Preliminary Phase II Environmental Site Assessment Report

Former Hillcrest Golf Course
St. Paul, Minnesota

Prepared for

Saint Paul Port Authority

Project B1903316
August 16, 2019

Braun Intertec Corporation

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August 16, 2019 Project B1903316

Mr. Monte Hilleman
Saint Paul Port Authority
380 St. Peter Street
St. Paul, MN 55102

Re: Preliminary Phase II Environmental Site Assessment
Former Hillcrest Golf Course
St. Paul, Minnesota (the Site)

Dear Mr. Hilleman:

On behalf of Saint Paul Port Authority, Braun Intertec Corporation conducted a Preliminary Phase II Environmental Site Assessment (ESA) of the above-referenced site (Site) in accordance with the authorized scope of services described in our proposal dated April 3, 2019. The Preliminary Phase II ESA was prepared for purposes of environmental due diligence for potential property acquisition and assist with redevelopment planning and related concept level cost estimating. For a complete discussion of our assessment, please refer to the attached Preliminary Phase II ESA report.

This Preliminary Phase II ESA was prepared on behalf of and for use by Saint Paul Port Authority. No other party has a right to rely on the contents of this Preliminary Phase II ESA without the written authorization of Braun Intertec.

We appreciate the opportunity to provide professional services to you for this project. If you have any questions or comments regarding this report or the project in general, please contact Mark Keefer at 952.995.2493 or Ken Larsen at 952-995-2455.

Sincerely,

BRAUN INTERTEC CORPORATION

Mark D. Keefer, PG
Associate Principal - Senior Geologist

Kenneth A. Larsen, PE, PG
Principal - Principal Engineer

Attachment:
Preliminary Phase II ESA Report

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A. Introduction

A.1. Authorization

Braun Intertec Corporation received authorization from Mr. Monte Hilleman of Saint Paul Port Authority (SPPA) to conduct a Preliminary Phase II Environmental Site Assessment (ESA) of the Former Hillcrest Golf Course located in Saint Paul, Minnesota (Site), in accordance with the scope of services described in Braun Intertec's proposal dated April 3, 2019. The Preliminary Phase II ESA was prepared in association with the proposed acquisition and redevelopment of the Site.

This Preliminary Phase II ESA was prepared on behalf of and for use by Saint Paul Port Authority in accordance with the contract between Saint Paul Port Authority and Braun Intertec. No other party has a right to rely on the contents of this Preliminary Phase II Environmental ESA without the written authorization of Braun Intertec.

The Preliminary Phase II ESA was conducted concurrently with a Preliminary Geotechnical Evaluation and Phase I Environmental Site assessment (ESA) of the Site, the results of which are provided under separate cover. The results of the Preliminary Geotechnical Evaluation should be reviewed in conjunction with this report to understand both the geotechnical aspects and environmental aspects of the site and how they may impact one another.

A.2. Project Objectives

The following summarizes the objectives of the Preliminary Phase II ESA:

- Evaluate whether the soil, soil vapor and/or groundwater beneath the Site has been impacted due to the recognized environmental conditions identified in the *Phase I Environmental Site Assessment, Former Hillcrest Golf Course, McKnight Road and Larpenteur Avenue East, St. Paul, Minnesota*, prepared by Braun Intertec and dated June 10, 2019 (2019 Phase I ESA).
- Provide preliminary environmental data to assist in the redevelopment planning and related concept level cost estimating.

B. Site Background

B.1. Site Location, Description and History

The Site is located at 2200 Larpenteur Ave E (see Figure 1).

Braun Intertec conducted a Phase I Environmental Site Assessment of the Site in 2019 the results of which are presented in the report entitled: *Phase I Environmental Site Assessment, Former Hillcrest Golf Course, McKnight Road and Larpenteur Avenue East, St. Paul, Minnesota*, dated June 10, 2019 (2019 Phase I ESA).

The following information for the Site was presented in the 2019 Phase I ESA report:

Address:	McKnight Road North and Larpenteur Avenue East
City:	St. Paul
County:	Ramsey
State:	Minnesota
Property Identification Numbers:	232922410002; 232922410001; 232922120006; 232922140002; 232922120004; 232922120003
Construction Year:	2000
Owner:	Hillcrest Investments LLC
Approximate Center Latitude:	44.987° North
Approximate Center Longitude:	93.008° West
Section, Township, Range Location:	E 1/2 of the E 1/2 of Sec 23, T 29 N, R 22 W
Approximate Size:	112.39 acres

At the time of this Phase II ESA, the Site consisted of a vacant 18-hole golf course that included club facilities, a driving range, practice putting greens, and support buildings. A vacant clubhouse with associated paved parking lot, swimming pool, vacant pool building, vacant golf cart sheds, and a vacant garage were located in the northwest corner of the Site. The fairways extend to the south of the clubhouse. A vacant maintenance area was located in the southeastern area of the Site that included a maintenance shop building, maintenance storage building, and agricultural chemical storage and mixing buildings (Ag chemical buildings). Earthen berms were located along the southeastern Site boundary next to and south of the maintenance area. Two unsealed water wells and two small remaining petroleum above ground storage tanks (ASTs) were also identified at the Site.

Information reviewed for the 2019 Phase I ESA indicated that the Site was used for cultivated agricultural land or grazing land prior to the 1920s. The Site was developed and used as a golf course from the early 1920s until it was closed in 2017. The Site has been vacant since 2017.

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The surrounding area was originally developed for cultivated agricultural land, grazing land, and residential use. By the early 1980s a small retail strip mall was developed on adjoining property to the north and another small retail strip mall was developed on adjoining property to the northeast by the early 1990s. The retail development on the adjoining property to the northeast included a gasoline filling station, which has operated since approximately 1990. Government records reviewed during the 2019 Phase I ESA identified no releases for the adjoining filling station.

B.2. Proposed Development

The SPPA has acquired the approximate 112-acre property and is considering the property for a mixed use redevelopment. It is anticipated that the SPPA will conduct activities to facilitate redevelopment including demolishing existing site structures, implementing site grading to an agreed upon future development plan, and constructing roadways, public utilities and related storm water infrastructure to support the planned development. Preliminary development schematics showing possible development configurations and future uses are included in Appendix A.

B.3. Previous Site Investigations

The 2019 Phase I ESA identified the following recognized environmental conditions (RECs) at the Site:

- Petroleum products, including heating oil, gasoline, and diesel, were stored in aboveground and underground tanks as well as lubricant, hydraulic, and various other oils that were stored in containers ranging in size from one pint to 55-gallons. Government database records and previous investigation reports indicate the likely presence of remaining contamination from past petroleum tank leaks. There is a potential to encounter identified and unidentified petroleum contamination at the Site during redevelopment.
- The use of the Site included storage, mixing, and application of various agricultural chemicals on the Site. Small quantities of chemicals were still stored on the Site at the time of reconnaissance for this assessment. There is a potential for agricultural chemical impacts to the soil and groundwater at the Site from spills during mixing, transport, or storage, which is considered a recognized environmental condition.
- The agricultural chemicals used and stored on the Site historically included mercury-based fungicide products. Repeated historical application of the fungicide results in an accumulation of mercury in the soils overtime. The resulting accumulation of mercury in the soils is considered a recognized environmental condition.

- The materials observed protruding from earthen berms next to and south of the maintenance area appeared to indicate a potential for the presence of buried trash, pavements, landscaping spoils, construction and demolition debris in the berms. Based on observations, there is a potential for encountering contaminated soils and buried regulated waste in the berms, which is considered a recognized environmental condition.

A regulatory file review was conducted for the 2019 Phase I ESA. In summary, three petroleum tank leak files were identified for the Site (Leak ID# 5050; Leak ID# 6222; and Leak ID# 18327). The following summarizes the MPCA file information for the three leak sites.

Leak ID# 5050
The file information obtained consisted of an MPCA Closure Confirmation Letter dated May 17, 2011. The letter states that the petroleum storage tank release was reported March 24, 1992 and assigned a closed status on June 1, 1992. The letter stated that it should be assumed that petroleum contamination is present during the planning stage of any future development.

Leak ID# 6222
The file information obtained included the following:

- MPCA Closure Confirmation Letter dated May 17, 2011.
- Remedial Investigation (RI) Report, Leak ID# 6222, Hillcrest Country Club, prepared by Applied Engineering, Inc., dated February 16, 1994.

The Closure Confirmation Letter states that the petroleum storage tank release was reported April 22, 1993 and assigned a closed status on September 26, 1994. The letter stated that it should be assumed that petroleum contamination is present during the planning stage of any future development.

The RI report indicates that soil was excavated from two tank locations (Tank 1 and Tank 2), both in the vicinity of the maintenance building. The RI report indicates that 193 tons of soil were thermally treated and disposed of off-site. The RI report indicates that contaminated soils exhibiting photoionization detector (PID) readings of 0 to 200 parts per million (ppm) remained in the ground.

Leak ID# 18327
The file information included the following:

- Remedial Investigation (RI) Report, Leak ID# 18327, Hillcrest Country Club, prepared by Landmark Environmental, LLC; dated January 8, 2011 (2011 RI).

- Phase I Environmental Site Assessment, 2200 East Larpenteuer Avenue and 1475 McKnight Road, St. Paul, Minnesota, prepared by Landmark Environmental, LLC; dated February 9, 2011 (2011 Phase I).
- Phase II Environmental Investigation Report, Hillcrest Golf Course, St. Paul, Minnesota, prepared by Landmark Environmental, LLC; dated February 9, 2011 (2011 Phase II).
- MPCA Closure Letter dated June 15, 2011.

Relevant environmental information included in the above referenced reports/documents are further described in the paragraphs below.

2011 RI

The 2011 RI indicates that eighteen borings were completed on January 5 and 7, 2011 to collect samples of soil, soil vapors, and groundwater in the vicinity of a diesel AST. The samples were analyzed for various volatile organic compounds (VOCs) and other petroleum related compounds and fuel additives. Petroleum compounds were detected in soil and groundwater in samples collected during the 2011 RI. The 2011 RI report concluded that petroleum contaminated soils were encountered but it could not be ascertained with certainty if the petroleum contamination was associated with Leak ID # 5050, Leak ID # 6222, or Leak ID # 18327.

2011 Phase I

The 2011 Phase I was completed of the entire Hillcrest Golf Course. The significant findings of the 2011 Phase I included the use and storage of petroleum products on the Site; the previously identified petroleum tank releases; and the potential for unidentified past releases of agricultural chemicals.

2011 Phase II

The 2011 Phase I was completed to further evaluate for non-petroleum releases to the Site. The 2011 Phase II ESA indicates that polycyclic aromatic hydrocarbons (PAHs) and mercury contaminants were identified in soil and cis 1, 2-dichloroethylene was identified in groundwater. Select information from the 2011 Phase II is included in Appendix B.

MPCA Closure Letter Leak ID# 18327

Based on the available file information, it appears that Leak ID# 18327 was a release opened by the MPCA in response to data submitted from Landmark's previous Phase II ESA indicating petroleum in the general area of the former release areas. The MPCA appears to have closed this release after reviewing the Landmark Phase II report and upon review of the UST removal documentation soil samples collected after the last remaining UST at the Site was removed.

The closure letter stated that the MPCA staff concluded that any remaining contamination, if present, does not appear to pose a threat to public health or the environment. The letter adds that it should be assumed that petroleum contamination is present during the planning stage of any future development.

B.4. Published Geologic Information

B.4.a. Topography

According to the United States Geological Survey (USGS) 7.5-minute topographic map series, St. Paul East, Minnesota quadrangle, the Site is located at an elevation of approximately 1,000 – 1,060 feet above mean sea level and the terrain is rolling.

B.4.b. Geology

According to published geologic information, the unconsolidated sediment in the Site vicinity are Pleistocene age till deposits that consist of sandy loam, clay loam, and silty clay loam. The till deposit is generally reddish brown in color and is locally compact.

According to published geologic information, the depth to bedrock in the Site vicinity is 100 to 150 feet below land surface. The uppermost bedrock units in the Site vicinity include the Middle Ordovician, Decorah Shale on the western portions of the Site, the Platteville and Glenwood Formations on most of the central and northern portions of the Site, and the St. Peter Sandstone on the southern portions of the Site. The Decorah Shale is described as a green, calcareous shale with thin limestone interbeds. The Platteville Formation is described as fine-grained dolostone and limestone underlain by thin, green, sandy shale (3-5.5 feet thick) of the Glenwood Formation. The upper portions of the St. Peter Sandstone is described as fine- to medium-grained, quartz sandstone which is generally massive to thick-bedded while the lower portion of the unit contains multicolored beds of mudstone, siltstone and shale, with interbeds of very coarse sandstone.

B.4.c. Hydrogeology

According to published geologic information, the reported depth to groundwater in the Site vicinity is 100 to 200 feet below land surface. Perched groundwater may occur at shallower depths above clay layers. The regional groundwater flow direction in the Site vicinity is generally west. However, the local direction of groundwater flow may be affected by nearby streams, lakes, wells, and/or wetlands and may vary seasonally.

C. Investigation Description

C.1. Investigation Areas

Braun Intertec targeted the following areas at the Site as part of this Preliminary Phase II ESA:

- Select greens, tee boxes, fairways at the Site for potential impacts related to the historical use of pesticides, herbicides, and fungicides common to former golf courses.
- Agricultural chemical, storage, mixing and wash out areas.
- Maintenance, fueling, and former above and below ground tank areas.

The investigation locations were selected to address the RECs identified during the concurrent 2019 Phase I ESA, to obtain good spatial coverage of the Site, and to provide data to assist with redevelopment planning and related concept level cost estimating.

C.2. Scope of Services

The following tasks were conducted at the Site as part of this Preliminary Phase II ESA:

- Coordinated with Braun Intertec's geotechnical drilling crew to clear public utilities through Gopher State One Call and private utilities for the investigation locations.
- Coordinated with Braun Intertec's geotechnical drilling crew to complete soil borings, install temporary groundwater monitoring wells, and complete soil vapor probes.
- Advanced 12 geotechnical soil borings (ST-1 through ST-12) and collected soil samples.
- Advanced 9 environmental soil borings (GP-1 through GP-9).
- Installed four temporary monitoring wells in four of the soil borings (ST-3, ST-8, ST-12, and GP-8) to facilitate collection of samples for laboratory analysis.
- Completed two temporary soil vapor probes (SV-1 and SV-2) and collected soil vapor samples.
- Collected 25 surficial soil samples(less than 2 feet below ground surface) in select greens, tees boxes, fringes and fairways to evaluated patterns in fungicide impacts at the Site.
- Collected one soil sample from the debris bearing maintenance berm.

- Collected one sub-slab soil vapor sample (SSV-1). The soil gas analytical results were used to provide data to determine if subsurface vapor impacts exist at levels warranting consideration for future redevelopment
- Conducted environmental monitoring during drilling and screened soil samples collected from the borings for the presence of organic vapors using a photoionization detector (PID). Visual and olfactory observations regarding potential contamination were also made and recorded.
- Analyzed representative samples of soil and groundwater for one or more of the following parameters: VOCs, PAHs, diesel range organics (DRO), gasoline range organics (GRO), organochlorine pesticides, Resource Conservation and Recovery Act (RCRA) metals, and toxicity characteristic leaching procedure (TCLP) mercury.
- Analyzed soil vapor samples for VOCs.
- Evaluated the data and prepared this Preliminary Phase II ESA report.

C.3. Deviations from Proposal

The groundwater samples collected from the temporary well installed in Boring location ST-8 was planned for analysis of VOCs, DRO, dissolved metals and PAHs. The temporary well set in ST-8 did not produce sufficient water for all of the originally planned analyses (even when allow to sit for several hours), therefore ST-8 was only analyzed for VOCs and DRO.

D. Investigation Methods and Procedures

The field work relating to the investigation was conducted between April 12 and May 10, 2019. Prior to beginning the field investigation, public utilities were cleared through Gopher State One Call and private utilities were cleared through a subcontracted private utility locator.

Field methods and results are discussed in the following sections. Previous investigation data are provided in Appendix B, soil boring logs are provided in Appendix C, laboratory analytical reports are provided in Appendix D, and Braun Intertec Standard Operating Procedures (SOPs) are provided in Appendix E.

Twelve geotechnical soil borings (ST-1 through ST-12), nine environmental soil borings (GP-1 through GP-9), four temporary groundwater monitoring wells (ST-3, ST-8, ST-12, and GP-8), two soil vapor probes (SV-1 and SV-2), and one sub-slab vapor point (SSV-1) were advanced at the Site. In addition, one soil sample was collected from the maintenance berm and 25 surficial soil samples were collected throughout the golf course.

The following was performed as part of this investigation:

- Conducted environmental screening of the soils from the 12 geotechnical borings completed using a photoionization detector (PID) equipped with a 10.6 eV lamp, and made visual/olfactory observations of the soil samples for other evidence of contamination (i.e., odors, staining, intermixed debris, etc.). Collected representative soil samples from select geotechnical borings for laboratory analysis for VOCs, PAHs, DRO, GRO, RCRA metals. In addition, two samples were submitted for additional analysis organochloride pesticides (i.e., these samples were near surface samples targeted for the former maintenance shed area where herbicides and pesticides may have been stored, mixed and loaded into equipment).
- Advanced nine environmental push probe soil borings to a depth of 5 to 15 feet below ground surface (bgs) at the Site. Collected depth stratified soil samples (approximate 6-inch intervals) at each selected green, tee box, and fairway location.
- Collected surface and near surface soil samples at various locations using hand tools. For the greens and tee boxes, the 0 to 6-inch samples were collected as a 4-part composite sample using hand equipment and the deeper depth stratified samples were collected as discreet samples.
- Submitted the 0 to 6-inch and 1 to 1.5 foot depth samples representing the greens, tee boxes and fairways (25 samples total) for analysis of total mercury. In addition, one shallow soil sample representing a green (one sample), a tee box (one sample), and a fairway (one sample) were analyzed for full RCRA metals and organochlorine pesticides.
- Advanced two push probe borings at selected locations across the Site to a depth of 8 feet to collect soil gas samples for VOCs by EPA Method TO-15.
- One sub-slab vapor sampling point was installed in slab of one of the Site buildings to collect a soil gas sample for VOCs by EPA Method TO-15. The soil gas analytical results were used to provide data to determine if subsurface vapor impacts exist at levels warranting consideration for future redevelopment.

Investigation locations are shown on Figures 4A through 4E and investigation locations, rationale for selection, and analytical testing parameters are summarized in Table 1.

The locations and ground surface elevations of soil borings, temporary monitoring wells, soil vapor probes, and surficial samples completed were determined using GPS technology. Investigation location completed inside of the building were approximated by measuring from the building walls.

D.1. Soil Evaluation

D.1.a. Soil borings

Braun Intertec advanced 21 soil borings at the Site to depths ranging from 5 to 21 feet bgs.

The environmental soil borings (GP-1 to GP-9) were completed with a hydraulically-driven push-probe sampling rig. To collect the soil samples from the borings, a disposable thin-walled PVC liner was placed inside of a 5-foot long sampling tool. The borehole was then advanced using a dual-tube system, which allows for the inner sampling tool to be pushed through a larger outer-diameter rod a total penetration depth of up to 5 feet. After advancing the tooling, the sampler was removed from the borehole, but the outer rod remained, keeping the borehole open, and the soil sample was retrieved from the PVC liner for field screening and classification. The process was then repeated to the termination depths of the borings.

The geotechnical soil borings were advanced using a hollow-stem auger rig. Soil borings were performed with a core-and-auger drill equipped with 3 1/4-inch inside-diameter hollow-stem auger. Soil sampling for the borings was conducted in general accordance with American Society for Testing and Materials (ASTM) D 1586, “Penetration Test and Split-Barrel Sampling of Soils.” The boreholes were advanced with the hollow-stem auger to the desired test depths. A 140-pound hammer falling 30 inches was then used to drive the standard 2-inch split-barrel sampler a total penetration of 1 1/2 feet below the tip of the hollow-stem auger. After advancing the tooling, the split-barrel sampler was removed from the borehole and the soil sample was retrieved for field screening and classification. The process was then repeated to the termination depths of the borings.

Prior to arrival onsite, the drill rigs and sampling equipment were cleaned with a high pressure, hot water sprayer. Between sampling locations, non-dedicated sampling equipment was cleaned with a soap and water scrub followed by a clean water rinse.

This investigation includes soil borings advanced to depths of 15 feet or deeper. The MDH considers any soil boring advanced to this depth an environmental well. Upon completion, soil borings were sealed in accordance with MDH regulations. Following temporary well use, the well materials were removed, and the boreholes were sealed in accordance with MDH regulations.

D.1.b. Surficial Soil Sampling

Twenty-five (25) surficial soil samples were collected throughout the golf course. The surficial samples were collected using stainless steel hand shovels.

The shovels were decontaminated before use, and in-between each sampling depth, using a scrub brush to remove the soil particles, the sampler was then scrubbed in a mixture of alconox and water followed by a clean water rinse.

D.1.c. Soil Classification and Monitoring

Soils samples from the soil borings were visually and manually classified in the field by an environmental technician using ASTM D 2487 "Unified Soils Classification System" and ASTM D 2488 "Recommended Practice for Visual and Manual Description of Soils." Additionally, soils were classified at the Braun Intertec soils laboratory by a geotechnical engineer using ASTM D 2487 and ASTM D 2488.

Soil samples retrieved were examined by an environmental technician, who was a certified asbestos inspector by Minnesota Department of Health (MDH), for unusual staining, odors, and other apparent signs of contamination. In addition, the soil samples were screened for the presence of organic vapors using a PID. The PID was equipped with a 10.6 electron-volt lamp and calibrated to an isobutylene standard. The PID was used to perform direct measurement and a headspace method of field analyses, as recommended by the MPCA in Petroleum Remediation Program Guidance Document 4-04 (September 2008).

