately 20 sites remediated under the State of New York Voluntary Clean-up program, and two sites on the Registry of Inactive Hazardous Waste Sites. Mr. Fleming has been the Principal in charge of the preparation of Phase I Environmental Assessments for several hundred residential, commercial and industrial properties, as well as several hospitals throughout the New York Metropolitan Area. He has been the Project manager for the preparation of 208 wastewater facility planning studies, and has prepared the infrastructure and utility assessments for over 100 EIS's in the Metropolitan New York Area.

PROJECT EXPERIENCE

535 West 23rd Street Development

Prepared the Phase I and asbestos surveys for this Manhattan development site. Designed the Phase II sampling program, executed the sampling and on the basis of the findings obtained approval to remediate an extensive oil spill via bio-remediation. The system was designed and installed under the new building with operation to begin upon occupancy of the building. The approach allowed the construction schedule to proceed without delay due to the discovered contamination.

Queens West Redevelopment
Technical representative to the Queens West Development Corporation (QWDC) a subsidiary to the Empire State Development Corporation charged with developing the 78 area redevelopment of the Hunters Point waterfront into a mixed commercial/residential development. Mr. Fleming developed a model remediation plan for the first residential building in 1995 and has applied this model to the next three residential development sites in Stage 1 of the development, the first having opened for residency in the summer of 2002. Mr. Fleming is assisting QWDC in selecting a developer for Stage 2 and 4 and is advising them on the remediation of Stage 2, a former oil refinery and paint factories. Development of Stage 2 is to occur simultaneous to the remediation efforts in the refinery portion of the site.

Staten Island Muss Site Redevelopment
Managed the initial Phase II sampling for this former industrial site re-zoned for single family residential development. The site was listed on the Registry of Inactive Hazardous Waste Sites. Prepared in Remedial Investigation and Feasibility Studied that led to a Record of Decision (ROD) setting forth the remediation for the site. Prepared the remedial Design to satisfy the ROD and managed the oversight of the remediation leading up to the removal of the site from the registry. Designed a revetment system to protect the capping material that was an integral part of the remediation from storm related erosion from the adjacent Raritan Bay. Petitioned the Federal Emergency Management Agency to remove the site from the 100-year flood plain on the basis of the new elevations and erosion measures implemented on the site.

Rego Park, Queens Remediation
Prepared a Voluntary Clean-up Application, performed additional sampling and developed a remedial work plan to remove solvent contaminated soils from this development site. Designed a sparged air/ Vapor Extraction System to remediated contaminated groundwater and site soils. Operated the system for two years reducing the groundwater contamination by over 90%. The sparged air / VES was designed to be installed under the building avoiding the delay of remediation the site prior to construction.

Hudson River Park Redevelopment
For this new park stretching from Battery Park City to 59th Street, Mr. Fleming oversaw the preparation of the US Army Corps of Engineers and the New York State Department of Environmental Conservation permit application s and responses to comments leading to issuance of this waterfront development permit. This permit was unique in that it addressed the first segment that was designed and ready to be built as well as the entire park for which no design was available. To address the future segments, schematic design drawings were submitted showing conceptual designs that would be refined as the park was designed and build. A permit condition to submit each segment design for review and determination of consistency with the master permit was included to assure that no impacts were introduced in the design process. If a determination on any segment were made that the design was not consistent with the master permit, a new permit process would be initiated.

Greenpoint Brooklyn Waterfront Development Planning

For a private developer, Mr. Fleming has prepared an evaluation of the permitting concerns including a jurisdictional assessment of the existing waterfront edge, to assist in the establishing of a development plan that will be compatible with the requirements of federal and state permits.

Queens West Redevelopment

Mr. Fleming led the permitting effort to allow redevelopment of the waters edge associated with this 78 acre mixed Commercial/Residential waterfront development. The project has three stages, the first under construction and permitted in 1995. Mr. Fleming managed the permitting effort for this first waterfront permit. The current application to the state and federal permitting agencies is for a project wide permit covering the remaining 3 stages of which 2 are under design. The final stage of the project was the subject to a schematic design only. Notable in the current permit is the reconstruction of collapsed platforms that are to become a site wide park and esplanade providing water access to this portion of the east river for the first time in over a century.

West Side Ferry Terminal

For the New York City Economic Development Corporation, Mr. Fleming led the permit effort to allow a new public ferry terminal located within the bounds of the Hudson River Park. Because the ferry terminal was not approved when the Park permit was issued, this project was carved out of the park permitting process and followed a separate permit track. The permit application was assembled using updated submissions from the Park permit application and addressed the specific concerns of the State and federal permitting

Jersey City Colgate Site Redevelopment

For this mixed commercial/residential waterfront redevelopment project, Mr. Fleming prepared the state Coastal Zone Development permit and a US army Corp of Engineers dredge and fill permit to allow a marina, esplanade and a new combined sewer manifold to be built. The sewer manifold was placed in the river because of space limitations and was permitted, the first fill permit in this portion of the Hudson River in 20 years.

River East Environmental Permits for Shoreline Protection

For this 10 acre site obtained the permits to install 500 feet of revetment to allow a 1.4 million square foot residential development on a former oil terminal. Also prepared the Remedial Action Work Plan to remove historic spilled oil simultaneous to Vernon Realty shoreline construction.

Mark Hutson, PG
Director/Senior Project Manager

Education

BIS, Geological Sciences and Applied Biological Sciences, Arizona State University, Tempe, AZ

Awards / Certifications / Training

- OSHA 40-HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- OSHA 10-Hour Construction Safety
- NYCOER Gold Certified Professional

Professional Registrations

- Professional Geologist (License No. 001190-1) – New York State

GENERAL EXPERTISE

Mark Hutson is a Director/Senior Project Manager with experience in environmental consulting, specializing in environmental liability management. Mark provides clients with innovative, cost effective strategies to manage their environmental liability and compliance issues. He oversees the firm’s project portfolio as well as managing junior and senior level staff. His expertise include hazardous material assessments, environmental due diligence, site characterization, sub-surface investigations, soil and ground water remediation, remedial design and implementation, data management and interpretation, regulatory compliance and reporting, stakeholder management, cost to incident closure estimates and insurance claim investigations. He has considerable leadership and supervisory experience including direct interface with clients, and third-party stakeholders such as property owners, attorneys, real estate developers and regulatory agencies including the NYSDEC, NYCDEP, NYCOER, NYSDOH and various county health departments. Mark has worked on environmental projects in New York, New Jersey, Connecticut, Arizona, California and Nevada.

PROJECT EXPERIENCE

Queens Plaza Residential Development (QPRD), Long Island City, NY

Served as project manager for three separate Brownfield Cleanup Program sites associated with QPRD. Responsibilities included direct oversight and management of day to day field activities, implementation and execution of the remedial program, coordination with construction mangers, remedial contractors and several local and state agencies including NYSDEC, NYCOER, NYSDOH, and NYCTA. Remediation included the removal of over

115,000 tons of impacted soil, In-situ Soil Stabilization, NAPL recovery, collection of over 400 soil samples. Mr. Hutson's authority included directing all field efforts and acted as the primary contact for the project. Additional responsibilities included the coordination and preparation of all final reports including SMPs and FERs. QPRD received Certificates of Completion (COCs) for all three sites in August and September of 2016.

Inwood Rezoning, Manhattan, New York

Assessed presence of hazardous materials in soil and groundwater at projected and potential development sites identified in the Inwood Rezoning proposal over a 27-block area of Inwood neighborhoods in the Manhattan Borough of New York City. Composed the hazardous materials chapter of the Environmental Impact Statement and coordinated with NYC Economic Development Corporation to address revisions and comments.

Port Richmond Brownfield Opportunity Area Study, Staten Island, NY

Developed an inventory of and analysis of known and potential Brownfield Sites within the project boundaries. Prepared an environmental assessment including a review of past site use and potential for environmental impact for six strategic sites proposed for potential redevelopment. Assisted in the preparation of the Nomination Document pursuant to NYS Department of State (NYSDOS) guidelines and coordinated with NYSDOS to address revisions and comments.

Retail Petroleum/Bulk Storage Facilities Portfolio, New York

Served as project manager for numerous active and former retail petroleum facilities in varying lifecycle stages including site characterization, remedial design and implementation, and closure for a major petroleum client. Responsibilities included site characterization, scope development, remedial design and implementation, data management and interpretation, UST/AST removal, budget forecasting and management, regulatory compliance and reporting, and management of project teams and subcontractors.

Insurance Claim Investigation and Support, NY/NJ

Served as the regional lead and project manager for an international insurance company acting as environmental expert to assist the insurer in claim determinations. Responsibilities included claim investigation and technical support on projects associated with petroleum and industrial chemical releases, remediation, and UST removals in New York and New Jersey. Responsible for developing cost to incident closure estimates, determining what is reasonable and necessary regarding an insured's response to a claim, preparation of claim recommendations and reports including reviewing insured's invoices and invoice tracking.

Former Retail Petroleum Facility Redevelopment, Brooklyn, NY

Served as project manager for the remediation and redevelopment of a former retail petroleum facility with a open NYSDEC spill number. Remediation of the underlying soil and groundwater occurred simultaneously with the construction of a 12-story multi-use building. Remediation included the excavation of contaminated soil to 15 feet bgs followed by In Situ Chemical Oxidation of residual soil and ground water impacts. Project required interface with and coordination of numerous stakeholders and regulatory agencies including the NYSDEC, NYCOER, NYCDEP, NYCTA and NYCDOB.

Soil Vapor Intrusion Investigation, Brooklyn, NY

Served as project manager for a large soil vapor intrusion investigation of a former retail petroleum facility now a PETCO retail store. Responsible for the development and execution of a sampling plan in compliance with NYSDOH/EPA guidelines which included the installation of numerous subsurface soil vapor sampling points and indoor/outdoor sampling of ambient air conditions to determine potential exposure scenarios.

Commingled Plume Investigation/Remediation, Blythe, CA

Acted as field geologist/environmental scientist for a public municipality client responsible for a commingled gasoline/diesel plume emanating from multiple sources. Responsibilities included plume characterization, site investigation, remedial design, implementation and operation, permitting, data collection and analysis, and waste management. Oversaw the installation of five multi-phase extraction (MPE) systems and was responsible for the operation, maintenance and optimization of the MPE systems operating simultaneously.

Various Environmental Sites, AZ/CA/NV

Served as lead environmental scientist/field geologist for numerous environmental remediation sites throughout Arizona, Southern California and Nevada. Responsibilities included site characterization, sub-surface investigations, sampling of environmental media, data analysis and interpretation report preparation, and oversight of remedial contractors.

Steven E. Panter, CGWP, PG

Education

- GIS Training, Penn State University, ongoing
- Master of Science, Environmental Engineering, Concentration in Hydrogeology New Jersey Institute of Technology (1990)
- Graduate Studies, Soil Sciences, Rutgers University (1979)
- Bachelor of Science, Forest Science, University of Wisconsin (1978)

Certifications/Training

- OSHA 40-Hour HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- Fracture Trace and Lineament Analysis, April 1995
- Intensive training course in identifying fractures and lineaments in rocks of Pennsylvania.
- The course emphasized the importance of identifying these features in order to assess and understand ground water movement and to understand contaminant migration in geologic settings where these features can play a key role.
- Treatment Technology for Contaminated Soils and Ground Water, February 1995.
- Assessment, Control and Remediation of LNAPL Contaminated Sites, October 1994.
- Ground Water Flow through Fractured Media, University of Wisconsin, 1993.
- Hydrogeology of the Glacial Deposits of New Jersey: An Applied Field Course, presented by Cook College in Cooperation with Rutgers University, 1993.
- Design and Analysis of Aquifer Pumping Tests - Association of Ground Water Scientists and Engineers, Dublin, Ohio, 1991.

Professional Registrations

- Certified Ground Water Professional (CGWP No. 437) by the National Ground Water. Association (NGWA), June 1993
- Professional Geologist – New York State

General Expertise

Steven Panter is a Hydrogeologist with over 30 years of experience in environmental consulting. Mr. Panter has supervised or played a key technical role in many soil and ground water investigations involving investigations and remediation of fuel oil, PCE, TCE, polychlorinated biphenyls (PCBs), cumene, gasoline, organic compounds, metals, dioxins, and coal tar. They have been performed for landfills, chemical processing plants, underground storage tanks (UST), fuel oil terminals, manufacturing plants and power production facilities. The clients have been primarily large corporations, utilities, or municipalities, although some work has been done for small businesses. He is responsible for projects that range from less than $20K to more than $20,000,000. Mr. Panter has developed sampling and analysis programs for a variety of ground water and subsurface soil investigations. His expertise also extends to technical oversight and legal support; and environmental auditing. Mr. Panter also has worked on environmental impact statements for several proposed power plant facilities and power plant upgrades in New York State.

He has extensive experience in New York State Brownfield Cleanup Program projects. Mr. Panter has directed or played a key technical role in a number of Brownfield projects involving the investigation and remediation of petroleum and coal tar contaminated media.

PROJECT EXPERIENCE

Queens Plaza Residential Development

Mr. Panter was one of the key senior staff and the technical lead for the Brownfield remediation of a highly contaminated three-acre, parcel in New York City. The total project monetary size was 875 million dollars. The former chemical plant was incorporated into three separate Brownfield sites that required multiple investigations, remedial investigation reports, and remedial action work plans. Mr. Panter was the principal author of these reports and responsible for meeting deadlines to ensure that financing for the project remained in place. He coordinated major aspects of the project and represented the client in meetings with state officials, attorneys, insurance companies and other critical parties. Ultimately, the site successfully met the Brownfield goals and received Certificates of Completion (COC) for all three parcels allowing development to move forward. Very large tax credits then became available to the client as a result of receiving the COCs.

Queens West Parcel 8 Remediation

Mr. Panter oversaw and directed the investigation of a Brownfield Cleanup Program site contaminated with 80,000 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik®, which eliminated excavation and saved the client $7 to $9 million dollars in cleanup costs and eliminated community exposure. The treatment focused on oxidation of 47,000 pounds of coal tar contaminant in the treatment interval. This was the first remediation of its kind in New York State. NYSDEC approved the results and issued a Certificate of Completion within 14 months of the beginning of cleanup. Treatment lasted five months in one application.

Queens West Center Boulevard Remediation

Mr. Panter oversaw and directed the investigation of a Voluntary Cleanup Site contaminated with 18,500 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik®, which eliminated excavation of the street and disruption to the community and eliminated public exposure. This was the second remediation of its kind in New York State. NYSDEC review is ongoing. Treatment lasted two months in one application.

Queens West Redevelopment

Mr. Panter oversees environmental compliance for a very large scale redevelopment of the New York City waterfront, and entails remediation of numerous parcels of former industrial waterfront that are heavily contaminated with petroleum, coal tar, and numerous other wastes. The site will be redeveloped into commercial and residential space with parks and green spaces. Mr. Panter advises QWDC on all aspects of environmental compliance, contaminated site investigation, hazardous materials management, and remediation.

Long Island City, Queens, New York Redevelopment
Mr. Panter prepared a detailed assessment of soil disposal options and costs for a facility contaminated with creosote and metals. He used a statistical analysis approach to advise the client on the most cost effective means of selecting soil disposal options depending on the type and degree of soil contamination.

West 23rd Street 10th Avenue Redevelopment
On a site contaminated with gasoline and fuel oil, Mr. Panter prepared an analysis differentiating the sources of on-site and off-site contamination in order to justify closing the spill number. This was a multivariate analysis demonstrating that the on-site contamination was clearly different from the off-site contamination. What was unique about the analysis is that conventional reporting of results did not distinguish between the different sources, but the multivariate analysis—using the same data—showed a distinct difference.

West 30th Street and 11th Avenue Redevelopment
On a site contaminated with metals near a former coal gas plant slated for a major residential development, Mr. Panter analyzed groundwater issues stemming from benzene contamination and successfully predicted contaminant plume behavior during dewatering. He developed an indoor air monitoring program for a neighboring residential building as a protective measure against inducing contamination to residents. He also presented data supporting the case that chromium levels were the result of natural conditions rather than contamination.

Gansevoort Street to West 23rd Street; The High Line
Mr. Panter managed the waste characterization portion of the High Line project in New York City, where a defunct elevated industrial railway is being converted into a major urban park and green space. Mr. Panter directed testing, removal, and management of contaminated track ballast and was a key individual in planning waste management for all track bed materials. He was responsible for directing and planning inspections for hazardous materials throughout the entire program and also directed air sampling and monitoring for the construction phase.

Astoria, Queens, NY Astoria Gas Turbines Well Reconnaissance Program
Mr. Panter managed a well reconnaissance program at the Astoria Gas Turbine facility to assist the development of a remediation program to close out petroleum spills inherited from the previous site owner. The program encompassed evaluation of more than 70 monitoring wells, groundwater and product level measurements, groundwater sampling, a summary of the findings, and recommendations for improving the monitoring network and resolving ambiguities in the well information. Mr. Panter effectively coordinated meetings between station representatives, off-site NRG managers, and an independent project manager working for NRG. He also facilitated very productive meetings between the previous site owner and NRG in order to obtain additional well information and secure permission to access wells in off-site, adjacent areas.

Staten Island, NRG Arthur Kill Generating Station, Staten Island Ignition Oil Area Recovery Program

Mr. Panter has been assisting NRG at the Arthur Kill Generating Station with a product recovery/monitoring in the Ignition Oil Area. This effort entails monthly monitoring, recovery, and reporting of product levels in five recovery wells installed by a consulting firm when the plant belonged to Con Edison. At NRG's request, the program was recently extended. Station personnel often call the Mr. Panter to discuss other environmental matters because of his extensive site knowledge and excellent rapport with the Station managers and staff.

Staten Island, Transformer Explosion Remediation Program

Following a transformer fire and rupture that released PCBs in concentrations exceeding 300,000 ppm, Mr. Panter managed a major remediation program encompassing massive interior and exterior portions of the power plant including soils, pavement, and walls. This was done under a Consent Order and had potential penalties of $500,000,000. Mr. Panter oversaw and directed all aspects of the field program and represented Con Edison at numerous meetings with regulatory personnel. This portion of the remedial program lasted one year.

Staten Island, Property Sale Site Assessment

Project manager for a large-scale expedited site assessment of the Arthur Kill Generating Station as part of the property sale to Visy Paper Company and the New York City Economic Development Corporation. Directed, planned, and coordinated the investigation. Played a critical role in numerous meetings with representatives of the New York State Department of Environmental Conservation (NYSDEC) from the Acting Regional Director and Director of Hazardous Waste to NYSDEC field staff. Rapidly and thoroughly completed the site investigation and remedial assessment to a level whereby the findings and recommendations were easily accepted by NYSDEC. Acceptance of results and remedial strategies was facilitated by the excellent rapport with NYSDEC representatives.

All Boroughs, Site Investigation, New York City Housing Authority

Supervised and coordinated the investigation of 20 housing project sites with leaking USTs and pipelines for the New York City Housing Authority. Provided client contact, prepared work plans, supervised field programs, interpreted and analyzed data, and prepared final reports and recommendations. The focus of the program was to characterize and delineate the extent of oil-contaminated soils and ground water contamination, prior to remediation. Program included installation of monitoring wells and interpretation of soil and ground water contamination in a variety of geologic settings throughout the five boroughs including marine deposits, bedrock, glacial outwash and till.

Manhattan and Brooklyn, Environmental Assessment, New York City School Construction Authority

Project Manager for an environmental assessment of three properties proposed for an elementary and two middle schools in New York City. Directed technical and administrative aspects of the project. Program consisted of installation of deep monitoring wells in glacial outwash deposits and evaluation of ground water flow and quality.

Environmental Assessment, New York City Economic Development Corporation.
Managed environmental assessments of two NYC-owned properties slated for commercial development. Directed technical aspects of the project including soil gas testing and monitoring well installation and sampling.

All Boroughs, Site Investigations, New York City Housing Authority
Supervised the investigation of 20 sites with leaking USTs for the New York City Housing Authority.

Fuel Oil Terminal Demolition, Paragon Cable Company/Rucci Oil Company
Oversaw the demolition of two fuel oil terminals in NYC. Prepared a remedial action and sampling plan to expedite the cleanup process and comply with New York State Department of Environmental Conservation regulations. Supervised and directed the activities of several contractors with field crews of 10 to 20 people. Advised corporate principals on project progress, issues and alternatives. Met with regulatory officials on behalf of the client. One facility contained more than 18 large aboveground and underground fuel oil tanks. Total storage capacity was 2.3 million gallons. The second facility had seven underground storage tanks and one aboveground tank. Total storage capacity was 385,000 gallons.

Rockaway (NJ) Borough Superfund Site Ground Water Investigation Program
Developed a ground water investigation program for a buried glacial aquifer system in northern New Jersey. Designed the investigation to examine the effect of TCE contamination on a local aquifer. The program consisted of a network of shallow, deep and intermediate level monitoring wells and associated ground water sampling.

All Boroughs, Ground Water and Soil Sampling, New York City Housing Authority
Developed a ground water and soils sampling program to assess fuel oil contamination at approximately 20 New York City Housing Authority sites.

Site Investigation, New York City School Construction Authority
Conducted site investigations of soils and ground water in Manhattan and Brooklyn.

Soil Sampling Program, Paragon Cable/Rucci Oil Company
Conducted a soil sampling program as part of the demolition of two fuel oil terminals in NYC. The program included the sampling of waste soil piles and the excavations.

Expert Witness Testimony and Report Preparation
Mr. Panter testified as an expert witness as part of a technical panel before the New York State Board of Public Utilities as part of a power plant siting hearing. In this capacity, Mr. Panter was cross-examined on his written testimony by a panel of attorney's on the side of the opposition. He testified on technical matters involving hazardous materials and contamination of soil and groundwater and the impacts to the community depending on the project. Mr. Panter also served as a fact expert for a New York State agency in a contamination lawsuit against a Fortune 100 company. Mr. Panter was deposed as part of this case. He drafted and corroborated on two expert reports prepared and prepared counter arguments for the case. The case had a successful outcome for the client.

Publications

Mr. Panter has authored numerous technical papers on site investigation and remediation and has given technical presentations on these topics and on effective presentation of technical information.

Joel Kane
Environmental Scientist

Education

- B.S. Biology, minors in Chemistry; English, Gonzaga University (2013)

Certifications and Training

- OSHA 40-Hour HAZWOPER Training
- 10-Hour Construction Safety and Health Training
- SWPPP Inspector/Administrator
- Optical Gas Thermographer
- 8-Hour NORM Surveyor

General Expertise

Joel Kane is an Environmental Scientist with Fleming Lee-Shue. Mr. Kane has experience conducting Phase I and Phase II Environmental Site Assessments to support property transactions, Environmental Assessment Statement and Environmental Impact Statement studies, pre-design investigations, hazardous soil and waste classification, construction oversight and lab coordination. Mr. Kane possesses over five years' experience in assessing the presence of hazardous materials through the evaluation of site conditions and the review of historic federal, state and municipal databases. Mr. Kane has conducted numerous subsurface investigations and is skilled in sample collection of all environmental media. Mr. Kane is experience in Oil & Gas spill response, site remediation/reclamation, air monitoring, and compliance plan development. He possesses a functioning knowledge of several field related software and instruments, including but not limited to: Equis Data Gathering Engine (EDGE), ArcGIS, LIMS lab software, AutoCAD, TVA 1000B Flame Ionization Detectors, NORM surveying meters, various groundwater sampling pumps and Microsoft Office Suite. Additionally, Mr. Kane has practical work experience in bench chemistry, organic chemistry, GCMS analyses, soil chemistry consulting, and data validation. Mr. Kane has a proficient understanding of, NYSDEC, NYCOER and NJDEP regulations and participated in numerous projects requiring environmental review to comply with the City Environmental Quality Review (CEQR) requirements. Mr. Kane maintains a track record of excellence, regularly managing the quality assurance of subcontractors and ensuring that client scope requirements are met on every project.

PROJECT EXPERIENCE

Brownfield Cleanup Site – Former Stapler Manufacturer, Long Island City, NY

Performed CAMP, operation and maintenance on soil vapor extraction system and Electrical Resistance Heating remedial technologies implemented at site. Conducted soil, soil vapor, waste characterization and groundwater sampling investigations onsite.

Interpreted analytical data to build conceptual site model of geochemical conditions and delineate contaminant plume characterization onsite. Prepared daily reports, generated data management tools, and managed inventory of generated waste onsite.

Brownfield Cleanup Site – Former Chemical Factory, Long Island City, NY
Performed drilling oversight and operation and maintenance on capture well treatment system at heavily contaminated NYS Brownfield Cleanup Site. Conducted waste characterization and groundwater sampling investigations onsite. Monitored sub-slab depressurization system functionality onsite. Prepared reports and managed inventory of generate waste onsite.

Phase I Environmental Site Assessments
Performed over 50 Phase I Environmental Site Assessments including due diligence valuations on 60 plus oil and gas facilities. Past assessments vary from single home residential properties to large parcel Brownfield Cleanup Program sites. Investigated the potential impacts to the sites and used expertise to summarize any existing recognized environmental conditions based on review of historical records, environmental database listings, site inspection, and interviews with former owners.

Phase II Environmental Site Assessment – Jericho, NY
Performed a Phase II Environmental Site Assessment as a part of a real estate transaction on a former auto repair service facility. Performed soil, oil sludge, and soil vapor sampling on the site. Evaluated analytical data and prepared Phase II assessment of onsite contamination.

Remedial Site Investigation for Historical Spill – Manhattan, NY
Performed a Remedial Site Investigation for a petroleum spill associated with a underground storage tank in Manhattan, NY. Performed drilling oversight and conducted soil and groundwater sampling on the site. Evaluated analytical data and prepared report assessment of onsite contamination.

Former Gas Plant Remediation – Everton, WY
Served as lead chemist and scientist on remediation alternatives analyses for the former Whitney Canyon Gas Plant in western Wyoming. Organized remedial investigation, evaluated laboratory analytical data and developed alternatives analyses for reclamation of the site, including the possibility for *in-situ* treatment. Responsibilities included data interpretation, chemical alternative prediction modeling, and final report writing.

Oil Contaminated Soil Landfarm – Bairoil, WY
Served as lead chemist and scientist on remediation alternatives analyses for the former Bairoil landfarm contaminated waste site. Organized remedial investigation, evaluated laboratory analytical data and developed alternatives analyses for reclamation of the site, including the possibility for *in-situ* treatment. Responsibilities included data interpretation, chemical alternative prediction modeling, and final report writing.

Waste Oil Injection Plant– Gillette, WY
Served as lead chemist and scientist on remediation alternatives analyses for the former Injection Plant No. 1 waste oil injection plant site. Organized remedial investigation evaluated laboratory analytical data and developed alternatives analyses for reclamation of the site including the possibility for *in-situ* treatment. Responsibilities included data interpretation, chemical alternative prediction modeling, and final report writing.

Stream Infrastructure Restoration Projects– Sweet Grass County, MT
Responsible for reviewing initial assessments, surveying, reporting for the Boe-Engle Ditch and Yanzick Brey-Riddle Infrastructure Rehabilitation projects located on the Boulder River, MT. Project objectives include completing a geomorphologic and hydrologic analysis of the river near the headgate location to improve diversion efficiency to the headgate and minimize impacts to the stream and fisheries. Responsibilities included preparing a grant application, project management, and construction oversight. Construction complete spring of 2018.

Baseline Water Quality Sampling— Bakken Oil Field, ND
Responsible for project oversight, including using GIS system data to find groundwater wells within a half mile of future oil and gas drilling locations, developing a Sampling and Analysis Plan (SAP), coordinating landowner letters and scheduling, sampling groundwater wells, communicating with laboratories, and developing Data Summary Reports for submittal.

Large Oil and Gas Spill Assessment Projects, MT, ND, SD, WY
Served as environmental scientist for more than 100 environmental spill remediation sites throughout Montana, North Dakota, South Dakota, and Wyoming. Responsibilities included site characterization, sub-surface investigations, sampling of environmental media, data analysis, developing site conceptual models, alternatives analysis, data interpretation, report preparation, and oversight of remedial contractors.

NANCY C. ROTHMAN, Ph.D.

CEO/Principal Scientist
Sr. Environmental Chemist

Professional Affiliations

- NJDEP Science Advisory Board
- Licensed Site Professional Association, Massachusetts, Associate Member (LSPA)
- Licensed Site Remediation Professional Association (LSRP)
- Interstate Technology & Regulatory Council (ITRC)
- Society of Environmental Toxicology and Chemistry (SETAC)

Areas of Expertise

- Setting Data Quality Objectives (DQOs)
- Organic Chemistry
- Method Development
- Emerging Contaminants
- Quality Assurance Project Plans
- Technical Chemistry Review
- Field & Lab corrective action
- Data Validation
- Data Usability Assessments
- Quality Assurance Management
- Laboratory Audits
- Consultant for Regulatory Agencies
- Litigation Support & Expert Testimony

Presentations / Training

- *Limitations of PFAS Data;* AEHS International Conference, 2017
- *Preservation & Holding Times for Contaminant Chemistry*; Gulf of Mexico Oil Spill Conference, 2014
- *Data Quality Assessment for Investigation & Remediation;* NJDEP LSRP Training, 2014
- *PCBs in Schools – NYC School Case Study;* AEHS International Conference, 2011
- *Sediment Data Quality for Use in Ecological Risk Assessment;* SETAC Conference, 2007

Nancy Rothman, Ph.D. is CEO and a Principal Scientist of New Environmental Horizons, Inc. (NEH). She is a recognized expert in organic environmental chemistry. Dr. Rothman has over 30 years of experience in the development of methods, analysis, and data evaluation for volatile (VOC) and semivolatile organic compounds (SVOC), including dioxins/furans and polychlorinated biphenyls (PCBs), with a specialty in emerging contaminants including Per- and Polyfluoroalkyl Substances (PFASs). She applies her depth of experience to evaluate usability of current and historical data and in the development and review of project-specific Work Plans, QAPPs, and method development for environmental investigations in support of NOAA NRDA, USEPA Superfund, US Army Corps of Engineers, and state-led programs. Dr. Rothman has successfully provided expert testimony and litigation support for complex environmental data issues involving analyses of polynuclear aromatic hydrocarbons (PAHs), VOCs, and PCBs.

Dr. Rothman is an appointed member of the New Jersey Department of Environmental Protection (NJDEP) Science Advisory Board offering technical expertise and guidance to the Office of Science on existing and emerging issues. She is also a member of the NJDEP Site Remediation Program Analytical Methods Technical Guidance Group, responsible for redesigning and developing QA/QC guidance for NJDEP. Dr. Rothman currently serves on two ITRC teams where she shares her expertise and assists in developing guidance for Total Petroleum Hydrocarbons (TPH) and PFAS.

CREDENTIALS

Education/Training

- Ph.D., Physical-Organic Chemistry, Brandeis University
- M.A., Physical-Organic Chemistry, Brandeis University
- B.S., Chemistry, Union College

REPRESENTATIVE EXPERIENCE

Emerging Contaminants

Dr. Rothman currently serves on two Interstate Technology & Regulatory Council (ITRC) teams: “TPH Risk Evaluation at Petroleum-Contaminated Sites” and “Key Information Needed to Develop Strategies to Address Environmental Releases of Per- and Polyfluoroalkyl Substances (PFASs)”. She assists in writing and reviewing ITRC guidance documents and fact sheets, working cooperatively with other scientists from the public and private sectors. Dr. Rothman has also developed project-specific Quality Assurance Project Plans (QAPPs) for other emerging contaminants including Endocrine Disruptors, Pharmaceuticals and Personal Care Products in sediments and water in support of environmental investigations.

Project-specific Data Quality Objectives (DQOs), Method Development, Technical Review

Dr. Rothman was the *Assistant Technical Work Group Leader for Chemistry and Sampling* for the **NOAA - Natural Resource Damage Assessment (NRDA) of the Deepwater Horizon Oil Spill**. She was responsible for coordinating sample collection and analysis activities for NOAA-NRDA for greater than 70,000 samples of sediment, water, soil, oil, and tissue. Dr. Rothman reviewed project-specific Work Plans, developed project DQOs and method-specific QA/QC acceptance criteria, assisted in method development, and performed technical review of NRDA reports.

Preparation of Project-specific QAPPs

Dr. Rothman has developed numerous project-specific QAPPs for large, complex sites including New Bedford Harbor, MA where the main contaminant of concern (COCs) are PCBs; Newtown Creek Superfund Site, NYC where the main COCs being investigated are PAHs, NAPL, and Metals; and for a large residential neighborhood in MA where vapor intrusion of VOCs from a contaminated groundwater plume was identified as a human health risk. She has experience with many regulatory programs, including USEPA (Regions 1, 2, and 3), NYSDEC, NYCDEP, NOAA-NRDA, US Army Corps (USACE), and state programs (CT, MA, ME, NH, NJ, NY, RI). This experience includes the more detailed format in the Uniform Federal Policy (UFP) for QAPPs, currently required by many of the USEPA Regions and the USACE.

NANCY C. ROTHMAN, Ph.D.

CEO/Principal Scientist
Sr. Environmental Chemist

Presentations / Training – cont'd

- *Out of the Frying Pan, into the Drinking Water: Health Hazards and Community Responses to Water Contaminated with PFCs;* Collaborative on Health and the Environment (CHE) Webinar, 2016
- *Analytical Rules and Technical Guidance;* NJDEP Training, 2014
- *Soil Vapor Intrusion Data – Planning and QA/QC Evaluation for Risk Assessment*; AEHS International Conference, 2007
- *Interpretation of Uncertainty in Dioxin/Furan Data for the Risk Assessor and Environmental Decision-Maker*; SETAC Conference, 2006
- *Demystifying Dioxin Data for the Environmental Decision*-Maker; AEHS International Conference, 2005
- *Evaluation of Data Quality for MCP Submittals*; MassDEP LSP Training, 2004
- *Planning the Collection and Analysis of Environmental Data to Support Risk Assessment;* National Environmental Monitoring Conference (NEMC), 2003
- *Quality of Environmental Measurements;* MassDEP LSP Training, 2001
- *Freeze-Drying of Sediments to Achieve Risk-Based Detection Levels for Polyaromatic Hydrocarbons (PAHs) and Metals;* AEHS International Conference, 2000
- *Effective Tools for Explaining Environmental Chemistry;* Boston Bar Association, 2000

Data Validation and Usability Assessment

Dr. Rothman has performed data validation and data usability assessments for thousands of environmental samples in a variety of media including waters, soils, sediments, biological tissues, and air. In addition to the standard organic analytical techniques, Dr. Rothman's expertise in data review extends to specialty analyses including LC/MS/MS, GC/MS/SIM, and high resolution / isotope dilution GC/MS methods.

Litigation Support and Expert Testimony

Dr. Rothman has been successful in using her expertise in litigation support and expert testimony as demonstrated by the following projects:

- ➢ **NYS - State of New York, Office of the Attorney General – Hudson River, NY.** Dr. Rothman provided litigation support and reviewed hundreds of results from historical Hudson River fish tissue data for PCBs generated on samples collected by NY State from 1969 through 1987. She authored "Privileged and Confidential Attorney Work Product" memoranda with technical opinions on historical data certainty (bias) and usability.
- ➢ **Reliance Insurance Company – Raybestos Products Company, Crawfordsville, IN.** Dr. Rothman was an Expert Witness, reviewed Work Plans, depositions, and reports on cleanup activities performed at and by the Raybestos company and ultimately provided an expert opinion on the source and timing of PCB and lead contamination of property adjacent to the facility.
- ➢ **State of Illinois - Donaldson, et al. vs. Central Illinois Public Service (CIPS), Taylorville, IL.** Dr. Rothman was an Expert Witness and reviewed case documentation focusing on the release and analysis of PAHs as a result of an Immediate Removal Action (IRA) of coal tar from a site owned by CIPS. She produced an expert opinion on activities at the site during the IRA and testified on remediation QA/QC practices and usability of analytical data for determining whether environmental conditions lead to development of cancer in the plaintiffs. Dr. Rothman's testimony helped win the case for the plaintiffs.

Analytical Laboratory Audits

As a former Laboratory Director of **Enseco-Erco Laboratory, Cambridge, MA and Enseco-East Laboratory, Somerset, NJ**, Dr. Rothman has in-depth knowledge of environmental analytical laboratory operations. Dr. Rothman directed two environment testing laboratories each with over 100 employees. She was responsible for operations, sales, customer service, information technology, business reporting, and QA/QC. Dr. Rothman also performed lab audits in support of the NOAA-NRDA for the Deep Water Horizon Oil Spill.

Alliance with Regulatory Agencies

Dr. Rothman has worked cooperatively with regulatory agencies to develop analytical guidance and to promote science-based policy. Select examples include the following:

- ➢ **2010-Present: NJDEP – Site Remediation Program Analytical Methods Technical Guidance Group, Trenton, NJ**. *Developed State Guidance / Training.* Assisting in redesigning and developing guidance for QAPP development, specified QA/QC requirements for Analytical Methods to produce Data of Known Quality, and developed Data Usability assessment guidance for NJDEP. Performed training on use of new guidance to NJDEP and License Site Remediation Professionals (LSRPs).

- ➢ **2006-2007: MassDEP Data Audit Project:** Dr. Rothman performed in-depth reviews of analytical data packages for EPH, VPH, APH, and TO-15 analyses from laboratories selected by MassDEP as part of a Data Audit project to ensure compliance with the methods and CAM. Dr. Rothman assisted in the generation of the final report to MassDEP summarizing the results of the data audits and recommendations for improvement.

Attachment B

Alpha Analytical Quality Systems Manual

Quality Systems Manual

Alpha Analytical, Inc.

D/B/A

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President: Mark Woelfel, 508-439-5115
Quality Assurance Officer: James Todaro, Ext 508-439-5101
Laboratory Technical Manager (Director) Westboro: Joseph Watkins 508-439-5125
Laboratory Technical Manager (Director) Mansfield: John Trimble, 508-844-4134
Laboratory Technical Manager (Director) Air-Mansfield: Andy Rezendes, 508-844-4181

1 Mission Statement

The mission of Alpha Analytical is quite simply to provide our customers with the greatest value in analytical service available. For the ‘greatest value’ is not only found in the data that is delivered, it is also found in the services provided.

- Data must be of the highest integrity, accuracy and precision.
- Consultation and educational services must be provided to support the customer in establishing data quality objectives and interpretation of the final data package.
- Support services such as sample containers, courier service and electronic data deliverables must be available to the customer.

Alpha’s mission continues with an established commitment to our community and environment. We must ensure that we do not produce any additional contamination to our environment or harm our neighbors and community in any way.

The value of Alpha’s product is in the honesty and integrity with which each chemist, courier, login staff member, or office staff member performs their tasks. The customer or employee must always feel satisfied that they received the greatest value in their lab experience at Alpha.

Alpha Analytical will vigorously pursue its mission into the next millennium.

Mark Woelfel

President

2 Table of Contents

3 Introduction

The Quality Systems Manual, referred to as Corporate Quality Systems Manual (CQSM) of Alpha Analytical describes the quality program in use at the laboratory for both Westboro and Mansfield facilities. This Quality Systems Manual provides employees, customers and accrediting agencies with the necessary information to become familiar with how the quality system operates within Alpha Analytical. The quality program includes quality assurance, quality control, and the laboratory systems including feedback mechanisms for the automated continuous improvement of the laboratory operations to meet customer needs.

Implementation of the laboratory operations is by documenting procedures, training personnel and reviewing operations for improvement. Written procedures are maintained as Standard Operating Procedures (SOPs). The SOPs are available to the staff as a controlled, electronic, secure copy. The provisions of the QSM are binding on all temporary and permanent personnel assigned responsibilities. All laboratory personnel must adhere strictly to the QSM and SOPs.

All policies and procedures have been structured in accordance with the NELAC Institute (TNI) Standards), DOD QSM 5.1 and applicable EPA requirements and standards.

Twenty-five (25) sections comprise the QSM. Related quality documentation including the listing of SOPs, forms, floor plan, equipment, personnel and laboratory qualifications are available. The QSM sections provide overview descriptions of objectives, policies, services and operations.

3.1 Scope

The QSM describes the requirements of the Laboratory to demonstrate competency in the operations for performing environmental tests for inorganic, organic, air and microbiological testing. The basis for the environmental tests is the methods found in documents published by the United States Environmental Protection Agency (EPA), ASTM, AOAC, APHA/AWWA/WEF, Standard Methods, and other procedures and techniques supplied by customers.

The QSM includes requirements and information for assessing competence and determining compliance by the laboratory to the quality system. When more stringent standards or requirements are included in a mandated test method, by regulation, or specified in a project plan the laboratory demonstrates achievement of the customer specified requirements through its documented processes.

The QSM is for use by Alpha Analytical for developing and implementing the quality system. Accrediting authorities and customers use the QSM for assessing the competence of Alpha Analytical. Alpha Analytical is committed to continually improving the quality system. Meeting customer needs, operating within regulatory requirements and adhering to Alpha’s Data Integrity and Ethics policy are several of the mechanism used to continually improve the quality system.

3.2 Policy Statement

This Quality Systems Manual summarizes the policies, responsibilities and operational procedures associated with Alpha Analytical. This manual applies to all associates of the laboratory and is intended for use in the on-going operations at Alpha Analytical. Specific protocols for sample handling and storage, chain-of-custody, laboratory analyses, data reduction, corrective action, and reporting are described. All policies and procedures have been structured in accordance with the NELAC Institute (TNI) Standards, DOD QSM(which includes 17025 standards), applicable EPA requirements, regulations, guidance, and technical standards. This Quality Systems Manual, laboratory Standard Operating Procedures (SOPs), and related documentation describe the quality systems, policies and procedures for Alpha Analytical.

Alpha Analytical performs chemical analyses for inorganic and organic constituents in water, seawater, soil, sediment, oil, tissue and air matrices. Alpha Analytical's goal is to produce data that is scientifically valid, technically defensible, and of known and documented quality in accordance with standards developed by The NELAC Institute (TNI) Standards and any applicable state or EPA regulations or requirements. It is the commitment of the President, Operations Director, Laboratory Technical Manager and Quality Assurance Officer to work towards continuous improvement of the operation, and towards meeting our customer's needs, requirements, and intended data usage. This continued commitment is built into every activity of the laboratory. It is the responsibility of Senior Management and the Department Managers to ensure that all associates familiarize themselves with, and comply at all times with, the quality systems, procedures and policies set forth in this manual, laboratory SOPs, and related documentation.

Alpha Analytical analyzes Proficiency Test (PT) samples, in accordance with the NELAC Institute (TNI) Standards and other regulatory programs, from a National Institute of Standards and Technology (NIST)-approved PT provider for the analytes established by EPA for water samples, and for other analytes and matrices. The specific analytes and matrices analyzed are based on the current scope of the laboratory services as documented in the laboratory SOPs and state certifications.

The technical and service requirements of all requests to provide analyses are thoroughly evaluated before commitments are made to accept the work. This includes a review of facilities and instrumentation, staffing, and any special QC or reporting requirements to ensure that analyses can be performed correctly and within the expected schedule. All measurements are made using published reference methods or methods developed by Alpha Analytical. Competence with all methods is demonstrated according to the procedure described in SOP/ 1739 prior to use.

Alpha Analytical has developed a proactive program for prevention and detection of improper, unethical or illegal actions. Components of this program include: internal proficiency testing, electronic data audits and post-analysis data review by the QA Officer; a program to improve employee vigilance and co-monitoring; and Ethics Training program identifying appropriate and inappropriate laboratory practices, instrument manipulation practices and consequences. Additionally, all associates are required to sign the Alpha Analytical *Ethics Agreement* form upon commencement of employment and each year following. This form clearly outlines the possible consequences of unethical or improper behavior, or data misrepresentation. All staff are required to report any suspected unethical conduct to management. Management will then investigate and determine if the situation was considered unethical and will take appropriate action as described in the Alpha Ethics policy.

It is the policy of the laboratory to discourage and reject all influence or inducements (whether commercial, financial or personal) offered either by customers or suppliers, which might adversely affect results or otherwise compromise the judgment or impartiality of the staff. It is the responsibility of the Operations Director and Laboratory Technical Manager to inform customers and suppliers of this policy when necessary.

In the event that any such influences or inducements are encountered, the staff is instructed to inform management immediately. It is the responsibility of the Operations Director and the Laboratory Technical Manager to take appropriate action to prevent recurrence.

3.3 References

External reference documents are available electronically in the Qualtrax system for staff to access the latest edition or version of the reference methods, regulations or national standards. The Quality Assurance Department maintains the electronic files in the Qualtrax system. Management purchases automated update services, where available, to provide the laboratory with the latest hardcopy edition, where electronic means is not available.

3.4 Definitions

Appendix A lists the definitions as adopted by the laboratory. The definitions are from the 2009 TNI standards.

4 Organization and Management

4.1 Legal Definition of Laboratory

Alpha Analytical is a full service analytical laboratory. Testing services include Drinking Water, Waste Water, Ground Water, Waste material and Air. Alpha Analytical is a privately held corporation incorporated in the state of Massachusetts. Alpha Analytical, Inc. does business as (D/B/A) Alpha Analytical.

Alpha Analytical has been in business since 1985. The types of businesses served include:

Consulting firms,
Engineering firms,
Waste Management Companies,
Industrial sites,
Municipal agencies
Department of Defense projects.

4.2 Organization

The laboratory operates a quality system approach to management in order to produce data of known quality. The laboratory organization provides effective communication and lines of authority to produce analytical data meeting customer specifications. The organizational design provides open communication while ensuring that pressures and day to day operating circumstances do not compromise the integrity of the reporting of the final data. See Appendix B for Organizational Chart.

The President is responsible for directing all areas of the company. The following job functions report to the President:

Operations Manager
Quality Assurance Officer
Marketing / Business Development / Sales
Financial Services
Human Resources

The Operations Manager is responsible for directing all laboratory operational areas of the company. The following job functions report to the Operations Manager:

Laboratory Technical Manager(s)
Customer Services Manager
Department Managers

The Laboratory Technical Manager(s) is(are) responsible for the laboratory data generated by the organics testing, inorganics testing and metals testing areas and the Air Technical Director is responsible for laboratory data generated by air analyses.

The Departmental Managers (Supervisors) have the following responsibilities:

The organics managers direct personnel in the organics extraction and instrumental laboratories.

The wet chemistry manager directs personnel and team leaders in the wet chemistry and/or microbiological testing areas.

The metals manager directs personnel and team leaders in the metals sample preparation and instrumental laboratories.

The Quality Assurance Officer is a member of the staff and reports directly to the President and has defined responsibility and authority for ensuring that the quality system is implemented and adhered to at all times. The Quality Assurance (QA) Officer is responsible for interacting and communicating certification requirements, implementing the Quality Systems Manual and reporting to the Laboratory Technical Manager and Senior Management the status of the quality program. The QAO oversees the Quality Systems Specialists and is responsible for oversight and/or review of quality control data and function independently from laboratory operations.

The Customer Services Manager is responsible for customer interactions, project coordination and laboratory personnel notification of project requirements.

The Marketing, Business Development and Sales personnel are responsible for increasing the volume of work from current customers and adding new customers to the base business of Alpha Analytical. The Marketing and Business Development personnel review all new work with the Laboratory Technical Manager, Operations Manager, President and/or Quality Assurance Officer before contractual commitment.

The CFO is responsible for maintaining and reporting on the financial status of the company. The CFO directs financial personnel on proper accounting procedures and maintaining the list of approved suppliers and subcontractors. The CFO reports directly to the President.

The Human Resource Director is responsible for personnel recruitment, hiring, performance reviews.

Personnel job descriptions define the operational function duties and responsibilities. Administration and Laboratory personnel assignments may include cross-functional training and work performance in multiple areas of the operations. Multiple function training ensures laboratory back up personnel during peak workloads.

During the absence of any staff member, assignment of alternative personnel occurs by memo or e-mail. The Manager or Supervisor authorizes the assignment. The naming of alternative personnel assures the continuing performance of critical tasks during the primary person’s absence and ensures that lines of communication remain open for continued decision making. The deputy for the Laboratory Technical Manager is the Quality Assurance (QA) Officer. The deputies for the Quality Assurance (QA) Officer are the Quality Systems Specialists.

For the purposes of the NELAC Institute (TNI) Standards the Lead Laboratory Technical Manager is the Laboratory Technical Manager. The deputies for the Lead Technical Manager are the Quality Assurance (QA) Officer, and the Departmental Managers. The Laboratory Technical Manager meets the requirements specified in the Section 4.1.7.2 Volume 1, Module 2 of the 2009 TNI standards. If the Laboratory Technical Manager is absent for a period of time exceeding 15 consecutive calendar days, a full-time staff member meeting the qualifications of Laboratory Technical Manager will be designated to temporarily perform this function. The primary Accrediting Body shall be notified in writing if the Technical Manager’s absence exceeds 35 consecutive calendar days.

4.3 Business Practices

Alpha maintains certification for the programs and analytes required by regulatory programs. The listing of qualifications from the various certifications, registrations and accreditation programs are available upon request. Alpha Analytical operates Monday to Friday from 7:30 a.m. to 5:30 p.m. Management prepares and posts the holiday schedule for the year indicating closed operations. Sample delivery occurs during normal operating hours unless arranged in advance.

Alpha's reputation depends upon timely reporting and quality data. The standard turnaround time for engineering and consulting firms is five business days from time of sample receipt. Standard turnaround for all other customers is ten business days from time of sample receipt. The time of sample receipt is when the verification of the chain of custody and samples meets the laboratory sample acceptance policy. Laboratory management must approve any special arrangements for rush or expedited turnaround time. The basis for data quality depends on customer, regulation and method performance criteria. Accuracy, precision, sensitivity and comparability are expressions of method performance criteria.

All work is performed in the strictest confidence. New and contract employees must review corporate policy and practice requirements for protecting customer confidentiality and proprietary rights. The review occurs during orientation and ethics training. It is the policy of the laboratory to release data to the customer authorized contact. Personnel assigned the duties of interacting with customers review project files and discuss data related only to the project. Personnel whose duties do not include routine customer contact must check with the customer service manager before discussing data with regulators or third parties

5 Quality System

Establishment, Audits, Essential Quality Controls and Data Verification

5.1 Establishment

The Mission Statement presents the policy and objectives for Alpha Analytical. The Quality Systems Manual provides the framework for the processes and operations to implement the Mission. The Quality Systems Manual and documentation controlled by the laboratory system detail the management authorized operations for achieving the objectives of the company.

The laboratory operates a quality system approach to management in order to produce data of known quality. Alpha Analytical is a full service laboratory designed to provide its customers with accurate, precise and reliable data within the best turn-around time and at the most reasonable prices. Alpha employs chemists of the highest training, ethics and caliber in the field of analytical chemistry. This and state-of-the-art instrumentation and automation combine to insure data of known and documented quality.

5.2 Quality Systems Manual

The QA Officer is responsible for the publication and distribution of the Quality Systems Manual and annual review. Management reviews and authorizes the manual. Implementation of major changes in the quality system occurs after revision of the appropriate Quality Systems Manual section and authorization by management.

The authorization of the Quality Systems Manual is documented electronically in Qualtrax. Updates of this manual occur at any time throughout the year. Document control procedures (SOP1729) apply to the distribution of the Quality Systems Manual. Controlled copies of the manual are maintained electronically within Qualtrax. Persons or organizations outside of Alpha Analytical may receive uncontrolled copies. Copies are distinctly indicated “Uncontrolled Documents” within the footer of each page.

5.3 Audits

Laboratory audits, both internal and external, review and examine the operations performed in the laboratory. Internal audits are conducted by qualified QA Specialists and external audits are reviews by external organizations to evaluate the ability of the laboratory to meet regulatory or project requirements. Internal audits are conducted on a frequency of bi-annually, method required and annually for DoD certified methods.

A QA designee schedules internal process audits to ensure the completion of the annual audit of each operational area. The process audits are a more detailed review of the operations. Personnel from areas other than the one audited perform process audits.

The internal system audit is a review of the implementation of the documented quality system. The system audit includes sample tracking from receipt to disposal, a data audit of a completed report, and all operations not audited during the process audit.

The purpose of the internal system audit is:

Verification that adequate written instructions are available for use;

Analytical practices performed in the laboratory are consistent with SOPs;

The quality control practices are applied during production;

Corrective actions are applied as necessary;

Deviations from approved protocols are occurring only with proper authorization and documentation;

Reported data is correct and acceptable for reporting;

SOPs, quality records, analytical records, electronic data files are maintained properly; and

Personnel training files and records are satisfactory and current.

Before a scheduled internal audit, the assigned auditor reviews checklists, if used, and/or the SOP specific to the area. The checklist may be from an external source or prepared by the auditor. . After the audit, the auditor submits a summary or notes from the audit to the Laboratory Technical Manager or QAO as part of the audit report. The summary identifies discrepancies found during the audit. Technical personnel are responsible for the inspection and monitoring of in-process and final data. Personnel independent of those having direct responsibility for the work performed audit the quality system and processes.

Representatives sent by customers and government or accrediting agencies often perform external audits. These audits are most often announced inspections, but sometimes are not announced. The Quality Assurance Officer, Laboratory Technical Manager or assigned deputy, and/or appropriate Department Manager accompany the external audit team through the laboratory. The auditors receive a brief overview of company objectives, activities, and facilities. Interviews with essential supervisory staff and technical staff are arranged, along with retrieval of any documentation pertinent to the audit. Auditors usually provide a report on their findings shortly after the audit. The QA Officer receives the audit report and copies are provided to laboratory personnel for review. Corrective actions are identified and distributed to responsible parties for implementation in response to any cited deficiencies.

5.4 Audit Review

Management reviews internal and external audit reports to evaluate system effectiveness at the annual management review meeting. Tracking of the audit findings occurs through the nonconformance action process. The management and staff work together to establish a time line for resolving the audit findings. The Quality Assurance team tracks the time line and reports to the Laboratory Technical Manager on any outstanding audit findings. Approved corrective actions for DoD that are not implemented or avoided may result in loss of DoD ELAP accreditation and may result in work being discontinued until implementation is verified by DOD ELAP AB.

5.5 Performance Audits

Alpha Analytical participates in inter-laboratory comparisons and proficiency test programs required by customers and certifying agencies. The performance audits provide information on the data comparability of results generated by the laboratory. Test samples received by the laboratory are handled following routine laboratory procedures. Proficiency test samples are unpacked, checked against the packing slip and examined for damage. Reporting requirements and deviations to routine practices are noted as would be required for any project.

Analysts demonstrate proficiency by analyzing either an external proficiency test sample, an internally prepared blind test sample or Initial Demonstration of Capability (IDC) before independent operation of a test method. The results of performance audits serve several purposes. The QA Officer may use performance audits for evaluating analyst proficiency, laboratory performance in a specified area to facilitate laboratory improvement efforts, and/or to provide information to an accrediting agency on correction of past performance of an external performance audit.

5.6 Corrective Actions/Preventative Actions (CAPA)

The corrective action process at Alpha Analytical is detailed in SOP 1736. The corrective action program at Alpha Analytical uses the Nonconformance workflow in Qualtrax to document and follow through the corrective action/preventative action process for three main areas: nonconformance's within the laboratory, customer complaints and failed PT studies. The process ensures continuous improvement of company performance by preventing the recurrence of quality problems.

Nonconformance reports are tracked for closure date and the type. Reports to management include the listing of open nonconformance reports and the frequency of the type of nonconformance occurring. A QA designee monitors the completeness of the forms, as well as verifies the actions are complete and acceptable.

Customers will be notified within 5 days of any question(s) regarding validity of results.

5.7 Managerial Review

The management review occurs at least once per year as part of the strategic planning process. Documentation of the management review meeting is by recording the meeting minutes and listing the attendees. The focus of the quality management review is the frequency of the type of nonconformance, closure status, audit progress and other quality assurance actions. Meetings include discussion and progress on quality system initiatives since the last meeting.

Prior to the meeting, an agenda is distributed to all personnel expected to be in attendance. The meeting is chaired by the President. Minutes are taken and distributed at the conclusion of the meeting by a QA designee. If action is necessary on any issue, a Summary Report is generated and distributed to responsible parties for implementation. Actions are monitored by the QAO or designee until completion.

5.8 Essential Quality Control Procedures

The following general quality control principles apply to all tests. The manner implemented is dependent on the type of test performed. The laboratory SOP presents the specific quality control checks undertaken to ensure precision, accuracy and sensitivity of each test method. Deviations from the existing SOP are allowed only upon approval of the deviation by the department manager and Quality Assurance Officer. This documentation must be either in form of written notice or email.

Alpha Analytical uses quality control samples to evaluate the following:

1. Adequate positive and negative controls to monitor blanks, spikes, reference toxicants, zero blanks;
2. Adequate tests to define the variability and/or reproducibility of laboratory results;
3. Measures to ensure the accuracy of the test data including sufficient calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples;
4. Measures to evaluate test performance, such as detection limits and quantitation limits or range of applicability such as linearity;
5. Selection of appropriate formulae to reduce raw data to final results such as linear regression, internal standards, or statistical packages;
6. Selection and use of reagents and standards of appropriate quality;

7. Measures to assure the selectivity of the test for its intended purpose;
8. Measures to assure constant and consistent test conditions for the method such as temperature, humidity, light, or specific instrument conditions.

   Note: All quality control samples are treated in the same manner as field samples.

All quality control measures are assessed and evaluated on an on-going basis, and quality control acceptance limits are used to determine the usability of the data. Control charts and/or calculated control limits monitor the long-term method performance by analyte, by instrument for water matrices. Routine evaluation and reporting of the control chart performance provides supervisors and management with additional performance measures to ensure data comparability. Control limits are recalculated when trends are observed.

Where no reference method or regulatory criteria exist, the laboratory specifies the acceptance/rejection criteria in the SOP. The test SOP specifies the QC samples performed per batch of samples. The quality control samples are categorized into the following, as appropriate to the method

- Method Blank
- Laboratory Duplicate
- Laboratory Control Sample (LCS)
- Laboratory Control Sample Duplicate (LCSD)
- Matrix Spike (MS)
- Matrix Spike Duplicate (MSD)

Selection of samples for Duplicate, Matrix Spike (MS) & Matrix Spike Duplicate (MSD)

2. Duplicate samples
   a. Samples will be selected if identified and requested by customer
   b. If no samples are identified by the customer then random samples will be analyzed within the batch as defined by the method, program or at a minimum batch of 20 samples.

3. Matrix Spike (MS) / Matrix Spike Duplicate (MSD) samples
   a. Samples will be selected if identified and requested by customer
   b. If no samples are identified by the customer then random samples will be selected and analyzed within the batch as defined by the method, program or at a minimum batch of 20 samples.
   c. If MS/MSD is not required, LCS/LCSD may be substituted for

precision and accuracy evaluation.
All DOD projects require MS/MSD.

The frequency is dependent on the reference method and test protocol. The following is the default requirement for quality control checks in lieu of any other guidance. The frequency for each quality control sample is generally one (1) per every 20 samples.

5.9 Data Reduction

After completion of the test procedure, the data reduction process begins.

Chromatography data may require the manual integration of peak areas or heights before reporting of results. The analyst must perform manual integration when software does not properly integrate or identify the peak. Manual integration must not occur for the purpose of achieving acceptable quality control or calibration. The analyst and reviewer sign and date the hardcopy of all manual integration. The analyst notes the rationale for performing the manual integration on the hardcopy printout and ensures the “TIC” marks from the software represent the integration area used for reporting the results. The analyst must minimize and avoid manual integration. The establishment of the proper integration parameters in the software reduces the number of manual integration occurrences.

The SOP for each test presents the formulas used for the specific test method. The formulas for the data calculations used throughout the laboratory are the following:

% Recovery (LCS)

$$\frac{MV}{TV} * 100 = \%R_{LCS}$$

where:
MV = Measured Value
TV = True Value

% Recovery (MS or MSD)

$$\frac{MV - SV}{TV} * 100 = \%R_{MS}$$

where:
MV = Measured Value
TV = True Value
SV = Amount found in sample

Average ($\overline{X}$)

$$\sum_{i-1}^{n} X_i \Big/ n = \overline{X}$$

where: $\overline{X}$ = Average of all values
X = Result of each measurement
n = Number of values

Relative Percent Difference (% RPD)

$$\frac{R_1 - R_2}{(R_1 + R_2)\big/2} * 100 = \%RPD$$

where: R_1 = Larger of two observed values
R_2 = Smaller of two observed values

% Difference (%D)

$$\frac{X-\overline{X}}{\overline{X}}*100=\%D$$

where: $\overline{X}$ = Average of all values
X = Result of measurement

Standard Deviation of the sample (S_x)

$$\sqrt{\frac{\sum\left(X-\overline{X}\right)^2}{n-1}}=S_x$$

where: $\overline{X}$ = Average of all values
X = Result of each measurement
n = Number of values

Relative Standard Deviation (%RSD)

$$\frac{S_x}{\overline{X}}*100=\%RSD$$

where: $\overline{X}$ = Average of all values
Sx = Standard Deviation (n - 1)

Range of Logs (for microbiological enumeration analysis)

10% of routine samples are analyzed in duplicate and the range of logs is determined.

MDL (See 40CFR Part 136 for details)

$$\left[\sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2 \Big/ n}{n-1}}\right] * t_{0.99} = MDL$$

where: *MDL* = The method detection limit
X = Result of each measurement
n = Number of values
t(n-1,1 = .99) = The students' T value appropriate for a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom. (See Students t Test Table)

Reporting Limit (RL)

Lowest calibration standard or greater

Control Limits

Upper Control Limit: $\overline{X} + 3 * S_x = UCL$
Lower Control Limit: $\overline{X} - 3 * S_x = LCL$

Warning Limits

Upper Warning Limit: $\overline{X} + 2 * S_x = UWL$
Lower Warning Limit: $\overline{X} - 2 * S_x = UWL$

Method of Standard Additions (MSA): (See EPA 7000A for details)

The simplest version of this technique is the single-addition method, in which two identical aliquots of the sample solution, each of volume Vx, are taken. To the first (labeled A) is added a known volume Vs of a standard analyte solution of concentration Cs. To the second aliquot (labeled B) is added the same volume Vs of the solvent. The analytical signals of A and B are measured and corrected for non-analyte signals. The unknown sample concentration Cx is calculated:

$$C_x = \frac{SB\ V_S\ C_s}{(SA - SB)\ V_X}$$

where SA and SB are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_S and C_s should be chosen so that SA is roughly twice SB on the average, avoiding excess dilution of the sample. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure.

Improved results can be obtained by employing a series of standard additions. To equal volumes of the sample are added a series of standard solutions containing different known quantities of the analyte, and all solutions are diluted to the same final volume.

For example, addition 1 should be prepared so that the resulting concentration is approximately 50 percent of the expected absorbance from the endogenous analyte in the sample. Additions 2 and 3 should be prepared so that the concentrations are approximately 100 and 150 percent of the expected endogenous sample absorbance.

The absorbance of each solution is determined and then plotted on the vertical axis of a graph, with the concentrations of the known standards plotted on the horizontal axis. When the resulting line is extrapolated to zero absorbance, the point of interception of the abscissa is the endogenous concentration of the analyte in the sample. The abscissa on the left of the ordinate is scaled the same as on the right side, but in the opposite direction from the ordinate. A linear regression program may be used to obtain the intercept concentration.

5.10 Document Control

The Document Control Procedure (SOP/1729) describes the process for controlled and uncontrolled documents. The use of the revision number allows for the retention of a previous document for historical information purposes.

Every document is assigned a unique identification number, which is present on each page of the document. A master list of documents includes the unique identification. Each controlled copy includes the revision number, published date and page number.

Full document control includes the status of each document: active, inactive or superseded/archived. Inactive documents are procedures not currently requested, but may be in the future. Archived documents are procedures replaced with a later revision. Authorized personnel must review and approve each document and any subsequent revisions before use in the laboratory. Personnel authorized to review and approve a document have access to all necessary information on which to base their review and approval. The history section of the document in Qualtrax includes a description of the nature of the document change.

Standard Operating Procedures (SOPs) are instructions for repetitive or standard operations performed by the laboratory. The SOP author is the person familiar with the topic. The standard format for writing SOPs is set-up as a template for administration and technical SOPs. Each SOP is peer reviewed, authorized by management, and QA before final publication and implementation. Authorized signatories for controlled documentation include one or more of the following personnel: Company President, Quality Assurance Officer, Laboratory Technical Manager, Department Manager, Department Team Leader. Personnel acknowledge approved documents as read, understood and agreed to through electronic attestation forms associated with each document as SOP Attestation Tests which reside in Qualtrax.

SOPs must receive evaluation and input by laboratory supervisors and key technical personnel. The content of each SOP must conform to applicable requirements of analytical methods and certification agencies. Within these constraints, the content of a SOP meets the needs of a particular area of the laboratory. A new or revised SOP is needed when regulatory programs update or add methods, the scope of the existing method is extended, or when activities are being performed without adequate documentation.

Updating, modifying and changing SOPs, forms and the contents of this QSM are prompt and part of the routine practices. The prompt modification of these documents ensures the documents reflect the current practices and operations of the laboratory. During annual review of a document, (including but not limited to: SOPs, Ethics Policy, Quality Systems Manual), requested changes are reviewed and the document reissued using the information and a new revision number is assigned and published in Qualtrax.

The laboratory maintains control over the possession and distribution of all documents that directly affect the quality of data. This includes, but is not limited to, documents such as the Quality Systems Manual, Standard Operating Procedures, customer instructions, Laboratory Work Instructions, data sheets, check lists and forms.

5.11 Detection Limits

Detection Limits (DLs), previously referred to as Method Detection Limits (MDLs), are determined for all analytes as specified in the Institute (TNI) Standards. DLs are determined for all new instrumentation, whenever there is a change in the test method or instrumentation that affects performance or sensitivity of the analysis. From these, detection limits, Reporting Limits (RLs), are established. The RL is the minimum concentration of an analyte that can be identified and quantified within specified limits of precision and bias during routine and analytical operating conditions.

Laboratory reporting limits lie within the calibration range, at or above the RL. For methods that require only one standard, the reporting limit is no lower than the low-level check standard, which is designed to verify the integrity of the curve at lower levels. If reporting limits are required below the lower level of the calibration curve, RL, or low-level check standard, method modifications are required. Refer to DL/LOD/LOQ SOP/1732. Note: ”J” Estimated value: Upon customer request, the Target analyte concentration can be reported below the quantitation limit (RL), but above the Detection Limit (DL) with a “J” qualifier as long as there is a LOD study on file.

5.12 LOD/LOQ Studies

A. LOD (Limit of Detection) Verification

1. LOD (Limit of Detection) verification is required annually for each target analyte in which test results are to be reported below the lowest calibration standard (“J” values) for each instrument, matrix and prep procedure. LOD is required quarterly for all DOD projects.

2. All sample-processing steps of the analytical method shall be included in the determination of the LOD.

3. The validity of the LOD shall be confirmed by ***qualitative*** identification of the analyte(s) in a QC sample in each quality system matrix containing the analyte at no more than 2-3X the LOD for single analyte tests, and 2X up to 4X the LOD for multiple analyte tests. This verification must be performed on every instrument that is to be used for analysis of samples and reporting of data.

4. An LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature. Where an LOD study is not performed, the laboratory may not report a value below the limit of quantitation.

B. LOQ (Limit of Quantitation) Verification

1. LOQ (Limit of Quantitation) verification is required annually for each target analyte that is not reported below the lowest calibration standard for each matrix and prep procedure. LOQ is not required if an annual LOD verification is performed.
2. The validity of the LOQ shall be confirmed by successful analysis of a QC sample containing the analytes of concern in each quality system matrix 1-2 times the claimed LOQ. A successful analysis is one where the recovery of each analyte is within the established test method acceptance criteria for accuracy. LOQ are required quarterly for all DOD projects.

The LOQ study is not required for any component or property for which spiking solutions or quality control samples are not commercially available or otherwise inappropriate (e.g., pH).

The LOQ acceptance criteria are based on the established acceptance criteria for Laboratory Control Samples.

Refer to DL/LOD/LOQ SOP/1732

5.13 Range of Logs – Precision of Quantitative Methods - Microbiology

A. Precision of duplicate analyses is calculated for samples examined by enumerative microbiological methods according to the following procedure:

   a. Perform duplicate analyses on first 15 positive samples.

   b. Record duplicate analyses as D1 and D2 and calculate the logarithm of each result.

   c. If either of a set of duplicate results is <1, add 1 to both values before calculating the logarithms.

   d. Calculate the range (R) for each pair of transformed duplicates as the mean of these ranges.

6 Personnel

6.1 Laboratory Management Responsibilities

Management is responsible for communicating the requirements of the quality system, customer specifications and regulatory needs to all personnel. Management job descriptions detail the responsibilities of each position.

The H.R. Director has job descriptions for all positions in the laboratory defining the level of qualifications, training, and experience and laboratory skills. During initial training, management provides access to documented operations procedures, observes personnel performance, and evaluates personnel proficiency. Management documents technical laboratory staff's proficiency initially and on a continuing basis through use of laboratory control samples and purchased proficiency evaluation standards.

Management is responsible for verification of proper sample management and all aspects of data reporting. The communication of the operating practices of the laboratory is through the document control and attestation process.

Either the Quality Assurance Officer, Operations Director and/or Technical Managers have the authority to stop work due to non-conformances and have the authority to resume work after it has been stopped.

6.2 Laboratory Staff Requirements

Recruitment is the responsibility of the Operations Manager and HR Department, with input from other personnel as required. The Training Program procedure SOP/1565 details the process for completing requirements and training to ensure personnel have adequate skills and competence for the job function. Initial training includes ethics training, Qualtrax Training, QA Basics, IT/LIMs including computer security.

A job description details the necessary requirements for each job and includes position title, minimum educational requirements, skills, responsibilities and reporting relationships and any supervisory responsibility.

Initial training of new employees and contract staff includes laboratory ethics and quality policies, signing the Employee Signature Log, as well as execution of an Ethics Agreement. Any employee found to knowingly violate the Ethics Policy Agreement, report data values, that are not actual values obtained or improperly manipulated, or intentionally report dates and times of data analyses that are not the actual dates and times of analysis, will lead to disciplinary action, including termination, as outlined in Section V.K of the Employee Handbook. Each employee must report personally or anonymously to the Laboratory Technical Manager, QA Officer and/or Ethics Team Member any accidental or suspected intentional reporting of non-authentic data by others for follow up action. The review of the laboratory ethics and ethics training occurs annually with all personnel.

(DOD) All inappropriate and prohibited laboratory practices, as detailed in the DOD WSM 5.2.7, will be reported to the appropriate accrediting body within 15 business days of discovery. Records of corrective actions or proposed will be submitted within 30 business days. Failure to notify the AB within 15 business days will result in suspension of the DOD ELAP accreditation.

The Ethics program consists of the following key components:

- Ethics Policy /Agreement (Appendix F)
- Initial and annual ethics training

- Internal audits conducted annually
- Adherence to Manual Integration SOP/1731
- Ethical or Data Integrity issues reported to Lab Managers, QAO or HR Director
- Anonymous reporting to HR Director - This is accomplished by writing a detailed description of the suspected ethics breach and submitting the information, anonymously, to the Human Resource Director.
- “No-fault” policy encouraging reporting of incidences without fear of retribution
- Electronic tracking and audit trails through LIMs and instruments enabled where available.

6.3 Training

The Quality Systems Manual and related documentation is available to all employees. Cross training, supervisory training and other related training takes place on a scheduled and as-needed basis. Training ensures the communication and understanding of all personnel in the laboratory-documented procedures and practices.

All personnel undertake orientation-training sessions upon initial employment. Orientation training includes laboratory business practices, employment specifications, Ethics Policy, Quality Systems Manual, Chemical Hygiene Plan, and all SOPs required for the job function.

Managers ensure the training for new employees and review the continuing training for current employees. Training includes on-site and off-site programs presented by staff members, contractors, equipment manufacturers, and institutions of higher learning.

Training of new personnel to any job assignment takes place on-site according to the Training Program procedure. Laboratory personnel may perform their assigned methods/protocols without supervision only after documentation of acceptable proficiency. Training records lists the current training status.

On-the-job training includes demonstration of skills during job performance, initial demonstration of proficiency, and review of SOPs. Health and Safety training takes place on an annual basis with careful introduction to new principles. Personnel have access to the Chemical Hygiene Plan and Material Safety Data Sheets. On-site training includes side-by-side hands-on training, formal classroom type instruction on the SOP or a meeting to discuss procedural changes or to address questions related to the laboratory operation. All training is documented via the Training Attestation Form, which is signed by all in attendance that they understood and will implement what was presented to them.

Training is an on-going opportunity to evaluate the laboratory operations. The updating of SOPs, Quality Systems Manual and other related information documents all changes to the quality system. Training is documented via the Training Attestation Form or in Qualtrax with training test records.

Off-site training takes place on an as-needed basis. Recommendations and suggestions regarding educational programs come from all levels of staff. It is the employee’s responsibility to present a copy of any certificates or attendance information to the HR Director. The information is added to the individual’s training record.

6.4 Records

The QA Department is responsible for maintaining training records. Certificates, demonstration of capability forms and other records of training are placed in the individual's training file.

Appropriate personnel are notified through email and/or Qualtrax or by the QA department when a revision is complete for the controlled version of a document. The manager of the area determines when a change is significant to require training.

Job descriptions are included in the training record files. The Human Resources Department reviews the job descriptions, Resumes and/or biosketches are kept on file with the Human Resources Department and the QA Department.

7 Physical Facilities – Accommodation and Environment

This laboratory facility has a total area of 25,000 square feet for each of the Westboro and Mansfield Facilities

The laboratory functional areas include:

Administration and offices
Sample receiving
Sample management
Air analysis (Mansfield Facility only)
Microbiological (Westboro Facility only)
General analytical chemistry
Metals sample preparation (Mansfield Facility only)
Organic sample preparation
Metals analysis (Mansfield Facility only)
Volatiles gas chromatography (GC)
Volatiles gas chromatography/mass spectrometry (GC/MS)
Volatiles air analysis (Mansfield Facility only)
Semivolatiles gas chromatography/mass spectrometry (GC/MS)
Semivolatiles gas chromatography (GC)
Miscellaneous facility mechanical and storage areas.

All chemicals are stored in appropriate cabinets and properly disposed of as required. All flammable solvents are stored in OSHA and NFPA approved cabinets. Acids are stored in OSHA acid cabinets. Separate waste areas houses the sample and chemical waste before pickup by a licensed waste hauler.

7.1 Environment

Lighting, noise, humidity, heating, ventilation and air conditioning satisfy the needs of the testing performed on the premises. The laboratory building design ensures regulated temperature control for analytical equipment. Air-handling systems minimize airborne contaminants that may jeopardize sample integrity or analytical performance.

The analytical instrumentation is in separate rooms from laboratory activities that involve the use of large quantities of organic solvents or inorganic acids. A separate room, in the Westboro facility, provides the facilities for the microbiological testing.

Standards and other materials requiring below 0°C storage temperatures are placed in freezers and separated from samples or potential contaminating materials. Refrigerators provide cooling needs for samples and materials with temperature requirements of below room temperature and greater than freezing. Sample and standard storage areas are monitored and controlled for temperature and recorded in the data logger system. Sample storage areas for volatiles are separated from other samples and monitored for any effects due to cross contamination.

Bulk hazardous waste containers are located away from the testing activities. Waste disposal uses lab pack procedures and those designated by the regulatory authorities. The Chemical Hygiene Plan and the Waste Management and Disposal SOPs (Westboro: SOP/1728 and Mansfield SOP/1797)) include the procedures for handling and disposing of chemicals used in the laboratory.

The working and storage environments are maintained in a safe and appropriate manner. A Chemical Hygiene Plan details the requirements for safety and chemical handling. Safety measures that protect property and personnel from injury or illness include: fume hoods, fire extinguishers, fire blankets, alarm systems, safety training, protective clothing, emergency showers, eyewashes, and spill control kits.

7.2 Work Areas

Good housekeeping is the responsibility of all personnel. Each person is responsible for assuring clean and uncluttered work areas. The job descriptions list specific housekeeping duties. Records, samples and waste materials are the common cause for clutter in the laboratory.

. Removal of administration and laboratory records to the record storage area occurs to reduce clutter and ensure traceability. The individual filling the laboratory record box, labels the box with a number, the contents, date and laboratory area. Authorized personnel assign and record into a permanent record the box number, discard date and box contents. Authorized personnel review the box label for number, discard date and contents. Boxes are stored onsite and off-site for the record retention period identified in the NELAC Institute (TNI) Standards and EPA regulations, whichever is more stringent.

Sample management personnel remove samples to the sample storage area after all data is correct and complete. Sample coolers are removed to a designated storage area for recycling. Samples are stored in the designated process storage areas until testing is complete. Sample removal from the process storage occurs after mailing of the final report. The sample management staff places the samples in the archive storage area for thirty days after report release. The archive sample storage area is not controlled or monitored. Based on customer specifications, samples are properly disposed or returned to the customer.

Waste materials, expired reagents, expired standards and materials are disposed of and not stored in the laboratory. Hazardous waste labeled accumulation containers in the laboratory collect designated waste streams for later bulk disposal. Laboratory personnel remove the less than five-gallon accumulation containers when full from the laboratory and place the containers in the bulk hazardous waste area. Refer to the Waste Management and Disposal SOPS for Westboro: SOP/1728 and Mansfield SOP/1797. Personnel identifying out of date reagents and standards remove the materials to the proper disposal area.

7.3 Security

Alpha Analytical provides a secure environment for our employees, guests, customers, samples and analytical data. Security procedures require that all exterior doors remain locked unless manned. Access to the laboratory is limited to employees and contractors. Visitors not under signed contract are required to sign the Visitors Log and must be accompanied by a laboratory employee at all times within the testing areas.

The defined high security area is the sample management area. Identification card locks on the internal doors control entry into the laboratory area.

All doors are locked after hours and require a key for entry. The security alarm continuously monitors for smoke and fire related heat. When the alarm is activated, the appropriate emergency response officers are notified. The local emergency offices have the emergency contact list for the laboratory.

8 Equipment and Reference Materials

8.1 Maintenance

The laboratory has a proactive equipment maintenance program. The laboratory maintains service contracts for most major equipment, which include routine preventative maintenance visits by the service provider. Technical personnel perform manufacturer's specified maintenance on a routine basis to ensure equipment operates at peak performance.

A brief summary of some common preventive maintenance procedures is provided in Appendix D. All instrument preventative and corrective maintenance is recorded in the maintenance logbook assigned to the equipment. After maintenance or repair, the instrument must successfully calibrate following the method SOP. Laboratory personnel must demonstrate quality control performance before sample analysis.

The laboratory maintains a stock of spare parts and consumables for analytical equipment. Backup instrumentation for some analytical equipment is available on site for use in case of major equipment failure. The person discovering or suspecting an equipment maintenance problem or failure tags the equipment with 'out of service' tag. If routine maintenance measures do not eliminate the problem, the Laboratory Technical Manager or Operations Director is notified and the appropriate equipment service provider is contacted.

All major laboratory equipment has individual and traceable maintenance logbooks in which to document manufacturer's recommended maintenance procedures, specific cleaning procedures, comments on calibration, replacement of small worn or damaged parts, and any work by outside contractors. The person performing routine or non-routine maintenance signs and dates the maintenance logbook. If an instrument is down for maintenance, a complete record of all steps taken to put it back into service is recorded including reference to the new calibration and quality control checks. Any equipment service providers working on the equipment are recorded in the logbook.

Record repetitive or on-going equipment problems other than normal maintenance requirements on nonconformance action forms. The nonconformance action form notifies management and the Quality Assurance Officer of a problem affecting the performance and data quality.

The laboratory groups some equipment into a single laboratory equipment maintenance logbook. Examples include: autopipets, thermometer calibration. The identity of each item is by serial number or a laboratory-designated item number. The same data recorded for major equipment applies to this documentation.

The maintenance records shall include:

Equipment name;

Manufacturer's name, type identification, serial number or other unique identification;

Date received, date put into service, condition when received;

Current location;

Details of past maintenance and future schedule;

A history of any damage, malfunction, modification or repair;

Dates and results of calibration or verification.

The maintenance logbook may include the reference to the location of the equipment operational and maintenance manuals. The logbook may include the reference to laboratory run logbook or data files for the calibration and quality checks of daily or frequent calibrations.

The Courier Supervisor ensures that maintenance and records for transportation vehicles are complete. The purchasing process is used for ordering garage maintenance, the garage work order is reviewed, and the vehicle checked for condition. The Controller receives all paperwork for completion of the maintenance process.

8.1.1 Microbiology General Equipment Maintenance

Optics of the Quebec colony counter and microscope are cleaned prior to each use. The stage of the microscope is also cleaned and the microscope is kept covered when not in use.

Glassware is checked for residual alkaline or acid residue utilizing bromothymol blue (BTB) on each day of media preparation.

8.2 Equipment Listing

A listing of the major equipment used for testing is available upon request. The equipment list details the unique identification number, equipment location, serial number, model number, and purchase date. The unique identification number is attached to the piece of equipment.

The laboratory performs analyses using state of the art equipment. In addition to the major equipment, the most common equipment used in the laboratory are: thermometers, balances, autopipets, water baths, hot plates, autoclaves, pH meters, conductivity meters and a variety of labware. The SOPs list the calibration and verification requirements for all laboratory equipment used in measurements.

8.3 Laboratory Water

Laboratory water is purified from central DI and RO water systems and piped to all laboratory areas. The QA Department samples the laboratory grade water and submits the samples for analysis by the lab to document the water meets the drinking water certification criteria. The Laboratory Water Logbook lists the daily conductivity checks and acceptance criteria for the laboratory water. The laboratory documents the daily, monthly and annual water quality checks. Please refer to Table 8-1 for tested parameters, monitoring frequency and control limits for each parameter (SOP/1738). Additional parameters may be tested for at the laboratory's discretion.

When additional treatment occurs in the test area, that test area records the water quality checks from the most frequently used tap. At a minimum the quality of the laboratory grade water is monitored daily by conductivity measurements. Records of the daily checks are found in the Laboratory Water Logbook. If out of specification results occur, a nonconformance action form is submitted.

TABLE 8-1

Parameter	Monitoring Frequency	Control Limits
Conductivity	Daily	<2 µmhos/cm @ 25^{o}C
pH	Daily	5.5 - 7.5
Total Organic Carbon (Westboro only)	Monthly	< 1.0 mg/L
Total Residual Chlorine	Monthly	< detection limit
Ammonia Nitrogen (Westboro only)	Monthly	< 0.1 mg/L
Metals: Cd, Cr, Cu, Pb, Ni and Zn (Mansfield only)	Monthly (Required Annually)	< 0.05 mg/L
Total Metals (Mansfield only)	Monthly (Required Annually)	< 0.1 mg/L

Heterotrophic Plate Count (Westboro only)	Monthly	< 500 CFU/mL
Water Quality Test (Biosuitability) (Westboro only)	Annually	0.8 – 3.0 ratio

8.4 Reference Materials

Reference materials include: Class 1 weights, NIST thermometers and reference standards. Logbooks record the reference materials used for calibration and verification. The Department Manager or QA Department maintains any certificates received with the reference materials. Laboratory personnel record in the standards logbook the reference standards date received, unique identification number, expiration date and number of containers. Each laboratory area records the unique identifier on the reference standard certificate and the Department Manager maintains the certificate. The identifier allows traceability from the certificate to the analytical data.

9 Measurement Traceability and Calibration

9.1 General Requirements

All measuring operations and testing equipment having an effect on the accuracy or validity of tests are calibrated and/or verified before put into service and on a continuing basis. The results are recorded in the instrument specific logbook. The laboratory has a program for the calibration and verification of its measuring and test equipment. The program includes all major equipment and minor equipment such as balances, thermometers and control standards. The Quality Systems Manual and method SOP describe the calibration records, frequency and personnel responsibilities.

9.2 Traceability of Calibration

The program of calibration and/or verification and validation of equipment is such that measurements are traceable to national standards, where available. Calibration certificates indicate the traceability to national standards, provide the results, and associated uncertainty of measurement and/or a statement of compliance with identified metrological specifications. A body that provides traceability to a national standard calibrates reference standards. The laboratory maintains a permanent file of all such certifications.

9.3 Reference Standards and Materials

Alpha Analytical has a program for calibration and verification of reference standards. The results and program are recorded in the appropriate instrument logbook. Required in-service checks between calibrations and verifications are described in method SOPs and are recorded in the appropriate instrument logbook.

Calibration standards are maintained within the area of consumption. A logbook of use is maintained and use is limited strictly to method required calibrations. Each calibration standard is identified as to test method used, date received, date opened, and expiration date. Calibrations are verified by using a second source or lot number of the calibration standard. Calibration check procedures are stated in applicable test method SOPs.

Preparation of standards must be performed using Class A glassware. Class A glassware must be used for all processes involving quantitative analyses.

Reference standards of measurement in the laboratory’s possession (such as calibration weights or traceable thermometers) are used for calibration only and for no other purpose.

Standards and reagents are uniquely identified as outlined in Westboro SOP 1745 and Mansfield SOP 1816.

9.4 Calibration General Requirements

Each calibration record is dated and labeled with method, instrument, analysis date, analyst(s) and each analyte name, concentration and response. For electronic processing systems that compute the calibration curve, the equation for the curve and the correlation coefficient are recorded in the appropriate instrument logbook. This is also true for manually prepared curves. Calibrations are tagged to the specific instrument through use of the instrument logbook and or sequence file documentation.

Initial calibration requires a standard curve that brackets the expected sample concentration. Initial calibration generally uses three to five standards depending on the equipment and reference method specifications. Before the start of each analytical sequence, initial calibration is verified by using a continuing calibration standard. Calibration verification or continuing calibration uses the same standard as the ICAL unless method specifies otherwise. The ICV is from a second source or lot number than that used for initial calibration. The acceptance criteria for the continuing calibration standard must meet acceptance criteria before analysis of any samples. When the acceptance criteria is not within limits, review maintenance protocols and perform any necessary maintenance before starting the initial calibration sequence.

9.5 Equipment Calibration

The SOP used for the analysis defines the instrument and equipment calibration required. The following defines the general practices for equipment calibration of selected equipment.

9.5.1 Gas Chromatography/Mass Spectrometry (GC/MS)

The GC/MS is hardware tuned before performing the initial and continuing calibrations. Results must meet the peak ratio specifications of the analytical methods. For volatiles analyses, bromofluorobenzene (BFB) is used, and for semivolatiles analyses, decafluorotriphenylphosphine (DFTPP) is used for instrument tuning.

The mass spectrometer response is calibrated by analyzing a set of five or more initial calibration solutions, as appropriate, for each GC/MS method. Each solution is analyzed once, unless the method or the customer requires multiple analyses. The relative response factor for each analyte is calculated for internal standard calibration. The calibration factor for external standard calibration is calculated using the expressions found in the laboratory method SOP. Calibration is acceptable when all acceptance criteria are within method criteria.

The initial calibration is verified through the analysis of a continuing calibration standard every 12 hours. The concentration of the continuing calibration standard is dependent on the requirements of the specific method. The relative response factors for all analytes of interest are calculated and verified against the initial calibration mean relative response factors. The percent difference (%D) for each analyte is calculated and must be less than the acceptance criteria stated in the method.

An acceptable continuing calibration run must have measured percent differences for the analytes within method specified ranges. If any criteria for an acceptable calibration are not met, either instrument maintenance must be performed until the continuing calibration analysis meets all criteria or a new initial calibration is established before any samples are analyzed. No samples may be analyzed unless the acceptance criteria are met for the initial and continuing calibration.

Additional quality control samples are part of the GC/MS analysis. These include internal standards, surrogates, method blanks, instrument blanks, laboratory control samples, matrix spikes and matrix spike duplicates. The frequency and control criteria are defined in the laboratory SOP.

9.5.2 Gas Chromatography (GC)

Internal standard calibration or external standard calibration is utilized for analysis by GC. The method-specified number of calibration standards is used. Each solution is analyzed once and the analyte relative response factors or calibration factors are calculated. The mean relative response factor for each analyte is then obtained by using the expression in the formula listed in the SOP. Integrated areas are utilized for these expressions.

For multiple response pesticides, PCBs or hydrocarbons the quantitation consists of the average of selected peaks or the integration of the area defined by a reference standard. The SOP details the integration criteria for each compound.

The initial calibration is verified through the analysis of a continuing calibration standard every 12 hours or 20 samples. The concentration of the continuing calibration standard is dependent on the requirements of the specific method. The relative response factors for all analytes of interest are calculated and verified against the initial calibration mean relative response factors. The percent difference (%D) for each analyte is calculated. The percent drift (%d) may be calculated when calibration factors are used for quantitation.

An acceptable continuing calibration must have measured percent differences or percent drift for the analytes within method specified ranges. Should any criteria for an acceptable calibration not be met, either instrument maintenance is performed until the continuing calibration analysis meets all criteria, or a new calibration is established before any samples are analyzed. No samples may be analyzed unless the acceptance criteria are met for the initial and continuing calibration.

Other standard checks may be required for a specified reference method. Instrument performance checks specified in the reference method must be performed and be within the acceptance limits stated in the reference method. Additional quality control samples are part of the GC analysis. These include internal standards, surrogates, method blanks, instrument blanks, laboratory control samples, matrix spikes and matrix spike duplicates. The frequency and control criteria are defined in the laboratory SOP.

9.5.3 Cold Vapor Atomic Absorption Spectrophotometry (CVAA)

An initial calibration is performed daily with freshly prepared working standards that bracket the expected concentration range of the sample. A minimum of a three-point calibration curve is acquired which must have a correlation coefficient of 0.995 or better. The initial calibration is verified every 10 samples. The continuing calibration is required to be within method-defined criteria, depending on the analytical method employed. Continuing calibration blanks are run at the same frequency. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within ± 10% of the true value.

9.5.4 Inductively Coupled Plasma Emission Spectrophotometry-Mass Spectrometry (ICP-MS)

Initial calibration and instrument tune is performed daily, not to exceed 24 hours, and continuing calibrations are performed every 10 samples. Initial calibration consists of a minimum of three standards and a Blank that bracket the expected concentration range of the samples. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within method-defined criteria. The continuing calibration is required to be within method-defined criteria. Interference check standards are performed at the beginning of the sequence. Acceptance criteria are stated in the SOP.

9.5.5 Inductively Coupled Plasma Emission Spectrophotometry (ICP)

Initial calibration is performed daily, not to exceed 24 hours, and continuing calibrations are performed every 10 samples. Initial calibration consists of one standard and a Blank that bracket the expected concentration range of the samples. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within 5% of the true value for EPA Method 200.7 and 10% for SW846 6010 methods. The continuing calibration is required to be within 10% of the true value. Interference check standards are performed at the beginning and end of the sequence. Acceptance criteria are stated in the SOP.

9.5.6 Thermometers

Laboratory thermometers are checked annually for accuracy against certified, NIST traceable thermometers. Correction factors derived from the annual calibrations are applied to temperature readings where applicable. The analyst records the corrected temperature for all observations.

NIST traceable thermometers are calibrated professionally and re-certified every year. Records of thermometer calibrations are retained by the QA Department. All thermometers are tagged with the ID number, correction factor to be applied and the expiration of the calibration check.

NOTE: Electronic-based thermometers are calibrated on an annual basis. Thermometers are tagged with calibration information by the vendor, including the ID number, correction factor to be applied and the expiration of the calibration check. Certificates are kept on file in the QA Department.

Thermometers are not used past the calibration expiration date or if the thermometer is not reading properly. Replacement thermometers are calibrated and the maintenance logbook is updated when a change in the thermometer is required due to breakage, damage or expired calibration.

9.5.7 Balances

Calibration checks are performed for each day of use, for each balance. The calibration consists of a minimum of two weights, which bracket the weight to be measured. Additional calibration check procedures are performed on balances utilized in Microbiology laboratory. This additional procedure consists of a deflection test, which is performed to ensure that 100mg is detectable at a weight of 150 grams.

The balance logbook lists the acceptance criteria and performance criteria for the various balances used in the laboratory. Calibration weight measurements must meet the acceptance criteria listed on the record form.

Each balance is serviced and calibrated by a professional semi-annually. Balances are labeled with the balance number, date of service and the expiration date for the annual service check. The balance number used for any measurements requiring traceability is recorded with measurement data. Balances are not used past the expiration date or when the weight check is not within acceptable criteria. The accuracy of the calibration weights used by Alpha Analytical is verified annually by an accredited calibration service.

9.5.8 Mechanical volumetric pipettes

Delivery volumes for the mechanical volumetric pipettes (i.e. Eppendorf) are checked and recorded gravimetrically before use and on a quarterly basis. The verification is performed at the volume of use or bracketing the volume range of use. The check must be within the criteria stated in the laboratory logbook. Pipettes failing acceptance criteria are tagged and removed from service until repaired and the criteria are met, or discarded and replaced. Automatic pipettes are labeled with a unique ID number, volumes verified and expiration date.

9.5.9 Ion Chromatography

The ion chromatograph calibration is by analyzing a set of five or more initial calibration solutions, with concentrations of analytes appropriate to the analytical methods. The concentrations must bracket the expected concentration range of the samples analyzed. Procedures for verifying the calibration curve are method specific. The initial calibration is performed at the start of each day. The calibration curve is verified at least after every 20 samples.

9.5.10 pH Meters

pH meters are calibrated prior to use for each day of use. The meter is calibrated following the procedure for pH analysis. The records of the calibration are recorded in an instrument logbook or in the raw data for the analysis being performed. At least two buffer solutions that bracket the measurement range for the analysis are used for calibration. A second source check standard is used at the end of a run to verify meter stability. Buffer solutions used for calibration are NIST certified. Standard buffer solutions are not retained or re-used. The lot number of the buffer solutions is recorded in the data record to ensure traceability of the measurement to NIST.

9.5.11 Conductivity Meters

Three calibration standards of potassium chloride (KCL) solutions are analyzed annually on each instrument range. The calibration standards are used to verify instrument performance. The acceptance criteria are defined in the test SOP. If unacceptable performance is found, the cell is cleaned and rechecked. The cell is not used until satisfactory performance is achieved.

A single KCL standard solution is used to calibrate each range of the instrument. A second standard is used to check the calibration each day the meter is used. The check standard is near the measurement range for the samples to be analyzed. The acceptance criterion is ± 20% of the true value. The meter is labeled with expiration date for the annual calibration. A check standard that is NIST traceable is used to allow traceability. The check standard is performed at the end of the analysis run or at least after every 20 samples.

9.5.12 Autoclave

The date, contents, sterilization time and temperature, total cycle time and analyst's initials are recorded each time the autoclave is used. Autoclave cycles must be completed within 45 minutes when a 15 minute sterilization time is used. Autoclave timing mechanisms are checked quarterly with a stopwatch to verify timing controls. A maximum temperature thermometer is used with each cycle to ensure the sterilization temperature is reached.

Spore strips or ampoules are used weekly to confirm sterilization. BTSure ampoules are utilized as follows: An indicator ampoule is placed in most challenging area of sterilizer. Load is processed according to standard operating instructions. Remove from sterilizer and allow to cool for a minimum of 10 minutes. (Chemical indicator on label changes from green to black when processed.) Place the autoclaved indicator and un-autoclaved control indicator in an upright position in the plastic crusher provided. Gently squeeze crusher to break glass ampoules. Incubate both indicators at 55-60^{o}C for 24 hours. Examine appearance for color change. Yellow color indicates bacterial growth. No color change indicates adequate sterilization.

Calibration is conducted and certified annually by an outside service provider and recorded. Certificates are kept on file. Routine maintenance includes cleaning the autoclave seal to ensure freedom of caramelized media and cleaning drain screens to remove any debris buildup. For the efficient operation of the unit, overcrowding is avoided.

10 Test Methods and Standard Operating Procedures

10.1 Methods Documentation

Analysis consists of setting up proper instrument operating conditions, executing acceptable calibrations, monitoring instrument performance tests, analyzing prepared samples, and collecting data from the analyses. The test method SOP describes the instrumental analysis procedures, quality control frequencies and acceptance criteria. EPA accepted methods, national recognized methods or customer-specified methods are the basis for performance criteria, instrument conditions and the steps of the procedure. The method performance requirements of the published methods are followed unless otherwise specified by the customer.

The reference methods define the instrument operating conditions. In many of the reference methods, a range or general guidance on the operating conditions is defined. Documented modifications to the operating conditions clarify the reference methods or improve the quality of the results. In all cases where the method modifications are adopted, the performance criteria from the reference method must be met. Modifications to the operating conditions are stated in the SOP. Changes in the operating conditions made at the time of the analysis are documented in the appropriate laboratory or sequence log. A revision to the SOP takes place, when a day to day change in the operating condition improves performance for all matrices.

The laboratory SOPs include the operation of measurement equipment. The SOPs contain the - following information, as applicable:

The equipment used in the procedure, including equipment type

Equipment calibration and process for obtaining the measurement from the calibration

The step by step instructions to perform the measurement

Acceptance criteria for the calibrations

Corrective action for failed acceptance criteria, including assessment of previous calibration results

The basis used for the calibration standards such as traceability to NIST or EPA or demonstration of comparability

Frequency at which the equipment will be calibrated, adjusted and checked

The records maintained to document the calibration and use of measurement equipment

The calibration status for the equipment

The environmental conditions necessary before measurement equipment may be calibrated or used for measurement

Allowed adjustments to measurement equipment, including software, which will not invalidate the laboratory analysis

Maintenance of the equipment and record keeping to track performance before and after maintenance is completed

Define the standards, reagents and sample handling, interferences, preservation, and storage in order to assure measurement performance

10.2 Standard Operating Procedures (SOPs)

Alpha Analytical maintains SOPs that accurately reflect all phases of current laboratory activities such as assessing data integrity, nonconformance actions, handling customer complaints, sample receipt and storage, purchasing of all materials, and all test methods. These documents include equipment manuals provided by the manufacturer, internally written documents, and published methods with documented changes or modifications.

Copies of all SOPs are accessible to all personnel in electronic form through Qualtrax. Each SOP clearly indicates the published date of the document and the revision number.

10.3 Laboratory Method Manual (s)

All SOPs are posted as secure documents in the Alpha Qualtrax system. Directories are available for each laboratory area and administrative area in appropriate subfolders. Each SOP includes or references where applicable:

1) identification of the test method and where applicable;
2) applicable matrix or matrices;
3) method detection limit;
4) scope and application;
5) summary of method;
6) definitions;
7) interferences;
8) safety;
9) equipment and supplies
10) reagents and standards
11) sample collection, preservation, shipment and storage;
12) quality control;
13) calibration and standardization;
14) procedure;
15) calculations;
16) method performance;
17) pollution prevention;
18) data assessment and acceptance criteria for quality control measurements;
19) corrective actions for out-of-control data;
20) contingencies for handling out-of-control or unacceptable data;
21) waste management;
22) references; and
23) any tables, diagrams, flowcharts and validation data.

In cases where modifications to the published method have been made by the laboratory or where the referenced method is ambiguous or provides insufficient detail, these changes or clarifications are clearly described in the SOP.

10.4 Test Methods

The laboratory uses appropriate methods and procedures for all tests and related activities within its responsibility (including sampling, handling, transport and storage, preparation of items, estimation of uncertainty of measurement and analysis of test data). The method and procedures are consistent with the accuracy required, and with any standard specification relevant to the calibrations or tests concerned. When the use of mandated methods for a sample matrix is required, only those methods are used. Where methods are employed that are not required, the methods are fully documented and validated and are available to the customer and other recipients of the relevant reports.

The customer requests the reference method for sample analysis usually based on the regulatory program. The customer services staff may assist the customer with method selection when the customer specifies the regulatory program, but is unsure of the correct method required. The Laboratory Technical Manager or Quality Assurance Officer recommends methods for non-regulatory programs. In all cases, recommendation of methods is based on customer-defined method performance criteria. Customer services may recommend a procedure that meets the customer method performance criteria.

10.5 Method Validation/Initial Demonstration of Method Performance

Before acceptance and use of any method, satisfactory initial demonstration of method performance is required. In all cases, appropriate forms are completed and retained by the laboratory and made available upon request. All associated supporting data necessary to reproduce the analytical results is retained. Initial demonstration of method performance is completed each time there is a significant change in instrument type, personnel or method.

10.6 Sample Aliquots

The aliquot sampling process from a submitted sample is part of a test method. The laboratory uses documented and appropriate procedures and techniques to obtain representative sub-samples. Sample aliquots removed for analysis are homogenized and representative portions removed from the sample container. Personnel record observations made during aliquot sampling in the test method logbooks.

10.7 Data Verification

Calculations and data transfers are subject to appropriate checks which is a 3 tier approach. The initial analyst verifies all of his work, a secondary review of 100% of the initial is conducted by a an independent qualified analyst. A Customer Services representative reviews data for project and method performance requirements where applicable. A QA representative reviews data for project and method performance requirements when requested by a Customer. Final report review is performed by an authorized company signatory.

For drinking water suppliers, every effort is made to notify the Customer within 24-hours of obtaining valid data of any results that exceed any established maximum contaminant level or reportable concentration. Analyst or Department Supervisor notifies the Customer Services Department of the sample number(s), Customer name, analysis and sample results (preliminary or confirmed). The Customer Services Department notifies the customer.

The laboratory Report Generation and Approval SOP describes the practices to ensure that the reported data is free of transcription errors and calculation errors. Manually entered data into the LIMS is dual entered and checked by the LIMS to minimize transcription errors. The laboratory test method SOP describes the quality control measures used to assure method performance before reporting data.

10.8 Labeling of Standards and Reagents

The purchase, receipt and storage of consumable materials used for the technical operations of the laboratory include the following:

a) The laboratory retains records of manufacturer’s statement of purity, of the origin, purity and traceability of all chemical and physical standards.
b) Original reagent containers are labeled with the date opened and the expiration date.
c) Detailed records are maintained on reagent and standards preparation. These records indicate traceability to purchased stocks or neat compounds and include the date of preparation and preparer's initials.

d) Where calibrations do not include the generation of a calibration curve, records show the calibration date and type of calibration standard used.
e) All prepared reagents and standards are uniquely identified and the contents are clearly identified with preparation date, concentration and preparer's initials. These procedures are outlined in Westboro SOP/1745 and Mansfield SOP/1816.

10.9 Computers and Electronic Data Related Requirements

Computers or automated equipment are used for the capture, processing, manipulation, recording, reporting, storage or retrieval of test data. The laboratory ensures that computer software is documented and adequate. The goals of the software development methodology, existing system validations and the change control system are to ensure that:

the software systems perform the required functions accurately,

the users understand how to use the system, and

auditors can assure themselves of the validity of the analytical data.

The computer systems used at Alpha Analytical are purchased. A coordinated effort is made with the supplier to assure the computer operations meet the laboratory requirements for data integrity. Alpha Analytical has a formal validation program of its computer systems. The validation program is a comprehensive program to ensure data transmitted, reported or manipulated by electronic means is correct and free of errors. The validation and verification approach is separated into three areas.

1. New software is developed and validated using test data. Records of validation include the test data report, date and initials. Where formulas are part of the program, documentation includes manual verification of the final calculated values. New software includes the development of macros for spreadsheets and other tools using commercial software packages.
2. Reasons for changes to software are identified through flaws in existing documentation or the need to improve system processes and are documented on the Nonconformance Report. Final implementation of the change is documented on the nonconformance action form. The tracking and timelines of making the change is readily available. This process also provides the complete documentation of all software and electronic data reporting problems. All nonconformance identified with electronic data process result in corrective action that are reported to management before or at the bi-weekly executive meeting. Customers will be notified prior to any changes to software or hardware that will adversely affect customer electronic data. This information is provided by IT department to QA and Project Managers to be communicated to appropriate customers.

Verification of system integrity is through routine maintenance, protection from unauthorized access and electronic verification programs. Routine maintenance including system backups are performed on a scheduled basis. The backup process and password and access protections are defined in the Computer System Backup Control SOP/1562 and Computer Security SOP/1563. Electronic verification may be used to assure the commercially purchased software is performing at its original specifications. This includes virus checking of all network operation at least once per week. Documentation of all verification and maintenance operations is retained.

11 Sample Handling, Sample Acceptance Policy and Sample Receipt

The Sample Login and Custody procedures define the process for sample management from sample receipt through analysis and to disposal. These procedures detail the process for sample receipt, records and storage pending analysis.

Customers or Alpha's Couriers deliver samples to the laboratory during normal business hours. Sample receiving occurs in the sample management area.

Customer service personnel place bottle orders. The orders are filled following the bottle order instruction form. Blanks are prepared as needed with minimal storage. All glass containers are packed to minimize or prevent breakage. The containers are placed in plastic coolers or shipping packages and Chain-of Custody forms, seals (if requested) and labels enclosed. The bottle order is shipped by third party, picked up by the customer or customer representative or delivered by Alpha courier to the customer.

11.1 Sampling Supplies

11.1.1 Sample Containers

Sample containers provided by Alpha Analytical include labels, preservatives and a blank chain of custody form. Preservatives and containers are lot controlled and verified as appropriate for the indicated type of analysis.

Each lot of containers used for the collection of samples for microbiological analysis is checked for sterility prior to distribution. Sterility checks are performed by Microbiology staff and results recorded in Microbiology Sample Container Sterility Log.

Sample Containers for collecting Air samples (TO-15) are cleaned and prepared according to SOP 2190 "Cleaning and Preparation Procedures for Equipment used to collect Air sample for analytis of Volatile Organic Compounds".

11.1.2 Chain of Custody

Chain of custody forms must accompany all samples received by Alpha personnel. The chain of custody form indicates the sample origin and arrival at the laboratory and identifies the analyses requested.

11.1.3 Reagent Water

Alpha Analytical supplies laboratory pure water for field QC blanks. Water used for volatile organics must be free of volatile compounds below the method detection limit. The quality of the laboratory water is monitored for conductivity once per day. Additional water quality criteria may be monitored based on customer specific requests. The water quality in the laboratory is monitored for chemical parameters as required by the EPA certification manual for drinking water (Water Quality Monitoring SOP/1738).

11.2 Sample Tracking

Alpha Analytical uses an internal chain-of-custody in LIMs for sample tracking control purposes. When requested or required by regulation a legal custody program is used in addition to the routine laboratory practices. Legal custody practices must be arranged at the time of contractual commitment.

For legal custody the process must include complete and continuous records of the physical possession, storage, and disposal of sample containers, collected samples, sample aliquots, and sample extracts or digestates. For legal custody a sample is in someone's custody if:

1. It is in one's actual physical possession;
2. It is in one's view, after being in one's physical possession;
3. It is in one's physical possession and then locked up so that no one can tamper with it;
4. It is kept in a secured area, restricted to authorized personnel only.

The routine sample handling and tracking process includes unique identification of all sample containers, initials of the person removing the sample from the sample management area and documentation of the date of sample removal for disposal.

Samples are assigned a unique identification number from the LIMS program. Each sample container label includes a unique identifier for the container. The person handling the sample is recorded along with the unique identifier in the container tracking records in LIMS.

ALPHA ANALYTICAL utilizes a custom designed Laboratory Information Management System (LIMS) to uniquely identify and track samples and analytical data throughout the facility. The LIMS log-in, is initiated by the Sample Custodian when the following information is entered into the computer:

- Quote number (unique to the project if requested)
- Project name or description
- Analyses requested (per matrices received)
- Sample number (unique to this sample)
- Sample descriptions (customer ID, including number of received containers)
- Date received
- Date(s) and time(s) collected
- Date analytical results are due

11.2.1 Chain of Custody

Chain of custody forms must accompany all samples received by Alpha personnel. The chain of custody form indicates the sample origin and arrival at the laboratory and identifies the analyses requested.

- Customer's name and address
- Notation of special handling instructions
- Additional comments or instruction for the laboratory
- Purchase order number(s), if applicable

Alpha Job Numbers (Process for assigning numbers)

Alpha Job Numbers are unique #'s automatically designated by our LIMS computer system for every individual customer project.

There are 3 parts to this number:

- All numbers start with the letter “L”
- The next two numbers are the last two numbers of the current year.
- The last five numbers are pulled sequentially by the LIMS as each Login personnel requests a new number for a job.

  For example…. L0904165 ---- Year 2009 and 4,165th job to be logged in this year.

  The Alpha Job Number then may contain as many extensions as there are individual samples in a job. L0904165-01 is the first sample, L0904165-02 is the second and so on. Each sample may contain as many as 26 containers as the containers are designated with the letters of the Alphabet, and each container receives its own bar-coded label. For example, L0904165-09A is the first container of the 9th sample listed on a customer’s Chain of Custody.

Each container is labeled with a unique identifier, a label with a unique identifier number is placed on each sample container. Once labeled, the sample containers are placed in the appropriate storage area.

11.3 Sample Acceptance Policy

The sample management personnel check for proper sample labeling, preservation and handling at the time of arrival at the laboratory. The customer and customer services manager specifies the proper sample preservation, containers, cooling and other criteria on the project review form and in the LIMS. Sample management staff record all observations and immediate notify customer services of any discrepancies or questions arising during sample receipt.

It is possible for samples or sample containers to be lost, damaged, or determined to be unsuitable, for whatever reason, after initial receipt at Alpha Analytical. The problem is brought to the attention of a customer services manager who reports it to the customer. Plans for disposition of the affected samples or container are agreed upon with the customer, carried out, and recorded in the project records. Sample hold times and preservations are listed on the Alpha website (www.alphalab.com) under Support Services “Sampling Reference Guide”.

11.4 Sample Receipt Protocols

The sample management staff receives all samples. A unique job number is assigned to each shipment of samples received from a customer. The in-house records for the incoming job, including the internal Chain-of -Custody, are initiated with a Sample Delivery Group (SDG) form. The customer, and Alpha courier and/or the sample management personnel sign the sample custody form at the time of receipt at the laboratory. Samples received via overnight courier are signed on the bill of lading. The bill of lading, SDG form and the sample custody form are completed for external courier delivered samples.

The sample management staff examines the shipping containers, their contents, and accompanying customer documentation. Information about the sample identification, the location, date and time of collection, collector’s name, preservation type, sample type, presence and condition of custody seals, the state of preservation of the samples and other required information is noted on the SDG form. Any discrepancies in documentation or problems with sample condition such as appropriate sample containers, thermal preservation variation, holding times and adequate sample volumes are noted and brought to the attention of the customer via the nonconformance action form, The login staff or project manager contacts the client via email or or by phone. The Customer Services Manager provides clarification or further instruction to the sample management staff on the processing of the samples that are incomplete or missing required information.

The sample management staff logs the samples in the LIMs and a durable label for each container is printed. The custodian attaches each label to the appropriate sample container. The following information is recorded for tracking internal custody: laboratory sample ID, customer sample ID, sample matrix and storage location. Sample receipt and log-in specifically requires: date and time of laboratory receipt of sample(s); sample collection date; unique laboratory ID code; field ID code supplied by sample submitter; requested analyses; signature or initials of data logger; comments from inspection for sample acceptance or rejection and in some cases, sample bottle codes.

11.5 Storage Conditions

Alpha Analytical stores samples under proper environmental conditions to ensure their integrity and security. Samples are stored at temperatures that meet specifications of the methodology, regulatory agencies and customer directives. Refrigerators are monitored and controlled to be within 4 ± 2°C. Chemical, temperature, holding times and container storage requirements are listed in the LIMS project database.

Customer Quality Assurance Project Plans may list preservation requirements differing from the laboratory. The sample management staff reviews project information for projects specific handling. Addition of chemical preservative to sample containers normally is done in the field at the time of sampling. Chemical preservation and temperature preservation checks at the time of receipt are recorded except for volatile organic compounds, bacteria, sulfite, and dissolved oxygen preservation. Any differences from laboratory or customer specific requirements are recorded on nonconformance action forms and contact made with the customer by the Customer Services Manager or designee.

Sample storage facilities are located within the sample management area, walk-in custody refrigerator or in designated sample storage areas within the analytical departments. Internal chain-of-custody procedures and documentation pertaining to sample possession, removal from storage, and transfer are outlined in the sample custody procedure. Samples are returned to the sample storage area after the sample portion is removed for analysis. Extracts and digestates are tracked and follow the same internal custody operation. Extracts and digestates are removed to the waste disposal area after analysis for proper disposal.

Sample storage precautions are used to ensure that cross contamination does not occur during sample storage. Refrigerator storage blanks are monitored bi-weekly for volatile compounds.. The storage blank information allows the assessment of potential cross contamination in the sample storage refrigerator.

Temperatures of cold storage areas are recorded continuously in the data logger system. Corrective action is done as necessary when temperatures are not within the control criteria. In both the Westboro and Mansfield facilities, Automated Data loggers are linked to thermocouples in custody refrigerators and freezers in the Sample Storage areas as well as department standards/storage refrigerators and freezers. The Data logger is calibrated and certified by an outside vendor annually and on a quarterly basis for DOD standards/storage refrigerators and freezers. If there is a catastrophic failure of custody refrigerators, a record of all samples affected and customers associated with such samples are notified of any samples affected by the failure. Refrigerators and/or freezers not connected to the Data Logger system have temperatures measured with NIST traceable thermometers. Temperature records indicate the thermometer or sensor (Data logger) used for obtaining the measurement.

11.6 Sample Disposal

Samples are held for 21 calendar days after the report is released to the customer. Upon written customer request samples may be held longer in an uncontrolled area. Requests for controlled sample storage must be arranged at the time of contractual commitment. Air canister samples are held for 3 days after the report is released to the customer.

An authorized waste carrier is contracted to pick up waste as needed and dispose of it, in accordance with all regulatory requirements. Post-analysis disposition of samples is dependent upon project specific requests. Remaining sample material may be returned to the customer, safely discarded, or archived for a specific time prior to disposal. The waste disposal SOP 1797 defines the specific requirements for sample disposal and other waste disposal operations.

The sample management staff are responsible for the archival and disposal of raw samples, extracts and digestates. Raw and prepared samples may not be archived or disposed until all of the designated analyses are complete and resultant analytical data is sent to customers. Samples in storage are retained a minimum of 21 calendar days after reporting the results to the customer. Any samples requiring more than 21 calendar days are archived. Air canister samples requiring storage more than 3 business days require prior approval.

When a customer has requested the return of samples, the sample management staff prepares and ships the samples according to the same custody procedures in which the samples were received and following any customer specified requirements. Protection of the samples during delivery is ensured by the implementation of special packaging procedures. Packages are delivered by a commercial carrier whose procedures for protecting the samples are not within the control of this laboratory. Customers are informed that a commercial carrier will deliver their samples if required.

12 Records

Alpha Analytical has a record system that produces accurate records, which document all laboratory activities. The laboratory retains records of all original observations, calculations and derived data, calibration records and a copy of the test for ten years minimum. The system retains records longer than the minimum upon the request of authorized customers, agencies or another regulator. Note: Ohio VAP requires notification before disposal of any VAP records.

12.1 Record Keeping System and Design

The record keeping system allows reconstruction of laboratory processes that produced the analytical data of the sample.

a) The records include the names of personnel involved in sampling, preparation, calibration or testing.

b) Information relating to laboratory facilities equipment, analytical methods, and activities such as sample receipt, preparation, or data verification are documented.

c) The record keeping system provides retrieval of working files and archived records for inspection and verification purposes.

d) Documentation entries are signed or initialed by responsible staff.

e) Generated data requiring operator logging on appropriate logsheets or logbooks are recorded directly and legibly in permanent ink

f) Entries in records are not obliterated by any method. Corrections to errors are made by one line marked through the error. The person making the correction signs and dates the correction.

g) Data entry is minimized by electronic data transfer and ensuring the number of manual data transcriptions is reduced.

12.2 Records Management and Storage

1. Records including calibration and test equipment, certificates and reports are safely stored, held secure and in confidence to the customer.
2. The laboratory maintains hardware and software necessary for reconstruction of data.
3. Records that are stored or generated by computers have hard copy or write-protected backup copies.
4. Alpha Analytical has established a record management system, for control of hard copy laboratory notebooks.

5. Access to archived information is carefully controlled and is limited to authorized personnel. These records are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources.
6. In the event that Alpha Analytical transfers ownership or goes out of business, there is a plan to ensure that the records are maintained or transferred according to the customer's instructions. A plan will be developed to maintain continuity of our record keeping systems as requested and/or required by both state and federal laws.

Alpha Analytical retains all original hard copy or electronic raw data for calibrations, samples, and quality control measures for ten years, including:

1. Analysts work sheets and data output records,
2. Reference to the specific method,
3. Calculation steps including definition of symbols to reduce observations to a reportable value,
4. Copies of all final reports
5. Archived SOPs,
6. Correspondence relating to laboratory activities for a specific project,
7. All nonconformance action reports, audits and audit responses,
8. Proficiency test results and raw data,
9. Data review and cross checking.

The basic information to tie together analysis and peripherals such as strip charts, printouts, computer files, analytical notebooks and run logs for Alpha Analytical includes:

1. Unique ID code for each Laboratory sample or QC sample;
2. Date of analysis;
3. Instrument identification and operating conditions;
4. SOP reference and version;
5. Calculations;
6. Analyst or operator's initials/signature.

In addition, Alpha Analytical maintains records of:

1. Personnel qualifications, experience and training
2. Initial and continuing demonstration of proficiency for each analyst
3. A log of names, initials and signatures for all individuals who are responsible for signing or initialing any laboratory records. Use of electronic signatures has been approved by regulatory agencies.

12.3 Laboratory Sample Tracking

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained. These include but are not limited to records pertaining to:

a) Sample preservation including appropriate sample container and compliance with holding time requirement; If the time of the sample collection is not provided, the laboratory must assume the most conservative time of day (i.e., earliest).

b) Sample identification, receipt, acceptance or rejection and log-in;

c) Sample storage and tracking including shipping receipts, transmittal forms, and internal routing and assignment records; this includes inter-laboratory transfers of samples, extracts and digestates.

d) Sample preparation including cleanup and separation protocols, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents;

e) Sample analysis;

f) Standard and reagent origin, receipt, preparation, and use;

g) Equipment receipt, use, specification, operating conditions and preventative maintenance;

h) Calibration criteria, frequency and acceptance criteria;

i) Data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions;

j) Method performance criteria including expected quality control requirements;

k) Quality control protocols and assessment;

l) Electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries;

m) Automated sample handling systems;

n) Records storage and retention; and

o) Disposal of hazardous samples including the date of sample or sub-sample disposal and the name of the responsible person.

p) The COC records account for all time periods associated with the samples.

q) The COC records include signatures of all individuals who had access to individual samples. Signatures (written or electronic) of all personnel who physically handle the samples. Time of day and calendar date of each transfer or handling procedure.

r) Common carrier documents.

13 Laboratory Report Format and Contents

The Process Planning and Control Procedure details the recording and reporting of data as required by the customer and in accordance with relevant environmental regulations.

Customers specify the report delivery and deliverables required for the work submitted. Report delivery includes standard turnaround and rush turnaround. Customers specify the delivery address or multiple addresses and method of delivery such as U.S. Mail, facsimile or electronic at the start of the project. Alpha Analytical provides data deliverables in hardcopy or electronic format. At the start of any project, the electronic deliverable formats required must be received before sample arrival. Affidavits are required with each report or series of reports generated for a particular project for Ohio VAP reports.

Reporting packages are available for routine regulatory reporting requirements. Regulatory reporting packages include only the information requested by the regulatory agency. In addition to regulatory report packages, Alpha Analytical prepares a standard report format. The standard report format includes:

1. Title: “Certification of Analysis”
2. Name and address of the laboratory
3. Laboratory Job Number, page number and total number of pages included in the report.
4. Name and address of the customer
5. Alpha sample number, Customer identification, Sample location
6. Samples identified that do not meet the sample acceptance requirements for project.
7. Date of sample receipt, sample collection, preparation or extraction date and time (if applicable), analysis date and time, report date and analyst
8. Identification of data reported by subcontractors
9. Test name and reference method number
10. Delivery method and sampling procedures when collected by lab personnel
11. Deviations or modifications that affect data quality and/or data integrity. These deviations or modifications are included in narrative statements and/or data merger files.
12. Statement that results relate only to the sample tested
13. Statement that report must be copied in full unless the laboratory provides written permission for partial copies
14. Glossary, References and limits of liability
15. Units of measure and reporting detection limit
16. Quality control data for: % Recovery surrogates, % Recovery of LCS, % RPD of LCSD, Blank analysis, % Recovery Matrix Spike, %RPD of Laboratory Duplicates, as applicable
17. Signature, title and date of report

18. A “Certificate/Approval Program Summary” page is included at the end of the report that identifies analytes for which Alpha Analytical holds certification and for those analytes reported that it does not. This summary also includes the certification numbers for either NELAP certified states, State certifications (e.g. Massachusetts laboratory certification identification number)..
19. Alpha Analytical does not accept samples from private residents for drinking water analysis and therefore maximum contaminant levels are not necessary. If Alpha were to change its policy and report drinking water samples, MCLs would be included with the report.

Results transmitted by facsimile or other electronic means include a statement of confidentiality and return of the materials at the laboratory’s expense.

The laboratory notifies the customer in writing of any circumstance that causes doubt on the validity of the results. The amended or modified report lists the change, reason for the change, affected page numbers, date of the amendment and authorized signature. The customer will be notified prior to changes in LIMs software or hardware configurations that will adversely affect customer electronic data.

13.1 Data Qualifiers

The following data qualifiers are used in conjunction with analytical results depending on the definition, state or regulatory program and report type.

Note: ”J” Estimated value: Upon customer request, the Target analyte concentration can be reported below the quantitation limit (RL), but above the Method Detection Limit (DL) with a “J” qualifier as long as there is a LOD study on file. (See section 5.11)

Data Qualifier	Qualifier Information	Regulatory Requirement
A	Spectra identified as "Aldol Condensation Product".	CT RCP, NC
B	The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at <5x the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than 10x the concentration found in the blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone) For DOD related projects, flag applies to detectable concentration of target analyte in the blank that exceeds ½ the LOG or is greater than 1/10 the concentration in the field sample	EPA Functional Guidelines 'MassDEP MCP, CT RCP, NJ-TO15/LL-TO15; NJ Tech Guidance 2014, DOD QSM 5.1
C	Co-elution: target analyte co-elutes with a known lab standard (i.e. surrogates, internal standards, etc.) for co-extracted analyses.	
D	Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.	NJ-TO15/LL-TO15 - Air only EPA Functional Guidelines; EPA Region 2,5
DL	Same was re-analyzed at a dilution. Qualifier applied to sample number.	

E		Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.	EPA Region 2,5 CT RCP, NJ-TO15/LL-TO15
G		The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.	In-house/Forensics.
H		The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.	THE NELAC INSTITUTE (TNI) STANDARDS
I		The lower value for the two columns has been reported due to obvious interference.	In-house.
J		Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).	CT RCP (for TICs),
JN (NJ)		Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.	EPA Functional Guidelines 'NJ-TO15-LL
ND	DU-J	Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for same-related analysis	In-house
P	All DU	The RPD between the results for the two columns exceeds the method-specified criteria.	MassDEP MCP, CT RCP
Q	All DU	The quality control sample exceeds the associated acceptance criteria. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)	
R	All DU	Analytical results are from sample re-analysis	Customer-specific

RE	All DU	Analytical results are from sample re-extraction.	Customer-specific
S		Analytical results are from modified screening analysis	

13.2 Compound Summation for Organic Analyses

In order to be compliant with regulations from certain states, Alpha Analytical has created the following Summation Rules to cover reporting “Total Analytes”. The following are an example of several compounds that can be reported as “Totals”:

Volatiles:	
1,3-Dichloropropene, Total	cis + trans isomers
Xylenes, Total	m/p + o isomers
1,2-Dichloroethene, Total	cis + trans isomers
Trihalomethanes, Total	Chloroform + Bromoform +
	Dibromochloromethane +
	Dichlorobromomethane
PCBs:	
PCBs, Total	Sum of reportable Aroclors
	(all Aroclors reported for the project)

The following are the summation rules that the LIMs uses to calculate the Total values:

Summation Rules:		
H + H = H		Key:
H + J = J		H = Hit (above RL)
J + J = J		J = J-flagged value
H + ND = H		ND = U-flagged value
J + ND = J		
ND + ND = ND		

The ND values are considered “0” during the calculations.
The “E” flagged values (over the calibration) are ignored and not utilized during the calculations.
Any “N” flagged values (do not report) are ignored and not utilized during the calculations.
For dual-column analysis, the Total is reported as part of column “A” data, unless all individuals are reported from “B” column.

For analytical group summations, the Total is reported based on the associated “Reporting List”. For example, if only 7 Aroclors are requested, then the Total is based on 7 Aroclors, not 9.

The RL and MDL for Totals will always be the lowest of the individual compounds used in the summation.

For each Total summation, two values are calculated: TOTALH (calculated from all associated hits above the R L– used in DU reporting formats) and TOTALJ (calculated from all associated hits and J flagged values – used in DJQL reporting formats). Total concentrations are calculated for all samples and QC samples (however, recoveries are not calculated since they are only calculated for the compounds spiked)

If a Total summation is requested, the individual compounds must also be reported.

14 Outside Support Services and Supplies

When Alpha Analytical purchases outside services and supplies in support of tests, the laboratory uses only those outside services and supplies that are of adequate quality to maintain confidence in the tests. Differences between Request/Tender and Contracts must be resolved before work commences.

The Purchasing SOP/1726 describes approval and monitoring of all suppliers and subcontractors used by the laboratory. Where no independent assurance of the quality of outside support services or supplies is available, the laboratory ensures that purchased equipment, materials, and services comply with specifications by evaluating method performance before routine use.

The laboratory checks shipments upon receipt as complying with purchase specifications. The use of purchased equipment and consumables is only after the evaluation and compliance to the specifications is complete. The Purchasing SOP/1726 describes the details for receipt and inspection of purchased product.

The Purchasing SOP describes the process for raising, review and placement of purchase orders. It is company policy to purchase from third party certified suppliers and subcontractors wherever possible. Purchases must be from suppliers approved by the Laboratory. Laboratory or sampling subcontractors specified by the customer are noted as “Trial” on the purchase order. This identifies the subcontractor as a non-approved subcontractor. All DoD work that is subcontracted must comply with Alpha’s management system and must comply with the QSM standard and is subject to DoD customer approval.

The laboratory maintains list of approved vendors (Form 18302) and subcontractors from whom it obtains support services or supplies required for tests.

14.1 Subcontracting Analytical Samples

Customers are advised, verbally and/or in writing, if any analyses will be subcontracted to another laboratory. Any testing covered under the NELAC Institute (TNI) Standards that requires subcontracting, will be subcontracted to another THE NELAC Institute (TNI) Standard accredited laboratory for the tests to be performed. The laboratory approves testing and sampling subcontractors by review of current state, national or other external parties’ certifications or approvals. This document must indicate current approval for the subcontracted work. Any sample(s) needing special reports (*i.e.*, MCL exceedance) will be identified on the chain of custody when the laboratory subcontracts with another laboratory. Subcontractor Laboratory Certifications are located in Qualtrax under Customer Services folder

The Sample Receipt and Login Procedure describes the process for sample handling when subcontracting samples. The quotation form lists the subcontractor in order to notify the customer of any subcontracted work. Customer notification of subcontracted work is in writing before releasing samples to the subcontractor.

The review of subcontractor documents for completeness and meeting the specifications defined for the project follows the laboratory process for reporting and verification of process data. The person responsible for receiving the order reviews the information supplied by the subcontractor instead of the Department Supervisor.

15 Customer Relations

15.1 Customer Service

The majority of the customer services occur from personnel in the administration, sample receiving and sampling areas. Customer service involves inquiries into services offered, technical consulting, placing orders, and receiving orders, providing updates on the status of orders and completing orders. Personnel interacting with customers must document and review customer specific project requirements. Call Tracker is used to document communications with customers (SOP/1723). Personnel must document customer interactions following the appropriate laboratory procedures. Each person must communicate deviations, modifications and customer requests following the laboratory defined procedures.

15.2 Project Management

During staff meetings the laboratory management reviews requests for new work. The Operations Director and/or Laboratory Technical Manager address all capacity and capability issues. Where conflicts in workload arise, customer notification is immediate. The Project Communication Form (PCF) contains the documentation of all project information. Cooperation between laboratory and customer services staff allows direct communication and scheduling. Management arranges complex scheduling and coordination between departmental areas. Documentation of approval for waivers from the DoD QSM requirements must be documented on a project specific waiver. This documentation needs to be in writing and readily available for review.

15.3 Complaint Processing

The laboratory staff documents all customers or other parties' complaints or concerns regarding the data quality or laboratory operations. The Nonconformance Report records complaints, correcting the concern, and resolving the concern with the customer or other party. The process uses the same form and process as the nonconformance action process. Where repetitive corrective actions indicate a problem, an audit of the area, Customer Inquiry and Complaint SOP/1722 is immediate to ensure the corrective action has effectively solved the concern.

16 Appendix A – Definitions/References

The following definitions are from Section 3.0 of the 2009 TNI Standard. The laboratory adopts these definitions for all work performed in the laboratory.

Acceptance Criteria: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation: the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. (TNI)

Accuracy: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (TNI)

Aliquot: A discrete, measured, representative portion of a sample taken for analysis. (EPA QAD glossary)

Analyst: The designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI)

Analyte: The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family, and which are analyzed together. (EPA Risk Assessment Guide for Superfund; OSHA Glossary)

Analytical Uncertainty: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI)

Assessment: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation. (TNI)

Assessment (Clarification): The evaluation process used to measure the performance or effectiveness of a system and its elements against specific criteria.

Assessment Criteria: the measures established by The NELAC Institute (TNI) Standards and applied in establishing the extent to which an applicant is in conformance with the NELAC Institute (TNI) Standards requirements.

Audit: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI).

Batch: Environmental samples, which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A

preparation batch is composed of one (1) to twenty (20) environmental samples of the same quality systems matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates), which are analyzed together as a group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed 20 samples. (TNI)

Bias: The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). (TNI)

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (TNI)

Blanks include:

Equipment Blank: a sample of analyte-free media, which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures.

Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g. distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Method Blank: A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses, (TNI)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS)

Blind Sample: a sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst or laboratory's proficiency in the execution of the measurement process.

Calibration: set of operations which establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (TNI)

1) In calibration of support equipment the values realized by standards are established through the use of Reference Standards that are traceable to the International System of Units (SI).

2) In calibration according to test methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the Laboratory with a certificate of analysis or purity, or prepared by the Laboratory using support equipment that has been calibrated verified to meet specifications.

Calibration Range: The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.

Calibration Curve: the graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (TNI)

Calibration Method: A defined technical procedure for performing a calibration.

Calibration Standard: A substance or reference material used to calibrate an instrument. (TNI)

Certified Reference Material (CRM): Reference material, accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI)

Chain of Custody Form: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; collector; time of collection; preservation; and requested analyses. See also Legal Chain of Custody Protocols (TNI)

Clean Air Act: the enabling legislation in 42 U.S.C. 7401 *et seq*., Public Law 91-604, 84 Stat. 1676 Pub.L. 95-95, 91 Stat., 685 and Pub. L. 95-190, 91 Stat., 1399, as amended, empowering EPA to promulgate air quality standards, monitor and to enforce them.

Confirmation: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: Second column confirmation, Alternate wavelength, Derivatization, Mass spectral interpretation, Alternative detectors, or Additional cleanup procedures (TNI)

Customer: Any individual or organization for which items or services are furnished or work performed in response to defined requirements and expectations. (ANSI/ASQ E4-2004)

Congener: A member of a class of related chemical compounds (e.g., PCBs, PCDDs)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA/Superfund): the enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites.

Conformance: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Consensus Standard: A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof. (ANSI/ASQ ANSI/ASQ E4-2004)

Continuing calibration verification: The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models. (IDQTF)

Corrective Action: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

Completeness: the percentage of measurements judged to be valid compared to the total number of measurements made for a specific sample matrix and analysis.

Data Quality Objectives (DQO):

Data Reduction: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (TNI)

Definitive Data: Analytical data of known quality, concentration, and level of uncertainty. The levels of quality and uncertainty of the analytical data are consistent with the requirements for the decision to be made. Suitable for final decision-making. (UFP-QAPP)

Demonstration of Capability: a procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)

Detection Limit: (previously referred to as Method Detection Limit –MDL) the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit.

Detection Limit (DL) (Clarification): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.

Document Control: the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)

Environmental Data: Any measurements or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology. (ANSI/ASQ E4-2004)

False Negative: An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.

False Positive: An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA): the enabling legislation under 7 U.S.C. 135 *et seq*., as amended, that empowers the EPA to register insecticides, fungicides, and rodenticides.

Federal Water Pollution Control Act (Clean Water Act, CWA): the enabling legislation under 33 U.S.C 1251 et seq., Public Law 92-50086 Stat. 8.16, that empowers EPA to set discharge limitations, write discharge permits, monitor, and bring enforcement action for non-compliance.

Field Measurement: The determination of physical, biological, or radiological properties, or chemical constituents; that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.

Field of Accreditation: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation. (TNI)

Finding: an assessment conclusion, referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. (TNI)

Finding (Clarification): An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative and is normally accompanied by specific examples of the observed condition (ANSI/ASQ E4-2004).

Holding Times: The maximum time that can elapse between two (2) specified activities. (TNI)

The maximum times that samples may be held prior to analysis and still be considered valid or not compromised. (40 CFR part 136)

Inspection: An activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic. (ANSI/ASQC E4-1994)

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (TNI)

Isomer: One of two or more compounds, radicals, or ions that contain the same number of atoms of the same elements but differ in structural arrangement and properties. For example, hexane (C_6H_{14}) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.

Laboratory: Body that calibrates and/or tests. (ISO 25)

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank or QC check sample): a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (TNI).

Laboratory Duplicate: aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.

Legal Chain of Custody Protocols: procedures employed to record the possession of samples from the time of sampling until analysis and are performed at the special request of the customer. These protocols include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory. (TNI)

Limit of Detection (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI)

Limit of Detection (Clarification): The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

Limits of Quantitation (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g. target analyte) that can be reported with a specified degree of confidence. (TNI) For DOD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard and within the calibration range.

Limit of Quantitation (Clarification): The lowest concentration that produces a quantitative result within specified limits of precision and bias.

Management: Those individuals directly responsible and accountable for planning, implementing, and assessing work. (ANSI/ASQ E4-2004)

Management System: System to establish policy and objectives and to achieve those objectives (ISO 9000).

Matrix: The substrate of a test sample. (TNI)

Matrix Spike (spiked sample, fortified sample): A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of Target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (TNI).

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (TNI).

Measurement System: A test method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s). (TNI)

Method: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI)

Method Detection Limit: (now referred to as Detection Limit) one way to establish a Detection Limit, defined as the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Method Detection Limit (MDL) (Clarification): The MDL is one way to establish a Detection Limit, not a Limit of Detection.

Method of Standard Additions: A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration. (This process is often called spiking the sample.) (Modified Skoog, Holler, and Nieman. Principles of Instrumental Analysis. 1998)

Mobile Laboratory: A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans and skid-mounted structures configured to house testing equipment and personnel. (TNI)

National Institute of Standards and Technology (NIST): A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute. (NMI). (TNI)

National Environmental Laboratory Accreditation Program (NELAP): The overall National Environmental Laboratory Accreditation Program of which TNI is a part.

Negative Control: Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

Positive Control: Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI).

Preservation: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (TNI)

Procedure: A specified way to carry out an activity or a process. Procedures can be documented or not. (TNI)

Proficiency Testing: A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI)

Proficiency Testing Program: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI)

Proficiency Test Sample (PT): A sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria. (TNI).

Protocol: A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) which must be strictly followed. (TNI)

Quality Assurance: An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is the type and quality needed and expected by the customer. (TNI)

Quality Assurance [Project] Plan (QAPP): A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

Quality Control: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements or quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. (TNI)

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking intended to demonstrate that a measurement system or activity is in control. (TNI)

Quality Manual: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, the ensure the quality of its product and the utility of its product to the users. (TNI)

Quality Manual Clarification: Alpha Analytical refers to Quality Manual as Corporate Quality Systems Manual (CQSM). (Alpha)

Quality System: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC) activities. (TNI)

Quality System Matrix: These matrix definitions are to be used for purposes of batch and quality control requirements: (TNI)

Air and Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.

Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, ground water effluents, and TCLP or other extracts.

Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously defined.

Drinking Water: Any aqueous sample that has been designated a potable or potential potable water source.

Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.

Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids.

Raw Data: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI)

Reference Material: Material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)

Reference Standard: Standard used for the calibration of working measurement standards in a given organization or at a given location. (TNI)

Representativeness: the degree to which the sample represents the properties of the particular sample being analyzed.

Resource Conservation and Recovery Act (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage and disposal.

Safe Drinking Water Act (SDWA): the enabling legislation, 42 USC 300f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations.

Sample Tracking: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of the samples.

Sampling: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure. (TNI)**Second source calibration verification (ICV):** A standard obtained or prepared from a source independent of the source of standards for the initial calibration. Its concentration should be at or near the middle of the calibration range. It is done after the initial calibration.

Selectivity: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent. (TNI)

Sensitivity: The capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI)

Signal to Noise Ratio: The signal carries information about the analyte, while noise is made up of extraneous information that is unwanted because it degrades the accuracy and precision of an analysis and also places a lower limit on the amount of analyte that can be detected. In most measurements, the average strength of the noise is constant and independent of the magnitude of the signal. Thus, the effect of noise on the relative error of a measurement becomes greater and greater as the quantity being measured (producing the signal) decreases in magnitude. (Skoog, Holler, and Nieman. Principles of Instrumental Analysis. 1998)

Signatures, Electronic: A technology that allows a person to electronically affix a signature or its equivalent to an electronic document. The electronic signature links the signature to the signer's identity and to the time the document was signed. Alpha approves the use of electronic signatures for signing and initializing any laboratory record including, by not limited to: analytical reports, controlled documents, workflows and purchasing requests.

Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies. (TNI)

Standard Operating Procedures (SOPs): A written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks. (TNI)

Standard Method: a test method issued by an organization generally recognized as competent to do so.

Standardized Reference Material (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method.

Surrogate: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

Technology: a specific arrangement of analytical instruments, detection systems, and/or preparation techniques. (TNI)

Test: A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate. (ISO/IEC Guide 2 - 12.1, amended)

Tentatively Identified Compound (TIC): A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. Tentatively Identified Compounds, if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported.

Test Method: An adoption of a scientific technique for performing a specific measurement, as documented in a laboratory SOP or as published by a recognized authority.

Toxic Substances Control Act (TSCA): the enabling legislation in 15 USC 2601 et seq. (1976), the provides for testing, regulating, and screening all chemicals produced or imported into the United States for possible toxic effects prior to commercial manufacture.

Traceability: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)

Tuning: A check and/or adjustment of instrument performance for mass spectrometry as required by the method.

United States Environmental Protection Agency (EPA): the federal governmental agency with responsibility for protecting public health and safeguarding and improving the natural environment (i.e. the air, water and land) upon which human life depends. (US-EPA)

Validation: the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

Verification: confirmation by examination and provision of evidence that specified requirements have been met. (TNI)

NOTE - In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.

The result of verification leads to a decision either to restore in service, to perform adjustments, or to repair, or to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring

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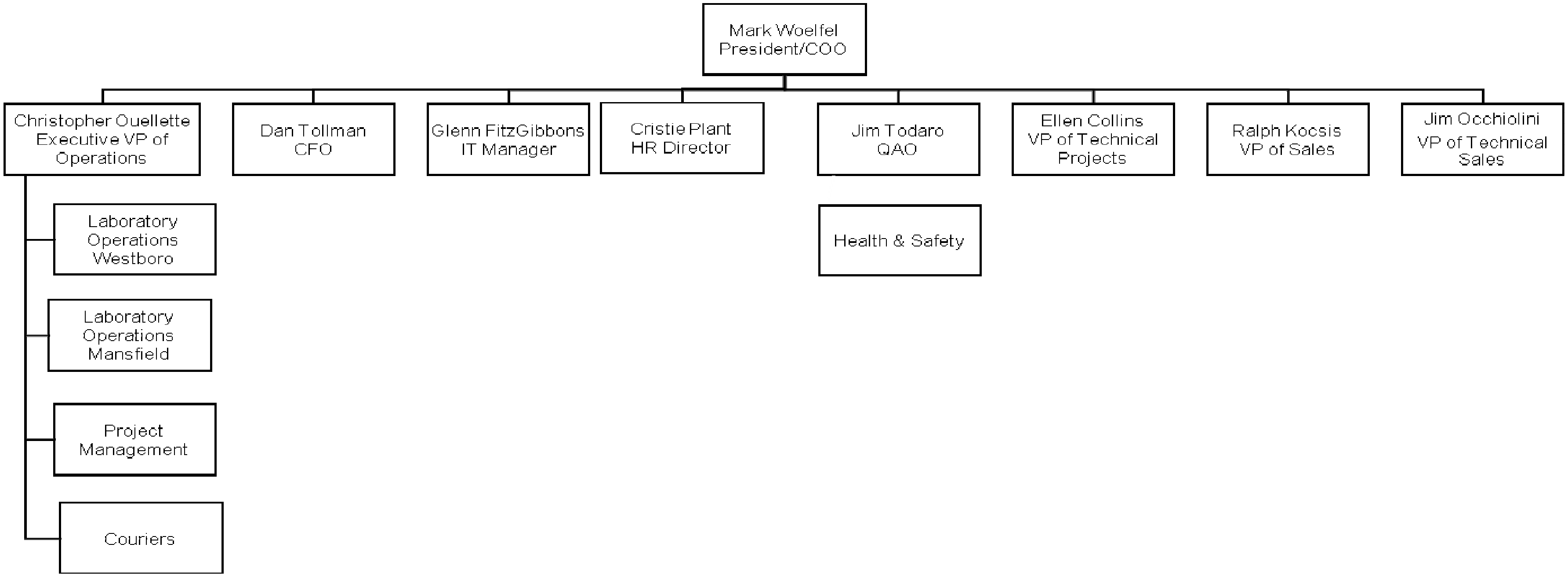
17 Appendix B – Organization Charts

The following charts provide an overview of the organizational structure of Alpha Analytical. The chart also identifies the key personnel responsible for the listed positions. For the various laboratory areas, the individual departmental supervisors are noted. For a listing of all current key personnel, please refer to Section 18, Appendix C.

Updated 09/28/2017

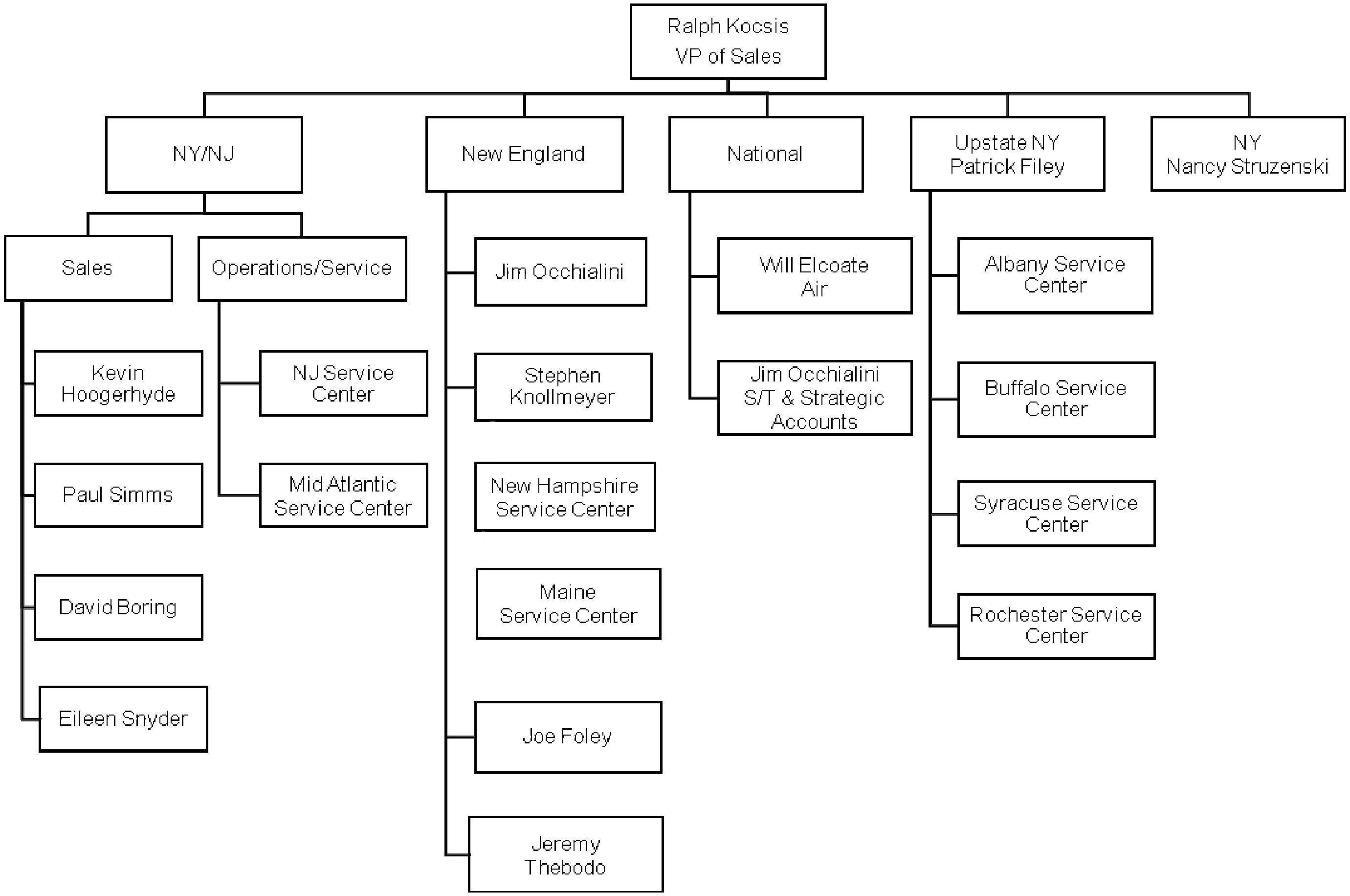
Alpha Analytical
Company Organizational Chart



Updated 09/28/2017

Alpha Analytical

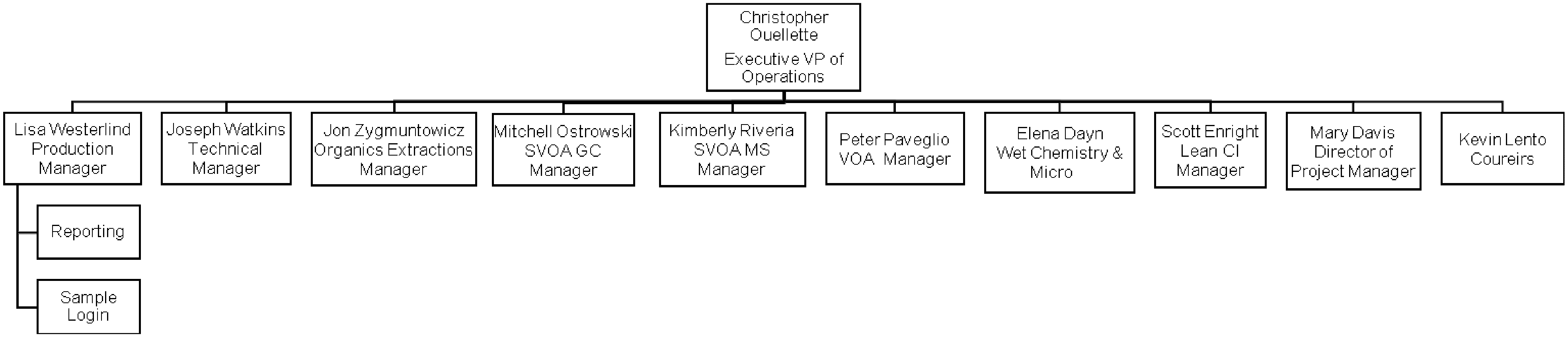
Sales Organizational Chart



Updated 09/28/2017

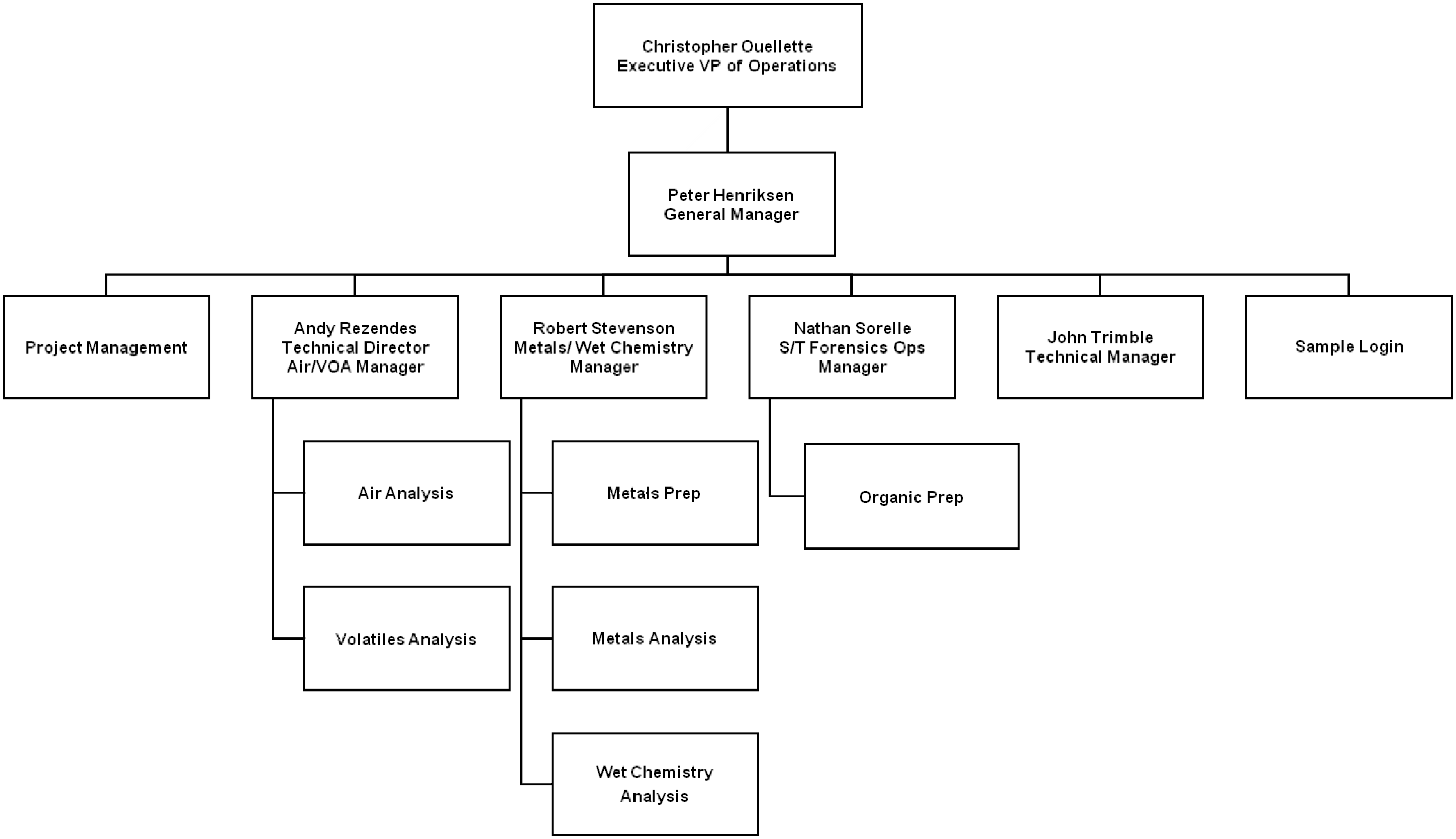
Westboro Facility

Organizational Chart



Updated 09/28/2017

Mansfield Facility Organizational Chart



18 Appendix C – List of Key Personnel

The following is a listing of all current key personnel. If role is specific to a facility it is denoted by either Westboro or Mansfield following the position title. **Updated 09/2017.**

President / COO: Mark Woelfel
Executive VP of Operations: Christopher Ouellette
CFO: Dan Tollman
Laboratory Technical Manager - Westboro: Joseph Watkins
Laboratory Technical Manager - Mansfield: John Trimble
Laboratory Technical Manager- Air, Volatiles Manager - Mansfield: Andy Rezendes
Quality Assurance Officer/Health & Safety Manager: James C. Todaro
VP, Technical Projects: Ellen Collins
VP of Sales: Ralph Kocsis
VP, Technical Sales: James Occhialini, Pat Filey, Kevin Hoogerhyde, Steven Knollmeyer, Nancy Struzenski
Technical Sales Reps: Paul Simms, David Boring, Joe Foley, Jeremy Thebodo
General Manager, Mansfield: Peter Henriksen
Director of Project Management: Mary Davis
National Air Account Manager: Will Elcoate
Information Technology Manager: Glenn Fitzgibbons
Human Resources Director: Cristie Plant
Health & Safety Officer: James Todaro
Forensic & S/T Operations Manager, Mansfield: Nathan Sorelle
SVOA GC Manager, Westboro: Mitchell Ostrowski
SVOA GC/MS Manager, Westboro: Kimberly Rivera
Extractions Manager, Westboro: John Zygmuntowicz
VOA Department Manager, Westboro: Peter Paveglio
Wet Chemistry Department Manager, Westboro: Elena Dayn
Metals Department Manager, Mansfield: Robert Stevenson
Login Manager/ Reporting Manager, Westboro Lisa Westerlind
Quality Systems Specialists: Amy Rice, Rene Bennett, Jason Hebert, Blake Buckalew
Purchasing: David Peak
Logistics Manager: Kevin Lento
Equipment Specialist: Syzmon Sus

19 Appendix D – Preventive Maintenance Procedures

Optimized Service-Calibration Intervals

Equipment	Frequency	Type of Calibration or Maintenance
Balances	semiannually daily	cleaning & operations check by service technician (external) calibration verification using Class S-1 certified weights
COD Reactor	annually annually	complete operations check by service technician (external) reaction temperature verification
Conductivity Bridge	annually each use	verification of cell constant complete operations check by service technician (external) calibration verification
DI Water System	as needed monthly annually daily	complete operations check by service technician (external) Residual Chlorine check Biosuitability testing (external) pH and Conductivity check
DO Meter	annually each use	complete operations check by service technician (external) calibration against air as specified by manufacturer
Emergency/Safety Equipment	annually monthly	fire extinguishers and emergency exit lighting check eye washes, showers, fire blanket and first aid kits checked
Freezers	daily	temperature verification
Gas Chromatographs	as needed as needed beginning and end of batch and 10 to 20 samples as per method	injection port preparation; cleaning of detectors initial multi-point calibration continuing calibration verification (CCV) against initial calibration
ICP	Every other day Daily Annually Annually As needed	Change pump tubing Calibration, profile Complete operations check by service technician (external), Linear Dynamic Range determination Clean torch, clean nebulizer, clean spray chamber
Lachat analyzer	Daily As needed	Calibration, clean lines Change tubing, change O-rings
Mass Spectrometers (GC & ICP)	bi-annually as needed 12 hour or daily	change of mechanical pump oil by service technician (external) cleaning of source BFB, DFTPP or ICP-MS tune analysis followed by ICAL or CCV
Mercury Analyzer	monthly each use	clean cell and change pump windings calibration using multi-point curve
Auto-pipettes	Monthly Annually	verification of accuracy verification of precision
Microwave	Quarterly Annually	power and temperature verification RPM verification
Ovens	annually daily	complete operations check by service technician (external) temperature verification
pH Meters	annually each use	complete operations check by service technician (external) calibration using certified buffers
Refrigerators (General Use)	daily	temperature verification
Refrigerators (Sample Management)	daily	temperature verification
Spectrophotometer	Semi-annually Semi-annually daily	cleaning & operations check by service technician (external) wavelength verification (external) continuing calibration verification (CCV) against initial calibration
TCLP Rotator	annually	RPM verification
Thermometers (Mercury/Alcohol)	annually	calibration against NIST traceable thermometer (internal)
Thermometers (digital)	Quarterly	calibration against NIST traceable thermometer (external)
Thermometer (NIST Traceable)	annually	calibration and certification of conformance (external)
Turbidity meter	annually each use	cleaning & operations check by service technician (external) calibration using formazin
Weights (Class S-1)	annually	service/calibration and certification of conformance (external)

20 Appendix E – Alpha Code of Ethics Agreement

Alpha Analytical, Inc.
Ethical Conduct and Data Integrity Agreement

A. ***Personal Pledge:*** I understand that I am charged with meeting the highest degree of ethical standards in performing all of my duties and responsibilities and pledge to only report data, test results and conclusions that are accurate, precise and of the highest quality.