D.1.d. Soil Analyses

Selected soil samples were collected from the select soil borings and surficial soil for laboratory analysis. Soil samples were generally collected from depths most likely to be encountered during proposed redevelopment activities. Soil samples were also collected from intervals where indications of contamination were observed in the field. If no indications of contamination were observed, the soil samples were collected from the depth most likely to be impacted based on the potential contaminant source (i.e. surface application of fungicide, bottom of tank basin etc.). Investigation locations, rationale for selection, and analytical testing parameters are summarized in Table 1.

Samples were submitted to Pace Analytical Laboratory (Pace) of Minneapolis, Minnesota and analyzed for a combination of the following parameters:

- VOCs using United States Environmental Protection Agency (EPA) Method 8260
- PAHs using EPA Method 8270

- PCBs using EPA Method 8082
- DRO using the Wisconsin Department of Natural Resources Method (WDNR)
- GRO using the WDNR method
- Organochlorine pesticides using Method 8081B
- Eight RCRA metals using EPA Methods 6010 and 7471
- TCLP mercury

D.2. Groundwater Evaluation

Temporary monitoring wells (designated as ST-3, ST-8, ST-12, and GP-8) were installed in four of the soil borings to evaluate groundwater conditions at the Site. The wells were permitted with the MDH. The temporary monitoring well locations are shown on Figures 4A through 4E.

After the soil borings were advanced 5 feet into the water table, temporary monitoring wells were constructed using 1-inch-diameter PVC riser and 5-foot long, 10-slot screens. Prior to sampling, static groundwater levels were measured in each monitoring well to the nearest 0.01 foot and recorded. The temporary monitoring wells were sampled using a length of new polyethylene tubing equipped with a check ball valve. Water samples retrieved were examined by the field technician for unusual odors, petroleum-like sheen, and other apparent signs of contamination. The groundwater samples were placed directly into laboratory supplied containers, preserved appropriately, and submitted to the laboratory for chemical analysis.

The groundwater samples collected from the temporary wells were submitted to Pace and analyzed for a combination of the following parameters:

- VOCs using United States Environmental Protection Agency (EPA) Method 8260
- PAHs using EPA Method 8270
- DRO using the WDNR method
- GRO using the WDNR method
- Organochlorine pesticides using Method 8081B
- Eight RCRA metals using EPA Methods 6010 and 7471

Analytical parameters for groundwater samples collected from each temporary well are summarized in Table 1.

D.3. Soil Vapor Evaluation

D.3.a. Soil Vapor Probes

Soil vapor samples were collected of subsurface soil vapor samples for general screening purposes. One of the soil vapor samples was collected in the assumed worst case sample in the area of the current maintenance shop area and previous petroleum releases. The other soil vapor borings were placed spatially across the site for general coverage.

Two temporary soil vapor probes (SV-1 and SV-2) were completed at the Site. The temporary soil vapor probe locations are shown on Figures 4A and 4E. Each soil vapor probe was advanced, using a hydraulically-driven push-probe rig, to a depth of 10 feet bgs and then retracted to a depth of 8 feet bgs. New, inert tubing was attached to the top of the downhole sampler, and the sampling point and tubing were purged with a hand pump to remove two volumes of air prior to sample collection. Following purging, organic vapor concentrations were screened with a PID and the value was recorded. The soil vapor samples were then collected using laboratory-supplied negative pressure air-sample collection canisters (6-liter canisters) equipped with 200 milliliter per minute (mL/min) flow restrictors in accordance with the MPCA guidelines. Following sample collection, the temporary sampling point was removed from the borehole, and the borehole was sealed in accordance with MDH guidelines.

The soil vapor samples were submitted to Pace and analyzed for the VOCs using EPA Method TO-15.

D.3.b. Sub-Slab Vapor Point

One sub-slab vapor sampling point (SSV-1) was installed in the slab of the former agricultural chemical storage building at the Site. The temporary sub-slab soil vapor point location is shown on Figure 4C. As part of the installation, a hole was drilled through the concrete floor slab, and an air-tight temporary soil vapor point connected to inert shut-in test tubing assembly was installed. The other end of the shut-in test assembly was connected to the valve and gauge assembly connected to the air canister. A water dam leak test and shut-in test were successfully performed in general accordance with Appendix B of the MPCA 2017 Vapor Investigation Document verifying that there were no leaks in the sample train. The sampling point and tubing were purged to remove at least two volumes of air prior to sample collection. The soil vapor samples were then collected using laboratory-supplied negative pressure air-sample collection canisters (1-liter canisters) equipped with 200 milliliter per minute (mL/min) flow restrictors in accordance with the MPCA guidelines. The shut-in test assembly was disconnected. Following sampling, organic vapor concentrations at the vapor pin were screened with a PID and the value was recorded. The temporary sampling point was removed from the borehole and the borehole was patched with concrete.

The sub-slab vapor samples were submitted to Pace and analyzed for VOCs using EPA Method TO-15.

E. Investigation Results

E.1. Geologic Conditions

Soil boring logs with descriptions of the various soil strata encountered during the soil boring operations and water level information are contained in Appendix C. The depths shown as changes between the soil types are approximate. The actual changes may be transitional, and the transition depths are likely to be horizontally variable.

A layer of dark brown to black topsoil was encountered in all of the soil borings from the surface to approximately one foot bgs. Beneath the topsoil there was a layer of tan to brown sandy fill that ranged in depth from three to seven feet bgs. Clayey sand or organic clayey sand was encountered beneath the fill. Fragments of concrete and asphalt were encountered in boring GP-2 at a depth ranging from one to 5.5 feet bgs.

Soil borings in the northwest corner of the golf course contained interbedded layers of glacial till and fluvium. The till was composed of a reddish brown clayey sand with trace gravel.

E.2. Field Screening

Soil recovered from the soil borings was screened by the field technician for evidence of contamination, including odors, staining, and the presence of debris.

Organic vapor/PID readings were recorded for soil samples collected from each borings. Observed organic vapor concentrations ranged from 0.0 to 0.4 parts per million (ppm), which are considered to be general background readings. Soil screening PID results are included on the boring logs in Appendix C.

Groundwater samples were examined by the field technician for evidence of contamination, including unusual odors, petroleum-like sheen, and other apparent signs of contamination. No odors, sheens, or other signs of contamination were observed in the groundwater recovered from any of the temporary monitoring wells.

E.3. Soil Analytical Results

This section provides a discussion of soil analytical results. A summary of the soil analytical results are provided in the following tables:

- Table 2: Soil Analytical Results – Geotechnical Borings
- Table 3: Soil Analytical Results – Environmental Borings
- Table 4: Soil Analytical Results – Surface Soil Samples
- Table 5: Cumulative Soil Analytical Results – Mercury

Figure 5A through 5D show analytical result exceedances, where applicable, for the soil samples. The complete laboratory reports with chain-of-custody forms are included in Appendix D.

The soil analytical results can be compared with the Soil Reference Values (SRVs) and Screening Soil Leaching Values (SLVs) which are also listed on Tables 2 through 5. SRVs and SLVs are allowable risk-based contaminant concentrations derived by the Minnesota Pollution Control Agency (MPCA) using risk assessment methodology, modeling, and risk management policy to guide investigation and cleanup actions. SRVs relate to direct-contact exposure scenarios and SLVs relate to potential leaching of contaminants to groundwater. Concentrations of contaminants in soil, SRVs, and SLVs are expressed in units of milligrams per kilogram (mg/kg).

Soil investigation results requiring consideration for redevelopment are summarized below:

- Mercury has been detected at elevated concentrations in soil at numerous locations at the Site. Mercury concentrations in the samples ranged from not detected (<0.020 mg/kg) to 144 mg/kg. For comparison purposes, the Minnesota Pollution Control Agency (MPCA) Residential and Industrial Soil Reference Values (SRVs) are 0.5 milligrams per kilogram (mg/kg) and 1.5 mg/kg, respectively.
- The highest concentrations of mercury were detected in soil samples collected from the former greens, related fringe/apron areas. Mercury concentrations exceeding SRVs were also detected consistently on tee boxes, tested fairways and in soil near the “mixing area” where fungicides are known to have been mixed with water and loaded into the turf management equipment for use of the golf course. The location of the mixing area is known based on an interview by Braun Intertec with a former Superintendent at Hillcrest with knowledge of golf course maintenance activities dating back to the 1990’s.

- The two soil samples with the highest mercury concentrations from the Phase II ESA were also analyzed for mercury using the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP mercury concentrations for these sample were less than the TCLP hazardous waste criterion of 0.2 mg/L.
- Total arsenic was detected at a concentration of 15.7 milligrams per kilogram (mg/kg) in soil sample ST-3 (0-2), which exceeds the MPCA residential soil reference value of 9 mg/kg. This sample was collected from a former putting green that also had elevated mercury. Elevated concentrations of arsenic in soil were not detected in any other soil sample during the past or current Phase II ESAs at the property.
- Several soil berms with intermixed debris and solid waste are present in the wooded area south of the maintenance shop area on the east side of the property and adjacent to McKnight Road. Debris types observed in the soil includes brick, asphalt, concrete, carpet, drain tile, conduit, plastic, etc. A composite soil sample collected from the soil berms with debris detected mercury at a concentration exceeding the Industrial SRV, and also low concentrations of DRO and PAHs.

E.4. Groundwater Analytical Results

This section provides a discussion of the groundwater analytical results. A summary of the groundwater analytical results is provided in Table 6. For comparison purposes, Table 6 includes Drinking Water Criteria from the Minnesota Department of Health (MDH) Human Health-Based Water guidance. Drinking Water Criteria include MDH Health Risk Limits (HRLs), MDH Health Based Values (HBVs), MDH Risk Assessment Advice (RAA), and Maximum Contaminant Levels (MCLs) established by the Environmental Protection Agency (EPA). Concentrations of contaminants in water and Drinking Water Criteria are expressed in units of micrograms per liter (µg/L).

Figures 6A and 6B depicts the depth to groundwater encountered in each temporary monitoring well and the analytical result exceedances, where applicable, for the groundwater samples. The complete laboratory reports with chain-of-custody forms are included in Appendix D.

The following provides a summary of the groundwater analytical results.

- No VOCs, PAHs, GRO or pesticides were detected above the laboratory reporting limits in the samples analyzed during this investigation.
- Dissolved Barium was the only metal detected in the water samples, however the detected concentration were well below the drinking water standards for barium.

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- DRO was detected at 540 ug/l in groundwater at boring locating ST-8, in the former washout/tank area of the site. The MDH health based value for total petroleum hydrocarbons is 200 ug/l. DRO was not detected above the laboratory reporting limits in the other samples analyzed during this investigation.

E.5. Soil Vapor Analytical Results

This section provides a discussion of the soil vapor analytical results. A summary of the soil vapor analytical results is provided in Table 7. The complete laboratory reports with chain-of-custody forms are included in Appendix D.

For comparison purposes, Table 7 includes Intrusion Screening Values (ISVs). ISVs were developed by the Minnesota Pollution Control Agency (MPCA) in coordination with the Minnesota Department of Health (MDH) as screening values for evaluating vapor intrusion risks from VOCs identified in indoor air. The potential for indoor air to be impacted by soil vapor intrusion can also be assessed using ISVs. Concentrations of VOCs in air or soil vapor and ISVs are expressed in units of micrograms per cubic meter ($\mu g/m^3$).

Per 2017 MPCA Vapor Investigation Document, soil vapor results are compared to 33X ISVs to assess vapor intrusion risk if building conditions are appropriate. According to the guidance, soil vapor concentrations greater than 33X ISVs indicate a vapor source with potential vapor intrusion risk is present. A Site with contaminant concentrations greater than 33X ISVs would typically require either mitigation or additional assessment of potential pathways and receptors to better quantify risks, which might include collection of sub-slab or indoor air samples.

In addition to ISVs, the MPCA has published expedited ISVs (EISVs) for select compounds at sites where sensitive individuals may be exposed to soil vapor impacts through vapor intrusion. Sensitive individuals may include women who are pregnant or may become pregnant, or infants and young children, elderly persons, immunocompromised individuals, and individuals with chronic disease who live in the lowest level of the building, spend significant time in the lowest level of the building or who rarely leave the building. The current list of EISVs is found in the MPCA document entitled *Interim ISV Short Guidance* dated February 13, 2017. Soil vapor concentrations greater than 33X ISVs and/or 33X EISVs may indicate a comparatively higher vapor intrusion risk and MPCA guidance requires completion of a building survey, collection of sub-slab or indoor air samples, and/or remedial design of measures to mitigate the potential for vapors to enter buildings. If a VOC is detected in sub-slab vapor at a concentration greater than 33X its EISV, the MPCA requires expedited action consisting of paired sub-slab/indoor air sampling or vapor mitigation system installation beginning no more than 30 days after receiving laboratory analytical results.

In summary, various VOCs were detected in the vapor samples collected during this investigation at low concentrations; however, none of the detected VOCs were at concentrations exceeded the MPCA 33 times (33x) ISV criterion for assessing the vapor intrusion pathway.

E.6. Quality Assurance/Quality Control

Samples were placed in clean, laboratory supplied containers, preserved, labeled, and transported to the Pace laboratory under refrigerated conditions using chain-of-custody procedures. Analyses were performed using EPA or other recognized standard procedures.

A quality assessment of field procedures and analytical laboratory reports was performed to evaluate potential effects on data quality used to support project objectives. All applicable Braun Intertec SOPs were followed as prescribed unless otherwise noted in this report. Notable findings are provided in more detail below and incorporated, where necessary, into this report.

Soil and water trip blanks accompanied the investigative samples and were analyzed for VOCs and GRO. No contaminants were detected in the trip blanks at concentrations greater than the laboratory method reporting limits.

The reporting limit for soil sample ST-5 (1-3) for selenium exceeded the SLV due to sample dilution.

Pace noted that sediment was present in three of the four groundwater samples, which is typical during the collection of groundwater samples from temporary monitoring wells.

The reporting limits for arsenic and cadmium exceeded their respective Drinking Water Criteria for the three groundwater samples analyzed. Cadmium was not detected at elevated concentrations in any of the soil samples associated with this investigation. Arsenic was only detected at an elevated concentration in one soil sample [ST-3 (0-2)].

In summary, data quality control items identified during the quality review are considered to be minor and all data collected are acceptable for use in this investigation for the intended purpose of identifying soil, groundwater, and soil vapor impacts within the project area.

F. Discussion and Conclusions

Past and current Phase II ESAs have detected both non-petroleum and petroleum compounds in soil at various locations and depths across the Site. The non-petroleum impacts include widespread mercury contamination from the historical use of specialty fungicides and other turf management agricultural products associated with golf courses dating back to the 1930's and into the 1990's. Additional non-petroleum impacts to soil from PAHs and arsenic have also been detected at a few locations the Site, but these impacts are relatively minor in extent and magnitude. Petroleum impacts detected at the Site are primarily associated with the past use and storage of diesel fuel and gasoline products in the former maintenance shop area located on the east side of the Site adjacent to McKnight Road. Specifically, there were three separate petroleum leak site numbers opened by the MPCA for the releases reported in the vicinity of the former maintenance shop area at the property. The MPCA closed these leak site numbers following review of the previously completed petroleum release investigations and/or soil corrective actions.

Groundwater samples collected during the recent Phase II ESA completed by Braun Intertec did not detect evidence of significant or widespread contamination by petroleum compounds or hazardous substances. The only detection of a contaminant in groundwater above a drinking water standard was DRO in the sample collected near maintenance shop area in the area of previously investigated petroleum releases that have been closed by the MPCA (sample ST-8W). The presence of residual petroleum-related groundwater contamination was previously investigated, is a known condition, and would only be a concern for redevelopment if dewatering for construction was required and/or if a storm water infiltration feature was planned for this particular area of the property.

Low concentrations of VOCs were detected in soil vapor samples collected during this investigation. However, none of the detected concentrations of VOCs in soil vapor were above the MPCA's action level of 33X the residential ISVS in any of the sample locations.

G. Recommendations

The following recommendations are provided based on the results of this Preliminary Phase II ESA and referenced previous environmental reports available for the Site:

- The Site has been entered in the Minnesota Department of Agriculture (MDA) Agricultural Chemical Voluntary Investigation and Cleanup (AgVIC) Program, MPCA Voluntary Investigation and Cleanup (VIC) Program, and the MPCA Petroleum Brownfields (PB) Program to facilitate investigation and cleanup of the property and to receive applicable assurance letters from these agencies. MDA involvement on this project is triggered by the mercury impacts related to the previous historic use of mercury-containing fungicides used for turf management. Specifically, the MDA has jurisdiction for all impacts resulting from use of hazardous substances for agricultural purposes including turf management on golf courses. Agency approvals and environmental assurances will be sought through the MDA for agricultural chemical impacts at the property. The MPCA VIC Program's involvement is needed to obtain environmental assurances and approvals related to hazardous substances for which they have jurisdiction (e.g., PAHs), and the MPCA PB Program's involvement is needed to obtain environmental assurances and approvals related to the past petroleum releases and remaining residual petroleum contamination.

- Additional remedial investigation will be necessary to further delineate and define the magnitude and extent of the identified impacts at the Site in consideration of future redevelopment. Once the redevelopment plans are more defined, Work Plans for additional Phase II ESA work should be prepared and submitted to the MDA AgVIC, MPCA VIC and MPCA PB Programs for review and approval. This additional Phase II ESA work should be completed after the development plans are further refined and future building locations are known. The program-specific requirements of the respective MDA and MPCA voluntary programs should be incorporated into the additional Phase II ESA Work Plans.
- Subsequent to the completed Phase II field work for the preliminary assessment and during preparation of this report, the SPPA received information suggesting a possible up gradient source of benzene impacted soil and groundwater that may be impacting groundwater at the Site. While no benzene was detected in groundwater during the preliminary assessment, the planned supplemental Phase II investigation of the Site will involve addition groundwater investigation and sampling for benzene, including sampling groundwater in the northwest portion of the Site, and if possible, testing unsealed water wells located on the Site.
- A response action plan (RAP) appropriate for the planned use of the Site should be prepared and submitted to the MDA AgVIC, MPCA VIC and MPCA PB programs for review and approval. The RAP should include information on the specific response actions needed to mitigate, address and/or manage the identified soil impacts at the Site to facilitate the planned use. The RAP should also address requirements for managing potential petroleum-impacted groundwater near f the former Maintenance Shop Area (if dewatering is required), removing the two small remaining ASTs located near the former Maintenance Shop Area, and sealing the two known remaining water wells at the Site in accordance with Minnesota Department of Health requirements..

H. Assessment Limitations

The analyses and conclusions submitted in this report are based on field observations and the results of laboratory analyses of soil samples, groundwater, and soil vapor samples collected from the soil borings, surface soil sampling, and soil vapor probes completed for this project.

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Figures

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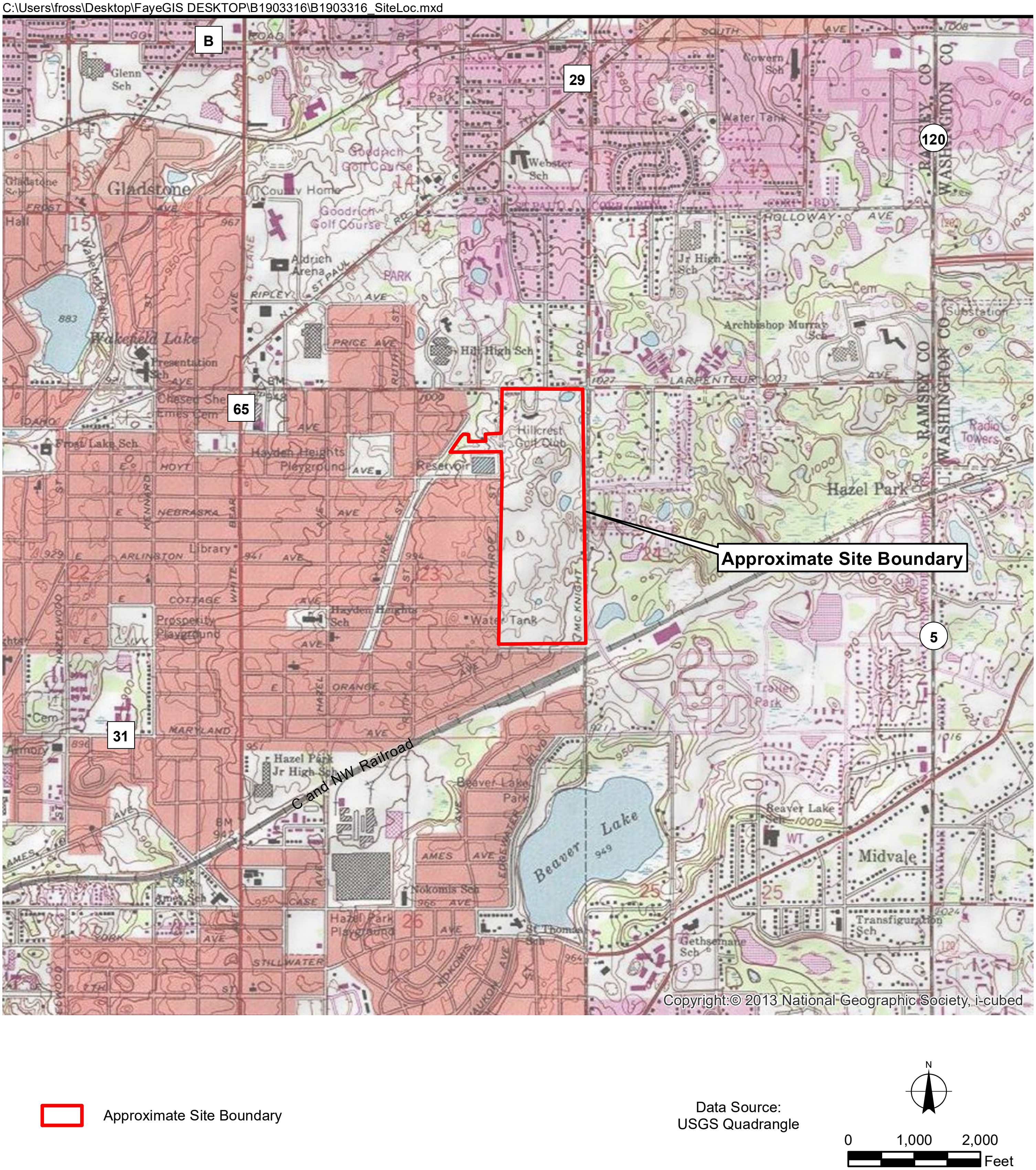

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Drawn By:	FER
Date Drawn:	4/12/2019
Checked By:	MPE
Last Modified:	4/12/2019

Former Hillcrest Golf Course

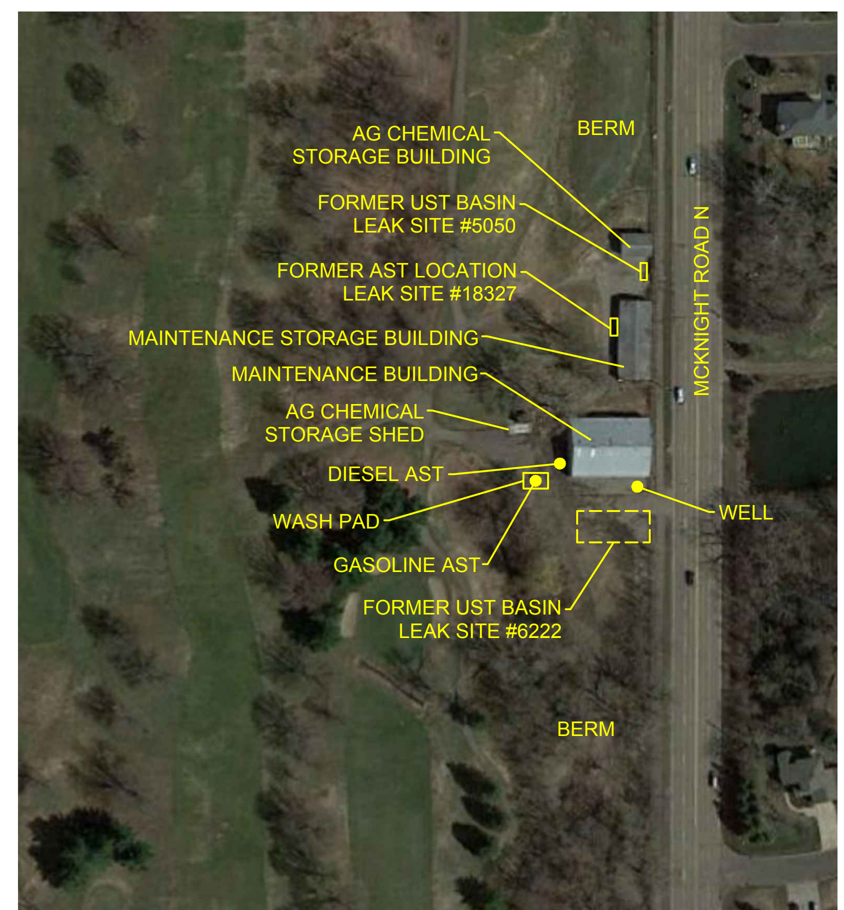
McKnight Road N and Larpenteur Avenue E

St. Paul, Minneosta

Site Location Map

Figure 1

INSET 1: CLUBHOUSE AREA
SCALE: 1" = 120'



INSET 2: MAINTENANCE FACILITY
SCALE: 1" = 200'

250' 0 500'
SCALE: 1"= 500'

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Last Modified: 6/10/19

Project Information

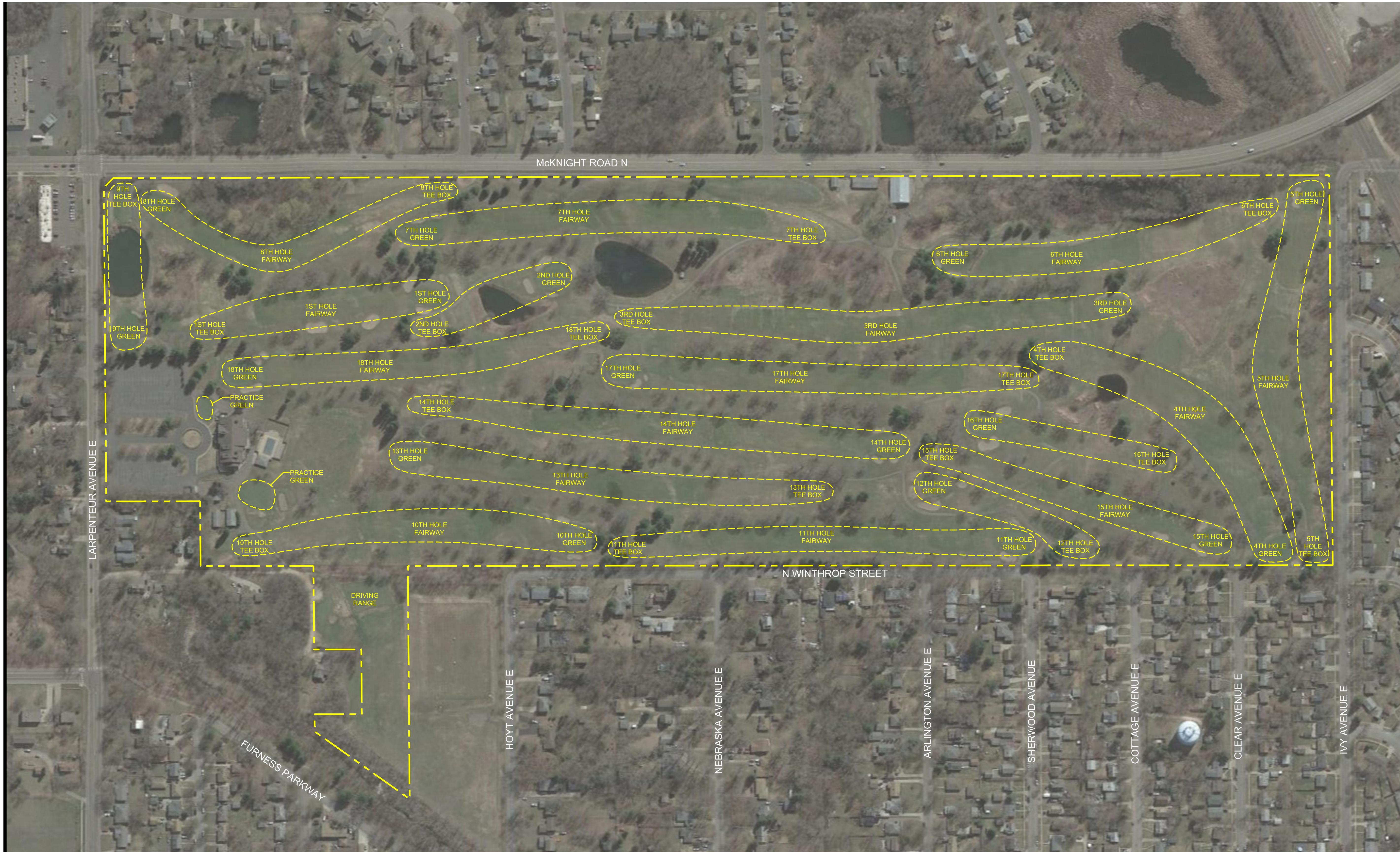
Former Hillcrest Golf Course

McKnight Road N and Larpenteur Avenue E

St. Paul, Minnesota

Site Diagram

Figure 2



150' 0 300'

SCALE: 1" = 300'

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Date Drawn:	5/23/19
Checked By:	MK
Last Modified:	6/10/19

Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Golf Course Layout

Figure 3

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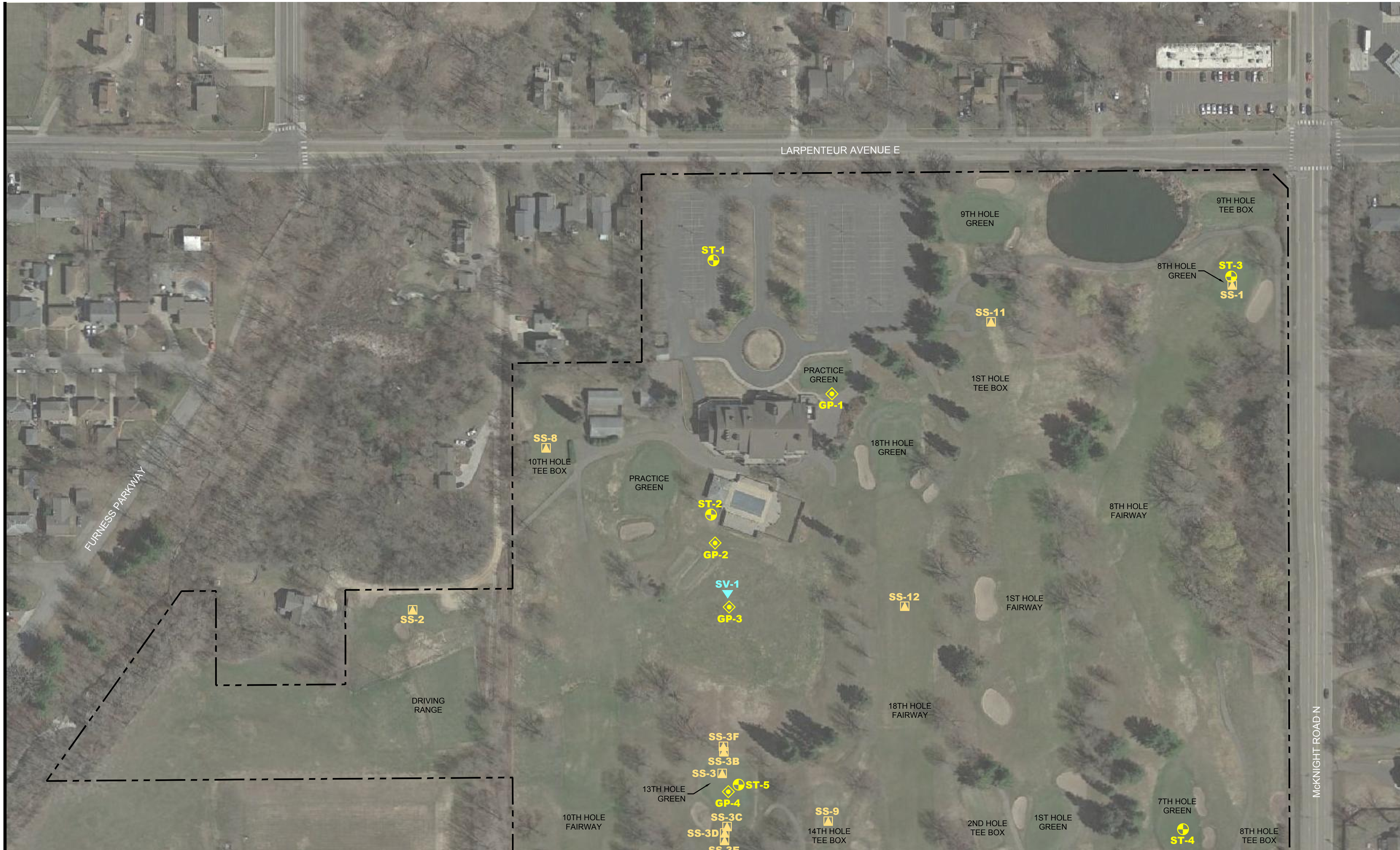

HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

75' 0 150'

SCALE: 1" = 150'

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Last Modified: 6/10/19

Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Site Detail - North

Figure 4a

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HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

75' 0 150'

SCALE: 1" = 150'

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Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Site Detail - North Central

Figure 4b

HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

75' 0 150'

SCALE: 1" = 150'

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Last Modified: 6/10/19

Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Site Detail - Central

Figure 4c

HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

N

75' 0 150'

SCALE: 1" = 150'

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Date Drawn: 5/23/19

Checked By: MK

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Project Information

Former Hillcrest Golf Course

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Saint Paul, Minnesota

Site Detail - South Central

Figure 4d

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HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

N

75' 0 150'

SCALE: 1" = 150'

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Last Modified:	6/10/19

Project Information

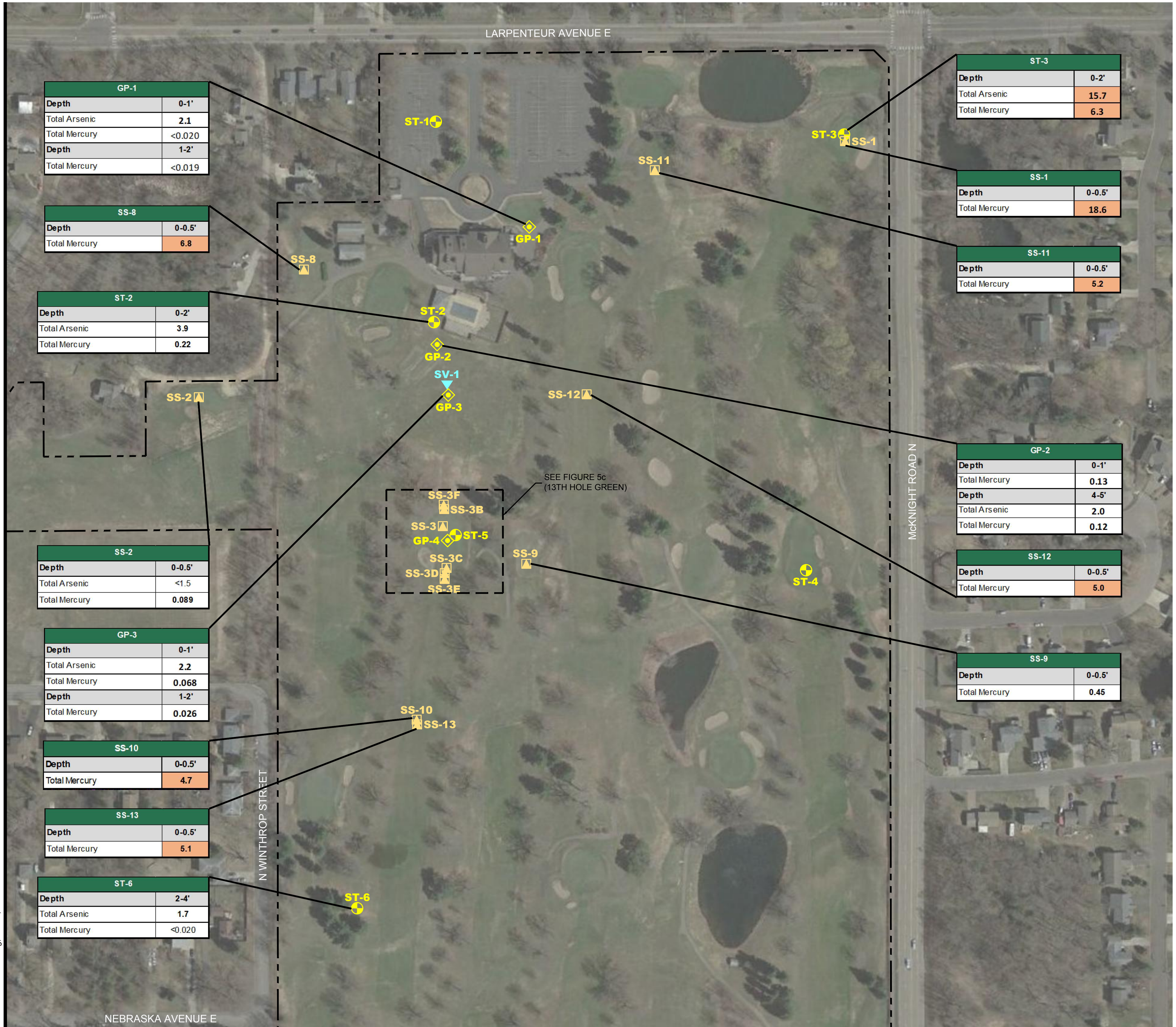
Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Site Detail - South

Figure 4e



GP-1	
Depth	0-1'
Total Arsenic	2.1
Total Mercury	<0.020
Depth	1-2'
Total Mercury	<0.019

SS-8	
Depth	0-0.5'
Total Mercury	6.8

ST-2	
Depth	0-2'
Total Arsenic	3.9
Total Mercury	0.22

SS-2	
Depth	0-0.5'
Total Arsenic	<1.5
Total Mercury	0.089

GP-3	
Depth	0-1'
Total Arsenic	2.2
Total Mercury	0.068
Depth	1-2'
Total Mercury	0.026

SS-10	
Depth	0-0.5'
Total Mercury	4.7

SS-13	
Depth	0-0.5'
Total Mercury	5.1

ST-6	
Depth	2-4'
Total Arsenic	1.7
Total Mercury	<0.020

ST-3	
Depth	0-2'
Total Arsenic	15.7
Total Mercury	6.3

SS-1	
Depth	0-0.5'
Total Mercury	18.6

SS-11	
Depth	0-0.5'
Total Mercury	5.2

GP-2	
Depth	0-1'
Total Mercury	0.13
Depth	4-5'
Total Arsenic	2.0
Total Mercury	0.12

SS-12	
Depth	0-0.5'
Total Mercury	5.0

SS-9	
Depth	0-0.5'
Total Mercury	0.45

Soil Notes
Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
< = Not detected at or above the laboratory reporting limit indicated.
mg/kg = Milligrams per kilogram
SLV = Soil Leaching Value
SRV =Soil Reference Value
[1] [D3] Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
Soil Criteria
Arsenic Residential SRV = 9 mg/kg
Mercury Residential SRV = 0.5 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Exceeds Residential SRV
Exceeds Screening SLV

HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

100' 0 200'

SCALE: 1" = 200'

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Date Drawn: 5/23/19

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Last Modified: 6/12/19

Project Information

Former Hillcrest Golf Course

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Saint Paul, Minnesota

Soil Exceedances

Figure 5a

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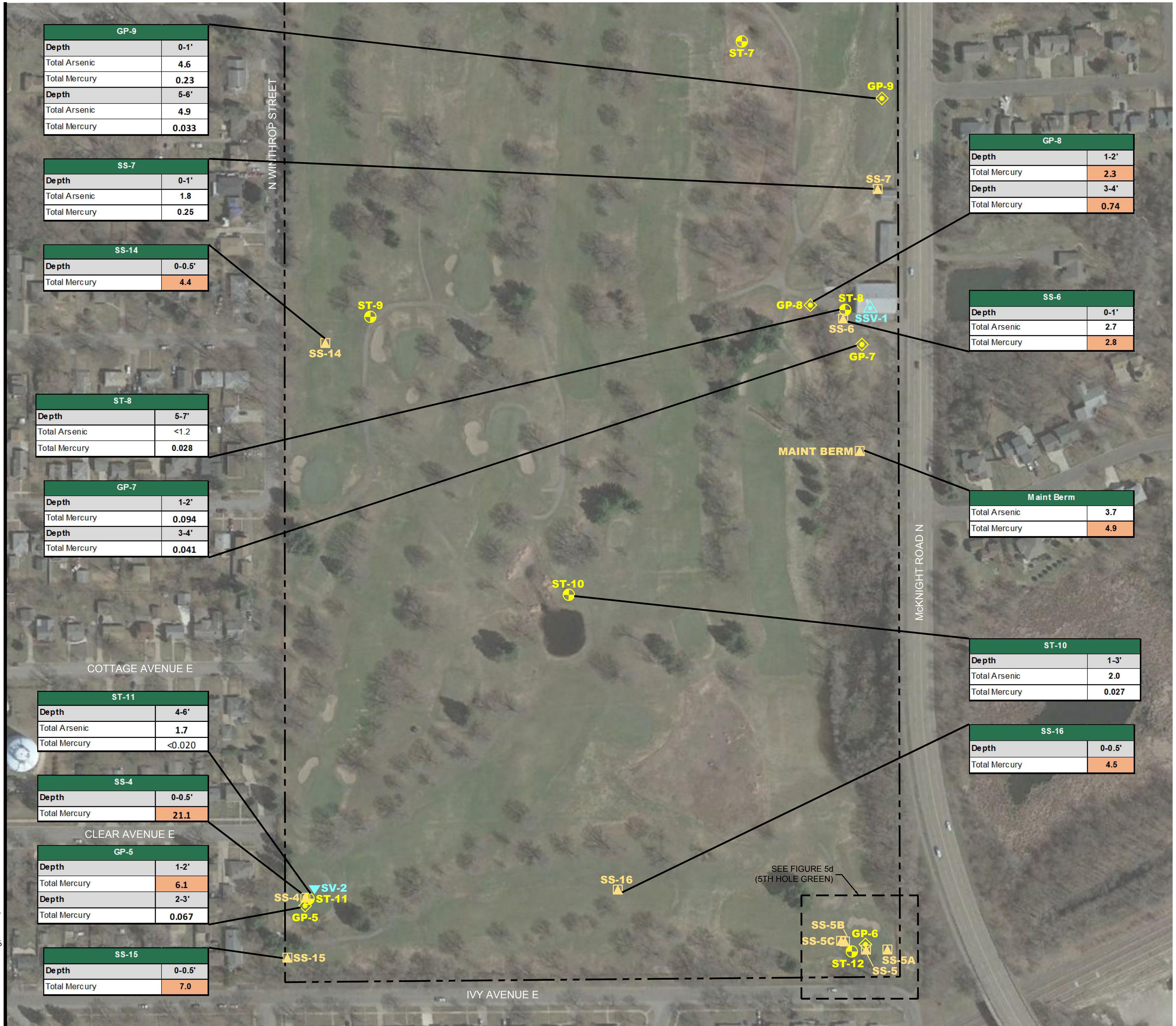