B. ***Protocol Pledges:*** I agree to adhere to the following protocols and principles of ethical conduct in fulfilling my work assignments at Alpha:

1. All work assigned to me will be performed using Standard Operating Procedures (SOPs) that are based on EPA approved methods or Alpha methods.

2. I will only report results or data that match the actual results observed or measured.

3. I will not intentionally nor improperly manipulate or falsify data in any manner, including both sample and QC data. Furthermore, I will not modify data values unless the modification can be technically justified through a measurable analytical process or method acceptable to Alpha. All such modifications will be clearly and thoroughly documented in the appropriate laboratory notebooks and raw data and include my initials or signature and date.

4. I will not intentionally report dates and times of analyses that are not the actual dates and times the analyses were conducted.

5. I will not intentionally represent another individual’s work as my own or represent my work as someone else’s.

6. I will not make false statements to, or seek to otherwise deceive Alpha staff, leaders or customers. I will not, through acts of commission, omission, erasure or destruction, improperly report measurements, standards results, data, test results or conclusions.

C. ***Guardian Pledge:***

1. I will not condone any accidental or intentional reporting of unauthentic data by other Alpha staff and will immediately report such occurrences to my supervisor, the QA Officer, the Laboratory Technical Manager or corporate leadership. I understand that failure to report such occurrences may subject me to immediate discipline, including termination.

2. If a supervisor or other member of the Alpha leadership group requests me to engage in, or perform an activity that I feel is compromising data validity or quality, I have the right to not comply with the request and appeal this action through Alpha’s QA Officer, senior leadership or corporate officers, including the President of the company.

3. I understand that, if my job includes supervisory responsibilities, then I will not instruct, request or direct any subordinate to perform any laboratory practice that is unethical or improper. Also, I will not discourage, intimidate or inhibit a staff member who may

choose to appropriately appeal my supervisory instruction, request or directive that may be perceived to be improper, nor retaliate against those who do so.

D. ***Agreement Signature:*** I have read and fully understand all provisions of the *Alpha Analytical Ethical Conduct and Data Integrity Agreement*. I further realize and acknowledge my responsibility as an Alpha staff member to follow these standards. I clearly understand that adherence to these standards is a requirement of continued employment at Alpha.

____
Employee Signature

____
Printed Name

____
Date

Review Requirements

The *Ethical Conduct and Data Integrity Agreement* must be signed at the time of hire (or within 2 weeks of a staff member's receipt of this policy). Furthermore, each staff member will be required to review and sign this agreement every year. Such signature is a condition of continued employment at Alpha. Failure to comply with these requirements will result in immediate discharge from Alpha employment. This agreement is not an employment contract and does not modify in any manner the company's *Employment-at-Will* Agreement.

21 Appendix F – Floor Plan Westboro Facility

Fire Alarm Zones & Coverage

Zone 1	Manual Pull Stations, Heat & Smoke Detectors
Zone 2	Sprinklers, Tamper & Flow Switches
Zone 3	Duct Smoke Detectors
Zone 4	Smoke, Manual Pull Station, Fire suppression systems

Alpha Analytical
8 Walkup Drive
Westborough, MA

🟨	**Telephone/InterComm Control Room**
🟩	**Electrical Room**
P	**Pull Station**
(SD)	**Duct Smoke Detectors**
▭	**Fire Suppression Systems**
FD Key	**Fire Department secure key box**
RA	**Roof Access Point (internal)**
◎	**Fire Hydrant**
⚡	**Emergency Generator**
🏃	**Emergency Exit**
🟦	**Sprinkler/Water Room**
FDC	**Fire Dept Connection Location**
▣	**Electrical Main/ATS** (automatic transfer switch)
▮	**Electrical Panel**
▭	**Electrical Transformer**

22 Appendix G– Floor Plan Mansfield Facility

23 Appendix H – Job Titles and Requirements

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Technical Manager (Director) Organic Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 24 credit hours in Chemistry. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of organic analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Technical Manager (Director) Inorganic Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 16 credit hours in Chemistry. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of inorganic analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Technical Manager (Director) Microbiology Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 16 credit hours in the Biological Sciences, including at least one course having microbiology as a major component. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of microbiological analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Quality Assurance Officer	BS/BA in Chemistry, Biology, Environmental or related Science	Two (2) years Environmental Laboratory Experience	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Knowledgeable in Federal, State Programs (THE NELAC INSTITUTE (TNI) STANDARDS, etc.) 3. Able to develop QA/QC policies and certification requirements 4. Able to develop training programs for quality procedures 5. Documented training and/or experience in QA and QA procedures 6. Knowledge of safe laboratory practices and emergency protocols

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Laboratory Coordinator	High School Diploma; Associates or BS/BA in Chemistry, Biology or Environmental or related Science preferred	1 year +	1. Knowledge of safe laboratory practices and emergency protocols 2. Proficient in all methods and SOP's within their department 3. Experience with and understanding of LIMS 4. Proven ability to meet TAT (turnaround times)
Quality Systems Specialist	BS/BA Chemistry	2 years +	1. General knowledge of laboratory methods 2. Experience with and understanding of LIMS 3. Strong attention to detail 4. Strong oral/written communication and organizational skills 5. Knowledge of QA/QC policies and certification requirements
EH&S Coordinator	High School or Equivalent	2 years +	1. General knowledge of lab operations 2. Detailed knowledge of safe lab practices and emergency protocols 3. Hazardous Waste Management and RCRA Regulation Training 4. DOT Hazardous Materials Regulations Training 5. OSHA Compliance Training 6. Able to develop and deliver new hire and ongoing safety training programs
Lab Technician I	HS or Equivalent	0-1 years. 1+ years preferred.	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Familiarity with standard and reagent preparation 4. Knowledgeable in using volumetric pipettes and glassware 5. Strong oral/written communication and organizational skills
Lab Technician II	HS or Equivalent	2-4 years	1. All skills of Lab Technician I 2. Trained in majority of technician skills relative to department
Lab Technician III	HS or Equivalent	5 years +	1. All skills of Lab Technician II 2. Experienced in training staff
Lab Technician/Chemist I	BS/BA in Chemistry, Biology, Environmental or related Science	0-1 years	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Familiarity with standard and reagent preparation 4. Knowledgeable in using volumetric pipettes and glassware 5. Strong oral/written communication and organizational skills
Lab Technician/Chemist II	BS/BA in Chemistry, Biology, Environmental or related Science	2-4 years	1. All skills of Chemist I 2. Trained in majority of department methods

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Lab Technician/Chemist III	BS/BA in Chemistry, Biology, Environmental or related Science	5 years +	1. All skills of Chemist II 2. Experienced in training staff
Analyst I	HS or Equivalent	0-1 years	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Experienced with sample handling, preparation and/or extraction
Analyst II	HS or Equivalent	2-4 years	1. All skills of Analyst I 2. Experienced in machine operation, maintenance and troubleshooting
Analyst III	HS or Equivalent	5 years +	1. All skills of Analyst II 2. Experienced in data review and reporting 3. Experienced in training staff
Analytical Chemist I	BS/BA in Chemistry, Biology, Environmental or related Science	6 mos-1 year	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Experienced with sample handling, preparation and/or extraction
Analytical Chemist II	BS/BA in Chemistry, Biology, Environmental or related Science	2-4 years	1. All skills of Analytical Chemist I 2. Experienced in machine operation, maintenance and troubleshooting
Analytical Chemist III	BS/BA in Chemistry, Biology, or Environmental or related Science	5 years +	1. All skills of Analytical Chemist II 2. Experienced in data review and reporting 3. Experienced in training staff
Data Deliverable Specialist I	HS Diploma, BS/BA or Associates preferred	0-1 years	1. Introductory knowledge of laboratory methods 2.Able to follow direction and Standard Operating Procedures (SOP's) 3. Working knowledge of Adobe Acrobat, Microsoft Word, Excel 4. Good writing and typing skills
Data Deliverable Specialist II	HS Diploma, BS/BA or Associates preferred	2-4 years	1. All skills of Data Deliverable Specialist I 2. General knowledge of laboratory methods 3. Understanding of data review/ data reporting process 4. Experience with and understanding of LIMS and electronic data deliverables

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Data Deliverable Specialist III	HS Diploma, BS/BA or Associates preferred	5 years +	1. All skills of Data Deliverable Specialist II 2. Intermediate/advanced knowledge of laboratory methods 3. Able to perform report review 4. Experience with and understanding of LIMS and electronic data deliverables 5. Able to initiate re-work where necessary
Laboratory Intern	2 Semesters of Chemistry, Biology or Environmental Science	None; Lab work study experience preferred	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures

KEY

* Internal terms only. Full title would have "Environmental Laboratory" and specific department preceding it.

** Substitutions: Equivalent knowledge may be substituted for a degree in some instances.

*** Not meant to be an exhaustive list of skill requirements. For full list of skills consult the "Laboratory Skills" list. Actual Job Duties and Responsibilities can be found within job descriptions for each position.

24 Appendix I – Standard Operating Procedures

WESTBORO SOP #	Title
1728	Waste Management and Disposal
1730	Balance Calibration Check
1733	Thermometer Calibration
1735	Analytical Guidelines for Method Validation
1737	Inorganics Glassware Cleaning and Handling
1738	Water Quality Monitoring
1745	Reagent, Solvent and Standard Control
1948	Separatory Funnel Liquid-Liquid Extraction – EPA 3510C
1953	Organic Extraction Glassware Cleaning & Handling
1954	Soxhlet Extraction – EPA 3540C
1955	Sulfur Cleanup – EPA 3660A
1956	Oil and Waste Dilution – EPA 3580A
1959	Microwave Extraction – EPA 3546
1960	Sulfuric Acid Cleanup – EPA 3665A
1962	Florisil Cleanup
1963	Fractionation Cleanup
1964	Preparation of Samples for Chlorinated Herbicides
2022	Volatile Organic Compounds – EPA 624
2107	Volatile Organic Compounds – EPA 524.2
2108	Volatile Organic Compounds – EPA 8260C
2109	Polynuclear Aromatic Hydrocarbons (PAHs) by SIM – EPA 8270D (modified)
2110	Semivolatile Organics by GC/MS – EPA 625
2111	Semivolatile Organics by GC/MS – EPA 8270D
2112	TCLP/SPLP Extraction - Volatile Organics SW-846 Method 1311/1312
2113	EDB & DBCP in Water by Microextraction & Gas Chromatography – EPA 504.1, 8011
2116	Organochlorine Pesticides by Capillary Column GC – EPA 8081B
2119	Extractable Petroleum Hydrocarbons – MADEP
2120	Volatile Petroleum Hydrocarbons – MADEP
2122	Organochlorine Pesticides & PCBs by Capillary Column GC – EPA 608
2123	Polychlorinated Biphenyls in Oil – EPA 600/4-81-045
2125	TPH-Diesel Range Organics, Maine 4.1.25, EPA 8015C (Modified)
2126	TPH- Gasoline Range Organics, Maine 4.2.17, EPA 8015C (Modified)
2127	CT-ETPH
2128	Herbicides by 8151A

WESTBORO SOP #	**Title**
2129	PCBs by Capillary Column Gas Chromatography - EPA 8082A
2131	New Jersey EPH Method
2133	TCLP Extraction Metals and Semi-Volatile Organics – SW-846 Method 1311
2135	SPLP Extraction Inorganics and Semivolatile Organics, EPA 1312
2161	Fecal Coliform by Membrane Filtration – SM 9222D
2163	Fecal Coliform by Multiple Tube Fermentation – SM 9221E
2191	Heterotrophic Plate Count – SM 9215B
2192	Total Coliform/E.Coli – Presence/Absence (Colilert) – SM 9223B
2193	Total Coliform by Membrane Filtration – SM 9222B
2194	Total Coliform by Multiple Tube Fermentation – SM 9221B
2195	Chlorophyll A – SM 10200H
2196	E. Coli – Membrane Filtration
2197	Chlorophyll A – EPA 446
2198	Air Density Monitoring
2199	Inhibitory Residue Test
2200	Enterococcus – MF
2201	Total Coliform, E.Coli & Enterococcus by Quantification Methods (Quanti Tray)
2202	pH, Liquid Samples
2203	pH, Soil & Waste Samples
2204	Hexavalent Chromium
2205	Biological Oxygen Demand
2206	Ammonia Nitrogen
2207	Total Kjeldahl Nitrogen
2208	Chemical Oxygen Demand
2209	Oil & Grease by n-Hexane Extraction Method & Gravimetry
2210	Cyanide, Total
2211	Phenol, Total
2212	Sulfate, Turbidimetric Method
2213	Alkalinity, Titration Method –SM 2320B
2214	Determination of Inorganic Anions by Ion Chromatography – EPA 300.0
2215	Total Organic Carbon/Dissolved Organic Carbon
2216	Chloride – SM 4500Cl-E, EPA 9251
2217	Nitrate, Nitrite and Nitrate/Nitrite Nitrogen – EPA 353.2, SM 4500NO_3-F
2218	Total Solids (Dried @ 103-105^o) and TVS – SM 2540B, SM 2540E
2219	Total Dissolved Solids – SM 2540C
2220	Total Suspended Solids – SM 2540D
2221	Total Sulfide – SM 4500S2-AD, EPA 9030B
2222	MBAS, Anionic Surfactants – SM 5540C

WESTBORO SOP #	**Title**
2223	Fluoride, Electrode Method – SM 4500F-BC
2224	Turbidity, Nephelometric Method – EPA 180.1, SM 2130B
2225	Orthophosphate, Colorimetric Single Reagent Method – SM 4500P-E
2226	Total Phosphorous, Colorimetric Combined Reagent Method – SM 4500P-E
2227	Flashpoint – EPA 1010
2228	Reactivity – EPA Chapter 7.3
2229	Total Solids (Dried @ 103-105^{o}) – SM 2540G
2230	Specific Conductance and Salinity
2231	True and Apparent Color, Visual Comparison Method
2232	Acidity, Titration Method
2233	Determination of Formaldehyde by HPLC, EPA 8315A
2234	Sulfite, Iodometric
2235	Ferrous Iron
2236	Residual Chlorine
2237	ORP
2238	Ignitability of Solids EPA 1030
2239	Physiologically Available Cyanide (PAC)
2240	Total Settleable Solids SM 2540 F
2241	Fixed and Volatile Solids in Solid and Semisolid Samples – SM 2540G
2242	Tannin & Lignin
2243	Nitrite - Manual Colorimetric Method
2244	Paint Filter Liquids Test
2245	Odor, Threshold Odor Test
2249	Dissolved Oxygen
2251	Perchlorate by IC/MS/MS
3743	Free Cyanide
9177	Total Phenol - SEAL Method
9733	Oil & Grease and TPH in Soil
10807	Percent Organic Matter in Soil
12838	Buchi Concentration
17972	Extractable Organic Halides (EOX)
18236	Chloropicrin and Carbon Tetrachloride by EPA 8011
19332	DI Water Extraction ASTM D3987

MANSFIELD SOP #	**Title**
1753	Glassware Cleaning
1754	Balance Calibration
1755	Pipette Checks
1796	Sample Management - Forensics
1797	Haz Waste
1816	Reagent Solvent Standard Control
2134	Hot Block Digestion for Aqueous Samples EPA 3005A
2137	ICP-MS EPA 6020A
2138	Mercury Aqueous 7470A
2139	Mercury Soil 7471B
2140	AVS SEM
2141	Hydride Generation
2142	Mercury Aqueous 1631E
2143	Mercury Soil 7474
2148	Metals Soil Digestion 3050
2150	Metals Microwave 3015
2151	Metals Acid Digestion 3020
2152	Seawater Extraction of Metals
2154	TCLP 1311
2155	EPA 8270D
2157	PAH by SIM
2158	EPA 8081B
2160	EPA 8082A Aroclors/Congeners by GC and TO-10A
2162	Pesticides/PCB Aroclors/Congeners by GC/MS SIM
2164	1,4-Dioxane GC/MS SIM
2165	Separatory Funnel Extraction EPA 3510C
2166	Tissue Prep
2167	GPC
2168	Sulfur Cleanup 3660
2169	Sulfuric Acid Cleanup 3665
2170	Silica Gel Cleanup
2171	% Lipids
2172	Microscale Solvent Extraction EPA 3570
2173	Soxhlet Extraction EPA 3540C
2174	Soxhlet Extraction of PUFs
2175	% Total Solids
2182	TOC by Lloyd Kahn
2183	Particle Size Determination
2184	Particulates in Air PM-10

MANSFIELD SOP #	**Title**
2186	TO-15
2187	APH
2188	Air PIANO
2189	Dissolved Gases
2190	Can Cleaning
2246	TPH and SHC
2247	Alkylated PAH
2248	Organic Lead
2252	Fixed Gases
2253	TO-11A
2255	PIANO Volatiles
2256	Ethanol in Oil
2257	Whole Oil Analysis
2259	Density Determination of Oils
2260	Alumina Cleanup
2261	Shaker Table
2263	Gravimetric Determination
2264	Tissue Extraction
2265	Organic Waste Dilution
2267	Client SOP: SGC - Manual Method
2268	Client SOP: DCM Extractable Method
4246	PAHs by SPME
6398	TO-17
6438	Mercury in Sorbent Tubes by CVAA
7900	Mercury 1631E Using Cetac-M-8000 Analyzer
9077	Porewater Generation
9480	EPA-TO-12
12863	EPA 8270D GC/MS Full Scan TO-13A
13091	HPAH
13406	Particulate Organic Carbon
14500	Lead in Particulate Matter
17452	TOC by EPA 9060A
17456	Moisture, Ash and Organic Matter
18086	Total Suspended Solids (TSS) SM 2540D
17829	Specific Gravity of Soil
17830	Liquid Limit, Plastic Limit and Plasticity Index of Soils
17940	1,4-Dioxane in Drinking Water by EPA 522
18705	PCB Congeners by GC/MS-SIM EPA 8270D
18710	Trace Elements in Waters and Wastes by ICP-MS EPA 200.8

MANSFIELD SOP #	Title
18711	Metals by ICP EPA 200.7
18714	Metals by ICP EPA 6010C
18715	Mercury in Water (CVAA) EPA 245.1
18716	Hot Block Digestion for Aqueous Samples EPA 3005A
18717	Microwave Assisted Acid Digestion of TCLP Extracts EPA 3015
18718	Microwave Assisted Acid Digestion for Metals EPA 3015A/3051A
18817	Alcohols by FID- Aqueous Direct Injection EPA 8015D
19625	Glycols by GC-FID EPA 8015D
19971	Air Drying Samples for PCBs and Metals Analysis
19978	Density of Soil
22132	Data Review – Ohio VAP
23511	PFAS by LC/MS/MS by EPA 537
23528	PFAS by LC/MS/MS Isotope Dilution by EPA 537(M)
24454	Acetonitrile Extraction for Unknown Compounds via GCFID

CORPORATE SOP #	Title
1559	Sample Receipt and Login
1560	Sample Custody and Tracking
1561	Bottle Order Preparation
1562	Computer System Backup/Control
1563	Computer and Network Security
1564	Software Validation and Control
1565	Training Program
1566	Report Generation and Approval
1567	Organics Data Deliverable Package Review
1722	Customer Inquiry and Complaint Procedures
1723	Customer Service
1724	Quote/Contract Procedure
1725	Project Communication Form Generation
1726	Procedure
1727	Accounts Payable Invoice Processing
1729	Document Control
1731	Manual Integration and Compound Rejection
1732	DL LOD LOQ Generation
1734	Control Limit Generation
1736	Corrective and Preventative Actions
1739	Demonstration of Capability (DOC) Generation
1740	Internal Audit Procedure

CORPORATE SOP #	Title
1741	Data Review – Organics
1742	Calculating Measurement Uncertainty
1743	Annual Management Review
1744	Sample Compositing Procedure
1746	Nonconformance Planning/Procedures
1747	Temperature Datalogger Operation
2274	Data Validation Package
17553	Lab Supply Transfer Procedure
18821	Weights Verification
18909	PT Corrective and Preventive Action Process

Attachment C

Alpha Analytical 1,4-Dioxane Analyses Procedures

1,4-Dioxane

By Gas Chromatography / Mass Spectrometry in Selected Ion Mode (GC/MS-SIM) with Isotope Dilution Modification

References:

Method 8270D, Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 4, February 2007, Test Methods for Evaluating Solid Waste, SW-846.

EPA 8000C, SW-846,Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846. Update III, March 2003.

1,4-Dioxane Analytical Notes, Appendix II-B-4, WSC-CAM-II-B, Revision 1, July 2010, (Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup).

1. Scope and Application

Matrices: Aqueous, soil/sediment and non-aqueous waste matrices

Definitions: Refer to Alpha Analytical Quality Manual.

This method is applicable to the quantification of 1,4-Dioxane extracted from aqueous samples in methylene chloride and analyzed by GC/MS-SIM. The extraction method is listed below and should be referenced for more details. Detection limits will vary with instrument calibration range, and volume of sample analyzed. 1,4-Dioxane detected over the calibration ranges of the instrument it is being analyzed on will be diluted and re-analyzed for accurate quantification.

The following extraction method applies:

- *Extraction of Water Samples by Separatory Funnel* (SOP 2165)
- *Microscale Solvent Extraction (MSE)* (SOP 2172)
- *Organic Waste Dilution Extraction* (SOP 2265)

The data report packages present the documentation of any method modification related to the samples tested. Depending upon the nature of the modification and the extent of intended use, the laboratory may be required to demonstrate that the modifications will produce equivalent results for the matrix. Approval of all method modifications is by one or more of the following laboratory personnel before performing the modification: Area Supervisor, Department Supervisor, Laboratory Director, or Quality Assurance Officer.

This method is restricted to use by or under the supervision of analysts experienced in the operation of the GC/MS-SIM and in the interpretation of GC/MS-SIM data. Each analyst must demonstrate the ability to generate acceptable results with this method by performing an initial demonstration of capability.

2. Summary of Method

Generally 1000 or 500ml of aqueous samples are serially extracted with methylene chloride in a 2 Liter Separatory Funnel (Method 3510) at a neutral pH. The extract is concentrated in MeCl2 to a 10 or 5ml final volume respectively depending on the volume of sample extracted. Soil/sediment samples are extracted by Microscale Solvent Extraction (MSE Method 3570). Approximately 5g of sample is extracted and concentrated to a 4mL final volume. Non-aqueous waste samples are extracted by Organic Waste Dilution Extraction (Method 3580). Approximately 1g is diluted to 10mL final volume.

Analytes are introduced into the GC/MS using a large volume injector and injecting 2uL- 3ul of the calibration standards, quality control samples, and sample extracts into the GC equipped with a narrow-bore capillary column. The GC column is temperature programmed to separate the analytes, which are then detected with a mass spectrometer (MS) in selective ion mode. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of the calibration standards. Concentrations are determined using mean relative response factors from a multi-level calibration curve. Response factors for target analytes and surrogate compounds are determined relative to the internal standards.

Isotope dilution quantification is achieved by spiking 1,4-Dioxane-d8 at extraction which is then in turn used as both an internal standard (IS) and surrogate. For quantification, the 1,4-Dioxane-d8 IS quantifies 1,4-Dioxane in samples. An additional IS added prior to analysis, 1,4-Dichlorobenzene-d4, quantifies 1,4-Dioxane-d8 as a surrogate.

2.1 Method Modifications from Reference

SIM option with Isotope dilution is utilized to increase sensitivity for this analyte. Note that while this method may be used for the evaluation of 1,4-Dioxane in soil/sediment samples, the MA DEP CAM does not approve of this method for determining presumptive certainty for MA DEP cleanup sites. Method 8260 should be employed in these cases.

3. Reporting Limits

Concentrations for 1,4-Dioxane can be detected in water samples in the range of 150ng/L to 100,000ng/L. Soil/sediment samples can be detected in the range of 8ug/Kg to 8,000ug/Kg.

4. Interferences

4.1 Phthalate esters can be a major source of contamination if any material containing plasticizers (phthalates) comes in contact with the sample during the extraction process. Use of plastic or any material containing plasticizers (phthalates) should be avoided during extraction or analysis.

4.2 The injection port of the gas chromatograph can become contaminated with high boiling compounds resulting in the loss of sensitivity. It may be necessary to replace the injection port liner routinely to prevent this loss of sensitivity. Clipping off approximately four inches of the column at the injection end may also increase sensitivity. Low instrument response can be detected during the daily tuning procedure by including pentachlorophenol and benzidine in the daily tuning mix.

4.3 Raw GC/MS data from all blanks, samples, and spikes must be evaluated for interferences or carryover. Contamination by carryover can occur whenever high-concentration and low-concentration samples are sequentially analyzed.

4.4 Solvents, reagents and glassware may introduce interferences. These must be demonstrated to be free of interferences by the analysis of a method blank. See the SOP *Reagent, Solvent and Standard Control* (G-008) and *Laboratory Glassware Cleaning* (G-002), for additional details.

4.5 It should be noted that there are some chromatographic consequences observed due to the acetone used in the MSE extraction process. This is characterized by a shift in retention time for 1,4-Dioxane and the 1,4-Dioxane-d8 surrogate (~0.4minutes), as well as the presence of a large peak (likely acetone) in all chromatograms.

5. Health and Safety

The toxicity or carcinogenicity of each reagent and standard used in this method is not fully established; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. A reference file of material safety data sheets is available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available in the Chemical Hygiene Plan.

All personnel handling environmental samples known to contain or to have been in contact with municipal waste must follow safety practices for handling known disease causative agents.

6. Sample Collection, Preservation, Shipping and Handling

6.1 Sample Collection

Solid samples; A minimum of 100grams of sample must be collected in a glass jar with a Teflon lined screw cap.

Water samples: A minimum of 0.5 to 2 liters of sample must be collected in amber glass bottles.

6.2 Sample Preservation

Solid samples: The sample must be refrigerated and maintained at 4±2 °C until extraction and analysis. Sediment samples can be frozen at -20±5 °C until extraction to extend hold time. The extracts must be refrigerated and maintained at 4±2 °C until analysis.

Water samples: The samples must not be preserved except by refrigeration at 4±2 °C until extraction and analysis. The extracts must be refrigerated and maintained at 4±2 °C until analysis.

Non-aqueous waste samples: Concentrated sample extracts must be stored in contaminant-free containers and preserved in a refrigerator when not used for more than four hours.

6.3 Sample Shipping

No special shipping requirements.

6.4 Sample Handling

Solid samples: All solid samples must be extracted within 14 days from the date of collection. Frozen sample hold times are monitored up to 14 days from the date removed from freezer. The extracts must be refrigerated and maintained at 4±2 °C until analysis. Sample extracts must be analyzed within 40 days from date of extraction.

Water samples: All water samples must be extracted within 7 days from the date of collection. Sample extracts must be analyzed within 40 days from date of extraction.

Non-aqueous waste samples: Hold times do not apply to neat oils/NAPL/product samples.

7. Equipment and Supplies

7.1 Gas chromatograph – Programmable, heating range from 40C to 350C; splitless-type inlet system, (Hewlett Packard 6890N Series II or similar); mass selective detector (Hewlett Packard 5973, or similar); automatic injector (Hewlett Packard 7683B or similar).

7.2 Chromatography Column – Fused silica capillary column, 0.25mm ID x 60m length, 0.25um film thickness RTX-5, Restek Corporation, 5% diphenyl-95% dimethyl polysiloxane, Fused silica capillary column, 0.18mm ID x 60m length, 0.18um film thickness RTX-PCB, Restek Corporation, Fused silica capillary column, 0.25mm ID x 30m length, .25um film thickness (Zebron ZB-SemiVolatiles, Phenomenex Corporation, 5% Polysilarylene - 95% Polydimethylsiloxane) , or equivalent.

7.3 Gerstel Large Volume Injection System – Temperature programmable range from 0C to 350C; pressure programmable; capable of split or splitless injection; Injection volumes range from 1 to 50uL and Cryo cooling availability to allow for cold injections.

7.4 Agilent Split/Splitless injector System

7.5 Data Acquisition System - Computerized system for collecting, storing, and processing detector output (Hewlett Packard Enviroquant target software) or equivalent.

7.6 Gases - BIP Ultra high purity helium (99.9995%); Compressed nitrogen for N-Evap. Carbon dioxide (siphon type) for Gerstel.

7.7 Syringes – 10uL to 1.0mL

7.8 Vials- including 2ml, 4ml, 10ml, 40ml and other sizes as necessary.

7.9 Hamilton Gas tight Syringes - varying sizes

7.10 Gerstel Single baffle injection port liners- packed lightly with glass wool.

7.11 GC Injection Port Liner: Phenomenex Direct Connect Top Hole

7.12 Class A Volumetric flasks: Including 10ml, 20 ml, 50 ml, 100ml and other sizes as necessary

8. Reagents and Standards

Use reagent grade chemicals for all reagents. Deionized (DI) water is ASTM Type II laboratory reagent grade water.

8.1 Solvents: All solvent expirations determined as indicated by manufacturer guidelines

8.1.1 Methylene Chloride, ACS approved, Pesticide grade, see SOP *Reagent, Solvent and Standard Control* (SOP 1816) for additional details regarding solvent purity. Used to extract samples and prepare instrument/analytical standards.

8.1.2 Acetone, ACS approved, Pesticide grade, see SOP *Reagent, Solvent and Standard Control* (SOP 1816) for additional details regarding solvent purity. This water soluble solvent is used for surrogate and LCS/MS preparation.

8.1.3 Methanol, ACS approved, Pesticide grade, *Reagent, Solvent and Standard Control SOP* (SOP 1816) for additional details regarding solvent purity.

8.2 Analytical Standards: Standards should be stored at –10C or less, away from light when not in use. They should be discarded after 1 year unless the vendor expiration date states otherwise or, if degradation is observed. Stock standards are given a 1 year expiration from the preparation date or the expiration of the primary vendor solution, whichever occurs first. Working standards are given six month expiration from the preparation date or the expiration of the primary solution whichever occurs first. All analytical standards are made up in Methylene Chloride. All prep standards are made up in Acetone.

8.3 Surrogate/Internal Standard (IS):

8.3.1 A 1,4-Dioxane-d8 Primary neat standard is commercially obtained from Cambridge Isotope (Cat #DLM-28-10 or equivalent). A stock surrogate/internal standard solution is prepared by weighing 0.1 g of the primary neat standard and diluting volumetrically in 10 mls methylene chloride (or equivalent preparation) to obtain a concentration of ~10,000 ug/ml.

8.3.2 From this stock (Section 8.3.1), the Surrogate spiking solution is made by a serial dilution (1 ml diluted up in a 50 ml volumetric flask, followed by a 0.5 ml of this solution diluted up in a 20 ml volumetric flask or equivalent preparations) in Acetone to achieve a concentration of 5 ug/mL. Of this surrogate solution, 1 mL is spiked into each water sample, and 0.4 mL is spiked into each soil/sediment sample for a surrogate/IS concentration of 500 ng/mL in samples.

8.3.3 The initial stock solution (Section 8.3.1) is diluted volumetrically (250 uL diluted up in a 100 ml volumetric flask or equivalent preparation) in methylene chloride to obtain an IS solution at a concentration of 25 ug/ml for the spiking of only the analytical standards (i.e. calibration curve and continuing calibration).

8.4 Internal Standard: 1,4-Dichlorobenzene-d4 commercially obtained from Restek (Cat #31206 or equivalent). This primary solution is at 2000 ug/mL and contains other Semivolatile Internal standards, however this method only utilizes the 1,4-Dichlorobenzene-d4. This solution is diluted volumetrically (250 uL diluted up in a 50 ml volumetric flask or equivalent preparation) in methylene chloride to obtain a SIM-IS solution at a concentration of 25 ug/ml. All samples and standards are spiked with 20uL of internal standard before analysis. This IS is intended to be used for both quantitation (of the surrogate 1,4-Dioxane-d8) and the establishment of relative retention times.

8.5 Matrix Spike/Laboratory Control Spike Solutions (MS/LCS) – 1,4-Dioxane primary spike solution is commercially obtained from Restek at 2000 ug/mL (Cat #31853 or equivalent). To prepare the working spike solution, syringe measure 0.25 mL of stock and bring to 100 mL in acetone (or equivalent preparation) for a 5 ug/mL concentration. From this solution, 1 mL is spiked into each MS/LCS QC water sample and 0.4 mL is spiked into each soil/sediment sample. The final concentration in a 10 mL water extract and in a 4 mL soil/sediment sample will be 500 ng/mL.

8.6 Stock Calibration Standards are prepared from a primary standard commercially obtained from Restek at a concentration of 2000 ug/ml (Cat #31853 or equivalent). The primary standard is used to appropriately prepare a stock standard at a concentration of 10,000 ng/ml (125 uL diluted up in a 25 ml volumetric flask or equivalent preparation). The stock solution is generally made up in 25 ml increments. The stock solution then doubles as a high level standard for the calibration curve, as well as a stock solution by which to serially dilute to prepare the other calibration standards. Except for the high level standard, the calibration curve levels are generally each made at 10 ml. Refer to the table below for example calibration curve levels. All the calibration curve levels, once aliquoted at 1 ml increments for injection, have 20 ul of 1,4 Dichlorobenzene IS (SIM IS – Section 8.4) added as well as 20 uL of 1,4 Dioxane-d8 IS/Surrogate (Section 8.3.3) added.

8.7 Curve Preparation:
The following 7 levels are the possible levels that can be analyzed for an ICAL.

Calibration Level	*Volume of Stock Std Added Into 10 ml of DCM*
Level 1 (10 ng/mL)	10 uL
Level 2 (50 ng/mL)	50 uL
Level 3 (100 ng/mL)	100 uL
Level 4 (500 ng/mL)	500 uL
Level 5 (1000 ng/mL) - CCV	1.0 mL
Level 6 (5000 ng/mL)	5.0 mL
Level 7 (10,000 ng/mL)	NA

8.8 The Independent Check Verification Standard is prepared from a Primary standard solution commercially obtained from Ultra (Cat NV-150-1 or equivalent) at a concentration of 100 ug/ml. The primary solution is diluted volumetrically (100 ul diluted up in a 10 ml volumetric flask or equivalent preparation) in methylene chloride to create a working ICV solution at a concentration of 1000 ng/ml. The working ICV solution is aliquoted into 1 ml increments as needed to inject with each calibration curve. Additionally, 20 ul of SIM IS (Section 8.4) and 20 ul of 1,4-Dioxane-d8 IS (Section 8.3.3) is added into the 1 ml aliquot.

9. Quality Control

The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

9.1 Blank(s)

A method blank must be prepared once per every 20 samples or per extraction batch, whichever is more frequent.

Organic compounds of interest must not be detectable in the method blank at a concentration greater than the reporting limit.

Corrective Action: For contaminated blanks, all efforts must be made to identify and eliminate the source of contamination. The presence of analytes at concentrations at or above the reporting limit will warrant application of a “B” qualifier to that target compound(s) on all associated report forms, and perhaps re-extraction of all associated samples. Re-extraction of the method blank and all associated samples must be performed until the blank is in control. Surrogate recoveries must meet the QC limits for the method blank. Re-extraction must be initiated immediately so that minimum time is wasted before re-extraction can occur - if at all possible-this re-extraction should take place within holding time. Re-extraction *corrective action* that would exceed the sample holding time criteria should be discussed with the Organics Supervisor, Project Manager, client, and Operations Manager prior to implementation. Exceptions may be made with approval of the Organics Section Supervisor if the samples associated with an out of control method blank are non-detect for the affected compound(s) or if the concentration of the affected compound(s)in the sample is greater than 10x the blank level. In such cases, the sample results are accepted without corrective action for the high method blank result. The client must be notified, via the project narrative, of any method blank non-compliance associated with sample results

9.2 Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

Laboratory control samples (LCS/LCSD) must be prepared once per every 20 samples or per extraction batch, whichever is more frequent, and spiked with 1,4 Dioxane spike solution (Section 8.5) and surrogate (Section 8.3.2) before extraction. The IS (Section 8.4) is spiked after extraction and before the analysis.

Acceptable Recovery limits are 40% - 140%. The relative percent difference (RPD) between the LCS/LCSD is 30%. Limits are adapted from MCP protocol and are generally monitored and documented in-house through control charts.

Corrective Action: Analysis must be repeated if an analytical error is suspected. If the LCS/LCSD recoveries and/or %RPD are still out of control, re-extract and re-analyze the LCS/LCSD and all associated samples. Samples cannot be reported until an acceptable LCS is obtained.

9.3 Initial Calibration Verification (ICV)

Refer to Section 10.2.

9.4 Continuing Calibration Verification (CCV)

Refer to Section 10.4.

9.5 Matrix Spike / Matrix Spike Duplicate (MS/MSD)

Matrix spike / matrix spike duplicate (MS/MSD) samples are performed upon project specifications. They are performed per client request. The sample is spiked with 1,4-Dioxane spike solution (Section 8.5) and surrogate (Section 8.3.2) before extraction. The IS (Section 8.4) is spiked after extraction and before the analysis. The recovery limits are 40% - 140% and the RPD limit is 30%. Limits are adapted from MCP protocol and are generally monitored and documented in-house through control charts.

Corrective Action: Analysis must be repeated if an analytical error is suspected. If the % recovery and/or %RPD still exceeds the control limits and the LCS/LCSD is compliant; include a project narrative with the results to client noting that there may be potential matrix effects on the accuracy or precision of the reported results as evidenced by MS/MSD recoveries and/or %RPD outside of QC limits.

9.6 Laboratory Duplicate

Duplicate analyses are performed upon client and/or workplan request. *For Organic analyses, the matrix duplicate is usually in the form of the matrix spike duplicate, see Section 9.5.*

Acceptable relative percent difference (RPD) of duplicates is 30%. Acceptance criterion is not applicable to sample concentrations less than 5 times the reporting limit. Calculate the RPD as follows:

$$RPD = \frac{R1 - R2}{\frac{[R1 + R2]}{2}} \times 100$$

where:

R1 = sample Replicate #1
R2 = sample Replicate #2

The RPD limits should be monitored and documented in-house through control charts and updated as needed.

Corrective Action: Analysis must be repeated if an analytical error is suspected.. If the % RPD still exceeds the control limits; include a project narrative with the results to client noting that there may be potential matrix effects on the precision of the reported results as evidenced by the matrix duplicate % RPD exceedence.

9.7 Method-specific Quality Control Samples

9.7.1 Surrogates

Surrogate spikes (Section 8.3.2 and Section 8.3.3) must be added to QC and field samples to evaluate the extraction method performance.

The acceptable surrogate recovery limits are 15% - 110%. Limits are adapted from MCP protocol.

Corrective Action: Analysis must be repeated if an analytical error is suspected. If the % recovery still exceeds the control limits the sample must be re-extracted and re-analyzed to confirm the sample matrix. If *obvious* matrix interferences are noted, consultation with the Organic Supervisor or Operations Manager may be in order to confirm the need for sample re-extraction. If no re-extraction occurs, the surrogate results and reasons for the decision not to re-extract must be discussed in the project narrative to the client. Due to the isotope dilution nature of this method, the analyst must pay close attention to surrogate recoveries and areas as this recovery is then used to surrogate correct (as an Internal standard) the response of 1,4-Dioxane.

9.7.2 Internal Standards

Internal standards must be added to all sample extracts, QC samples and standards for quantitation purposes. For sample extracts, only the 1,4-Dichlorbenzene-d4 IS (SIM IS – Section 8.4) should be added since the extraction surrogate is then used as an Internal Standard upon analysis. However, all Calibration standards must be spiked with both 1,4-Dichlorobenzene-d4 as well as 1,4-Dioxane-d8 (Section 8.3.3). In the sample extracts the area counts for 1,4-Dioxane-d8 will vary based on the extraction, however the 1,4-Dichlorobenzene-d4 area counts should remain fairly constant. The 1,4-Dichlorobenzene-d4 internal standard should also remain constant with respect to the continuing calibration analyzed at the beginning of the run. Sample IS areas must be –50% to +100% of the Internal Standards in the Continuing Calibration – applies only to 1,4-Dichlorobenzene-d4. Additionally, the IS retention times should not differ more than 30 seconds from the Continuing Calibration.

Corrective Action: Analysis must be repeated once unless there are obvious samples matrix interferences, i.e., the sample extract was very colored and viscous, or there are obvious chromatographic interferences. If *obvious* matrix interferences are noted, consultation with the Organic Supervisor or Operations Manager may be in order to confirm the need for sample re-analysis or re-extraction.

9.8 Method Sequence

- Tune
- CCV
- Method Blank
- LCS
- LCSD
- Samples

10. Procedure

10.1 Equipment Set-up

10.1.1 The instrument used for the analysis is a HP 6890N Series gas chromatograph. The HP system is equipped with a Gerstel large volume injection system, and a 7683B-type autosampler or equivalent. The mass spectrometer is an HP 5973 or 5975 with the HP Enviroquant data system. The method is modified for selective ion monitoring. The table below lists the ions monitored in one SIM window. This method must only be set up and analyzed by an experienced mass spectrometrist.

Compound	*Primary Ion*	*Secondary Ion*
1,4-Dioxane	88	58, 43
1,4-Dioxane-d8	64	96
1,4-Dichlorobenzene-d4	152	115

10.1.2 The basic GC parameters are as follows for the Gerstel Large Volume Injection System:

Oven Equib Time: 0.10 min
Oven Max: 325
Initial Temp.: 45°C
Initial Time: 6.00 min

Level	Rate (°C/min)	Final Temp. (°C)	Final Time (min)
1	19.00	120	1.0
2	11.00	150	1.00
3	19.00	305	4.00

Final Time: 26.83

10.1.3 The basic injection port parameters are as follows for the Gerstel Large Volume Injection System:

“Splitless” mode
Initial Temp: 46 °C
Initial Time: 0.30 min
Ramp Rate: 300°/second
Final Temp: 300°C
Final Time: 30.0
Cryo: ON
Cryo Use temp: 25 °C
Cryo Timeout: 30.0 min
Cryo Fault: ON

Purge Flow: 25 ml/min
Purge Time: 2.50 min
Gas Saver: off
Gas: Helium

Mode: Constant Pressure
Average Velocity: 30cm/sec
Initial flow: 1.3 ml/min

10.1.4 The basic GC parameters are as follows for the Agilent Split/Splitless injector System:

Oven Equib Time: 0.20 min
Oven Max: 325°C
Initial Temp.: 30°C

Level	Rate (°C/min)	Final Temp. (°C)	Final Time (min)
1	0	30	2.00
2	5	50	0.00
3	50	300	2.00

Final Time: 13.00

10.1.5 The basic injection port parameters are as follows for the Agilent Split/Splitless injector System:

:

Mode: Splitless
Temperatuire: 200 °C
Flow: 1.0 mL/min
Velocity: 36.074 cm/sec
Septum Purge: 3mL/min
Purge Flow to Split Vent: 60 mL/min at 0.3 min

10.1.6 MS Acquisition Information:

Tune file: dftpp.u
Acquisition Mode: SIM
Solvent Delay: 7.70 min
MS Source temp: 280°C

10.1.7 Tuning

10.1.7.1 Before the analytical standards are analyzed the mass spectrometer must be adjusted to meet the proper ion criteria for DFTPP. This is demonstrated by injecting into the GC/MS system 1uL of a 50ug/mL DFTPP solution. After the analysis of the DFTPP, evaluate the tune as follows:

- Enter into the “Environmental Data Analysis” (off-line) screen.
- Go to “File” and select the tune data file.
- Go into “Tuner” and select “Eval DFTPP”, then select “AutoFind DFTPP to Screen,” to evaluate the tune file, based on the pre-set SW-846 criteria**.** The

software will evaluate the tune by selecting three scans of the DFTPP peak and will display the ion intensities on the screen. That is, one scan at the apex, one scan directly preceding the apex and one scan following the apex and averages them, then takes one background subtracted scan, 20 seconds before the beginning of the DFTPP peak. If the criteria below are met, repeat, select "AutoFind to Printer", for a hardcopy of the tune evaluation for the record.

If the "AutoFind" tune evaluation does not meet the criteria below, manual evaluation of the tune can be performed by attempting either of the options below:

- Blow up the DFTPP peak on the screen and select either one single scan at the apex of the peak, or a scan immediately preceding or following the apex. Go into "Tuner" and select "Evaluate DFTPP to Screen," or "Evaluate DFTPP to Printer," as described above, OR,
- Take the average of the scans across the entire peak. Go into "Tuner" and select "Evaluate DFTPP to Screen," or "Evaluate DFTPP to Printer," as described above.

10.1.7.2 The following DFTPP mass intensity criteria should be used.

DFTPP KEY MASSES AND ABUNDANCE CRITERIA

Mass	m/z Abundance criteria
51	10-80 percent of mass 198.
68	Less than 2 percent of mass 69.
70	Less than 2 percent of mass 69.
127	10-80 percent of mass 198.
197	Less than 2 percent of mass 198.
198	Base peak, or >50 percent of Mass 442.
199	5-9 percent of mass 198.
275	10-60 percent of mass 198.
365	Greater than 1 percent of mass 198.
441	Present but less than 24 percent of mass 442.
442	Base Peak, or > 50 percent of mass 198.
443	15-24 percent of mass 442.

10.1.8 Tune acceptance should be verified at the beginning of every 12 hour analytical shift. The DFTPP may be combined with the calibration verification standard as long as both tuning and calibration acceptance criteria are met.

10.2 Initial Calibration

10.2.1 After the DFTPP passes criteria, a set of multi-level calibration standards listed in Section 8.7 are analyzed, from low concentration to high. A minimum of five calibration levels are analyzed. The calibration standards are stored in amber vials in the standards freezer. The labeling convention allows each standard to have a unique identifier which distinguishes it from field samples. The naming convention used throughout the laboratory identifies the standard as semivolatile, hydrocarbon, pesticide/PCB or volatile. An example of this would be SW042407E, meaning it is a semivolatile (S) working (W) standard made on April 24, 2007 and that it was the fifth standard made that day. All certificates of analysis that are shipped with standards are filed with their receipt ID written on it to insure traceability.

10.2.2 Once the standards have been analyzed, they are reduced by the search software of the Enviroquant data system. Once all the components are identified, a linear curve is calculated for the components. The criteria for evaluation are as follows:

10.2.2.1 The average RF for each compound must be greater than 0.05.

10.2.2.2 The %RSD of each compound must not exceed 20%. If they do this may be an indication that the chromatographic system is too reactive for analysis to begin. This indicates the instrument may need maintenance.

10.2.2.3 Alternatively, a linear regression model may be employed, provided that the coefficient of determination (COD or r2) is $\geq$0.99. Otherwise, construct a nonlinear calibration of no more than a third order equation. Statistical considerations in developing a non-linear calibration model require more data than the more traditional linear approach. A quadratic (second order) model requires six standards, and a third order polynomial requires seven standards. In setting model parameters, do not force the line through the origin. The COD or r^2 must be greater than or equal to 0.99.

10.2.2.4 Once the calibration curve is reviewed, an Initial Calibration Checklist must be completed.

10.2.3 All samples and standards are spiked with Internal Standards (IS) before analysis. Refer to section 8.4 for specific internal standard spiking information. The IS is intended to be used for both quantitation and the establishment of relative retention times. Internal standard acceptance criteria can be found in Section 9.7.2.

10.2.4 Independent check standards (Section 8.8) from a separate source or different lot are analyzed after every initial calibration for evaluation against calibration standard solutions. The % Difference (%D) should not be greater than $\pm$30%.

10.3 Equipment Operation and Sample Processing

10.3.1 Tuning

A DFTPP standard must be analyzed and pass criteria before a continuing calibration verification standard or any samples are analyzed. The DFTPP may be combined with the calibration verification standard as long as both tuning and calibration acceptance criteria are met. A DFTPP tune standard must be analyzed before each 12 hour analytical shift. Please refer to Section 10.1.5 for tuning criteria and other information.

10.3.2 Daily Calibration

On a daily basis after the DFTPP has passed, a mid-level (usually 1000 ng/mL) continuing calibration standard which contains all of the analytes of interest is analyzed. The criteria for acceptance are:

10.3.2.1 All analytes must have response factors greater than 0.05.

10.3.2.2 The % D must be $\pm$20% D from the initial calibration.

10.3.3 Sample Analysis

10.3.3.1 The prep lab staff will transfer the samples to the instrument laboratory. The samples are generally brought to a 10 mL final volume for liquids or 4 ml for soil samples; 1 mL is transferred and the remaining sample volume is archived. One aliquot of each sample is then placed in the sample extract holding refrigerator located in the instrument laboratory.

10.3.3.2 All of the samples at 1 mL (including the batch QC samples) are spiked with 20 uL internal standard (see section 8.4 for specifics regarding the internal standard). The samples are shaken briefly after the internal standard is added to ensure mixing. A sample will need a dilution for target analytes that are over calibration.

10.3.3.3 After the daily tune and CCAL have passed criteria, the analyst places the samples onto the autosampler tray. (Generally, the samples will be analyzed in order of color (lightest to darkest.) with QC samples being analyzed first. The instrument sequence is typed into the HP Chemstation Software. Next run “Simulate Sequence” (also under the “Sequence” dropdown list) without clicking the “Overwrite Files” box. Compare the order of the vials on the instrument versus the sequence to confirm all the samples and standards are in the right places. Next click “Run Sequence” also under the HP Chemstation “Sequence” dropdown list.

10.3.3.4 After the samples have been analyzed, the data files from the MS are quantitated versus the proper quantitation method. The QCPRN1.MAC macro creates a form with which to easily check internal standard and surrogate criteria are met. The following should be reviewed initially:

10.3.3.4.1 Are all the surrogates within QC criteria? Please see Section 9.7.1 for surrogate information.

10.3.3.4.2 Is the internal standard- 1,4 Dichlorobenzene-d4, within 50-200% of the daily CCAL? If not, the samples should be checked for matrix interferences that may be causing these issues. The IS peaks should also be evaluated for peak splitting or incorrect integration by the software. A sample may not need to be reanalyzed if it can be determined (with guidance from a supervisor) that the QC is exceeded due to matrix interference.

10.3.3.4.3 Are all target analytes within calibration range? If not, the sample(s) should be diluted and re-analyzed. If a dilution is performed after the internal standard has already been added, it will be necessary to add additional IS in order to make up for the impact of the original IS added also being diluted. Conversely, if a sample has been over-diluted, it may need to be analyzed at less of a dilution to detect target analytes that may have been diluted out. Note: for this method, due to the isotope dilution, it is necessary to refer to area counts to determine if dilution is required. The area response for 1,4-Dioxane should be compared to the area of the highest level of the ICAL standard for that target. If the area of 1,4-Dioxane in the extract is greater than the area of 1,4-Dioxane in the Highest level of the Calibration Curve, then a dilution is necessary. The analyst **CAN NOT** use the concentration of 1,4-Dioxane found in the extract to determine if dilution is required because the concentration of 1,4-Dioxane in the sample is surrogate corrected in Chemstation based on the use of the extraction surrogate as an Internal Standard. Once it is determined based on the peak area that a sample requires a dilution, the analyst must pay attention to the concentration of IS in the dilution. Although the analyst will adjust the 1,4-Dichlorobenzene-d4 concentration by adding the appropriate amount of additional IS to the dilution, there is no way for the analyst to make up for the dilution of the extraction surrogate 1,4 dioxane-d8 (also used as internal standard). To account for this the analyst must change the concentration of the 1,4-Dioxane-d8 within the calibration table to a value which accounts for the dilution. (Example: If the analyst performs a 10x dilution then the concentration of 1,4-Dioxane–d8 must be changed within the ICAL to 50.) The analyst must ensure that only the diluted sample is calculated against this value and that the method is returned to the proper concentration once the analysis of the dilution is complete.

10.3.3.4.4 Are all analyses within 12 hour tune time? If a sample is analyzed outside tune time, it will need to be re-analyzed in another tune clock.

10.3.3.4.5 The sequence should also be printed out from Chemstation, initialed and dated, and placed in the logbook.

10.3.3.4.5.1 If anything in the initial review of the data indicates that there should be a re-analysis, the reason for re-analysis should be noted on the sequence.

10.3.3.4.5.2 Also, note the time the tune standard was analyzed, the time of the last sample analysis. If there are samples analyzed outside tune time, the time the last sample within tune time ran should be noted, as well as the last sample analyzed.

10.3.3.4.5.3 If a re-extract is required, the “Request for Repreparation/Reclean” book should be filled out and a photocopy of the appropriate page should be given to the Preparation Group leader or the Organics Section Head.

10.4 Continuing Calibration

Continuing Calibration Criteria is outlined in section 10.3.2

10.5 Preventive Maintenance

If performing any maintenance on any piece of equipment it must be documented in the *Instrument Maintenance Logbook* located in the laboratory specific to each instrument.

Daily

Injection port maintenance: Maintenance should be done when the daily CCAL starts to demonstrate degradation either by %D outliers or area responses <50% as compared to the ICAL areas. Several tune clocks may be injected before maintenance is needed. The type of samples analyzed will have an effect on how soon maintenance should be performed. Injection port maintenance should be done as needed. General maintenance includes replacing the single baffle liner packed lightly with glass wool, cutting about 2-4 inches off the head of the column, and replacing the septa. Refer to maintenance log for more specific information.

The Gerstel Injection port should be handled with care. The liners are quite thin. Do not force the Gerstel weldmen into place as the threads are soft metal and will cross thread. Always make sure the weldmen goes on straight. The Gerstel injection port does not require significant tightening of either the weldmen or column nut, tighten enough to seal but there is no need to crank down on it.

11. Data Evaluation, Calculations and Reporting

11.1 Qualitative Analysis

11.1.1 The qualitative identification of compounds determined by this method is based on retention time and on comparison of mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined as the two ions of greatest relative intensity, and are over 30% relative intensity. Compounds are identified when the following criteria are met.

11.1.2 The intensities of the characteristic ions of a compound must maximize in the same scan or within one scan of each other. A peak selected by the data system, based on the presence of target specific ions at a target specific retention time will be accepted as meeting these criteria.

11.1.3 The relative retention time of the sample component is within ± 0.06 RRT units of the RRT of the standard component.

11.1.4 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%.) The relative intensities are monitored daily. The relative intensities will be updated when they exceed established values from the reference spectrum.

11.1.5 Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

11.1.6 Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e. a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important. Selective ion monitoring eliminates this potential.

11.2 Quantitative Analysis

11.2.1 Response factors and % RSD to evaluate Initial Calibration acceptability.

Calculate RF by:

$$RF = \frac{area_{cmp}}{area_{is}} \times \frac{conc_{is}}{conc_{cmp}}$$

where:

area cmp = Area of the characteristic ion for the compound being measured.
area is = Area of the characteristic ion for the specific internal standard.
conc is = Concentration of the specific internal standard.
conc cmp = Concentration of the compound being measured.

Calculate % RSD by:

$$\%RSD = \frac{SD}{\overline{x}} \times 100 \qquad SD = \sqrt{\sum_{i=1}^{N} \frac{(x_i - \overline{x})^2}{N-1}}$$

where:

% RSD = percent relative standard deviation
x = average of RF's
SD = standard deviation
xi = analytical results of each level in the final reporting units
N = number of results (levels)

11.2.2 Calculate % Difference (%D) by:

$$\%D = \frac{\overline{R}\overline{F}_i - RF_c}{\overline{R}\overline{F}_i} \times 100$$

where:

RFi - Initial Calibration average RF
RFc = Continuing Calibration RF

11.2.3 Results of Water Analysis - calculation as performed in report form:

$$\text{Concentration (ug/L)} = \frac{\text{(Conc) (Vf) (DF)}}{\text{(Vi)}} \times 1000$$

11.2.4 Results of Soil/Sediment Analysis – calculation as performed in report form:

$$\text{Concentration (ug/Kg)} = \frac{\text{(Conc) (Vf) (DF)}}{\text{(Vi) \%S}} \times 1000$$

where:
Conc = Raw on-column concentration obtained from the quantitation report using Initial Calibration results.
Vf = Final volume of extract (mL)
Vi = Volume of sample extracted (mL), or weight of sample extracted in grams (g)
DF = Dilution factor, for manually prepared dilutions, not instrumental "dilutions".
%S = percent solids, as a decimal

12. Contingencies for Handling Out-of-Control Data or Unacceptable Data

Section 9.0 outlines sample batch QC acceptance criteria. If non-compliant organic compound results are to be reported, the Organic Section Head and/or the Laboratory Director, and the Operations Manager must approve the reporting of these results. The laboratory Project Manager shall be notified, and may chose to relay the non-compliance to the client, for approval, or other corrective action, such as re-sampling and re-analysis. The analyst, Data Reviewer, or Department Supervisor performing the secondary review initiates the project narrative, and the narrative must clearly document the non-compliance and provide a reason for acceptance of these results.

All results for the organic compounds of interest are reportable without qualification if extraction and analytical holding times are met, preservation requirements (including cooler temperatures) are met, all QC criteria defined in the table below are met, and matrix interference is not suspected during extraction or analysis of the samples. If any of the below QC parameters are not met, all associated samples must be evaluated for re-extraction and/or re-analysis.

QC Parameter	Acceptance Criteria
Method Blank	No analyte above the reporting limit The results are qualified with a "B" for any associated sample concentrations that are less than 10x the blank concentration for this analyte
Surrogate Recovery	15% - 110%
Laboratory Control Samples	40% - 140% and 30% RPD
Matrix Duplicate	30% RPD
Matrix Spike	40% - 140%
Matrix Spike Duplicate	30% - 140% and 30% RPD

13. Method Performance

13.1 Method Detection Limit Study (MDL) / Limit of Detection Study (LOD) / Limit of Quantitation (LOQ)

The laboratory follows the procedure to determine the MDL, LOD, and/or LOQ as outlined in Alpha SOP 1732. These studies performed by the laboratory are maintained on file for review.

13.2 Demonstration of Capability Studies

Refer to Alpha SOP 1739 for further information regarding IDC/DOC Generation.

13.2.1 Initial (IDC)

The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method, prior to the processing of any samples.

13.2.2 Continuing (DOC)

The analyst must make a continuing, annual, demonstration of the ability to generate acceptable accuracy and precision with this method.

14. Pollution Prevention and Waste Management

Refer to Alpha's Chemical Hygiene Plan and Waste Management and Disposal SOP for further pollution prevention and waste management information.

15. Referenced Documents

Chemical Hygiene Plan

SOP 1732 Detection Limit (DL), Limit of Detection (LOD) & Limit of Quantitation (LOQ)
SOP 1739 Demonstration of Capability (DOC) Generation
SOP 1731 Manual Integration & Compound Rejection
SOP 1797 Hazardous Waste and Sample Disposal

SOP 1816 Reagent, Solvent and Standard Control

16. Attachments

None.

Attachment D

Alpha Analytical PFAS Analyses Procedures

Determination of Selected Perfluorinated Alkyl Substances by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry Isotope Dilution (LC/MS/MS)

Reference: EPA Method 537, Version 1.1, September 2009, EPA Document #: EPA/600/R-08/09

Department of Defense, Quality Systems Manual for Environmental Laboratories, Version 5.1, .2017

1. Scope and Application

Matrices: Drinking Water, Non-potable Water, Soil and Tissue Matrices

Definitions: Refer to Alpha Analytical Quality Manual.

1.1 This is a liquid chromatography/tandem mass spectrometry (LC/MS/MS) method for the determination of selected perfluorinated alkyl substances (PFAS) in Non-Drinking Water Matrices. Accuracy and precision data have been generated in reagent water, and finished ground and surface waters for the compounds listed in Table 1.

1.2 The data report packages present the documentation of any method modification related to the samples tested. Depending upon the nature of the modification and the extent of intended use, the laboratory may be required to demonstrate that the modifications will produce equivalent results for the matrix. Approval of all method modifications is by one or more of the following laboratory personnel before performing the modification: Area Supervisor, Department Supervisor, Laboratory Director, or Quality Assurance Officer.

1.3 This method is restricted to use by or under the supervision of analysts experienced in the operation of the LC/MS/MS and in the interpretation of LC/MS/MS data. Each analyst must demonstrate the ability to generate acceptable results with this method by performing an initial demonstration of capability.

2. Summary of Method

2.1 A 250-mL water sample is fortified with extracted internal standards (EIS) and passed through a solid phase extraction (WAX) cartridge containing a mixed mode, Weak Anion Exchange, reversed phase, water-wettable polymer to extract the method analytes and isotopically-labeled compounds. The compounds are eluted from the solid phase in two fractions with methanol followed by a small amount of 2% ammonium hydroxide in methanol solution. The extract is concentrated with nitrogen in a heated water bath, and then adjusted to a 1-mL volume with 80:20% (vol/vol) methanol:water. An injection (typically 2-5 µl) is made into an LC equipped with a C18 column that is interfaced to an MS/MS. The analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC/MS/MS conditions. The concentration of each analyte is determined by using the isotope dilution technique. Extracted Internal Standards (EIS) analytes are used to monitor the extraction efficiency of the method analytes.

2.2 Method Modifications from Reference

None.

Table 1

Parameter	Acronym	CAS
PERFLUOROALKYL ETHER CARBOXYLIC ACIDS (PFECAs)		
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid	HFPO-DA	62037-80-3
Dodecafluoro-3h-4,8-dioxanonoate	ADONA	958445-44-8
PERFLUOROALKYLCARBOXILIC ACIDS (PFCAs)		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA *	307-24-4
Perfluoroheptanoic acid	PFHpA *	375-85-9
Perfluorooctanoic acid	PFOA *	335-67-1
Perfluorononanoic acid	PFNA *	375-95-1
Perfluorodecanoic acid	PFDA *	335-76-2
Perfluoroundecanoic acid	PFUnA *	2058-94-8
Perfluorododecanoic acid	PFDoA *	307-55-1
Perfluorotridecanoic acid	PFTrDA *	72629-94-8
Perfluorotetradecanoic acid	PFTA *	376-06-7
Perfluorohexadecanoic acid	PFHxDA	67905-19-5
Perfluorooctadecanoic acid	PFODA	16517-11-6
PERFLUOROALKYLSULFONATES (PFASs)		
Perfluorobutanesulfonic acid	PFBS *	375-73-5
Perfluoropentanesulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS *	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS *	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid	PFDS	335-77-3
PERFLUOROOCTANESULFONAMIDES (FOSAs)		
Perfluorooctanesulfonamide	PFOSA	754-91-6
TELOMER SULFONATES		
1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	4:2FTS	n/a
1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	6:2FTS	27619-97-2
1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	8:2FTS	39108-34-4
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA *	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA *	2991-50-6

*** also reportable via the standard 537 method**

3. Reporting Limits

The reporting limit for PFAS's is 2 ng/L for aqueous samples and 1 ng/g for soil samples.

4. Interferences

4.1 All glassware must be meticulously cleaned. Wash glassware with detergent and tap water, rinse with tap water, followed by a reagent water rinse. Non-volumetric glassware can be heated in a muffle furnace at 400 °C for 2 hours or solvent rinsed. Volumetric glassware should be solvent rinsed and not be heated in an oven above 120 °C. Store clean glassware inverted or capped. Do not cover with aluminum foil because PFAS's can be potentially transferred from the aluminum foil to the glassware.

4.1.1 **NOTE:** PFAS standards, extracts and samples should not come in contact with any glass containers or pipettes as these analytes can potentially adsorb to glass surfaces. PFAS analyte and EIS standards commercially purchased in glass ampoules are acceptable; however, all subsequent transfers or dilutions performed by the analyst must be prepared and stored in polypropylene containers.

4.2 Method interferences may be caused by contaminants in solvents, reagents (including reagent water), sample bottles and caps, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. The method analytes in this method can also be found in many common laboratory supplies and equipment, such as PTFE (polytetrafluoroethylene) products, LC solvent lines, methanol, aluminum foil, SPE sample transfer lines, etc. All items such as these must be routinely demonstrated to be free from interferences (less than 1/3 the RL for each method analyte) under the conditions of the analysis by analyzing laboratory reagent blanks as described in Section 9.2. **Subtracting blank values from sample results is not permitted.**

4.3 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the water. Humic and/or fulvic material can be co-extracted during SPE and high levels can cause enhancement and/or suppression in the electrospray ionization source or low recoveries on the SPE sorbent. Total organic carbon (TOC) is a good indicator of humic content of the sample.

4.4 SPE cartridges can be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. Brands and lots of SPE devices should be tested to ensure that contamination does not preclude analyte identification and quantitation.

5. Health and Safety

5.1 The toxicity or carcinogenicity of each reagent and standard used in this method is not fully established; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. A reference file of material safety data sheets is available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available in the Chemical Hygiene Plan.

5.2 All personnel handling environmental samples known to contain or to have been in contact with municipal waste must follow safety practices for handling known disease causative agents.

5.3 PFOA has been described as "likely to be carcinogenic to humans." Pure standard materials and stock standard solutions of these method analytes should be handled with suitable protection to skin and eyes, and care should be taken not to breathe the vapors or ingest the materials.

6. Sample Collection, Preservation, Shipping and Handling

6.1 Sample Collection for Aqueous Samples

6.1.1 Samples must be collected in three (3) 250-mL high density polyethylene (HDPE) container with an unlined plastic screw cap.

6.1.2 The sample handler must wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.

6.1.3 Open the tap and allow the system to flush until the water temperature has stabilized (approximately 3 to 5 min). Collect samples from the flowing system.

6.1.4 Fill sample bottles. Samples do not need to be collected headspace free.

6.1.5 After collecting the sample and cap the bottle. Keep the sample sealed from time of collection until extraction.

6.1.6 Field Reagent Blank (FRB)

6.1.6.1 A FRB must be handled along with each sample set. The sample set is composed of samples collected from the same sample site and at the same time. At the laboratory, fill the field blank sample bottle with reagent water and preservatives, seal, and ship to the sampling site along with the sample bottles. For each FRB shipped, an empty sample bottle (no preservatives) must also be shipped. At the sampling site, the sampler must open the shipped FRB and pour the reagent water into the empty shipped sample bottle, seal and label this bottle as the FRB. The FRB is shipped back to the laboratory along with the samples and analyzed to ensure that PFAS's were not introduced into the sample during sample collection/handling.

The reagent water used for the FRBs must be initially analyzed for method analytes as a MB and must meet the MB criteria in Section 9.2.1 prior to use. This requirement will ensure samples are not being discarded due to contaminated reagent water rather than contamination during sampling.

6.2 Sample Collection for Soil and Sediment samples.

Grab samples are collected in polypropylene containers. Sample containers and contact surfaces containing PTFE shall be avoided.

6.3 Sample Preservation

The preservation reagent, listed in the table below, is added to each drinking water sample bottle as a solid prior to shipment to the field (or prior to sample collection).

Table 2

Compound	Amount	Purpose
Trizma	5.0 g/l	Buffering reagent and removes free chlorine

6.4 Sample Shipping

Samples must be chilled during shipment and must not exceed 10 °C during the first 48 hours after collection. Sample temperature must be confirmed to be at or below 10 °C when the samples are received at the laboratory. Samples stored in the lab must be held at or below 6 °C until extraction, but should not be frozen.

NOTE: Samples that are significantly above 10° C, at the time of collection, may need to be iced or refrigerated for a period of time, in order to chill them prior to shipping. This will allow them to be shipped with sufficient ice to meet the above requirements.

6.5 Sample Handling

6.5.1 Holding Times

6.5.1.1 Water samples should be extracted as soon as possible but must be extracted within 14 days. Soil samples should be extracted within 28 days. Extracts are stored at < 10 ° C and analyzed within 28 days after extraction.

7. Equipment and Supplies

7.1 SAMPLE CONTAINERS – 250-mL high density polyethylene (HDPE) bottles fitted with unlined screw caps. Sample bottles must be discarded after use.

7.2 POLYPROPYLENE BOTTLES – 4-mL narrow-mouth polypropylene bottles.

7.3 CENTRIFUGE TUBES – 15-mL conical polypropylene tubes with polypropylene screw caps for storing standard solutions and for collection of the extracts.

7.4 AUTOSAMPLER VIALS – Polypropylene 0.7-mL autosampler vials with polypropylene caps.

7.4.1 NOTE: Polypropylene vials and caps are necessary to prevent contamination of the sample from PTFE coated septa. However, polypropylene caps do not reseal, so evaporation occurs after injection. Thus, multiple injections from the same vial are not possible.

7.5 POLYPROPYLENE GRADUATED CYLINDERS – Suggested sizes include 25, 50, 100 and 1000-mL cylinders.

7.6 Auto Pipets – Suggested sizes include 5, 10, 25, 50, 100, 250, 500 and 1000-µL syringes.

7.7 PLASTIC PIPETS – Polypropylene or polyethylene disposable pipets.

7.8 ANALYTICAL BALANCE – Capable of weighing to the nearest 0.0001 g.

7.9 SOLID PHASE EXTRACTION (SPE) APPARATUS FOR USING CARTRIDGES

7.9.1 SPE CARTRIDGES – 0.5 g, 6-mL SPE cartridges containing a reverse phase copolymer characterized by a weak anion exchanger (WAX) sorbent phase.

7.9.2 VACUUM EXTRACTION MANIFOLD – A manual vacuum manifold with Visiprep large volume sampler for cartridge extractions, or an automatic/robotic sample preparation system designed for use with SPE cartridges, may be used if all QC requirements discussed in Section 9 are met. Extraction and/or elution steps may not be changed or omitted to accommodate the use of an automated system. Care must be taken with automated SPE systems to ensure the PTFE commonly used in these systems does not contribute to unacceptable analyte concentrations in the MB (Sect. 9.2.1).

7.9.3 SAMPLE DELIVERY SYSTEM – Use of a polypropylene transfer tube system, which transfers the sample directly from the sample container to the SPE cartridge, is recommended, but not mandatory. Standard extraction manifolds come equipped with PTFE transfer tube systems. These can be replaced with 1/8” O.D. x 1/16” I.D. polypropylene or polyethylene tubing cut to an appropriate length to ensure no sample contamination from the sample transfer lines. Other types of non-PTFE tubing may be used provided it meets the MB (Sect. 9.2.1) and LCS (Sect. 9.3) QC requirements. The PTFE transfer tubes may be used, but an MB must be run on each PFTE transfer tube and the QC requirements in Section 13.2.2 must be met. In the case of automated SPE, the removal of PTFE lines may not be feasible; therefore, MBs will need to be rotated among the ports and must meet the QC requirements of Sections 13.2.2 and 9.2.1.