GP-9	
Depth	0-1'
Total Arsenic	4.6
Total Mercury	0.23
Depth	5-6'
Total Arsenic	4.9
Total Mercury	0.033

SS-7	
Depth	0-1'
Total Arsenic	1.8
Total Mercury	0.25

SS-14	
Depth	0-0.5'
Total Mercury	4.4

ST-8	
Depth	5-7'
Total Arsenic	<1.2
Total Mercury	0.028

GP-7	
Depth	1-2'
Total Mercury	0.094
Depth	3-4'
Total Mercury	0.041

ST-11	
Depth	4-6'
Total Arsenic	1.7
Total Mercury	<0.020

SS-4	
Depth	0-0.5'
Total Mercury	21.1

GP-5	
Depth	1-2'
Total Mercury	6.1
Depth	2-3'
Total Mercury	0.067

SS-15	
Depth	0-0.5'
Total Mercury	7.0

GP-8	
Depth	1-2'
Total Mercury	2.3
Depth	3-4'
Total Mercury	0.74

SS-6	
Depth	0-1'
Total Arsenic	2.7
Total Mercury	2.8

Maint Berm	
Total Arsenic	3.7
Total Mercury	4.9

ST-10	
Depth	1-3'
Total Arsenic	2.0
Total Mercury	0.027

SS-16	
Depth	0-0.5'
Total Mercury	4.5

Soil Notes

Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
< = Not detected at or above the laboratory reporting limit indicated.
mg/kg = Milligrams per kilogram
SLV = Soil Leaching Value
SRV = Soil Reference Value
[1] [D3] Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Soil Criteria

Arsenic Residential SRV = 9 mg/kg
Mercury Residential SRV = 0.5 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Exceeds Residential SRV
Exceeds Screening SLV

HOLLOW STEM AUGER BORING LOCATION
SOIL VAPOR PROBE LOCATION
SUB SLAB VAPOR PROBE LOCATION
PUSH PROBE BORING LOCATION
SURFACE SOIL SAMPLE LOCATION

100' 0 200'
SCALE: 1" = 200'

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Date Drawn: 5/23/19
Checked By: MK
Last Modified: 6/12/19

Project Information

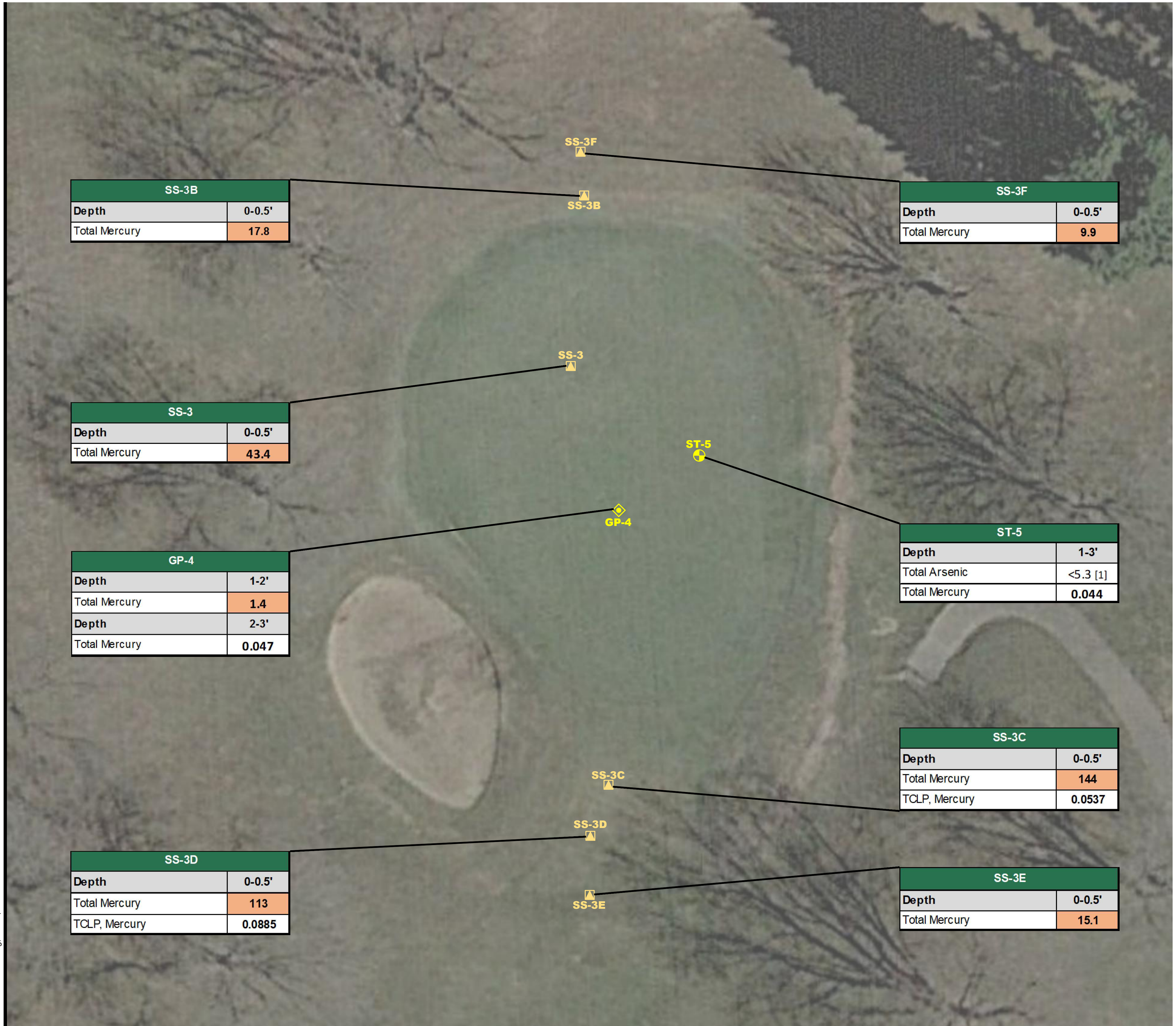
Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Soil Exceedances

Figure 5b



SS-3B	
Depth	0-0.5'
Total Mercury	17.8

SS-3F	
Depth	0-0.5'
Total Mercury	9.9

SS-3	
Depth	0-0.5'
Total Mercury	43.4

ST-5	
Depth	1-3'
Total Arsenic	<5.3 [1]
Total Mercury	0.044

GP-4	
Depth	1-2'
Total Mercury	1.4
Depth	2-3'
Total Mercury	0.047

SS-3C	
Depth	0-0.5'
Total Mercury	144
TCLP, Mercury	0.0537

SS-3D	
Depth	0-0.5'
Total Mercury	113
TCLP, Mercury	0.0885

SS-3E	
Depth	0-0.5'
Total Mercury	15.1

Soil Notes
Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
< = Not detected at or above the laboratory reporting limit indicated.
mg/kg = Milligrams per kilogram
SLV = Soil Leaching Value
SRV = Soil Reference Value
[1] [D3] Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
Soil Criteria
Arsenic Residential SRV = 9 mg/kg
Mercury Residential SRV = 0.5 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Exceeds Residential SRV
Exceeds Screening SLV

HOLLOW STEM AUGER BORING LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

N

10' 0 20'

SCALE: 1" = 20'

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Drawing Information

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Drawing No: B1903316A

Drawn By: BJB
Date Drawn: 5/23/19
Checked By: MK
Last Modified: 6/12/19

Project Information

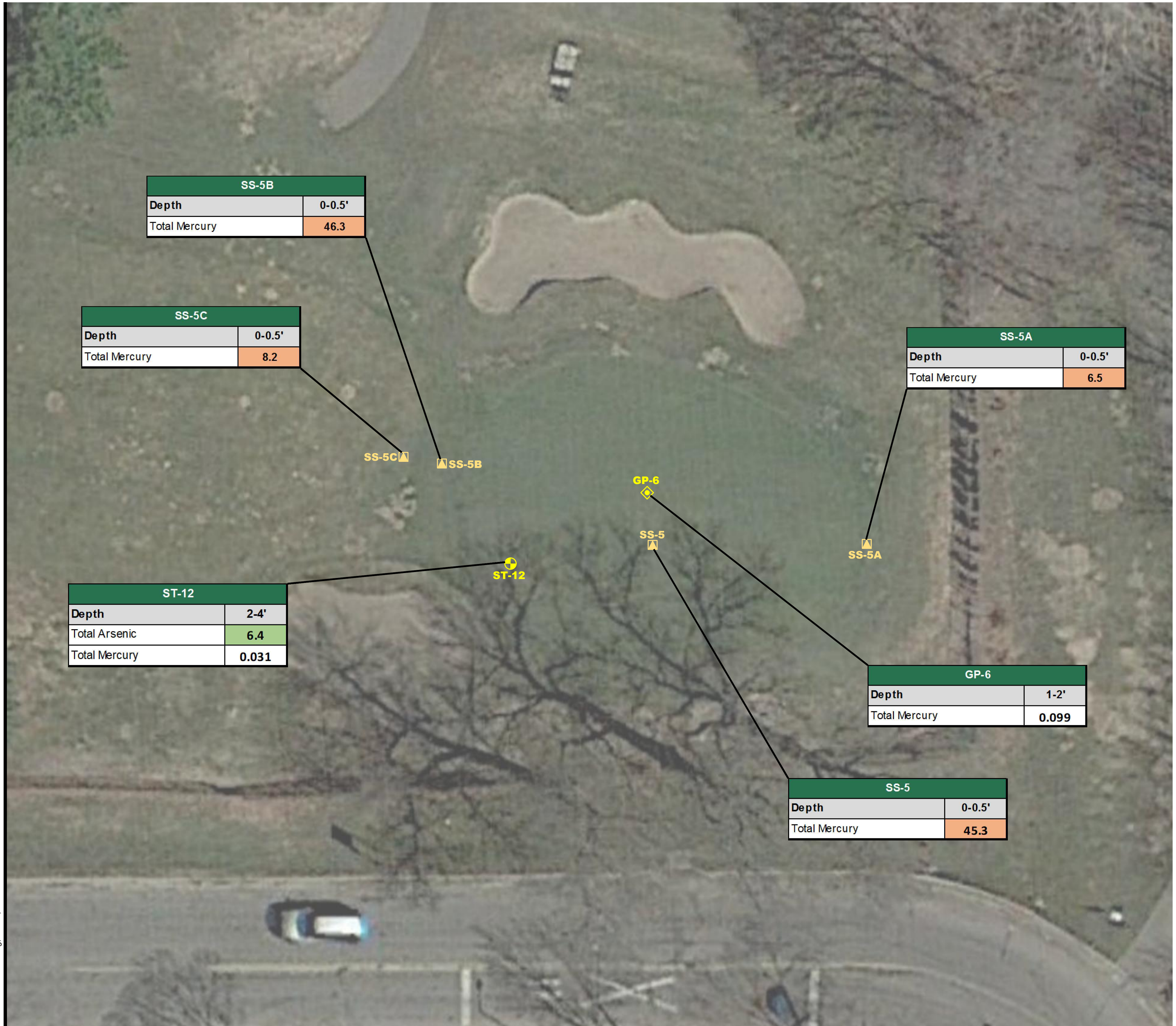
Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Soil Exceedances

Figure 5c



Soil Notes
Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
< = Not detected at or above the laboratory reporting limit indicated.
mg/kg = Milligrams per kilogram
SLV = Soil Leaching Value
SRV =Soil Reference Value
[1] [D3] Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
Soil Criteria
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Mercury Residential SRV = 0.5 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Exceeds Residential SRV
Exceeds Screening SLV

HOLLOW STEM AUGER BORING LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

N

10' 0 20'

SCALE: 1" = 20'

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Drawing No: B1903316A

Drawn By: BJB
Date Drawn: 5/23/19
Checked By: MK
Last Modified: 6/12/19

Project Information

Former Hillcrest Golf Course

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Saint Paul, Minnesota

Soil Exceedances

Figure 5d

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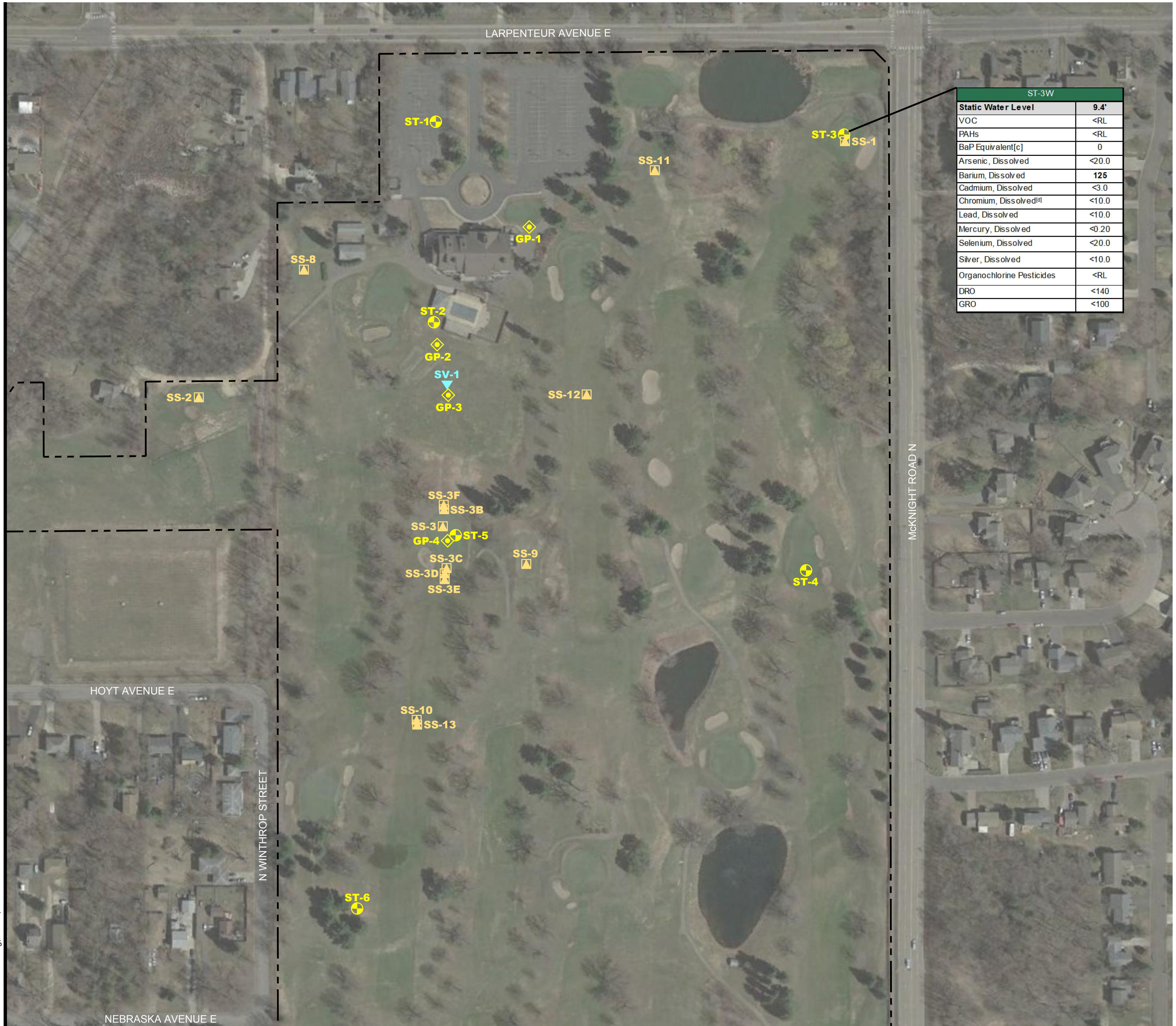

ST-3W	
Static Water Level	**9.4'**
VOC	<RL
PAHs	<RL
BaP Equivalent[c]	0
Arsenic, Dissolved	<20.0
Barium, Dissolved	**125**
Cadmium, Dissolved	<3.0
Chromium, Dissolved[d]	<10.0
Lead, Dissolved	<10.0
Mercury, Dissolved	<0.20
Selenium, Dissolved	<20.0
Silver, Dissolved	<10.0
Organochlorine Pesticides	<RL
DRO	<140
GRO	<100

Drinking Water Notes

Drinking Water Criteria = The most conservative value for chronic or cancer exposures provided from the following sources including the Minnesota Department of Health (MDH) Health Risk Limit (HRL), MDH Health Based Value (HBV), MDH Risk Assessment Advice (RAA) or Maximum Contaminant Level (MCL). The date of promulgation is provided, if available. Values updated 7/27/16.
µg/L = Micrograms per liter.
< = Not detected at or above the laboratory reporting limit indicated.
--- = Not analyzed or calculated for this parameter or not applicable.
RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.
NE = Regulatory limit not established for this parameter.
cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.
[c] = Benzo[a]pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; Minnesota Pollution Control Agency; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.
[d] = Reported result is total chromium, criteria for chromium III and chromium VI are provided.
[e] = Provisional MDH Health Based Value for total petroleum hydrocarbons (sum of DRO and GRO).
[T6] = High boiling point hydrocarbons are present in the sample.

Drinking Water Criteria

BaP Equivalent[c] HBV-12 = 0.06
Arsenic, Dissolved MCL = 10 µg/L
Barium, Dissolved HRL-93 = 2,000 µg/L
Cadmium, Dissolved HRL-15 = 0.5 µg/L
Chromium, Dissolved[d] HRL-94 = 20,000/100[d] µg/L
Lead, Dissolved MCL = 15 µg/L
Mercury, Dissolved MCL = 2 µg/L
Selenium, Dissolved HRL-93 = 30 µg/L
Silver, Dissolved HRL-93 = 30 µg/L
Diesel Range Organics (DRO) HBV[e] = 200 µg/L
Gasoline Range Organics (GRO) HBV[e] = 200 µg/L
Exceeds Drinking Water Criteria

HOLLOW STEM AUGER BORING LOCATION
SOIL VAPOR PROBE LOCATION
SUB SLAB VAPOR PROBE LOCATION
PUSH PROBE BORING LOCATION
SURFACE SOIL SAMPLE LOCATION

100' 0 200'
SCALE: 1" = 200'

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Minneapolis, MN 55438
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Drawing Information

Project No: B1903316
Drawing No: B1903316A
Drawn By: BJB
Date Drawn: 5/23/19
Checked By: MK
Last Modified: 6/12/19

Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Groundwater Exceedances

Figure 6a

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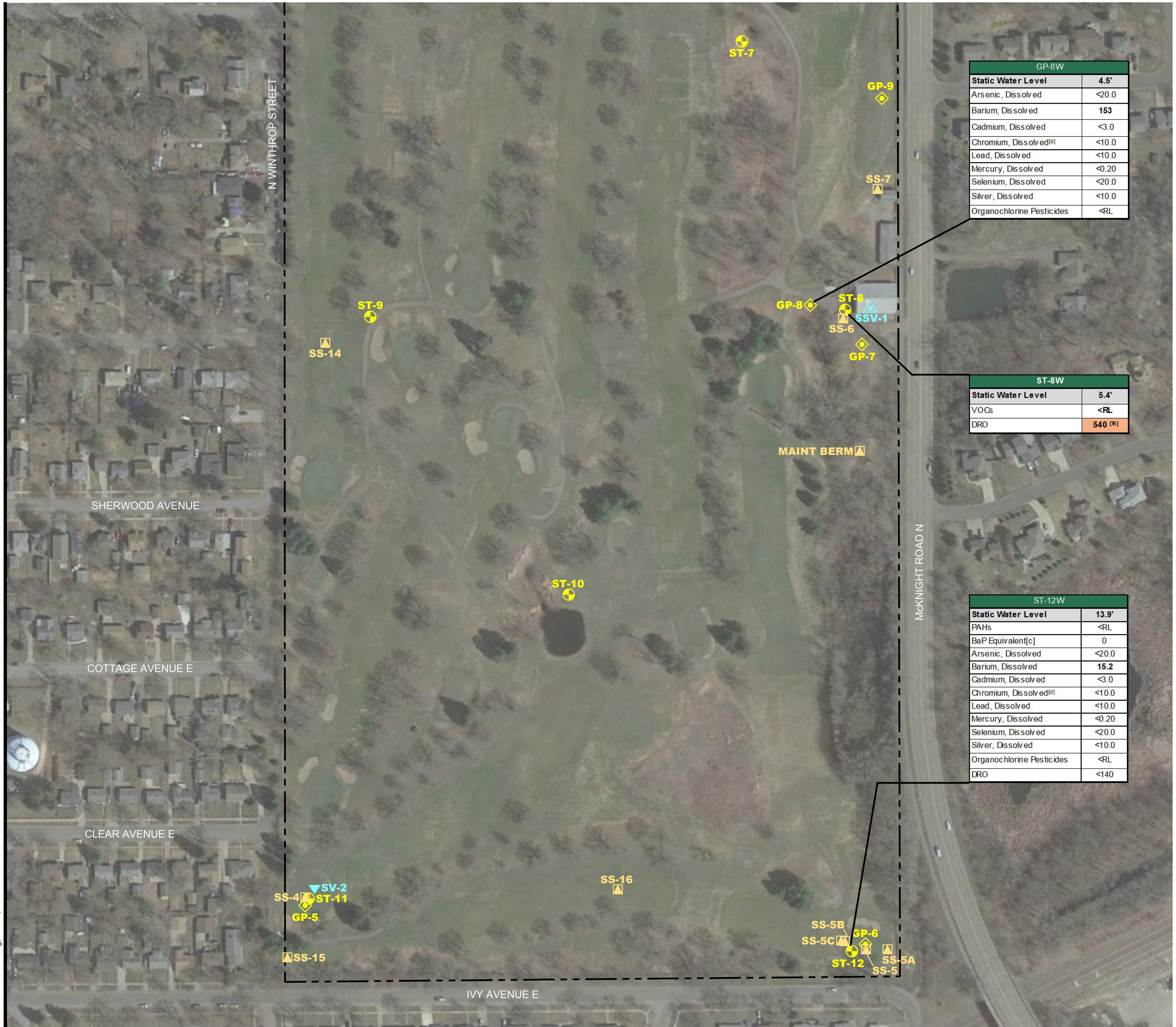

GP-8W	
Static Water Level	4.5'
Arsenic, Dissolved	<20.0
Barium, Dissolved	153
Cadmium, Dissolved	<3.0
Chromium, Dissolved[d]	<10.0
Lead, Dissolved	<10.0
Mercury, Dissolved	<0.20
Selenium, Dissolved	<20.0
Silver, Dissolved	<10.0
Organochlorine Pesticides	<RL

ST-8W	
Static Water Level	5.4'
VOCs	<RL
DRO	540 [T6]

ST-12W	
Static Water Level	13.9'
PAHs	<RL
BaP Equivalent[c]	0
Arsenic, Dissolved	<20.0
Barium, Dissolved	15.2
Cadmium, Dissolved	<3.0
Chromium, Dissolved[d]	<10.0
Lead, Dissolved	<10.0
Mercury, Dissolved	<0.20
Selenium, Dissolved	<20.0
Silver, Dissolved	<10.0
Organochlorine Pesticides	<RL
DRO	<140

Drinking Water Notes

Drinking Water Criteria = The most conservative value for chronic or cancer exposures provided from the following sources including the Minnesota Department of Health (MDH) Health Risk Limit (HRL), MDH Health Based Value (HBV), MDH Risk Assessment Advice (RAA) or Maximum Contaminant Level (MCL). The date of promulgation is provided, if available. Values updated 7/27/16.

µg/L = Micrograms per liter.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo[a]pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; Minnesota Pollution Control Agency; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[d] = Reported result is total chromium, criteria for chromium III and chromium VI are provided.

[e] = Provisional MDH Health Based Value for total petroleum hydrocarbons (sum of DRO and GRO).

[T6] = High boiling point hydrocarbons are present in the sample.

Drinking Water Criteria

BaP Equivalent[c] HBV-12 = 0.06

Arsenic, Dissolved MCL = 10 µg/L

Barium, Dissolved HRL-93 = 2,000 µg/L

Cadmium, Dissolved HRL-15 = 0.5 µg/L

Chromium, Dissolved[d] HRL-94 = 20,000/100[d] µg/L

Lead, Dissolved MCL = 15 µg/L

Mercury, Dissolved MCL = 2 µg/L

Selenium, Dissolved HRL-93 = 30 µg/L

Silver, Dissolved HRL-93 = 30 µg/L

Diesel Range Organics (DRO) HBV[e] = 200 µg/L

Gasoline Range Organics (GRO) HBV[e] = 200 µg/L

Exceeds Drinking Water Criteria

HOLLOW STEM AUGER BORING LOCATION

SOIL VAPOR PROBE LOCATION

SUB SLAB VAPOR PROBE LOCATION

PUSH PROBE BORING LOCATION

SURFACE SOIL SAMPLE LOCATION

N

100' 0 200'

SCALE: 1" = 200'

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Drawing Information

Project No: B1903316

Drawing No: B1903316A

Drawn By: BJB

Date Drawn: 5/23/19

Checked By: MK

Last Modified: 6/12/19

Project Information

Former Hillcrest Golf Course

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Groundwater Exceedances

Figure 6b

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Tables

Table 1
Phase II Sample Locations and Analytical Testing Summary
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

							Analytical Parameters									
Sample Location	Rationale for Location	Sample Identifier / Depth	Matrix	Date Collected	Grab	Composite	VOCs	PAHs	Mercury, Total	Mercury, TCLP	Arsenic, Total	RCRA Metals, Total	RCRA Metals, Dissolved	Organochlorine Pesticides	DRO	GRO
ST-2	SW Corner Former Pool House	ST-2 (0-2)	Soil	04/12/2019	X		X	X				X				
ST-3	8th Hole Green	ST-3 (0-2)	Soil	04/13/2019	X		X	X				X			X	X
ST-3	8th Hole Green	ST-3 W	Water	04/13/2019	X		X	X					X	X	X	X
ST-5	13th Hole Green	ST-5 (1-3)	Soil	04/12/2019	X							X				
ST-6	Rough between 13th Hole and 11th Hole	ST-6 (2-4)	Soil	04/12/2019	X		X	X				X			X	X
ST-8	Wash Out Area	ST-8 (5-7)	Soil	04/13/2019	X		X	X				X			X	X
ST-8	Wash Out Area	ST-8 W	Water	04/13/2019	X		X								X	
ST-10	Rough Area East of 16th Hole	ST-10 (1-3)	Soil	04/12/2019	X		X	X				X			X	X
ST-11	4th Hole Green	ST-11 (4-6)	Soil	04/13/2019	X							X				
ST-12	5th Hole Green	ST-12 (2-4)	Soil	04/13/2019	X			X				X				
ST-12	5th Hole Green	ST-12 W	Water	04/13/2019	X			X					X	X	X	
GP-1	Fringe of Putting Green near Club House	GP-1 0-1	Soil	05/07/2019	X				X		X					
GP-1	Fringe of Putting Green near Club House	GP-1 1-2	Soil	05/07/2019	X				X							
GP-2	Area South of Pool House	GP-2 0-1	Soil	05/07/2019	X				X							
GP-2	Area South of Pool House	GP-2 4-5	Soil	05/07/2019	X			X				X				
GP-3	Former Tennis Court Area	GP-3 0-1	Soil	05/07/2019	X				X		X					
GP-3	Former Tennis Court Area	GP-3 1-2	Soil	05/07/2019	X				X							
GP-4	13th Hole Green	GP-4 1-2	Soil	05/07/2019	X				X							
GP-4	13th Hole Green	GP-4 2-3	Soil	05/07/2019	X				X							
GP-5	4th Hole Green	GP-5 1-2	Soil	05/07/2019	X				X							
GP-5	4th Hole Green	GP-5 2-3	Soil	05/07/2019	X				X							
GP-6	5th Hole Green	GP-6 1-2	Soil	05/07/2019	X				X							
GP-7	South Wash Area	GP-7 1-2	Soil	05/07/2019	X				X							
GP-7	Southeast of Wash Area	GP-7 3-4	Soil	05/07/2019	X				X							
GP-8	Main Wash Area	GP-8	Water	05/07/2019	X								X	X		
GP-8	Main Wash Area	GP-8 1-2	Soil	05/07/2019	X				X							
GP-8	Main Wash Area	GP-8 3-4	Soil	05/07/2019	X				X							
GP-9	Berm North of Maintenance Sheds	GP-9 0-1'	Soil	05/07/2019	X							X				
GP-9	Berm North of Maintenance Sheds	GP-9 5-6'	Soil	05/07/2019	X			X				X				
Maint Berm	Berm of Debris bearing soils by Maintenance sheds	Maint Berm	Soil	05/10/2019	X			X				X			X	

Table 1
Phase II Sample Locations and Analytical Testing Summary
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

							Analytical Parameters										
Sample Location	Rationale for Location	Sample Identifier / Depth	Matrix	Date Collected	Grab	Composite	VOCs	PAHs	Mercury, Total	Mercury, TCLP	Arsenic, Total	RCRA Metals, Total	RCRA Metals, Dissolved	Organochlorine Pesticides	DRO	GRO
SS-1	8th Hole Green, mercury delineation	SS-1 (0-6")	Soil	04/19/2019		X			X							
SS-2	Practice Green Near Driving Range, mercury delineatio	SS-2 (0-6")	Soil	04/19/2019		X						X				
SS-3	13th Hole Green, mercury delineation	SS-3 (0-6")	Soil	04/19/2019		X			X							
SS-3	North Fringe of 13th Hole Green, mercury delineation	SS-3B (0-6")	Soil	05/01/2019	X				X							
SS-3	South Fringe of 13th Hole Green, mercury delineation	SS-3C (0-6")	Soil	05/01/2019	X				X	X						
SS-3	10 feet south of 13th Hole Fringe, mercury	SS-3D (0-6")	Soil	05/01/2019	X				X	X						
SS-3	20 feet south of 13th Hole Fringe, mercury	SS-3E 0-0.5	Soil	05/10/2019	X				X							
SS-3	10 feet north of 13th Hole Fringe, mercury	SS-3F 0-0.5	Soil	05/10/2019	X				X							
SS-4	4th Hole Green, mercury delineation	SS-4 (0-6")	Soil	04/19/2019		X			X							
SS-5	5th Hole Green, mercury delineation	SS-5 (0-6")	Soil	04/19/2019		X			X							
SS-5	East Fringe of 5th Hole Green, mercury delineation	SS-5A 0-0.5	Soil	05/10/2019	X				X							
SS-5	West Fringe of 5th Hole Green, mercury delineation	SS-5B 0-0.5	Soil	05/10/2019	X				X							
SS-5	10 feet west of 5th Hole Fringe, mercury delineation	SS-5C 0-0.5	Soil	05/10/2019	X				X							
SS-6	Immediately South of Wash Out Area, mercury delineation	SS-6 (0-1')	Soil	04/19/2019	X							X		X		
SS-7	NW Corner of Fertilizer Storage Building, mercury delineation	SS-7 (0-1')	Soil	04/19/2019	X							X		X		
SS-8	Tee box - 10th hole, mercury delineation	SS-8 (0-6")	Soil	05/01/2019		X			X							
SS-8	Tee box - 10th hole, mercury delineation	SS-8 1-2	Soil	05/10/2019	X				X							
SS-9	Tee box - 14th Hole, mercury delineation	SS-9 (0-6")	Soil	05/01/2019	X				X							
SS-10	Low Area in 13th Hole Fairway, mercury delineation	SS-10 (0-6")	Soil	05/01/2019	X				X							
SS-11	Tee Box - 11th Hole, mercury delineation	SS-11 0-0.5	Soil	05/10/2019	X				X							
SS-12	18th Hole Fairway, mercury delineation	SS-12 0-0.5	Soil	05/10/2019	X				X							
SS-13	11th Hole Fairway, mercury delineation	SS-13 0-0.5	Soil	05/10/2019	X				X							
SS-14	Low Area in 13th Hole Fairway, mercury delineation	SS-14 0-0.5	Soil	05/10/2019	X				X							
SS-15	Tee Box - 5th Hole, mercury delineation	SS-15 0-0.5	Soil	05/10/2019	X				X							
SS-16	5th Hole Fairway, mercury delineation	SS-16 0-0.5	Soil	05/10/2019	X				X							
SSV-1	Evaluate Phase I REC	SSV-1	Sub-slab	05/07/2019	X		X									
SV-1	Evaluate Phase I REC	SV-1	Vapor	05/07/2019	X		X									
SV-2	Evaluate Phase I REC	SV-2	Vapor	05/07/2019	X		X									

Notes

All depths are below ground surface.
VOCs = Volatile organic compounds.
PAHs = Polycyclic aromatic hydrocarbons.
TCLP = Toxicity Characteristic Leaching Procedure.

RCRA = Resource Conservation and Recovery Act.
DRO = Diesel Range Organics.
GRO = Gasoline Range Organics.

Table 2
Soil Analytical Results - Geotechnical Borings
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Sample Location, Course Location, and Date Collected									Residential Soil Reference Value (SRV) (mg/kg)	Industrial Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		ST-2 (0-2)	**ST-3 (0-2)**	**ST-5 (1-3)**	**ST-6 (2-4)**	**ST-8 (5-7)**	**ST-10 (1-3)**	**ST-11 (4-6)**	**ST-12 (2-4)**	**Trip Blank-SL**			
		Grassy Area	Green	Green	Rough	Paved - Wash Out	Rough	Green	Green	---			
		04/12/2019	04/13/2019	04/12/2019	04/12/2019	04/13/2019	04/12/2019	04/13/2019	04/13/2019	04/13/2019			
Volatile Organic Compounds (VOCs) (mg/kg)													
Xylenes, total	1330-20-7	**0.277**	<0.204	---	<0.162	<0.192	<0.165	---	---	<0.150	45[b]	130[b]	5.4[b]
All other reported VOCs	---	<RL	<RL	---	<RL	<RL	<RL	---	---	<RL	---	---	---
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)													
Benzo(b)fluoranthene	205-99-2	<0.0115	**0.0189**	---	<0.0107	<0.0128	<0.0113	---	<0.0121	---	cPAH	cPAH	cPAH
Benzo(a)pyrene	50-32-8	<0.0115	**0.0130**	---	<0.0107	<0.0128	<0.0113	---	<0.0121	---	cPAH	cPAH	cPAH
Chrysene	218-01-9	<0.0115	**0.0135**	---	<0.0107	<0.0128	<0.0113	---	<0.0121	---	cPAH	cPAH	cPAH
Fluoranthene	206-44-0	<0.0115	**0.0259**	---	<0.0107	<0.0128	<0.0113	---	<0.0121	---	1,080	6,800	670
Pyrene	129-00-0	<0.0115	**0.0204**	---	<0.0107	<0.0128	<0.0113	---	<0.0121	---	890	5,800	440
All other reported PAHs	---	<RL	<RL	---	<RL	<RL	<RL	---	<RL	---	---	---	---
BaP Equivalent[c]	---	0	**0.0150**	---	0	0	0	---	0	---	2	3	1.4
Metals (mg/kg)													
Arsenic, Total	7440-38-2	**3.9**	**15.7**	<5.3 [D3]	**1.7**	<1.2	**2.0**	**1.7**	**6.4**	---	9	20	5.8
Barium, Total	7440-39-3	**50.8**	**127**	**64.1**	**23.0**	**48.1**	**30.5**	**26.1**	**62.5**	---	1,100	18,000	1,700
Cadmium, Total	7440-43-9	<0.17	**0.61**	<0.80 [D3]	<0.15	<0.18	<0.15	<0.16	<0.18	---	25	200	8.8
Chromium, Total[e]	7440-47-3	**17.3**	**18.7**	**29.9**	**16.7**	**11.9**	**16.9**	**12.6**	**27.3**	---	44,000/87[e]	100,000/650[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	**4.5**	**41.6**	**6.9**	**2.4**	**5.1**	**2.7**	**2.8**	**6.4**	---	300	700	2,700
Mercury, Total	7439-97-6	**0.22**	**6.3**	**0.044**	<0.020	**0.028**	**0.027**	<0.020	**0.031**	---	0.5	1.5	3.3
Selenium, Total	7782-49-2	<1.1	<1.2	<5.3 [D3]	<1.0	<1.2	<1.0	<1.1 [M1]	<1.2	---	160	1,300	2.6
Silver, Total	7440-22-4	<0.56	<0.62	<2.7 [D3]	<0.50	<0.59	<0.51	<0.55	<0.59	---	160	1,300	7.9
Other Parameters (mg/kg)													
Diesel Range Organics (DRO)	---	---	**41.0 [T6]**	---	<8.4	<10.1	<8.6	---	---	---	NE	NE	NE
Gasoline Range Organics (GRO	---	---	<14.5	---	<10.8	<12.4	<11.5	---	---	<10.0	NE	NE	NE

Exceeds Residential SRV
Exceeds Screening SLV
Exceeds 100 mg/kg for DRO/GRO

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo(a)pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; MPCA; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

[D3] = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

[M1] = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

[T6] = High boiling point hydrocarbons are present in the sample.

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Table 3
Soil Analytical Results - Environmental Borings
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Sample Location, Course Location, and Date Collected										Residential Soil Reference Value (SRV) (mg/kg)	Industrial Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		GP-1 0-1	**GP-1 1-2**	**GP-2 0-1**	**GP-2 4-5**	**GP-3 0-1**	**GP-3 1-2**	**GP-4 1-2**	**GP-4 2-3**	**GP-5 1-2**	**GP-5 2-3**			
		Fringe - Practice Green	Fringe - Practice Green	Grassy Area	Grassy Area	Grassy Area	Grassy Area	Green	Green	Green	Green			
		05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019			
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	---	---	---	**0.305**	---	---	---	---	---	---	1,200	5,260	81
Anthracene	120-12-7	---	---	---	**0.516**	---	---	---	---	---	---	7,880	45,400	1,300
Benz(a)anthracene	56-55-3	---	---	---	**1.00**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Benzo(b)fluoranthene	205-99-2	---	---	---	**1.06**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Benzo(k)fluoranthene	207-08-9	---	---	---	**0.422**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Benzo(a)pyrene	50-32-8	---	---	---	**0.780**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Benzo(g,h,i)perylene	191-24-2	---	---	---	**0.398**	---	---	---	---	---	---	NE	NE	NE
Chrysene	218-01-9	---	---	---	**0.862**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Dibenz(a,h)anthracene	53-70-3	---	---	---	**0.138**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Fluoranthene	206-44-0	---	---	---	**2.16**	---	---	---	---	---	---	1,080	6,800	670
Fluorene	86-73-7	---	---	---	**0.303**	---	---	---	---	---	---	850	4,120	110
Indeno(1,2,3-cd)pyrene	193-39-5	---	---	---	**0.369**	---	---	---	---	---	---	cPAH	cPAH	cPAH
Naphthalene	91-20-3	---	---	---	**0.0355**	---	---	---	---	---	---	10	28	4.5
Phenanthrene	85-01-8	---	---	---	**2.05**	---	---	---	---	---	---	NE	NE	NE
Pyrene	129-00-0	---	---	---	**1.77**	---	---	---	---	---	---	890	5,800	440
All other reported PAHs	---	---	---	---	<RL	---	---	---	---	---	---	---	---	---
BaP Equivalent[c]	---	---	---	---	**1.15**	---	---	---	---	---	---	2	3	1.4
Metals (mg/kg)														
Arsenic, Total	7440-38-2	**2.1**	---	---	**2.0**	**2.2**	---	---	---	---	---	9	20	5.8
Barium, Total	7440-39-3	---	---	---	**54.5**	---	---	---	---	---	---	1,100	18,000	1,700
Cadmium, Total	7440-43-9	---	---	---	<0.16	---	---	---	---	---	---	25	200	8.8
Chromium, Total[e]	7440-47-3	---	---	---	**17.4**	---	---	---	---	---	---	44,000/87[e]	100,000/650[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	---	---	---	**20.9**	---	---	---	---	---	---	300	700	2,700
Mercury, Total	7439-97-6	<0.020	<0.019	**0.13**	**0.12**	**0.068**	**0.026**	**1.4**	**0.047**	**6.1**	**0.067**	0.5	1.5	3.3
Selenium, Total	7782-49-2	---	---	---	<1.1	---	---	---	---	---	---	160	1,300	2.6
Silver, Total	7440-22-4	---	---	---	<0.54	---	---	---	---	---	---	160	1,300	7.9

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo(a)pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; MPCA; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

Exceeds Residential SRV

Exceeds Screening SLV

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Table 3
Soil Analytical Results - Environmental Borings
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Sample Location, Course Location, and Date Collected								Residential Soil Reference Value (SRV) (mg/kg)	Industrial Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		GP-6 1-2	**GP-7 1-2**	**GP-7 3-4**	**GP-8 1-2**	**GP-8 3-4**	**GP-9 0-1'**	**GP-9 5-6'**	**Maint Berm**			
		Green	Dirt - Wash Area	Dirt - Wash Area	Dirt - Wash Area	Dirt - Wash Area	Grassy Area	Grassy Area	Berm			
		05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/10/2019			
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)												
Acenaphthene	83-32-9	---	---	---	---	---	---	<0.0120	<0.0129	1,200	5,260	81
Anthracene	120-12-7	---	---	---	---	---	---	<0.0120	<0.0129	7,880	45,400	1,300
Benz(a)anthracene	56-55-3	---	---	---	---	---	---	<0.0120	**0.0317**	cPAH	cPAH	cPAH
Benzo(b)fluoranthene	205-99-2	---	---	---	---	---	---	<0.0120	**0.0583**	cPAH	cPAH	cPAH
Benzo(k)fluoranthene	207-08-9	---	---	---	---	---	---	<0.0120	**0.0233**	cPAH	cPAH	cPAH
Benzo(a)pyrene	50-32-8	---	---	---	---	---	---	<0.0120	**0.0393**	cPAH	cPAH	cPAH
Benzo(g,h,i)perylene	191-24-2	---	---	---	---	---	---	<0.0120	**0.0343**	NE	NE	NE
Chrysene	218-01-9	---	---	---	---	---	---	<0.0120	**0.0379**	cPAH	cPAH	cPAH
Dibenz(a,h)anthracene	53-70-3	---	---	---	---	---	---	<0.0120	<0.0129	cPAH	cPAH	cPAH
Fluoranthene	206-44-0	---	---	---	---	---	---	<0.0120	**0.0695**	1,080	6,800	670
Fluorene	86-73-7	---	---	---	---	---	---	<0.0120	<0.0129	850	4,120	110
Indeno(1,2,3-cd)pyrene	193-39-5	---	---	---	---	---	---	<0.0120	**0.0264**	cPAH	cPAH	cPAH
Naphthalene	91-20-3	---	---	---	---	---	---	<0.0120	<0.0129	10	28	4.5
Phenanthrene	85-01-8	---	---	---	---	---	---	<0.0120	**0.0216**	NE	NE	NE
Pyrene	129-00-0	---	---	---	---	---	---	<0.0120	**0.0561**	890	5,800	440
All other reported PAHs	---	---	---	---	---	---	---	<RL	<RL	---	---	---
BaP Equivalent[c]	---	---	---	---	---	---	---	0	**0.0536**	2	3	1.4
Metals (mg/kg)												
Arsenic, Total	7440-38-2	---	---	---	---	---	**4.6**	**4.9**	**3.7**	9	20	5.8
Barium, Total	7440-39-3	---	---	---	---	---	**62.9**	**70.5**	**53.4**	1,100	18,000	1,700
Cadmium, Total	7440-43-9	---	---	---	---	---	<0.16	<0.18	**0.65**	25	200	8.8
Chromium, Total[e]	7440-47-3	---	---	---	---	---	**16.1**	**12.9**	**18.2**	44,000/87[e]	100,000/650[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	---	---	---	---	---	**6.3**	**6.2**	**16.5**	300	700	2,700
Mercury, Total	7439-97-6	**0.099**	**0.094**	**0.041**	**2.3**	**0.74**	**0.23**	**0.033**	**4.9**	0.5	1.5	3.3
Selenium, Total	7782-49-2	---	---	---	---	---	<1.1	<1.2	<1.2	160	1,300	2.6
Silver, Total	7440-22-4	---	---	---	---	---	<0.53	<0.59	<0.60	160	1,300	7.9