7.10 Extract Clean-up Cartridge – 5 g 6ml SPE Cartridge containing graphitized polymer carbon

7.11 EXTRACT CONCENTRATION SYSTEM – Extracts are concentrated by evaporation with nitrogen using a water bath set no higher than 65 °C.

7.12 LABORATORY OR ASPIRATOR VACUUM SYSTEM – Sufficient capacity to maintain a vacuum of approximately 10 to 15 inches of mercury for extraction cartridges.

7.13 LIQUID CHROMATOGRAPHY (LC)/TANDEM MASS SPECTROMETER (MS/MS) WITH DATA SYSTEM

7.13.1 LC SYSTEM – Instrument capable of reproducibly injecting up to 10-µL aliquots, and performing binary linear gradients at a constant flow rate near the flow rate used for development of this method (0.4 mL/min). The LC must be capable of pumping the water/methanol mobile phase without the use of a degasser which pulls vacuum on the mobile phase bottle (other types of degassers are acceptable). Degassers which pull vacuum on the mobile phase bottle will volatilize the ammonium acetate mobile phase causing the analyte peaks to shift to earlier retention times over the course of the analysis batch. The usage of a column heater is optional.

NOTE: During the course of method development, it was discovered that while idle for more than one day, PFAS’s built up in the PTFE solvent transfer lines. To prevent long delays in purging high levels of PFAS’s from the LC solvent lines, they were replaced with PEEK tubing and the PTFE solvent frits were replaced with stainless steel frits. It is not possible to remove all PFAS background contamination, but these measures help to minimize their background levels.

7.13.2 LC/TANDEM MASS SPECTROMETER – The LC/MS/MS must be capable of negative ion electrospray ionization (ESI) near the suggested LC flow rate of 0.4 mL/min. The system must be capable of performing MS/MS to produce unique product ions for the method analytes within specified retention time segments. A minimum of 10 scans across the chromatographic peak is required to ensure adequate precision.

7.13.3 DATA SYSTEM – An interfaced data system is required to acquire, store, reduce, and output mass spectral data. The computer software should have the capability of processing stored LC/MS/MS data by recognizing an LC peak within any given retention time window. The software must allow integration of the ion abundance of any specific ion within specified time or scan number limits. The software must be able to calculate relative response factors, construct linear regressions or quadratic calibration curves, and calculate analyte concentrations.

7.13.4 ANALYTICAL COLUMN – An LC BEH C_{18} column (2.1 x 50 mm) packed with 1.7 µm d_p C_{18} solid phase particles was used. Any column that provides adequate resolution, peak shape, capacity, accuracy, and precision (Sect. 9) may be used.

8. Reagents and Standards

8.1 GASES, REAGENTS, AND SOLVENTS – Reagent grade or better chemicals should be used.

8.1.1 REAGENT WATER – Purified water which does not contain any measurable quantities of any method analytes or interfering compounds greater than 1/3 the RL for each method analyte of interest. Prior to daily use, at least 3 L of reagent water should be flushed from the purification system to rinse out any build-up of analytes in the system's tubing.

8.1.2 METHANOL (CH_3OH, CAS#: 67-56-1) – High purity, demonstrated to be free of analytes and interferences.

8.1.3 AMMONIUM ACETATE ($NH_4C_2H_3O_2$, CAS#: 631-61-8) – High purity, demonstrated to be free of analytes and interferences.

8.1.4 2 mM AMMONIUM ACETATE/REAGENT WATER – To prepare 1 L, add .154 g ammonium acetate to 1 L of reagent water. This solution is prone to volatility losses and should be replaced at least every 48 hours.

8.1.5 ACETIC ACID (H_3CCOOH, CAS#: 64-19-7) - High purity, demonstrated to be free of analytes and interferences.

8.1.6 AMMONIUM HYDROXIDE (NH_3, CAS#: 1336-21-6) - High purity, demonstrated to be free of analytes and interferences.

8.1.7 Sodium Acetate ($NaOOCCH_3$, CAS#: 127-09-3) – High purity, demonstrated to be free of analytes and interferences.

8.1.8 25 mM Sodium Acetate Buffer – To prepare 250mls, dissolve .1 grams of sodium acetate into 100 mls of reagent water. Add 4 mls Acetic Acid and adjust the final volume to 250 mls with reagent water.

8.1.9 NITROGEN – Used for the following purposes: Nitrogen aids in aerosol generation of the ESI liquid spray and is used as collision gas in some MS/MS instruments. The nitrogen used should meet or exceed instrument manufacturer's specifications. In addition, Nitrogen is used to concentrate sample extracts (Ultra High Purity or equivalent).

8.1.10 ARGON – Used as collision gas in MS/MS instruments. Argon should meet or exceed instrument manufacturer's specifications. Nitrogen gas may be used as the collision gas provided sufficient sensitivity (product ion formation) is achieved.

8.2 STANDARD SOLUTIONS – When a compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. PFAS analyte and IS standards commercially purchased in glass ampoules are acceptable; however, all subsequent transfers or dilutions performed by the analyst must be prepared and stored in polypropylene containers. Standards for sample fortification generally should be prepared in the smallest volume that can be accurately measured to minimize the addition of excess organic solvent to aqueous samples.

NOTE: Stock standards (Sect. 8.2.1 and 8.2.3) are stored at ≤4 °C. Primary dilution standards (Sect. 8.2.2 and 8.2.4) are stored at room temperature to prevent adsorption of the method analytes onto the container surfaces that may occur when refrigerated. Storing the standards at room temperature will also minimize daily imprecision due to the potential of inadequate room temperature stabilization.

8.2.1 ISOTOPE DILUTION Extracted Internal Standard (ID EIS) STOCK SOLUTIONS - ID EIS stock standard solutions are stable for at least 6 months when stored at 4 °C. The stock solution is purchased at a concentration of 1000 ng/mL.

8.2.2 ISOTOPE DILUTION Extracted Internal Standard PRIMARY DILUTION STANDARD (ID EIS PDS) – Prepare the ID EIS PDS at a concentration of 500 ng/mL. The ID PDS is prepared in 80:20% (vol/vol) methanol:water. The ID PDS is stable for at least two months when stored in polypropylene centrifuge tubes at room temperature.

Table 3

8.2.3 ANALYTE STOCK STANDARD SOLUTION – Analyte stock standards are stable for at least 6 months when stored at -15 °C. When using these stock standards to prepare a PDS, care must be taken to ensure that these standards are at room temperature and adequately vortexed.

8.2.4 ANALYTE PRIMARY SPIKING STANDARD – Prepare the spiking standard at a concentration of 500 ng/mL in 80:20% (vol/vol) methanol:water. The spiking standard is stable for at least two months when stored in polypropylene centrifuge tubes at room temperature.

Table 4

Analyte	Conc. of Stock (ng/mL)	Vol. of Stock (mL)	Final Vol. of IS PDS (mL)	Final Conc. of IS PDS (ng/mL)
HFPO-DA	50,000	.04	4	500
ADONA	50,000	.04	4	500
PFBA	2000	1	4	500
PFPeA	2000	1	4	500
PFHxA	2000	1	4	500
PFHpA	2000	1	4	500
PFOA	2000	1	4	500
PFNA	2000	1	4	500
PFDA	2000	1	4	500
PFUdA	2000	1	4	500

PFDoA	2000	1	4	500
PFTrDA	2000	1	4	500
PFTeDA	2000	1	4	500
PFHxDA	50,000	.04	4	500
PFODA	50,000	.04	4	500
FOSA	2000	1	4	500
N-MeFOSAA	2000	1	4	500
N-EtFOSAA	2000	1	4	500
L-PFBS	1770	1	4	442.5
L-PFPeS	1880	1	4	470
L-PFHxSK	1480	1	4	370
Br-PFHxSK	344	1	4	86
L-PFHpS	1900	1	4	475
L-PFOSK	1460	1	4	365
Br-PFOSK	391	1	4	97.75
L-PFNS	1920	1	4	480
L-PFDS	1930	1	4	482.5
4:2FTS	1870	1	4	467.5
6:2FTS	1900	1	4	475
8:2FTS	1920	1	4	480

8.2.5 LOW, MEDIUM AND HIGH LEVEL LCS – The LCS's will be prepared at the following concentrations and rotated per batch; 2 ng/L, 40 ng/L, 500 ng/l. The analyte PDS contains all the method analytes of interest at various concentrations in methanol containing 20% water. The analyte PDS has been shown to be stable for 6 months when stored at room temperature.

8.2.6 Isotope Dilution Labeled Recovery Stock Solutions (ID REC) – ID REC Stock solutions are stable for at least 6 months when stored at 4 °C. The stock solution is purchased at a concentration of 1000 ng/mL.

8.2.7 Isotope Dilution Labeled Recovery Primary Dilution Standard (ID REC PDS) - Prepare the ID REC PDS at a concentration of 500 ng/mL. The ID REC PDS is prepared in 80:20% (vol/vol) methanol:water. The ID REC PDS is stable for at least two months when stored in polypropylene centrifuge tubes at room temperature.

Table 5

Analyte	Conc. of REC Stock (ng/mL)	Vol. of REC Stock (mL)	Final Vol. of REC PDS (mL)	Final Conc. of REC PDS (ng/mL)
M2PFOA	2000	1	4	500
MPFDA	2000	1	4	500
M3PFBA	2000	1	4	500
MPFOS	2000	1	4	500

8.2.8 CALIBRATION STANDARDS (CAL) –

Current Concentrations (ng/mL): 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 125, 150

Prepare the CAL standards over the concentration range of interest from dilutions of the analyte PDS in methanol containing 20% reagent water. 20 µl of the EIS PDS and REC PDS are added to the CAL standards to give a constant concentration of 10 ng/ml. The lowest concentration CAL standard must be at or below the RL (2 ng/L), which may depend on system sensitivity. The CAL standards may also be used as CCVs (Sect. 9.8). The CAL standards are stable for at least two weeks when stored at room temperature. Longer storage times are acceptable provided appropriate QC measures are documented demonstrating the CAL standard stability.

9. Quality Control

The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

9.1 MINIMUM REPORTING LIMIT (MRL) CONFIRMATION

9.1.1 Fortify, extract, and analyze seven replicate LCSs at 2 ng/l. Calculate the mean measured concentration (*Mean*) and standard deviation for these replicates. Determine the Half Range for the prediction interval of results (HR_{PIR}) using the equation below

$$HR_{PIR} = 3.963s$$

Where:

s = the standard deviation
3.963 = a constant value for seven replicates.

9.1.2 Confirm that the upper and lower limits for the Prediction Interval of Result ($PIR = Mean \pm HR_{PIR}$) meet the upper and lower recovery limits as shown below

The Upper PIR Limit must be ≤150% recovery.

$$\frac{Mean + HR_{PIR}}{Fortified\ Concentration} \times 100\% \leq 150\%$$

The Lower PIR Limit must be ≥ 50% recovery.

$$\frac{Mean - HR_{PIR}}{Fortified\ Concentration} \times 100\% \geq 50\%$$

9.1.3 The RL is validated if both the Upper and Lower PIR Limits meet the criteria described above. If these criteria are not met, the RL has been set too low and must be determined again at a higher concentration.

9.2 Blank(s)

9.2.1 **METHOD BLANK (MB) -** A Method Blank (MB) is required with each extraction batch to confirm that potential background contaminants are not interfering with the identification or quantitation of method analytes. If more than 20 Field

Samples are included in a batch, analyze an MB for every 20 samples. If the MB produces a peak within the retention time window of any analyte that would prevent the determination of that analyte, determine the source of contamination and eliminate the interference before processing samples. Background contamination must be reduced to an acceptable level before proceeding. Background from method analytes or other contaminants that interfere with the measurement of method analytes must be below 1/2 of the RL. Blank contamination is estimated by extrapolation, if the concentration is below the lowest CAL standard. This extrapolation procedure is not allowed for sample results as it may not meet data quality objectives. If the method analytes are detected in the MB at concentrations equal to or greater than this level, then all data for the problem analyte(s) must be considered invalid for all samples in the extraction batch. Because background contamination is a significant problem for several method analytes, it is highly recommended that the analyst maintain a historical record of MB data.

9.2.2 **FIELD REAGENT BLANK (FRB)** - The purpose of the FRB is to ensure that PFAS's measured in the Field Samples were not inadvertently introduced into the sample during sample collection/handling. Analysis of the FRB is required only if a Field Sample contains a method analyte or analytes at or above the RL. The FRB is processed, extracted and analyzed in exactly the same manner as a Field Sample. If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/2 the RL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed.

9.3 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicates (LCSD)

9.3.1 An LCS is required with each extraction batch. The fortified concentration of the LCS must be rotated between low, medium, and high concentrations from batch to batch. The low concentration LCS must be as near as practical to, but no more than two times, the RL. Similarly, the high concentration LCS should be near the high end of the calibration range established during the initial calibration (Sect. 10.6). Results of the low-level LCS analyses must be 50-150% of the true value. Results of the medium and high-level LCS analyses must be 70-130% of the true value. Calculate the percent recovery (%*R*) for each analyte using the equation

$$\%R = \frac{A \times 100}{B}$$

Where:

A = measured concentration in the fortified sample
B =fortification concentration.

9.3.2 Where applicable, LCSD's are to be extracted and analyzed. The concentration and analyte recovery criteria for the LSD must be the same as the batch LCS The RSD's must fall within ≤30% of the true value for medium and high level replicates, and ≤50% for low level replicates. Calculate the relative percent difference (RPD) for duplicate MSs (MS and MSD) using the equation

$$RPD = \frac{|LCS - LCSD|}{(LCS + LCSD) / 2} \times 100$$

9.3.3 **If the LCS and or LCSD results do not meet these criteria for method analytes, then all data for the problem analyte(s) must be considered invalid for all samples in the extraction batch.**

9.4 Labeled Recovery Standards (REC)

9.4.1 The analyst must monitor the peak areas of the REC(s) in all injections during each analysis day. The REC responses (peak areas) in any chromatographic run must be within laboratory generated control limits generated from the analysis of control spike samples. Default limits of 50-150% may be used for analytes until sufficient replicates have been analyzed to generate proper control limits. If the REC areas in a chromatographic run do not meet these criteria, inject a second aliquot of that extract into a new capped autosampler vial. Random evaporation losses have been observed with the polypropylene caps causing high REC(s) areas.

9.4.1.1 If the reinjected aliquot produces an acceptable REC response, report results for that aliquot.

9.4.1.2 If the reinjected extract fails again, the analyst should check the calibration by reanalyzing the most recently acceptable CAL standard. If the CAL standard fails the criteria of Section 9.8, recalibration is in order per Section 10.6. If the CAL standard is acceptable, extraction of the sample may need to be repeated provided the sample is still within the holding time. Otherwise, report results obtained from the reinjected extract, but annotate as suspect. Alternatively, collect a new sample and re-analyze.

9.5 Extracted Internal Standards (EIS)

9.5.1 The EIS standard is fortified into all samples, CCVs, MBs, LCSs, MSs, MSDs, FD, and FRB prior to extraction. It is also added to the CAL standards. The EIS is a means of assessing method performance from extraction to final chromatographic measurement. Calculate the recovery (%R) for the EIS using the following equation

$$\%R = (A / B) \times 100$$

Where:

A = calculated EIS concentration for the QC or Field Sample
B = fortified concentration of the EIS.

9.5.2 EIS recovery must be in the range of 50-150%. When EIS recovery from a sample, blank, or CCV is less than 50% or greater than 150%, check 1) calculations to locate possible errors, 2) standard solutions for degradation, 3) contamination, and 4) instrument performance. Correct the problem and reanalyze the extract.

9.5.2.1 If the extract reanalysis meets the EIS recovery criterion, report only data for the reanalyzed extract.

9.5.2.2 If the extract reanalysis fails the 50-150% recovery criterion, the analyst should check the calibration by injecting the last CAL standard that passed. If the CAL standard fails the criteria of Section 10.7, recalibration is in order per Section 10.6. If the CAL standard is acceptable, extraction of the sample should be repeated provided the sample is still within the holding time. If the re-extracted sample also fails the recovery criterion, report all data for that sample as suspect/EIS recovery to inform the data user that the results are suspect due to EIS recovery. Alternatively, collect a new sample and re-analyze.

9.6 Matrix Spike (MS)

9.6.1 Analysis of an MS is required in each extraction batch and is used to determine that the sample matrix does not adversely affect method accuracy. Assessment of method precision is accomplished by analysis of a Field Duplicate (FD) (Sect. 9.6); however, infrequent occurrence of method analytes would hinder this assessment. If the occurrence of method analytes in the samples is infrequent, or if historical trends are unavailable, a second MS, or MSD, must be prepared, extracted, and analyzed from a duplicate of the Field Sample. Extraction batches that contain MSDs will not require the extraction of a field sample duplicate. If a variety of different sample matrices are analyzed regularly, for example, drinking water from groundwater and surface water sources, method performance should be established for each. Over time, MS data should be documented by the laboratory for all routine sample sources.

9.6.2 Within each extraction batch, a minimum of one Field Sample is fortified as an MS for every 20 Field Samples analyzed. The MS is prepared by spiking a sample with an appropriate amount of the Analyte Stock Standard (Sect. 8.2.4). Use historical data and rotate through the low, mid and high concentrations when selecting a fortifying concentration. Calculate the percent recovery (%*R*) for each analyte using the equation

$$\%R = \frac{(A - B)}{C} \times 100$$

Where:

A = measured concentration in the fortified sample
B = measured concentration in the unfortified sample
C = fortification concentration.

9.6.3 Analyte recoveries may exhibit matrix bias. For samples fortified at or above their native concentration, recoveries should range between 70-130%, except for low-level fortification near or at the RL (within a factor of 2-times the RL concentration) where 50-150% recoveries are acceptable. If the accuracy of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the LCS, the recovery is judged to be matrix biased. The result for that analyte in the unfortified sample is labeled suspect/matrix to inform the data user that the results are suspect due to matrix effects.

9.7 Laboratory Duplicate

9.7.1 FIELD DUPLICATE OR LABORATORY FORTIFIED SAMPLE MATRIX DUPLICATE (FD or MSD) – Within each extraction batch (not to exceed 20 Field Samples), a minimum of one FD or MSD must be analyzed. Duplicates check the precision associated with sample collection, preservation, storage, and laboratory procedures. If method analytes are not routinely observed in Field Samples, an MSD should be analyzed rather than an FD.

9.7.2 Calculate the relative percent difference (*RPD*) for duplicate measurements (*FD1* and *FD2*) using the equation

$$RPD = \frac{|FD1 - FD2|}{(FD1 + FD2)/2} \times 100$$

9.7.3 RPDs for FDs should be ≤30%. Greater variability may be observed when FDs have analyte concentrations that are within a factor of 2 of the RL. At these concentrations, FDs should have RPDs that are ≤50%. If the RPD of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the CCV, the recovery is judged to be matrix biased. The result for that analyte in the unfortified sample is labeled suspect/matrix to inform the data user that the results are suspect due to matrix effects.

9.7.4 If an MSD is analyzed instead of a FD, calculate the relative percent difference (RPD) for duplicate MSs (MS and MSD) using the equation

$$RPD = \frac{|MS - MSD|}{(MS + MSD)/2} \times 100$$

9.7.5 RPDs for duplicate MSs should be ≤30% for samples fortified at or above their native concentration. Greater variability may be observed when MSs are fortified at analyte concentrations that are within a factor of 2 of the RL. MSs fortified at these concentrations should have RPDs that are ≤50% for samples fortified at or above their native concentration. If the RPD of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the LCSD where applicable, the result is judged to be matrix biased. If no LCSD is present, the associated MS and MSD are to be re-analyzed to determine if any analytical has occurred. If the resulting RPDs are still outside control limits, the result for that analyte in the unfortified sample is labeled suspect/matrix to inform the data user that the results are suspect due to matrix effects.

9.8 Initial Calibration Verification (ICV)

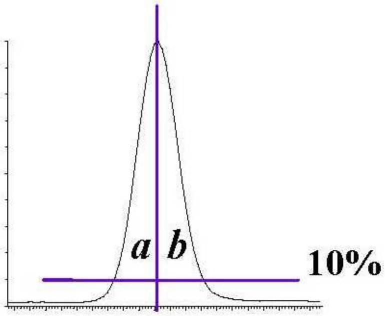
9.8.1 As part of the IDC (Sect. 13.2), each time a new Analyte Stock Standard solution (Sect. 8.2.4) is used, and at least quarterly, analyze a QCS sample from a source different from the source of the CAL standards. If a second vendor is not available, then a different lot of the standard should be used. The QCS should be prepared and analyzed just like a CCV. Acceptance criteria for the QCS are identical to the CCVs; the calculated amount for each analyte must be ± 30% of the expected value. If measured analyte concentrations are not of acceptable accuracy, check the entire analytical procedure to locate and correct the problem.

9.9 Continuing Calibration Verification (CCV)

9.9.1 CCV Standards are analyzed at the beginning of each analysis batch, after every 10 Field Samples, and at the end of the analysis batch. See Section 10.7 for concentration requirements and acceptance criteria.

9.10 Method-specific Quality Control Samples

9.10.1 PEAK ASYMMETRY FACTOR – A peak asymmetry factor must be calculated using the equation below during the IDL and every time a calibration curve is generated. The peak asymmetry factor for the first two eluting peaks in a midlevel CAL standard (if only two analytes are being analyzed, both must be evaluated) must fall in the range of 0.8 to 1.5. Modifying the standard or extract composition to more aqueous content to prevent poor shape is not permitted. See guidance in Section 10.6.4.1 if the calculated peak asymmetry factors do not meet the criteria.



$$A_s = b / a$$

Where:

A_s = peak asymmetry factor
b = width of the back half of the peak measured (at 10% peak height) from the trailing edge of the peak to a line dropped perpendicularly from the peak apex
a = the width of the front half of the peak measured (at 10% peak height) from the leading edge of the peak to a line dropped perpendicularly from the apex.

9.11 Method Sequence

CCV-LOW
MB
LCS
LCSD
MS
Duplicate or MSD
Field Samples (1-10)
CCV-MID

Field Samples (11-20)

CCV-HIGH

10. Procedure

10.1 Equipment Set-up

10.1.1 This procedure may be performed manually or in an automated mode using a robotic or automatic sample preparation device. If an automated system is used to prepare samples, follow the manufacturer's operating instructions, but all extraction and elution steps must be the same as in the manual procedure. Extraction and/or elution steps may not be changed or omitted to accommodate the use of an automated system. If an automated system is used, the MBs should be rotated among the ports to ensure that all the valves and tubing meet the MB requirements (Sect. 9.2).

10.1.2 Some of the PFAS’s adsorb to surfaces, including polypropylene. Therefore, the aqueous sample bottles must be rinsed with the elution solvent (Sect 10.3.4) whether extractions are performed manually or by automation. The bottle rinse is passed through the cartridge to elute the method analytes and is then collected (Sect. 10.3.4).

10.1.3 **NOTE:** The SPE cartridges and sample bottles described in this section are designed as single use items and should be discarded after use. They may not be refurbished for reuse in subsequent analyses.

10.2 Sample Preparation and Extraction of Aqueous Samples

10.2.1 Samples are preserved, collected and stored as presented in Section 6.

The entire sample that is received must be sent through the SPE cartridge. In addition, the bottle must be solvent rinsed and this rinse must be sent through the SPE cartridge as well. The method blank (MB) and laboratory control sample (LCS) must be extracted in exactly the same manner (i.e., must include the bottle solvent rinse). It should be noted that a water rinse alone is not sufficient. This does not apply to samples with high concentrations of PFAS that are prepared using serial dilution and not SPE.

10.2.2 Determine sample volume. An indirect measurement may be done in one of two ways: by marking the level of the sample on the bottle or by weighing the sample and bottle to the nearest 10 g. After extraction, proceed to Section 10.5 for final volume determination.

NOTE: Some of the PFAS’s adsorb to surfaces, thus the sample volume may **NOT** be transferred to a graduated cylinder for volume measurement.

10.2.3 The MB, LCS and FRB may be prepared by measuring 250 mL of reagent water with a polypropylene graduated cylinder or filling a 250-mL sample bottle to near the top.

10.2.4 Adjust the sample pH to 3 by adding a 1:1 solution of acetic acid in water dropwise

10.2.5 Add 20 µL of the EIS PDS (Sect. 8.2.2) to each sample and QC, cap and invert to mix.

10.2.6 If the sample is an LCS, LCSD, MS, or MSD, add the necessary amount of analyte PDS (Sect. 8.2.4). Cap and invert each sample to mix.

10.3 Cartridge SPE Procedure

10.3.1 CARTRIDGE CLEAN-UP AND CONDITIONING – DO NOT allow cartridge packing material to go dry during any of the conditioning steps. Rinse each cartridge with 3 X 5 mL of 2% ammonium hydroxide in methanol, followed by 5mls of methanol. Next, rinse each cartridge with 5 mls of the 25 mM acetate buffer, followed by 15 mL of reagent water, without allowing the water to drop below the top edge of the packing. If the cartridge goes dry during the conditioning phase, the conditioning must be started over. Add 4-5 mL of reagent water to each cartridge, attach the sample transfer tubes (Sect. 7.9.3), turn on the vacuum, and begin adding sample to the cartridge.

10.3.2 SAMPLE EXTRACTON – Adjust the vacuum so that the approximate flow rate is 10-15 mL/min. Do not allow the cartridge to go dry before all the sample has passed through.

10.3.3 SAMPLE BOTTLE AND CARTRIDGE RINSE – After the entire sample has passed through the cartridge, rinse the sample bottles with 4 ml reagent water followed by 4 ml 25 mM acetate buffer at pH 4 and draw the aliquot through the sample transfer tubes and the cartridges. Draw air or nitrogen through the cartridge for 5-10 min at high vacuum (10-15 in. Hg). **NOTE: If empty plastic reservoirs are used in place of the sample transfer tubes to pass the samples through the cartridges, these reservoirs must be treated like the transfer tubes. After the entire sample has passed through the cartridge, the reservoirs must be rinsed to waste with reagent water.**

10.3.4 SAMPLE BOTTLE AND CARTRIDGE ELUTION, Fraction 1 – Turn off and release the vacuum. Lift the extraction manifold top and insert a rack with collection tubes into the extraction tank to collect the extracts as they are eluted from the cartridges. Rinse the sample bottles with 4 mls of methanol and draw the aliquot through the sample transfer tubes and cartridges. Use a low vacuum such that the solvent exits the cartridge in a dropwise fashion. Repeat sample bottle rinse and cartridge elution with 2 more 4-mL methanol.

SAMPLE BOTTLE AND CARTRIDGE ELUTION, Fraction 2 In a separate collection vial, rinse the sample bottles with 4 mL of 2% ammonium hydroxide in methanol and elute the analytes from the cartridges by pulling the 4 mL of methanol through the sample transfer tubes and the cartridges. Use a low vacuum such that the solvent exits the cartridge in a dropwise fashion. Repeat sample bottle rinse and cartridge elution with 2 more 4-mL aliquots of 2% ammonium hydroxide in methanol. To the final extract, add 50 ul of acetic acid.

NOTE: If empty plastic reservoirs are used in place of the sample transfer tubes to pass the samples through the cartridges, these reservoirs must be treated like the transfer tubes. After the reservoirs have been rinsed in Section 10.3.3, the elution solvent used to rinse the sample bottles must be

swirled down the sides of the reservoirs while eluting the cartridge to ensure that any method analytes on the surface of the reservoirs are transferred to the extract.

10.3.5 Fractions 1 and 2 are to be combined during the concentration stage (section10.6)

10.4 Sample Prep and Extraction Protocol for Soils

10.4.1 2 grams of sample (measured to the nearest hundredth of a gram) is placed in a 15 ml polypropylene centrifuge tube. For laboratory control blanks and spikes, 2 grams of clean sand is used.

10.4.2 Add 20 µL of the EIS PDS (Sect. 8.2.2) to each sample and QC.

10.4.3 If the sample is an LCS, LCSD, MS, or MSD, add the necessary amount of analyte PDS (Sect. 8.2.4). Cap and invert each sample to mix.

10.4.4 To all samples, add 10 mls of methanol, cap and mix of 30 minutes using a shaker table of tumbler.

10.4.5 Following mixing, sonicate each sample for 30 minutes

10.4.6 Centrifuge each sample at 15,000g for 5 minutes.

10.4.7 Remove supernatant, and reserve for clean-up.

10.5 Extract Clean-up

10.5.1 CARTRIDGE CLEAN-UP AND CONDITIONING –. Rinse each cartridge with 15 mL of methanol and discard. If the cartridge goes dry during the conditioning phase, the conditioning must be started over. Attach the sample transfer tubes (Sect. 7.9.3), turn on the vacuum, and begin adding sample to the cartridge.

10.5.2 Adjust the vacuum so that the approximate flow rate is 1-2 mL/min. Do not allow the cartridge to go dry before all the sample has passed through.

10.5.3 SAMPLE BOTTLE AND CARTRIDGE RINSE – After the entire sample has passed through the cartridge, rinse the sample collection vial with two 1-mL aliquots of methanol and draw each aliquot through the cartridges. Draw air or nitrogen through the cartridge for 5 min at high vacuum (10-15 in. Hg).

10.5.4 If extracts are not to be immediately evaporated, cover collection tubes and store at ambient temperature till concentration.

10.6 Extract Concentration

10.6.1 Concentrate the extract to dryness under a gentle stream of nitrogen in a heated water bath (60-65 °C) to remove all the water/methanol mix. Add the appropriate amount of 80:20% (vol/vol) methanol:water solution and 20 µl of the ID REC PDS (Sect. 8.2.7) to the collection vial to bring the volume to 1 mL and vortex. Transfer a small aliquot with a plastic pipet (Sect. 7.6) to a polypropylene autosampler vial.

NOTE: It is recommended that the entire 1-mL aliquot not be transferred to the autosampler vial because the polypropylene autosampler caps do not reseal after injection. Therefore, do not store the extracts in the

autosampler vials as evaporation losses can occur occasionally in these autosampler vials. Extracts can be split between 2 X 700 µl vials (Sect. 7.4).

10.7 Sample Volume Determination

10.7.1 If the level of the sample was marked on the sample bottle, use a graduated cylinder to measure the volume of water required to fill the original sample bottle to the mark made prior to extraction. Determine to the nearest 10 mL.

10.7.2 If using weight to determine volume, weigh the empty bottle to the nearest 10 g and determine the sample weight by subtraction of the empty bottle weight from the original sample weight (Sect. 10.2.2). Assume a sample density of 1.0 g/mL. In either case, the sample volume will be used in the final calculations of the analyte concentration (Sect. 11.2).

10.8 Initial Calibration - Demonstration and documentation of acceptable initial calibration is required before any samples are analyzed. After the initial calibration is successful, a CCV is required at the beginning and end of each period in which analyses are performed, and after every tenth Field Sample.

10.8.1 ESI-MS/MS TUNE

10.8.1.1 Calibrate the mass scale of the MS with the calibration compounds and procedures prescribed by the manufacturer.

10.8.1.2 Optimize the [M-H]- for each method analyte by infusing approximately 0.5-1.0 µg/mL of each analyte (prepared in the initial mobile phase conditions) directly into the MS at the chosen LC mobile phase flow rate (approximately 0.4 mL/min). This tune can be done on a mix of the method analytes. The MS parameters (voltages, temperatures, gas flows, etc.) are varied until optimal analyte responses are determined. The method analytes may have different optima requiring some compromise between the optima.

10.8.1.3 Optimize the product ion for each analyte by infusing approximately 0.5-1.0 µg/mL of each analyte (prepared in the initial mobile phase conditions) directly into the MS at the chosen LC mobile phase flow rate (approximately 0.3 mL/min). This tune can be done on a mix of the method analytes. The MS/MS parameters (collision gas pressure, collision energy, etc.) are varied until optimal analyte responses are determined. Typically, the carboxylic acids have very similar MS/MS conditions and the sulfonic acids have similar MS/MS conditions.

10.8.2 Establish LC operating parameters that optimize resolution and peak shape. Modifying the standard or extract composition to more aqueous content to prevent poor shape is not permitted.

Cautions: LC system components, as well as the mobile phase constituents, contain many of the method analytes in this method. Thus, these PFAS's will build up on the head of the LC column during mobile phase equilibration. To minimize the background PFAS peaks and to keep background levels constant, the time the LC column sits at initial conditions must be kept constant and as short as possible (while ensuring reproducible retention times). In addition, prior to daily use, flush the column with 100% methanol for at least 20 min before initiating a sequence. It may be necessary on some systems to flush other LC components such as wash

syringes, sample needles or any other system components before daily use.

10.8.3 Inject a mid-level CAL standard under LC/MS conditions to obtain the retention times of each method analyte. If analyzing for PFTA, ensure that the LC conditions are adequate to prevent co-elution of PFTA and the mobile phase interferants. These interferants have the same precursor and products ions as PFTA, and under faster LC conditions may co-elute with PFTA. Divide the chromatogram into retention time windows each of which contains one or more chromatographic peaks. During MS/MS analysis, fragment a small number of selected precursor ions ([M-H]-) for the analytes in each window and choose the most abundant product ion. For maximum sensitivity, small mass windows of ±0.5 daltons around the product ion mass were used for quantitation. If sufficient sensitivity exists to meet the RL, wider mass ranges may be used to obtain more confirmation ions.

10.8.3.1 NOTE: As the NOTE in Section 10.6.4.1 indicates, PFOS has linear and branched isomers. There have been reports that not all the products ions in the linear PFOS are produced in all the branched PFOS isomers. (This phenomenon probably exists for PFHxS and PFBS also, although it has not been studied to date.) Thus, in an attempt to reduce PFOS bias, it is required that the *m/z* 499 → *m/z* 80 transition be used as the quantitation transition. Some MS/MS instruments, such as conventional ion traps, may not be able to scan a product ion with such a wide mass difference from the precursor ion; therefore, they may not be used for this method if PFOS, PFBS, or PFHxS analysis is to be conducted. Literature reports indicate for the most abundant PFOS isomer, which is the linear isomer, that all the products ions obtained on an ion trap have less than 10% relative abundance. In addition, there is not a single ion trap MS/MS transition that encompasses the linear isomer and the majority of the branch isomers; thus, the bias would be unacceptably high.

10.8.4 Inject a mid-level CAL standard under optimized LC/MS/MS conditions to ensure that each method analyte is observed in its MS/MS window and that there are at least 10 scans across the peak for optimum precision.

10.8.4.1 If broad, split or fronting peaks are observed for the first two eluting chromatographic peaks (if only two analytes are being analyzed, both must be evaluated), change the initial mobile phase conditions to higher aqueous content until the peak asymmetry ratio for each peak is 0.8 – 1.5. The peak asymmetry factor is calculated as described in Section 9.9.1 on a mid-level CAL standard. The peak asymmetry factor must meet the above criteria for the first two eluting peaks during the IDL and every time a new calibration curve is generated. Modifying the standard or extract composition to more aqueous content to prevent poor shape is not permitted.

NOTE: PFHxS, PFOS, NMeFOSAA, and NEtFOSAA have multiple chromatographic peaks using the LC conditions in Table 5 due to chromatographic resolution of the linear and branched isomers of these compounds. Most PFAS's are produced by two different processes. One process gives rise to linear PFAS's only while the other process produces both linear and branched isomers. Thus, both branched and linear PFAS's can potentially be found in the

environment. For the aforementioned compounds that give rise to more than one peak, all the chromatographic peaks observed in the standard must be integrated and the areas totaled. Chromatographic peaks in a sample must be integrated in the same way as the CAL standard.

10.8.5 Prepare a set of CAL standards as described in Section 8.2.5. The lowest concentration CAL standard must be at or below the RL (2 ng/L), which may depend on system sensitivity. It is recommended that at least four of the CAL standards are at a concentration greater than or equal to the RL.

10.8.6 The LC/MS/MS system is calibrated using the IS technique. Use the LC/MS/MS data system software to generate a linear regression or quadratic calibration curve for each of the analytes. This curve **must always** be forced through zero and may be concentration weighted, if necessary. Forcing zero allows for a better estimate of the background levels of method analytes.

10.8.6.1 The isotopically labeled IS(s) in this method may undergo suppression in the ESI source if the concentration of the co-eluting unlabeled method analyte(s) is too high. The analyte concentration at which suppression may occur can vary depending on the instrument, LC conditions, ESI conditions, IS concentration, etc. To evaluate whether suppression is occurring during calibration, calculate the relative percent difference (*RPD*) between the high (H) and low (L) areas for each IS using the equation

$$\text{RPD} = \frac{(\text{H} - \text{L})}{(\text{H} + \text{L}) / 2} \times 100$$

10.8.6.2 The RPD calculated above must be <20% for each IS during calibration. If the calculated RPD is >20% for any IS, the analyst must recalibrate at lower analyte concentrations until the IS RPDs are <20%.

10.8.7 CALIBRATION ACCEPTANCE CRITERIA – When quantitated using the initial calibration curve, each calibration point, except the lowest point, for each analyte should calculate to be within 70-130% of its true value. The lowest CAL point should calculate to be within 50-150% of its true value. If these criteria cannot be met, the analyst will have difficulty meeting ongoing QC criteria. It is recommended that corrective action is taken to reanalyze the CAL standards, restrict the range of calibration, or select an alternate method of calibration (forcing the curve through zero is still required).

10.8.7.1 **CAUTION:** When acquiring MS/MS data, LC operating conditions must be carefully reproduced for each analysis to provide reproducible retention times. If this is not done, the correct ions will not be monitored at the appropriate times. As a precautionary measure, the chromatographic peaks in each window must not elute too close to the edge of the segment time window.

10.9 CONTINUING CALIBRATION CHECK (CCV) – Minimum daily calibration verification is as follows. Verify the initial calibration at the beginning and end of each group of analyses, and after every tenth sample during analyses. In this context, a “sample” is considered to be a Field Sample. MBs, CCVs, LCSs, MSs, FDs FRBs and MSDs are not counted as samples. The beginning CCV of each analysis batch must be at or below the RL in order to verify instrument sensitivity prior to any analyses. If standards have been prepared such that all low CAL points are not in the same CAL solution, it may be necessary to analyze two CAL standards to meet this requirement. Alternatively, the analyte concentrations in the analyte PDS may be customized to meet this criteria. Subsequent CCVs should alternate between a medium and high concentration CAL standard.

10.9.1 Inject an aliquot of the appropriate concentration CAL standard and analyze with the same conditions used during the initial calibration.

10.9.2 Determine that the absolute areas of the quantitation ions of the ID REC(s) are within 50-150% of the areas measured in the most recent continuing calibration check, and within 50-150% from the average areas measured during initial calibration. If any of the ID REC areas has changed by more than these amounts, adjustments must be made to restore system sensitivity. These adjustments may include cleaning of the MS ion source, or other maintenance as indicated in Section 10.7.4. Major instrument maintenance requires recalibration (Sect 10.6) and verification of sensitivity by analyzing a CCV at or below the RL (Sect 10.7). Control charts are useful aids in documenting system sensitivity changes.

10.9.3 Calculate the concentration of each analyte and EIS in the CCV. The calculated amount for each analyte for medium and high level CCVs must be within ± 30% of the true value. The calculated amount for each EIS must be within ± 50% of the true value The calculated amount for the lowest calibration point for each analyte must be within ± 50%. If these conditions do not exist, then all data for the problem analyte must be considered invalid, and remedial action should be taken (Sect. 10.7.4) which may require recalibration. Any Field or QC Samples that have been analyzed since the last acceptable calibration verification should be reanalyzed after adequate calibration has been restored, with the following exception. **If the CCV fails because the calculated concentration is greater than 130% (150% for the low-level CCV) for a particular method analyte, and Field Sample extracts show no detection for that method analyte, non-detects may be reported without re-analysis.**

10.9.4 REMEDIAL ACTION – Failure to meet CCV QC performance criteria may require remedial action. Major maintenance, such as cleaning the electrospray probe, atmospheric pressure ionization source, cleaning the mass analyzer, replacing the LC column, etc., requires recalibration (Sect 10.6) and verification of sensitivity by analyzing a CCV at or below the RL (Sect 10.7).

10.10 EXTRACT ANALYSIS

10.10.1 Establish operating conditions equivalent to those summarized in Tables 6-8 of Section 16. Instrument conditions and columns should be optimized prior to the initiation of the IDC.

10.10.2 Establish an appropriate retention time window for each analyte. This should be based on measurements of actual retention time variation for each method analyte in CAL standard solutions analyzed on the LC over the course of time. A value of plus or minus three times the standard deviation of the retention time obtained for each method analyte while establishing the initial calibration and completing the IDC can be used to calculate a suggested window size. However, the experience of the analyst should weigh heavily on the determination of the appropriate retention window size.

10.10.3 Calibrate the system by either the analysis of a calibration curve (Sect. 10.6) or by confirming the initial calibration is still valid by analyzing a CCV as described in Section 10.7. If establishing an initial calibration, complete the IDC as described in Section 13.2.

10.10.4 Begin analyzing Field Samples, including QC samples, at their appropriate frequency by injecting the same size aliquots under the same conditions used to analyze the CAL standards.

10.10.5 At the conclusion of data acquisition, use the same software that was used in the calibration procedure to identify peaks of interest in predetermined retention time windows. Use the data system software to examine the ion abundances of the peaks in the chromatogram. Identify an analyte by comparison of its retention time with that of the corresponding method analyte peak in a reference standard.

10.10.6 Comparison of the MS/MS mass spectra is not particularly useful given the limited ±0.5 dalton mass range around a single product ion for each method analyte.

10.10.7 The analyst must not extrapolate beyond the established calibration range. If an analyte peak area exceeds the range of the initial calibration curve, the sample should be re-extracted with a reduced sample volume in order to bring the out of range target analytes into the calibration range. If a smaller sample size would not be representative of the entire sample, the following options is recommended. Re-extract an additional aliquot of sufficient size to insure that it is representative of the entire sample. Spike it with a higher concentration of internal standard. Prior to LC/MS analysis, dilute the sample so that it has a concentration of internal standard equivalent to that present in the calibration standard. Then, analyze the diluted extract.

11. Data Evaluation, Calculations and Reporting

11.1 Complete chromatographic resolution is not necessary for accurate and precise measurements of analyte concentrations using MS/MS. In validating this method, concentrations were calculated by measuring the product ions listed in Table 7.

11.2 Calculate analyte concentrations using the multipoint calibration established in Section 10.6. Do not use daily calibration verification data to quantitate analytes in samples. Adjust final analyte concentrations to reflect the actual sample volume determined in Section 10.6 where:

C_{ex} = (Area of target analyte * Concentration of Labeled analog) / (area of labeled analog * CF)

C_s = (C_{ex} / sample volume in ml) * 1000

C_{ex} = The concentration of the analyte in the extract
CF = calibration factor from calibration.

11.3 Prior to reporting the data, the chromatogram should be reviewed for any incorrect peak identification or poor integration.

11.4 PFHxS, PFOS, PFOA, NMeFOSAA, and NEtFOSAA have multiple chromatographic peaks using the LC conditions in Table 5 due to the linear and branch isomers of these compounds (Sect. 10.6.4.1). The areas of all the linear and branched isomer peaks observed in the CAL standards for each of these analytes must be summed and the concentrations reported as a total for each of these analytes.

11.5 Calculations must utilize all available digits of precision, but final reported concentrations should be rounded to an appropriate number of significant figures (one digit of uncertainty), typically two, and not more than three significant figures.

12. Contingencies for Handling Out-of-Control Data or Unacceptable Data

12.1 Section 9.0 outlines sample batch QC acceptance criteria. If non-compliant organic compound results are to be reported, the Organic Section Head and/or the Laboratory Director, and the Operations Manager must approve the reporting of these results. The laboratory Project Manager shall be notified, and may choose to relay the non-compliance to the client, for approval, or other corrective action, such as re-sampling and re-analysis. The analyst, Data Reviewer, or Department Supervisor performing the secondary review initiates the project narrative, and the narrative must clearly document the non-compliance and provide a reason for acceptance of these results.

12.2 All results for the organic compounds of interest are reportable without qualification if extraction and analytical holding times are met, preservation requirements (including cooler temperatures) are met, all QC criteria are met, and matrix interference is not suspected during extraction or analysis of the samples. If any of the below QC parameters are not met, all associated samples must be evaluated for re-extraction and/or re-analysis.

13. Method Performance

13.1 Detection Limit Study (DL) / Limit of Detection Study (LOD) / Limit of Quantitation (LOQ)

13.1.1 The laboratory follows the procedure to determine the DL, LOD, and/or LOQ as outlined in Alpha SOP ID 1732. These studies performed by the laboratory are maintained on file for review.

13.2 Demonstration of Capability Studies

13.2.1 The IDC must be successfully performed prior to analyzing any Field Samples. Prior to conducting the IDC, the analyst must first generate an acceptable Initial Calibration following the procedure outlined in Section 10.6.

13.2.2 INITIAL DEMONSTRATION OF LOW SYSTEM BACKGROUND – Any time a new lot of SPE cartridges, solvents, centrifuge tubes, disposable pipets, and autosampler vials are used, it must be demonstrated that an MB is reasonably free of contamination and that the criteria in Section 9.2.1 are met. If an automated extraction system is used, an MB should be extracted on each port to ensure that all the valves and tubing are free from potential PFAS contamination.

13.2.3 INITIAL DEMONSTRATION OF PRECISION (IDP) – Prepare, extract, and analyze four to seven replicate LCSs fortified near the midrange of the initial calibration curve according to the procedure described in Section 10. Sample preservatives as described in Section 6.2.1 must be added to these samples. The relative standard deviation (RSD) of the results of the replicate analyses must be less than 20%.

13.2.4 INITIAL DEMONSTRATION OF ACCURACY (IDA) – Using the same set of replicate data generated for Section 13.2.3, calculate average recovery. The average recovery of the replicate values must be within ± 30% of the true value.

13.2.5 INITIAL DEMONSTRATION OF PEAK ASYMMETRY FACTOR – Peak asymmetry factors must be calculated using the equation in Section 9.10.1 for the first two eluting peaks (if only two analytes are being analyzed, both must be evaluated) in a mid-level CAL standard. The peak asymmetry factors must fall in the range of 0.8 to 1.5. See guidance in Section 10.6.4.1 if the calculated peak asymmetry factors do not meet the criteria.

13.2.6 Refer to Alpha SOP ID 1739 for further information regarding IDC/DOC Generation.

13.2.7 The analyst must make a continuing, annual, demonstration of the ability to generate acceptable accuracy and precision with this method.

14. Pollution Prevention and Waste Management

14.1.1 Refer to Alpha's Chemical Hygiene Plan and Hazardous Waste Management and Disposal SOP for further pollution prevention and waste management information.

14.1.2 This method utilizes SPE to extract analytes from water. It requires the use of very small volumes of organic solvent and very small quantities of pure analytes, thereby minimizing the potential hazards to both the analyst and the environment as compared to the use of large volumes of organic solvents in conventional liquid-liquid extractions.

14.1.3 The analytical procedures described in this method generate relatively small amounts of waste since only small amounts of reagents and solvents are used. The matrices of concern are finished drinking water or source water. However, laboratory waste management practices must be conducted consistent with all applicable rules and regulations, and that laboratories protect the air, water, and land by minimizing and controlling all releases from fume hoods and bench operations. Also, compliance is required with any sewage discharge permits and regulations, particularly the hazardous waste identification rules and land disposal restrictions.

15. Referenced Documents

15.1.1 Chemical Hygiene Plan – ID 2124

15.1.2 SOP ID 1732 Detection Limit (DL), Limit of Detection (LOD) & Limit of Quantitation (LOQ) SOP

15.1.3 SOP ID 1739 Demonstration of Capability (DOC) Generation SOP

15.1.4 SOP ID 1728 Hazardous Waste Management and Disposal SOP

16. Attachments

Table 6: LC Method Conditions

Time (min)	**2 mM Ammonium Acetate (5:95 MeOH/H_2O)**	**2 mM Ammonium Acetate (100% Methanol)**
Initial	100.0	0.0
1.0	100.0	0.0
2.2	85.0	15.0
11	20.0	80.0
11.4	0.0	100.0
12.4	100.0	00.0
15.5	100.0	0.0
Waters Aquity UPLC ® BEHC_{18} 2.1 x 50 mm packed with 1.7 µm BEH C_{18} stationary phase Flow rate of 0.4 mL/min 2-5 µL injection		

Table 7: ESI-MS Method Conditions

ESI Conditions	
Polarity	Negative ion
Capillary needle voltage	.5 kV
Cone Gas Flow	20 L/hr
Nitrogen desolvation gas	1000 L/hr
Desolvation gas temp.	500 °C

Table 8: Method Analyte Source, Retention Times (RTs), and EIS References

#	Analyte	Transition	RT	IS	Type
1	M3PBA	216>171	2.65		REC
2	PFBA	213 > 169	2.65	2: MPFBA	
3	M4PFBA	217 > 172	2.65	1: M3PBA	EIS
4	PFPeA	263 > 219	5.67	4: M5PFPEA	
5	M5PFPEA	268 > 223	5.66	1: M3PBA	EIS
6	PFBS	299 > 80	6.35	6: M3PFBS	
7	M3PFBS	302 > 80	6.35	1: M3PBA	EIS
8	FtS 4:2	327 > 307	7.47	9: M2-4:2FTS	
9	M2-4:2FTS	329 > 81	7.47	1: M3PBA	EIS
10	PFHxA	303 > 269	7.57	10: M5PFHxA	
11	M5PFHxA	318 > 273	7.57	1: M3PBA	EIS
12	PFPeS	349 > 80	7.88	18: M3PFHxS	

#	Analyte	Transition	RT	IS	Type
13	PFHpA	363 > 319	8.80	14: M4PFHpA	
14	M4PFHpA	367 > 322	8.80	1: M3PBA	EIS
15	L-PFHxS	399 > 80	8.94	18: M3PFHxS	
16	br-PFHxS	399 > 80	8.72	18: M3PFHxS	
17	PFHxS Total	399 > 80	8.94	18: M3PFHxS	
18	M3PFHxS	402 > 80	8.94	1: M3PBA	EIS
19	M2PFOA	415 > 370	9.7		REC
20	PFOA	413 > 369	9.7	23: M8PFOA	
21	br-PFOA	413 > 369	9.48	23: M8PFOA	
22	PFOA Total	413 > 369	9.7	23: M8PFOA	
23	M8PFOA	421 > 376	9.7	19: M2PFOA	EIS
24	FtS 6:2	427 > 407	9.66	25: M2-6:2FTS	
25	M2-6:2FTS	429 > 409	9.66	19: M2PFOA	EIS
26	PFHpS	449 > 80	9.78	33: M8PFOS	
27	PFNA	463 > 419	10.41	33: M8PFOS	
28	M9PFNA	472 > 427	10.41	19: PFOA	EIS
29	M2PFOS	501 > 80	10.45		REC
30	PFOS	499 > 80	10.45	33: M8PFOS	
31	br-PFOS	499 > 80	10.27	33: M8PFOS	
32	PFOS Total	499 > 80	10.45	33: M8PFOS	
33	M8PFOS	507 > 80	10.45	29: M2PFOS	EIS
34	FtS 8:2	527 > 507	10.99	38: M2-8:2FTS	
35	M2-8:2FTS	529 > 509	10.99	36: M2PFDA	EIS
36	M2PFDA	515 > 470	11.00		REC
37	PFDA	513 > 469	11.00	38: M6PFDA	
38	M6PFDA	519 > 474	11.00	36: M2PFDA	EIS
39	PFNS	549 > 80	11.02	38: M6PFDA	
40	NMeFOSAA	570 > 419	11.41	41: D3-NMeFOSAA	
41	d3-NMeFOSAA	573 > 419	11.41	36: M2PFDA	EIS
42	PFOSA	498 > 78	11.48	29: M8FOSA	
43	M8FOSA	506 > 78	11.48	19: M2PFOA	EIS
44	PFUnDA	563 > 519	11.51	41: M7-PFUDA	
45	M7-PFUDA	570 > 525	11.51	36: M2PFDA	EIS
46	PFDS	599 > 80	11.51	45: M7-PFUDA	
47	NEtFOSAA	584 > 419	11.68	48: d5-NEtFOSAA	
48	d5-NEtFOSAA	589 > 419	11.68	36: M2PFDA	EIS
49	PFDoA	613 > 569	11.96	50: MPFDOA	
50	MPFDOA	615 > 570	11.96	36: M2PFDA	EIS
51	PFTriA	663 > 619	12.34	50: MPFDOA	

#	Analyte	Transition	RT	IS	Type
52	PFTeA	713 > 669	12.6	53: M2PFTEDA	
53	M2PFTEDA	715 > 670	12.6	36: M2PFDA	EIS
54	M3HFPO-DA	329>285	7.97	1: M3PFBA	EIS
55	HFPO-DA	332>287	7.97	54: M3HFPO-DA	
56	ADONA	377>251		23: M8PFOA	
57	PFHxDA	813>769	13.2	53:M2PFTEDA	
58	PFODA	913>869	13.5	53:M2PFTEDA	

Attachment E

Alpha Analytical PFAS Sampling Procedures

EPA 537 (PFAS) Field Sampling Guidelines

Sampling for PFASs via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

Field Clothing and PPE

- No clothing or boots containing Gore-Tex®
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

Sample Containers

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene (no Teflon® -lined caps)

Wet Weather (as applicable)

Wet weather gear made of polyurethane and PVC only

Equipment Decontamination

- “PFAS-free” water on-site for decontamination of sample equipment. No other water sources to be used.
- Only Alconox and Liquinox can be used as decontamination materials

Food Considerations

- No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

Other Recommendations

Sample for PFAS first! Other containers for other methods may have PFAS present on their sampling containers

Field Equipment

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS
- Coolers filled with regular ice only. Do not use chemical (blue) ice packs.

EPA Method 537 (PFAS) Sampling Instructions

Please read instructions entirely prior to sampling event.

*Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling.

Each sample set* requires a set of containers to comply with the method as indicated below.
*sample set is composed of samples collected from the same sample site and at the same time.

Container Count	Container Type	Preservative
3 Sampling Containers - Empty	250 mL container	Pre preserved with 1.25 g Trizma
Reagent Water for Field Blank use	250 mL container	Pre preserved with 1.25 g Trizma
1 Field Blank (FRB) Container - Empty	250 mL container	Unpreserved

**** Sampling container <u>must be filled to the neck</u>. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers****

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be prefilled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.
4. **If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.**

Both the <u>empty</u> Reagent Water container and the <u>filled</u> Field Blank container must be returned to the laboratory along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc® bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information. Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your project manager with additional questions or concerns.

Attachment F

Alpha Analytical 1,4-Dioxane Sampling Procedures

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Revision: 3

1,4-Dioxane - Method 522 Sample Collection Instructions

- Allow water to run and flush the system (approximately three to five minutes). Collect samples from running water.
- For each sample, fill two sodium sulfite (solid dechlorination reagent) preserved 500mL wide mouth amber sample containers. Note: It is recommended that additional sample containers be collected for two samples for the required sample duplicate and matrix spike.
- Fill containers to near the top, being careful not flush out the dechlorination reagent. Samples do NOT need to be collected headspace-free.
- Cap the container and agitate the container until the dechlorination reagent dissolves.
- Carefully add approximately 1.0 mL (~20 drops) of sodium bisulfate, microbial inhibitor (using graduated pipette and preservative solution provided by Alpha).
- Recap container and mix sample and preservatives well.

Note: Reagents provided may be caustic. Please take necessary precautions to avoid skin contact. MSDS may be provided upon request.

Please call our Client Services Department at 800-624-9220 for additional guidance.

Thank you for using Alpha Analytical Labs!

Attachment G

SGS Accutest User Guide

PFAS USER GUIDE

ANALYSES OF PER- AND POLYFLUORO ALKYL SUBSTANCES (PFAS) BY LC-MS/MS

WHAT ARE PFAS COMPOUNDS?

Per- and Polyfluoroalkyl Substances (PFAS) are classified as contaminants of emerging concern (CECs) based on increasing environmental and health concerns and consequent developing regulatory standards. Comprising a class of over 3,000 identified fluorinated compounds; they are used in the manufacture of many products such as PTFE (polytetrafluorethylene), textile coatings, firefighting foams, semi-conductors, paper and packaging coating additives, cleaning products, pesticides and metal plating process agents. The C-F bond is the strongest known in organic chemistry, making PFAS persistent in the environment. Longer chain PFAS are bioaccumulative as well. Key PFAS classes of concern include perfluoroalkyl carboxylic acids (PFCAs) such as PFOA, and perfluoroalkyl sulfonic acids (PFSAs) such as PFOS. Many PFAS will transform in the environment or via biological processes to form PFCAs or PFSAs.

There are no federal drinking water standards established for PFAS substances. However, in 2016, the EPA released drinking water health advisories of 70 parts per trillion for the sum of PFOS and PFOA to protect Americans from adverse health effects caused over a lifetime of exposure. Other countries, and select U.S. states have implemented regulations for a broader group of PFAS and the development of regulatory guidance is on-going.

BENEFITS OF SERVICE

As an emerging contaminant requiring evolving analytical methods, it is important that you get the highest degree of positive identification and accurate quantification. Analytical methods must be rugged and use defined best practices updated to reflect current understanding. SGS provides you industry leading testing experience over 16 years and more than 80,000 processed PFAS samples. SGS has multiple facilities in North America with broad accreditation scope including DoD, NELAP, and ISO17025.

We support your PFAS needs by:

- ANALYSIS of PFAS compounds of concern with the widest range of PFAS analytes and matrices available commercially
- INSTRUMENTAL CAPACITY to address growing market demands for volume and turn-around-time with our network of 12 LC/MS/MS instruments available for PFAS analysis
- TOP (Total Oxidizable Precursor) analysis - providing you comprehensive information on unknown precursors at your site
- METHOD DEVELOPMENT - adapting to changing analytical needs. PFAS analytical methodologies and regulations are in a state of rapid transition. SGS AXYS is at the forefront of these changes, through collaboration with leading technical and regulatory groups. As the PFAS analytical requirements change, SGS helps you meet your evolving PFAS data needs.

SGS has a wide variety of analytical options to support many and varied PFAS studies. Your SGS representative can assist you to determine the right service for your needs.

TOTAL OXIDIZIABLE PRECURSORS (TOPS)

TOP is an analytical procedure for transforming PFAS Precursors in a sample to measurable perfluorinated carboxylic acids (C4-C14), and is used to estimate potential PFCA contributions from unknown precursors. TOP uses persulfate-mediated hydroxyl radical oxidation to convert precursors to terminal PFCAs. The analysis may be applied with pre- and post-conversion measurements. The measured increase in PFCAs in the post-conversion analysis compared to pre-conversion values, represents a measure of the potential precursors in the sample. This data may be useful to clients concerned with studying overall PFAS in specific environments/sites, and to provide comprehensive assessments of remediation success.

CONTINUED COMPETITIVE ADVANTAGE

Our unrivalled analytical experience, capabilities and capacity offer you the best choice for your PFAS testing needs.

Consequently, SGS is the first choice for many government agencies, consultants and EHS managers. Our continuous improvement and quality control practices ensure comprehensive, current and defensible data.

Our PFAS Analyses include:

- A wide range of matrices to analyze 24 - 33 PFAS compounds in water, soil, sediments, biosolids and tissues/biofluids.
- Specific analyte lists applicable to air, biological tissue and serum are available
- Specialized tests for precursors such as PAPs, diPAPs, FTCAs, FTUCAs etc, and for isomer speciation.
- Use of isotope dilution/internal standard methods in all matrices except prescriptive EPA 537 drinking water analysis
- Best in class reporting limits for low level PFAS work
- 8 dedicated LC/MS/MS instruments specifically for PFAS analysis in our network
- Technical expertise with more than 30 years of analytical experience and over 80,000 samples processed for PFAS
- Multiple accreditations including DoD, ELAP/TNI and ISO17025
- Demonstrated analytical proficiency demonstrated through regular PE studies and worldwide inter-calibration studies
- The most experienced technical assistance available for SGS clients

PFAS ANALYTES

ANALYTE	ACRONYM	CAS #	REPORT LISTS*										CERTS	
			PFOA PFOS GENX	UCMR3 List	EPA 537 List	EPA 537.1 List	NH Short List	NH Long List	TCEQ List	NY List	MI List	QSM 5.1 "List"	DOD ELAP	FL NELAC
PERFLUOROALKYL CARBOXYLIC ACIDS														
Perfluorobutanoic acid	PFBA	375-22-4					X	X	X	X	X	X	X	X
Perfluoropentanoic acid	PFPeA	2706-90-3					X	X	X	X	X	X	X	X
Perfluorohexanoic acid	PFHxA	307-24-4			X	X	X	X	X	X	X	X	X	X
Perfluoroheptanoic acid	PFHpA	375-85-9		X	X	X	X	X	X	X	X	X	X	X
Perfluorooctanoic acid	PFOA	335-67-1	X	X	X	X	X	X	X	X	X	X	X	X
Perfluorononanoic acid	PFNA	375-95-1		X	X	X	X	X	X	X	X	X	X	X
Perfluorodecanoic acid	PFDA	335-76-2			X	X		X	X	X	X	X	X	X
Perfluoroundecanoic acid	PFUnDA or PFUnA	2058-94-8			X	X		X	X	X	X	X	X	X
Perfluorododecanoic acid	PFDoDA or PFDoA	307-55-1			X	X		X	X	X	X	X	X	X
Perfluorotridecanoic acid	PFTrDA	72629-94-8			X	X		X	X	X	X	X	X	X
Perfluorotetradecanoic acid	PFTeDA	376-06-7			X	X		X	X	X	X	X	X	X
PERFLUOROALKYL SULFONIC ACIDS														
Perfluorobutanesulfonic acid	PFBS	375-73-5		X	X	X	X	X	X	X	X	X	X	X
Perfluoropentanesulfonic acid	PFPeS	2706-91-4									X	X	X	X
Perfluorohexanesulfonic acid	PFHxS	355-46-4		X	X	X	X	X	X	X	X	X	X	X
Perfluoroheptanesulfonic acid	PFHpS	375-92-8						X		X	X	X	X	X
Perfluorooctanesulfonic acid	PFOS	1763-23-1	X	X	X	X	X	X	X	X	X	X	X	X
Perfluorononanesulfonic acid	PFNS	474511-07-4									X	X	X	X
Perfluorodecanesulfonic acid	PFDS	335-77-3						X	X	X	X	X	X	X
PERFLUOROOCTANE SULFONAMIDES														
Perfluorooctane sulfonamide	FOSA or PFOSA	754-91-6						X	X	X	X	X	X	X
N-Methyl perfluorooctane sulfonamide	N-MeFOSA	31506-32-8						X*					X	X
N-Ethyl perfluorooctane sulfonamide	N-EtFOSA	4151-50-2						X*					X	X
PERFLUOROOCTANE SULFONAMIDO ACETIC ACIDS														
N-Methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9			X	X				X	X	X	X	X
N-Ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6			X	X				X	X	X	X	X
PERFLUOROOCTANE SULFONAMIDO ETHANOLS														
N-Methyl perfluorooctane sulfonamidoethanol	N-MeFOSE	24448-09-7						X*					X	X
N-Ethyl perfluorooctane sulfonamidoethanol	N-EtFOSE	1691-99-2						X*					X	X
FLUOROTELOMER SULFONATES														
4:2 Fluorotelomer sulfonate	4:2 FTS	757124-72-4									X	X	X	X
6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2						X		X	X	X	X	X
8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4						X		X	X	X	X	X
PERFLUOROETHER CARBOXYLIC/SULFONIC ACIDS (PFECA/PFESA)														
Tetrafluoro-2-(heptafluoropropoxy)-propanoic acid (GenX)	HFPO-DA	13252-13-6	X			X		X						
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4				X								
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1				X								
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9				X								

Updated February 2019 | Custom report lists are available | *Available at SGS Axys & Wilmington labs

Please contact the laboratory for DL, LOD and LOQ

SAMPLING, SHIPPING & HANDLING

MATRIX	CONTAINER	PRESERVATIVE	MATRIX CODE ON COC	METHOD	NOTES
Soil, sediment	1x4 oz. HDPE	none	SO/SED	537 performance-based	
Groundwater, surface water, water	2x125 ml HDPE	none	GW/SW/WW	537 performance-based	
Groundwater, surface water, water needing lower RLs	2x250 ml HDPE	none	GW/SW/WW	537 performance-based	
Effluent	2x125 ml HDPE	TRIZMA	WW or EF	537 performance-based	Finished samples may need TRIZMA. TRIZMA is a buffer and removes free chlorine.
Drinking water	2x250 ml HDPE or PP	TRIZMA	DW	537	
Drinking water not for compliance	2x250 ml HDPE	TRIZMA	WW	537 performance-based	Matrix code DW triggers the lab to use method 537 so samples need to be logged as WW.
Air					contact Orlando lab for specifics
Tissue					contact SGS AXYS for specifics

SAMPLING GUIDELINES

When sampling for PFAS, use best practices prior to and during sampling to avoid residual PFAS on sampling equipment, cross contamination issues, and sample heterogeneity in high surfactant situations. Your SGS project manager can provide more information.

Using new nitrile gloves, collect the sample for PFAS first, prior to collecting samples for any other parameters into any other containers. This avoids contact with any other type of sample containers, bottles or package materials.

Do not place the sample bottle cap on any other surface when collecting the sample.

Avoid all contact with the inside of the sample bottle or its cap.

When the sample is collected and capped, place the sample bottle(s) in an individual sealed plastic bag (e.g. Ziploc) separate from all other sample parameter bottles. To facilitate whole container aqueous analysis, it may be necessary to provide samples of different bottle sizes.

DO NOT USE ITEMS	DO USE ITEMS
FIELD EQUIPMENT ITEMS	
No Teflon™ containing materials	High-density polyethylene (HDPE) and polypropylene (PP) materials
Do not store samples in containers made of LDPE materials	Acetate liners
No Teflon™ tubing	Silicon tubing
No waterproof field books	Loose paper (non-waterproof)
No plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
No Post-It Notes	Sharpies®, pens
No chemical (blue) ice packs	Regular ice
FIELD CLOTHING AND PPE ITEMS	**FIELD CLOTHING AND PPE ITEMS**
No new clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of synthetic or natural fibers (preferably cotton)
No clothing laundered using fabric softener	No fabric softener
No boots containing Gore-Tex™	Boots made with polyurethane and polyvinyl chloride (PVC)
No Tyvek®	Cotton Clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling	Sunscreens – All Organic Natural Sunscreen, that are "free" or "natural". Check the label Insect Repellents – Natural preparations, DEET (check the label)
SAMPLE CONTAINERS ITEMS	**SAMPLE CONTAINERS ITEMS**
No LDPE or glass containers	HDPE or polypropylene
No Teflon™-lined caps	Lined or unlined HDPE or polypropylene caps
RAIN GEAR ITEMS	**RAIN GEAR ITEMS**
No waterproof or resistant rain gear	Tent that is only touched or moved prior to & following sampling activities
EQUIPMENT DECONTAMINATION ITEMS	**EQUIPMENT DECONTAMINATION ITEMS**
No Decon 90	Alconox® and/or Liquinox®
No water from an on-site well	Potable water from municipal drinking water supply
FOOD ITEMS	**FOOD ITEMS**
No food and drink, with exceptions noted on the right	Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area

SHIPPING

Please include a fully completed chain-of-custody with each shipment. All sample documentation must be received for the samples to be accepted for analysis.

Samples are accepted Monday through Friday from 8 am – 5 pm. Samples are accepted Saturday delivery by Federal Express only. Other arrangements may be made as necessary.

ACCREDITATIONS SUMMARY

STATE	POTABLE WATER (SDWA)	NON-POTABLE WATER (CWA)	SOLID AND CHEMICAL MATERIALS (RCRA)	TISSUE	SERUM PLASMA
Alabama	O* W*	O* W* S*	O* S*		
Alaska	O W	O W	O		
Arizona	O	O* W* S*	O* S*		
Arkansas	O* W*	O* W* S*	O* S*		
California	O	O* W* S*	O* S*		
Colorado	O* W*	O* W* S*	O* S*		
Connecticut	O* W*	O* W* S*	O* S*		
Delaware		O* W* S*	O* S*		
DoD ELAP/ISO 17025	O W	O S	O S		
DoD QSM 5.1.1., Table b-15	NA	O S	O S		
Florida	O W	O S	O S	S	
Georgia	O* W*	O* W* S*	O* S*		
Hawaii	O* W*	O* W* S*	O* S*		
Idaho		O* W* S*	O*		
Illinois	O* W*	O* W* S*	O* S*		
Indiana	O* W*	O* W* S*	O* S*		
Iowa	O* W*	O* W* S*	O* S*		
Kansas	O	O* W* S*	O*		
Kentucky	O* W*	O* W* S*	O* S*		
Louisiana	O W	O	O		
Maine	W	W* S*			
Maryland	O* W*	O* W* S*	O* S*		
Massachusetts	O* W*	O* W* S*	O* S*		
Michigan	O* W*	O* W* S*	O* S*		
Minnesota	W	W S	S	S	
Mississippi	O* W*	O* W* S*	O* S*		
Missouri		O* W* S*	O* S*		
Montana	W	O* W* S*	O* S*		
Nebraska	O	O* W* S*	O*		
Nevada	O	O	O		
New Hampshire	O W	O W	O		
New Jersey	O W	O W S	O S	S	
New Mexico	O* W*	O* W* S*	O* S*		
New York	O W	O* W* S*	O* S*		
North Carolina	O* W*	O* W* S*	O* S*		
North Dakota	O W	O* W* S*	O* S*		
Ohio	W*				
Oklahoma	O* W*	O* W* S*	O* S*		
Oregon	O W	O	O		
Pennsylvania	O W	O* S*	O* S*		
Rhode Island	O*	O*	O* S*		
South Carolina	O* W*	O* W* S*	O* S*		
South Dakota	O* W*	O* W* S*	O* S*		
Tennessee		O* W* S*	O* S*		
Texas	O* W*	O* W* S*	O* S*		
Utah	O	O	O		
Vermont	O W	O* W* S*	O* S*		
Virginia	O* W*	O* W* S*	O* S*		
Washington	O W	O S	O S		
West Virginia		O* S*	O* S*		
Wisconsin	W*	W* S*			
Wyoming		O* W* S*	O* S*		
ISO/IEC 17025		S**	S	S	S

Updated March 2019

O	Accreditation for Orlando, FL laboratory
S	Accreditation for SGS Axys, Sidney, BC laboratory
W	Accreditation for Wilmington, NC laboratory
*	Accreditation not required under this state program, o is either not needed or is covered under another program (different matrix, NELAP, etc.). SGS is fully qualified to perform work for this program.
**	The ISO 17025 accreditation granted by Canada does not distinguish between potable and non-potable water. In some Canada jurisdictions labs are required to have separate licensing; in addition to accreditation. SGS AXYS does not hold any accreditation, licensing, or recognition specific for drinking water.
NOTE	SGS AXYS Analytical Services Ltd. is now certified in Total Oxidizable Precursors (TOP) in Canada. This is a new test that includes a measurement of sample PFAS content plus the potential of the sample to form PFAS from the presence of PFAS 'precursor' compounds.

GLOSSARY OF TERMS

AFFF	Aqueous film forming foams
ASTM	American Society for Testing and Materials
CWA	Clean Water Act
CoC	Contaminant of concern
CoPC	Contaminant of potential concern
DoD	Department of Defense
DW	Drinking water
EPA	Environmental Protection Agency
FFTA	Firefighting training area
FRBs	Field Reagent Blanks
FTS	Fluorotelomer sulfonate
GC/MS	Gas chromatography/mass spectroscopy
GW	Ground Water
HAs	Health advisories
HDPE	High-density polyethylene
HPLC	High performance liquid chromatography
HRMS	High resolution mass spectrometry
ID	Isotope Dilution
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LC-MS/MS	Liquid chromatography tandem mass spectrometry
LDPE	Low-density polyethylene
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
MS	Matrix spike
MSD	Matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
ng/l	nanogram/liter
NPDES	National Pollution Discharge Elimination System
PAH	Polynuclear aromatic hydrocarbon
PE	Polyethylene
PFAS	Perfluoroalkyl and polyfluoroalkyl substance(s)
PFCs	Perluorinated compounds
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PHA	Provisional health advisory
PP	Polypropylene
PPE	Personal protective equipment
ppm	parts per million
ppt	parts per trillion
PTFE	Polytetrafluoroethylene
QA/QC	Quality Assurance/Quality Control
QSM	Quality systems manual
RCRA	Resource Conservation and Recovery Act
RL	Reporting limit
SDWA	Safe Drinking Water Act
SPE	Solid phase extraction
SW	Solid waste
TOP	Total Oxidizable Precursor
ug/l	microgram per liter

PFAS FREE DRILLING

SGS's North American Drilling Division has over 30 years of experience with more than 6,500 completed projects within the United States and the U.S. Virgin Islands. Our expansive, diverse fleet of drills ranges from the smallest Geoprobe 420M up to full size Sonic, Air Rotary, Mud Rotary, Dual Rotary and Hollow-Stem rigs.

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WHEN YOU NEED TO BE SURE

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Appendix D

Health and Safety Plan

Formerly ACCO Brands, Inc. Site

32-00 Skillman Avenue
Long Island City, New York
NYSDEC BCP Site No. C241061

HEALTH & SAFETY PLAN

Prepared for
Beam Suntory, Inc.
149 Happy Hollow Road
Clermont, KY 40110

FLS Project Number: 10195-001

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, New York 11101-5407

MAY 2018

Prepared by:

ARNOLD F. FLEMING P.E.

&

Fleming
Lee Shue

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Revision No.	Date	Summary of Revision
1	5/30/17	Update for ERH
2	5/1/18	Update PPE and monitoring for TCE & PCBs

LAWRENCE ENV LLC
ENVIRONMENTAL CONSULTANTS

Health and Safety Plan Certification

This is to certify that I, a Certified Industrial Hygienist (CIH), have reviewed the Health and Safety Plan (HASP), prepared by Fleming Lee Shue, Environmental Management & Consulting, dated May 2018 for the following site:

Formerly ACCO Brands, Inc. Site
32-00 Skillman Avenue
Long Island City, New York
NYSDEC VCP Site #V00331

Tom C. Eng

Tom C. Eng, CIH
ABIH Certification # 5291CP
Date: May 16, 2018

Lawrence ENV LLC
108 West 39th Street, Suite 500, New York, NY 10018 | Phone: 212.682.2001 | Fax: 212.682.1991

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PROJECT INFORMATION SHEET

Project/Site Name:	Formerly ACCO Brands, Inc.
Site Address:	32-00 Skillman Ave., Long Island City (Queens), NY
Project No:	10195-001
Client:	Beam Suntory, Inc.
Project Engineer:	Arnold F. Fleming, P.E.
FLS Project Manager:	Daniel DiRocco
FLS Project HSO:	Joel Kane
Date HASP Revised:	05/01/2018
Anticipated Dates of Site Work:	May 2018 – December 2018

1.0 INTRODUCTION

Fleming-Lee Shue, Inc. (FLS) and Arnold F. Fleming, P.E. prepared this Health and Safety Plan (HASP) on behalf of Beam Suntory, Inc. (Volunteer) to address the general health and safety practices and guidelines that will be employed during the remediation of the former ACCO Brands property, located at 32-00 Skillman Avenue, Long Island City, New York (Site). The Site is under the BCP as BCP Site No. C241061 administered by NYSDEC. The parcel is bounded on the north by Skillman Avenue, to the east by 32nd Place, to the south by Queens Boulevard and to the west by Van Dam Street. Figure 1 is a Site location map.

1.1 Purpose

The purpose of this HASP is to identify the real and potential hazards associated with environmental field activities and to stipulate appropriate health and safety procedures, particularly where hazardous materials are potentially present. The procedures and guidelines contained in this document are intended to minimize exposure to chemical, physical, and biological hazards that may be present in the soil, groundwater, or air, and to reduce the potential for accidents and injuries associated with the implementation of remedial action.

This HASP provides a description of site-specific personal protection levels and safe operating guidelines for use by FLS personnel. Contractors, subcontractors and their employees, working under the direction of FLS, can follow the procedures in this HASP if they choose. Otherwise, contractor and subcontractors must prepare their own HASP.

This HASP will be kept onsite during field activities and shall be accessible at all times. This HASP will be reviewed as necessary and will be amended or revised as conditions change and additional activities arise. All FLS and contractor/subcontractor personnel choosing to follow the procedures of this HASP will be required to sign the Acknowledgement Form (Attachment 1).

Description of Specific Tasks

This project involves the following tasks:

- Mobilization and equipment preparation
- Heavy Equipment – Boring and monitoring well installation
- Monitoring of electrical resistance heating (ERH) system by TRS
- Soil, groundwater, waste stream, and soil vapor sampling
- Handling waste material drums
- Implementation of enhanced in-situ bioremediation

- Installation and operation of remediation systems (i.e. soil vapor extraction, vapor mitigations systems, etc).

1.2 References

The procedures described in this document were developed in accordance with the provisions of Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard 29 CFR 1910.120 or 29 CFR 1926.65 and FLS' policies and procedures. The Occupational Safety and Health Act (1970) requires the following:

- Employers shall furnish each employee with a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.
- Employers must comply with occupational health and safety standards and rules, regulations and orders pursuant to the Act, that are applicable to company business and operations.
- All employees must comply with occupational health and safety standards and regulations under the Act, which are applicable to their actions and situations.
- Employees are encouraged to contact their immediate superior for information that will help them understand their responsibilities under the Act.

2.0 SITE INFORMATION

2.1 Site Description

The Site is located at 32-00 Skillman Avenue, Long Island City, New York and is identified as Block 245 and Lot 9 on the New York City Tax Map. The Site is approximately 1.8-acres and is bounded by Skillman Avenue to the north, Queens Boulevard to the south, 32nd Place to the east, and Van Dam Street to the west. The Site is designated as M1-4 for industrial and manufacturing use. Figure 1 shows the Site location.

The subject property is developed with a three-story commercial and light industrial building occupied by multiple tenants, including a newspaper printing facility on the ground floor and a two-story tennis and racquet ball club addition on the upper floors. The Responsible Party entered into the NYSDEC Voluntary Cleanup Program (VCP) in October 2000. Under the VCP soil and groundwater within the footprint of the basement area is designated the “Site” (formerly OU-1) while contaminated media related to the Site outside of the Site boundary is designated “off-site” (formerly OU-2). As of 2015 NYSDEC has changes the designation from OU-1 to “Site” and OU-2 to “Off-site”. Figure 2 shows the Site Plan.

Based on information published by the United States Geological Survey 7.5 Minute Series Topographic Map of Brooklyn New York Quadrangle, the Site is located at approximately 10 to 15 feet (ft.) above mean sea level. The topographic gradient of the Site and the surrounding area gradually slopes south- southwest towards Dutch Kills. The Site subsurface consists of interbedded sand and silt units that overlie a clay unit. The sand/silt unit ranges from approximately 33 to 43 ft. in thickness.

An on-site investigation was initiated in 2000 and an off-site investigation in 2001. TCE was identified in the soils and groundwater beneath the building in addition to off-site. Concentrations as high as 720,000 ppb have been identified in one of the on-site injection wells. This gross level of impact is indicative of free phrase TCE product, which is a Dense Non-Aqueous Phase Liquid (DNAPL). A DNAPL is a denser-than-water Non-Aqueous Phase Liquid (NAPL), i.e. a liquid that is both denser than water and is immiscible in or does not dissolve in water.

The Site has been undergoing active remediation since 2003, when the initial soil vapor extraction (SVE) system was activated. Remedial measures implemented include: SVE (2003 to present), air sparging (2004 to 2005), ozone injection (2005 to 2008) and chemical oxidation (2004 to 2010.) To date, these remedial measures have not been successful at removing the TCE source. The chemical oxidation treatment was effective for a limited period of time after treatment, but the TCE concentrations continued to rebound once the oxidant was spent. The rebound occurs due to the TCE desorbing into the sand from the underlying finer silt layer. A more detailed breakdown of past and current investigation and remediation, including isocontour maps and graphs of TCE concentrations over time is provided in the March 2015 Remedial Action Work Plan (RAWP).

Remediation by means of Electrical Resistivity Heating (ERH) began in September 2017 and is anticipated to continue until July 2018. ERH remediates the subsurface by heating the soils to 100^0 C or higher, causing the TCE to volatilize. This creates steam that carries the TCE to the surface where it is collected in a condensate stream that is run through Granulated Activated Carbon (GAC) before discharge to the sewer.

During this time the subsurface has been heated. A by-product of this heating is that we have observed some NAPL containing polychlorinated biphenyls (PCB) in the condensate. PCBs, which were not compounds of concern at this site, have NAPL concentrations measuring 48,300 mg/kg and 50,400 mg/kg. The NAPL was contained within the tanks holding the GAC and the volumes is expected to be very small, i.e., less than one-half liter. It is believed that trace levels of NAPL containing low levels of PCBs in soil were dissolved by steam stripped TCE that transported the low level PCBs in the soil and concentrated them in the condensate.

This observation prompted a re-evaluation of the HASP and review by a Certified Industrial Hygienist (CIH) who made upgrades to this HASP. This finding also prompted PCB panel testing of FLS staff who have been working at the site. PCBs were not detected in any of the three individuals tested.

The basement air and surfaces were sampled for PCBs by a third party (the electrodes were off at this time.) The sample results are as follows:

PCB Air Sampling Results Summary, $\mu g/m^3$

Compound	No. Samples	Min.	p25	p50	p75	Max.
Aroclor 1016	5	nd	nd	nd	nd	nd
Aroclor 1221	5	nd	nd	nd	nd	nd
Aroclor 1232	5	nd	nd	nd	nd	nd
Aroclor 1242	5	nd	nd	nd	0.53	0.55
Aroclor 1248	5	nd	nd	nd	nd	nd
Aroclor 1254	5	nd	nd	nd	nd	nd
Aroclor 1260	5	nd	nd	nd	nd	nd
Aroclor 1262	5	nd	nd	nd	nd	nd
Aroclor 1268	5	nd	nd	nd	nd	nd

nd – non-detect. Min. – minimum value; p25 – 25th percentile; p50 - 50th percentile (median), etc.

PCB air testing results were all far below Occupational Health & Safety Administration (OSHA) Time Weighted Average (TWA) Permissible Exposure Limits (PELs) and the more conservative American Conference of Governmental and Industrial Hygienists (ACGIH) TWA limits.

PCB Surface Sampling Results Summary, µg/100 cm^2

Compound	No. Samples	Min.	p25	p50	p75	Max.
Aroclor 1016	10	nd	nd	nd	nd	nd
Aroclor 1221	10	nd	nd	nd	nd	nd
Aroclor 1232	10	nd	nd	nd	nd	nd
Aroclor 1242	10	nd	nd	0.50	1.5	46
Aroclor 1248	10	nd	nd	nd	nd	1.5
Aroclor 1254	10	nd	nd	0.50	4.9	140
Aroclor 1260	10	nd	nd	nd	nd	nd
Aroclor 1262	10	nd	nd	nd	nd	nd
Aroclor 1268	10	nd	nd	nd	nd	nd

nd – non-detect. Min. – minimum value; p25 – 25th percentile; p50 - 50th percentile (median), etc.

There are no standards/guidelines for surface sample results. The prudent practice is to minimize surface concentrations through cleaning and housekeeping practices. Workers must also don the required PPE and follow the prescribed personal hygiene practices.

3.0 SCOPE OF WORK

This HASP addresses the general activities associated with the planned environmental remediation of the Site. These activities include, but are not limited to, the following:

- Mobilization/demobilization
    - Mobilization and demobilization of equipment and supplies
    - Establishment of Site access procedures, site security and work zones
- Pre-Remediation Activities
    - Site Inspection and Survey
    - Utility Clearance and Permitting
- Remedial Activities
    - Installation of monitoring wells and borings
    - Installation and operation of ERH
    - Implementation of enhanced in-situ bioremediation
    - Collection of soil, groundwater and soil vapor samples for monitoring and system optimization. Collection of air flux measurements from ERH system monitoring points

The planned remedial activities are detailed in the succeeding sections.

3.1 Proposed Remedial Action

Based on the comparative evaluation of proposed remedial alternatives as specified in the RAWP, Alternative 4 (Remediation via ERH with enhanced in-situ bioremediation) is recommended for the Site. The proposed remedial action for the Site consists of performing ERH treatment of the source contamination area on Site to achieve Track 4 SCOs. Remediation of the groundwater plume offsite would occur through enhanced in-situ bioremediation or other remedy. Site management would continue until asymptotic levels TCE are reached on and offsite.

Site-specific soil Cleanup objectives based on 6 NYCRR Part 375-1.8(f) were developed in conjunction with the proposed Remedial Alternative selection.

3.2 Scope of Electrical Resistance Heating Remedial Alternative

The ERH remedial alternative addresses the source contamination on the Site (formerly OU-1). The scope of the remediation is to remediate the most heavily impacted area as identified during the SRI. This area will be remediated to meet the Track 4 standards addressed in the RAWP. To accomplish this remediation in a safe manner, the following methods will be used:

1) Prior to the start of field work, fencing will be erected to prevent access by the general public. This will be supplemented with signs stating no site access.
2) A pre-treatment meeting will be scheduled with NYSDEC to review the proposed remediation.
3) All remedial activity will be reviewed by the Remedial Engineer and updates will be provided throughout the duration of the field work.
4) Utility mark-outs will be completed prior to any subsurface work.
5) Emergency contact numbers are provided in the attached HASP.
6) All remedial activities will be fully documented in a final report.

ERH passes an alternating electrical current through the soil and groundwater that requires treatment. When an electrical current is applied to the treatment volume, subsurface heating occurs due to the resistive properties of the soil. Subsurface heating continues and boils a portion of the soil moisture into steam. This in-situ steam generation occurs in all soil types, regardless of permeability. Electrical energy volatilizes the target contaminant and provides steam as a carrier gas to sweep the chlorinated VOCs to the vapor recovery (VR) wells. After the steam is condensed from the vapor stream and the extracted air is cooled to ambient conditions, the chlorinated VOC vapors are treated using conventional methods.

The design of the ERH treatment will be completed by TRS Group, Inc. (TRS) with guidance from FLS. The TRS design specifics and parameters utilized to develop the remedy are presented in the RAWP. The anticipated treatment volume of approximately 12,900 cubic yards (cu. yd.). Based on design preparations, it is anticipated that the ERH treatment will require 72 electrodes/vapor recovery wells. The electrodes will be installed in the saturated zone to a depth intersecting the confining clay layer. Seven temperature monitoring points are anticipated to be installed within the ERH treatment volume to monitor subsurface temperatures throughout the ERH remediation. The recovered vapors will be treated through vapor-phase GAC prior to discharge to the ambient air.

All activities associated with the remedial action, including permitting requirements, will be conducted in accordance with the applicable Federal, State and local rules and regulations.

3.3 Scope of Enhanced In-Situ Bioremediation

Enhanced in-situ bioremediation is the process by which biostimulation and bioaugmentation are used to promote the biodegradation of contaminants in the subsurface. Biostimulation is the addition of carbon substrate to the subsurface to encourage beneficial microbial growth. Bioaugmentation is the addition of microbes that will reductively dechlorinate the contamination. In this case, degradation of the remaining chlorinated compounds will be achieved through the use of naturally occurring bacteria - *Dehalococcoides*.

The injections will be conducted to achieve accelerated reduction of TCE concentrations in groundwater. To accomplish this remediation in a safe manner, the following methods will be used:

1) A pre-treatment meeting will be scheduled with NYSDEC to review the proposed remediation.
2) All remedial activity will be reviewed by the Remedial Engineer and updates will be provided throughout the duration of the field work.
3) Emergency contact numbers are provided in the attached HASP.
4) All remedial activities will be fully documented in the final report.

4.0 PROJECT ORGANIZATION AND PERSONNEL RESPONSIBILITIES

All personnel who participate in field activities will be required to attend a Health and Safety meeting prior to the commencement of field activities. These meetings will review the scope of work to be accomplished, any specific safety concerns, address safety questions and issues, and asses the condition of crew and equipment. The tailgate meeting represents the first opportunity to prevent an accident. The meeting will be noted and summarized in the field log.

All Site workers must review this HASP before entering the Site. The Health and Safety Officer (HSO) or designee will ensure that personnel have reviewed the HASP and will provide an opportunity to ask health and safety questions during attendance at a pre-field safety meeting. Field personnel will sign the acknowledgment form (Attachment 1) maintained on-Site during the remedial action work. The recommended health and safety guidelines in this document may be modified, if warranted, by additional information obtained prior to, or during Site investigation. The HSO will also maintain copies of pertinent health and safety records for all field personnel. The responsibilities of each personnel are listed below:

4.1 Health and Safety Officer

- Administers all aspects of the occupational health and safety program;
- Develops programs and technical guidance to identify and remove physical, chemical, and biological hazards from facilities, operations, and sites;
- Assists management and supervisors in the health and safety training of employees;
- Conducts inspections to identify unhealthy or unsafe conditions or work practices;
- Investigates all accidents and takes action to eliminate accident causes;
- Monitors to determine the degree of hazard to determine the protection levels and equipment required to ensure the safety of personnel;
- Evaluates on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator, modifications to the work plan and personnel protection levels;
- Monitors performance of all personnel to ensure compliance with the required safety procedures;
- Ensures that all personnel have been trained in proper site-safety procedures including the use of personal protective equipment (PPE), and have read and signed the Acknowledgment Form (Attachment 1);

- Halts work if necessary;
- Ensures strict adherence to the Site HASP; and
- Reviews personnel medical monitoring participation.

4.2 Project Manager

- Familiar with health and safety regulations related to area of responsibility.
- Directs and coordinates health and safety activities within area of responsibility.
- Ensures arrangements for prompt medical attention in case of serious injury
- Requires all employees supervised to use individual protective equipment and safety devices.
- Ensures that safety equipment is available, maintained, used, and stored correctly.
- Instructs and trains all persons within area of responsibility in health and safety requirements.
- Conducts frequent and regular health and safety inspections of work area. Directs correction of unsafe conditions.
- Conducts weekly safety briefings with all supervisors and/or workers.
- Requires all subcontractors and subcontractor personnel to comply with health and safety regulations.

4.3 All Personnel

The minimum personal qualifications for each individual participating in field activities are:

- OSHA-specific medicals including, but not limited to, audiometric testing under the hearing conservation program;
- Participation in the FLS Occupational Health Monitoring Program;
- Successful completion of the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]);
- Be familiar with and comply with proper health and safety practices;
- Use the required safety devices and proper PPE; and
- Notify HSO/supervisor immediately of unsafe conditions/acts, accidents, and injuries.

5.0 POTENTIAL CHEMICAL, PHYSICAL, AND BIOLOGICAL HAZARDS AND CONTROLS

This section discusses the potential chemical, physical, and biological hazards and controls associated with the remedial action tasks. A summary of potential site tasks, safety hazards and safety requirements is presented in Table 1.

5.1 Potential Chemical Hazards/Controls

Based on data collected during previous investigations at the Site, this HASP focuses on the identified chemicals of concern:

- Trichloroethene (elevated concentrations)
- Tetrachloroethene and daughter products (lower concentrations);
- Potassium permanganate (introduced during chemical injections, purple color);
- Regional Urban Fill: metals and SVOCs, polychlorinated biphenyls (PCBs)
- NAPL in GAC Tanks: PCBs
- Basement surfaces: low levels of PCBs

Caution should always be taken when handling soil and groundwater in urban areas specifically this area which has been filled to raise elevations since 1800s. The source of the various urban fill material is unknown and may be from various historic industrial sources (i.e. manufacturing processes, coal ash, petroleum industry, etc.). Attachment 2 lists the recognized and suspected health hazards, exposure limits, physical and chemical properties, recommended protection levels and symptoms of exposure for the chemicals known or suspected to be present at the Site. The chemical hazards will be minimized by limiting exposure of personnel to soil and groundwater and by the use of PPE.

5.2. Physical Hazards/Controls

Physical hazards potentially present at the Site include, but are not limited to, the following:

Hazard	Control
Slip, trip and fall (uneven terrain and slippery surfaces)	Avoid Uneven Terrain, Walk Slowly, Wear Sturdy/Supportive Shoes
Environmental (heat/cold) stress	A discussion of heat stress and cold stress and related illnesses and controls is provided in Attachment 3.
Subsurface/Aboveground Utilities	Ensure utility clearance has occurred in drilling area, respect subsurface utility marks. Inspect area where drill rig derrick will be hoisted for utilities.
Vehicular Traffic	Avoid working in high traffic areas. If necessary, use cones, reflective vests, and consider use of a flagman/additional protection.
Fire	Ensure class ABC fire extinguisher is nearby to work area when using equipment that can provide an ignition source (drill rigs, generators, power tools)
Noise hazards	Use ear plugs and/or ear muffs during drilling and boring.
Use of heavy equipment	Stay clear of heavy equipment during operation. Maintain eye contact with operator when approaching equipment.
Electrical resistance heating system	Access to treatment area (electrode field) limited to ERH trained competent persons and is controlled by fencing.

Anticipated Site operations do not include the need for specific operations such as, lockout/tag-out, scaffolds or confined spaces; therefore, these items are not addressed in this HASP. If Site activities require these operations, properly trained, experienced and competent personnel shall be utilized.

5.3 Biological Hazards/Controls

Hazard	Control
Bites or stings from insects/animals (particularly ticks) resulting in skin inflammation, disease, or allergic response	Keep exposed skin covered. Use insect repellant if necessary. Inspect yourself carefully after work is completed.
Allergens and toxins from plants and animals, producing dermatitis, rhinitis, or asthma	Keep exposed skin covered using proper PPE. Wash hands regularly.

6.0 HEALTH AND SAFETY PROTOCOL

6.1 Site Work Hazard Evaluation

An evaluation of the Site tasks must be conducted to identify potential hazards and anticipate hazard controls. Upon review of contaminant levels, physical hazards, and Site tasks, it has been determined that Level D protection will be implemented to start all field activities. Air monitoring and action levels for appropriate PPE levels is included in Table 2.

6.2. Training

Knowledge of the safety rules supplemented by compliance is essential to safety. New employees will be provided orientation training and will be furnished information and literature covering the company health and safety policies, rules, and procedures. This orientation training must be provided prior to the employee's visit to the Site.

All employees will have successfully completed the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]).

All personnel must read the HASP and project-specific RAWP, which contains the applicable regulations/standards for their job.

Prior to beginning work on-Site, and weekly thereafter, the Health and Safety Officer (HSO) will lead safety-training sessions and/or training meetings. These meetings will be conducted to provide information and training on new equipment, new procedures, new chemicals, refresher/remedial training in specific areas, or meet annual requirements. Such training may be held in conjunction with the safety briefings/meetings addressed elsewhere in this program.

If necessary, the HSO will ensure that employees are scheduled and provided specialized training as required. Examples of specified training include (but are not limited to).

- Safe handling/use of flammables, poisons, or toxics
- Confined space entry
- Hazard communication (hazardous chemicals)
- Slip, trip and fall hazards and fall protection
- Blood-borne Pathogens (Non-Medical)
- ERH-specific training

Specialized training will be documented in the employees' personnel records and/or in a master training record.

6.3 Contractor and Subcontractor Compliance

All FLS contracts and subcontracts require that state laws concerning health and safety will be observed by the subcontractor. The provisions of these health and safety responsibilities apply to subcontractors and their employees working for FLS. Failure to fulfill this requirement is a failure to meet the conditions of the contract.

6.4 Personal Hygiene

Eating, drinking and the use of tobacco products in the work area are prohibited. The use of alcohol or other non-prescription drugs by personnel that could impair the ability to function at the work site is prohibited. The use of some prescription drugs may impair the ability to function and can create safety problems on-site. Field personnel taking prescription medication should alert the HSO in case of an emergency. Dermal contact with groundwater should be avoided. This includes avoiding walking through puddles, pools, and mud, sitting or leaning on or against drums, equipment, or on the ground. Field personnel should wash their hands before eating, smoking, using the toilet, etc. Field personnel should wash their hands and face and shower (daily) as soon as possible after leaving the Site.

6.5 Levels of Personal Protection

PPE must be worn as required for each job in all operations where there is an exposure to hazardous conditions. Upon review of contaminant levels, physical and biological hazards, exposure routes and the nature of the field tasks, it has been determined that Level D protection will be used during field work. Total Organic Compounds will be measured using a photoionization detector (PID) instrument. If Total Organic Compound concentrations in the breathing zone meet or exceed 10 parts per million (ppm) for a sustained period of 10 minutes, based on the potential presence of trichloroethylene, work activities will be stopped and the area allowed to ventilate or mitigation measures will be employed to maintained Level D conditions. If PID readings in the breathing zone continue to meet or exceed 10 ppm, work will be stopped and the Site HSO and Project Manager contacted to evaluate upgrading to Level C. Protection levels are described in more detail in Section 4.6 and air monitoring is discussed in Section 6.

Level D protection

Level D applies to work in areas where the possibility of contact with potentially contaminated groundwater and soil exists. The protective equipment required for Level D includes, but is not limited to the following:

- Long sleeve shirt and long pants, coveralls optional
- Safety boots, with or composite steel toe
- Safety glasses
- Hard hat
- Reflective vest
- Disposable nitrile gloves
- Reusable over boots (kept on site) or disposable boot covers
- Hearing protection, to be used as needed

6.6 General Workplace Safety Rules

- Report unsafe conditions, accidents, injuries, or incidents to the HSO and Project Manager.
- Use eye and/or face protection where there is danger from flying objects or particles, (such as when grinding, chipping, burning and welding, etc.) or from hazardous chemical splashes.
- Dress properly. Loose clothing and jewelry shall not be worn.
- Keep all equipment in safe working condition. Never use defective tools or equipment.
- Report any defective tools or equipment to immediate supervisor.
- Properly care for and be responsible for all PPE.
- Do not leave materials in aisles, walkways, stairways, work areas, roadways, or other points of egress.
- Practice good housekeeping at all times.
- Training on equipment is required prior to unsupervised operation.
- During work, pause every few minutes and assess surrounding conditions.

- Crossing highways and major roadways is not recommended. Expect movement of cars and buses at any time along any roadway, regardless of traffic signals, stop signs, yield signs, etc.
- When walking on right-of-way or road-shoulders, keep a sharp lookout in both directions.
- For personal safety, be cognizant of your surroundings and ensure that equipment is properly secured.
- Place plastic disposable, single-use plastic sheeting on the ground surface to provide an additional layer to prevent direct contact with surfaces during groundwater sampling.

6.7 Housekeeping

- Proper housekeeping is the foundation for a safe work environment. It definitely helps prevent accidents and fires, as well as creating a professional appearance in the work area.
- Material will be piled or stored in a stable manner so that it will not be subject to falling.
- Combustible scrap, debris, and garbage shall be removed from the work area at frequent and regular intervals.
- Stairways, walkways, exit doors, in front of electrical panels, or access to firefighting equipment will be kept clear of materials, supplies, trash, and debris.

6.8 Fire Prevention

- All firefighting equipment shall be conspicuously located, accessible, and inspected periodically, and maintained in operating condition. An annual service check and monthly visual inspections are required for fire extinguisher.
- All employees must know the location of firefighting equipment in the work area and have knowledge of its use and application.

6.9 Industrial Hygiene and Occupational Health

- Toilet facilities shall be provided as required for the number of workers.
- A first aid kit and portable eyewash station shall be kept on site.
- An adequate supply of potable water shall be provided.

- When no medical facility is reasonably accessible (time and distance) to the worksite, a person who has a valid certificate of first aid training will be available at the worksite to render first aid.
- Employees must be protected against exposure to hazardous noise levels by controlling exposure or by use of proper PPE.
- Any FLS Activities will be assessed for lead exposure (particularly if drywall or any painted surfaces or abrasive blasting/grinding is involved) and/or asbestos exposure.

6.10 Construction Equipment Safety Rules

A discussion of health and safety issues related to FLS and AFF employees performing work in the vicinity of common construction elements, such as electrical; compressed gas cylinders; ladders; aerial lifts; cranes; welding and brazing; tools; safety railings and other fall protection; scaffolds; excavations and trenches; motor vehicles and mechanized equipment, is provided in Attachment 4.

6.11 Spill Containment Program

The cleanup of a chemical spill should only be done by knowledgeable and experienced personnel. Spill kits, consisting of absorbents and protective equipment should be available to clean up minor spills. A minor chemical spill is one that the FLS and AFF staff is capable of handling safely without the assistance of emergency personnel. All other chemical spills are considered major. For a major spill, contact the HSO.

Procedure for Responding to a Minor Chemical Spill

- Contact HSO to obtain guidance
- Alert people in immediate area of spill
- Wear PPE, minimum level D—**First assess the spill to determine whether you have sufficient protection to continue.**
- Confine spill to small area using absorbent, debris, soil etc.
- Absorb spill with vermiculite, dry sand, or oil-sorbent pads
- Collect residues, place in DOT-approved containers (labeled) and dispose as chemical waste

7.0 INDIVIDUAL HEALTH AND SAFETY PROGRAMS LISTING

The OSHA standards specify various individual programs that may be applicable to work performed on eligible sites. Highlights of these programs are provided below, and specific written programs or procedures may be included into this written program, attached, or developed separately, as necessary.

7.1 Hazard Communication Program

If employees are exposed to or work with hazardous chemicals at the job site, this program is required. Required elements of the written program include a master listing of chemicals; maintaining material safety data sheets on each chemical; and training of employees on the program, the chemicals exposed to, and material safety data sheets.

7.2 Respiratory Protection Program

If employees are exposed to hazardous/toxic chemical, paint or other gases, vapors, fumes, dusts, or mists above the National Institute for Occupational Safety and Health (NIOSH) permissible exposure limit (PEL), and/or employees wear respirators, this program is required. Program elements are written program for the selection, maintenance, care, and use of respirators; fit testing, training, and employee evaluation for use.

7.3 Occupational Noise Exposure/Hearing Conservation Program

If employees are exposed to noise levels above the permissible noise exposures, protection against the effects of noise and an effective hearing conservation program are required. Such a program would include elements such as a written program, noise monitoring, hearing evaluations and follow-on testing, PPE (hearing protection), and maintenance of medical records.

7.4 Assured Equipment Grounding Conductor Program

If the employer uses assured equipment grounding verses ground fault circuit interrupters to provide employee electrical grounding protection, this program is required. Program elements include the inclusion of all cord sets, receptacles and cord/plug connected equipment and tools; a written program; quarterly testing; recording of each test by logging, color coding, or other equally effective means; and designation of a competent person to run the program.

7.5 Fire Protection and Prevention

A fire protection and prevention program must be developed and followed throughout all phases of the construction and demolition work. Program elements include providing the specified firefighting equipment, periodic inspections of the same, providing fire alarm devices/system, and establishment and adherence to fire prevention practices.

7.6 Emergency Response Plan

If employees are engaged in emergency response to a hazardous substance/chemical release, an emergency response plan must be developed and implemented. Program elements include a written response plan, identification and training of responding employees, medical surveillance and consultation, and post response operations.

7.7 Asbestos Control Program

If employees are exposed to asbestos fibers in the workplace, then an initial monitoring for asbestos exposure must be made. If the monitoring results are above the PEL, this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, PPE, and training.

7.8 Lead Exposure Program

If employees are exposed to lead in the workplace, then an initial monitoring for lead exposure must be made. If the monitoring results are above the PEL, this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, PPE, and training.

7.9 Equipment Exhaust Control

As the remediation work will be performed in the basement of the subject property, the exhaust from gasoline and/or diesel powered equipment must by vented out of the work area. Contractors will be requested to use equipment equipped by exhaust scrubber units whenever possible. Portable high-volume vehicle exhaust systems will also be employed to vent the exhaust gasses out of the work area.

7.10 Building Access

FLS employees are prohibited from entering buildings or other structures deemed unsafe and/or structurally unsound.

8.0 AIR QUALITY MONITORING AND ACTION LEVELS

During any activity disturbing the soil, including drilling and electrode installation, air quality in the worker breathing zone will be monitored. Air quality will be regularly monitored using a PID during ERH operation.

8.1 COMMUNITY AIR MONITORING PROGRAM

Monitoring equipment will be used to measure total organic vapors, dust, and carbon monoxide. Equipment required includes a MultiRAE (to monitor total volatile organic and carbon monoxide concentrations) and a particulate monitor. Air monitoring requirements by field activity is specified in Table 1. The instruments will be calibrated daily or as necessary due to field conditions and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book. The action levels and required responses are listed in the Table 2.

9.0 SITE/WORK AREA MANAGEMENT

The Site control measures shall be implemented to protect the public and the personnel working on-Site. A typical Site work area will consist of an exclusion zone (EZ) where the actual field activity will take place, a contaminant reduction zone (CRZ), and a support zone (SZ) located outside the CRZ and EZ.

Levels of personal protection in the EZ will vary depending on air monitoring data, and will be specified by the Site HSO.

Fences, guardrails and access devices shall be provided and maintained by the construction contractor throughout the project activities in accordance with 29 CFR 1926. In addition, barricades, warning signs and devices, temporary lighting and other safety measures shall be provided by the construction contractor, as required, to protect Site personnel.

All visitors to the Site shall report first to the Contractor field office. Visitor access shall be limited to the SZ and Level D operation areas only, and shall be allowed only with the prior consent of the Contractor Site Manager. No visitor shall enter a work area unescorted by a Subcontractor or Contractor representative. The presence of any regulatory agency on-site shall be reported immediately to the Contractor Brownfield Site Manager.

9.1 Work Zones

Entry into the work zones begins once a person comes on-Site. This approach reflects the dynamic nature of the operations and the need for everyone to be aware of the conditions while on-site. Using the concept of three zones for the Site, the following areas are identified:

Exclusion Zone (EZ)

The EZ will be within a designated area to be determined based on where field activities will take place. No employee shall enter the EZ without the required training and PPE. In the event that an employee in the EZ requires a replacement or his/her protective suit or respirator filters, the employee shall exit the EZ and utilize proper decontamination procedures in the CRZ, replace or repair the defective PPE, then re-enter the EZ.

Contamination Reduction Zone (CRZ)

The CRZ will be within a designated area to be determined based on where field activities will take place. Personnel shall be aware of and follow all control procedures with respect to entering and exiting the CRZ, to ensure that they are not exposed to contaminants and to minimize the potential for contamination of personnel and the spread of contamination outside the EZ. These measures include having personnel follow the proper procedures for donning and doffing PPE and washing in the CRZ. The measures also address the decontamination procedures for use when moving equipment between zones. The CRZ shall consist of an area to drop off equipment, plastic bags to dispose of protective clothing, adequate soap and water for personnel and equipment decontamination and a means of capturing any wash water generated.

Support Zone

This area starts at the project/property fence line and extends to the entry to where field work will be conducted. In this area, all personnel required wear Level D PPE.

9.2 Personnel Decontamination

Decontamination of personnel consists of physically removing soil or contaminants using the correct procedures for washing and removal of PPE. Decontamination will take place in the designated decontamination zone using the stations in the CRZ:

- Station 1: Equipment Drop – Equipment used in the EZ, which can be reused when returning to work after breaks or at the end of the day, will be stored in a designated area.
- Station 2: Equipment Decontamination – If the equipment will be removed from the Site, the equipment will be washed or wiped with a mild soap solution (e.g. Alconox) and rinsed with clean water and wiped dry. Wash and rinse buckets with brushes will be set up along with containers for trash and water containment for disposal purposes. Plastic sheeting will be used to collect material for containerization and proper disposal.
- Station 3: PPE Decontamination – If reusable PPE, such as over boots or work gloves, are used for certain tasks, the PPE will be washed or wiped with a mild soap solution (e.g. Alconox) and rinsed with clean water and wiped dry. Wash and rinse buckets with brushes will be set up along with containers for trash and water containment for disposal purposes. Plastic sheeting will be used to collect material for containerization and proper disposal.
- Station 4: Change Out – Removal of disposable boot covers, gloves and coveralls. All PPE will be collected and containerized for proper disposal.

9.3 Equipment Decontamination

The following decontamination procedure will be implemented in the field after field equipment has come in contact with contaminated material.

- Rinse equipment in tap water
- Scrub equipment with non-phosphate detergent and tap water
- Rinse equipment with distilled water
- Allow equipment to air dry

10.0 EMERGENCY AND CONTINGENCY PLAN

Emergency communications will be maintained during all on-site field activities. Emergency contacts and their phone numbers are presented below. The route to the closest area hospital is shown on Figure 2.

A first aid kit will be available on-site at all times for any minor on-site injuries. Emergency medical assistance or ambulance can be reached by calling 911 for more severe injuries.

Key Personnel Emergency Phone Numbers

Emergency

New York City Police Department	911
New York City Fire Department	911
Emergency Medical Service (Ambulance)	911
National Response Center	(800) 424-8802
NYSDEC Spill Hotline	(800) 457-7362
Mount Sinai of Queens 25-10 30th Avenue Astoria, NY	(718) 932-1000

FLS Project Staff

Fleming-Lee Shue Office	(212) 675-3225
Arnold F. Fleming, P.E., Remedial Engineer	
Daniel DiRocco, FLS Sr. Project Manager	(973) 525-7706
Adam Conti, Health and Safety Officer	(410) 212-7879
Josh Golding, Site Supervisor	(917) 941-3484

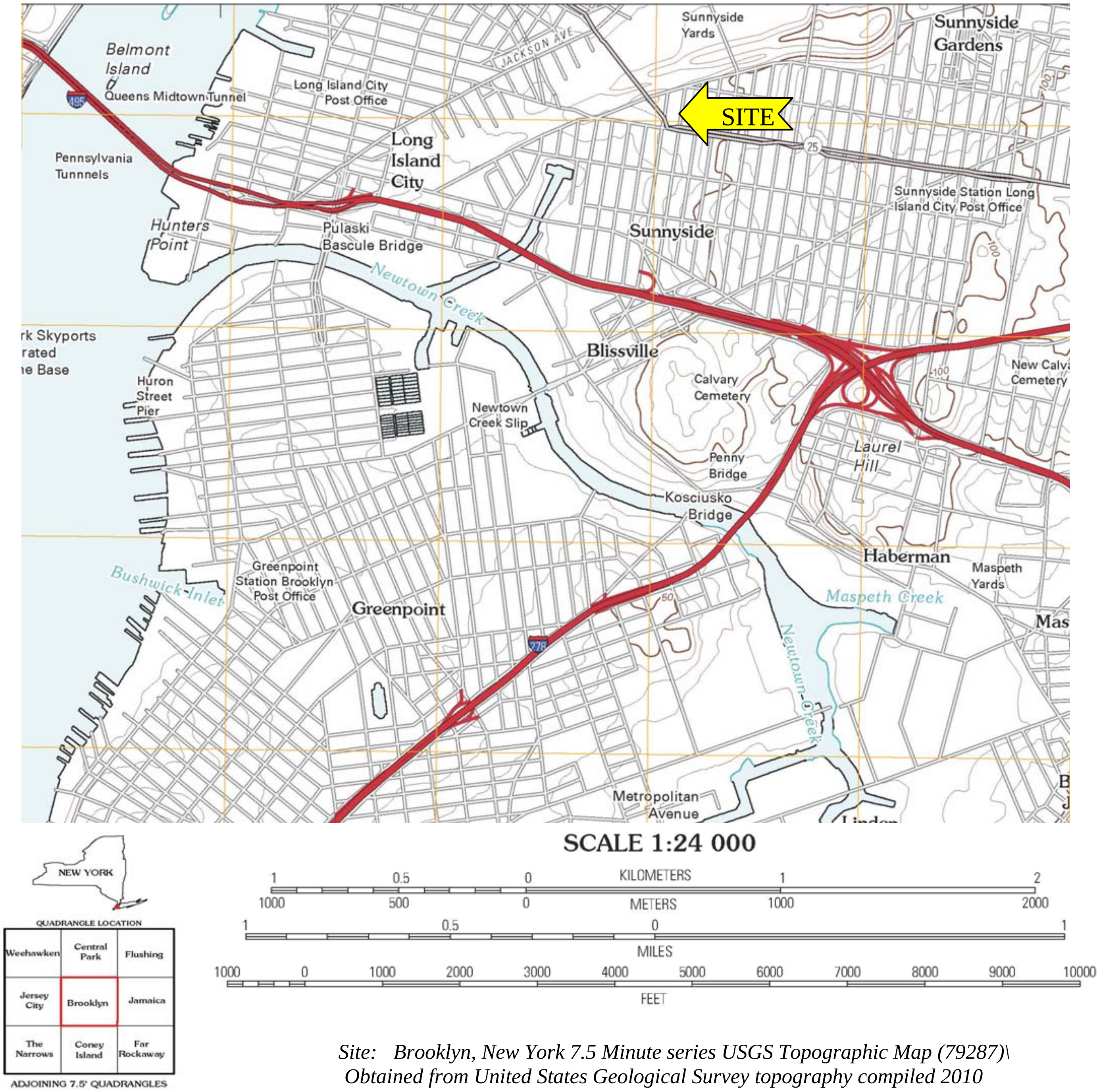
TRS Project Staff – Managing the OMM of the Electrical Resistance Heating System

Chris Blundy, Senior Project Manager

Emily Crownover, Project Engineer/Manager

Paul Greenberg, Assistant Project Manager

Figures



Site: Brooklyn, New York 7.5 Minute series USGS Topographic Map (79287)
Obtained from United States Geological Survey topography compiled 2010

Fleming
Lee Shue

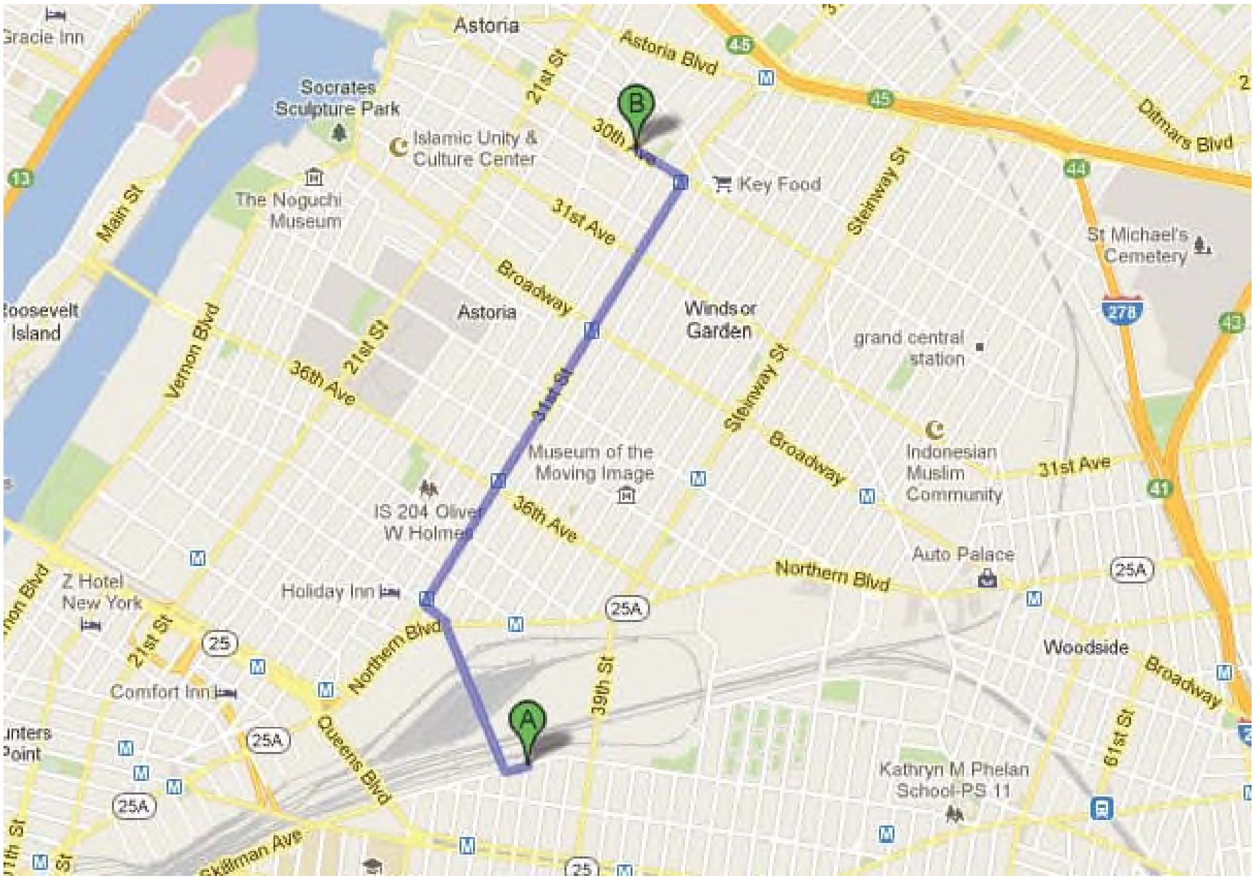
FIGURE 1: SITE LOCATION

SITE:	FORMER ACCO BRANDS 32-00 SKILLMAN AVENUE LONG ISLAND CITY, NEW YORK

Environmental Management & Consulting, 158 West 29th Street, 9th Fl., New York, NY 10001

Figure 2

Directions to Mount Sinai of Queens
25-10 30th Avenue
Astoria, NY 11102
(718) 932-1000



Driving Directions:	**Distance (miles)**
Start on 5th Street and 47th Avenue	0.1
Turn right onto 46th Road	0.4
Turn left onto 21st Street	2.1
Turn right onto 29th Avenue	0.2
Turn right onto 25th Street/Crescent Street	0.1
Arrive at 25-10 30th Avenue, Astoria	

Tables

Table 1
Tasks, Safety Hazards Safety Requirements

Task/Activity	Hazards	Preventative Measures	Air Monitoring Requirements
Installation and Implementation of Eletrical Resistance Heating	Subsurface utilities, vehicle hazards, trips, falls, materials handling. VOCs, DNAPL, CO, CO_2, LEL, noise, vibration	Clear utilities beforehand, exercise caution around equipment, wet area if necessary to control dust and odors. Level D PPE, hearing protection as required.	PID measurements for VOCs, particulate monitoring.
Implementation of Enhanced In-Situ Bioremediation	Subsurface utilities, vehicle hazards, trips, falls, materials handling. DNAPL, LEL, noise, vibration	Clear utilities beforehand, exercise caution around equipment. Level D PPE, hearing protection as required.	PID measurements for VOCs.
Groundwater Montoring	Vehicle hazards, trips, falls, materials handling, VOCs. DNAPL	Level D PPE.	Air monitoring not required

LEL - Lower Explosive Limit
PID - Photoionization detector
VOCs - Volatile organic compounds
DNAPL - Dense non-aqueous phase liquid

Table 2
Air Monitoring, Action Levels and Personal Protective Equipment

Instrument	Action Level	Response Action
Gas/Vapor		
PID	< 0.5 ppm total VOCs in the workers' breathing zone (WBZ)	Continue work
PID	> 0.5 ppm for a sustained period of 5 minutes in the WBZ	Briefly discontinue work and allow work area to vent.
PID	1 to 10 ppm in the WBZ	Briefly discontinue work and allow work area to vent. Notify HSO
	> 10 ppm for a sustained period of 5 minutes in the WBZ (confirmed absence of benzene)	Discontinue work and allow the work area to vent. Use mechanical ventilation as necessary. If after 15 minutes the PID reading is still greater than 10 ppm, notify HSO
	> 100 ppm for a sustained period of 5 minutes in the WBZ	Stop work. Resume work when readings are less than 100 ppm
Combustible Gas Indicator	Less than 20% LEL	Continue work
	Greater than 20% LEL	Stop work. Resume work when less than 20% LEL
Oxygen Monitor	Above 19.5% and less than 23.5%	Continue work
	Outside of this range	Stop work. Resume work when concentration is back in this acceptable range
Carbon Monoxide Monitor	Less than 25 ppm	Continue work
	Above 25 ppm	Stop work. Use mechanical ventilation as necessary. Resume work when less than 25 ppm.
Carbon Dioxide Monitor	< 1000 ppm	Continue work
	> 1000 ppm	Stop work. Use mechanical ventilation as necessary. Resume work when less than 1000 ppm.
Particulates		
Particulate Monitor	< 100 µg/m^3 above background (upwind location)	Continue work
	> 100 µg/m3 above background for a period of 5 minutes in the WBZ	Stop work. Apply dust suppression measures. Resume work only if < 100 µg/m^3 above background.

ATTACHMENT 1

Acknowledgment Form

HASP ACKNOWLEDGMENT FORM

The following personnel have read the site-specific HASP and are familiar with its provisions.

Print Name	*Signature*	*Company*	*Function*	*Date*

ATTACHMENT 2

Profiles of Chemicals of Concern/Material Safety Data Sheets

MATERIAL SAFETY DATA SHEET

CAIROX® Potassium Permanganate

Section 1 Chemical Product and Company Identification

PRODUCT NAME: CAIROX® potassium permanganate, $KMnO_4$

SYNONYMS:
Permanganic acid potassium salt
Chameleon mineral
Condy's crystals
Permanganate of potash

MANUFACTURER'S NAME: CARUS CHEMICAL COMPANY

MANUFACTURER'S ADDRESS:
Carus Chemical Company
1500 Eighth Street
P. O. Box 1500
LaSalle, IL 61301

TRADE NAME: CAIROX® potassium permanganate

TELEPHONE NUMBER FOR INFORMATION: 815/223-1500

EMERGENCY TELEPHONE NO: 800/435-6856

AFTER HOURS NO. 815/223-1565
5:00 PM-8:00 AM Central Standard Time
Monday-Friday, Weekends and Holidays

CHEMTREC TELEPHONE NO.: 800/424-9300

Section 2 Composition/Information on Ingredients

Material or component	CAS No.	%	Hazard Data	
Potassium permanganate	7722-64-7	97% min. $KMnO_4$	PEL-C	5 mg Mn per cubic meter of air
			TLV-TWA	0.2 mg Mn per cubic meter of air

Section 3 Hazards Identification

1. Eye Contact
   Potassium permanganate is damaging to eye tissue on contact. It may cause severe burns that result in damage to the eye.

2. Skin Contact
   Contact of solutions at room temperature may be irritating to the skin, leaving brown stains. Concentrated solutions at elevated temperature and crystals are damaging to the skin.

3. Inhalation
   Acute inhalation toxicity data are not available. However, airborne concentrations of potassium permanganate in the form of dust or mist may cause damage to the respiratory tract.

4. Ingestion
   Potassium permanganate, if swallowed, may cause severe burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Section 4 First Aid Measures

1. Eyes
   Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Do not attempt to neutralize chemically. Seek medical attention immediately. Note to physician: Soluble decomposition products are alkaline. Insoluble decomposition product is brown manganese dioxide.

2. Skin
   Immediately wash contaminated areas with large amounts of water. Remove contaminated clothing and footwear. Wash clothing and decontaminate footwear before reuse. Seek medical attention immediately if irritation is severe or persistent.

3. Inhalation
   Remove person from contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. Seek medical attention immediately.

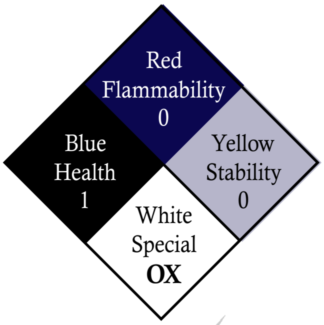
4. Ingestion
   Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water. Seek medical attention immediately.

Section 5 Fire Fighting Measures

NFPA* HAZARD SIGNAL

Health Hazard (less than 1 hour exposure) 1 = Materials which under fire conditions would give off irritating combustion products. Materials which on the skin could cause irritation.
Flammability Hazard 0 = Materials that will not burn.
Reactivity Hazard 0 = Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Special Hazard OX = Oxidizer

***National Fire Protection Association 704**



FIRST RESPONDERS:

Wear protective gloves, boots, goggles, and respirator. In case of fire, wear positive pressure breathing apparatus. Approach site of incident with caution. Use Emergency Response Guide NAERG 96 (RSPA P5800.7). Guide No. 140.

FLASHPOINT	None	
FLAMMABLE OR EXPLOSIVE LIMITS	Lower: Nonflammable	Upper: Nonflammable
EXTINGUISHING MEDIA	Use large quantities of water. Water will turn pink to purple if in contact with potassium permanganate. Dike to contain. Do not use dry chemicals, CO_2, Halon® or foams.	
SPECIAL FIREFIGHTING PROCEDURES	If material is involved in fire, flood with water. Cool all affected containers with large quantities of water. Apply water from as far a distance as possible. Wear self-contained breathing apparatus and full protective clothing.	

Section 6 Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Clean up spills immediately by sweeping or shoveling up the material. Do not return spilled material to the original container. Transfer to a clean metal drum. EPA banned the land disposal of D001 ignitable waste oxidizers. These wastes must be deactivated by reduction. To clean floors, flush with abundant quantities of water into sewer, if permitted by Federal, State, and Local regulations. If not permitted, collect water and treat chemically (Section 13).

PERSONAL PRECAUTIONS

Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean-up.

Section 7 Handling and Storage

WORK/HYGENIC PRACTICES

Wash hands thoroughly with soap and water after handling potassium permanganate, and before eating or smoking. Wear proper protective equipment. Remove contaminated clothing.

VENTILATION REQUIREMENTS

Provide sufficient area or local exhaust to maintain exposure below the TLV-TWA.

CONDITIONS FOR SAFE STORAGE

Store in accordance with NFPA 430 requirements for Class II oxidizers. Protect containers from physical damage. Store in a cool, dry area in closed containers. Segregate from acids, peroxides, formaldehyde, and all combustible, organic or easily oxidizable materials including anti-freeze and hydraulic fluid.

Section 8 Exposure Controls/Personal Protection

RESPIRATORY PROTECTION

In the case where overexposure may exist, the use of an approved NIOSH-MSHA dust respirator or an air supplied respirator is advised. Engineering or administrative controls should be implemented to control dust.

EYE

Faceshield, goggles, or safety glasses with side shields should be worn. Provide eye wash in working area.

GLOVES

Rubber or plastic gloves should be worn.

OTHER PROTECTIVE EQUIPMENT

Normal work clothing covering arms and legs, and rubber or plastic apron should be worn.

Section 9 Physical and Chemical Properties

APPEARANCE AND ODOR	Dark purple solid with a metallic luster, odorless
BOILING POINT, 760 mm Hg	Not applicable
VAPOR PRESSURE (mm Hg)	Not applicable
SOLUBILITY IN WATER % BY SOLUTION	6% at 20ºC (68ºF), and 20% at 65ºC (149ºF)
PERCENT VOLATILE BY VOLUME	Not volatile
EVAPORATION RATE (BUTYL ACETATE=1)	Not applicable
MELTING POINT	Starts to decompose with evolution of oxygen (O_2) at temperatures above 150ºC (302ºF). Once initiated, the decomposition is exothermic and self-sustaining.
OXIDIZING PROPERTIES	Strong oxidizer
SPECIFIC GRAVITY	2.7 @ 20ºC (68ºF)
VAPOR DENSITY (AIR=1)	Not applicable

Section 10 Stability and Reactivity

STABILITY Under normal conditions, the material is stable.

CONDITIONS TO AVOID Contact with incompatible materials or heat (>150ºC/302ºF).

INCOMPATIBLE MATERIALS Acids, peroxides, formaldehyde, anti-freeze, hydraulic fluids, and all combustible organic or readily oxidizable inorganic materials including metal powders. With hydrochloric acid, toxic chlorine gas is liberated.

HAZARDOUS DECOMPOSITION PRODUCTS When involved in a fire, potassium permanganate may liberate corrosive fumes.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION Material is not known to polymerize.

Section 11 Toxicological Information

Potassium permanganate: Acute oral LD_{50}(rat) = 780 mg/kg Male (14 days); 525 mg/kg Female (14 days)
The fatal adult human dose by ingestion is estimated to be 10 grams. (Ref. Handbook of Poisoning: Prevention, Diagnosis & Treatment, Twelfth Edition)

EFFECTS OF OVEREXPOSURE

1. Acute Overexposure
   Irritating to body tissue with which it comes into contact.

2. Chronic Overexposure
   No known cases of chronic poisoning due to potassium permanganate have been reported. Prolonged exposure, usually over many years, to heavy concentrations of manganese oxides in the form of dust and fumes, may lead to chronic manganese poisoning, chiefly involving the central nervous system.

3. Carcinogenicity
   Potassium permanganate has not been classified as a carcinogen by OSHA, NTP, IARC.

4. Medical Conditions Generally Aggravated by Exposure
   Potassium permanganate will cause further irritation of tissue, open wounds, burns or mucous membranes.

   Registry of Toxic Effects of Chemical Substances
   RTECS #SD6476000

Section 12 Ecological Information

Entry to the Environment

Potassium Permanganate has a low estimated lifetime in the environment, being readily converted by oxidizable materials to insoluble manganese dioxide (MnO_2).

Bioconcentration Potential

In non-reducing and non-acidic environments manganese dioxide (MnO_2) is insoluble and has a very low bioaccumulative potential.

Aquatic Toxicity

Rainbow trout, 96 hour LC_{50}: 1.8 mg/L
Bluegill sunfish, 96 hour LC_{50}: 2.3 mg/L

Section 13 Disposal Consideration

DEACTIVATION OF D001 IGNITABLE WASTE OXIDIZERS BY CHEMICAL REDUCTION

Reduce potassium permanganate in aqueous solutions with sodium thiosulfate (Hypo), or sodium bisulfite or ferrous salt solution. The thiosulfite or ferrous salt may require some dilute sulfuric acid to promote rapid reduction. If acid was used, neutralize with sodium bicarbonate to neutral pH. Decant or filter, and mix the sludge with sodium carbonate and deposit in an approved landfill. Where permitted, the sludge can be drained into sewer with large quantities of water. Use caution when reacting chemicals. Contact Carus Chemical Company for additional recommendations.

Section 14 Transport Information

U. S. DEPARTMENT OF TRANSPORTATION INFORMATION:

Proper Shipping Name:	49 CFR 172.101	Potassium Permanganate
ID Number:	49 CFR 172.101	UN 1490
Hazard Class:	49 CFR 172.101	Oxidizer
Division:	49 CFR 172.101	5.1
Packing Group:	49 CFR 172.101	II

Section 15 Regulatory Information

TSCA Listed in the TSCA Chemical Substance Inventory

CERCLA **Hazardous Substance**

Reportable Quantity: RQ - 100 lb 40 CFR 116.4; 40 CFR 302.4

RCRA Oxidizers such as potassium permanganate meet the criteria of ignitable waste. 40 CFR 261.21

SARA TITLE III Information

Section 302	Extremely hazardous substance: Not listed
Section 311/312	Hazard categories: Fire, acute and chronic toxicity
Section 313	CAIROX® potassium permanganate contains 97% Manganese Compound as part of the chemical structure (manganese compounds CAS Reg. No. N/A) and is subject to the reporting requirements of Section 313 of Title III, Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.

Section 15 Regulatory Information (cont.)

STATE LISTS	Michigan Critical Materials Register:	Not listed
	California Proposition 65:	Not listed
	Massachusetts Substance List:	5 F8
	Pennsylvania Hazard Substance List:	E
FOREIGN LISTS	Canadian Domestic Substances List (DSL)	Listed
	Canadian Ingredient Disclosure List	Listed
	European Inventory of Existing Chemical Substances (EINECS)	2317603

Section 16 Other Information

NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Safety and Health Administration
NTP	National Toxicology Program
IARC	International Agency for Research on Cancer
TSCA	Toxic Substances Control Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
PEL-C	OSHA Permissible Exposure Limit-OSHA Ceiling Exposure Limit
TLV-TWA	Threshold Limit Value - Time Weighted Average (American Conference of Governmental Industrial Hygienists)

Kenneth Krogulski

Kenneth Krogulski
May 2000

CARUS

Responsible Care®
A Public Commitment

21

VOC

Material Safety Data Sheet
Tetrachloroethylene

ACC# 22900

Section 1 - Chemical Product and Company Identification

MSDS Name: Tetrachloroethylene
Catalog Numbers: C182 20, C182 4, C182-20, C182-4, C18220, C1824, O4586 4, O4586-4, O45864
Synonyms: Ethylene tetrachloride; Tetrachlorethylene; Perchloroethylene; Perchlorethylene
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
127-18-4	Tetrachloroethylene	99.0+	204-825-9

Hazard Symbols: XN N
Risk Phrases: 40 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Irritant. May cause severe eye and skin irritation with possible burns. May cause central nervous system depression. May cause liver and kidney damage. May cause reproductive and fetal effects. May cause cancer based on animal studies. **Caution!** May cause respiratory tract irritation.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects
Eye: Contact with eyes may cause severe irritation, and possible eye burns.
Skin: May cause severe irritation and possible burns.
Ingestion: May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: Inhalation of vapor may cause respiratory tract irritation. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability.
Chronic: Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause respiratory tract cancer. May cause

adverse nervous system effects including muscle tremors and incoordination. May cause liver and kidney damage. May cause reproductive and fetal effects.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Flush down the spill with a large amount of water. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not reuse this container. Avoid breathing vapors from heated material. Avoid contact with skin and eyes. Keep container tightly closed. Keep away from flames

and other sources of high temperatures that may cause material to form vapors or mists.
Storage: Keep away from heat and flame. Store in a cool, dry place. Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrachloroethylene	25 ppm TWA; 100 ppm STEL	150 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Tetrachloroethylene: 25 ppm TWA; 170 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: sweetish odor
pH: Not available.
Vapor Pressure: 15.8 mm Hg
Vapor Density: 5.2
Evaporation Rate:9 (ether=100)
Viscosity: 0.89 mPa s 20 deg C
Boiling Point: 121 deg C
Freezing/Melting Point:-22.3 deg C
Decomposition Temperature:150 deg C
Solubility: Nearly insoluble in water.
Specific Gravity/Density:1.623
Molecular Formula:C_2Cl_4
Molecular Weight:165.812

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, excess heat.
Incompatibilities with Other Materials: Strong bases, metals, liquid oxygen, dinitrogen tetroxide.

Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 127-18-4: KX3850000
LD50/LC50:
CAS# 127-18-4:
Draize test, rabbit, eye: 162 mg Mild;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 810 mg/24H Severe;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, mouse: LC50 = 5200 ppm/4H;
Inhalation, rat: LC50 = 34200 mg/m3/8H;
Oral, mouse: LD50 = 8100 mg/kg;
Oral, rat: LD50 = 2629 mg/kg;
Carcinogenicity:
CAS# 127-18-4:
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 4/1/88
NIOSH: potential occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
Epidemiology: Epidemiologic studies have given inconsistent results. Studi es have shown that tetrachloroethylene has not caused canc er in exposed workers. The studies have serious weakne sses such as mixed exposures. In tests with rats and mice, i t appeared that tissue destruction or peroxisome prolifera tion rather than genetic mechanisms were the cause of the observed increases in normally occurring cancers. The oral mouse TDLo that was tumorigenic was 195 gm/kg/50W-I.
Teratogenicity: Has caused musculoskeletal abnormalities. Has caused morphological transformation at a dose of 97mol/L in a study using rat embryos.
Reproductive Effects: Has caused behavioral, biochemical, and metabolic effects on newborn rats when the mother was exposed to the TCLo of 900 ppm/7H at 7-13 days after conception. A dose of 300 ppm/7H 6-15 days after conception caused post-implantation mortality.
Neurotoxicity: No information available.
Mutagenicity: Not mutagenic in Escherichia coli. No mutagenic effects were seen in rat liver after exposure at 200 ppm for 10 weeks. No chromosome changes were seen in the bone marrow cells of exposed mice.
Other Studies: A case of 'obstructive jaundice' in a 6-week old infant has been attributed to tetrachloroethylene in breast milk.

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 5.28 mg/L; 96 Hr.; Static Condition, 12 degrees C Fathead Minnow: LC50 = 18.4 mg/L; 96 Hr.; Flow-through condition Bluegill/Sunfish: LC50 = 12.9 mg/L; 96 Hr.; Static Condition ria: Phytobacterium phosphoreum: EC50 = 120.0 mg/L; 30 minutes; Microtox test No data available.

Environmental: In soil, substance will rapidly evaporate. In water, it will evaporate. In air, it can be expected to exist in the vapor phase.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 127-18-4: waste number U210.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	TETRACHLOROETHYLENE				TETRACHLOROETHYLENE
Hazard Class:	6.1				6.1
UN Number:	UN1897				UN1897
Packing Group:	III				III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 127-18-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 127-18-4: Effective Date: 6/1/87; Sunset Date: 6/1/97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 127-18-4: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 127-18-4: acute.
Section 313
This material contains Tetrachloroethylene (CAS# 127-18-4, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 127-18-4 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 127-18-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 127-18-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 127-18-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains Tetrachloroethylene, a chemical known to the state of California to cause cancer. California No Significant Risk Level: CAS# 127-18-4: 14 ug/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
XN N

Risk Phrases:
R 40 Limited evidence of a carcinogenic effect.
R 51/53 Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 127-18-4: 3

Canada - DSL/NDSL
CAS# 127-18-4 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1B, D2A.

Canadian Ingredient Disclosure List
CAS# 127-18-4 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits
CAS# 127-18-4: OEL-ARAB Republic of Egypt:TWA 5 ppm (35 mg/m3);Skin OEL-AUSTRALIA:TWA 50 ppm (335 mg/m3);STEL 150 ppm;CAR OEL-BELGIUM:TWA 50 ppm (339 mg/m3);STEL 200 ppm (1368 mg/m3) OEL-CZECHOSLOVAKIA:TWA 250 mg/m3;STEL 1250 mg/m3 OEL-DENMARK:TWA 30 ppm (200 mg/m3);Skin OEL-FINLAND:TWA 50 ppm (335 mg/m3);STEL 75 ppm (520 mg/m3);Skin OEL-FRANCE:TWA 50 ppm (335 mg/m3) OEL-GERMANY:TWA 50 ppm (345 mg/m3);Carcinogen OEL-HUNGARY:STEL 50 mg/m3;Skin;Carcinogen OEL-JAPAN:TWA 50 ppm (340 mg/m3) OEL-THE NETHERLANDS:TWA 35 ppm (240 mg/m3);Skin OEL-THE PHILIPPINES:TWA 100 ppm (670 mg/m3) OEL-POLAND:TWA 60 mg/m3 OEL-RUSSIA:TWA 50 ppm;STEL 10 mg/m3 OEL-SWEDEN:TWA 10 ppm (70 mg/m3);STEL 25 ppm (170 mg/m3) OEL-SWITZERLAND:TWA 50 ppm (345 mg/m3);STEL 100 ppm;Skin OEL-THAILAND:TWA 100 ppm;STEL 200 ppm OEL-UNITED KINGDOM:TWA 50 ppm (335 mg/m3);STEL 15 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA

check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/17/1999
Revision #3 Date: 3/18/2003

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VOC

Material Safety Data Sheet
Trichloroethylene

ACC# 23850

Section 1 - Chemical Product and Company Identification

MSDS Name: Trichloroethylene
Catalog Numbers: S80232, S80327ACS-1, S80327ACS-2, NC932384B, NC9494003, NC9494591, NC9981849, S80237ACS-1, S80237ACS-2, T340-4, T341-20, T341-4, T341-500, T341J4, T403-4, XXT341SK4LIX48
Synonyms: Ethylene trichloride; triclene; trichloroethene; benzinol cecolene
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
79-01-6	Trichloroethylene	99.5	201-167-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

Warning! Causes eye and skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system depression. May cause cancer based on animal studies. Potential cancer hazard. May cause liver damage.
Target Organs: Central nervous system, liver, eyes, skin.

Potential Health Effects
Eye: Causes moderate eye irritation. May result in corneal injury. Contact produces irritation, tearing, and burning pain.
Skin: Causes mild skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.
Ingestion: Aspiration hazard. May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. May cause liver abnormalities. May cause peripheral nervous system effects.
Chronic: Possible cancer hazard based on tests with laboratory animals. Chronic inhalation may

cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Combustion generates toxic fumes. Containers may explode in the heat of a fire.
Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: 778 deg F (414.44 deg C)
Explosion Limits, Lower:12.5
Upper: 90.0
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from

contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trichloroethylene	50 ppm TWA; 100 ppm STEL	1000 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Trichloroethylene: 50 ppm TWA; 270 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: sweetish odor - chloroform-like
pH: Not available.
Vapor Pressure: 58 mm Hg @20C
Vapor Density: 4.53
Evaporation Rate:0.69 (CCl4=1)
Viscosity: 0.0055 poise
Boiling Point: 189 deg F
Freezing/Melting Point:-121 deg F
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density:1.47 (water=1)
Molecular Formula:C_2HCl_3
Molecular Weight:131.366

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, oxidizers.
Incompatibilities with Other Materials: Alkalis (sodium hydroxide), chemically active metals (aluminum, beryllium, lithium, magnesium), epoxies and oxidants. Can react violently with aluminum, barium, lithium, magnesium, liquid oxygen, ozone, potassium hydroxide, potassium nitrate, sodium, sodium hydroxide, titanium, and nitrogen dioxide. Reacts with water under heat

and pressure to form hydrogen chloride gas.
Hazardous Decomposition Products: Hydrogen chloride, carbon dioxide, chloride fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 79-01-6: KX4550000
LD50/LC50:
CAS# 79-01-6:
Draize test, rabbit, eye: 20 mg/24H Moderate;
Draize test, rabbit, skin: 2 mg/24H Severe;
Inhalation, mouse: LC50 = 8450 ppm/4H;
Inhalation, mouse: LC50 = 220000 mg/m3/20M;
Inhalation, mouse: LC50 = 262000 mg/m3/30M;
Inhalation, mouse: LC50 = 40000 mg/m3/4H;
Inhalation, rat: LC50 = 140700 mg/m3/1H;
Oral, mouse: LD50 = 2402 mg/kg;
Oral, mouse: LD50 = 2400 mg/kg;
Oral, rat: LD50 = 4920 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rabbit: LD50 = 20 mL/kg;
Carcinogenicity:
CAS# 79-01-6:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

Epidemiology: Suspected carcinogen with experimental carcinogenic, tumorigenic, and teratogenic data.
Teratogenicity: No information available.
Reproductive Effects: Experimental reproductive effects have been observed.
Mutagenicity: Human mutation data has been reported. IARC and the National Toxicology Program (NTP) stated that variability in the mutagencity test results with trichloroethylene may be due to the presence of various stabilizers used in TCEwhich are mutagens (e.g.epoxybutane, epichlorohydrin).See actual entry in RTECS for complete infomation.R68 Mutagen Category 3 (CHIP 2002, UK).
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Bluegill sunfish, LD50= 44,700 ug/L/96Hr. Fathead minnow, LC50=40.7 mg/L/96Hr.
Environmental: In air, substance is photooxidized and is reported to form phosgene, dichloroacetyl chloride, and formyl chloride. In water, it evaporates rapidly.
Physical: No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 79-01-6: waste number U228.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TRICHLOROETHYLENE	TRICHLOROETHYLENE
Hazard Class:	6.1	6.1(9.2)
UN Number:	UN1710	UN1710
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 79-01-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 79-01-6: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 79-01-6: acute, chronic, reactive.
Section 313
This material contains Trichloroethylene (CAS# 79-01-6, 99.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
CAS# 79-01-6 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 79-01-6 is listed as a Hazardous Substance under the CWA. CAS# 79-01-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 79-01-6 is listed as a Toxic Pollutant under

the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 79-01-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Trichloroethylene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 79-01-6: 50 æg/day NSRL (oral); 80 æg/day NSRL (inhalation)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 36/38 Irritating to eyes and skin.
R 45 May cause cancer.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 67 Vapours may cause drowsiness and dizziness.
R 68 Possible risk of irreversible effects.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 79-01-6: 3

Canada - DSL/NDSL

CAS# 79-01-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B, D2B.

Canadian Ingredient Disclosure List

CAS# 79-01-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/01/1999
Revision #5 Date: 5/31/2005

Chlorodiphenyl (42% chlorine)

Synonyms & Trade Names

Aroclor® 1242, PCB [Chlorodiphenyl (42% chlorine)], Polychlorinated biphenyl [Chlorodiphenyl (42% chlorine)]

CAS No.

53469-21-9

RTECS No.

TQ1356000

DOT ID & Guide

2315 171

Formula

$C_6H_4ClC_6H_3Cl_2$ (approx)

Conversion

IDLH

Ca [5 mg/m^3]
See: 53469219

Exposure Limits

NIOSH REL

Ca TWA 0.001 mg/m³ See Appendix A (nengapdxa.html) [*Note: The REL also applies to other PCBs.]

OSHA PEL

TWA 1 mg/m³ [skin]

Measurement Methods

NIOSH 5503 ;
OSHA PV2089
See: NMAM or OSHA Methods

Physical Description

Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor.

Molecular Weight

258 (approx)

Boiling Point

617-691°F

Freezing Point

-2°F

Solubility

Insoluble

Vapor Pressure
0.001 mmHg

Ionization Potential
?

Specific Gravity
(77°F): 1.39

Flash Point
NA

Upper Exposive Limit
NA

Lower Explosive Limit
NA

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans & chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities

Strong oxidizers

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

irritation eyes; chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs

Skin, eyes, liver, reproductive system

Cancer Site

[in animals: tumors of the pituitary gland & liver, leukemia]

Personal Protection/Sanitation

(See protection codes (protect.html))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid

(See procedures (firstaid.html))
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.
Click here (pgintrod.html#nrp) for information on selection of N, R, or P filters.
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also
INTRODUCTION   MEDICAL TESTS: 0175

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CDC 24/7: Saving Lives, Protecting People™

Promoting productive workplaces through safety and health research

(/niosh/index.htm)

Chlorodiphenyl (54% chlorine)

Synonyms & Trade Names

Aroclor® 1254, PCB [Chlorodiphenyl (54% chlorine)], Polychlorinated biphenyl [Chlorodiphenyl (54% chlorine)]

CAS No.

11097-69-1

RTECS No.

TQ1360000

DOT ID & Guide

2315 171

Formula

$C_6H_3Cl_2C_6H_2Cl_3$ (approx)

Conversion

IDLH

Ca [5 mg/m^3]
See: IDLH INDEX

Exposure Limits

NIOSH REL

Ca TWA 0.001 mg/m^3 See Appendix A (nengapdxa.html) [*Note: The REL also applies to other PCBs.]

OSHA PEL

TWA 0.5 mg/m^3 [skin]

Measurement Methods

NIOSH 5503 ;
OSHA PV2088
See: NMAM or OSHA Methods

Physical Description

Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

Molecular Weight

326 (approx)

Boiling Point

689-734°F

Freezing Point

50°F

Solubility

Insoluble

Vapor Pressure
0.00006 mmHg

Ionization Potential
?

Specific Gravity
(77°F): 1.38

Flash Point
NA

Upper Exposive Limit
NA

Lower Explosive Limit
NA

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities

Strong oxidizers

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs

Skin, eyes, liver, reproductive system

Cancer Site

[in animals: tumors of the pituitary gland & liver, leukemia]

Personal Protection/Sanitation

(See protection codes (protect.html))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid

(See procedures (firstaid.html))
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.
Click here (pgintrod.html#nrp) for information on selection of N, R, or P filters.
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also
INTRODUCTION ICSC CARD: 0939 MEDICAL TESTS: 0176

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Content source: National Institute for Occupational Safety and Health (NIOSH) (/niosh/) Education and Information Division

ATTACHMENT 3

Heat Stress / Cold Stress and Related Illnesses

Heat Stress / Cold Stress

1.0 HEAT STRESS

Excessive exposure to a hot environment can bring about a variety of heat-induced disorders. The four main types of heat stress related illnesses: heat rash, heat cramps, heat exhaustion, and heat stroke, are discussed below.

1.1 Heat Rash

Heat rash also know as prickly heat, is likely to occur in hot, humid environments where sweat is not readily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by an infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

1.2 Heat Cramps

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used to perform the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth, such as the variety of sports drinks on the market.

Caution Should Be Exercised By People With Heart Problems Or Those On Low Sodium Diets Who Work In Hot Environments. These People Should Consult A Physician About What To Do Under These Conditions.

1.3 Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from this condition still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

A summary of the key symptoms of heat exhaustion is as follows:

- Clammy skin
- Confusion
- Dizziness
- Fainting
- Fatigue
- Heat Rash
- Light-headedness
- Nausea
- Profuse sweating
- Slurred Speech
- Weak Pulse

In most cases, treatment involves having the victim rest in a cool place and drink plenty of fluids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.
As With Heat Cramps, Certain Persons Should Consult With Their Physician About What To Do Under These Conditions.

1.4 Heat Stroke

This is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

A summary of the key symptoms of heatstroke is as follows:

- Confusion
- Convulsions
- Incoherent Speech
- Staggering Gait
- Unconsciousness
- Sweating stops
- Hot skin, high temperature (yet extremities may feel chilled)

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes moving the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should include continuation of the cooling process and the monitoring of complications that often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

1.5 Preparing for the Heat

Humans, to a large extent, are capable of adjusting to heat. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more tolerable.

On the first day of exposure, body temperature, pulse rate, and general discomfort will be higher. With each succeeding day of exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body does become acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

A gradual exposure to heat gives the body time to become accustomed to higher temperatures, such as those encountered in chemical protective clothing.

1.6 Protecting Against Heat Stress

There are several methods that can be used to reduce heat stress:

- Limit duration of work periods
- Use protective clothing with cooling devices
- Enforce the use of the "Buddy System"
- Consume electrolyte solutions prior to suiting up
- Monitor workers for pulse recovery rates, body fluid loss, body weight loss, and excess fatigue
- Screen for heat stress susceptible candidates in your medical surveillance program
- Have all personnel know the signs and symptoms of heat stress

2.0 **Cold Stress**

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold injury, ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at minus 18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost Nip or Initial Frostbite: characterized by suddenly blanching or whitening of skin.
- Superficial Frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep Frostbite: tissues are cold, pale, and solid; extremely serious injury.

2.2 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes rapid cooling of the body to less than 95°F)
- Unconsciousness, glassy stage, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Thermal socks, long cotton or thermal underwear, hard hat liners and other cold weather gear can aid in the prevention of hypothermia. Blankets and warm drinks (other than caffeinated coffee) are also recommended.

Measures shall be taken to keep workers from getting wet, such as issuance of rain gear. Workers whose cloths become wet shall be given the opportunity to dry off and change clothes.

ATTACHMENT 4

Remediation Construction Equipment Safety Rules

Construction Equipment Safety Rules

1.0 ELECTRICAL

1. Live electrical parts shall be guarded against accidental contact by cabinets, enclosure, location, or guarding. Cabinet covers will be replaced.

2. Working and clear space around electric equipment and distribution boxes will be kept clear and assessable.

3. Circuit breakers, switch boxes, etc. will be legibly marked to indicate their purpose.

4. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. If the prime contractor has not provided this protection with GFCI receptacles at the temporary service drop, employees will ensure portable GFCI protection is provided. (Employers may wish to use assured equipment grounding conductor program in lieu of this GFCI protection.) This requirement is in addition to any other electrical equipment grounding requirement or double insulated protection.

5. All extension cords will be three-wire (grounded) type and designed for hard or extra hard usage (Type S, ST, SO, STO, or SJ, SJO, SJT, SJTO).