Exceeds Residential SRV
Exceeds Screening SLV

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo(a)pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; MPCA; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

Table 4
Soil Analytical Results - Surface Soil Samples
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Sample Location, Course Location, Sample Type, and Date Collected													Residential Soil Reference Value (SRV) (mg/kg)	Industrial Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		SS-1 (0-6")	**SS-2 (0-6")**	**SS-3 (0-6")**	**SS-3B (0-6")**	**SS-3C (0-6")**	**SS-3D (0-6")**	**SS-3E 0-0.5'**	**SS-3F 0-0.5'**	**SS-4 (0-6")**	**SS-5 (0-6")**	**SS-5A 0-0.5'**	**SS-5B 0-0.5'**	**SS-5C 0-0.5'**			
		Green	Practice Green	Green	Fringe	Fringe	Down Hill of Fringe	Down Hill of Fringe	Down Hill of Fringe	Green	Green	Fringe	Fringe	Fringe			
		4-Point Composite	4-Point Composite	4-Point Composite	Grab	Grab	Grab	Grab	Grab	4-Point Composite	4-Point Composite	Grab	Grab	Grab			
		04/19/2019	04/19/2019	04/19/2019	05/01/2019	05/01/2019	05/01/2019	05/10/2019	05/10/2019	04/19/2019	04/19/2019	05/10/2019	05/10/2019	05/10/2019			
Metals (mg/kg)																	
Arsenic, Total	7440-38-2	---	<1.5	---	---	---	---	---	---	---	---	---	---	---	9	20	5.8
Barium, Total	7440-39-3	---	**16.2**	---	---	---	---	---	---	---	---	---	---	---	1,100	18,000	1,700
Cadmium, Total	7440-43-9	---	<0.22	---	---	---	---	---	---	---	---	---	---	---	25	200	8.8
Chromium, Total[e]	7440-47-3	---	**6.5**	---	---	---	---	---	---	---	---	---	---	---	44,000/87[e]	100,000/650[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	---	**2.6**	---	---	---	---	---	---	---	---	---	---	---	300	700	2,700
Mercury, Total	7439-97-6	**18.6**	**0.089**	**43.4**	**17.8**	**144**	**113**	**15.1**	**9.9**	**21.1**	**45.3**	**6.5**	**46.3**	**8.2**	0.5	1.5	3.3
Selenium, Total	7782-49-2	---	<1.5	---	---	---	---	---	---	---	---	---	---	---	160	1,300	2.6
Silver, Total	7440-22-4	---	<0.74	---	---	---	---	---	---	---	---	---	---	---	160	1,300	7.9
Organochlorine Pesticides (mg/kg)																	
All reported Organochlorine Pesticide	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Toxicity Characteristic Leaching Procedure (TCLP) - Metals (mg/L)															**Regulatory Level**		
Mercury	7439-97-6	---	---	---	---	**0.0537**	**0.0885**	---	---	---	---	---	---	---	0.2		

Exceeds Residential SRV
Exceeds Screening SLV

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

TCLP Notes

Regulatory Level = Maximum Concentration of Contaminants for the Toxicity Characteristic from 40 CFR 261.24.

mg/L = Milligrams per liter.

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Table 4
Soil Analytical Results - Surface Soil Samples
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Sample Location, Course Location, Sample Type, and Date Collected												Residential Soil Reference Value (SRV) (mg/kg)	Industrial Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		SS-6 (0-1')	**SS-7 (0-1')**	**SS-8 (0-6")**	**SS-8 1-2'**	**SS-9 (0-6")**	**SS-10 (0-6")**	**SS-11 0-0.5'**	**SS-12 0-0.5'**	**SS-13 0-0.5'**	**SS-14 0-0.5'**	**SS-15 0-0.5'**	**SS-16 0-0.5'**			
		Grassy Area - Wash out	Grassy Area	Tee box	Tee box	Tee box	Fairway	Tee Box	Fairway	Fairway	Fairway	Tee Box	Fairway			
		Grab	Grab	4-Point Composite	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab			
		04/19/2019	04/19/2019	05/01/2019	05/10/2019	05/01/2019	05/01/2019	05/10/2019	05/10/2019	05/10/2019	05/10/2019	05/10/2019	05/10/2019			
Metals (mg/kg)																
Arsenic, Total	7440-38-2	**2.7**	**1.8**	---	---	---	---	---	---	---	---	---	---	9	20	5.8
Barium, Total	7440-39-3	**42.1**	**21.9**	---	---	---	---	---	---	---	---	---	---	1,100	18,000	1,700
Cadmium, Total	7440-43-9	**0.49**	<0.19	---	---	---	---	---	---	---	---	---	---	25	200	8.8
Chromium, Total[e]	7440-47-3	**17.3**	**6.6**	---	---	---	---	---	---	---	---	---	---	44,000/87[e]	100,000/650[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	**12.9**	**3.6**	---	---	---	---	---	---	---	---	---	---	300	700	2,700
Mercury, Total	7439-97-6	**2.8**	**0.25**	**6.8**	**0.030**	**0.45**	**4.7**	**5.2**	**5.0**	**5.1**	**4.4**	**7.0**	**4.5**	0.5	1.5	3.3
Selenium, Total	7782-49-2	<1.3	<1.2	---	---	---	---	---	---	---	---	---	---	160	1,300	2.6
Silver, Total	7440-22-4	<0.63	<0.62	---	---	---	---	---	---	---	---	---	---	160	1,300	7.9
Organochlorine Pesticides (mg/kg)																
All reported Organochlorine Pesticide	---	<RL	<RL	---	---	---	---	---	---	---	---	---	---	---	---	---
Toxicity Characteristic Leaching Procedure (TCLP) - Metals (mg/L)														**Regulatory Level**		
Mercury	7439-97-6	---	---	---	---	---	---	---	---	---	---	---	---	0.2		

Exceeds Residential SRV
Exceeds Screening SLV

Notes
Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.
mg/kg = Milligrams per kilogram.
< = Not detected at or above the laboratory reporting limit indicated.
--- = Not analyzed or calculated for this parameter or not applicable.
RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.
NE = Regulatory limit not established for this parameter.
[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

TCLP Notes
Regulatory Level = Maximum Concentration of Contaminants for the Toxicity Characteristic from 40 CFR 261.24.
mg/L = Milligrams per liter.

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Table 5
Cumulative Soil Analytical Results - Mercury
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Sample Identifier	Date Collected	Mercury, Total (mg/kg)	Mercury, TCLP (mg/L)
ST-2 (0-2)	04/12/2019	**0.22**	---
ST-3 (0-2)	04/13/2019	**6.3**	---
ST-5 (1-3)	04/12/2019	**0.044**	---
ST-6 (2-4)	04/12/2019	<0.020	---
ST-8 (5-7)	04/13/2019	**0.028**	---
ST-10 (1-3)	04/12/2019	**0.027**	---
ST-11 (4-6)	04/13/2019	<0.020	---
ST-12 (2-4)	04/13/2019	**0.031**	---
Trip Blank-SL	04/13/2019	---	---
GP-1 0-1	05/07/2019	<0.020	---
GP-1 1-2	05/07/2019	<0.019	---
GP-2 0-1	05/07/2019	**0.13**	---
GP-2 4-5	05/07/2019	**0.12**	---
GP-3 0-1	05/07/2019	**0.068**	---
GP-3 1-2	05/07/2019	**0.026**	---
GP-4 1-2	05/07/2019	**1.4**	---
GP-4 2-3	05/07/2019	**0.047**	---
GP-5 1-2	05/07/2019	**6.1**	---
GP-5 2-3	05/07/2019	**0.067**	---
GP-6 1-2	05/07/2019	**0.099**	---
GP-7 1-2	05/07/2019	**0.094**	---
GP-7 3-4	05/07/2019	**0.041**	---
GP-8 1-2	05/07/2019	**2.3**	---
GP-8 3-4	05/07/2019	**0.74**	---
GP-9 0-1'	05/07/2019	**0.23**	---
GP-9 5-6'	05/07/2019	**0.033**	---
Maint Berm	05/10/2019	**4.9**	---
Residential Soil Reference Value		0.5	---
Industrial Soil Reference Value		1.5	---
Soil Screening Leaching Value		3.3	---
Regulatory Criterion		---	0.2

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

TCLP Notes

Regulatory Level = Maximum Concentration of Contaminants for the Toxicity Characteristic from 40 CFR 261.24.

mg/L = Milligrams per liter.

Exceeds Residential SRV
Exceeds Screening SLV

Table 5
Cumulative Soil Analytical Results - Mercury
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Sample Identifier	Date Collected	Mercury, Total (mg/kg)	Mercury, TCLP (mg/L)
SS-1 (0-6'')	04/19/2019	**18.6**	---
SS-2 (0-6'')	04/19/2019	**0.089**	---
SS-3 (0-6'')	04/19/2019	**43.4**	---
SS-3B (0-6')	05/01/2019	**17.8**	---
SS-3C (0-6')	05/01/2019	**144**	**0.0537**
SS-3D (0-6')	05/01/2019	**113**	**0.0885**
SS-3E 0-0.5	05/10/2019	**15.1**	---
SS-3F 0-0.5	05/10/2019	**9.9**	---
SS-4 (0-6'')	04/19/2019	**21.1**	---
SS-5 (0-6'')	04/19/2019	**45.3**	---
SS-5A 0-0.5	05/10/2019	**6.5**	---
SS-5B 0-0.5	05/10/2019	**46.3**	---
SS-5C 0-0.5	05/10/2019	**8.2**	---
SS-6 (0-1')	04/19/2019	**2.8**	---
SS-7 (0-1')	04/19/2019	**0.25**	---
SS-8 (0-6')	05/01/2019	**6.8**	---
SS-8 1-2	05/10/2019	**0.030**	---
SS-9 (0-6')	05/01/2019	**0.45**	---
SS-10 (0-6')	05/01/2019	**4.7**	---
SS-11 0-0.5	05/10/2019	**5.2**	---
SS-12 0-0.5	05/10/2019	**5.0**	---
SS-13 0-0.5	05/10/2019	**5.1**	---
SS-14 0-0.5	05/10/2019	**4.4**	---
SS-15 0-0.5	05/10/2019	**7.0**	---
SS-16 0-0.5	05/10/2019	**4.5**	---
Residential Soil Reference Value		0.5	---
Industrial Soil Reference Value		1.5	---
Soil Screening Leaching Value		3.3	---
Regulatory Criterion		---	0.2

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

TCLP Notes

Regulatory Level = Maximum Concentration of Contaminants for the Toxicity Characteristic from 40 CFR 261.24.

mg/L = Milligrams per liter.

Exceeds Residential SRV
Exceeds Screening SLV

Table 6
Groundwater Analytical Results
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier, Depth to Groundwater, and Date Collected					Drinking Water Criteria (µg/L)	Source-Date
		ST-3 W	**ST-8 W**	**ST-12 W**	**Trip Blank-WT**	**GP-8**		
		9.4'	5.4'	13.9'	---	4.5'		
		04/13/2019	04/13/2019	04/13/2019	04/13/2019	05/07/2019		
Volatile Organic Compounds (VOCs) (µg/L)								
All reported VOCs	---	<RL	<RL	---	<RL	---	---	---
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)								
All reported PAHs	---	<RL	---	<RL	---	---	---	---
BaP Equivalent[c]	---	0	---	0	---	---	0.06	HBV-12
Metals (µg/L)								
Arsenic, Dissolved	7440-38-2	<20.0	---	<20.0	---	<20.0	10	MCL
Barium, Dissolved	7440-39-3	**125**	---	**15.2**	---	**153**	2,000	HRL-93
Cadmium, Dissolved	7440-43-9	<3.0	---	<3.0	---	<3.0	0.5	HRL-15
Chromium, Dissolved[d]	7440-47-3	<10.0	---	<10.0	---	<10.0	20,000/100[d]	HRL-94
Lead, Dissolved	7439-92-1	<10.0	---	<10.0	---	<10.0	15	MCL
Mercury, Dissolved	7439-97-6	<0.20	---	<0.20	---	<0.20	2	MCL
Selenium, Dissolved	7782-49-2	<20.0	---	<20.0	---	<20.0	30	HRL-93
Silver, Dissolved	7440-22-4	<10.0	---	<10.0	---	<10.0	30	HRL-93
Organochlorine Pesticides (µg/L)								
All reported Organochlorine Pesticides	---	<RL	---	<RL	---	<RL	---	---
Other Parameters (µg/L)								
Diesel Range Organics (DRO)	---	<140	**540 [T6]**	<140	---	---	200	HBV[e]
Gasoline Range Organics (GRO)	---	<100	---	---	<100	---	200	HBV[e]

Notes

Drinking Water Criteria = The most conservative value for chronic or cancer exposures provided from the following sources including the Minnesota Department of Health (MDH) Health Risk Limit (HRL), MDH Health Based Value (HBV), MDH Risk Assessment Advice (RAA) or Maximum Contaminant Level (MCL). The date of promulgation is provided, if available. Values updated 7/27/16.

µg/L = Micrograms per liter.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo[a]pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; Minnesota Pollution Control Agency; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[d] = Reported result is total chromium, criteria for chromium III and chromium VI are provided.

[e] = Provisional MDH Health Based Value for total petroleum hydrocarbons (sum of DRO and GRO).

[T6] = High boiling point hydrocarbons are present in the sample.

Exceeds Drinking Water Criteria

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Table 7
Soil Vapor Analytical Results
Former Hillcrest Golf Course
St. Paul, Minnesota
Project B1903316

Compound/Parameter	CAS No.	Sample Identifier and Date Collected			Residential ISV ($\mu g/m^3$)	33X Residential ISV ($\mu g/m^3$)
		SSV-1	**SV-1**	**SV-2**		
		Sub-slab	Soil Vapor	Soil Vapor		
		05/07/2019	05/07/2019	05/07/2019		
Volatile Organic Compounds (VOCs) ($\mu g/m^3$)						
Acetone	67-64-1	**58.5**	**48.6**	**30.3**	31,000	1,000,000
Benzene	71-43-2	<0.50	**31.4**	**2.8**	4.6	150
2-Butanone (Methyl ethyl ketone, MEK)	78-93-3	<4.6	**13.0**	**5.7**	5,000	170,000
Carbon disulfide	75-15-0	<0.98	**3.7**	<0.94	700	23,000
Chloromethane	74-87-3	<0.65	<0.66	**1.0**	90	3,000
Cyclohexane	110-82-7	<2.7	**7.1**	<2.6	6,000	200,000
1,3-Dichlorobenzene	541-73-1	<1.9	**99.8**	**28.0**	NE	NE
Dichlorodifluoromethane	75-71-8	**2.1**	**5.7**	**2.2**	200	6,700
Ethanol	64-17-5	**31.7**	**86.7**	**43.4**	15,000	500,000
Ethyl acetate	141-78-6	<1.1	**7.3**	**3.1**	3,000	100,000
Ethylbenzene	100-41-4	<1.4	**3.0**	**1.6**	4.1	140
n-Heptane	142-82-5	<1.3	**15.3**	**4.0**	NE	NE
n-Hexane	110-54-3	**21.7**	**44.6**	**3.1**	2,000	67,000
Methylene chloride (Dichloromethane)	75-09-2	**12.8**	<5.6	<5.3	630	21,000
2-Propanol (Isopropyl alcohol)	67-63-0	<9.7	**165**	**69.5**	7,000	230,000
Propylene	115-07-1	<1.4	**639** [E]	**89.2** [E]	3,000	100,000
Tetrahydrofuran	109-99-9	**7.8**	<0.95	<0.89	NE	NE
Toluene	108-88-3	<1.2	**18.8**	**5.8**	5,200	170,000
1,2,4-Trimethylbenzene	95-63-6	**2.8**	**3.4**	**2.2**	63	2,100
Xylenes, m- & p-	179601-23-1	<2.7	**6.8**	**4.2**	100[b]	3,300[b]
Xylene, o-	95-47-6	<1.4	**3.0**	**2.0**	100[b]	3,300[b]
All other Reported VOCs	---	<RL	<RL	<RL	---	---

Notes

Minnesota Pollution Control Agency (MPCA) Intrusion Screening Value (ISV) is a Revised Interim ISV if established. ISVs updated 2/13/2017.

$\mu g/m^3$ = Micrograms per cubic meter.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

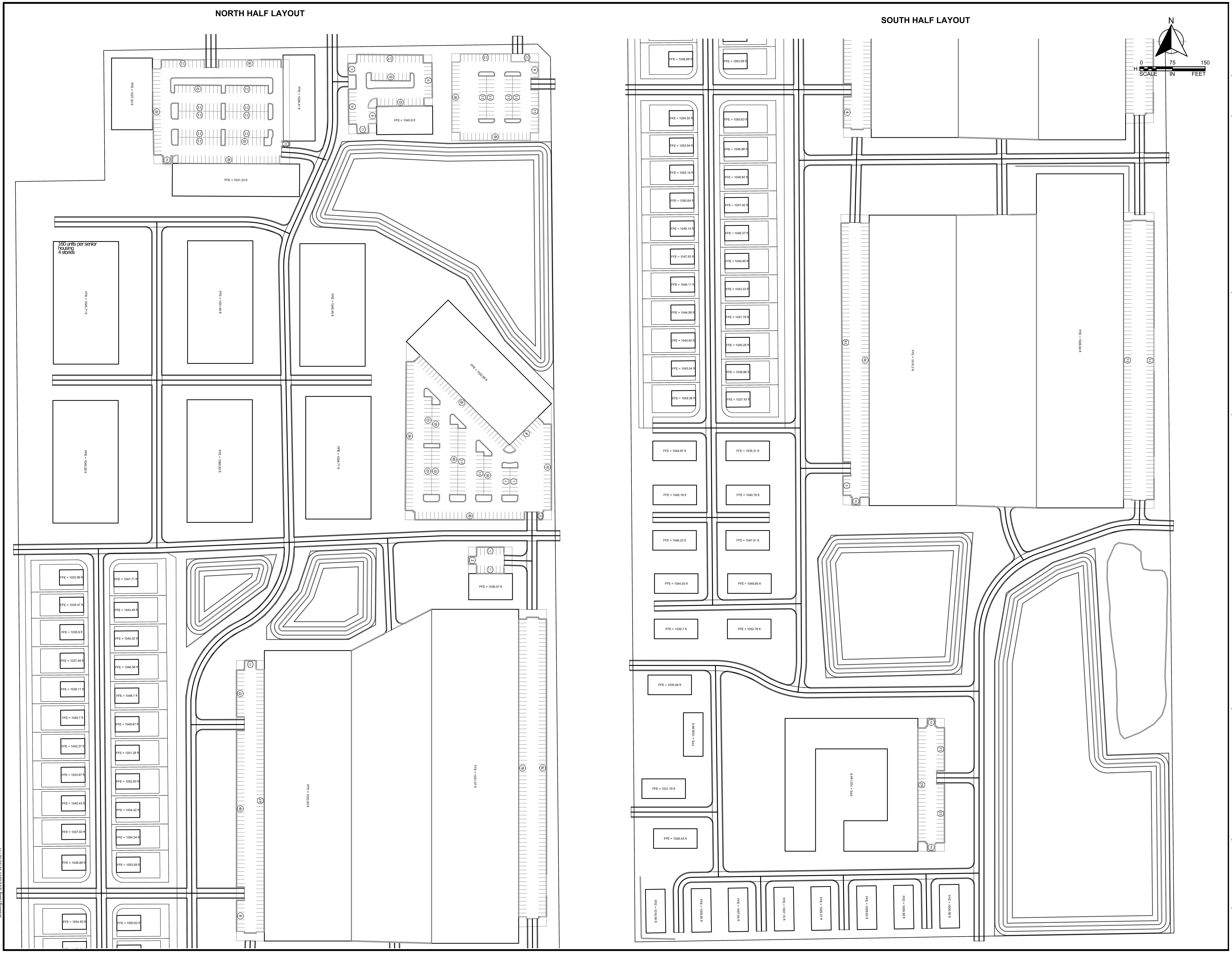
[b] = Regulatory limit for combination of m-, p-, and o-xylenes.

[E] = Analyte concentration exceeded the calibration range. The reported result is estimated.