6. Ground prongs will not be removed.

7. Cords and strain relief devices/clamps will be in good condition.

8. All lamps for general illumination will have the bulbs protected against breakage.

9. Electrical cords will not suspend temporary lights unless cords and lights are designed for such suspension. Flexible cords used for temporary and portable lights will be designed for hard or extra hard usage.

10. Employees will not work in such close (able to contact) proximity to any part of an electric power circuit unless the circuit is de-energized, grounded, or guarded by insulation.

11. Equipment or circuits that are de-energized will be locked out and tagged out. The tags will plainly identify the equipment or circuits being worked on.

2.0 COMPRESSED GAS CYLINDERS

1. All gas cylinders will have their contents clearly marked on the outside of each cylinder.
2. Cylinders must be transported, stored, and secured in an upright position. They will never be left laying on the ground or floor, nor used as rollers or supports.
3. Cylinder valves must be protected with caps and closed when not in use.
4. All leaking or defective cylinders must be removed from service promptly, tagged as inoperable and placed in an open space removed from the work area.
5. Oxygen cylinders and fittings will be kept away from oil or grease.
6. When cylinders are hoisted, they will be secured in a cradle, sling-board, or pallet. Valve protection caps will not be used for lifting cylinders from one vertical level to another.

3.0 LADDERS

1. A competent person to identify any unsafe conditions will periodically inspect ladders.
2. Those ladders with structural defects will be removed from service, and repaired or replaced.
3. Straight ladders used on other than stable, level, and dry surfaces must be tied off, held, or secured for stability.
4. Portable ladder side rails will extend at least three feet above the upper landing to which the ladder is used to gain access.
5. The top or top step of a stepladder will not be used as a step.

4.0 AERIAL LIFTS

1. Aerial lifts include cherry pickers, extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers, and any combinations of the above.
2. Only authorized and trained persons will operate aerial lifts.
3. Lift controls will be tested each day before use.
4. Safety harness will be worn when elevated in the aerial lift.
5. Lanyards will be attached to the boom or basket.

6. Employees will not belt off to adjacent poles, structures, or equipment while working from an aerial lift.

7. Employees will always stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket.

8. Planks, ladders, or other devices will not be used for work position or additional working height.

9. Brakes will be set and outriggers will be used.

10. The aerial lift truck will not be moved with the boom elevated and employees in the `basket, unless the equipment is specifically designed for such.

5.0 CRANES

1. A competent person prior to each use/during use to make sure it is in safe operating condition will inspect all cranes. Also, a certification record of monthly inspections to include date, inspector signature, and crane identifier will be maintained.

2. A thorough annual inspection of hoisting machinery will be made by a competent person, or by a government or private agency, and records maintained.

3. Loads will never be swung over the heads of workers in the area.

4. Employees will never ride hooks, concrete buckets, or other material loads being suspended or moved by cranes.

5. Hand signals to crane operators will be those prescribed by the applicable ANSI standard to the type of crane in use.

6. Tag lines must be used to control loads and keep workers away.

7. Loads, booms, and rigging will be kept at least 10 feet from energized electrical lines rated 50 KV or lower unless the lines are de-energized. For lines rated greater that 50 KV follow OSHA Rules and Regulations, 1926.550(a)(15).

8. Cranes will always be operated on firm, level surfaces, or use mats/pads, particularly for near-capacity lifts.

9. Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, will be barricaded in such a manner as to prevent employees from being struck or crushed by the crane.

10. If suspended personnel platforms are to be lifted with a crane, reference 1926.550(g) for general and specific requirements.

11. Rigging equipment (chains, slings, wire rope, hooks, other attachments, etc.) will be inspected prior to use on each shift to ensure it is safe. Defective rigging and equipment will be removed from service.

12. Job or shop hooks or other makeshift fasteners using bolts, wire, etc. will not be used.

13. Wire rope shall be taken out of service when one of the following conditions exist:

    - In running ropes, 6 random distributed broken wires in one lay or 3 broken wires in one strand or one lay.
    - Wear of one-third the original diameter of outside individual wires.
    - Kinking, crushing, bird caging, heat damage, or any other damage resulting in distortion of the rope structure.
    - In standing ropes, more than two broken wires in one lay in sections beyond end connections, or more than one broken wire at an end connection.

6.0 WELDING and BRAZING

1. Combustible material will be cleared from the area around cutting or welding operations.

2. Welding helmets and goggles will be worn for eye protection and to prevent flash burns.

3. Eye protection to guard against slag while chipping, grinding and dressing of welds will be worn.

4. Only electrode holders specifically designed for arc welding will be used.

5. All parts subject to electrical current will be fully insulated against the maximum voltage encountered to ground.

6. A ground return cable shall have a safe current carrying capacity equal to, or exceeding, the specified maximum output capacity of the arc-welding unit that it services.

7. Cables, leads, hoses, and connections will be placed so that there are no fire or tripping hazards.

7.0 TOOLS

1. Take special precautions when using power tools.

2. Defective tools will be removed form service.

3. Electric power tools will be the grounded-type or double insulated.

4. Power tools will be turned off and motion stopped before setting tool down.

5. Tools will be disconnected from power source before changing drills, blades or bits, or attempting repair or adjustment. Never leave a running tool unattended.

6. Power saws, table saws, and radial arm saws will have operational blade guards installed and used.

7. Unsafe/defective hand tools will not be used. These include sprung jaws on wrenches, mushroomed head of chisels/punches, and cracked/broken handles of any tool.

8. Portable abrasive grinders will have guards installed covering the upper and back portions of the abrasive wheel. Wheel speed ratings will never be less than the grinder RPM speed.

9. Compressed air will not be used for cleaning purposes except when pressure is reduced to less than 30 psi by regulating or use of a safety nozzle, and then only with effective chip guarding and proper personal protective equipment.

10. Abrasive blasting nozzles will have a valve that must be held open manually.

11. Only trained employees will operate powder-actuated tools.

12. Any employee furnished tools of any nature must meet all OSHA and ANSI requirements.

8.0 SAFETY RAILINGS AND OTHER FALL PROTECTION

1. All open sided floors and platforms six feet or more above adjacent floor/ground level will be guarded by a standard railing (top and mid rail, toeboard if required).

2. A stairway or ladder will be provided at any point of access where there is a break in elevation of 19 inches or more.

3. All stairways of four or more risers or greater than 30 inches high will be guarded by a handrail or stair rails

4. When a floor hole or opening (greater than two inches in its least dimension) is created during a work activity, through which a worker can fall, step into, or material can fall through, a cover or a safety guardrail must be installed immediately.

5. Safety nets will be provided when workplaces are more than 25 feet above the ground, water, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts, is impractical.

6. Safety harnesses, lanyards, lines, and lifelines may be used in lieu of other fall protection systems to provide the required fall protection.

7. Adjustment of lanyards must provide for not more than a six-foot fall, and all tie off points must be at least waist high.

8.1 Scaffolds

1. Scaffolds will be erected, moved, dismantled, or altered only under the supervision of a competent person qualified in scaffold erection, moving, dismantling, or alteration.

2. Standard guardrails (consisting of top-rail and mid-rail) will be installed on all open sides and ends of scaffold platforms and/or work levels more than ten feet above the ground, floor, or lower level.

3. Scaffolds four to ten feet in height with a minimum horizontal dimension in any direction less than 45 inches will have standard railings installed on all open sides/ends.

4. Platforms at all working levels will be fully planked. Planking will be laid tight with no more than one inch space between them, overlap at least 12 inches, and extend over end supports 6 - 12 inches.

5. The front edge of all platforms will be no more than 14 inches from the face of the work, except plastering/lathing may be 18 inches.

6. Mobile scaffolds will be erected no more than a maximum height of four times their minimum base dimension.

7. Scaffolds will not be overloaded beyond their design loadings.

8. Scaffold components should not be used as tie-off/anchor points for fall protection devices.

9. Portable ladders, hook-on ladders, attachable ladders, integral prefabricated scaffold frames, walkways, or direct access from another scaffold or structure will be used for access when platforms are more than two feet above or below a point of access.

10. Cross braces will not be used as a mean of access to scaffolds.

11. Scaffolds will not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than the following:

    - Three feet from insulated lines of less than 300 volts;

    - Ten feet plus for any other insulated or un-insulated lines.

8.2 Excavations and Trenches

1. Any excavation or trench five feet or more in depth will be provided cave-in protection through shoring, sloping, benching, or the use of hydraulic shoring, trench shields, or trench boxes.

2. Trenches less than five feet in depth and showing potential of cave-in will also be provided cave-in protection. Specific requirements of each system are dependent upon the soil classification as determined by a competent person.

3. A competent person will inspect each excavation/trench daily prior to start of work, after every rainstorm or other hazard-increasing occurrence, and as needed throughout the shift.

4. Means of egress will be provided in trenches four feet or more in depth so as to require no more than 25 feet of lateral travel for each employee in the trench.

5. Spoil piles and other equipment will be kept at least two feet from the edge of the trench or excavation.

9.0 MOTOR VEHICLES AND MECHANIZED EQUIPMENT

1. All vehicles and equipment will be checked at the beginning of each shift, and during use, to make sure it is in safe operating condition.

2. All equipment left unattended at night adjacent to highways in normal use shall have lights or reflectors, or barricades with lights or reflectors, to identify the location of the equipment.

3. When equipment is stopped or parked, parking brakes shall be set. Equipment on inclines shall have wheels chocked as well as having parking brakes set.

4. Operators shall not use earth-moving or compaction equipment having an obstructed rear view unless vehicle has an audible reverse signal alarm, or is backed only when observer says it is safe to do so.

5. All vehicles shall have in operable condition:

- Horn (bi-directional equipment)
- Seats, firmly secured, for the number of persons carried. Passengers must ride in seats.
- Seat belts properly installed.
- Service, parking and emergency brake system.
- All vehicles with cabs will be equipped with windshields with safety glass.
- All material handling equipment will equipped with rollover protective structures.

10.0 MISCELLANEOUS

1. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the impalement hazard.

2. Enclosed chutes will be used when material, trash, and debris are dropped more than 20 feet outside the exterior walls of a building. A substantial gate will be provided near the discharge end of the chute, and guardrails at the chute openings into which workers drop material.

3. Only trained employees will service large truck wheels. A cage or other restraining device plus an airline assembly consisting of a clip-on chuck, gauge, and length of hose will be used to inflate any large truck tires.

4. Only trained employees will operate forklifts and other industrial trucks.

ATTACHMENT 5

Lawrence Environmental,

Certified Industrial Hygiene Survey Report,
April 2018.

LAWRENCE ENV LLC
ENVIRONMENTAL CONSULTANTS

Project:
Industrial Hygiene Survey Report

Location:
Formerly ACCO Brands, Inc. Site
32-00 Skillman Avenue
Long Island City, New York 11101

Report Prepared for:
Fleming-Lee Shue, Inc.
158 West 29th Street, 9th Floor
New York, New York 10001

Prepared by:
Lawrence ENV, LLC
108 West 39th Street
Suite 500
New York, NY 10018

Project# MSCCOM 592

Survey Date:
April 4, 2018

Date of Issue:
May 16, 2018

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I. PURPOSE/SURVEY SCOPE

Lawrence ENV LLC (LENV) was retained by Fleming-Lee Shue, Inc. (FLS), the Client, to conduct an industrial hygiene survey at the former ACCO Brands, Inc. site located at 32-00 Skillman Avenue, Long Island City, New York 11101, the subject property. The purpose of the survey was to ascertain current conditions at the site with respect to potential worker's exposure to polychlorinated biphenyls (PCBs) compounds.

The survey was conducted, on April 4, 2018, by a Certified Industrial Hygienist, and consisted of the following activities:

- An initial site visit with FLS, on March 28, 2018, to understand the remediation activities that are being undertaken by FLS personnel and the average amount of time spent on different activities while on site
- Collection of air and surface samples to determine the concentration of PCBs in each media
- Photo documentation

A summary of the air and surface sampling results are summarized in Tables 1 and 2. Laboratory analytical results are provided in Appendix A. Data statistical summaries are provided in Appendix B. Photographic documentation of the sampling locations is provided in Appendix C.

II. BACKGROUND

The subject property is a three-story commercial and light industrial building occupied by multiple tenants. Trichloroethylene has been determined to be the primary site contaminant of concern and PCBs have also been detected in past sampling events. The subject property has been undergoing active remediation since 2003 and currently a parameter soil vapor extraction (SVE) system is in operation along with an ERH system. The ERH passes an electrical current through the soil and groundwater that requires treatment to expedite the site remediation process. The ERH System was not in operation during this survey.

III. DISCUSSION

PCBs are a group of man-made organic chemicals (commonly referred to as Aroclor compounds) that were domestically manufactured from 1929 until manufacturing was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to black waxy solids. PCBs were used in hundreds of industrial and commercial applications due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties. Such applications include: electrical/heat transfer/hydraulic equipment, plasticizers in paints/plastics/rubber products, and pigments/dyes. Although they are no longer commercially produced in the US, PCBs may be present in products and materials that were produced before the 1979 ban. Such products include: transformers and capacitors, electrical equipment, oil used in motors and hydraulic systems, old electrical devices, fluorescent light ballasts, cable insulation, thermal insulation material, adhesives, caulking, plastics, and floor finish. PCBs do not readily break down in the environment and can remain in the air, water, and soil for long periods of time.

PCBs enter the human body through three main exposure pathways; inhalation, skin absorption, and ingestion. When it comes to occupational exposure to PCBs, the primary pathways are inhalation and skin absorption via dermal routes. Although PCBs evaporate slowly at room temperature, a small rise in temperature has the ability to increase the volatility of PCBs dramatically. When equipment containing PCBs overheats it can vaporize a significant amount of these compounds, thus creating an inhalation hazard. PCBs are also highly lipophilic in nature, which allows them to be absorbed through the skin following contact with contaminated equipment, water, or soil. The primary route of exposure to PCBs in the general population, however, is the consumption of contaminated foods, particularly meat, fish, and poultry.

According to the National Institute for Occupational Safety and Health (NIOSH) the symptoms of exposure to high levels of PCBs include; eye and respiratory system irritation, chloracne (a skin disease resembling severe acne), liver damage, and reproductive effects. The target organs PCBs affect includes the skin, eyes, liver, and reproductive system. The American Conference of Governmental Industrial Hygienists

(ACGIH) has designated Aroclor 1254 as an A3 compound, indicating that is a confirmed animal carcinogen.

The current occupational exposure standards and guidelines for inhalation exposure to two PCBs compounds are as follows:

Compound	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Aroclor 1242	1.0 mg/m3 (skin)	1.0 mg/m3 (skin)
Aroclor 1254	0.5 mg/m3 (skin)	0.5 mg/m3 (skin)

OSHA PEL-TWA: Occupational Safety and Health Administration, Permissible Exposure Limit – Time Weighted Average
ACGIH TLV-TWA: ACGIH, Threshold Limit Value – Time Weighted Average
Skin: indicates that the compound can be adsorbed through intact skin

IV. SAMPLING AND ANALYTICAL METHODOLOGIES

Air samples for PBCs were collected by using portable sampling pumps connected to a 2-stage sampling train consisting of 13-millimeter (mm) glass fiber filter to collect the airborne PCBs aerosol and a 2-section sorbent tube filled with 100 milligrams (mg) and 50 mg of florisil to collect the vapor phase PCBs. The air samples were collected at an estimated height of 5 feet from the floor to approximate an average worker's breathing zone and set at a flow rate of 1 liter per minute (L/m). The sampling time of 4 hours was selected for each sample as this is the average time that an FLS employee spends on site per day to monitor the remediation systems performance parameters. The samples were analyzed by National Institute of Occupational Safety and Health (NIOSH), Method 5503, consisting of gas chromatography and electron capture detector (GC-ECD).

An area air sample was collected from the following locations:

- The office
- At the vapor phase carbon influent sample port
- At the SVE system knock-out tank

- In the electrode field (the ERH system and electrodes were off at the time of this survey).
- An ambient background sample was collected in the staircase landing leading to the basement

Surface samples for PCBs were collected on 2-inch square gauge pads impregnated with hexane. A premeasured 100-centimeter square (cm2) disposable template was placed on the selected surface followed by wiping with the impregnated gauge pad with both the horizontal and vertical directions. The sample was then placed into an amber glass bottle for analysis by a laboratory created and verified method.

A surface sample was collected from the following locations:

- Office supply shelf
- Office work table with microwave oven
- Vapor line near the vapor phase carbon influent sample port
- SVE knock-out tank and condensate valve handle
- Concrete floor in front of MWR-4
- Top of SVE system carbon canisters
- Remediation system, top of carbon cannister
- Concrete floor in front of GO3
- Top of electrical transformer, adjacent to GO3
- Concrete floor in front of MWR-3S

The air and surface samples were sent to SGS Galson Laboratory, an American Industrial Hygiene Association (AIHA) accredited laboratory for analysis.

V. RESULTS

The results of the five (5) area air samples identified that airborne concentrations of PCBs compounds, ranging from Aroclor 1216 to Aroclor 1268, in both the particulate and vapor phase forms were very low and generally at non-detectable concentrations. All results were below the currently established OSHA PEL-TWAs and ACGIH TLV-TWAs for Aroclor 1242 and Aroclor 1254.

The results of the ten (10) surface samples identified that PCBs compounds were detected on certain surfaces, primarily on the ground, in the work area. The sample with the highest concentration of PCBs was sample ACCO-05S collected from the concrete floor in front of MWR-4 (Aroclor 1242: 46 micrograms per 100 centimeter squared [ug/cm2] and Aroclor 1254: 140 ug/100 cm2). Currently, there are no standards or guidelines for exposure through intact skin.

VI. CONCLUSIONS

The results of this survey indicate that airborne concentrations of PCBs compounds in this work environment is not a primary route of exposure for the FLS personnel. The air sampling results also indicate that PCBs compounds are not migrating from the work area, as non-detectable concentrations were reported for the sample collected from the staircase leading to the upper floors.

The results of the surface samples indicate that skin absorption is a route of potential exposure due to the presence of PCBs compounds on surfaces such as the vapor line near the influent sample port, the SVE system knock-out tank, and the concrete floors near MWR-4, GO3, and MWR-3S.

VII. RECOMMENDATIONS

LENV provides the following recommendations for consideration:

1. Inform all FLS personnel, assigned to this site, of the potential health hazards associated with PCBs compounds along with the other site contaminants. The hazard communication should include a review of the site-specific health and safety plan (HASP) and the requirements for personal protective equipment (PPE), personal

hygiene, decontamination procedures, and other protective measures to reduce the potential for direct skin contact with site remediation equipment and surfaces.

2. While on site, efforts should be made to reduce exposed skin. These protective measures should include wearing long sleeve shirts and long pants along with wearing safety glasses to prevent direct eye contact.

3. Wear chemically-resistant nitrile gloves to prevent direct hand contact with any materials or surfaces.

4. For activities, such as groundwater sampling, disposable single use plastic sheeting may be place on the ground surface to provide an additional layer of protection to prevent direct contact. This is because ground surfaces resulted in the most frequent detection and the highest concentrations of PCBs.

TABLES

TABLE 1

Summary of PCBs Air Sampling Data

Table 1: Summary of PCBs Air Sampling Data, Former ACCO Site, Queens, New York

Sample ID	Sample Location	Total Volume (L)	PCBs Results (mg/m^3)							
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1268
ACCO-01A	Office	235.2	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
ACCO-02A	Vapor Phase Carbon, Influent Sample	254.1	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
ACCO-03A	SVE System, Knock-out Tank	243	< .0002	< .0002	< .0002	0.00055	< .0002	< .0002	< .0002	< .0002
ACCO-04A	Electrode Field	226.32	< .0002	< .0002	< .0002	0.00053	< .0002	< .0002	< .0002	< .0002
ACCO-05A	Staircase, Basement Level	244.53	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002

L: Liters

mg/m^3: Milligrams per cubic meter

TABLE 2

Summary of PCBs Surface Sampling Data

Table 2: Summary of PCB Surface Sample Data, Former ACCO Site, Queens, New York

Sample ID	Sample Location	Results (ug/100cm^2)							
		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1268
ACCO-01S	Office Supply Shelf, Third Shelf	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
ACCO-02S	Office Work Table	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
ACCO-03S	Vapor Line, Influent Sample Port Area	< .5	< .5	< .5	1	< .5	< .5	< .5	< .5
ACCO-04S	SVE System, Knock-out Tank (Blower Room)	< .5	< .5	< .5	< .5	< .5	1	< .5	< .5
ACCO-05S	Concrete Floor in front of MWR-4	< .5	< .5	< .5	46	< .5	140	< .5	< .5
ACCO-06S	SVE System, Top of Carbon Canisters	< .5	< .5	< .5	1.2	< .5	1.8	< .5	< .5
ACCO-07S	Remediation System, Top of Carbon Canisters	< .5	< .5	< .5	< .5	1.5	< .5	< .5	< .5
ACCO-08S	Concrete Floor in front of G03	< .5	< .5	< .5	4.5	< .5	43	< .5	< .5
ACCO-09S	Top of Transformer, Adjacent to G03	< .5	< .5	< .5	< .5	1.2	< .5	< .5	< .5
ACCO-10S	Concrete Floor in front of MWR-3S	< .5	< .5	< .5	1.5	< .5	4.9	< .5	< .5

ug/100cm^2: Micrograms per 100 square centimeters

APPENDICES

APPENDIX A

Laboratory Analytical Results

SGS GALSON

Mr. Tom Eng
Lawrence Env, LLC
108 W 39th Street
Suite 500
New York, NY 10018

April 09, 2018

DOH ELAP #11626
AIHA-LAP #100324

Account# 18517

Login# L438679

Dear Mr. Eng:

Enclosed are the analytical results for the samples received by our laboratory on April 05, 2018. All test results meet the quality control requirements of AIHA-LAP and NELAC unless otherwise stated in this report. All samples on the chain of custody were received in good condition unless otherwise noted.

Results in this report are based on the sampling data provided by the client and refer only to the samples as they were received at the laboratory. When possible, non-IOM samples will be retained for 14 days following the date of this report (unless an extension is specifically requested). IOM samples are retained for 7 days.

Current Scopes of Accreditation can be viewed at www.sgsgalson.com in the accreditations section of the "About" page.

Please contact Joanne White at (888)-432-5227, if you would like any additional information regarding this report. Thank you for using SGS Galson.

Sincerely,

SGS Galson

Lisa Swab

Lisa Swab
Laboratory Director

Enclosure(s)

SGS GALSON

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679

Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : ACCO-01AC/-01AT **Lab ID : L438679-1** **Air Volume : 235.2 L**
Date Sampled : 04/04/18 **Date Analyzed : 04/05/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1242	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	<0.0002

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39 Submitted by: MRH Approved by: NKP
Date : 06-APR-18 NYS DOH # : 11626 Supervisor: KAG QC by: MLN

< -Less Than
> -Greater Than
mg -Milligrams
ug -Micrograms
m3 -Cubic Meters
l -Liters
kg -Kilograms
NS -Not Specified
NA -Not Applicable
ppm -Parts per Million
ND -Not Detected
LOQ-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : ACCO-02AC/-02AT **Lab ID : L438679-2** **Air Volume : 254.1 L**
Date Sampled : 04/04/18 **Date Analyzed : 04/05/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1242	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	<0.0002

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39
Date : 06-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : ACCO-03AC/-03AT **Lab ID : L438679-3** **Air Volume : 243 L**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1242	0.05	0.12	<0.05	0.13	0.00055
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	<0.0002

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39
Date : 06-APR-18
Submitted by: MRH
NYS DOH # : 11626
Approved by: NKP
Supervisor: KAG
QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : ACCO-04AC/-04AT **Lab ID : L438679-4** **Air Volume : 226.32 L**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1242	0.05	0.11	<0.05	0.12	0.00053
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	<0.0002

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39
Date : 06-APR-18
Submitted by: MRH
NYS DOH # : 11626
Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : ACCO-05AC/-05AT **Lab ID : L438679-5** **Air Volume : 244.53 L**
Date Sampled : 04/04/18 **Date Analyzed : 04/05/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1242	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	<0.0002
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	<0.0002

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39
Date : 06-APR-18
Submitted by: MRH
NYS DOH # : 11626
Approved by: NKP
Supervisor: KAG
QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679

Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057039

Client ID : BLANK **Lab ID : L438679-6** **Air Volume : NA**
Date Sampled : 04/04/18 **Date Analyzed : 04/05/18**

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3
PCB Aroclor 1016	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1221	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1232	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1242	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1248	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1254	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1260	0.05	<0.05	<0.05	<0.06	NA
PCB Aroclor 1268	0.05	<0.05	<0.05	<0.06	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 225-16/226-39
Date : 06-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-01S **Lab ID : L438679-7** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/05/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	<0.5	<0.5
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	<0.5	<0.5
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY ANALYSIS REPORT

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-02S **Lab ID : L438679-8** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	<0.5	<0.5
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	<0.5	<0.5
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-03S **Lab ID : L438679-9** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	1	1
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	<0.5	<0.5
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY ANALYSIS REPORT

Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-04S **Lab ID : L438679-10** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	<0.5	<0.5
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	1.0	1.0
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-05S **Lab ID : L438679-11** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/07/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	46	46
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	140	140
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

SGS GALSON

LABORATORY ANALYSIS REPORT

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East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-06S **Lab ID : L438679-12** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	1.2	1.2
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	1.8	1.8
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY ANALYSIS REPORT

Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-07S **Lab ID : L438679-13** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	<0.5	<0.5
PCB Aroclor 1248	0.5	1.5	1.5
PCB Aroclor 1254	0.5	<0.5	<0.5
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

<u>COMMENTS:</u> Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY ANALYSIS REPORT

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-08S **Lab ID : L438679-14** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/07/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	4.5	4.5
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	43	43
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

<	-Less Than	mg	-Milligrams	m3	-Cubic Meters	kg	-Kilograms	NA	-Not Applicable	ND	-Not Detected
>	-Greater Than	ug	-Micrograms	l	-Liters	NS	-Not Specified	ppm	-Parts per Million	LOQ	-Limit of Quantitation

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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : ACCO-09S **Lab ID : L438679-15** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	<0.5	<0.5
PCB Aroclor 1248	0.5	1.2	1.2
PCB Aroclor 1254	0.5	<0.5	<0.5
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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Client	: Lawrence Environmental Group,	Account No.:	18517
Site	: ACCO	Login No.	: L438679
Project No.	: MSCom592		
Date Sampled	: 04-APR-18	Date Analyzed	: 05-APR-18 - 07-APR-18
Date Received	: 05-APR-18	Report ID	: 1057104

Client ID : ACCO-10S **Lab ID : L438679-16** **Area : 1 100cm2**
Date Sampled : 04/04/18 **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	<0.5
PCB Aroclor 1221	0.5	<0.5	<0.5
PCB Aroclor 1232	0.5	<0.5	<0.5
PCB Aroclor 1242	0.5	1.5	1.5
PCB Aroclor 1248	0.5	<0.5	<0.5
PCB Aroclor 1254	0.5	4.9	4.9
PCB Aroclor 1260	0.5	<0.5	<0.5
PCB Aroclor 1268	0.5	<0.5	<0.5

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze	Submitted by: MRH	Approved by: NKP
Date : 09-APR-18	NYS DOH # : 11626	Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
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Client : Lawrence Environmental Group,
Site : ACCO
Project No. : MSCom592
Date Sampled : 04-APR-18
Date Received : 05-APR-18

Account No.: 18517
Login No. : L438679
Date Analyzed : 05-APR-18 - 07-APR-18
Report ID : 1057104

Client ID : BLANK **Lab ID : L438679-17** **Area : NA**
Date Sampled : **Date Analyzed : 04/06/18**

Parameter	LOQ ug	Total ug	Conc ug/100cm2
PCB Aroclor 1016	0.5	<0.5	NA
PCB Aroclor 1221	0.5	<0.5	NA
PCB Aroclor 1232	0.5	<0.5	NA
PCB Aroclor 1242	0.5	<0.5	NA
PCB Aroclor 1248	0.5	<0.5	NA
PCB Aroclor 1254	0.5	<0.5	NA
PCB Aroclor 1260	0.5	<0.5	NA
PCB Aroclor 1268	0.5	<0.5	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media: 2x2 Gauze
Date : 09-APR-18

Submitted by: MRH
NYS DOH # : 11626

Approved by: NKP
Supervisor: KAG QC by: MLN

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	NA -Not Applicable	ND -Not Detected
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ppm -Parts per Million	LOQ-Limit of Quantitation

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LABORATORY FOOTNOTE REPORT

Client Name : Lawrence Environmental Group, llc
Site : ACCO
Project No. : MSCom592

Date Sampled : 04-APR-18
Date Received: 05-APR-18
Date Analyzed: 05-APR-18 - 07-APR-18

Account No.: 18517
Login No. : L438679

Unless otherwise noted below, all quality control results associated with the samples were within established control limits or did not impact reported results.

Note: The findings recorded within this report were drawn from analysis of the sample(s) provided to the laboratory by the Client (or a third party acting at the Client's direction). The laboratory does not have control over the sampling process. The findings herein constitute no warranty of the samples' representativeness of any sampled environment and strictly relate to the samples as they were presented to the laboratory.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceeding the final result column may have been rounded and therefore, if carried through the calculations, may not yield an identical final result to the one reported.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

Unless otherwise noted below, reported results have not been blank corrected for any field blank or method blank.

L438679 (Report ID: 1057104):
SOPs: GC-SOP-12(14), GC-SOP-18(19)

L438679-9-12,14,16 (Report ID: 1057104):
Sample results may be biased high due to coelution of Aroclors that are present in the samples.

L438679 (Report ID: 1057104):
Accuracy and mean recovery data presented below is based on a 95% confidence interval (k=2). The estimated accuracy applies to the media, technology, and SOP referenced in this report and does not account for the uncertainty associated with the sampling process. The accuracy is based solely on spike recovery data from internal quality control samples. Where N/A appears below, insufficient data is available to provide statistical accuracy and mean recovery values for the associated analyte.

Parameter	Accuracy	Mean Recovery
PCB Aroclor 1016	N/A	N/A
PCB Aroclor 1221	N/A	N/A
PCB Aroclor 1232	N/A	N/A
PCB Aroclor 1242	N/A	N/A

< -Less Than
> -Greater Than
mg -Milligrams
ug -Micrograms
m3 -Cubic Meters
l -Liters
kg -Kilograms
NS -Not Specified
ppm -Parts per Million
ND -Not Detected
NA -Not Applicable

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Client Name : Lawrence Environmental Group, llc
Site : ACCO
Project No. : MSCom592

Date Sampled : 04-APR-18
Date Received: 05-APR-18
Date Analyzed: 05-APR-18 - 07-APR-18

Account No.: 18517
Login No. : L438679

PCB Aroclor 1248	N/A	N/A
PCB Aroclor 1254	N/A	N/A
PCB Aroclor 1260	N/A	N/A
PCB Aroclor 1268	N/A	N/A

Parameter	Method	PEL
PCB Aroclor 1016	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1221	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1232	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1242	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1248	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1254	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1260	In-house: GC-SOP-12,-18; GC/ECD	NA
PCB Aroclor 1268	In-house: GC-SOP-12,-18; GC/ECD	NA

L438679 (Report ID: 1057039):

PCB Aroclor 1016 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1221 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1232 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1242 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1248 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1254 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1260 - Total ug corrected for a desorption efficiency of 89%.
PCB Aroclor 1268 - Total ug corrected for a desorption efficiency of 89%.
NIOSH 5503 specifies 2 to 10 field blanks per set.
SOPs: GC-SOP-12(14), GC-SOP-18(19)

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms	ppm -Parts per Million	
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified	ND -Not Detected	NA -Not Applicable

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LABORATORY FOOTNOTE REPORT

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Client Name : Lawrence Environmental Group, llc
Site : ACCO
Project No. : MSCom592

Date Sampled : 04-APR-18
Date Received: 05-APR-18
Date Analyzed: 05-APR-18 - 07-APR-18

Account No.: 18517
Login No. : L438679

L438679 (Report ID: 1057039):

Accuracy and mean recovery data presented below is based on a 95% confidence interval (k=2). The estimated accuracy applies to the media, technology, and SOP referenced in this report and does not account for the uncertainty associated with the sampling process. The accuracy is based solely on spike recovery data from internal quality control samples. Where N/A appears below, insufficient data is available to provide statistical accuracy and mean recovery values for the associated analyte.

Parameter	Accuracy	Mean Recovery
PCB Aroclor 1016	N/A	N/A
PCB Aroclor 1221	N/A	N/A
PCB Aroclor 1232	N/A	N/A
PCB Aroclor 1242	N/A	N/A
PCB Aroclor 1248	N/A	N/A
PCB Aroclor 1254	N/A	N/A
PCB Aroclor 1260	N/A	N/A
PCB Aroclor 1268	N/A	N/A

Parameter	Method	PEL
PCB Aroclor 1016	mod. NIOSH 5503; GC/ECD	NA
PCB Aroclor 1221	mod. NIOSH 5503; GC/ECD	NA
PCB Aroclor 1232	mod. NIOSH 5503; GC/ECD	NA
PCB Aroclor 1242	mod. NIOSH 5503; GC/ECD	1 mg/m3 (TWA)
PCB Aroclor 1248	mod. NIOSH 5503; GC/ECD	NA
PCB Aroclor 1254	mod. NIOSH 5503; GC/ECD	0.5 mg/m3 (TWA)
PCB Aroclor 1260	mod. NIOSH 5503; GC/ECD	NA
PCB Aroclor 1268	mod. NIOSH 5503; GC/ECD	NA

< -Less Than
> -Greater Than
mg -Milligrams
ug -Micrograms
m3 -Cubic Meters
l -Liters
kg -Kilograms
NS -Not Specified
ppm -Parts per Million
ND -Not Detected
NA -Not Applicable

771916903959
Date:04/05/18
Shipper:FEDEX
Initials:MAK
Prep:UNKNOWN

GALSON CHAIN OF CUSTODY

R63

Turn Around Time (TAT):	(surcharge)
☐ Standard	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☑ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same Day	200%

☑ Samples submitted using the FreePumpLoan™ Program
☐ Samples submitted using the FreeSamplingBadges™ Program

You may edit and complete this COC electronically by logging in to your Client Portal account at https://portal.galsonlabs.com/

Client Acct No.: 18517
Original Prep No.: PSY472110
CS Rep: JTRAINER
Online COC No.: 149926

Report To : Mr. Tom Eng
Company Name : Lawrence Env, LLC
Address 1 : 108 W 39th Street
Address 2 : Suite 500
City, State Zip : New York, NY 10018
Phone No. : 212 - 682 - 2001
Cell No. : 201 - 417 - 3079
Email reports to : teng@lgenv.com, jkaplan@lgenv.com
Comments :

Invoice To : Mr. Tom Eng
Company Name : Lawrence Env, LLC
Address 1 : 108 W 39th Street
Address 2 : Suite 500
City, State Zip : New York, NY 10018
Phone No. : 212 - 682 - 2001
Email Address : jkaplan@lgenv.com, teng@lgenv.com
Comments :
P.O. No. :
Payment info. : ☐ I will call SGS Galson to provide credit card info
☐ Card on File (enter the last five digits on the line below)

Comments :

State Sampled : NY

Please indicate which OEL(s) this data will be used for :
☑ OSHA PEL ☑ ACGIH TLV ☐ MSHA ☐ Cal OSHA
☐ IAQ : ______ Specify Limit(s) ☐ Other : ______ Specify Other

Site Name : ACCO
Project : MSCom592
Sampled By : TOM ENG
List description of industry or Process/interferences present in sampling area :

Sample ID * (Maximum of 20 Characters)	Date Sampled *	Collection Medium	Sample Volume ~~Sample Time~~ ~~Sample Area~~*	Liters ~~Minutes~~ ~~in², cm², ft²~~ *	Analysis Requested	Method Reference ^	Hexavalent Chromium Process (e.g., welding, plating, painting, etc.)
ACCO-01AC	4/4/18	13mm GFF in Swinnex cassette	Volume	235.2	PCBs	NIOSH 5503	
ACCO-02AC	4/4/18	13mm GFF in Swinnex cassette	Volume	254.1	↓	↓	

☐ ^ If the method(s) indicated on the COC are not our routine/preferred method(s), we will substitute our routine/preferred methods. If this is not acceptable, check here to have us contact you.

Chain of Custody	Print Name / Signature		Date	Time		Print Name / Signature		Date	Time
Relinquished By :	TOM ENG		4/4/18	5PM	Received By :				
Relinquished By :					Received By :	Michelle Krause	Michelle Krause	4/5/18	1006

* You must fill in these columns for any samples which you are submitting.
Samples received after 3pm will be considered as next day's business.

Online COC No. : 149926
Prep No. : PSY472110
Account No. : 18517
Draft : 4/2/2018 11:38:18 AM

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/en/Terms-and-Conditions.aspx

SGS GALSON CHAIN OF CUSTODY

Comments :

Sample ID * (Maximum of 20 Characters)	Date Sampled *	Collection Medium	Sample Volume ~~Sample Time~~ ~~Sample Area~~	Liters ~~Minutes~~ ~~in², cm², ft²~~	Analysis Requested	Method Reference ^	Hexavalent Chromium Process (e.g., welding, plating, painting, etc.)
ACCO-03AC	4/4/18	13mm GFF in Swinnex cassette	VOLUME	243	PCBs	NIOSH 5503	
ACCO-04AC	4/4/18	13mm GFF in Swinnex cassette		226.32			
ACCO-05AC	4/4/18	13mm GFF in Swinnex cassette		244.53			
Blank		13mm GFF in Swinnex cassette					
		13mm GFF in Swinnex cassette					
ACCO-01AT	4/4/18	Florisil Tubes/226-39		235.2			
ACCO-02AT	4/4/18	Florisil Tubes/226-39		254.1			
ACCO-03AT	4/4/18	Florisil Tubes/226-39		243			
ACCO-04AT	4/4/18	Florisil Tubes/226-39		226.32			
ACCO-05AT	4/4/18	Florisil Tubes/226-39		244.53			
Blank		Florisil Tubes/226-39					

☐ ^ If the method(s) indicated on the COC are not our routine/preferred method(s), we will substitute our routine/preferred methods. If this is not acceptable, check here to have us contact you.

Chain of Custody	Print Name / Signature		Date	Time		Print Name / Signature		Date	Time
Relinquished By :			4/4/18	5PM	Received By :				
Relinquished By :					Received By :	Michelle Krause	Michelle Krause	4/5/18	1006

* You must fill in these columns for any samples which you are submitting.

Samples received after 3pm will be considered as next day's business.

Online COC No. : 149926
Prep No. : PSY472110
Account No. : 18517
Draft : 4/2/2018 11:38:18 AM

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/en/Terms-and-Conditions.aspx

NOT USED

SGS GALSON CHAIN OF COUSTODY

Comments :

Sample ID * (Maximum of 20 Characters)	Date Sampled *	Collection Medium	Sample Volume Sample Time Sample Area *	Liters Minutes in², cm², ft² *	Analysis Requested	Method Reference ^	Hexavalent Chromium Process (e.g., welding, plating, painting, etc.)
		Florisil Tubes/226-39					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					
		2x2 Gauze pad					

☐ ^ If the method(s) indicated on the COC are not our routine/preferred method(s), we will substitute our routine/preferred methods. If this is not acceptable, check here to have us contact you.

Chain of Custody	Print Name / Signature		Date	Time		Print Name / Signature		Date	Time
Relinquished By :	TOM ENG		4/4/18	5PM	Received By :				
Relinquished By :					Received By :	Michelle Krause	Michelle Krause	4/5/18	1006

* You must fill in these columns for any samples which you are submitting.

Samples received after 3pm will be considered as next day's business.

Online COC No. : 149926
Prep No. : PSY472110
Account No. : 18517
Draft : 4/2/2018 11:38:18 AM

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Comments :

Sample ID * (Maximum of 20 Characters)	Date Sampled *	Collection Medium	Sample Volume Sample Time Sample Area *	Liters Minutes in², cm², ft² *	Analysis Requested	Method Reference ^	Hexavalent Chromium Process (e.g., welding, plating, painting, etc.)
ACCO-01S	4/4/18	2x2 Gauze pad	Area	100 cm²	PCBS		
ACCO-02S	4/4/18	2x2 Gauze pad	Area	100 cm²			
ACCO-03S	4/4/18	2x2 Gauze pad	Area	100 cm²			
ACCO-04S	4/4/18	2x2 Gauze pad	Area	100 cm²			
ACCO-05S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
ACCO-06S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
ACCO-07S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
ACCO-08S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
ACCO-09S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
ACCO-10S	4/4/18	2x2 Gauze Pad	Area	100 cm²			
BLANK							

☐ ^ If the method(s) indicated on the COC are not our routine/preferred method(s), we will substitute our routine/preferred methods. If this is not acceptable, check here to have us contact you.

Chain of Custody	Print Name / Signature		Date	Time		Print Name / Signature		Date	Time
Relinquished By :	TOM ENG		4/4/18	5PM	Received By :				
Relinquished By :					Received By :	Michelle Krause	Michelle Krause	4/5/18	1006

* You must fill in these columns for any samples which you are submitting.

Samples received after 3pm will be considered as next day's business.

Online COC No. : 149926
Prep No. : PSY472110
Account No. : 18517
Draft : 4/2/2018 11:38:18 AM

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/en/Terms-and-Conditions.aspx

APPENDIX B

Data Statistical Summaries

PCB Air Sampling Results Summary, µg/m^3

Compound	No. Samples	Min.	p25	p50	p75	Max.
Aroclor 1016	5	nd	nd	nd	nd	nd
Aroclor 1221	5	nd	nd	nd	nd	nd
Aroclor 1232	5	nd	nd	nd	nd	nd
Aroclor 1242	5	nd	nd	nd	0.53	0.55
Aroclor 1248	5	nd	nd	nd	nd	nd
Aroclor 1254	5	nd	nd	nd	nd	nd
Aroclor 1260	5	nd	nd	nd	nd	nd
Aroclor 1262	5	nd	nd	nd	nd	nd
Aroclor 1268	5	nd	nd	nd	nd	nd

nd – non-detect. Min. – minimum value; p25 – 25th percentile; p50 - 50th percentile (median), etc.

PCB Surface Sampling Results Summary, µg/100 cm^2

Compound	No. Samples	Min.	p25	p50	p75	Max.
Aroclor 1016	10	nd	nd	nd	nd	nd
Aroclor 1221	10	nd	nd	nd	nd	nd
Aroclor 1232	10	nd	nd	nd	nd	nd
Aroclor 1242	10	nd	nd	0.50	1.5	46
Aroclor 1248	10	nd	nd	nd	nd	1.5
Aroclor 1254	10	nd	nd	0.50	4.9	140
Aroclor 1260	10	nd	nd	nd	nd	nd
Aroclor 1262	10	nd	nd	nd	nd	nd
Aroclor 1268	10	nd	nd	nd	nd	nd

nd – non-detect. Min. – minimum value; p25 – 25th percentile; p50 - 50th percentile (median), etc.

APPENDIX C

Photo Documentation

Photo # 1: Entrance

03.28.2018 10:07

Photo #2: Work Area

03.28.2018 10:08

Photo # 3: Work Area

Photo # 4: Vapor Phase Carbon Canisters

Photo # 5: Condensate Tank

Photo # 6: SVE System, Carbon Canisters

Photo # 7: SVE System, Knock-out Tank

Photo # 8: Electrode Field

Photo # 9: Electrode Field/Electrical Transformers

Photo # 10: Electrode Field

Photo # 11: Electrode Field

Photo # 12: Electrode Field

Photo # 13: Air Sample Location #1 - Office

Photo # 14: Air Sample Location #2 – Vapor Phase Carbon, Influent Sample Port

Photo # 15: Air Sample Location #3 – SVE System, Knock-out Tank

Photo # 16: Air Sample Location #4 – Electrode Field

Photo # 17: Air Sample Location #5 – Staircase, Basement Level

Photo # 18: Surface Sample Location #1 – Office Supply Shelf, Third Shelf

Photo # 19: Surface Sample Location #2 – Office Work Table

Photo # 20: Surface Sample Location #3 – Vapor Line, Influent Sample Port Area

Photo # 21: Surface Sample Location #4 – SVE System, Knock-out Tank (Blower Room)

Photo # 22: Surface Sample Location #5 – Concrete Floor in front of MWR-4

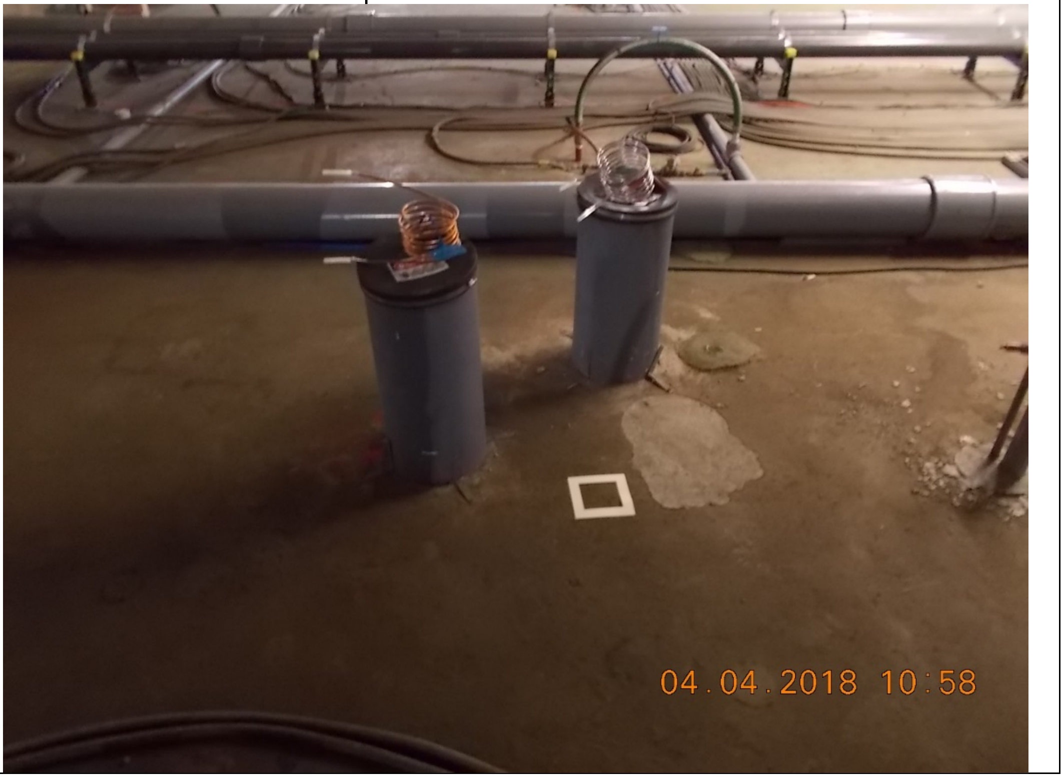

Photo # 23: Surface Sample Location #6 – SVE System, Top of Carbon Canisters


04.04.2018 11:07

Photo # 24: Surface Sample Location #7 - Remediation System, Top of Carbon Cannisters


04.04.2018 11:12

Photo # 25: Surface Sample Location #8 – Concrete Floor in front of G03

Photo # 26: Surface Sample Location #9 – Top of Transformer, Adjacent to G03

Photo # 27: Surface Sample Location #10 – Concrete Floor in front of MWR-3S

04.04.2018 11:26

DISCLAIMER

The professional opinions expressed in this document are based solely on the scope of work conducted and sources referred to therein. The presented data was collected and analyzed using accepted industry methods, procedures and practices in effect at the time this report was generated. This report represents the levels of airborne and surface contaminants at the time of sampling. No inferences regarding other conditions, locations or materials at a later or earlier time may be made based on the contents of this report. No other warranty, express or limited is made. LENV liability and that of its contractors and subcontractors, arising from any services rendered hereunder, shall not exceed the total fee paid by the client to LENV for this project. This report was prepared for the sole use of our client. The use of this report by anyone other than our client or LENV is strictly prohibited without the expressed written consent of LENV. Portions of this report may not be used independently of the entire report. The report attached hereto relates only to those areas required to be tested or areas specifically requested to be tested by the client/customer, and actually tested.

Should there be any change in the conditions of the areas tested, which takes place after the time of the survey, LENV should be contacted.

END OF REPORT

Appendix E

Laboratory Analytical Data

SGS

Dayton, NJ

08/05/19

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Fleming-Lee Shue, Inc.

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

10195-001

SGS Job Number: JC92094

Sampling Date: 07/23/19

Report to:

Fleming-Lee Shue, Inc.

joel@flemingleeshue.com

ATTN: Joel Kane

Total number of pages in report: **48**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Mike Earp
General Manager

Client Service contact: Tammy McCloskey 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, FL, IL, IN, KS, KY, LA, MA, MD, ME, MN, NC, OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TX, UT, VA, WV, DoD ELAP (ANAB L2248)

This report shall not be reproduced, except in its entirety, without the written approval of SGS.
Test results relate only to samples analyzed.

Table of Contents

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SGS LabLink@1048096 11:46 05-Aug-2019

Sample Summary

Fleming-Lee Shue, Inc.

Job No: JC92094

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC92094-1	07/23/19	11:10 JK	07/23/19	AQ	Ground Water	MW-4
JC92094-1A	07/23/19	11:10 JK	07/23/19	AQ	Ground Water	MW-4
JC92094-1F	07/23/19	11:10 JK	07/23/19	AQ	Groundwater Filtered	MW-4
JC92094-2	07/23/19	11:25 JK	07/23/19	AQ	Ground Water	MW-1
JC92094-2A	07/23/19	11:25 JK	07/23/19	AQ	Ground Water	MW-1
JC92094-2F	07/23/19	11:25 JK	07/23/19	AQ	Groundwater Filtered	MW-1
JC92094-3	07/23/19	11:58 JK	07/23/19	AQ	Ground Water	MW-1 DUP
JC92094-4	07/23/19	12:30 JK	07/23/19	AQ	Ground Water	MW-5
JC92094-4A	07/23/19	12:30 JK	07/23/19	AQ	Ground Water	MW-5
JC92094-4F	07/23/19	12:30 JK	07/23/19	AQ	Groundwater Filtered	MW-5
JC92094-5	07/23/19	13:05 JK	07/23/19	AQ	Field Blank Water	FIELD BLANK
JC92094-6	07/23/19	13:10 JK	07/23/19	AQ	Trip Blank Water	TRIP BLANK
JC92094-7	07/23/19	13:15 JK	07/23/19	AQ	Ground Water	MW-16

Sample Summary

(continued)

Fleming-Lee Shue, Inc.

Job No: JC92094

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
JC92094-7A	07/23/19	13:15	JK	07/23/19	AQ	Ground Water	MW-16
JC92094-7F	07/23/19	13:15	JK	07/23/19	AQ	Groundwater Filtered	MW-16

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Fleming-Lee Shue, Inc.	**Job No**	JC92094
Site:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Isla	**Report Date**	7/31/2019 5:03:09 PM

On 07/23/2019, 5 Sample(s), 1 Trip Blank(s) and 1 Field Blank(s) were received at SGS North America Inc. at a maximum corrected temperature of 3.4 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. Job Number of JC92094 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Compounds qualified as out of range in the continuing calibration summary report are acceptable as per method requirements when there is a high bias but the sample result is non-detect.

MS Volatiles By Method SW846 8260C

Matrix: AQ **Batch ID:** V2A8455

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC92094-1MS, JC92094-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JC92094-1: Diluted due to high concentration of target compound.
- JC92094-1 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-3 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-7 for Bromoform: Associated CCV outside of control limits high, sample was ND.
- JC92094-7 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-2 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-6 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-5 for Bromoform: Associated CCV outside of control limits high, sample was ND.
- JC92094-5 for 2-Hexanone: Associated CCV outside of control limits high, sample was ND.
- JC92094-2 for Bromoform: Associated CCV outside of control limits high, sample was ND.
- JC92094-3 for Bromoform: Associated CCV outside of control limits high, sample was ND.
- JC92094-6 for Bromoform: Associated CCV outside of control limits high, sample was ND.

Matrix: AQ **Batch ID:** V2A8456

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91996-8MS, JC91996-8MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- RPD(s) for MSD for 1,1,2-Trichloroethane, 1,2-Dibromoethane, 1,2-Dichlorobenzene, 1,2-Dichloroethane, 1,2-Dichloropropane, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Bromodichloromethane, Bromomethane, Chlorobenzene, Chloroethane, Chloromethane, Dibromochloromethane, Dichlorodifluoromethane, Isopropylbenzene, o-Xylene, Tetrachloroethene, Toluene, trans-1,3-Dichloropropene, Trichloroethene, Trichlorofluoromethane, Vinyl chloride are outside control limits for sample JC91996-8MSD. Analytical precision exceeds in-house control limits.
- V2A8456-BS for 2-Hexanone: High percent recoveries and no associated positive reported in the QC batch.
- JC92094-4 for 2-Hexanone: This compound in BS is outside in house QC limits bias high.

GC Volatiles By Method RSK-175

Matrix: AQ **Batch ID:** GAA1767

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC92094-1ADUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Matrix: AQ **Batch ID:** GAA1768

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91790-3DUP were used as the QC samples indicated.

Matrix: AQ **Batch ID:** GWW5229

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC92094-1ADUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- JC92094-7A: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC92094-2A: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC92094-1A: (pH=8)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC92094-4A: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Metals Analysis By Method SW846 6010D

Matrix: AQ **Batch ID:** MP16547

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92071-1FMS, JC92071-1FMSD, JC92071-1FSDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Iron, Manganese, Potassium are outside control limits for sample MP16547-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP16547-SD1 for Sodium: Serial dilution indicates possible matrix interference.

General Chemistry By Method EPA 300/SW846 9056A

Matrix: AQ **Batch ID:** GP22630

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91732-1DUP, JC91732-1MS were used as the QC samples for Sulfate, Chloride.
- Matrix Spike Recovery(s) for Chloride are outside control limits. Spike recovery indicates possible matrix interference.

General Chemistry By Method EPA 353.2/LACHAT

Matrix: AQ **Batch ID:** GP22603

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92071-1DUP, JC92071-1MS were used as the QC samples for Nitrogen, Nitrate + Nitrite.
- Matrix Spike Recovery(s) for Nitrogen, Nitrate + Nitrite are outside control limits. Spike recovery indicates possible matrix interference.

General Chemistry By Method EPA 365.3

Matrix: AQ	**Batch ID:** GN97877

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92094-2FDUP, JC92094-2FMS were used as the QC samples for Phosphate, Ortho.

Matrix: AQ	**Batch ID:** GP22619

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92094-1ADUP, JC92094-1AMS were used as the QC samples for Phosphorus, Total.

General Chemistry By Method EPA353.2/SM4500NO2B

Matrix: AQ	**Batch ID:** R180013

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC92094-1A for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ	**Batch ID:** R180016

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC92094-7A for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ	**Batch ID:** R180026

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC92094-4A for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ	**Batch ID:** R180030

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC92094-2A for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

General Chemistry By Method SM2320 B-11

Matrix: AQ	**Batch ID:** GN97914

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91885-1DUP were used as the QC samples for Alkalinity, Total as CaCO3.
- JC92094-7A for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC92094-2A for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC92094-1A for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC92094-4A for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.

General Chemistry By Method SM3500FE B-11

Matrix: AQ **Batch ID:** GN98022

- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92094-1ADUP, JC92094-1AMS were used as the QC samples for Iron, Ferrous.
- JC92094-7A for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC92094-4A for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC92094-1A for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC92094-2A for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

Matrix: AQ **Batch ID:** R180044

- The data for SM3500FE B-11 meets quality control requirements.
- JC92094-1A for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R180045

- The data for SM3500FE B-11 meets quality control requirements.
- JC92094-2A for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R180046

- The data for SM3500FE B-11 meets quality control requirements.
- JC92094-4A for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R180047

- The data for SM3500FE B-11 meets quality control requirements.
- JC92094-7A for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

General Chemistry By Method SM4500CO2 D-11

Matrix: AQ **Batch ID:** GN97922

- The data for SM4500CO2 D-11 meets quality control requirements.

General Chemistry By Method SM4500NH3 H-11LACHAT

Matrix: AQ **Batch ID:** GP22601

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92091-1DUP, JC92091-1MSD were used as the QC samples for Nitrogen, Ammonia.
- Matrix Spike Recovery(s) for Nitrogen, Ammonia are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

General Chemistry By Method SM4500NO2 B-11

Matrix: AQ **Batch ID:** GN97870

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92054-1DUP, JC92054-1MS were used as the QC samples for Nitrogen, Nitrite.

General Chemistry By Method SM4500S2- F-11

Matrix: AQ **Batch ID:** GN98014

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC92094-1AMS, JC92094-2ADUP were used as the QC samples for Sulfide.

SGS North America Inc. certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

SGS North America Inc. is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by SGS North America Inc indicated via signature on the report cover

Summary of Hits

Job Number: JC92094
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/23/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC92094-1	**MW-4**					
1,1-Dichloroethene [a]		6.6 J	10	5.9	ug/l	SW846 8260C
Trichloroethene		2310	50	26	ug/l	SW846 8260C
JC92094-1A	**MW-4**					
Methane		0.56	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [b]		16700	500	44	ug/l	RSK-175
Calcium		320000	10000		ug/l	SW846 6010D
Magnesium		68400	5000		ug/l	SW846 6010D
Manganese		36.4	15		ug/l	SW846 6010D
Potassium		16800	10000		ug/l	SW846 6010D
Sodium		1170000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		362	10		mg/l	SM2320 B-11
Chloride		2170	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		9.9	0.41		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		9.9	0.40		mg/l	EPA 353.2/LACHAT
Sulfate		66.8	2.0		mg/l	EPA 300/SW846 9056A
JC92094-1F	**MW-4**					
Phosphate, Ortho		0.40	0.050		mg/l	EPA 365.3
JC92094-2	**MW-1**					
Tetrachloroethene		10.6	1.0	0.90	ug/l	SW846 8260C
Trichloroethene		360	10	5.3	ug/l	SW846 8260C
JC92094-2A	**MW-1**					
Methane [e]		0.20	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [f]		2160	50	4.4	ug/l	RSK-175
Calcium		248000	15000		ug/l	SW846 6010D
Magnesium		27700	5000		ug/l	SW846 6010D
Manganese		18600	45		ug/l	SW846 6010D
Potassium		13700	10000		ug/l	SW846 6010D
Sodium		502000	30000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		75.0	5.0		mg/l	SM2320 B-11
Chloride		1120	10		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		0.54	0.20		mg/l	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]		5.5	0.35		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		6.0	0.30		mg/l	EPA 353.2/LACHAT
Nitrogen, Nitrite		0.52	0.050		mg/l	SM4500NO2 B-11
Sulfate		92.3	2.0		mg/l	EPA 300/SW846 9056A

Summary of Hits

Job Number: JC92094
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/23/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC92094-2F	**MW-1**					
No hits reported in this sample.						
JC92094-3	**MW-1 DUP**					
Tetrachloroethene		10.5	1.0	0.90	ug/l	SW846 8260C
Trichloroethene		459	10	5.3	ug/l	SW846 8260C
JC92094-4	**MW-5**					
Trichloroethene		2.1	1.0	0.53	ug/l	SW846 8260C
JC92094-4A	**MW-5**					
Methane		0.19	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [f]		3240	50	4.4	ug/l	RSK-175
Calcium		189000	5000		ug/l	SW846 6010D
Iron		139	100		ug/l	SW846 6010D
Magnesium		32600	5000		ug/l	SW846 6010D
Sodium		524000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		281	10		mg/l	SM2320 B-11
Chloride		599	6.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		29.2	2.0		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		29.2	2.0		mg/l	EPA 353.2/LACHAT
Sulfate		351	2.0		mg/l	EPA 300/SW846 9056A
JC92094-4F	**MW-5**					
Phosphate, Ortho		0.066	0.050		mg/l	EPA 365.3
JC92094-5	**FIELD BLANK**					
No hits reported in this sample.						
JC92094-6	**TRIP BLANK**					
No hits reported in this sample.						
JC92094-7	**MW-16**					
Chloroform		0.64 J	1.0	0.50	ug/l	SW846 8260C
Tetrachloroethene		1.2	1.0	0.90	ug/l	SW846 8260C
Trichloroethene		184	1.0	0.53	ug/l	SW846 8260C

Summary of Hits

Job Number: JC92094
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/23/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC92094-7A	**MW-16**					
Methane		0.15	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [f]		2860	50	4.4	ug/l	RSK-175
Calcium		92800	5000		ug/l	SW846 6010D
Magnesium		18700	5000		ug/l	SW846 6010D
Sodium		589000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		490	10		mg/l	SM2320 B-11
Chloride		594	6.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		6.3	0.21		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		6.3	0.20		mg/l	EPA 353.2/LACHAT
Sulfate		47.4	2.0		mg/l	EPA 300/SW846 9056A
JC92094-7F	**MW-16**					
Phosphate, Ortho		0.18	0.050		mg/l	EPA 365.3

(a) Diluted due to high concentration of target compound.
(b) (pH= 8)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(c) Sample was titrated to a final pH of 4.5.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)
(e) (pH= 6)Sample pH did not satisfy field preservation criteria.
(f) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2A196259.D	10	07/24/19 22:20	EH	n/a	n/a	V2A8455
Run #2	2A196283.D	50	07/25/19 11:00	EH	n/a	n/a	V2A8456

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	100	60	ug/l	
71-43-2	Benzene	ND	5.0	4.3	ug/l	
74-97-5	Bromochloromethane	ND	10	4.8	ug/l	
75-27-4	Bromodichloromethane	ND	10	5.8	ug/l	
75-25-2	Bromoform [b]	ND	10	6.3	ug/l	
74-83-9	Bromomethane	ND	20	16	ug/l	
78-93-3	2-Butanone (MEK)	ND	100	69	ug/l	
75-15-0	Carbon disulfide	ND	20	9.5	ug/l	
56-23-5	Carbon tetrachloride	ND	10	5.5	ug/l	
108-90-7	Chlorobenzene	ND	10	5.6	ug/l	
75-00-3	Chloroethane	ND	10	7.3	ug/l	
67-66-3	Chloroform	ND	10	5.0	ug/l	
74-87-3	Chloromethane	ND	10	7.6	ug/l	
110-82-7	Cyclohexane	ND	50	7.8	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	20	12	ug/l	
124-48-1	Dibromochloromethane	ND	10	5.6	ug/l	
106-93-4	1,2-Dibromoethane	ND	10	4.8	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	10	5.3	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	10	5.4	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	10	5.1	ug/l	
75-71-8	Dichlorodifluoromethane	ND	20	14	ug/l	
75-34-3	1,1-Dichloroethane	ND	10	5.7	ug/l	
107-06-2	1,2-Dichloroethane	ND	10	6.0	ug/l	
75-35-4	1,1-Dichloroethene	6.6	10	5.9	ug/l	J
156-59-2	cis-1,2-Dichloroethene	ND	10	5.1	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	10	5.4	ug/l	
78-87-5	1,2-Dichloropropane	ND	10	5.1	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	10	4.7	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	10	4.3	ug/l	
123-91-1	1,4-Dioxane	ND	1300	690	ug/l	
100-41-4	Ethylbenzene	ND	10	6.0	ug/l	
76-13-1	Freon 113	ND	50	19	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [b]	ND	50	20	ug/l	
98-82-8	Isopropylbenzene	ND	10	6.5	ug/l	
79-20-9	Methyl Acetate	ND	50	8.0	ug/l	
108-87-2	Methylcyclohexane	ND	50	6.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	10	5.1	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	50	19	ug/l	
75-09-2	Methylene chloride	ND	20	10	ug/l	
100-42-5	Styrene	ND	10	7.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	10	6.5	ug/l	
127-18-4	Tetrachloroethene	ND	10	9.0	ug/l	
108-88-3	Toluene	ND	10	5.3	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	10	5.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	10	5.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	10	5.4	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	10	5.3	ug/l	
79-01-6	Trichloroethene	2310 [c]	50	26	ug/l	
75-69-4	Trichlorofluoromethane	ND	20	8.4	ug/l	
75-01-4	Vinyl chloride	ND	10	7.9	ug/l	
	m,p-Xylene	ND	10	7.8	ug/l	
95-47-6	o-Xylene	ND	10	5.9	ug/l	
1330-20-7	Xylene (total)	ND	10	5.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%	95%	80-120%
17060-07-0	1,2-Dichloroethane-D4	97%	99%	81-124%
2037-26-5	Toluene-D8	91%	89%	80-120%
460-00-4	4-Bromofluorobenzene	89%	90%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits high, sample was ND.
(c) Result is from Run# 2

ND = Not detected   MDL = Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74507.D	1	07/25/19 16:38	TCH	n/a	n/a	GAA1767
Run #2 [a]	WW136115.D	10	07/25/19 12:57	DFT	n/a	n/a	GWW5229

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.56	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	16700 [b]	500	44	ug/l	

(a) (pH= 8)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	320000	10000	ug/l	2	07/24/19	07/26/19	MET	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	68400	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	36.4	15	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	16800	10000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	1170000	100000	ug/l	10	07/24/19	07/26/19	MET	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47178
(2) Instrument QC Batch: MA47185
(3) Prep QC Batch: MP16547

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/25/19 09:55	CM	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	362	10	mg/l	1	07/25/19 09:55	CM	SM2320 B-11
Chloride	2170	20	mg/l	10	07/27/19 17:37	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/25/19 14:40	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	9.9	0.41	mg/l	1	07/25/19 16:37	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	9.9	0.40	mg/l	4	07/25/19 16:37	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/23/19 21:02	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/29/19 17:46	MP	EPA 365.3
Sulfate	66.8	2.0	mg/l	1	07/26/19 12:30	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/27/19 15:36	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-4		
Lab Sample ID:	JC92094-1F	**Date Sampled:**	07/23/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.40	0.050	mg/l	1	07/24/19 10:31	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-1		
Lab Sample ID:	JC92094-2	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196263.D	1	07/25/19 00:16	EH	n/a	n/a	V2A8455
Run #2	2A196284.D	10	07/25/19 11:30	EH	n/a	n/a	V2A8456

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform [a]	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-1		
Lab Sample ID:	JC92094-2	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	10.6	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	360 [b]	10	5.3	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%	96%	80-120%
17060-07-0	1,2-Dichloroethane-D4	96%	97%	81-124%
2037-26-5	Toluene-D8	91%	90%	80-120%
460-00-4	4-Bromofluorobenzene	89%	89%	80-120%

(a) Associated CCV outside of control limits high, sample was ND.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-1
Lab Sample ID: JC92094-2A
Matrix: AQ - Ground Water
Method: RSK-175
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Date Sampled: 07/23/19
Date Received: 07/23/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA74519.D	1	07/26/19 11:26	TCH	n/a	n/a	GAA1768
Run #2 [b]	WW136118.D	1	07/25/19 15:19	DFT	n/a	n/a	GWW5229

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.20	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	2160 [c]	50	4.4	ug/l	

(a) (pH= 6)Sample pH did not satisfy field preservation criteria.
(b) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(c) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-1		
Lab Sample ID:	JC92094-2A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	248000	15000	ug/l	3	07/24/19	07/26/19	MET	SW846 6010D (2)	SW846 3010A (3)
Iron	< 100	100	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D (1)	SW846 3010A (3)
Magnesium	27700	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D (1)	SW846 3010A (3)
Manganese	18600	45	ug/l	3	07/24/19	07/26/19	MET	SW846 6010D (2)	SW846 3010A (3)
Potassium	13700	10000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D (1)	SW846 3010A (3)
Sodium	502000	30000	ug/l	3	07/24/19	07/26/19	MET	SW846 6010D (2)	SW846 3010A (3)

(1) Instrument QC Batch: MA47178
(2) Instrument QC Batch: MA47185
(3) Prep QC Batch: MP16547

RL = Reporting Limit

Report of Analysis

Page 1 of 1

Client Sample ID: MW-1
Lab Sample ID: JC92094-2A
Matrix: AQ - Ground Water
Date Sampled: 07/23/19
Date Received: 07/23/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/25/19 09:55	CM	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	75.0	5.0	mg/l	1	07/25/19 09:55	CM	SM2320 B-11
Chloride	1120	10	mg/l	5	07/27/19 18:00	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.54	0.20	mg/l	1	07/25/19 14:42	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	5.5	0.35	mg/l	1	07/25/19 16:38	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	6.0	0.30	mg/l	3	07/25/19 16:38	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.52	0.050	mg/l	5	07/23/19 19:05	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/29/19 17:46	MP	EPA 365.3
Sulfate	92.3	2.0	mg/l	1	07/26/19 12:57	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/27/19 15:36	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-1		
Lab Sample ID:	JC92094-2F	**Date Sampled:**	07/23/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/24/19 10:31	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-1 DUP		
Lab Sample ID:	JC92094-3	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196264.D	1	07/25/19 00:45	EH	n/a	n/a	V2A8455
Run #2	2A196285.D	10	07/25/19 11:59	EH	n/a	n/a	V2A8456

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform [a]	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-1 DUP		
Lab Sample ID:	JC92094-3	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	10.5	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	459 [b]	10	5.3	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	93%	95%	80-120%
17060-07-0	1,2-Dichloroethane-D4	96%	97%	81-124%
2037-26-5	Toluene-D8	92%	89%	80-120%
460-00-4	4-Bromofluorobenzene	91%	93%	80-120%

(a) Associated CCV outside of control limits high, sample was ND.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-5
Lab Sample ID: JC92094-4 **Date Sampled:** 07/23/19
Matrix: AQ - Ground Water **Date Received:** 07/23/19
Method: SW846 8260C **Percent Solids:** n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196282.D	1	07/25/19 10:31	EH	n/a	n/a	V2A8456
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-5		
Lab Sample ID:	JC92094-4	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	2.1	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	92%		80-120%
17060-07-0	1,2-Dichloroethane-D4	94%		81-124%
2037-26-5	Toluene-D8	92%		80-120%
460-00-4	4-Bromofluorobenzene	92%		80-120%

(a) This compound in BS is outside in house QC limits bias high.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-5		
Lab Sample ID:	JC92094-4A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74520.D	1	07/26/19 11:40	TCH	n/a	n/a	GAA1768
Run #2 [a]	WW136119.D	1	07/25/19 15:48	DFT	n/a	n/a	GWW5229

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.19	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	3240 [b]	50	4.4	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-5		
Lab Sample ID:	JC92094-4A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	189000	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	139	100	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	32600	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	< 15	15	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	< 10000	10000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	524000	50000	ug/l	5	07/24/19	07/26/19	MET	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47178
(2) Instrument QC Batch: MA47185
(3) Prep QC Batch: MP16547

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-5		
Lab Sample ID:	JC92094-4A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/25/19 09:55	CM	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	281	10	mg/l	1	07/25/19 09:55	CM	SM2320 B-11
Chloride	599	6.0	mg/l	3	07/27/19 18:24	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/25/19 14:43	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	29.2	2.0	mg/l	1	07/25/19 16:50	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	29.2	2.0	mg/l	20	07/25/19 16:50	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/23/19 21:02	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/29/19 17:46	MP	EPA 365.3
Sulfate	351	2.0	mg/l	1	07/26/19 14:09	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/27/19 15:36	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-5		
Lab Sample ID:	JC92094-4F	**Date Sampled:**	07/23/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.066	0.050	mg/l	1	07/24/19 10:31	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	FIELD BLANK		
Lab Sample ID:	JC92094-5	**Date Sampled:**	07/23/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196258.D	1	07/24/19 21:52	EH	n/a	n/a	V2A8455
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform [a]	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FIELD BLANK		
Lab Sample ID:	JC92094-5	**Date Sampled:**	07/23/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	91%		80-120%
17060-07-0	1,2-Dichloroethane-D4	91%		81-124%
2037-26-5	Toluene-D8	92%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

(a) Associated CCV outside of control limits high, sample was ND.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 2

Client Sample ID: TRIP BLANK
Lab Sample ID: JC92094-6 **Date Sampled:** 07/23/19
Matrix: AQ - Trip Blank Water **Date Received:** 07/23/19
Method: SW846 8260C **Percent Solids:** n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196257.D	1	07/24/19 21:22	EH	n/a	n/a	V2A8455
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform [a]	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	JC92094-6	**Date Sampled:**	07/23/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	92%		80-120%
17060-07-0	1,2-Dichloroethane-D4	92%		81-124%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

(a) Associated CCV outside of control limits high, sample was ND.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-16
Lab Sample ID: JC92094-7
Matrix: AQ - Ground Water
Method: SW846 8260C
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

Date Sampled: 07/23/19
Date Received: 07/23/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A196266.D	1	07/25/19 01:43	EH	n/a	n/a	V2A8455
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform [a]	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	0.64	1.0	0.50	ug/l	J
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-16		
Lab Sample ID:	JC92094-7	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone [a]	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	1.2	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	184	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		80-120%
17060-07-0	1,2-Dichloroethane-D4	97%		81-124%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

(a) Associated CCV outside of control limits high, sample was ND.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-16		
Lab Sample ID:	JC92094-7A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74522.D	1	07/26/19 12:09	TCH	n/a	n/a	GAA1768
Run #2 [a]	WW136120.D	1	07/25/19 16:25	DFT	n/a	n/a	GWW5229

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.15	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	2860 [b]	50	4.4	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-16		
Lab Sample ID:	JC92094-7A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	92800	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	18700	5000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	< 15	15	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	< 10000	10000	ug/l	1	07/24/19	07/25/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	589000	50000	ug/l	5	07/24/19	07/27/19	MET	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47178
(2) Instrument QC Batch: MA47185
(3) Prep QC Batch: MP16547

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-16		
Lab Sample ID:	JC92094-7A	**Date Sampled:**	07/23/19
Matrix:	AQ - Ground Water	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/25/19 09:55	CM	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	490	10	mg/l	1	07/25/19 09:55	CM	SM2320 B-11
Chloride	594	6.0	mg/l	3	07/27/19 18:48	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/27/19 19:19	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/25/19 14:44	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	6.3	0.21	mg/l	1	07/25/19 16:46	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	6.3	0.20	mg/l	2	07/25/19 16:46	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/23/19 21:02	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/29/19 17:46	MP	EPA 365.3
Sulfate	47.4	2.0	mg/l	1	07/26/19 14:33	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/27/19 15:36	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-16		
Lab Sample ID:	JC92094-7F	**Date Sampled:**	07/23/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/23/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.18	0.050	mg/l	1	07/24/19 10:31	JOO	EPA 365.3

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Certification Exceptions
- Chain of Custody

Parameter Certification Exceptions

Job Number: JC92094
Account: FLSNYNY Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
Alkalinity, Carbonate		**SM4500CO2 D-11**	AQ	SGS is not certified for this parameter.[a]

(a) Lab cert for analyte not supported by NJDEP, OQA. Only methods/analytes required for reporting by the State of NJ can be certified in NJ. Use of this analyte for compliance must be verified through the appropriate regulatory office.

Certification exceptions shown are based on the New Jersey DEP certifications. Applicability in other states may vary. Please contact your laboratory representative if additional information is required for a specific regulatory program.

GW
W FLM
W TB

E/F

SGS

CHAIN OF CUSTODY

SGS North America Inc. - Dayton
2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.sgs.com/ehsusa

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FED-EX Tracking #	Bottle Order Control #
SGS Quote #	SGS Job # JC92094

Client / Reporting Information

Company Name: Fleming Lee Shue
Street Address: 158 W 29th Street
City: New York State: NY Zip: 10001
Project Contact: D DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-6753225
Sampler(s) Name(s): J. Kane J. Arey Phone #:

Project Information

Project Name: ACCO upgradient well sampling
Street: 3200 Skillman Ave
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager: D. DiRocco

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	V8260TCL11	VRSK175D6MEE	VRSK175C02	CHL, S04	S	AMN	xFE3, xNO30	TPO4, OPO4	CA, K, MG, MN, NA	ALK, CAR(XCAR)		LAB USE ONLY
1F	MW-4		7/23/19	11:10	JK	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		
2F	MW-1			11:25	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		
3	MW-1 Dup			11:58	JA	G	GW	3	3								X											
4F	MW-5			12:30	JK	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		
5	Field Blank			13:05	JK	G	FB	2	2								X											
6	Trip Blank			13:10	JK	G	TB	2	2								X											
7F	MW-16			13:15	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

VSSI
A11
M24

Turn Around Time (Business Days)

Approved By (SGS PM): / Date:
☒ 10 Business Days everything else
☐ 5 Business Days
☐ 3 Business Days*
☒ 2 Business Days* VOCS ONLY
☐ 1 Business Day*
☐ Other ____________
All data available via Lablink
* Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

MW-1 HCL preserved vials effervesced slightly

2 day TAT VOCS ONLY

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1	Date / Time: 7/23/19 1515	Received By: 1 TSch 7/23/19 1515	Relinquished By: 2 TSch 7/23/19	Date / Time: 1705	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☑ Absent JK; On Ice ☑; Therm ID; Cooler Temp. °C

INITIAL ASESSMENT 2B JK

LABEL VERIFICATION________

CIP 3.3 3.4

EHSA-QAC-0023-02-FORM-Dayton - Standard COC.xlsx

SGS Sample Receipt Summary

Job Number: JC92094 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORMER ACCO BRAND/JIM BEAM, 32-00 SKIL

Date / Time Received: 7/23/2019 5:05:00 PM **Delivery Method:** **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 1: (3.3); Cooler 2: (3.4);

Cooler Temps (Corrected) °C: Cooler 1: (3.3); Cooler 2: (3.4);

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐

2. Cooler temp verification: IR Gun
3. Cooler media: Ice (Bag)
4. No. Coolers: 2

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☑	☐	☐
2. Trip Blank listed on COC:	☑	☐	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐

3. Condition of sample: Intact

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (Specify)

Comments

SM089-03
Rev. Date 12/7/17

Job Change Order: JC92094

Requested Date:	7/24/2019	**Received Date:**	7/23/2019
Account Name:	Fleming-Lee Shue, Inc.	**Due Date:**	7/25/2019
Project Description:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av	**Deliverable:**	NYASPB
C/O Initiated By:	TAMMY **PM:** TM	**TAT (Days):**	7

==

Sample #:	JC92094-1A, 1F, 2A, 2F, 4A, 4F, 7A, 7F,	**Change:**
Dept:		revise to 7 day t/a
TAT:	7	

==

Above Changes Per: Daniel DiRocco

Date/Time: 7/24/2019 10:06:49 AM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Page 1 of 1

SGS

Dayton, NJ

08/05/19

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Fleming-Lee Shue, Inc.

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

10195-001

SGS Job Number: JC91330

Sampling Dates: 07/09/19 - 07/12/19

Report to:

Fleming-Lee Shue, Inc.

joel@flemingleeshue.com

ATTN: Joel Kane

Total number of pages in report: **185**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Mike Earp
General Manager

Client Service contact: Tammy McCloskey 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, FL, IL, IN, KS, KY, LA, MA, MD, ME, MN, NC, OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TX, UT, VA, WV, DoD ELAP (ANAB L2248)

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Test results relate only to samples analyzed.

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SGS LabLink@1048096 11:46 05-Aug-2019

Sample Summary

Fleming-Lee Shue, Inc.

Job No: JC91330

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC91330-1	07/09/19	10:58 JA	07/09/19	AQ	Ground Water	MWR-7S
JC91330-1F	07/09/19	10:58 JA	07/09/19	AQ	Groundwater Filtered	MWR-7S
JC91330-2	07/09/19	14:00 JA	07/09/19	AQ	Ground Water	MWR-7I
JC91330-2F	07/09/19	14:00 JA	07/09/19	AQ	Groundwater Filtered	MWR-7I
JC91330-3	07/09/19	14:20 JA	07/09/19	AQ	Ground Water	MW-11I
JC91330-3F	07/09/19	14:20 JA	07/09/19	AQ	Groundwater Filtered	MW-11I
JC91330-4	07/09/19	14:20 JA	07/09/19	AQ	Trip Blank Water	TB-1
JC91330-5	07/10/19	09:45 JA	07/10/19	AQ	Ground Water	MW-8I
JC91330-5F	07/10/19	09:45 JA	07/10/19	AQ	Groundwater Filtered	MW-8I
JC91330-6	07/10/19	09:50 JA	07/10/19	AQ	Ground Water	MW-17
JC91330-6F	07/10/19	09:50 JA	07/10/19	AQ	Groundwater Filtered	MW-17
JC91330-7	07/10/19	10:54 JA	07/10/19	AQ	Ground Water	MW-10A
JC91330-7F	07/10/19	10:54 JA	07/10/19	AQ	Groundwater Filtered	MW-10A

Sample Summary

(continued)

Fleming-Lee Shue, Inc.

Job No: JC91330

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
JC91330-8	07/10/19	11:20	JA	07/10/19	AQ	Ground Water	MW-17I
JC91330-8F	07/10/19	11:20	JA	07/10/19	AQ	Groundwater Filtered	MW-17I
JC91330-9	07/10/19	13:28	JA	07/10/19	AQ	Ground Water	MW-12
JC91333-1	07/09/19	09:50	BH	07/09/19	AQ	Ground Water	MW-9
JC91333-1F	07/09/19	09:50	BH	07/09/19	AQ	Groundwater Filtered	MW-9
JC91333-2	07/09/19	09:50	BH	07/09/19	AQ	Ground Water	MW-9-DUP
JC91330-10	07/09/19	14:00	JA	07/10/19	AQ	Ground Water	MWR-7I-DUP
JC91330-11	07/10/19	13:28	JA	07/10/19	AQ	Ground Water	MWR-7I-UNPRES
JC91330-12	07/10/19	13:35	JA	07/10/19	AQ	Ground Water	MWR-7I-DUP-UNPRES
JC91330-13	07/10/19	14:20	JA	07/10/19	AQ	Trip Blank Water	TRIP BLANK
JC91330-14	07/11/19	10:05	JA	07/11/19	AQ	Ground Water	MWR-3I
JC91330-14F	07/11/19	10:05	JA	07/11/19	AQ	Groundwater Filtered	MWR-3I
JC91330-15	07/11/19	10:58	JA	07/11/19	AQ	Ground Water	MWR-1I

Sample Summary

(continued)

Fleming-Lee Shue, Inc.

Job No: JC91330

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC91330-15F	07/11/19	10:58 JA	07/11/19	AQ	Groundwater Filtered	MWR-1I
JC91330-16	07/11/19	13:15 JA	07/11/19	AQ	Ground Water	MWR-4I
JC91330-16F	07/11/19	13:15 JA	07/11/19	AQ	Groundwater Filtered	MWR-4I
JC91330-17	07/11/19	13:45 JA	07/11/19	AQ	Ground Water	MWR-4I-DUP
JC91330-18	07/11/19	13:55 JA	07/11/19	AQ	Ground Water	MWR-2I
JC91330-18F	07/11/19	13:55 JA	07/11/19	AQ	Groundwater Filtered	MWR-2I
JC91330-19	07/11/19	13:55 JA	07/11/19	AQ	Ground Water	MWR-2I-DUP
JC91330-20	07/11/19	14:00 JA	07/11/19	AQ	Trip Blank Water	TRIP BLANK-3
JC91330-21	07/11/19	14:00 JA	07/11/19	AQ	Field Blank Water	FIELD BLANK
JC91330-22	07/11/19	09:38 JA	07/11/19	AQ	Ground Water	MW-12I
JC91330-23	07/12/19	10:00 JA	07/12/19	AQ	Ground Water	MWR-3S
JC91330-23F	07/12/19	10:00 JA	07/12/19	AQ	Groundwater Filtered	MWR-3S
JC91330-24	07/12/19	10:03 JA	07/12/19	AQ	Ground Water	MWR-1S

Sample Summary

(continued)

Fleming-Lee Shue, Inc.

Job No: JC91330

Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Project No: 10195-001

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC91330-24F	07/12/19	10:03 JA	07/12/19	AQ	Groundwater Filtered	MWR-1S
JC91330-25	07/12/19	12:57 JA	07/12/19	AQ	Ground Water	MWR-2S
JC91330-25F	07/12/19	12:57 JA	07/12/19	AQ	Groundwater Filtered	MWR-2S
JC91330-26	07/12/19	13:05 JA	07/12/19	AQ	Ground Water	MWR-4S
JC91330-26F	07/12/19	13:05 JA	07/12/19	AQ	Groundwater Filtered	MWR-4S
JC91330-27	07/12/19	13:30 JA	07/12/19	AQ	Ground Water	MWR-4S-DUP
JC91330-28	07/12/19	13:50 JA	07/12/19	AQ	Field Blank Water	FIELD BLANK-2
JC91330-29	07/12/19	13:50 JA	07/12/19	AQ	Trip Blank Water	TRIP BLANK-4

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Fleming-Lee Shue, Inc.	**Job No**	JC91330
Site:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Isla	**Report Date**	7/29/2019 10:56:36 A

Between 07/09/2019 and 07/12/2019, 25 Sample(s), 4 Trip Blank(s) and 2 Field Blank(s) were received at SGS North America Inc. at a maximum corrected temperature of 3.8 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. Job Number of JC91330 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Compounds qualified as out of range in the continuing calibration summary report are acceptable as per method requirements when there is a high bias but the sample result is non-detect.

MS Volatiles By Method SW846 8260C

Matrix: AQ **Batch ID:** V2B7733

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91371-2MS, JC91371-2MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethene, 1,4-Dioxane, Acetone, Cyclohexane, Ethylbenzene, Isopropylbenzene, m,p-Xylene, Methyl Tert Butyl Ether, Methylcyclohexane, o-Xylene, Styrene, Toluene, Vinyl chloride, Xylene (total) are outside control limits. Outside control limits due to matrix interference.
- Matrix Spike Duplicate Recovery(s) for 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethene, Acetone, Cyclohexane, Ethylbenzene, Methyl Tert Butyl Ether, Isopropylbenzene, m,p-Xylene, Methylcyclohexane, o-Xylene, Styrene, Toluene, Vinyl chloride, Xylene (total) are outside control limits. Outside control limits due to matrix interference.
- Matrix Spike Recovery(s) for Chloromethane are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- RPD(s) for MSD for Isopropylbenzene, m,p-Xylene, Methylcyclohexane, o-Xylene, Styrene, Toluene, Vinyl chloride, Xylene (total) are outside control limits for sample JC91371-2MSD. Outside control limits due to matrix interference.
- V2B7733-MB for Dibromochloromethane: MDL from current instrument.
- V2B7733-MB for 1,1,2,2-Tetrachloroethane: MDL from current instrument.
- JC91371-2MS/MSD for Toluene-D8: Outside control limits due to matrix interference.

Matrix: AQ **Batch ID:** V2B7745

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91790-17MS, JC91790-17MSD were used as the QC samples indicated.
- JC91330-9: Diluted due to high concentration of target compound.
- JC91330-9 for 1,2,3-Trichlorobenzene: Associated CCV outside of control limits high, sample was ND.

Matrix: AQ **Batch ID:** V2D7895

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-15MS, JC91330-15MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for 1,1,2,2-Tetrachloroethane, 1,2-Dibromo-3-chloropropane, 2-Hexanone, 4-Methyl-2-pentanone(MIBK) are outside control limits. Outside control limits due to matrix interference.
- Matrix Spike Duplicate Recovery(s) for 1,1,2,2-Tetrachloroethane, 1,2-Dibromo-3-chloropropane, 2-Hexanone, 4-Methyl-2-pentanone(MIBK) are outside control limits. Outside control limits due to matrix interference.
- JC91330-18: Diluted due to high concentration of target compound.
- JC91330-19: Diluted due to high concentration of target compound.
- JC91330-18 for cis-1,3-Dichloropropene: This compound in BS is outside in house QC limits bias high.

MS Volatiles By Method SW846 8260C

Matrix: AQ **Batch ID:** V2D7895

- JC91330-19 for cis-1,3-Dichloropropene: This compound in BS is outside in house QC limits bias high.
- JC91330-22 for cis-1,3-Dichloropropene: This compound in BS is outside in house QC limits bias high.
- V2D7895-BS for cis-1,3-Dichloropropene: High percent recoveries and no associated positive reported in the QC batch.

Matrix: AQ **Batch ID:** V2D7897

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91461-1MS, JC91461-1MSD were used as the QC samples indicated.
- JC91330-15: Diluted due to high concentration of target compound.
- JC91330-17: Diluted due to high concentration of target compound.
- JC91330-15 for Chloroethane: Associated CCV outside of control limits low.
- JC91330-17 for Chloroethane: Associated CCV outside of control limits low.

Matrix: AQ **Batch ID:** V2D7899

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91330-14MS, JC91330-14MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- Matrix Spike Duplicate Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JC91330-16: Diluted due to high concentration of target compound.
- JC91330-16 for 1,1-Dichloroethane: This compound in BS is outside in house QC limits bias high.
- JC91330-21 for 1,1-Dichloroethane: This compound in BS is outside in house QC limits bias high.
- V2D7899-BS for 1,1-Dichloroethane: High percent recoveries and no associated positive reported in the QC batch.
- JC91330-20 for 1,1-Dichloroethane: This compound in BS is outside in house QC limits bias high.

Matrix: AQ **Batch ID:** V2V2459

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91627-10MS, JC91627-10MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Ethylbenzene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JC91330-14: Diluted due to high concentration of target compound.

Matrix: AQ **Batch ID:** V4B3920

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91330-6DUP, JC91330-8MS were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- JC91330-11: (pH=7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time.
- JC91330-12: (pH=7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time.

Matrix: AQ **Batch ID:** V4B3924

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91396-1DUP, JC91396-2MS were used as the QC samples indicated.

MS Volatiles By Method SW846 8260C

Matrix: AQ **Batch ID:** V4B3924

- JC91330-11: (pH=7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time. Diluted due to high concentration of target compound.
- JC91330-10: Diluted due to high concentration of target compound.
- JC91330-12: (pH=7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time. Diluted due to high concentration of target compound.

Matrix: AQ **Batch ID:** V4B3934

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91564-17MS, JC91564-17MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- JC91330-10: (pH=6)Sample pH did not satisfy field preservation criteria.

Matrix: AQ **Batch ID:** VA9739

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91448-5MS, JC91448-5MSD were used as the QC samples indicated.

Matrix: AQ **Batch ID:** VA9743

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91626-2MS, JC91626-2MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike / Matrix Spike Duplicate Recovery(s) for Tetrachloroethene, 1,1,1-Trichloroethane, cis-1,2-Dichloroethene, Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- RPD(s) for MSD for cis-1,3-Dichloropropene are outside control limits for sample JC91626-2MSD. Outside control limits due to matrix interference.
- JC91333-1: Diluted due to high concentration of target compound.
- JC91333-2: Diluted due to high concentration of target compound.
- JC91330-1: Diluted due to high concentration of target compound.
- JC91330-2: Diluted due to high concentration of target compound.
- JC91333-1 for Trichlorofluoromethane: Associated CCV outside of control limits low.
- JC91330-1 for Trichlorofluoromethane: Associated CCV outside of control limits low.
- JC91330-2 for Trichlorofluoromethane: Associated CCV outside of control limits low.
- JC91333-2 for Trichlorofluoromethane: Associated CCV outside of control limits low.
- VA9743-MB for Dibromochloromethane: MDL from current instrument.
- VA9743-MB for 1,1,2,2-Tetrachloroethane: MDL from current instrument.
- JC91330-3 for Trichlorofluoromethane: Associated CCV outside of control limits low.

Matrix: AQ **Batch ID:** VX7838

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91330-24MS, JC91330-24MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike / Matrix Spike Duplicate Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- Matrix Spike Duplicate Recovery(s) for Carbon disulfide are outside control limits. Outside control limits due to matrix interference.
- JC91330-24MS/MSD for 1,1-Dichloroethene: Outside control limits due to matrix interference.
- JC91330-28 for Dichlorodifluoromethane: Associated CCV outside of control limits low.

MS Volatiles By Method SW846 8260C

Matrix: AQ **Batch ID:** VX7838

- JC91330-29 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- JC91330-28 for Trichlorofluoromethane: Associated CCV outside of control limits high, sample was ND.
- JC91330-28 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- JC91330-29 for Trichlorofluoromethane: Associated CCV outside of control limits high, sample was ND.
- JC91330-29 for Dichlorodifluoromethane: Associated CCV outside of control limits low.

Matrix: AQ **Batch ID:** VX7840

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-23MS, JC91330-23MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JC91330-23: Diluted due to high concentration of target compound.
- JC91330-23 for Trichlorofluoromethane: Associated CCV outside of control limits high, sample was ND.This compound in BS is outside in house QC limits bias high.
- JC91330-23 for Dichlorodifluoromethane: Associated CCV outside of control limits low.
- JC91330-23 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- VX7840-BS for Trichlorofluoromethane: High percent recoveries and no associated positive reported in the QC batch.

Matrix: AQ **Batch ID:** VX7841

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91330-25MS, JC91330-25MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Trichloroethene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JC91330-25: Diluted due to high concentration of target compound.
- JC91330-27: Diluted due to high concentration of target compound.
- JC91330-26: Diluted due to high concentration of target compound.
- JC91330-24: Diluted due to high concentration of target compound.
- JC91330-26 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- JC91330-27 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- JC91330-24 for Freon 113: Associated CCV outside of control limits high, sample was ND.
- JC91330-25 for Freon 113: Associated CCV outside of control limits high, sample was ND.

GC Volatiles By Method RSK-175

Matrix: AQ **Batch ID:** GAA1760

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91176-1DUP were used as the QC samples indicated.
- RPD(s) for Duplicate for Ethane, Methane are outside control limits for sample JC91176-1DUP. Outside of in house control limits.

Matrix: AQ **Batch ID:** GAA1761

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91513-13DUP were used as the QC samples indicated.

Matrix: AQ **Batch ID:** GAA1762

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91330-5DUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Matrix: AQ **Batch ID:** GWW5223

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91333-1DUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- JC91330-3: (pH=6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-2: (pH=6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-1: (pH=6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91333-1: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Matrix: AQ **Batch ID:** GWW5224

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-5DUP were used as the QC samples indicated.
- JC91330-14: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-5: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-6: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-8: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-7: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-18: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-16: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-15: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Matrix: AQ **Batch ID:** GWW5225

- All samples were analyzed within the recommended method holding time.
- Sample(s) JC91513-8DUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- JC91330-23: (pH=6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-26: (pH=8)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-25: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
- JC91330-24: (pH=7)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Metals Analysis By Method SW846 6010D

Matrix: AQ **Batch ID:** MP16337

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91346-1MS, JC91346-1MSD, JC91346-1SDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Iron, Potassium are outside control limits for sample MP16337-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP16337-SD1 for Sodium: Serial dilution indicates possible matrix interference.
- MP16337-SD1 for Manganese: Serial dilution indicates possible matrix interference.

Matrix: AQ **Batch ID:** MP16359

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91371-2MSD, JC91371-2PS, JC91371-2SDL, JC91371-2FSDL were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Potassium are outside control limits. Spike recovery indicates possible matrix interference.
- Matrix Spike Duplicate Recovery(s) for Potassium are outside control limits. Spike recovery indicates possible matrix interference.
- Matrix Spike Recovery(s) for Sodium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- RPD(s) for Serial Dilution for Potassium are outside control limits for sample MP16359-SD2. Serial dilution indicates possible matrix interference.

Matrix: AQ **Batch ID:** MP16375

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91490-1MS, JC91490-1MSD, JC91490-1SDL, JC91490-1DUP were used as the QC samples for metals.
- RPD(s) for Duplicate for Iron are outside control limits for sample MP16375-D1. High rpd due to possible sample nonhomogeneity.

Matrix: AQ **Batch ID:** MP16384

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91458-1MSD, JC91458-1SDL, JC91458-1MS were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Potassium are outside control limits for sample MP16384-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

General Chemistry By Method EPA 300/SW846 9056A

Matrix: AQ **Batch ID:** GP22543

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1DUP, JC91330-2MS, JC91330-1DUP, JC91330-1MS were used as the QC samples for Sulfate, Chloride.
- Matrix Spike Recovery(s) for Chloride are outside control limits. Spike recovery indicates possible matrix interference.

Matrix: AQ **Batch ID:** GP22576

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91272-1DUP, JC91272-1MS were used as the QC samples for Sulfate, Chloride.

Matrix: AQ **Batch ID:** GP22600

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91523-1DUP, JC91523-1MS were used as the QC samples for Sulfate, Chloride.

General Chemistry By Method EPA 353.2/LACHAT

Matrix: AQ **Batch ID:** GP22482

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1DUP, JC91330-1MS were used as the QC samples for Nitrogen, Nitrate + Nitrite.

Matrix: AQ **Batch ID:** GP22523

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-14MS, JC91406-1DUP were used as the QC samples for Nitrogen, Nitrate + Nitrite.

Matrix: AQ **Batch ID:** GP22524

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-26DUP, JC91330-26MS were used as the QC samples for Nitrogen, Nitrate + Nitrite.
- Matrix Spike Recovery(s) for Nitrogen, Nitrate + Nitrite are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

General Chemistry By Method EPA 365.3

Matrix: AQ **Batch ID:** GN97380

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1FDUP, JC91330-1FMS were used as the QC samples for Phosphate, Ortho.

Matrix: AQ **Batch ID:** GN97472

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-5FDUP, JC91330-5FMS were used as the QC samples for Phosphate, Ortho.

Matrix: AQ **Batch ID:** GN97506

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-23FDUP, JC91330-23FMS were used as the QC samples for Phosphate, Ortho.

Matrix: AQ **Batch ID:** GP22322

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91301-2DUP, JC91301-2MS were used as the QC samples for Phosphorus, Total.

Matrix: AQ **Batch ID:** GP22375

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91490-1DUP, JC91490-1MS were used as the QC samples for Phosphorus, Total.

Matrix: AQ **Batch ID:** GP22419

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91674-1DUP, JC91674-1MS were used as the QC samples for Phosphorus, Total.

General Chemistry By Method EPA353.2/SM4500NO2B

Matrix: AQ **Batch ID:** R179815

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91333-1 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179816

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-5 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179817

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-6 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179818

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-7 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179819

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-8 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179821

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-1 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179822

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-2 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179823

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-3 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179854

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-14 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179855

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-26 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179856

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-15 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179857

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-16 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179858

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-18 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179869

- The data for EPA353.2/SM4500NO2B meets quality control requirements.

General Chemistry By Method EPA353.2/SM4500NO2B

Matrix: AQ **Batch ID:** R179869

- JC91330-23 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179870

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-24 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

Matrix: AQ **Batch ID:** R179871

- The data for EPA353.2/SM4500NO2B meets quality control requirements.
- JC91330-25 for Nitrogen, Nitrate: Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

General Chemistry By Method SM2320 B-11

Matrix: AQ **Batch ID:** GN97787

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1DUP were used as the QC samples for Alkalinity, Total as CaCO3.
- JC91333-1 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-5 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-14 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-6 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-8 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-2 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-15 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-3 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-7 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-1 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.

Matrix: AQ **Batch ID:** GN97800

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91406-6DUP were used as the QC samples for Alkalinity, Total as CaCO3.
- JC91330-16 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-18 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-23 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-25 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-26 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.
- JC91330-24 for Alkalinity, Total as CaCO3: Sample was titrated to a final pH of 4.5.

General Chemistry By Method SM3500FE B-11

Matrix: AQ	**Batch ID:** GN97769

- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1DUP, JC91330-1MS, JC91333-1DUP, JC91333-1MS were used as the QC samples for Iron, Ferrous.
- Matrix Spike Recovery(s) for Iron, Ferrous are outside control limits. Spike recovery indicates possible matrix interference.
- JC91330-5 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-25 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-3 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-18 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-2 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-26 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-1 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-23 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-14 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-7 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-6 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-8 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91333-1 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-15 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-16 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.
- JC91330-24 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

Matrix: AQ	**Batch ID:** R179825

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-1 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179826

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-3 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179827

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-5 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179828

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-6 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179829

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-7 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179830

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-8 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ	**Batch ID:** R179831

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-14 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

General Chemistry By Method SM3500FE B-11

Matrix: AQ **Batch ID:** R179832

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-15 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179833

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-16 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179834

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-18 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179835

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-23 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179836

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-24 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179837

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-2 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179838

- The data for SM3500FE B-11 meets quality control requirements.
- JC91333-1 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179839

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-25 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

Matrix: AQ **Batch ID:** R179840

- The data for SM3500FE B-11 meets quality control requirements.
- JC91330-26 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

General Chemistry By Method SM4500CO2 D-11

Matrix: AQ **Batch ID:** GN97789

- The data for SM4500CO2 D-11 meets quality control requirements.

Matrix: AQ **Batch ID:** GN97806

- The data for SM4500CO2 D-11 meets quality control requirements.

General Chemistry By Method SM4500NH3 H-11LACHAT

Matrix: AQ	**Batch ID:** GP22500

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91513-13DUP, JC91513-13MS, JC91513-13MSD were used as the QC samples for Nitrogen, Ammonia.

Matrix: AQ	**Batch ID:** GP22553

- All samples were prepared within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-14DUP, JC91330-14MS, JC91330-14MSD were used as the QC samples for Nitrogen, Ammonia.

General Chemistry By Method SM4500NO2 B-11

Matrix: AQ	**Batch ID:** GN97342

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91275-1ADUP, JC91275-1AMS were used as the QC samples for Nitrogen, Nitrite.

Matrix: AQ	**Batch ID:** GN97464

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91406-8DUP, JC91406-8MS were used as the QC samples for Nitrogen, Nitrite.

Matrix: AQ	**Batch ID:** GN97478

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-14DUP, JC91330-14MS were used as the QC samples for Nitrogen, Nitrite.

Matrix: AQ	**Batch ID:** GN97505

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-23DUP, JC91330-23MS were used as the QC samples for Nitrogen, Nitrite.

General Chemistry By Method SM4500S2- F-11

Matrix: AQ **Batch ID:** GN97425

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-1MS, JC91330-2DUP were used as the QC samples for Sulfide.

Matrix: AQ **Batch ID:** GN97532

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91371-2DUP, JC91371-2MS were used as the QC samples for Sulfide.

Matrix: AQ **Batch ID:** GN97544

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91490-1DUP, JC91490-1MS were used as the QC samples for Sulfide.

Matrix: AQ **Batch ID:** GN97555

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC91330-14MS, JC91330-15DUP were used as the QC samples for Sulfide.

SGS North America Inc. certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

SGS North America Inc. is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by SGS North America Inc indicated via signature on the report cover

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC91330-1	**MWR-7S**					
Benzene [a]		44.9	25	21	ug/l	SW846 8260C
1,1-Dichloroethene [a]		31.4 J	50	30	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		188	50	25	ug/l	SW846 8260C
Trichloroethene [a]		8000	50	26	ug/l	SW846 8260C
Methane		0.84	0.11	0.060	ug/l	RSK-175
Ethane		5.4	0.23	0.099	ug/l	RSK-175
Ethene		4.8	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [b]		2160	50	4.4	ug/l	RSK-175
Calcium		244000	25000		ug/l	SW846 6010D
Iron		118	100		ug/l	SW846 6010D
Magnesium		87000	5000		ug/l	SW846 6010D
Manganese		5110	15		ug/l	SW846 6010D
Potassium		22600	10000		ug/l	SW846 6010D
Sodium		1110000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		105	5.0		mg/l	SM2320 B-11
Chloride		1900	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		0.53	0.20		mg/l	SM4500NH3 H-11LACHAT
Nitrogen, Nitrite		0.010	0.010		mg/l	SM4500NO2 B-11
Phosphorus, Total		0.080	0.050		mg/l	EPA 365.3
Sulfate		272	2.0		mg/l	EPA 300/SW846 9056A
JC91330-1F	**MWR-7S**					
Phosphate, Ortho		0.062	0.050		mg/l	EPA 365.3
JC91330-2	**MWR-7I**					
cis-1,2-Dichloroethene [a]		263	100	51	ug/l	SW846 8260C
Trichloroethene [a]		14700	100	53	ug/l	SW846 8260C
Methane		15.1	0.11	0.060	ug/l	RSK-175
Ethane		5.2	0.23	0.099	ug/l	RSK-175
Ethene		8.9	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [b]		28400	500	44	ug/l	RSK-175
Calcium		220000	25000		ug/l	SW846 6010D
Magnesium		61200	5000		ug/l	SW846 6010D
Manganese		1910	15		ug/l	SW846 6010D
Potassium		16000	10000		ug/l	SW846 6010D
Sodium		985000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		505	5.0		mg/l	SM2320 B-11
Chloride		1380	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		0.71	0.15		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		1.4	0.10		mg/l	EPA 353.2/LACHAT
Nitrogen, Nitrite		0.69	0.050		mg/l	SM4500NO2 B-11

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sulfate		151	2.0		mg/l	EPA 300/SW846 9056A
JC91330-2F	**MWR-7I**					
No hits reported in this sample.						
JC91330-3	**MW-11I**					
Chloroethane		2.3	1.0	0.73	ug/l	SW846 8260C
1,1-Dichloroethene		1.5	1.0	0.59	ug/l	SW846 8260C
cis-1,2-Dichloroethene		40.1	1.0	0.51	ug/l	SW846 8260C
trans-1,2-Dichloroethene		6.4	1.0	0.54	ug/l	SW846 8260C
Trichloroethene		45.4	1.0	0.53	ug/l	SW846 8260C
Vinyl chloride		54.9	1.0	0.79	ug/l	SW846 8260C
Methane		1320	2.2	1.2	ug/l	RSK-175
Ethane		10.5	0.23	0.099	ug/l	RSK-175
Ethene		27.0	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [b]		6650	500	44	ug/l	RSK-175
Calcium		59300	25000		ug/l	SW846 6010D
Iron		34300	500		ug/l	SW846 6010D
Manganese		8040	75		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		165	10		mg/l	SM2320 B-11
Chloride		84.2	2.0		mg/l	EPA 300/SW846 9056A
Iron, Ferric [e]		33.9	0.70		mg/l	SM3500FE B-11
Iron, Ferrous [f]		0.38	0.20		mg/l	SM3500FE B-11
Nitrogen, Ammonia		6.2	0.80		mg/l	SM4500NH3 H-11LACHAT
Phosphorus, Total		0.56	0.10		mg/l	EPA 365.3
Sulfate		3.2	2.0		mg/l	EPA 300/SW846 9056A
JC91330-3F	**MW-11I**					
Phosphate, Ortho		0.24	0.050		mg/l	EPA 365.3
JC91330-4	**TB-1**					
No hits reported in this sample.						
JC91330-5	**MW-8I**					
Benzene		0.50	0.50	0.43	ug/l	SW846 8260C
Cyclohexane		1.5 J	5.0	0.78	ug/l	SW846 8260C
cis-1,2-Dichloroethene		2.9	1.0	0.51	ug/l	SW846 8260C
Isopropylbenzene		1.5	1.0	0.65	ug/l	SW846 8260C
Trichloroethene		32.9	1.0	0.53	ug/l	SW846 8260C
Methane		15.8	0.11	0.060	ug/l	RSK-175

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Client Sample ID Analyte	Result/ Qual	RL	MDL	Units	Method
Carbon Dioxide [g]	10100	500	44	ug/l	RSK-175
Calcium	122000	5000		ug/l	SW846 6010D
Magnesium	41100	5000		ug/l	SW846 6010D
Manganese	1380	15		ug/l	SW846 6010D
Potassium	22100	10000		ug/l	SW846 6010D
Sodium	641000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]	408	10		mg/l	SM2320 B-11
Chloride	791	8.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]	0.29	0.11		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	0.29	0.10		mg/l	EPA 353.2/LACHAT
Sulfate	66.6	2.0		mg/l	EPA 300/SW846 9056A
JC91330-5F MW-8I					
Phosphate, Ortho	0.077	0.050		mg/l	EPA 365.3
JC91330-6 MW-17					
Chloroform	1.1	1.0	0.50	ug/l	SW846 8260C
Trichloroethene	1.1	1.0	0.53	ug/l	SW846 8260C
Carbon Dioxide [g]	11400	500	44	ug/l	RSK-175
Calcium	161000	5000		ug/l	SW846 6010D
Magnesium	42700	5000		ug/l	SW846 6010D
Sodium	588000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]	510	10		mg/l	SM2320 B-11
Chloride	776	8.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]	7.9	0.41		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	7.9	0.40		mg/l	EPA 353.2/LACHAT
Sulfate	95.3	2.0		mg/l	EPA 300/SW846 9056A
JC91330-6F MW-17					
No hits reported in this sample.					
JC91330-7 MW-10A					
Acetone	14.7	10	6.0	ug/l	SW846 8260C
Chloroform	2.4	1.0	0.50	ug/l	SW846 8260C
1,2-Dichloroethane	1.3	1.0	0.60	ug/l	SW846 8260C
Tetrachloroethene	2.0	1.0	0.90	ug/l	SW846 8260C
1,1,2-Trichloroethane	8.5	1.0	0.53	ug/l	SW846 8260C
Trichloroethene	184	1.0	0.53	ug/l	SW846 8260C
Methane	1.1	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [g]	8240	500	44	ug/l	RSK-175
Calcium	111000	5000		ug/l	SW846 6010D

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Magnesium		35000	5000		ug/l	SW846 6010D
Manganese		1980	15		ug/l	SW846 6010D
Potassium		32500	10000		ug/l	SW846 6010D
Sodium		646000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		470	10		mg/l	SM2320 B-11
Chloride		891	8.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		1.2	0.11		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		1.2	0.10		mg/l	EPA 353.2/LACHAT
Sulfate		61.8	2.0		mg/l	EPA 300/SW846 9056A
JC91330-7F	**MW-10A**					
Phosphate, Ortho		0.050	0.050		mg/l	EPA 365.3
JC91330-8	**MW-17I**					
Chloroform		1.3	1.0	0.50	ug/l	SW846 8260C
Carbon Dioxide [g]		11400	500	44	ug/l	RSK-175
Calcium		181000	5000		ug/l	SW846 6010D
Magnesium		55700	5000		ug/l	SW846 6010D
Sodium		590000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		530	10		mg/l	SM2320 B-11
Chloride		887	8.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		10.3	0.21		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		10.3	0.20		mg/l	EPA 353.2/LACHAT
Sulfate		123	2.0		mg/l	EPA 300/SW846 9056A
JC91330-8F	**MW-17I**					
No hits reported in this sample.						
JC91330-9	**MW-12**					
Benzene [a]		130	1.0	0.85	ug/l	SW846 8260C
Cyclohexane [a]		73.9	10	1.6	ug/l	SW846 8260C
1,2-Dichlorobenzene [a]		1.4 J	2.0	1.1	ug/l	SW846 8260C
Ethylbenzene [a]		347	2.0	1.2	ug/l	SW846 8260C
Isopropylbenzene [a]		149	2.0	1.3	ug/l	SW846 8260C
Methylcyclohexane		66.7	25	3.0	ug/l	SW846 8260C
Toluene [a]		14.2	2.0	1.1	ug/l	SW846 8260C
Trichloroethene [a]		1.6 J	2.0	1.1	ug/l	SW846 8260C
m,p-Xylene [a]		607	2.0	1.6	ug/l	SW846 8260C
o-Xylene [a]		66.3	2.0	1.2	ug/l	SW846 8260C
Xylene (total) [a]		673	2.0	1.2	ug/l	SW846 8260C

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC91333-1	**MW-9**					
cis-1,2-Dichloroethene [a]		35.0 J	50	25	ug/l	SW846 8260C
Tetrachloroethene [a]		73.2	50	45	ug/l	SW846 8260C
Trichloroethene		41900	250	130	ug/l	SW846 8260C
Carbon Dioxide [g]		8270	500	44	ug/l	RSK-175
Calcium		251000	25000		ug/l	SW846 6010D
Magnesium		83500	5000		ug/l	SW846 6010D
Manganese		31.0	15		ug/l	SW846 6010D
Potassium		17800	10000		ug/l	SW846 6010D
Sodium		330000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		331	10		mg/l	SM2320 B-11
Chloride		842	8.0		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		6.7	0.41		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		6.7	0.40		mg/l	EPA 353.2/LACHAT
Sulfate		60.6	2.0		mg/l	EPA 300/SW846 9056A
JC91333-1F	**MW-9**					
No hits reported in this sample.						
JC91333-2	**MW-9-DUP**					
cis-1,2-Dichloroethene [a]		31.3 J	50	25	ug/l	SW846 8260C
Tetrachloroethene [a]		76.8	50	45	ug/l	SW846 8260C
Trichloroethene		42800	250	130	ug/l	SW846 8260C
JC91330-10	**MWR-7I-DUP**					
Benzene [a]		25.4	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		242	50	25	ug/l	SW846 8260C
Trichloroethene [h]		15600	500	260	ug/l	SW846 8260C
JC91330-11	**MWR-7I-UNPRES**					
Benzene [i]		25.3	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [i]		242	50	25	ug/l	SW846 8260C
Trichloroethene [j]		17400	100	53	ug/l	SW846 8260C
JC91330-12	**MWR-7I-DUP-UNPRES**					
Benzene [i]		23.0 J	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [i]		233	50	25	ug/l	SW846 8260C
Trichloroethene [j]		17800	100	53	ug/l	SW846 8260C

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC91330-13	**TRIP BLANK**					
No hits reported in this sample.						
JC91330-14	**MWR-3I**					
Benzene [a]		12.4	5.0	4.3	ug/l	SW846 8260C
1,1-Dichloroethene [a]		7.1 J	10	5.9	ug/l	SW846 8260C
cis-1,2-Dichloroethene		2370	50	25	ug/l	SW846 8260C
trans-1,2-Dichloroethene [a]		15.5	10	5.4	ug/l	SW846 8260C
Trichloroethene		5840	50	26	ug/l	SW846 8260C
Methane		0.25	0.11	0.060	ug/l	RSK-175
Carbon Dioxide [g]		3970	500	44	ug/l	RSK-175
Calcium		325000	25000		ug/l	SW846 6010D
Magnesium		214000	5000		ug/l	SW846 6010D
Manganese		4120	15		ug/l	SW846 6010D
Potassium		69500	10000		ug/l	SW846 6010D
Sodium		793000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		120	10		mg/l	SM2320 B-11
Chloride		2160	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		0.22	0.20		mg/l	SM4500NH3 H-11LACHAT
Sulfate		68.6	2.0		mg/l	EPA 300/SW846 9056A
JC91330-14F	**MWR-3I**					
No hits reported in this sample.						
JC91330-15	**MWR-1I**					
Benzene [a]		33.3	2.5	2.1	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		40.4	5.0	2.5	ug/l	SW846 8260C
Tetrachloroethene [a]		5.9	5.0	4.5	ug/l	SW846 8260C
Trichloroethene		2000	20	11	ug/l	SW846 8260C
Methane		4.9	0.11	0.060	ug/l	RSK-175
Ethene		0.35	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [g]		22100	500	44	ug/l	RSK-175
Calcium		283000	25000		ug/l	SW846 6010D
Magnesium		91400	5000		ug/l	SW846 6010D
Manganese		1250	15		ug/l	SW846 6010D
Potassium		17900	10000		ug/l	SW846 6010D
Sodium		600000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		241	10		mg/l	SM2320 B-11
Chloride		1210	10		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		2.1	0.20		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		3.2	0.10		mg/l	EPA 353.2/LACHAT

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Nitrogen, Nitrite		1.1	0.10		mg/l	SM4500NO2 B-11
Sulfate		120	2.0		mg/l	EPA 300/SW846 9056A
JC91330-15F	**MWR-1I**					
Phosphate, Ortho		0.091	0.050		mg/l	EPA 365.3
JC91330-16	**MWR-4I**					
Tetrachloroethene [a]		519	500	450	ug/l	SW846 8260C
Trichloroethene		232000	5000	2600	ug/l	SW846 8260C
Methane		0.33	0.11	0.060	ug/l	RSK-175
Ethane		2.5	0.23	0.099	ug/l	RSK-175
Ethene		1.4	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [g]		30600	500	44	ug/l	RSK-175
Calcium		128000	5000		ug/l	SW846 6010D
Magnesium		88200	5000		ug/l	SW846 6010D
Manganese		271	15		ug/l	SW846 6010D
Potassium		14900	10000		ug/l	SW846 6010D
Sodium		689000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		390	10		mg/l	SM2320 B-11
Chloride		1060	10		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		7.6	0.45		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		8.0	0.40		mg/l	EPA 353.2/LACHAT
Nitrogen, Nitrite		0.39	0.050		mg/l	SM4500NO2 B-11
Phosphorus, Total		0.087	0.050		mg/l	EPA 365.3
Sulfate		73.6	2.0		mg/l	EPA 300/SW846 9056A
JC91330-16F	**MWR-4I**					
Phosphate, Ortho		0.13	0.050		mg/l	EPA 365.3
JC91330-17	**MWR-4I-DUP**					
Tetrachloroethene [a]		508	500	450	ug/l	SW846 8260C
Trichloroethene		238000	5000	2600	ug/l	SW846 8260C
JC91330-18	**MWR-2I**					
Benzene [a]		31.7	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		254	50	25	ug/l	SW846 8260C
Trichloroethene [a]		7790	50	26	ug/l	SW846 8260C
Methane		0.57	0.11	0.060	ug/l	RSK-175
Ethane		0.42	0.23	0.099	ug/l	RSK-175
Ethene		1.1	0.31	0.072	ug/l	RSK-175

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Client Sample ID Analyte	Result/ Qual	RL	MDL	Units	Method
Carbon Dioxide [g]	2840	500	44	ug/l	RSK-175
Calcium	264000	10000		ug/l	SW846 6010D
Magnesium	71300	5000		ug/l	SW846 6010D
Manganese	160	15		ug/l	SW846 6010D
Potassium	48900	10000		ug/l	SW846 6010D
Sodium	1300000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]	105	5.0		mg/l	SM2320 B-11
Chloride	2140	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia	0.36	0.20		mg/l	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	0.19	0.11		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	0.21	0.10		mg/l	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.023	0.010		mg/l	SM4500NO2 B-11
Sulfate	238	2.0		mg/l	EPA 300/SW846 9056A
JC91330-18F MWR-2I					
No hits reported in this sample.					
JC91330-19 MWR-2I-DUP					
Benzene [a]	32.3	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]	254	50	25	ug/l	SW846 8260C
Trichloroethene [a]	7740	50	26	ug/l	SW846 8260C
JC91330-20 TRIP BLANK-3					
No hits reported in this sample.					
JC91330-21 FIELD BLANK					
No hits reported in this sample.					
JC91330-22 MW-12I					
Benzene	20.4	0.50	0.43	ug/l	SW846 8260C
Cyclohexane	35.3	5.0	0.78	ug/l	SW846 8260C
1,2-Dichlorobenzene	1.6	1.0	0.53	ug/l	SW846 8260C
Ethylbenzene	8.7	1.0	0.60	ug/l	SW846 8260C
Isopropylbenzene	90.5	1.0	0.65	ug/l	SW846 8260C
Methylcyclohexane	15.7	5.0	0.60	ug/l	SW846 8260C
Toluene	2.3	1.0	0.53	ug/l	SW846 8260C
m,p-Xylene	25.6	1.0	0.78	ug/l	SW846 8260C
o-Xylene	2.5	1.0	0.59	ug/l	SW846 8260C
Xylene (total)	28.1	1.0	0.59	ug/l	SW846 8260C

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC91330-23	**MWR-3S**					
Acetone [a]		236	200	120	ug/l	SW846 8260C
Benzene [a]		127	10	8.5	ug/l	SW846 8260C
1,1-Dichloroethene [a]		14.2 J	20	12	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		688	20	10	ug/l	SW846 8260C
Trichloroethene		12800	200	110	ug/l	SW846 8260C
Methane		2.8	0.11	0.060	ug/l	RSK-175
Ethane		4.2	0.23	0.099	ug/l	RSK-175
Ethene		6.2	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [b]		1290	50	4.4	ug/l	RSK-175
Calcium		621000	25000		ug/l	SW846 6010D
Iron		141	100		ug/l	SW846 6010D
Magnesium		37200	5000		ug/l	SW846 6010D
Manganese		411	15		ug/l	SW846 6010D
Potassium		93800	10000		ug/l	SW846 6010D
Sodium		1180000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		67.0	5.0		mg/l	SM2320 B-11
Chloride		2630	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		0.34	0.20		mg/l	SM4500NH3 H-11LACHAT
Sulfate		178	2.0		mg/l	EPA 300/SW846 9056A
JC91330-23F	**MWR-3S**					
No hits reported in this sample.						
JC91330-24	**MWR-1S**					
Acetone [a]		65.0 J	100	60	ug/l	SW846 8260C
Benzene [a]		10.0	5.0	4.3	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		79.7	10	5.1	ug/l	SW846 8260C
Trichloroethene		5390	50	26	ug/l	SW846 8260C
Methane		5.2	0.11	0.060	ug/l	RSK-175
Ethane		0.44	0.23	0.099	ug/l	RSK-175
Ethene		0.93	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [g]		43400	500	44	ug/l	RSK-175
Calcium		316000	25000		ug/l	SW846 6010D
Iron		142	100		ug/l	SW846 6010D
Magnesium		112000	5000		ug/l	SW846 6010D
Manganese		1100	15		ug/l	SW846 6010D
Potassium		17700	10000		ug/l	SW846 6010D
Sodium		688000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		360	10		mg/l	SM2320 B-11
Chloride		1540	20		mg/l	EPA 300/SW846 9056A
Sulfate		101	2.0		mg/l	EPA 300/SW846 9056A

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC91330-24F	**MWR-1S**					
Phosphate, Ortho		0.10	0.050		mg/l	EPA 365.3
JC91330-25	**MWR-2S**					
Benzene [a]		24.7 J	25	21	ug/l	SW846 8260C
cis-1,2-Dichloroethene [a]		385	50	25	ug/l	SW846 8260C
Trichloroethene		21100	250	130	ug/l	SW846 8260C
Methane		5.8	0.11	0.060	ug/l	RSK-175
Ethane		9.8	0.23	0.099	ug/l	RSK-175
Ethene		29.0	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [g]		776	50	4.4	ug/l	RSK-175
Calcium		453000	25000		ug/l	SW846 6010D
Magnesium		41500	5000		ug/l	SW846 6010D
Manganese		369	15		ug/l	SW846 6010D
Potassium		101000	10000		ug/l	SW846 6010D
Sodium		1110000	100000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		70.0	5.0		mg/l	SM2320 B-11
Chloride		2710	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		0.50	0.20		mg/l	SM4500NH3 H-11LACHAT
Sulfate		173	2.0		mg/l	EPA 300/SW846 9056A
JC91330-25F	**MWR-2S**					
No hits reported in this sample.						
JC91330-26	**MWR-4S**					
Trichloroethene		70700	1000	530	ug/l	SW846 8260C
Methane		2.8	0.11	0.060	ug/l	RSK-175
Ethane		14.7	0.23	0.099	ug/l	RSK-175
Ethene		12.2	0.31	0.072	ug/l	RSK-175
Carbon Dioxide [k]		906	50	4.4	ug/l	RSK-175
Calcium		249000	25000		ug/l	SW846 6010D
Magnesium		30600	5000		ug/l	SW846 6010D
Manganese		243	15		ug/l	SW846 6010D
Potassium		20900	10000		ug/l	SW846 6010D
Sodium		835000	50000		ug/l	SW846 6010D
Alkalinity, Total as CaCO3 [c]		62.5	5.0		mg/l	SM2320 B-11
Chloride		1570	20		mg/l	EPA 300/SW846 9056A
Nitrogen, Nitrate [d]		5.0	0.90		mg/l	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite		7.7	0.40		mg/l	EPA 353.2/LACHAT
Nitrogen, Nitrite		2.7	0.50		mg/l	SM4500NO2 B-11

Summary of Hits

Job Number: JC91330
Account: Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Collected: 07/09/19 thru 07/12/19

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sulfate		68.6	2.0		mg/l	EPA 300/SW846 9056A
JC91330-26F	**MWR-4S**					
No hits reported in this sample.						
JC91330-27	**MWR-4S-DUP**					
Trichloroethene		82300	1000	530	ug/l	SW846 8260C
JC91330-28	**FIELD BLANK-2**					
No hits reported in this sample.						
JC91330-29	**TRIP BLANK-4**					
No hits reported in this sample.						

(a) Diluted due to high concentration of target compound.
(b) (pH= 6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(c) Sample was titrated to a final pH of 4.5.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)
(e) Calculated as: (Iron) - (Iron, Ferrous)
(f) Field analysis required. Received out of hold time and analyzed by request.
(g) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(h) (pH= 6)Sample pH did not satisfy field preservation criteria.
(i) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time. Diluted due to high concentration of target compound.
(j) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time.
(k) (pH= 8)Sample is not acid preserved. Sample analyzed within 7 days holding time.

Section 4

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MWR-7S		
Lab Sample ID:	JC91330-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	A251755.D	50	07/17/19 17:46	ED	n/a	n/a	VA9743
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	44.9	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	31.4	50	30	ug/l	J
156-59-2	cis-1,2-Dichloroethene	188	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7S		
Lab Sample ID:	JC91330-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	8000	50	26	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	101%		81-124%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	103%		80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits low.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7S			
Lab Sample ID:	JC91330-1		**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water		**Date Received:**	07/09/19
Method:	RSK-175		**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74314.D	1	07/15/19 12:16	DFT	n/a	n/a	GAA1760
Run #2 [a]	WW136038.D	1	07/11/19 12:58	DFT	n/a	n/a	GWW5223

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.84	0.11	0.060	ug/l	
74-84-0	Ethane	5.4	0.23	0.099	ug/l	
74-85-1	Ethene	4.8	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	2160 [b]	50	4.4	ug/l	

(a) (pH= 6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MWR-7S
Lab Sample ID: JC91330-1
Matrix: AQ - Ground Water
Date Sampled: 07/09/19
Date Received: 07/09/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	244000	25000	ug/l	5	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]
Iron	118	100	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	87000	5000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	5110	15	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	22600	10000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	1110000	100000	ug/l	10	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47089
(2) Instrument QC Batch: MA47098
(3) Prep QC Batch: MP16337

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-7S			
Lab Sample ID:	JC91330-1		**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water		**Date Received:**	07/09/19
			Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY			

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	105	5.0	mg/l	1	07/22/19 10:30	CM	SM2320 B-11
Chloride	1900	20	mg/l	10	07/24/19 16:38	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.53	0.20	mg/l	1	07/19/19 15:42	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/19/19 09:26	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/19/19 09:26	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.010	0.010	mg/l	1	07/09/19 23:45	MS	SM4500NO2 B-11
Phosphorus, Total	0.080	0.050	mg/l	1	07/12/19 09:00	CM	EPA 365.3
Sulfate	272	2.0	mg/l	1	07/23/19 23:25	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/11/19 15:22	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-7S		
Lab Sample ID:	JC91330-1F	**Date Sampled:**	07/09/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.062	0.050	mg/l	1	07/10/19 14:45	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID: MWR-7I
Lab Sample ID: JC91330-2
Matrix: AQ - Ground Water
Method: SW846 8260C
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

Date Sampled: 07/09/19
Date Received: 07/09/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	A251756.D	100	07/17/19 18:15	ED	n/a	n/a	VA9743
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	1000	600	ug/l	
71-43-2	Benzene	ND	50	43	ug/l	
74-97-5	Bromochloromethane	ND	100	48	ug/l	
75-27-4	Bromodichloromethane	ND	100	58	ug/l	
75-25-2	Bromoform	ND	100	63	ug/l	
74-83-9	Bromomethane	ND	200	160	ug/l	
78-93-3	2-Butanone (MEK)	ND	1000	690	ug/l	
75-15-0	Carbon disulfide	ND	200	95	ug/l	
56-23-5	Carbon tetrachloride	ND	100	55	ug/l	
108-90-7	Chlorobenzene	ND	100	56	ug/l	
75-00-3	Chloroethane	ND	100	73	ug/l	
67-66-3	Chloroform	ND	100	50	ug/l	
74-87-3	Chloromethane	ND	100	76	ug/l	
110-82-7	Cyclohexane	ND	500	78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	200	120	ug/l	
124-48-1	Dibromochloromethane	ND	100	56	ug/l	
106-93-4	1,2-Dibromoethane	ND	100	48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	100	53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	100	54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	100	51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	200	140	ug/l	
75-34-3	1,1-Dichloroethane	ND	100	57	ug/l	
107-06-2	1,2-Dichloroethane	ND	100	60	ug/l	
75-35-4	1,1-Dichloroethene	ND	100	59	ug/l	
156-59-2	cis-1,2-Dichloroethene	263	100	51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	100	54	ug/l	
78-87-5	1,2-Dichloropropane	ND	100	51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	100	47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	100	43	ug/l	
123-91-1	1,4-Dioxane	ND	13000	6900	ug/l	
100-41-4	Ethylbenzene	ND	100	60	ug/l	
76-13-1	Freon 113	ND	500	190	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I		
Lab Sample ID:	JC91330-2	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	500	200	ug/l	
98-82-8	Isopropylbenzene	ND	100	65	ug/l	
79-20-9	Methyl Acetate	ND	500	80	ug/l	
108-87-2	Methylcyclohexane	ND	500	60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	100	51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	500	190	ug/l	
75-09-2	Methylene chloride	ND	200	100	ug/l	
100-42-5	Styrene	ND	100	70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	100	65	ug/l	
127-18-4	Tetrachloroethene	ND	100	90	ug/l	
108-88-3	Toluene	ND	100	53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	100	50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	100	50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	100	54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	100	53	ug/l	
79-01-6	Trichloroethene	14700	100	53	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	200	84	ug/l	
75-01-4	Vinyl chloride	ND	100	79	ug/l	
	m,p-Xylene	ND	100	78	ug/l	
95-47-6	o-Xylene	ND	100	59	ug/l	
1330-20-7	Xylene (total)	ND	100	59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		81-124%
2037-26-5	Toluene-D8	94%		80-120%
460-00-4	4-Bromofluorobenzene	101%		80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits low.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I		
Lab Sample ID:	JC91330-2	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74315.D	1	07/15/19 12:51	DFT	n/a	n/a	GAA1760
Run #2 [a]	WW136039.D	10	07/11/19 13:13	DFT	n/a	n/a	GWW5223

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	15.1	0.11	0.060	ug/l	
74-84-0	Ethane	5.2	0.23	0.099	ug/l	
74-85-1	Ethene	8.9	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	28400 [b]	500	44	ug/l	

(a) (pH= 6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I		
Lab Sample ID:	JC91330-2	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	220000	25000	ug/l	5	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	61200	5000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	1910	15	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	16000	10000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	985000	100000	ug/l	10	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47089
(2) Instrument QC Batch: MA47098
(3) Prep QC Batch: MP16337

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-7I		
Lab Sample ID:	JC91330-2	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	505	5.0	mg/l	1	07/22/19 10:30	CM	SM2320 B-11
Chloride	1380	20	mg/l	10	07/24/19 17:26	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 15:44	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	0.71	0.15	mg/l	1	07/19/19 09:27	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	1.4	0.10	mg/l	1	07/19/19 09:27	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.69	0.050	mg/l	5	07/09/19 23:45	MS	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/12/19 09:13	CM	EPA 365.3
Sulfate	151	2.0	mg/l	1	07/24/19 01:01	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/11/19 15:22	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-7I		
Lab Sample ID:	JC91330-2F	**Date Sampled:**	07/09/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/10/19 14:45	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	A251754.D	1	07/17/19 17:16	ED	n/a	n/a	VA9743
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	2.3	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	1.5	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	40.1	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	6.4	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	45.4	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane [a]	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	54.9	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	100%		81-124%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	103%		80-120%

(a) Associated CCV outside of control limits low.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74316.D	1	07/15/19 13:04	DFT	n/a	n/a	GAA1760
Run #2 [a]	WW136040.D	10	07/11/19 13:32	DFT	n/a	n/a	GWW5223
Run #3	AA74317.D	20	07/15/19 13:17	DFT	n/a	n/a	GAA1760

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	1320 [b]	2.2	1.2	ug/l	
74-84-0	Ethane	10.5	0.23	0.099	ug/l	
74-85-1	Ethene	27.0	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	6650 [c]	500	44	ug/l	

(a) (pH= 6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 3
(c) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	59300	25000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]
Iron	34300	500	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]
Magnesium	< 25000	25000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]
Manganese	8040	75	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]
Potassium	< 50000	50000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]
Sodium	< 50000	50000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [2]

(1) Instrument QC Batch: MA47089
(2) Prep QC Batch: MP16337

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	165	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	84.2	2.0	mg/l	1	07/24/19 01:25	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	33.9	0.70	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	0.38	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	6.2	0.80	mg/l	4	07/19/19 15:59	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/19/19 09:30	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/19/19 09:30	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/09/19 23:45	MS	SM4500NO2 B-11
Phosphorus, Total	0.56	0.10	mg/l	2	07/12/19 09:23	CM	EPA 365.3
Sulfate	3.2	2.0	mg/l	1	07/24/19 01:25	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/11/19 15:22	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-11I		
Lab Sample ID:	JC91330-3F	**Date Sampled:**	07/09/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.24	0.050	mg/l	1	07/10/19 14:45	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TB-1		
Lab Sample ID:	JC91330-4	**Date Sampled:**	07/09/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2B170878.D	1	07/15/19 14:35	ED	n/a	n/a	V2B7733
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB-1		
Lab Sample ID:	JC91330-4	**Date Sampled:**	07/09/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	101%		81-124%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	93%		80-120%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-8I		
Lab Sample ID:	JC91330-5	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B92334.D	1	07/12/19 15:06	CSF	n/a	n/a	V4B3920
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	0.50	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	1.5	5.0	0.78	ug/l	J
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	2.9	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-8I		
Lab Sample ID:	JC91330-5	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	1.5	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	32.9	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	103%		81-124%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	102%		80-120%

ND = Not detected　MDL = Method Detection Limit　J = Indicates an estimated value
RL = Reporting Limit　B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range　N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-8I		
Lab Sample ID:	JC91330-5	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74356.D	1	07/18/19 12:38	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136047.D	10	07/15/19 12:06	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	15.8	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	10100 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-8I		
Lab Sample ID:	JC91330-5	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	122000	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	41100	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	1380	15	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	22100	10000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	641000	50000	ug/l	5	07/12/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47097
(2) Instrument QC Batch: MA47115
(3) Prep QC Batch: MP16359

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-8I		
Lab Sample ID:	JC91330-5	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	408	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	791	8.0	mg/l	4	07/24/19 17:50	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 15:54	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	0.29	0.11	mg/l	1	07/19/19 09:33	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	0.29	0.10	mg/l	1	07/19/19 09:33	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 00:49	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	66.6	2.0	mg/l	1	07/24/19 03:49	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 12:00	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID: MW-8I
Lab Sample ID: JC91330-5F
Matrix: AQ - Groundwater Filtered
Date Sampled: 07/10/19
Date Received: 07/10/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.077	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B92331.D	1	07/12/19 13:41	CSF	n/a	n/a	V4B3920
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	1.1	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	1.1	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-120%
17060-07-0	1,2-Dichloroethane-D4	102%		81-124%
2037-26-5	Toluene-D8	101%		80-120%
460-00-4	4-Bromofluorobenzene	101%		80-120%

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74358.D	1	07/18/19 13:06	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136049.D	10	07/15/19 12:40	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	11400 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	161000	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	42700	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	< 15	15	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	< 10000	10000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	588000	50000	ug/l	5	07/12/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47097
(2) Instrument QC Batch: MA47115
(3) Prep QC Batch: MP16359

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	510	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	776	8.0	mg/l	4	07/24/19 18:14	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 15:55	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	7.9	0.41	mg/l	1	07/19/19 09:44	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	7.9	0.40	mg/l	4	07/19/19 09:44	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 00:49	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	95.3	2.0	mg/l	1	07/24/19 04:12	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 12:00	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Page 1 of 1

Client Sample ID:	MW-17		
Lab Sample ID:	JC91330-6F	**Date Sampled:**	07/10/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B92332.D	1	07/12/19 14:09	CSF	n/a	n/a	V4B3920
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	14.7	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	2.4	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	1.3	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	2.0	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	8.5	1.0	0.53	ug/l	
79-01-6	Trichloroethene	184	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	102%		81-124%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	102%		80-120%

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74359.D	1	07/18/19 14:11	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136050.D	10	07/15/19 12:57	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	1.1	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	8240 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	111000	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	35000	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	1980	15	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	32500	10000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	646000	50000	ug/l	5	07/12/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47097
(2) Instrument QC Batch: MA47115
(3) Prep QC Batch: MP16359

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	470	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	891	8.0	mg/l	4	07/24/19 18:38	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 15:56	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	1.2	0.11	mg/l	1	07/19/19 09:35	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	1.2	0.10	mg/l	1	07/19/19 09:35	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 00:49	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	61.8	2.0	mg/l	1	07/24/19 04:36	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 12:00	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-10A		
Lab Sample ID:	JC91330-7F	**Date Sampled:**	07/10/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.050	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-17I		
Lab Sample ID:	JC91330-8	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B92333.D	1	07/12/19 14:38	CSF	n/a	n/a	V4B3920
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	1.3	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17I		
Lab Sample ID:	JC91330-8	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	103%		81-124%
2037-26-5	Toluene-D8	101%		80-120%
460-00-4	4-Bromofluorobenzene	103%		80-120%

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17I		
Lab Sample ID:	JC91330-8	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74360.D	1	07/18/19 14:25	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136051.D	10	07/15/19 13:16	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	11400 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-17I		
Lab Sample ID:	JC91330-8	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	181000	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	55700	5000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	< 15	15	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	< 10000	10000	ug/l	1	07/12/19	07/15/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	590000	50000	ug/l	5	07/12/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47097
(2) Instrument QC Batch: MA47115
(3) Prep QC Batch: MP16359

RL = Reporting Limit

Report of Analysis

Client Sample ID: MW-17I
Lab Sample ID: JC91330-8
Matrix: AQ - Ground Water
Date Sampled: 07/10/19
Date Received: 07/10/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	530	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	887	8.0	mg/l	4	07/24/19 19:02	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 15:58	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	10.3	0.21	mg/l	1	07/19/19 09:45	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	10.3	0.20	mg/l	2	07/19/19 09:45	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 00:49	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	123	2.0	mg/l	1	07/24/19 05:48	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 12:00	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-17I		
Lab Sample ID:	JC91330-8F	**Date Sampled:**	07/10/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/10/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-12		
Lab Sample ID:	JC91330-9	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2B171067.D	2	07/23/19 22:14	ED	n/a	n/a	V2B7745
Run #2	4B92409.D	5	07/16/19 11:57	CSF	n/a	n/a	V4B3924

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	20	12	ug/l	
71-43-2	Benzene	130	1.0	0.85	ug/l	
74-97-5	Bromochloromethane	ND	2.0	0.96	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	1.2	ug/l	
75-25-2	Bromoform	ND	2.0	1.3	ug/l	
74-83-9	Bromomethane	ND	4.0	3.3	ug/l	
78-93-3	2-Butanone (MEK)	ND	20	14	ug/l	
75-15-0	Carbon disulfide	ND	4.0	1.9	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	1.1	ug/l	
108-90-7	Chlorobenzene	ND	2.0	1.1	ug/l	
75-00-3	Chloroethane	ND	2.0	1.5	ug/l	
67-66-3	Chloroform	ND	2.0	1.0	ug/l	
74-87-3	Chloromethane	ND	2.0	1.5	ug/l	
110-82-7	Cyclohexane	73.9	10	1.6	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	4.0	2.4	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	1.1	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	0.95	ug/l	
95-50-1	1,2-Dichlorobenzene	1.4	2.0	1.1	ug/l	J
541-73-1	1,3-Dichlorobenzene	ND	2.0	1.1	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.0	1.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	4.0	2.7	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	1.1	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	1.2	ug/l	
75-35-4	1,1-Dichloroethene	ND	2.0	1.2	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	2.0	1.0	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	2.0	1.1	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	1.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	0.94	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	0.86	ug/l	
123-91-1	1,4-Dioxane	ND	250	140	ug/l	
100-41-4	Ethylbenzene	347	2.0	1.2	ug/l	
76-13-1	Freon 113	ND	10	3.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12		
Lab Sample ID:	JC91330-9	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	10	4.1	ug/l	
98-82-8	Isopropylbenzene	149	2.0	1.3	ug/l	
79-20-9	Methyl Acetate	ND	10	1.6	ug/l	
108-87-2	Methylcyclohexane	66.7 [b]	25	3.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	1.0	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	10	3.7	ug/l	
75-09-2	Methylene chloride	ND	4.0	2.0	ug/l	
100-42-5	Styrene	ND	2.0	1.4	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	1.3	ug/l	
127-18-4	Tetrachloroethene	ND	2.0	1.8	ug/l	
108-88-3	Toluene	14.2	2.0	1.1	ug/l	
87-61-6	1,2,3-Trichlorobenzene [c]	ND	2.0	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene [c]	ND	2.0	1.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	1.1	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	1.1	ug/l	
79-01-6	Trichloroethene	1.6	2.0	1.1	ug/l	J
75-69-4	Trichlorofluoromethane	ND	4.0	1.7	ug/l	
75-01-4	Vinyl chloride	ND	2.0	1.6	ug/l	
	m,p-Xylene	607	2.0	1.6	ug/l	
95-47-6	o-Xylene	66.3	2.0	1.2	ug/l	
1330-20-7	Xylene (total)	673	2.0	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%	102%	80-120%
17060-07-0	1,2-Dichloroethane-D4	93%	101%	81-124%
2037-26-5	Toluene-D8	95%	101%	80-120%
460-00-4	4-Bromofluorobenzene	90%	97%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Result is from Run# 2
(c) Associated CCV outside of control limits high, sample was ND.

ND = Not detected　MDL = Method Detection Limit　J = Indicates an estimated value
RL = Reporting Limit　B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range　N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	A251743.D	50	07/17/19 11:44	ED	n/a	n/a	VA9743
Run #2	A251687.D	250	07/16/19 06:13	DG	n/a	n/a	VA9739

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	ND	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	35.0	50	25	ug/l	J
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	73.2	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	41900 [b]	250	130	ug/l	
75-69-4	Trichlorofluoromethane [c]	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%	105%	80-120%
17060-07-0	1,2-Dichloroethane-D4	102%	102%	81-124%
2037-26-5	Toluene-D8	96%	99%	80-120%
460-00-4	4-Bromofluorobenzene	103%	98%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Result is from Run# 2
(c) Associated CCV outside of control limits low.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74313.D	1	07/15/19 12:03	DFT	n/a	n/a	GAA1760
Run #2 [a]	WW136035.D	10	07/11/19 12:04	DFT	n/a	n/a	GWW5223

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	8270 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	251000	25000	ug/l	5	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	83500	5000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	31.0	15	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	17800	10000	ug/l	1	07/10/19	07/13/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	330000	50000	ug/l	5	07/10/19	07/16/19	GT	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47089
(2) Instrument QC Batch: MA47098
(3) Prep QC Batch: MP16337

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	331	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	842	8.0	mg/l	4	07/24/19 13:03	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/19/19 16:01	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	6.7	0.41	mg/l	1	07/19/19 09:39	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	6.7	0.40	mg/l	4	07/19/19 09:39	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/09/19 23:45	MS	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/12/19 09:15	CM	EPA 365.3
Sulfate	60.6	2.0	mg/l	1	07/24/19 01:49	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/11/19 15:22	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-9		
Lab Sample ID:	JC91333-1F	**Date Sampled:**	07/09/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/09/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/10/19 14:45	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MW-9-DUP			
Lab Sample ID:	JC91333-2		**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water		**Date Received:**	07/09/19
Method:	SW846 8260C		**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	A251744.D	50	07/17/19 12:14	ED	n/a	n/a	VA9743
Run #2	A251688.D	250	07/16/19 06:42	DG	n/a	n/a	VA9739

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	ND	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	31.3	50	25	ug/l	J
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-9-DUP		
Lab Sample ID:	JC91333-2	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/09/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	76.8	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	42800 [b]	250	130	ug/l	
75-69-4	Trichlorofluoromethane [c]	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%	105%	80-120%
17060-07-0	1,2-Dichloroethane-D4	102%	104%	81-124%
2037-26-5	Toluene-D8	98%	100%	80-120%
460-00-4	4-Bromofluorobenzene	102%	101%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Result is from Run# 2
(c) Associated CCV outside of control limits low.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I-DUP		
Lab Sample ID:	JC91330-10	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	4B92410.D	50	07/16/19 12:25	CSF	n/a	n/a	V4B3924
Run #2 [b]	4B92632.D	500	07/22/19 13:00	MD	n/a	n/a	V4B3934

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	25.4	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	242	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I-DUP		
Lab Sample ID:	JC91330-10	**Date Sampled:**	07/09/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	15600 [c]	500	260	ug/l	
75-69-4	Trichlorofluoromethane	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	96%	80-120%
17060-07-0	1,2-Dichloroethane-D4	101%	96%	81-124%
2037-26-5	Toluene-D8	100%	100%	80-120%
460-00-4	4-Bromofluorobenzene	100%	98%	80-120%

(a) Diluted due to high concentration of target compound.
(b) (pH= 6)Sample pH did not satisfy field preservation criteria.
(c) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I-UNPRES		
Lab Sample ID:	JC91330-11	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	4B92416.D	50	07/16/19 15:15	CSF	n/a	n/a	V4B3924
Run #2 [b]	4B92339.D	100	07/12/19 17:30	CSF	n/a	n/a	V4B3920

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	25.3	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	242	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I-UNPRES		
Lab Sample ID:	JC91330-11	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	17400 [c]	100	53	ug/l	
75-69-4	Trichlorofluoromethane	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%	104%	80-120%
17060-07-0	1,2-Dichloroethane-D4	102%	103%	81-124%
2037-26-5	Toluene-D8	99%	101%	80-120%
460-00-4	4-Bromofluorobenzene	100%	101%	80-120%

(a) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time. Diluted due to high concentration of target compound.
(b) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MWR-7I-DUP-UNPRES
Lab Sample ID: JC91330-12
Date Sampled: 07/10/19
Matrix: AQ - Ground Water
Date Received: 07/10/19
Method: SW846 8260C
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	4B92417.D	50	07/16/19 15:44	CSF	n/a	n/a	V4B3924
Run #2 [b]	4B92340.D	100	07/12/19 17:58	CSF	n/a	n/a	V4B3920

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	23.0	25	21	ug/l	J
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	233	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-7I-DUP-UNPRES		
Lab Sample ID:	JC91330-12	**Date Sampled:**	07/10/19
Matrix:	AQ - Ground Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	17800 [c]	100	53	ug/l	
75-69-4	Trichlorofluoromethane	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	104%	80-120%
17060-07-0	1,2-Dichloroethane-D4	102%	103%	81-124%
2037-26-5	Toluene-D8	99%	99%	80-120%
460-00-4	4-Bromofluorobenzene	101%	102%	80-120%

(a) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time. Diluted due to high concentration of target compound.
(b) (pH= 7) Sample is not acid preserved per method/client criteria. Sample analyzed within 7 days holding time.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	JC91330-13	**Date Sampled:**	07/10/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B92338.D	1	07/12/19 17:01	CSF	n/a	n/a	V4B3920
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	JC91330-13	**Date Sampled:**	07/10/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/10/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		81-124%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	102%		80-120%

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2V59878.D	10	07/24/19 15:01	ED	n/a	n/a	V2V2459
Run #2	2D184239.D	50	07/19/19 16:46	ED	n/a	n/a	V2D7899

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	100	60	ug/l	
71-43-2	Benzene	12.4	5.0	4.3	ug/l	
74-97-5	Bromochloromethane	ND	10	4.8	ug/l	
75-27-4	Bromodichloromethane	ND	10	5.8	ug/l	
75-25-2	Bromoform	ND	10	6.3	ug/l	
74-83-9	Bromomethane	ND	20	16	ug/l	
78-93-3	2-Butanone (MEK)	ND	100	69	ug/l	
75-15-0	Carbon disulfide	ND	20	9.5	ug/l	
56-23-5	Carbon tetrachloride	ND	10	5.5	ug/l	
108-90-7	Chlorobenzene	ND	10	5.6	ug/l	
75-00-3	Chloroethane	ND	10	7.3	ug/l	
67-66-3	Chloroform	ND	10	5.0	ug/l	
74-87-3	Chloromethane	ND	10	7.6	ug/l	
110-82-7	Cyclohexane	ND	50	7.8	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	20	12	ug/l	
124-48-1	Dibromochloromethane	ND	10	5.6	ug/l	
106-93-4	1,2-Dibromoethane	ND	10	4.8	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	10	5.3	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	10	5.4	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	10	5.1	ug/l	
75-71-8	Dichlorodifluoromethane	ND	20	14	ug/l	
75-34-3	1,1-Dichloroethane	ND	10	5.7	ug/l	
107-06-2	1,2-Dichloroethane	ND	10	6.0	ug/l	
75-35-4	1,1-Dichloroethene	7.1	10	5.9	ug/l	J
156-59-2	cis-1,2-Dichloroethene	2370 [b]	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	15.5	10	5.4	ug/l	
78-87-5	1,2-Dichloropropane	ND	10	5.1	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	10	4.7	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	10	4.3	ug/l	
123-91-1	1,4-Dioxane	ND	1300	690	ug/l	
100-41-4	Ethylbenzene	ND	10	6.0	ug/l	
76-13-1	Freon 113	ND	50	19	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	50	20	ug/l	
98-82-8	Isopropylbenzene	ND	10	6.5	ug/l	
79-20-9	Methyl Acetate	ND	50	8.0	ug/l	
108-87-2	Methylcyclohexane	ND	50	6.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	10	5.1	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	50	19	ug/l	
75-09-2	Methylene chloride	ND	20	10	ug/l	
100-42-5	Styrene	ND	10	7.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	10	6.5	ug/l	
127-18-4	Tetrachloroethene	ND	10	9.0	ug/l	
108-88-3	Toluene	ND	10	5.3	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	10	5.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	10	5.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	10	5.4	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	10	5.3	ug/l	
79-01-6	Trichloroethene	5840 [b]	50	26	ug/l	
75-69-4	Trichlorofluoromethane	ND	20	8.4	ug/l	
75-01-4	Vinyl chloride	ND	10	7.9	ug/l	
	m,p-Xylene	ND	10	7.8	ug/l	
95-47-6	o-Xylene	ND	10	5.9	ug/l	
1330-20-7	Xylene (total)	ND	10	5.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%	95%	80-120%
17060-07-0	1,2-Dichloroethane-D4	102%	90%	81-124%
2037-26-5	Toluene-D8	100%	95%	80-120%
460-00-4	4-Bromofluorobenzene	97%	98%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74362.D	1	07/18/19 15:25	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136052.D	10	07/15/19 13:49	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.25	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	ND	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	3970 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	325000	25000	ug/l	5	07/13/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	214000	5000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	4120	15	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	69500	10000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	793000	50000	ug/l	5	07/13/19	07/17/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47106
(2) Instrument QC Batch: MA47121
(3) Prep QC Batch: MP16375

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	120	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	2160	20	mg/l	10	07/25/19 16:58	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.22	0.20	mg/l	1	07/23/19 16:00	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/22/19 12:38	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/22/19 12:38	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 10:00	JOO	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	68.6	2.0	mg/l	1	07/25/19 06:12	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 15:34	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-3I		
Lab Sample ID:	JC91330-14F	**Date Sampled:**	07/11/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-1I		
Lab Sample ID:	JC91330-15	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2D184198.D	5	07/18/19 09:25	ED	n/a	n/a	V2D7897
Run #2	2D184182.D	20	07/17/19 14:50	ED	n/a	n/a	V2D7895

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	50	30	ug/l	
71-43-2	Benzene	33.3	2.5	2.1	ug/l	
74-97-5	Bromochloromethane	ND	5.0	2.4	ug/l	
75-27-4	Bromodichloromethane	ND	5.0	2.9	ug/l	
75-25-2	Bromoform	ND	5.0	3.2	ug/l	
74-83-9	Bromomethane	ND	10	8.2	ug/l	
78-93-3	2-Butanone (MEK)	ND	50	34	ug/l	
75-15-0	Carbon disulfide	ND	10	4.8	ug/l	
56-23-5	Carbon tetrachloride	ND	5.0	2.8	ug/l	
108-90-7	Chlorobenzene	ND	5.0	2.8	ug/l	
75-00-3	Chloroethane [b]	ND	5.0	3.6	ug/l	
67-66-3	Chloroform	ND	5.0	2.5	ug/l	
74-87-3	Chloromethane [b]	ND	5.0	3.8	ug/l	
110-82-7	Cyclohexane	ND	25	3.9	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	10	6.0	ug/l	
124-48-1	Dibromochloromethane	ND	5.0	2.8	ug/l	
106-93-4	1,2-Dibromoethane	ND	5.0	2.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	2.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	2.7	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	2.5	ug/l	
75-71-8	Dichlorodifluoromethane	ND	10	6.8	ug/l	
75-34-3	1,1-Dichloroethane	ND	5.0	2.8	ug/l	
107-06-2	1,2-Dichloroethane	ND	5.0	3.0	ug/l	
75-35-4	1,1-Dichloroethene	ND	5.0	3.0	ug/l	
156-59-2	cis-1,2-Dichloroethene	40.4	5.0	2.5	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	5.0	2.7	ug/l	
78-87-5	1,2-Dichloropropane	ND	5.0	2.5	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	5.0	2.4	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	5.0	2.2	ug/l	
123-91-1	1,4-Dioxane	ND	630	350	ug/l	
100-41-4	Ethylbenzene	ND	5.0	3.0	ug/l	
76-13-1	Freon 113	ND	25	9.7	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1I		
Lab Sample ID:	JC91330-15	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	25	10	ug/l	
98-82-8	Isopropylbenzene	ND	5.0	3.2	ug/l	
79-20-9	Methyl Acetate	ND	25	4.0	ug/l	
108-87-2	Methylcyclohexane	ND	25	3.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	25	9.3	ug/l	
75-09-2	Methylene chloride	ND	10	5.0	ug/l	
100-42-5	Styrene	ND	5.0	3.5	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.0	3.3	ug/l	
127-18-4	Tetrachloroethene	5.9	5.0	4.5	ug/l	
108-88-3	Toluene	ND	5.0	2.7	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	5.0	2.5	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	2.5	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	5.0	2.7	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	5.0	2.7	ug/l	
79-01-6	Trichloroethene	2000 [c]	20	11	ug/l	
75-69-4	Trichlorofluoromethane	ND	10	4.2	ug/l	
75-01-4	Vinyl chloride	ND	5.0	3.9	ug/l	
	m,p-Xylene	ND	5.0	3.9	ug/l	
95-47-6	o-Xylene	ND	5.0	3.0	ug/l	
1330-20-7	Xylene (total)	ND	5.0	3.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	85%	84%	80-120%
17060-07-0	1,2-Dichloroethane-D4	89%	88%	81-124%
2037-26-5	Toluene-D8	91%	90%	80-120%
460-00-4	4-Bromofluorobenzene	96%	93%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits low.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1I		
Lab Sample ID:	JC91330-15	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74363.D	1	07/18/19 15:39	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136053.D	10	07/15/19 14:05	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	4.9	0.11	0.060	ug/l	
74-84-0	Ethane	ND	0.23	0.099	ug/l	
74-85-1	Ethene	0.35	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	22100 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1I		
Lab Sample ID:	JC91330-15	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	283000	25000	ug/l	5	07/13/19	07/17/19	ND	SW846 6010D 2	SW846 3010A 3
Iron	< 100	100	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D 1	SW846 3010A 3
Magnesium	91400	5000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D 1	SW846 3010A 3
Manganese	1250	15	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D 1	SW846 3010A 3
Potassium	17900	10000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D 1	SW846 3010A 3
Sodium	600000	50000	ug/l	5	07/13/19	07/17/19	ND	SW846 6010D 2	SW846 3010A 3

(1) Instrument QC Batch: MA47106
(2) Instrument QC Batch: MA47121
(3) Prep QC Batch: MP16375

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-1I		
Lab Sample ID:	JC91330-15	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	241	10	mg/l	1	07/22/19 11:09	CM	SM2320 B-11
Chloride	1210	10	mg/l	5	07/25/19 17:22	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/23/19 16:02	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	2.1	0.20	mg/l	1	07/22/19 12:39	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	3.2	0.10	mg/l	1	07/22/19 12:39	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	1.1	0.10	mg/l	10	07/12/19 10:00	JOO	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	120	2.0	mg/l	1	07/25/19 06:36	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 15:34	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID: MWR-1I
Lab Sample ID: JC91330-15F
Matrix: AQ - Groundwater Filtered
Date Sampled: 07/11/19
Date Received: 07/11/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.091	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1 [a]	2D184240.D	500	07/19/19 17:18	ED	n/a	n/a	V2D7899
Run #2	2D184229.D	5000	07/19/19 11:30	ED	n/a	n/a	V2D7899

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
67-64-1	Acetone	ND	5000	3000	ug/l	
71-43-2	Benzene	ND	250	210	ug/l	
74-97-5	Bromochloromethane	ND	500	240	ug/l	
75-27-4	Bromodichloromethane	ND	500	290	ug/l	
75-25-2	Bromoform	ND	500	320	ug/l	
74-83-9	Bromomethane	ND	1000	820	ug/l	
78-93-3	2-Butanone (MEK)	ND	5000	3400	ug/l	
75-15-0	Carbon disulfide	ND	1000	480	ug/l	
56-23-5	Carbon tetrachloride	ND	500	280	ug/l	
108-90-7	Chlorobenzene	ND	500	280	ug/l	
75-00-3	Chloroethane	ND	500	360	ug/l	
67-66-3	Chloroform	ND	500	250	ug/l	
74-87-3	Chloromethane	ND	500	380	ug/l	
110-82-7	Cyclohexane	ND	2500	390	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	1000	600	ug/l	
124-48-1	Dibromochloromethane	ND	500	280	ug/l	
106-93-4	1,2-Dibromoethane	ND	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	500	270	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	500	270	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	500	250	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1000	680	ug/l	
75-34-3	1,1-Dichloroethane [b]	ND	500	280	ug/l	
107-06-2	1,2-Dichloroethane	ND	500	300	ug/l	
75-35-4	1,1-Dichloroethene	ND	500	300	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	500	250	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	500	270	ug/l	
78-87-5	1,2-Dichloropropane	ND	500	250	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	500	240	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	500	220	ug/l	
123-91-1	1,4-Dioxane	ND	63000	35000	ug/l	
100-41-4	Ethylbenzene	ND	500	300	ug/l	
76-13-1	Freon 113	ND	2500	970	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	2500	1000	ug/l	
98-82-8	Isopropylbenzene	ND	500	320	ug/l	
79-20-9	Methyl Acetate	ND	2500	400	ug/l	
108-87-2	Methylcyclohexane	ND	2500	300	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	500	250	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	2500	930	ug/l	
75-09-2	Methylene chloride	ND	1000	500	ug/l	
100-42-5	Styrene	ND	500	350	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	500	330	ug/l	
127-18-4	Tetrachloroethene	519	500	450	ug/l	
108-88-3	Toluene	ND	500	270	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	500	250	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	500	250	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	500	270	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	500	270	ug/l	
79-01-6	Trichloroethene	232000 ^{c}	5000	2600	ug/l	
75-69-4	Trichlorofluoromethane	ND	1000	420	ug/l	
75-01-4	Vinyl chloride	ND	500	390	ug/l	
	m,p-Xylene	ND	500	390	ug/l	
95-47-6	o-Xylene	ND	500	300	ug/l	
1330-20-7	Xylene (total)	ND	500	300	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%	97%	80-120%
17060-07-0	1,2-Dichloroethane-D4	91%	90%	81-124%
2037-26-5	Toluene-D8	95%	95%	80-120%
460-00-4	4-Bromofluorobenzene	97%	100%	80-120%

(a) Diluted due to high concentration of target compound.
(b) This compound in BS is outside in house QC limits bias high.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74364.D	1	07/18/19 15:52	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136054.D	10	07/15/19 14:24	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.33	0.11	0.060	ug/l	
74-84-0	Ethane	2.5	0.23	0.099	ug/l	
74-85-1	Ethene	1.4	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	30600 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	128000	5000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	88200	5000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	271	15	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	14900	10000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	689000	50000	ug/l	5	07/13/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47106
(2) Instrument QC Batch: MA47121
(3) Prep QC Batch: MP16375

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	390	10	mg/l	1	07/22/19 12:35	CM	SM2320 B-11
Chloride	1060	10	mg/l	5	07/25/19 17:45	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/23/19 16:03	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	7.6	0.45	mg/l	1	07/22/19 14:11	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	8.0	0.40	mg/l	4	07/22/19 14:11	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.39	0.050	mg/l	5	07/12/19 10:00	JOO	SM4500NO2 B-11
Phosphorus, Total	0.087	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	73.6	2.0	mg/l	1	07/25/19 07:00	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 13:30	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-4I		
Lab Sample ID:	JC91330-16F	**Date Sampled:**	07/11/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.13	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID: MWR-4I-DUP
Lab Sample ID: JC91330-17
Matrix: AQ - Ground Water
Method: SW846 8260C
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

Date Sampled: 07/11/19
Date Received: 07/11/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2D184199.D	500	07/18/19 09:55	ED	n/a	n/a	V2D7897
Run #2	2D184184.D	5000	07/17/19 15:59	ED	n/a	n/a	V2D7895

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	5000	3000	ug/l	
71-43-2	Benzene	ND	250	210	ug/l	
74-97-5	Bromochloromethane	ND	500	240	ug/l	
75-27-4	Bromodichloromethane	ND	500	290	ug/l	
75-25-2	Bromoform	ND	500	320	ug/l	
74-83-9	Bromomethane	ND	1000	820	ug/l	
78-93-3	2-Butanone (MEK)	ND	5000	3400	ug/l	
75-15-0	Carbon disulfide	ND	1000	480	ug/l	
56-23-5	Carbon tetrachloride	ND	500	280	ug/l	
108-90-7	Chlorobenzene	ND	500	280	ug/l	
75-00-3	Chloroethane [b]	ND	500	360	ug/l	
67-66-3	Chloroform	ND	500	250	ug/l	
74-87-3	Chloromethane [b]	ND	500	380	ug/l	
110-82-7	Cyclohexane	ND	2500	390	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	1000	600	ug/l	
124-48-1	Dibromochloromethane	ND	500	280	ug/l	
106-93-4	1,2-Dibromoethane	ND	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	500	270	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	500	270	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	500	250	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1000	680	ug/l	
75-34-3	1,1-Dichloroethane	ND	500	280	ug/l	
107-06-2	1,2-Dichloroethane	ND	500	300	ug/l	
75-35-4	1,1-Dichloroethene	ND	500	300	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	500	250	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	500	270	ug/l	
78-87-5	1,2-Dichloropropane	ND	500	250	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	500	240	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	500	220	ug/l	
123-91-1	1,4-Dioxane	ND	63000	35000	ug/l	
100-41-4	Ethylbenzene	ND	500	300	ug/l	
76-13-1	Freon 113	ND	2500	970	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4I-DUP		
Lab Sample ID:	JC91330-17	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	2500	1000	ug/l	
98-82-8	Isopropylbenzene	ND	500	320	ug/l	
79-20-9	Methyl Acetate	ND	2500	400	ug/l	
108-87-2	Methylcyclohexane	ND	2500	300	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	500	250	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	2500	930	ug/l	
75-09-2	Methylene chloride	ND	1000	500	ug/l	
100-42-5	Styrene	ND	500	350	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	500	330	ug/l	
127-18-4	Tetrachloroethene	508	500	450	ug/l	
108-88-3	Toluene	ND	500	270	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	500	250	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	500	250	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	500	270	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	500	270	ug/l	
79-01-6	Trichloroethene	238000 [c]	5000	2600	ug/l	
75-69-4	Trichlorofluoromethane	ND	1000	420	ug/l	
75-01-4	Vinyl chloride	ND	500	390	ug/l	
	m,p-Xylene	ND	500	390	ug/l	
95-47-6	o-Xylene	ND	500	300	ug/l	
1330-20-7	Xylene (total)	ND	500	300	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	86%	84%	80-120%
17060-07-0	1,2-Dichloroethane-D4	90%	88%	81-124%
2037-26-5	Toluene-D8	90%	90%	80-120%
460-00-4	4-Bromofluorobenzene	97%	92%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits low.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2I		
Lab Sample ID:	JC91330-18	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2D184185.D	50	07/17/19 16:34	ED	n/a	n/a	V2D7895
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	31.7	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	254	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene [b]	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2I		
Lab Sample ID:	JC91330-18	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	7790	50	26	ug/l	
75-69-4	Trichlorofluoromethane	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	86%		80-120%
17060-07-0	1,2-Dichloroethane-D4	89%		81-124%
2037-26-5	Toluene-D8	89%		80-120%
460-00-4	4-Bromofluorobenzene	93%		80-120%

(a) Diluted due to high concentration of target compound.
(b) This compound in BS is outside in house QC limits bias high.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2I			
Lab Sample ID:	JC91330-18		**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water		**Date Received:**	07/11/19
Method:	RSK-175		**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74365.D	1	07/18/19 16:08	TCH	n/a	n/a	GAA1762
Run #2 [a]	WW136055.D	10	07/15/19 14:46	DFT	n/a	n/a	GWW5224

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.57	0.11	0.060	ug/l	
74-84-0	Ethane	0.42	0.23	0.099	ug/l	
74-85-1	Ethene	1.1	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	2840 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2I		
Lab Sample ID:	JC91330-18	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	264000	10000	ug/l	2	07/13/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	71300	5000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	160	15	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	48900	10000	ug/l	1	07/13/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	1300000	100000	ug/l	10	07/13/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47106
(2) Instrument QC Batch: MA47121
(3) Prep QC Batch: MP16375

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2I		
Lab Sample ID:	JC91330-18	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	105	5.0	mg/l	1	07/22/19 12:35	CM	SM2320 B-11
Chloride	2140	20	mg/l	10	07/25/19 18:09	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.36	0.20	mg/l	1	07/23/19 16:05	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	0.19	0.11	mg/l	1	07/22/19 12:41	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	0.21	0.10	mg/l	1	07/22/19 12:41	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	0.023	0.010	mg/l	1	07/12/19 10:00	JOO	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/15/19 15:35	CM	EPA 365.3
Sulfate	238	2.0	mg/l	1	07/25/19 07:23	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 13:30	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2I		
Lab Sample ID:	JC91330-18F	**Date Sampled:**	07/11/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/11/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/12/19 09:36	JOO	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2I-DUP		
Lab Sample ID:	JC91330-19	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2D184186.D	50	07/17/19 17:07	ED	n/a	n/a	V2D7895
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	32.3	25	21	ug/l	
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	254	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene [b]	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113	ND	250	97	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2I-DUP		
Lab Sample ID:	JC91330-19	**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	7740	50	26	ug/l	
75-69-4	Trichlorofluoromethane	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	85%		80-120%
17060-07-0	1,2-Dichloroethane-D4	90%		81-124%
2037-26-5	Toluene-D8	90%		80-120%
460-00-4	4-Bromofluorobenzene	93%		80-120%

(a) Diluted due to high concentration of target compound.
(b) This compound in BS is outside in house QC limits bias high.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK-3		
Lab Sample ID:	JC91330-20	**Date Sampled:**	07/11/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D184235.D	1	07/19/19 14:38	ED	n/a	n/a	V2D7899
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane [a]	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK-3		
Lab Sample ID:	JC91330-20	**Date Sampled:**	07/11/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	94%		80-120%
17060-07-0	1,2-Dichloroethane-D4	90%		81-124%
2037-26-5	Toluene-D8	94%		80-120%
460-00-4	4-Bromofluorobenzene	98%		80-120%

(a) This compound in BS is outside in house QC limits bias high.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 2

Client Sample ID:	FIELD BLANK		
Lab Sample ID:	JC91330-21	**Date Sampled:**	07/11/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D184236.D	1	07/19/19 15:09	ED	n/a	n/a	V2D7899
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane [a]	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FIELD BLANK		
Lab Sample ID:	JC91330-21	**Date Sampled:**	07/11/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/11/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		80-120%
17060-07-0	1,2-Dichloroethane-D4	91%		81-124%
2037-26-5	Toluene-D8	93%		80-120%
460-00-4	4-Bromofluorobenzene	99%		80-120%

(a) This compound in BS is outside in house QC limits bias high.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12I			
Lab Sample ID:	JC91330-22		**Date Sampled:**	07/11/19
Matrix:	AQ - Ground Water		**Date Received:**	07/11/19
Method:	SW846 8260C		**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D184183.D	1	07/17/19 15:24	ED	n/a	n/a	V2D7895
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	20.4	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	35.3	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	1.6	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene [a]	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	8.7	1.0	0.60	ug/l	
76-13-1	Freon 113	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-12I
Lab Sample ID: JC91330-22
Matrix: AQ - Ground Water
Method: SW846 8260C
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY
Date Sampled: 07/11/19
Date Received: 07/11/19
Percent Solids: n/a

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	90.5	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	15.7	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	2.3	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	25.6	1.0	0.78	ug/l	
95-47-6	o-Xylene	2.5	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	28.1	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	85%		80-120%
17060-07-0	1,2-Dichloroethane-D4	90%		81-124%
2037-26-5	Toluene-D8	90%		80-120%
460-00-4	4-Bromofluorobenzene	92%		80-120%

(a) This compound in BS is outside in house QC limits bias high.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1 [a]	X183136.D	20	07/23/19 16:34	JP	n/a	n/a	VX7840
Run #2	X183137.D	200	07/23/19 17:04	JP	n/a	n/a	VX7840

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
67-64-1	Acetone	236	200	120	ug/l	
71-43-2	Benzene	127	10	8.5	ug/l	
74-97-5	Bromochloromethane	ND	20	9.6	ug/l	
75-27-4	Bromodichloromethane	ND	20	12	ug/l	
75-25-2	Bromoform	ND	20	13	ug/l	
74-83-9	Bromomethane	ND	40	33	ug/l	
78-93-3	2-Butanone (MEK)	ND	200	140	ug/l	
75-15-0	Carbon disulfide	ND	40	19	ug/l	
56-23-5	Carbon tetrachloride	ND	20	11	ug/l	
108-90-7	Chlorobenzene	ND	20	11	ug/l	
75-00-3	Chloroethane	ND	20	15	ug/l	
67-66-3	Chloroform	ND	20	10	ug/l	
74-87-3	Chloromethane	ND	20	15	ug/l	
110-82-7	Cyclohexane	ND	100	16	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	40	24	ug/l	
124-48-1	Dibromochloromethane	ND	20	11	ug/l	
106-93-4	1,2-Dibromoethane	ND	20	9.5	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	20	11	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	20	11	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	20	10	ug/l	
75-71-8	Dichlorodifluoromethane [b]	ND	40	27	ug/l	
75-34-3	1,1-Dichloroethane	ND	20	11	ug/l	
107-06-2	1,2-Dichloroethane	ND	20	12	ug/l	
75-35-4	1,1-Dichloroethene	14.2	20	12	ug/l	J
156-59-2	cis-1,2-Dichloroethene	688	20	10	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	20	11	ug/l	
78-87-5	1,2-Dichloropropane	ND	20	10	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	20	9.4	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	20	8.6	ug/l	
123-91-1	1,4-Dioxane	ND	2500	1400	ug/l	
100-41-4	Ethylbenzene	ND	20	12	ug/l	
76-13-1	Freon 113 [c]	ND	100	39	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	100	41	ug/l	
98-82-8	Isopropylbenzene	ND	20	13	ug/l	
79-20-9	Methyl Acetate	ND	100	16	ug/l	
108-87-2	Methylcyclohexane	ND	100	12	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	20	10	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	100	37	ug/l	
75-09-2	Methylene chloride	ND	40	20	ug/l	
100-42-5	Styrene	ND	20	14	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	20	13	ug/l	
127-18-4	Tetrachloroethene	ND	20	18	ug/l	
108-88-3	Toluene	ND	20	11	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	20	10	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	20	10	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	20	11	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	20	11	ug/l	
79-01-6	Trichloroethene	12800 [d]	200	110	ug/l	
75-69-4	Trichlorofluoromethane [e]	ND	40	17	ug/l	
75-01-4	Vinyl chloride	ND	20	16	ug/l	
	m,p-Xylene	ND	20	16	ug/l	
95-47-6	o-Xylene	ND	20	12	ug/l	
1330-20-7	Xylene (total)	ND	20	12	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	119%	119%	80-120%
17060-07-0	1,2-Dichloroethane-D4	111%	108%	81-124%
2037-26-5	Toluene-D8	96%	96%	80-120%
460-00-4	4-Bromofluorobenzene	92%	90%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits low.
(c) Associated CCV outside of control limits high, sample was ND.
(d) Result is from Run# 2
(e) Associated CCV outside of control limits high, sample was ND.This compound in BS is outside in house QC limits bias high.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74342.D	1	07/17/19 15:14	DFT	n/a	n/a	GAA1761
Run #2 [a]	WW136070.D	1	07/17/19 15:00	DFT	n/a	n/a	GWW5225

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	2.8	0.11	0.060	ug/l	
74-84-0	Ethane	4.2	0.23	0.099	ug/l	
74-85-1	Ethene	6.2	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	1290 [b]	50	4.4	ug/l	

(a) (pH= 6)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	621000	25000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [4]
Iron	141	100	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [4]
Magnesium	37200	5000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [4]
Manganese	411	15	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [4]
Potassium	93800	10000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [4]
Sodium	1180000	100000	ug/l	10	07/15/19	07/19/19	ND	SW846 6010D [3]	SW846 3010A [4]

(1) Instrument QC Batch: MA47118
(2) Instrument QC Batch: MA47127
(3) Instrument QC Batch: MA47138
(4) Prep QC Batch: MP16384

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	67.0	5.0	mg/l	1	07/22/19 12:35	CM	SM2320 B-11
Chloride	2630	20	mg/l	10	07/27/19 04:14	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.34	0.20	mg/l	1	07/23/19 16:16	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/22/19 12:56	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/22/19 12:56	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 23:25	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/17/19 14:40	CM	EPA 365.3
Sulfate	178	2.0	mg/l	1	07/25/19 23:52	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 13:30	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-3S		
Lab Sample ID:	JC91330-23F	**Date Sampled:**	07/12/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/13/19 00:29	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1 [a]	X183156.D	10	07/24/19 14:04	JP	n/a	n/a	VX7841
Run #2	X183094.D	50	07/22/19 15:55	RS	n/a	n/a	VX7838

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
67-64-1	Acetone	65.0	100	60	ug/l	J
71-43-2	Benzene	10.0	5.0	4.3	ug/l	
74-97-5	Bromochloromethane	ND	10	4.8	ug/l	
75-27-4	Bromodichloromethane	ND	10	5.8	ug/l	
75-25-2	Bromoform	ND	10	6.3	ug/l	
74-83-9	Bromomethane	ND	20	16	ug/l	
78-93-3	2-Butanone (MEK)	ND	100	69	ug/l	
75-15-0	Carbon disulfide	ND	20	9.5	ug/l	
56-23-5	Carbon tetrachloride	ND	10	5.5	ug/l	
108-90-7	Chlorobenzene	ND	10	5.6	ug/l	
75-00-3	Chloroethane	ND	10	7.3	ug/l	
67-66-3	Chloroform	ND	10	5.0	ug/l	
74-87-3	Chloromethane	ND	10	7.6	ug/l	
110-82-7	Cyclohexane	ND	50	7.8	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	20	12	ug/l	
124-48-1	Dibromochloromethane	ND	10	5.6	ug/l	
106-93-4	1,2-Dibromoethane	ND	10	4.8	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	10	5.3	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	10	5.4	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	10	5.1	ug/l	
75-71-8	Dichlorodifluoromethane	ND	20	14	ug/l	
75-34-3	1,1-Dichloroethane	ND	10	5.7	ug/l	
107-06-2	1,2-Dichloroethane	ND	10	6.0	ug/l	
75-35-4	1,1-Dichloroethene	ND	10	5.9	ug/l	
156-59-2	cis-1,2-Dichloroethene	79.7	10	5.1	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	10	5.4	ug/l	
78-87-5	1,2-Dichloropropane	ND	10	5.1	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	10	4.7	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	10	4.3	ug/l	
123-91-1	1,4-Dioxane	ND	1300	690	ug/l	
100-41-4	Ethylbenzene	ND	10	6.0	ug/l	
76-13-1	Freon 113 [b]	ND	50	19	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	50	20	ug/l	
98-82-8	Isopropylbenzene	ND	10	6.5	ug/l	
79-20-9	Methyl Acetate	ND	50	8.0	ug/l	
108-87-2	Methylcyclohexane	ND	50	6.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	10	5.1	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	50	19	ug/l	
75-09-2	Methylene chloride	ND	20	10	ug/l	
100-42-5	Styrene	ND	10	7.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	10	6.5	ug/l	
127-18-4	Tetrachloroethene	ND	10	9.0	ug/l	
108-88-3	Toluene	ND	10	5.3	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	10	5.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	10	5.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	10	5.4	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	10	5.3	ug/l	
79-01-6	Trichloroethene	5390 [c]	50	26	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	20	8.4	ug/l	
75-01-4	Vinyl chloride	ND	10	7.9	ug/l	
	m,p-Xylene	ND	10	7.8	ug/l	
95-47-6	o-Xylene	ND	10	5.9	ug/l	
1330-20-7	Xylene (total)	ND	10	5.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	113%	115%	80-120%
17060-07-0	1,2-Dichloroethane-D4	113%	102%	81-124%
2037-26-5	Toluene-D8	96%	97%	80-120%
460-00-4	4-Bromofluorobenzene	89%	90%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits high, sample was ND.
(c) Result is from Run# 2

ND = Not detected　MDL = Method Detection Limit　J = Indicates an estimated value
RL = Reporting Limit　B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range　N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1	AA74343.D	1	07/17/19 15:39	DFT	n/a	n/a	GAA1761
Run #2 [a]	WW136071.D	10	07/17/19 15:24	DFT	n/a	n/a	GWW5225

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
74-82-8	Methane	5.2	0.11	0.060	ug/l	
74-84-0	Ethane	0.44	0.23	0.099	ug/l	
74-85-1	Ethene	0.93	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	43400 [b]	500	44	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	316000	25000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]
Iron	142	100	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	112000	5000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	1100	15	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	17700	10000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	688000	50000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47118
(2) Instrument QC Batch: MA47127
(3) Prep QC Batch: MP16384

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	360	10	mg/l	1	07/22/19 12:35	CM	SM2320 B-11
Chloride	1540	20	mg/l	10	07/27/19 04:38	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/23/19 16:18	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/22/19 12:59	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/22/19 12:59	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 23:40	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/17/19 14:40	CM	EPA 365.3
Sulfate	101	2.0	mg/l	1	07/26/19 00:16	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 13:30	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-1S		
Lab Sample ID:	JC91330-24F	**Date Sampled:**	07/12/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	0.10	0.050	mg/l	1	07/13/19 00:29	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1 [a]	X183155.D	50	07/24/19 13:35	JP	n/a	n/a	VX7841
Run #2	X183151.D	250	07/24/19 11:29	JP	n/a	n/a	VX7841

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
67-64-1	Acetone	ND	500	300	ug/l	
71-43-2	Benzene	24.7	25	21	ug/l	J
74-97-5	Bromochloromethane	ND	50	24	ug/l	
75-27-4	Bromodichloromethane	ND	50	29	ug/l	
75-25-2	Bromoform	ND	50	32	ug/l	
74-83-9	Bromomethane	ND	100	82	ug/l	
78-93-3	2-Butanone (MEK)	ND	500	340	ug/l	
75-15-0	Carbon disulfide	ND	100	48	ug/l	
56-23-5	Carbon tetrachloride	ND	50	28	ug/l	
108-90-7	Chlorobenzene	ND	50	28	ug/l	
75-00-3	Chloroethane	ND	50	36	ug/l	
67-66-3	Chloroform	ND	50	25	ug/l	
74-87-3	Chloromethane	ND	50	38	ug/l	
110-82-7	Cyclohexane	ND	250	39	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	60	ug/l	
124-48-1	Dibromochloromethane	ND	50	28	ug/l	
106-93-4	1,2-Dibromoethane	ND	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	50	27	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	50	27	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	50	25	ug/l	
75-71-8	Dichlorodifluoromethane	ND	100	68	ug/l	
75-34-3	1,1-Dichloroethane	ND	50	28	ug/l	
107-06-2	1,2-Dichloroethane	ND	50	30	ug/l	
75-35-4	1,1-Dichloroethene	ND	50	30	ug/l	
156-59-2	cis-1,2-Dichloroethene	385	50	25	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	50	27	ug/l	
78-87-5	1,2-Dichloropropane	ND	50	25	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	50	24	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	50	22	ug/l	
123-91-1	1,4-Dioxane	ND	6300	3500	ug/l	
100-41-4	Ethylbenzene	ND	50	30	ug/l	
76-13-1	Freon 113 [b]	ND	250	97	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	250	100	ug/l	
98-82-8	Isopropylbenzene	ND	50	32	ug/l	
79-20-9	Methyl Acetate	ND	250	40	ug/l	
108-87-2	Methylcyclohexane	ND	250	30	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	50	25	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	250	93	ug/l	
75-09-2	Methylene chloride	ND	100	50	ug/l	
100-42-5	Styrene	ND	50	35	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	50	33	ug/l	
127-18-4	Tetrachloroethene	ND	50	45	ug/l	
108-88-3	Toluene	ND	50	27	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	50	25	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	50	25	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	50	27	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	50	27	ug/l	
79-01-6	Trichloroethene	21100 [c]	250	130	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	100	42	ug/l	
75-01-4	Vinyl chloride	ND	50	39	ug/l	
	m,p-Xylene	ND	50	39	ug/l	
95-47-6	o-Xylene	ND	50	30	ug/l	
1330-20-7	Xylene (total)	ND	50	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	114%	111%	80-120%
17060-07-0	1,2-Dichloroethane-D4	113%	109%	81-124%
2037-26-5	Toluene-D8	95%	95%	80-120%
460-00-4	4-Bromofluorobenzene	90%	89%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits high, sample was ND.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74344.D	1	07/17/19 15:56	DFT	n/a	n/a	GAA1761
Run #2 [a]	WW136074.D	1	07/17/19 16:23	DFT	n/a	n/a	GWW5225

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	5.8	0.11	0.060	ug/l	
74-84-0	Ethane	9.8	0.23	0.099	ug/l	
74-85-1	Ethene	29.0	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	776 [b]	50	4.4	ug/l	

(a) (pH= 7)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	453000	25000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D (2)	SW846 3010A (4)
Iron	< 100	100	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D (1)	SW846 3010A (4)
Magnesium	41500	5000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D (1)	SW846 3010A (4)
Manganese	369	15	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D (1)	SW846 3010A (4)
Potassium	101000	10000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D (1)	SW846 3010A (4)
Sodium	1110000	100000	ug/l	10	07/15/19	07/19/19	ND	SW846 6010D (3)	SW846 3010A (4)

(1) Instrument QC Batch: MA47118
(2) Instrument QC Batch: MA47127
(3) Instrument QC Batch: MA47138
(4) Prep QC Batch: MP16384

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	70.0	5.0	mg/l	1	07/22/19 12:35	CM	SM2320 B-11
Chloride	2710	20	mg/l	10	07/27/19 05:02	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	0.50	0.20	mg/l	1	07/23/19 16:19	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	< 0.11	0.11	mg/l	1	07/22/19 13:00	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	< 0.10	0.10	mg/l	1	07/22/19 13:00	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	< 0.010	0.010	mg/l	1	07/12/19 23:40	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/17/19 14:40	CM	EPA 365.3
Sulfate	173	2.0	mg/l	1	07/26/19 00:40	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 13:30	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-2S		
Lab Sample ID:	JC91330-25F	**Date Sampled:**	07/12/19
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/13/19 00:29	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID: MWR-4S
Lab Sample ID: JC91330-26
Date Sampled: 07/12/19
Matrix: AQ - Ground Water
Date Received: 07/12/19
Method: SW846 8260C
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	X183153.D	200	07/24/19 12:36	JP	n/a	n/a	VX7841
Run #2	X183150.D	1000	07/24/19 10:59	JP	n/a	n/a	VX7841

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2000	1200	ug/l	
71-43-2	Benzene	ND	100	85	ug/l	
74-97-5	Bromochloromethane	ND	200	96	ug/l	
75-27-4	Bromodichloromethane	ND	200	120	ug/l	
75-25-2	Bromoform	ND	200	130	ug/l	
74-83-9	Bromomethane	ND	400	330	ug/l	
78-93-3	2-Butanone (MEK)	ND	2000	1400	ug/l	
75-15-0	Carbon disulfide	ND	400	190	ug/l	
56-23-5	Carbon tetrachloride	ND	200	110	ug/l	
108-90-7	Chlorobenzene	ND	200	110	ug/l	
75-00-3	Chloroethane	ND	200	150	ug/l	
67-66-3	Chloroform	ND	200	100	ug/l	
74-87-3	Chloromethane	ND	200	150	ug/l	
110-82-7	Cyclohexane	ND	1000	160	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	400	240	ug/l	
124-48-1	Dibromochloromethane	ND	200	110	ug/l	
106-93-4	1,2-Dibromoethane	ND	200	95	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	200	110	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	200	110	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	200	100	ug/l	
75-71-8	Dichlorodifluoromethane	ND	400	270	ug/l	
75-34-3	1,1-Dichloroethane	ND	200	110	ug/l	
107-06-2	1,2-Dichloroethane	ND	200	120	ug/l	
75-35-4	1,1-Dichloroethene	ND	200	120	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	200	100	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	200	110	ug/l	
78-87-5	1,2-Dichloropropane	ND	200	100	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	200	94	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	200	86	ug/l	
123-91-1	1,4-Dioxane	ND	25000	14000	ug/l	
100-41-4	Ethylbenzene	ND	200	120	ug/l	
76-13-1	Freon 113 [b]	ND	1000	390	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4S		
Lab Sample ID:	JC91330-26	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	1000	410	ug/l	
98-82-8	Isopropylbenzene	ND	200	130	ug/l	
79-20-9	Methyl Acetate	ND	1000	160	ug/l	
108-87-2	Methylcyclohexane	ND	1000	120	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	200	100	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	1000	370	ug/l	
75-09-2	Methylene chloride	ND	400	200	ug/l	
100-42-5	Styrene	ND	200	140	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	200	130	ug/l	
127-18-4	Tetrachloroethene	ND	200	180	ug/l	
108-88-3	Toluene	ND	200	110	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	200	100	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	200	100	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	200	110	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	200	110	ug/l	
79-01-6	Trichloroethene	70700 [c]	1000	530	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	400	170	ug/l	
75-01-4	Vinyl chloride	ND	200	160	ug/l	
	m,p-Xylene	ND	200	160	ug/l	
95-47-6	o-Xylene	ND	200	120	ug/l	
1330-20-7	Xylene (total)	ND	200	120	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	113%	110%	80-120%
17060-07-0	1,2-Dichloroethane-D4	111%	110%	81-124%
2037-26-5	Toluene-D8	96%	96%	80-120%
460-00-4	4-Bromofluorobenzene	89%	89%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits high, sample was ND.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4S		
Lab Sample ID:	JC91330-26	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	RSK-175	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA74345.D	1	07/17/19 16:13	DFT	n/a	n/a	GAA1761
Run #2 [a]	WW136075.D	1	07/17/19 16:40	DFT	n/a	n/a	GWW5225

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	2.8	0.11	0.060	ug/l	
74-84-0	Ethane	14.7	0.23	0.099	ug/l	
74-85-1	Ethene	12.2	0.31	0.072	ug/l	
124-38-9	Carbon Dioxide	906 [b]	50	4.4	ug/l	

(a) (pH= 8)Sample is not acid preserved. Sample analyzed within 7 days holding time.
(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4S		
Lab Sample ID:	JC91330-26	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

Total Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	249000	25000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]
Iron	< 100	100	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Magnesium	30600	5000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Manganese	243	15	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Potassium	20900	10000	ug/l	1	07/15/19	07/17/19	ND	SW846 6010D [1]	SW846 3010A [3]
Sodium	835000	50000	ug/l	5	07/15/19	07/18/19	ND	SW846 6010D [2]	SW846 3010A [3]

(1) Instrument QC Batch: MA47118
(2) Instrument QC Batch: MA47127
(3) Prep QC Batch: MP16384

RL = Reporting Limit

SGS LabLink@1048096 11:46 05-Aug-2019

Report of Analysis

Client Sample ID:	MWR-4S		
Lab Sample ID:	JC91330-26	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
		Percent Solids:	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	07/22/19 13:13	MP	SM4500CO2 D-11
Alkalinity, Total as CaCO3 [a]	62.5	5.0	mg/l	1	07/22/19 13:08	CM	SM2320 B-11
Chloride	1570	20	mg/l	10	07/27/19 06:14	NV	EPA 300/SW846 9056A
Iron, Ferric [b]	< 0.30	0.30	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Iron, Ferrous [c]	< 0.20	0.20	mg/l	1	07/20/19 18:00	JOO	SM3500FE B-11
Nitrogen, Ammonia	< 0.20	0.20	mg/l	1	07/23/19 16:21	KI	SM4500NH3 H-11LACHAT
Nitrogen, Nitrate [d]	5.0	0.90	mg/l	1	07/22/19 14:25	KI	EPA353.2/SM4500NO2B
Nitrogen, Nitrate + Nitrite	7.7	0.40	mg/l	4	07/22/19 14:25	KI	EPA 353.2/LACHAT
Nitrogen, Nitrite	2.7	0.50	mg/l	50	07/12/19 23:40	EB	SM4500NO2 B-11
Phosphorus, Total	< 0.050	0.050	mg/l	1	07/17/19 14:40	CM	EPA 365.3
Sulfate	68.6	2.0	mg/l	1	07/26/19 01:04	NV	EPA 300/SW846 9056A
Sulfide	< 2.0	2.0	mg/l	1	07/15/19 15:34	MP	SM4500S2- F-11

(a) Sample was titrated to a final pH of 4.5.
(b) Calculated as: (Iron) - (Iron, Ferrous)
(c) Field analysis required. Received out of hold time and analyzed by request.
(d) Calculated as: (Nitrogen, Nitrate + Nitrite) - (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID: MWR-4S
Lab Sample ID: JC91330-26F
Matrix: AQ - Groundwater Filtered
Date Sampled: 07/12/19
Date Received: 07/12/19
Percent Solids: n/a
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Phosphate, Ortho	< 0.050	0.050	mg/l	1	07/13/19 00:29	EB	EPA 365.3

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MWR-4S-DUP		
Lab Sample ID:	JC91330-27	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	X183154.D	200	07/24/19 13:05	JP	n/a	n/a	VX7841
Run #2	X183149.D	1000	07/24/19 10:31	JP	n/a	n/a	VX7841

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2000	1200	ug/l	
71-43-2	Benzene	ND	100	85	ug/l	
74-97-5	Bromochloromethane	ND	200	96	ug/l	
75-27-4	Bromodichloromethane	ND	200	120	ug/l	
75-25-2	Bromoform	ND	200	130	ug/l	
74-83-9	Bromomethane	ND	400	330	ug/l	
78-93-3	2-Butanone (MEK)	ND	2000	1400	ug/l	
75-15-0	Carbon disulfide	ND	400	190	ug/l	
56-23-5	Carbon tetrachloride	ND	200	110	ug/l	
108-90-7	Chlorobenzene	ND	200	110	ug/l	
75-00-3	Chloroethane	ND	200	150	ug/l	
67-66-3	Chloroform	ND	200	100	ug/l	
74-87-3	Chloromethane	ND	200	150	ug/l	
110-82-7	Cyclohexane	ND	1000	160	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	400	240	ug/l	
124-48-1	Dibromochloromethane	ND	200	110	ug/l	
106-93-4	1,2-Dibromoethane	ND	200	95	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	200	110	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	200	110	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	200	100	ug/l	
75-71-8	Dichlorodifluoromethane	ND	400	270	ug/l	
75-34-3	1,1-Dichloroethane	ND	200	110	ug/l	
107-06-2	1,2-Dichloroethane	ND	200	120	ug/l	
75-35-4	1,1-Dichloroethene	ND	200	120	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	200	100	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	200	110	ug/l	
78-87-5	1,2-Dichloropropane	ND	200	100	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	200	94	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	200	86	ug/l	
123-91-1	1,4-Dioxane	ND	25000	14000	ug/l	
100-41-4	Ethylbenzene	ND	200	120	ug/l	
76-13-1	Freon 113 [b]	ND	1000	390	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MWR-4S-DUP		
Lab Sample ID:	JC91330-27	**Date Sampled:**	07/12/19
Matrix:	AQ - Ground Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	1000	410	ug/l	
98-82-8	Isopropylbenzene	ND	200	130	ug/l	
79-20-9	Methyl Acetate	ND	1000	160	ug/l	
108-87-2	Methylcyclohexane	ND	1000	120	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	200	100	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	1000	370	ug/l	
75-09-2	Methylene chloride	ND	400	200	ug/l	
100-42-5	Styrene	ND	200	140	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	200	130	ug/l	
127-18-4	Tetrachloroethene	ND	200	180	ug/l	
108-88-3	Toluene	ND	200	110	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	200	100	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	200	100	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	200	110	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	200	110	ug/l	
79-01-6	Trichloroethene	82300 [c]	1000	530	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	400	170	ug/l	
75-01-4	Vinyl chloride	ND	200	160	ug/l	
	m,p-Xylene	ND	200	160	ug/l	
95-47-6	o-Xylene	ND	200	120	ug/l	
1330-20-7	Xylene (total)	ND	200	120	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	113%	110%	80-120%
17060-07-0	1,2-Dichloroethane-D4	110%	109%	81-124%
2037-26-5	Toluene-D8	95%	94%	80-120%
460-00-4	4-Bromofluorobenzene	90%	89%	80-120%

(a) Diluted due to high concentration of target compound.
(b) Associated CCV outside of control limits high, sample was ND.
(c) Result is from Run# 2

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FIELD BLANK-2		
Lab Sample ID:	JC91330-28	**Date Sampled:**	07/12/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	X183092.D	1	07/22/19 14:52	RS	n/a	n/a	VX7838
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane [a]	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113 [b]	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FIELD BLANK-2		
Lab Sample ID:	JC91330-28	**Date Sampled:**	07/12/19
Matrix:	AQ - Field Blank Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		80-120%
17060-07-0	1,2-Dichloroethane-D4	100%		81-124%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	92%		80-120%

(a) Associated CCV outside of control limits low.
(b) Associated CCV outside of control limits high, sample was ND.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK-4		
Lab Sample ID:	JC91330-29	**Date Sampled:**	07/12/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	X183093.D	1	07/22/19 15:23	RS	n/a	n/a	VX7838
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	6.0	ug/l	
71-43-2	Benzene	ND	0.50	0.43	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.48	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.58	ug/l	
75-25-2	Bromoform	ND	1.0	0.63	ug/l	
74-83-9	Bromomethane	ND	2.0	1.6	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	6.9	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.95	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.55	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.56	ug/l	
75-00-3	Chloroethane	ND	1.0	0.73	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
74-87-3	Chloromethane	ND	1.0	0.76	ug/l	
110-82-7	Cyclohexane	ND	5.0	0.78	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	1.2	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.56	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.48	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1.0	0.53	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	1.0	0.54	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	1.0	0.51	ug/l	
75-71-8	Dichlorodifluoromethane [a]	ND	2.0	1.4	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.57	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.60	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.59	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.51	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.54	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.51	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.47	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.43	ug/l	
123-91-1	1,4-Dioxane	ND	130	69	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.60	ug/l	
76-13-1	Freon 113 [b]	ND	5.0	1.9	ug/l	

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK-4		
Lab Sample ID:	JC91330-29	**Date Sampled:**	07/12/19
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/12/19
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	5.0	2.0	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.65	ug/l	
79-20-9	Methyl Acetate	ND	5.0	0.80	ug/l	
108-87-2	Methylcyclohexane	ND	5.0	0.60	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.51	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.9	ug/l	
75-09-2	Methylene chloride	ND	2.0	1.0	ug/l	
100-42-5	Styrene	ND	1.0	0.70	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.65	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.90	ug/l	
108-88-3	Toluene	ND	1.0	0.53	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	1.0	0.50	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.54	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.53	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.53	ug/l	
75-69-4	Trichlorofluoromethane [b]	ND	2.0	0.84	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.79	ug/l	
	m,p-Xylene	ND	1.0	0.78	ug/l	
95-47-6	o-Xylene	ND	1.0	0.59	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.59	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	113%		80-120%
17060-07-0	1,2-Dichloroethane-D4	102%		81-124%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

(a) Associated CCV outside of control limits low.
(b) Associated CCV outside of control limits high, sample was ND.

ND = Not detected   MDL = Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Certification Exceptions
- Chain of Custody

Parameter Certification Exceptions

Job Number: JC91330
Account: FLSNYNY Fleming-Lee Shue, Inc.
Project: Former ACCO Brand/Jim Beam, 32-00 Skillman Avenue, Long Island City, NY

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
Alkalinity, Carbonate		**SM4500CO2 D-11**	AQ	SGS is not certified for this parameter.[a]

(a) Lab cert for analyte not supported by NJDEP, OQA. Only methods/analytes required for reporting by the State of NJ can be certified in NJ. Use of this analyte for compliance must be verified through the appropriate regulatory office.

Certification exceptions shown are based on the New Jersey DEP certifications. Applicability in other states may vary. Please contact your laboratory representative if additional information is required for a specific regulatory program.

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Page __ of __

FED-EX Tracking #
Bottle Order Control # TM-07319-171
SGS Quote #
SGS Job # JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue
Street Address: 158 W. 29th St.
City: NY State: NY Zip: 10001
Project Contact: Dan DiRocco E-mail: Daniel@flemingleeshue
Phone #: 212-675-3225
Sampler(s) Name(s): B.Hess / J. Arey Phone #

Project Information

Project Name: Former Allo Brands
Street: 32-00 Skillman Ave.
City: LIC State: NY
Project #: 10195-001
Client Purchase Order #
Project Manager: same as contact

Billing Information (if different from Report to)
Company Name
Street Address
City State Zip
Attention:

Requested Analysis

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	TCL VOCs	Methane, Ethane, Ethene	Chloride, Sulfate, Alkalinity	Ferric Iron (III) + Ferrous Iron (II)	Ferrous Iron (II)	Nitrate/Nitrite	Metals Ca, Mg, Mn, K, Na	ortho phosphate	Total phosphorous	Ammonia	CO2	LAB USE ONLY
1F	MW-7S		7/9/19	10:58	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X	X	A40
2F	MW-7I		7/9/19	14:00	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X	X	C44
3F	MW-11I		7/9/19	14:20	BH	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X	X	G22T1
4	TB-1		7/5/19	—	BH	G	QC	2	2								X											V423
	MW-7I Dup		7/9/19	14:00	JA	G	GW	3	3								X											

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

Turn Around Time (Business Days)

Approved By (SGS PM): / Date:

- ☒ 10 Business Days
- ☐ 5 Business Days
- ☐ 3 Business Days
- ☐ 2 Business Days
- ☐ 1 Business Day
- ☐ Other ______

All data available via Lablink
Approval needed for 1-3 Business Day TAT

Deliverable

- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☐ NJ Reduced (Level 3)
- ☐ Full Tier I (Level 4)
- ☐ Commercial "C"
- ☐ NJ DKQP
- ☐ NYASP Category A
- ☒ NYASP Category B
- ☐ MA MCP Criteria______
- ☐ CT RCP Criteria______
- ☐ State Forms
- ☐ EDD Format ______
- ☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

On-site wells

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1	Date / Time: 7/9/19 15:00	Received By: 1 Chris	Relinquished By: 2 Chris	Date / Time: 7/9/19 / 1740	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent Therm. ID: On Ice ☒ Cooler Temp. °C 3.2 °C CF

INITIAL ASESSMENT 3B (N)
LABEL VERIFICATION (N)

GW
WTB

PN/E/F

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FED-EX Tracking #
Bottle Order Control #
SGS Quote #
SGS Job # JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue Inc.
Street Address: 158 W 29th Street
City: New York State: NY Zip: 10001
Project Contact: D. DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): J. Arey B. Hess Phone #:

Project Information

Project Name: Former ACCO Brands Inc
Street: 3200 Skillman Ave.
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager: D. DiRocco

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analysis

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE		V8260TCL11	VRSK175DGMEE	VRSK175CO2	CHL, SO4, XCAR	XFE3	XNO30	S	CA, K, MG, MN, NA	OPO4, TPO4	AMN		LAB USE ONLY
5F	MW-8I		7/10/19	9:45	BH	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		A16
6F	MW-17			9:50	JA	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		C35
7F	MW-10A			10:54	BH	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		G22T2
8F	MW-17I			11:20	JA	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		V435
9	MW-12			13:28	BH	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

Turn Around Time (Business Days)

☒ 10 Business Days
☐ 5 Business Days
☐ 3 Business Days
☐ 2 Business Days
☐ 1 Business Day
☐ Other ________
All data available via Lablink

Approved By (SGS PM): / Date:
* Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

MW-10A pink due to $KMnO_4$
No ascorbic acid was added in the field.
JC91330

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1 Julie Arey	Date / Time: 7/10/19 1455	Received By: 1 Chris Land	Relinquished By: 2 Chris Land	Date / Time: 7/10/19/1720	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent ☐ Therm. ID: On Ice ☒ Cooler Temp. °C 3.8°C IP

INITIAL ASESSMENT 2 Box
LABEL VERIFICATION AD

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Page __ of __

FED-EX Tracking #
Bottle Order Control #
SGS Quote #
SGS Job # JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue, Inc.
Street Address: 158 W. 29th Street
City: New York State: NY Zip: 10001
Project Contact: D. DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): J. Arey B. Hess Phone #:

Project Information

Project Name: FORMER ACCO Brands Inc
Street: 3200 Skillman Ave.
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analysis: V8260 TCL11

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	V8260 TCL11	LAB USE ONLY
10	MW-7I-Dup		7/9/19	14:00	JA	G	GW		3								X	
11	MWR-7I-unpres	*	7/10/19	13:28	JA	G	GW		3								X	
12	MWR-7I-dup-unpres	*	7/10/19	13:35	JA	G	GW		3								X	
13	Trip-Blank-2		7/10/19	14:20	BH	G	TB		2								X	

*UP7 @ 7/10/19

Turn Around Time (Business Days)

☒ 10 Business Days
☐ 5 Business Days
☐ 3 Business Days
☐ 2 Business Days
☐ 1 Business Day
☐ Other
All data available via Lablink

Approved By (SGS PM): / Date:
Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

MW-7I -dup from yesterday effervesced when sampled
MWR-7I -unpres & MWR-7I-dup-unpres are unpreserved vials
JC91330

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1	Date / Time: 7/3/19 1455	Received By: 1 Chris Laul	Relinquished By: 2 Chris Laul	Date / Time: 7/10/19/1720	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal # ☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent	On Ice ☒ Therm. ID: Cooler Temp. °C 4.1° CCF

INITIAL ASESSMENT 2B JK

LABEL VERIFICATION______

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JC91330: Chain of Custody

Page 3 of 24

SGS

GW
FB
WB

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Page __ of __

E/F

FED-EX Tracking #:
Bottle Order Control #: TM 07319 168
SGS Quote #:
SGS Job #: JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue Inc.
Street Address: 158 W 29th Street
City: New York State: NY Zip: 10001
Project Contact: D. DiRocco E-mail: daniele flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): J. Arey B. Hess Phone #:

Project Information

Project Name: Former ACCO Brands Inc
Street: 32-00 Skillman Ave.
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager: D. DiRocco

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

Matrix Codes

- DW - Drinking Water
- GW - Ground Water
- WW - Water
- SW - Surface Water
- SO - Soil
- SL- Sludge
- SED-Sediment
- OI - Oil
- LIQ - Other Liquid
- AIR - Air
- SOL - Other Solid
- WP - Wipe
- FB - Field Blank
- EB-Equipment Blank
- RB - Rinse Blank
- TB - Trip Blank

Collection / Number of preserved Bottles / Requested Analysis

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE		V8260TCL11	VRSK175D6MEE	VRSK175C02	CHL, SO4, XCAR	XFE3	XNO3O	S	CA, K, MG, MN, NA	TPO4, OPO4	AMN		LAB USE ONLY
14F	MWR-3I		7/11/19	10:05	JA	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		A17
15F	MWR-1I			10:58	BH	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		M10
16F	MWR-4I			13:15	JA	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		G3871
17	MWR-4I-Dup			13:45	JA	G	GW	3	3									X											U452
18F	MWR-2I			13:55	BH	G	GW	20	6	2	2	3	7					X	X	X	X	X	X	X	X	X	X		
19	MWR-2I-Dup			13:55	BH	G	GW	3	3									X											
20	Trip Blank-3		7/5/19	7:00	—	-	TB	2	2									X											
21	Field Blank		7/11/19	14:00	JA	G	FB	2	2									X											

Turn Around Time (Business Days)

- ☒ 10 Business Days
- ☐ 5 Business Days
- ☐ 3 Business Days*
- ☐ 2 Business Days*
- ☐ 1 Business Day*
- ☐ Other ____________

All data available via Lablink

Approved By (SGS PM): / Date:

* Approval needed for 1-3 Business Day TAT

Deliverable

- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☐ NJ Reduced (Level 3)
- ☐ Full Tier I (Level 4)
- ☐ Commercial "C"
- ☐ NJ DKQP
- ☐ NYASP Category A
- ☒ NYASP Category B
- ☐ MA MCP Criteria______
- ☐ CT RCP Criteria______
- ☐ State Forms
- ☐ EDD Format __________
- ☐ DOD-QSM5

Commercial "A" = Results only; **Commercial "B"** = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

JC91330
~~MWR-3I~~ JA

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Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1 Ben Hess	Date / Time: 7/11/19 15:00	Received By: 1 Chris Lau	Relinquished By: 2 Chris Lau	Date / Time: 7/11/19 1755	Received By: 2	
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4	
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent Therm. ID:	On Ice ☒ Cooler Temp. °C 3.8°, 3.4°

INITIAL ASESSMENT SB JB
LABEL VERIFICATION AD

EHSA-QAC-0023-02-FORM-Dayton - Standard COC.xlsx

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www.sgs.com/ehsusa

Page __ of __

FED-EX Tracking #	Bottle Order Control #
SGS Quote #	SGS Job # JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue Inc.
Street Address: 158 W 29th Street
City: New York State: NY Zip: 10001
Project Contact: D. DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): B Hess Phone #:

Project Information

Project Name: Former ACCO Brands
Street: 3200 Skillman Ave.
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager: D. DiRocco

Billing Information (if different from Report to)
Company Name
Street Address
City State Zip
Attention:

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	V8260 TCL 11	LAB USE ONLY
22	MW-12		7/11/19	9:38	BH	G	GW	3	3								X	

Requested Analysis

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

Turn Around Time (Business Days)

Approved By (SGS PM): / Date:

☒ 10 Business Days
☐ 5 Business Days
☐ 3 Business Days*
☐ 2 Business Days*
☐ 1 Business Day*
☐ Other ______
All data available via Lablink
* Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

JC91330

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1 Ben Hess	Date / Time: 7/11/19 15:00	Received By: 1 Chris Laul	Relinquished By: 2 Chris Laul	Date / Time: 7/11/19 1755	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal # ☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent Therm. ID:	On Ice ☒ Cooler Temp. °C 3.8°, 3.4 °C IR

EHSA-QAC-0023-02-FORM-Dayton - Standard COC.xlsx

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WB

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www.sgs.com/ehsusa

Page __ of __

E / F / L

FED-EX Tracking #:
Bottle Order Control #:
SGS Quote #:
SGS Job #: JC91330

Client / Reporting Information

Company Name: Fleming Lee Shue Inc.
Street Address: 158 W 29th Street
City: New York State: NY Zip: 10001
Project Contact: D. DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): J. Arey B. Hess Phone #:

Project Information

Project Name: Former ACCO Brands Inc.
Street: 3200 Skillman Ave.
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager: D. DiRocco

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	V8260TCLII	VRSKI7SDGMEE	VRSKI7SCO2	CHL, SO4, xCAR	xFE3	xNO3O	S	CA, K, MG, MN, NA	OPO4, TPO4	AMN		LAB USE ONLY
23F	MWR-3S		7/12/19	10:00	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		A23
24F	MWR-1S			10:03	BH	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		B12
25F	MWR-2S			12:57	BH	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		G7T1
26F	MWR-4S			13:05	JA	G	GW	20	6	2	2	3	7				X	X	X	X	X	X	X	X	X	X		U465
27	MWR-4S-Dup			13:30	JA	G	GW	3	3								X											
28	Field Blank-2			13:50	JA	–	FB	2	2								X											
29	Trip Blank-4		7/5/19	7:00	–	–	TB	2	2								X											

INITIAL ASESSMENT 2A
LABEL VERIFICATION

Turn Around Time (Business Days)

Approved By (SGS PM): / Date:

☒ 10 Business Days
☐ 5 Business Days
☐ 3 Business Days
☐ 2 Business Days
☐ 1 Business Day
☐ Other
All data available via Lablink
Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Comments / Special Instructions

JC91330
Lab prepared Trip Blank has some head space in vial

http://www.sgs.com/en/terms-and-conditions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1	Date / Time: 7/12/19 14:37	Received By: 1		Relinquished By: 2	Date / Time: 7/12/19 1732	Received By: 2	
Relinquished by: 3	Date / Time:	Received By: 3		Relinquished By: 4	Date / Time:	Received By: 4	
Relinquished by: 5	Date / Time:	Received By: 5		Custody Seal # 12455 12451	☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent ☐	On Ice ☒ Therm. ID: Cooler Temp. °C 2.9°C IR 2.7°C FP

EHSA-QAC-0023-02-FORM-Dayton - Standard COC.xlsx

Job Change Order: JC91330

Requested Date: 7/10/2019
Account Name: Fleming-Lee Shue, Inc.
Project Description: Former ACCO Brand/Jim Beam, 32-00 Skillman Av
C/O Initiated By: TAMMY **PM:** TM

Received Date: 7/9/2019
Due Date: 7/23/2019
Deliverable: NYASPB
TAT (Days): 14

Sample #: JC91330-1
Dept:
TAT: 14
MW-7S

Change:
revise sample ID to MWR-7S

Sample #: JC91330-1F
Dept:
TAT: 14
MW-7S

Change:
revise sample ID to MWR-7S

Sample #: JC91330-2
Dept:
TAT: 14
MW-7I

Change:
revise sample ID to MWR-7I

Sample #: JC91330-2F
Dept:
TAT: 14
MW-7I

Change:
revise sample ID to MWR-7I

Above Changes Per: Daniel DiRocco **Date/Time:** 7/10/2019 4:57:57 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Job Change Order: JC91330

Requested Date:	7/10/2019		**Received Date:**	7/9/2019
Account Name:	Fleming-Lee Shue, Inc.		**Due Date:**	7/23/2019
Project Description:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av		**Deliverable:**	NYASPB
C/O Initiated By:	TAMMY	**PM:** TM	**TAT (Days):**	14

Above Changes Per: Daniel DiRocco **Date/Time:** 7/10/2019 4:57:57 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Job Change Order: JC91330

Requested Date: 7/12/2019
Account Name: Fleming-Lee Shue, Inc.
Project Description: Former ACCO Brand/Jim Beam, 32-00 Skillman Av
C/O Initiated By: TAMMY **PM:** TM

Received Date: 7/9/2019
Due Date: 7/23/2019
Deliverable: NYASPB
TAT (Days): 14

Sample #: JC91330-10
Dept:
TAT: 14

MW-7I-DUP

Change:
revise sample ID to MWR-7I-DUP

Sample #: JC91330-11
Dept:
TAT: 14

MW-7I-UNPRES

Change:
revise sample ID to MWR-7I-UNPRES

Sample #: JC91330-12
Dept:
TAT: 14

MW-7I-DUP-UNPRES

Change:
revise sample ID to MWR-7I-DUP-UNPRES

Above Changes Per: Daniel DiRocco
Date/Time: 7/12/2019 5:42:32 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Page 1 of 1

Job Change Order: JC91330

Requested Date:	7/15/2019	**Received Date:**	7/9/2019
Account Name:	Fleming-Lee Shue, Inc.	**Due Date:**	7/23/2019
Project Description:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av	**Deliverable:**	NYASPB
C/O Initiated By:	TAMMY **PM:** TM	**TAT (Days):**	14

==

Sample #: JC91330-1, 2, 3, 5 to 8, 14 to 16, 18, 23 to 26

Change:

Add CAR, then package CAR & ALK as XCAR

Dept:

TAT: 14

==

Above Changes Per: Daniel DiRocco

Date/Time: 7/15/2019 9:49:15 AM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Page 1 of 1

SGS Sample Receipt Summary

Job Number: JC91330 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORMER ACCO BRAND/JIM BEAM, 32-00 SKILL

Date / Time Received: 7/10/2019 5:20:00 PM **Delivery Method:** Accutest Courier **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 2: (3.8); Cooler 3: (4.1);

Cooler Temps (Corrected) °C: Cooler 2: (3.5); Cooler 3: (3.8);

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	IR Gun	
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	2	

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☑	☐	☐
2. Trip Blank listed on COC:	☑	☐	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (Specify)

Comments 7/10/2019 receipt:

1) -9 All analyses marked off on COC but only rec'd 3 HCL VOC vials.
2) -10 Missing "MW-7I-Dup" from samples rec'd on 7/9/19 has been rec'd. Additionally, sample previously effervesced when it came in contact with the HCL. Please handle carefully as sample may effervesce.

SM089-03
Rev. Date 12/7/17

Responded to by: Tammy Esposito McCloskey Response Date: 7/11/2019

Response:

7/10/2019 receipt:

1) JC91330-9 Field ID MW-12 should only be run for V8260TCL11
2) JC91330-10 MW-7I-DUP please add comment to handle sample with care due to sample effervescing when added to HCL preserved bottleware.

3

SGS Sample Receipt Summary

Job Number: JC91330 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORMER ACCO BRAND/JIM BEAM, 32-00 SKILL

Date / Time Received: 7/9/2019 5:40:00 PM **Delivery Method:** Accutest Courier **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 1: (3.2);

Cooler Temps (Corrected) °C: Cooler 1: (2.9);

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐

2. Cooler temp verification: IR Gun
3. Cooler media: Ice (Bag)
4. No. Coolers: 1

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☑	☐	☐
2. Trip Blank listed on COC:	☑	☐	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☐	☑

3. Condition of sample: Intact

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (Specify)

Comments
1) Did not receive sample "MW-7I DUP"
2) -2 Client noted that sample MWR-7I effervesced when it came in contact with the HCL. Please handle carefully as sample may effervesce.
3) -3 Rec'd 3 bottles that are bi-phasic: the H2SO4 and unpreserved bottles for XNO3O and the OPO4 bottle. There is sufficient volume in other bottles to run all Gen Chem parameters. Volume for OPO4 has been aliquoted. Due to short hold times, the 3 bottles that are bi-phasic will not be logged in and placed on Hold. Please handle with caution due to possible reaction.

SM089-03
Rev. Date 12/7/17

Responded to by: Tammy Esposito McCloskey Response Date: 7/10/2019

Response:

1) Disregard MW-7I DUP that is on chain. This will be submitted at a later date.
2) -2 Please add comment to sample as noted.
3) -3 Please do a phase separation. Analyze water phase for all tests noted. Oil phase can be discard

SGS Sample Receipt Summary

Job Number: JC91330 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORMER ACCO BRAND/JIM BEAM, 32-00 SKILL

Date / Time Received: 7/11/2019 5:55:00 PM **Delivery Method:** **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 4: (3.8); Cooler 5: (3.4);

Cooler Temps (Corrected) °C: Cooler 4: (3.5); Cooler 5: (3.1);

Cooler Security	**Y**	**N**		**Y**	**N**
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	**Y**	**N**
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	IR Gun	
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	2	

Quality Control Preservation	**Y**	**N**	**N/A**
1. Trip Blank present / cooler:	☑	☐	☐
2. Trip Blank listed on COC:	☑	☐	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentation	**Y**	**N**
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	**Y**	**N**
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	**Y**	**N**	**N/A**
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (Specify)

Comments

SM089-03
Rev. Date 12/7/17

SGS Sample Receipt Summary

Job Number: JC91330 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORMER ACCO BRAND/JIM BEAM, 32-00 SKILL

Date / Time Received: 7/12/2019 5:32:00 PM **Delivery Method:** Accutest Courier **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 6: (2.9); Cooler 7: (2.7);

Cooler Temps (Corrected) °C: Cooler 6: (2.9); Cooler 7: (2.7);

Cooler Security	**Y**	**N**		**Y**	**N**
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	**Y**	**N**
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:		
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	2	

Quality Control Preservation	**Y**	**N**	**N/A**
1. Trip Blank present / cooler:	☑	☐	☐
2. Trip Blank listed on COC:	☑	☐	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentation	**Y**	**N**
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	**Y**	**N**
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	**Y**	**N**	**N/A**
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (Specify)

Comments -29 Client noted that TB vials had headspace. The bubbles were measured and was not greater than 6mm. Bubbles are Microbubbles.

SM089-03
Rev. Date 12/7/17

Responded to by: CSR: N/A

Response Date: Response Date: 7/12/2019

Response:

Response: Proceed with analysis

JC91330: Chain of Custody
Page 17 of 24

Job Change Order: JC91330

Requested Date:	7/25/2019	**Received Date:**	7/9/2019
Account Name:	Fleming-Lee Shue, Inc.	**Due Date:**	7/23/2019
Project Description:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av	**Deliverable:**	NYASPB
C/O Initiated By:	TAMMY **PM:** TM	**TAT (Days):**	14

==

Sample #:	JC91330-22	**Change:** revise sample ID to MW-12I
Dept:		
TAT:	14	

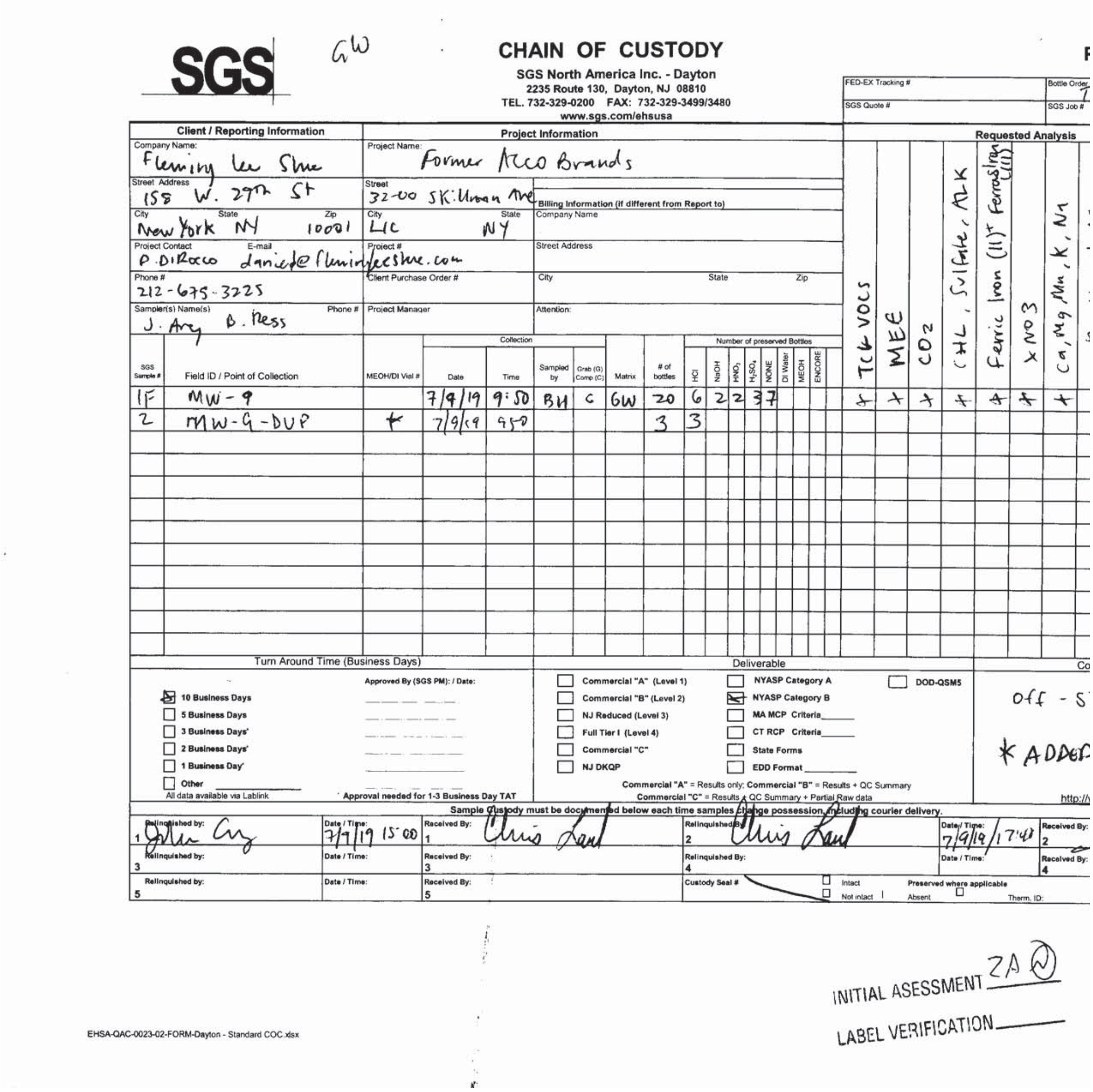
MW-12

==

Above Changes Per: Daniel DiRocco

Date/Time: 7/25/2019 10:31:17 AM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.



SGS GW

CHAIN OF CUSTODY

SGS North America Inc. - Dayton
2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.sgs.com/ehsusa

FED-EX Tracking #
SGS Quote #
Bottle Order 1
SGS Job #

Client / Reporting Information

Company Name: Fleming Lee Shue
Street Address: 158 W. 29th St
City: New York State: NY Zip: 10001
Project Contact: P. DiRocco E-mail: daniel@flemingleeshue.com
Phone #: 212-675-3225
Sampler(s) Name(s): J. Ary B. Ress Phone #:

Project Information

Project Name: Former Acco Brands
Street: 32-00 Skillman Ave
City: LIC State: NY
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Grab (G) Comp (C)	Matrix	# of bottles	HCl	NaOH	HNO_3	H_2SO_4	NONE	DI Water	MEOH	ENCORE	TCL VOCs	MEE	CO2	CHL, Sulfate, ALK	Ferric Iron (II)+ Ferrous Iron (III)	X NO3	Ca, Mg, Mn, K, Na
1F	MW-9		7/9/19	9:50	BH	C	GW	20	6	2	2	3	7				+	+	+	+	+	+	+
2	MW-9-DUP	+	7/9/19	950				3	3														

Turn Around Time (Business Days)

☒ 10 Business Days
☐ 5 Business Days
☐ 3 Business Days*
☐ 2 Business Days*
☐ 1 Business Day*
☐ Other
All data available via Lablink

Approved By (SGS PM): / Date:
* Approval needed for 1-3 Business Day TAT

Deliverable

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ NJ Reduced (Level 3)
☐ Full Tier I (Level 4)
☐ Commercial "C"
☐ NJ DKQP
☐ NYASP Category A
☒ NYASP Category B
☐ MA MCP Criteria______
☐ CT RCP Criteria______
☐ State Forms
☐ EDD Format ________
☐ DOD-QSM5

Commercial "A" = Results only; Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC Summary + Partial Raw data

Co

Off - S

* ADDE

http://

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by: 1 John Ary	Date / Time: 7/9/19 15:00	Received By: 1 Chris Land	Relinquished By: 2 Chris Land	Date / Time: 7/9/19 / 17:40	Received By: 2
Relinquished by: 3	Date / Time:	Received By: 3	Relinquished By: 4	Date / Time:	Received By: 4
Relinquished by: 5	Date / Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ Absent Therm. ID:

INITIAL ASESSMENT ZA
LABEL VERIFICATION ________

EHSA-QAC-0023-02-FORM-Dayton - Standard COC.xlsx

JC91330: Chain of Custody
Page 19 of 24

SGS Sample Receipt Summary

Job Number: JC91333 **Client:** FLEMING-LEE SHUE, INC. **Project:** FORM

Date / Time Received: 7/9/2019 5:40:00 PM **Delivery Method:** Accutest Courier **Airbill #'s:**

Cooler Temps (Raw Measured) °C: Cooler 1: (3.9);

Cooler Temps (Corrected) °C: Cooler 1: (3.6);

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐

2. Cooler temp verification: IR Gun
3. Cooler media: Ice (Bag)
4. No. Coolers: 1

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☐	☑	☐
2. Trip Blank listed on COC:	☐	☑	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☑	☐	☐

Sample Integrity - Documentati

1. Sample labels present on bottles:
2. Container labeling complete:
3. Sample container label / COC agr

Sample Integrity - Condition

1. Sample recvd within HT:
2. All containers accounted for:
3. Condition of sample:

Sample Integrity - Instructions

1. Analysis requested is clear:
2. Bottles received for unspecified t
3. Sufficient volume recvd for analy
4. Compositing instructions clear:
5. Filtering instructions clear:

Test Strip Lot #s: pH 1-12: 229517 pH 12+: 208717 Other: (S

Comments -2 Also rec'd sample MW-9-Dup not on COC/added. Rec'd 3 HCL preserved VOC vials collected 7/9/19 at 09:50.

SM089-02 Rev. Date 12/1/16

JC91330: Chain of Custody
Page 21 of 24

Job Change Order: JC91333

d Date:	7/15/2019			**Received Date:**	7/9/2019
lame:	Fleming-Lee Shue, Inc.			**Due Date:**	7/23/2019
escription:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av			**Deliverable:**	NYASPB
nitiated By:	TAMMY	**PM:**	TM	**TAT (Days):**	14

==

#:	JC91333-1	**Change:** Add CAR, then package CAR & ALK as XCAR
	14	

==

Job Change Order: JC91333

d Date:	7/25/2019	**Received Date:**	7/9/2019
lame:	Fleming-Lee Shue, Inc.	**Due Date:**	7/23/2019
escription:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av	**Deliverable:**	NYASPB
nitiated By:	TAMMY **PM:** TM	**TAT (Days):**	1

#:	JC91333-all	**Change:** move to JC91330
	1	

Job Change Order: JC91333

d Date:	7/25/2019	**Received Date:**	7/9/2019
ame:	Fleming-Lee Shue, Inc.	**Due Date:**	7/23/2019
scription:	Former ACCO Brand/Jim Beam, 32-00 Skillman Av	**Deliverable:**	NYASPB
itiated By:	TAMMY **PM:** TM	**TAT (Days):**	1

==

#:	JC91333-all	**Change:** move to JC91330
	1	

==