Exceeds 33X Residential ISV

Appendix A

Preliminary Development Schematics



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PLAN BY: ####
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REVISIONS

NO.	DATE	DESCRIPTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

####

DATE: ####
LIC. NO: ####

HILLCREST - FOURE

ENLARGED

Applicant/Developer:
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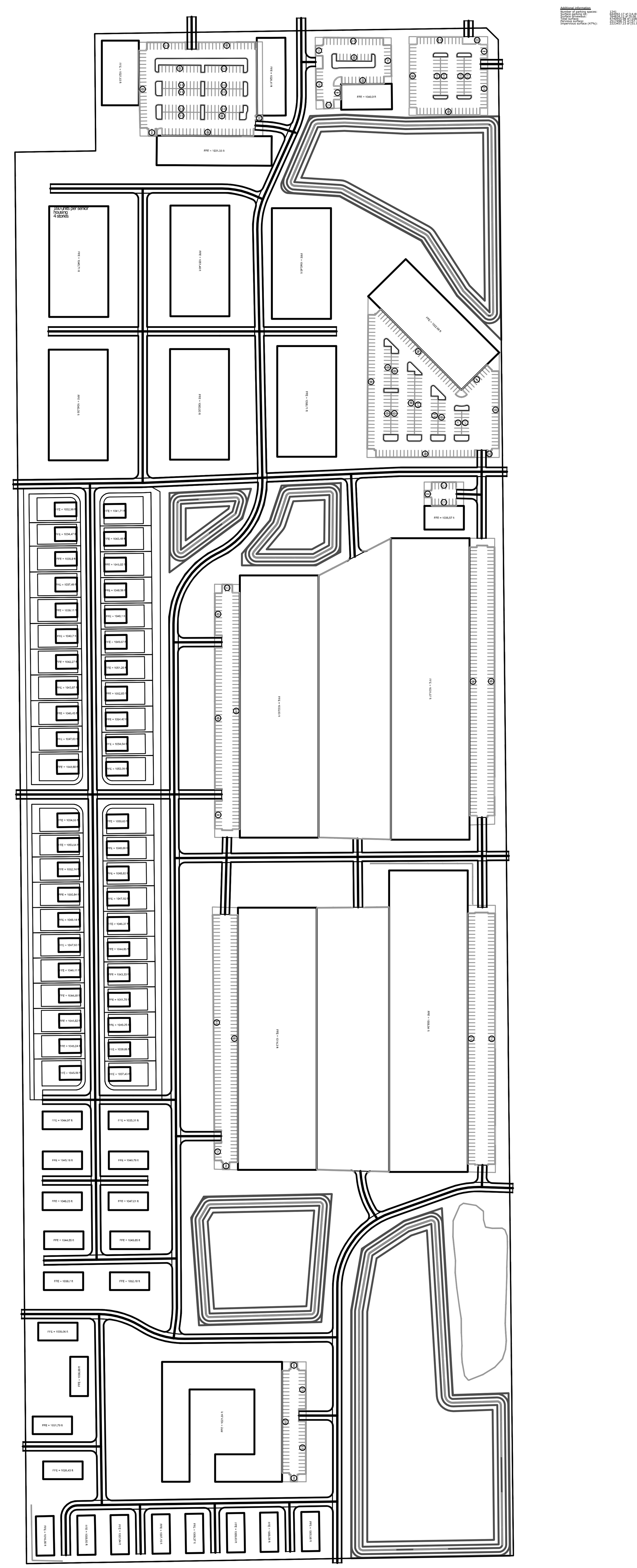

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NO.	DATE	DESCRIPTION

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HILLCREST - FOURE

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Appendix B

Previous Investigation Data

Landmark Environmental LLC

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BY:

Phase II Environmental Investigation Report
Hillcrest Golf Course
St. Paul, MN

Prepared for
United Association of Steamfitters-Pipefitters
Service Technicians

January 2011

2042 W. 98th Street Bloomington, Minnesota 55431 Phone: (952) 887-9601 Fax: (952) 887-9605 www.landmarkenv.com

Tables

Table 1
Summary of Investigation Rationale and Analytical Sampling
Hillcrest Golf Club Phase II Investigation
St. Paul, Minnesota
January 2011

Location ID	Sample Media	Depth (ft bgs)	Analysis	Location Rationale
LGP-1	Soil	5	Soil sample LGP-1/2.5-5 for on-site VOCs, GRO and TPH as diesel fuel	Located on north side of former gasoline UST basin, south of Maintenance Building (MPCA LEAK #6222)
LGP-2	Soil and Groundwater	10	Soil sample LGP-2/2.5-5 and groundwater sample LGP-2/3-5 for on-site VOCs, GRO and TPH as diesel fuel. Also duplicate soil and groundwater samples for GRO and VOC analysis at Pace	Located on south side of former gasoline UST basin, south of Maintenance Building (MPCA LEAK # 6222)
LGP-3	Soil and Groundwater	10	Soil sample LGP-3/0-2.5 and groundwater sample LGP-3/3-5 for on-site VOCs, GRO and TPH as diesel fuel.	Located on south side of active gasoline UST basin, south of Maintenance Building
LGP-4	Soil and Groundwater	10	Soil sample LGP-4/0-1 and groundwater sample LGP-4/3-5 for on-site VOCs, GRO and TPH as diesel fuel. Soil sample LGP-4/0-1 for DRO analysis at Pace	Located on southwest side of Maintenance Building next to diesel AST
LGP-5	Soil and Groundwater	5	Soil sample LGP-5/1-2 and groundwater sample LGP-5/3-5 for on-site VOCs, GRO and TPH as diesel fuel. Soil sample LGP-5/1-2 for DRO analysis at Pace	Located in Maintenance Building shop, between trench drain and oil-water separator. Also downgradient location of former septic drain field
LGP-6	Soil and Groundwater	5	Soil sample LGP-6/1-2 and groundwater sample LGP-6/3-5 for on-site VOCs, GRO and TPH as diesel fuel.	Located in western portion of Maintenance Building, next to gasoline storage cabinet and 12 feet north (upgradient) of diesel AST
LGP-7	Soil and Groundwater	10	Soil sample LGP-7/2-3 and groundwater sample LGP-7/3-5 for on-site VOCs, GRO and TPH as diesel fuel.	Located along northwest corner of Maintenance Building, west of former septic drain field
LGP-8	Soil and Groundwater	5	Soil sample LGP-8/0-1 and groundwater sample LGP-8/3-5 for on-site VOCs, GRO and TPH as diesel fuel.	Located west of Maintenance Building, along south side (downgradient) of Wash Pad area
LGP-9	Soil and Groundwater	10	Soil sample LGP-9/0-1 and groundwater sample LGP-9/3-5 for on-site VOCs, GRO and TPH as diesel fuel.	Located west of Maintenance Building, along north side (upgradient) of Wash Pad area

Table 1
Summary of Investigation Rationale and Analytical Sampling
Hillcrest Golf Club Phase II Investigation
St. Paul, Minnesota
January 2011

LGP-10	Soil	5	Soil sample LGP-10/1-2 for on-site VOCs, GRO and TPH as diesel fuel as well as DRO analysis at Pace	Located on northwest side of Maintenance Storage Building, potential former location of diesel AST (MPCA LEAK #5050)
LGP-11	Soil	5	Soil sample LGP-11/1-2 for on-site VOCs, GRO and TPH as diesel fuel as well as DRO analysis at Pace	Located on northwest side of Maintenance Storage Building, likely former location of diesel AST (MPCA LEAK #5050)
LGP-12	Soil and Groundwater	10	Soil sample LGP-12/3-4 and groundwater sample LGP-12/3-5 for on-site VOCs, GRO and TPH as diesel fuel	Located on south side of former gasoline UST basin, north of Maintenance Storage Building (MPCA LEAK # 6222)
LGP-13	Soil	10	Soil sample LGP-13/3-4 for on-site VOCs, GRO and TPH as diesel fuel	Located on west side of former gasoline UST basin, north of Maintenance Storage Building (MPCA LEAK # 6222)
LGP-14	Soil and Groundwater	10	Soil sample LGP-14/3-4 and groundwater sample LGP-14/3-5 for on-site VOCs, GRO and TPH as diesel fuel	Located on north side of former gasoline UST basin, north of Maintenance Storage Building (MPCA LEAK # 6222)
LGP-15	Soil	5	Soil sample LGP-15/2-4 for PAH and RCRA metals analysis at Pace	Located on southwest side of soil mound and suspect import fill material from McKnight Road construction
LGP-16	Soil	4	Soil sample LGP-16/2-4 for PAH and RCRA metals analysis at Pace	Located on southeast side of soil mound and suspect import fill material from McKnight Road construction
LGP-17	Soil	4	Soil sample LGP-17/1-3 for PAH and RCRA metals analysis at Pace	Located on northeast side of soil mound and suspect import fill material from McKnight Road construction
LGP-18	Soil	5	Soil sample LGP-18/1-3 for on-site VOCs, GRO and TPH as diesel fuel as well as PAH and RCRA metals analysis at Pace	Located in northern portion of Property, along east side of Electric Cart Storage Buildings, beneath cart path

Table 2
Soil Analytical Results (in milligrams per kilogram)
Hillcrest Golf Course--St. Paul, Minnesota
January 2011

Parameter	MPCA Recreational SRVs	MPCA Industrial SRVs	MPCA Residential SRVs	LGP-10/1-2 Pace	LGP-10/1-2 MESA	LGP-11/1-2 Pace	LGP-11/1-2 MESA	LGP-12/3-4 MESA	LGP-13/3-4 MESA	LGP-14/3-4 MESA	LGP-15/1-3 Pace	LGP-16/2-4 Pace	LGP-17/1-3 Pace	LGP-18/1-3 Pace	LGP-18/1-3 MESA
Detectable Resource Conservation and Recovery Act (RCRA) Metals															
Arsenic	11	20	9	NA	NA	NA	NA	NA	NA	NA	2.5	0.60	4.2	1.7	NA
Barium	1100	18000	1100	NA	NA	NA	NA	NA	NA	NA	94.6	84.4	71.8	46.5	NA
Cadmium	35	200	25	NA	NA	NA	NA	NA	NA	NA	0.88	0.17	0.14	0.10	NA
Chromium	120/60000	650/100000	87/44000	NA	NA	NA	NA	NA	NA	NA	18.3	14.8	13.7	17.4	NA
Lead	300	700	300	NA	NA	NA	NA	NA	NA	NA	38.4	11.6	8.7	11.1	NA
Mercury	1.2	1.5	.5	NA	NA	NA	NA	NA	NA	NA	**0.76**	0.048	0.046	0.025	NA
Detectable Volatile Organic Compounds (VOCs)															
1,2,4-Trichlorobenzene	290	985	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	20	25	8	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
1,3,5-Trimethylbenzene	8	10	3	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
Benzene	14	10	6	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
Ethylbenzene	200	200	200	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
Naphthalene	24	28	10	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
Xylene (Total)	110	130	45	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
n-Butylbenzene	70	92	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	70	93	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Detectable Polynuclear Aromatic Hydrocarbons (PAHs)															
Acenaphthene	1860	5260	1200	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.021	NA
Acenaphthylene	ns	ns	ns	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.026	NA
Anthracene	10000	45400	7880	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.065	NA
Benzo(a)anthracene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.23	NA
Benzo(a)pyrene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.28	NA
Benzo(b)fluoranthene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.37	NA
Benzo(g,h,i)perylene	ns	ns	ns	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.23	NA
Benzo(k)fluoranthene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.15	NA
Chrysene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.30	NA
Fluoranthene	1290	6800	1080	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.46	NA
Fluorene	1200	4120	850	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.016	NA
Indeno(1,2,3-cd)pyrene	see B(a)P eq.	see B(a)P eq.	see B(a)P eq.	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.19	NA
Phenanthrene	ns	ns	ns	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.21	NA
Pyrene	1060	5800	890	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.37	NA
B(a)P eq.	2	3	2	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA
Diesel Range Organics	ns	ns	ns	561	NA	143	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Diesel	ns	ns	ns	NA	ND	NA	ND	54	20.4	ND	NA	NA	NA	NA	ND
Gasoline Range Organics	ns	ns	ns	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND
PID Reading	Petroleum Action Level 10 ppm			ND		ND		ND	ND	ND	ND	ND	ND	ND	ND

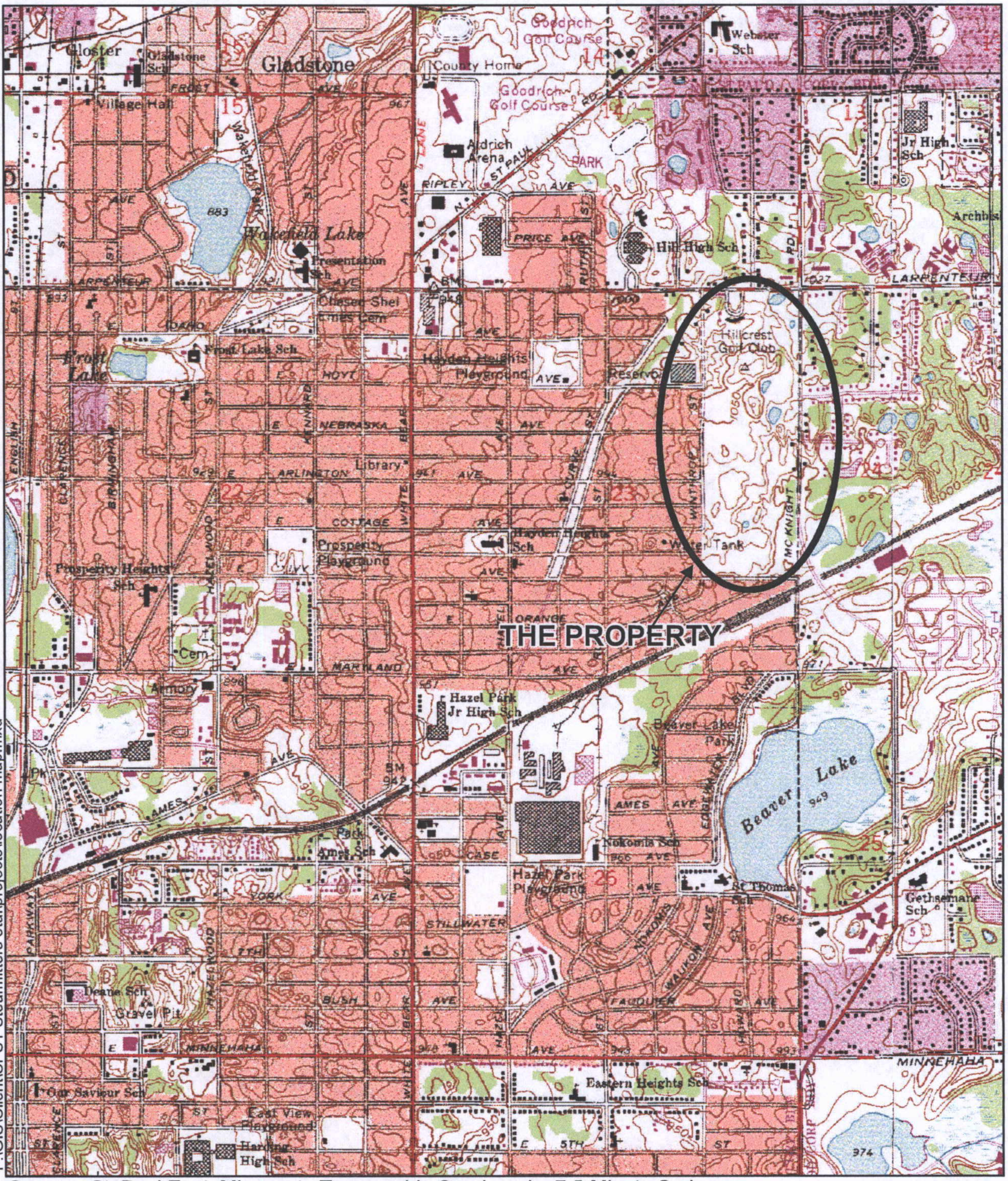
MPCA = Minnesota Pollution Control Agency
SRV = Soil Reference Value
ns = no standard
ND = Not Detected Above Method Detection Limits
NA = Not Analyzed
B(a)P eq. = Benzo(a)Pyrene Equivelant
TPH = Total Petroleum Hydrocarbons
PID = Photoionization Detector
ppm = parts per million
BOLD = Indicates exceedence of screening criteria

Table 3
Groundwater Analytical Results
(in micrograms per liter)
Hillcrest Golf Course--St. Paul, Minnesota
January 2011

Parameter	MDH Health Risk Limits 5/09	MPCA GW ISV	LGP-2/3-5 Pace	LGP-2/3-5 MESA	LGP-3/3-5 MESA	LGP-4/3-5 MESA	LGP-4/3-5 MESA	LGP-5/3-5 MESA	LGP-6/3-5 MESA	LGP-7/3-5 MESA	LGP-8/3-5 MESA	LGP-9/3-5 MESA	LGP-12/3-5 MESA	LGP-14/3-5 MESA
Detectable Volatile Organic Compounds (VOCs)														
cis 1,2-dichloroethylene	70	500	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	ND	ND
1,2,4-Trimethylbenzene	ns	70	5.1	6.1	ND	ND	6.3	ND	ND	ND	ND	ND	ND	ND
GRO	ns	ns	5.9	ND	ND	208	163	ND	ND	ND	ND	ND	ND	ND
TPH as Diesel	200	ns	NA	ND	ND	**1934**	**1138**	ND	ND	ND	ND	ND	ND	ND

MDH = Minnesota Department of Health
MPCA = Minnesota Pollution Control Agency
GRO = Gasoline Range Organics
TPH = Total Petroleum Hydrocarbons
GW ISV = Groundwater Screening Values for Vapor Intrusion Pathway
BOLD = Indicates exceedence of screening criteria

Figures



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Source: St. Paul East, Minnesota Topographic Quadrangle, 7.5-Minute Series

N

2,000 1,000 0 2,000 Feet

FIGURE 1

PROPERTY LOCATION MAP
2200 Larpenteur Avenue E and
1475 McKnight Road N
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC

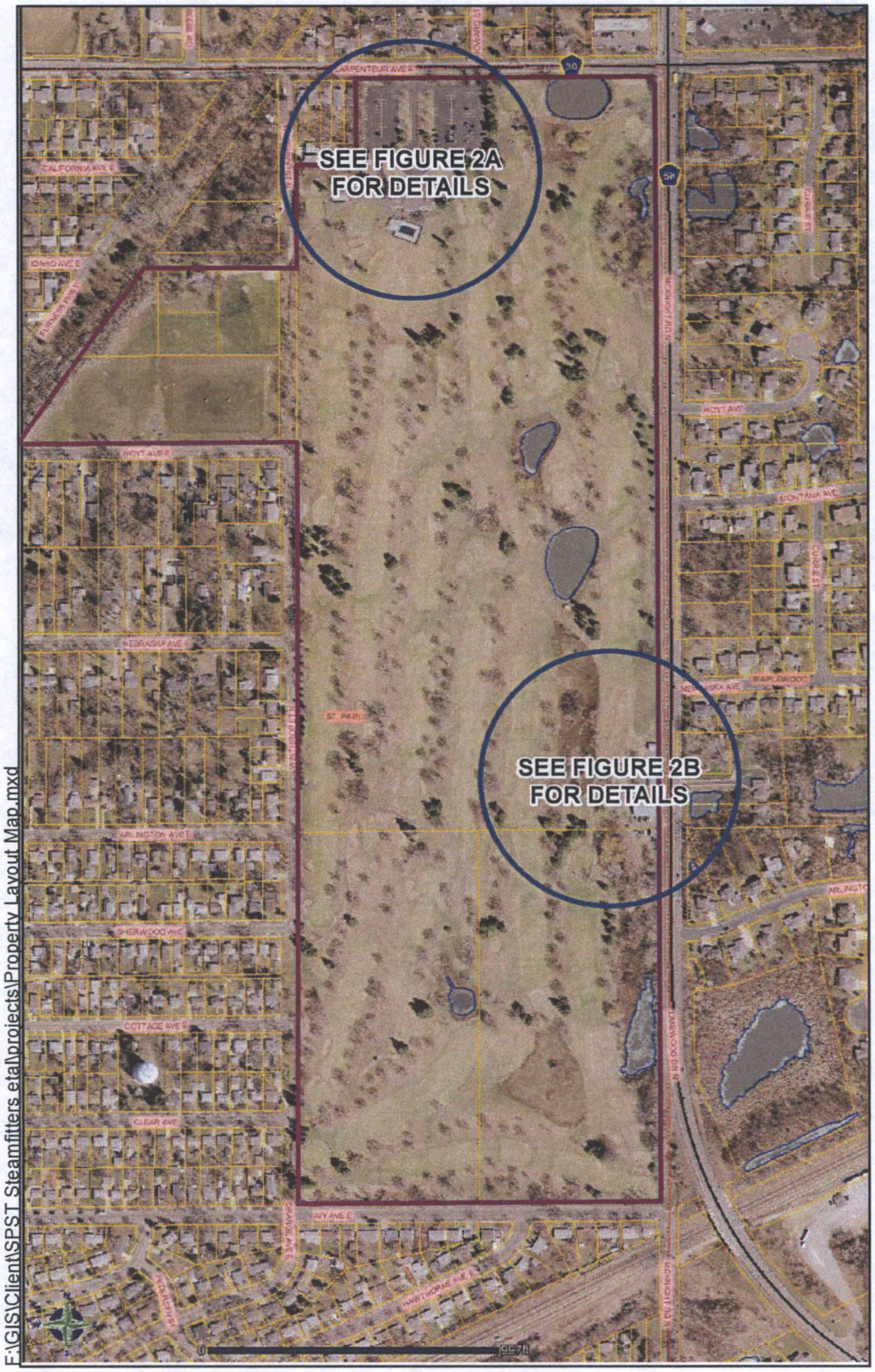

FIGURE 2

PROPERTY LAYOUT MAP
2200 Larpenteur Avenue E and
1475 McKnight Road N
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC

LEGEND

● Geoprobe Location

FIGURE 2A

CLUBHOUSE AREA LAYOUT
WITH INVESTIGATION LOCATIONS
2200 Larpenteur Avenue North
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC

Appendix C

Soil Boring Logs

BRAUN INTERTEC
The Science You Build On.

LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING:	**ST-1**
		LOCATION: See attached sketch	
		NORTHING: 173294.1	EASTING: 596927.5
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/12/19	END DATE: 04/12/19
SURFACE ELEVATION: 1030.6 ft RIG: GP-2	METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1029.7 0.9		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL FILL)			0.0		
		FILL: CLAYEY SAND (SC), trace roots, dark brown, moist	X	1-2-2 (4) 17"	0.0	16	
1024.6 6.0			X	2-2-3 (5) 16"	0.0	14	
		CLAYEY SAND (SC), trace Cobbles, reddish brown, moist (GLACIAL TILL)	X	3-2-3 (5) 15"	0.0		
			X	4-10-10 (20) 18"	0.0		
			X	12-13-15 (28) 18"	0.0		
		No odors *Cobbles at 15 feet*	X	20-18-14 (32) 16"	0.0		
1009.6 21.0			X	9-9-9 (18) 18"			
		END OF BORING Boring immediately grouted					

LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING: **ST-2**	
		LOCATION: See attached sketch	
		NORTHING: 172890.6	EASTING: 596923.8
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/12/19	END DATE: 04/12/19
SURFACE ELEVATION: 1037.5 ft	RIG: GP-2 / METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		FILL: CLAYEY SAND (SC), trace Gravel, trace organic, gray to dark brown, moist *Mixed with Poorly Graded Sand* *No odor, possible fertilizer*		50/3" (REF) 6"	0.0		Soil sample ST-2 (0-2') collected for VOC and RCRA
1032.5 5.0		END OF BORING Boring immediately backfilled		50/2" (REF) 3"			Auger met refusal at 5 feet. Boring offset 2 times with refusal at 5 feet.

Depth scale: 5, 10, 15, 20, 25, 30

LOG OF BORING

BRAUN INTERTEC
The Science You Build On.

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING:	**ST-3**
		LOCATION: See attached sketch	
		NORTHING: 173268.2	EASTING: 597749.3
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1024.0 ft	RIG: GP-2 / METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1022.0 / 2.0		FILL: CLAYEY SAND (SC), with roots, intermixed with Sand, black to brown, moist			0.1		Soil sample ST-3 (0-2') @ 08:30 collected for VOC, DRO, GRO, RCRA, and PAH
1020.0 / 4.0		FILL: SANDY LEAN CLAY (CL), trace roots, dark brown to black, moist	X	2-2-3 (5) 18"	0.0	10	
1017.0 / 7.0		ORGANIC CLAY (OL), black to gray, moist (SWAMP DEPOSIT)	X	2-3-4 (7) 16"	0.1 0.0	48	OC=9.5% Soil sample ST-3 (5-7') collected for RCRA
1015.0 / 9.0		LEAN CLAY (CL), black to gray, wet, medium (ALLUVIUM)	X	0-1-3 (4) 17"	0.0	26	Water sample ST-3W @ 09:00 collected for analytical testing
1013.0 / 11.0	▼	CLAYEY SAND (SC), brown to gray, moist, stiff (ALLUVIUM)	X	2-3-3 (6) 15"	0.0		
1010.0 / 14.0		SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, wet, loose (GLACIAL TILL)	X	0-4-5 (9) 15"	0.0		Temporary well installed with screen set from 9.3 to 14.3 feet
1007.0 / 17.0		SANDY SILT (ML), gray, wet, loose (GLACIOFLUVIUM)	X	2-3-3 (6) 18"	0.0		
1003.0 / 21.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist, stiff to very stiff (GLACIAL TILL)	X X	1-2-9 (11) 16" 12-12-12 (24) 50"	0.0		
		END OF BORING Boring immediately grouted					Water observed at 9.4 feet with 21.0 feet of tooling in the ground at end of drilling.

LOG OF BORING

BRAUN INTERTEC
The Science You Build On.

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**ST-4**		
LOCATION: See attached sketch			
NORTHING: 172391.3		EASTING: 597672.9	
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1037.0 ft	RIG: GP-2	METHOD: 3 1/4" HSA	SURFACING: Grass
WEATHER: Snow			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		ORGANIC SILT (OL), with roots, wood fragments, black, wet (SWAMP DEPOSIT)			0.1		
			X	2-2-2 (4) 22"	0.1	69	OC=12.9%
1033.0 / 4.0		SANDY SILT (ML), contains layers of Lean Clay, gray, wet, very loose (ALLUVIUM)	5 X	0-1-1 (2) 12"	0.4 / 0.1	30	Soil sample ST-4 (4-6') collected for RCRA
			X	0-0-3 (3) 18"	0.1		
1028.0 / 9.0	▽	CLAYEY SAND (SC), trace Gravel, brown, moist, stiff (GLACIAL TILL)	10 X	7-7-7 (14) 16"	0.0		
			X	6-7-8 (15) 14"	0.0		
			15 X	4-6-7 (13) 16"	0.0		
					0.0		
			20 X	4-5-6 (11) 18"			
1016.0 / 21.0		END OF BORING Boring immediately grouted					Water observed at 9.0 feet with 21.0 feet of tooling in the ground while drilling.
			25				
			30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**ST-5**		
LOCATION: See attached sketch			
NORTHING:	172462.1	EASTING:	596967.5
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/12/19	END DATE: 04/12/19
SURFACE ELEVATION: 1056.4 ft	RIG: GP-2	METHOD: 3 1/4" HSA	SURFACING: Grass
WEATHER: Snow			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), with roots, moist (TOPSOIL)			0.0		Soil sample ST-5 (1-3') @ 13:40 collected for analytical testing
1054.4 / 2.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist, stiff to very stiff (GLACIAL TILL)	X	2-3-4 (7) 20"	0.0	12	
			X	5-8-6 (14) 18"	0.0		
			X	4-6-9 (15) 16"	0.0		
			X	10-9-4 (13) 17"	0.0		
			X	9-7-10 (17) 17"	0.0		
			X	12-10-10 (20) 20"	0.0		
			X	20-17-16 (33) 18"	0.0		
			X	13-14 (14) 13"	0.0		
1035.4 / 21.0		END OF BORING Boring immediately grouted			0.0		

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING:	**ST-6**
		LOCATION: See attached sketch	
		NORTHING: 171710.8	EASTING: 596769.2
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/12/19	END DATE: 04/12/19
SURFACE ELEVATION: 1061.0 ft	RIG: GP-2 / METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1060.1 0.9		CLAYEY SAND (SC), with roots, dark brown, moist (TOPSOIL)			0.0		
1057.0 4.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist, medium dense (GLACIAL TILL)	X	6-7-11 (18) 18"	0.0	11	Soil sample ST-6 (2-4') @ 15:00 collected for VOC, DRO, GRO, RCRA, and PAH
1040.0 21.0		SILTY SAND (SM), fine to medium sand, reddish brown, moist, medium dense (GLACIAL TILL)	X (5)	8-8-9 (17) 18"	0.0		
			X	13-12-12 (24) 15"	0.0		
			X (10)	10-11-13 (24) 16"	0.0		
			X	14-12-13 (25) 18"	0.0		
			X (15)	15-15-10 (25) 16"	0.0		
			X (20)	15-14-16 (30) 17"			
		END OF BORING Boring immediately grouted	25 30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**ST-7**		
LOCATION: See attached sketch			
NORTHING:	171432.8	EASTING:	597530.4
DRILLER:	A. Holmbo	LOGGED BY:	S. Martin
START DATE:	04/13/19	END DATE:	04/13/19
SURFACE ELEVATION:	1022.3 ft	RIG:	GP-2
METHOD:	3 1/4" HSA	SURFACING:	Grass
WEATHER:	Snow		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1021.4 / 0.9		CLAYEY SAND (SC), with roots, black, moist (TOPSOIL)					
1018.3 / 4.0		ORGANIC SILT (OL), with roots, dark brown, wet, very loose (ALLUVIUM)		1-1-1 (2) 16"		27	OC=3.0%
1008.3 / 14.0		CLAYEY SAND (SC), trace Gravel, brown to reddish brown, moist, medium to very stiff (GLACIAL TILL)	5	3-2-3 (5) 15"			
				0-5-8 (13) 17"			
			10	6-10-10 (20) 18"			
				3-8-8 (16) 16"			
1001.3 / 21.0	▽	SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, wet, loose (GLACIAL TILL)	15	1-2-3 (5) 16"			
			20	3-3-5 (8) 14"			Water observed at 15.0 feet with 21.0 feet of tooling in the ground while drilling.
		END OF BORING Boring immediately grouted	25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING:	**ST-8**
		LOCATION: See attached sketch	
		NORTHING: 170892.6	EASTING: 597738.5
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1001.0 ft	RIG: GP-2 / METHOD: 3 1/4" HSA	SURFACING: Bituminous	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1000.7 0.3		BITUMINOUS, 3 inches of bituminous					
		FILL: LEAN CLAY (CL)				19	
997.0 4.0			X	0-0-0 WOH/18" 4"	0.1		
	▼	LEAN CLAY (CL), with roots, gray to brown, wet, soft (ALLUVIUM)	5 X	0-0-2 (2) 16"	0.1	26	Water sample ST-8W @ 10:45 collected for analytical testing
994.0 7.0	▽	CLAYEY SAND (SC), trace Gravel, brown, moist to wet, soft to very stiff (GLACIAL TILL)	X	0-0-3 (3) 18"	0.1		Soil sample ST-8 (5-7’) @ 10:45 collected for VOC, DRO, GRO, RCRA, and PAH
			10 X	3-5-8 (13) 16"	0.0		Temporary well installed with a screen set from 5.4 to 10.4 feet
			X	5-7-7 (14) 15"	0.0		
			15 X	5-9-10 (19) 5"	0.0		
980.0 21.0			20 X	2-5-7 (12) 13"			Water observed at 8.5 feet with 21.0 feet of tooling in the ground while drilling.
		END OF BORING Boring immediately grouted	25				Water observed at 5.4 feet with 21.0 feet of tooling in the ground at end of drilling.
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**ST-9**
LOCATION:	See attached sketch
NORTHING: 170878.7	EASTING: 596782.5
DRILLER: A. Holmbo	LOGGED BY: S. Martin
START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1033.6 ft	RIG: GP-2
METHOD: 3 1/4" HSA	SURFACING: Grass
WEATHER: Snow	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1032.1 / 1.5		CLAYEY SAND (SC), with roots, dark brown, moist (TOPSOIL)			0.0		
1029.6 / 4.0		LEAN CLAY (CL), brown, moist, soft (ALLUVIUM)	X	1-2-2 (4) 10"	0.0	28	
1026.6 / 7.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist, very stiff (GLACIAL TILL)	X	5-8-10 (18) 18"	0.0		
1024.6 / 9.0	▽	POORLY GRADED SAND with SILT (SP-SM), fine to medium sand, reddish brown, wet, medium dense (GLACIAL OUTWASH)	X	7-8-9 (17) 16"	0.0		
1012.6 / 21.0		SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, moist, medium dense (GLACIAL TILL)	X	5-12-15 (27) 15"	0.0		
			X	10-12-14 (26) 18"	0.0		
			X	9-10-10 (20) 17"	0.0		
					0.0		
			X	8-7-8 (15) 18"			Water observed at 7.5 feet with 21.0 feet of tooling in the ground while drilling.
		END OF BORING Boring immediately grouted					

LOG OF BORING

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	ST-10		
LOCATION: See attached sketch			
NORTHING:	170319.3	EASTING:	597182.0
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1017.1 ft	RIG: GP-2	METHOD: 3 1/4" HSA	
SURFACING:	Grass	WEATHER:	Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1015.1 / 2.0		CLAYEY SAND (SC), with roots, dark brown, moist (TOPSOIL)			0.0	13	Soil sample ST-10 (1-3') collected for VOC, DRO, GRO, RCRA, and PAH
1013.1 / 4.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist to moist, stiff (GLACIAL TILL)	X	3-7-4 (11) 16"	0.0		
1000.1 / 17.0		SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, moist, medium (GLACIAL TILL)	X	6-8-8 (16) 14"			
			X	6-10-10 (20) 18"			
			X	7-8-9 (17) 16"			
			X	7-9-9 (18) 16"			
			X	7-6-7 (13) 14"			
996.1 / 21.0		CLAYEY SAND (SC), trace Gravel, reddish brown, moist to wet, stiff (GLACIAL TILL)	X	6-7-9 (16) 18"			
		END OF BORING Boring immediately grouted					

Depth scale: 5, 10, 15, 20, 25, 30

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING:	**ST-11**
		LOCATION: See attached sketch	
		NORTHING: 169707.6	EASTING: 596658.2
DRILLER: A. Holmbo	LOGGED BY: S. Martin	START DATE: 04/13/19	END DATE: 04/13/19
SURFACE ELEVATION: 1019.2 ft	RIG: GP-2 / METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Snow

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1018.2 1.0		CLAYEY SAND (SC), with roots, dark brown, moist (TOPSOIL)					
1017.2 2.0		CLAYEY SAND (SC), trace roots, dark brown, moist, medium (GLACIAL TILL)	X	1-2-4 (6) 18"			
1007.2 12.0		SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, moist, loose to medium dense (GLACIAL TILL)	X	2-3-3 (6) 15"			Soil sample ST-11 (4-6') @ 13:15 collected for RCRA and dry weight
			X	8-6-7 (13) 17"			
			X	8-7-8 (15) 3"			
998.2 21.0		POORLY GRADED SAND (SP), fine to medium sand, trace Gravel, light brown, moist, loose to medium dense (GLACIAL OUTWASH)	X	4-3-4 (7) 12"			
			X	5-7-10 (17) 15"			
			X	10-8-8 (16) 17"			
		END OF BORING Boring immediately grouted					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**ST-12**
LOCATION:	See attached sketch
NORTHING: 169601.5	EASTING: 597751.8
START DATE: 04/13/19	END DATE: 04/13/19
SURFACING: Grass	WEATHER: Snow

DRILLER: A. Holmbo	LOGGED BY: S. Martin		
SURFACE ELEVATION: 993.7 ft	RIG: GP-2	METHOD: 3 1/4" HSA	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Depth	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		FILL: LEAN CLAY (CL), with roots, dark brown, moist						
991.7 / 2.0		LEAN CLAY (CL), brown, wet, soft to stiff (ALLUVIUM)		X	2-2-12 (14) 18"			Soil sample ST-12 (2-4') collected for RCRA and dry weight
			5	X	2-1-3 (4) 14"			
987.7 / 6.0		SILTY SAND (SM), fine to medium sand, trace Gravel, reddish brown, wet, medium dense (GLACIAL TILL)		X	7-7-8 (15) 15"			Soil sample ST-12 (6-8') @ 12:10 collected for RCRA and dry weight
			10	X	6-10-8 (18) 18"			
				X	12-10-11 (21) 15"			
979.7 / 14.0	▼ ▽	POORLY GRADED SAND with SILT (SP-SM), fine to medium sand, trace Gravel, reddish brown, wet, medium dense (GLACIAL OUTWASH)	15	X	6-8-10 (18) 17"			Water sample ST-12W @ 12:30 collected for analytical testing Temporary well installed with a screen set from 13.8 to 18.8 feet
			20	X	9-8-4 (12) 16"			
972.7 / 21.0		END OF BORING Boring immediately grouted	25, 30					Water observed at 15.0 feet with 21.0 feet of tooling in the ground while drilling. Water observed at 13.9 feet with 21.0 feet of tooling in the ground at end of drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**	BORING: **GP-1** LOCATION: See attached sketch NORTHING: EASTING:
DRILLER: Range	LOGGED BY: J. Michael
START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor
METHOD: Direct Push	SURFACING: Grass
WEATHER:	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1.0		SILTY SAND (SM), black (TOPSOIL)					Soil sample GP-1 (0-1') @ 17:30 collected for analytical testing
10.0		CLAYEY SAND (SC), fine sand, brown, moist			0.1		
					0.2		Soil sample GP-1 (1-2') @ 17:35 collected for analytical testing
							Soil sample GP-1 (4-5') @ 17:40 collected for analytical testing
					0.1		
					0.2		
		END OF BORING Boring immediately backfilled					

Depth scale: 5, 10, 15

LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING: **GP-2**			
LOCATION: See attached sketch			
NORTHING:		EASTING:	
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor	METHOD: Direct Push	SURFACING: Grass	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1.0		Black (TOPSOIL)					Soil sample GP-2 (0-1') @ 17:10 collected for analytical testing
5.5		FILL: CLAYEY SAND (SC), with debris, concrete, and asphalt fragments, brown			0.1 0.2		Soil sample GP-2 (4-5') @ 17:15 collected for analytical testing
10.0		CLAYEY SAND (SC), fine sand, brown, moist, with pebbles			0.2 0.1		Soil sample GP-2 (8-9') @ 17:20 collected for analytical testing
		END OF BORING Boring immediately backfilled					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING: **GP-3**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor / METHOD: Direct Push	SURFACING: Grass	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1.5		FILL: CLAYEY SAND (SC), brown					Soil sample GP-3 (0-1') @ 16:50 collected for analytical testing
10.0		CLAYEY SAND (SC), fine sand, brown, moist, with pebbles			0.1 0.1 0.1 0.1		Soil sample GP-3 (1-2') @ 16:55 collected for analytical testing Soil sample GP-3 (4-5') @ 17:00 collected for analytical testing
		END OF BORING Boring immediately backfilled					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING: **GP-4**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor / METHOD: Direct Push	SURFACING: Grass	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
3.5		LEAN CLAY (CL), brown, moist			0.1 0.1		Soil sample GP-4 (1-2') @ 16:30 collected for analytical testing Soil sample GP-4 (2-3') @ 16:35 collected for analytical testing
5.0		CLAYEY SAND (SC), fine sand, brown, moist					Soil sample GP-4 (4-5') @ 16:40 collected for analytical testing
		END OF BORING Boring immediately backfilled					

LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING: **GP-5**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor / METHOD: Direct Push	SURFACING: Grass	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
3.0		SILTY CLAY (CL-ML), tan and brown, moist			0.2		Soil sample GP-5 (1-2') @ 16:00 collected for analytical testing
5.0		LEAN CLAY (CL), brown, moist			0.1		Soil sample GP-5 (2-3') @ 16:05 collected for analytical testing Soil sample GP-5 (4-5') @ 16:10 collected for analytical testing
		END OF BORING Boring immediately backfilled					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316
Geotechnical & Environmental Evaluation
Former Hillcrest Golf Course
St. Paul, Minnesota

BORING:	**GP-6**		
LOCATION: See attached sketch			
NORTHING:		EASTING:	
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor	METHOD: Direct Push	SURFACING: Topsoil
WEATHER:			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1.0		Black (TOPSOIL)					Soil sample GP-6 (1-2') @ 15:30 collected for analytical testing
		FILL: SILTY CLAY (CL-ML), brown and tan, moist, soft			0.2		
					0.2		Soil sample GP-6 (2-3') @ 15:35 collected for analytical testing
5.0							Soil sample GP-6 (4-5') @ 15:40 collected for analytical testing
		END OF BORING Boring immediately backfilled					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**		BORING: **GP-7**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION:	RIG: Subcontractor / METHOD: Direct Push	SURFACING: Asphalt	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
0.5		ASPHALT					
3.0		FILL: SILTY SAND (SM), with Gravel *Rock fragments from 1 1/2 feet to 3 feet*					Soil sample GP-7 (1-2') @ 14:00 collected for analytical testing
4.0		SANDY LEAN CLAY (CL), tan and brown, moist					Soil sample GP-7 (3-4') @ 14:05 collected for analytical testing
5.0		LEAN CLAY (CL), gray, moist, soft					Soil sample GP-7 (4-5') @ 14:15 collected for analytical testing
		END OF BORING Boring immediately backfilled					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 Geotechnical & Environmental Evaluation Former Hillcrest Golf Course St. Paul, Minnesota	BORING: GP-8
	LOCATION: See attached sketch
	NORTHING: / EASTING:

DRILLER: Range	LOGGED BY: J. Michael	START DATE: 05/07/19	END DATE: 05/07/19
SURFACE ELEVATION: / RIG: Subcontractor	METHOD: Direct Push	SURFACING: Topsoil	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
3.0		CLAYEY SAND (SC), with wood debris, and roots, black (TOPSOIL)			0.1 0.1		Soil sample GP-8 (1-2') @ 13:30 collected for analytical testing Soil sample GP-8 (3-4') @ 13:35 collected for analytical testing
4.0		SANDY LEAN CLAY (CL), black and gray, moist					
6.5	▼	LEAN CLAY (CL), with Silt, gray, moist, soft			0.1 0.1		Water sample GP-8W @ 16:20 collected for analytical testing Soil sample GP-8 (4-5') @ 13:45 collected for analytical testing
15.0		SANDY LEAN CLAY (CL), gray and tan, soft			0.2 0.3 0.3		Temporary well installed with screen set from 4.5 to 9.5 feet
		END OF BORING Boring immediately backfilled					Water observed at 4.5 feet with 15.0 feet of tooling in the ground at end of drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B1903316 **Geotechnical & Environmental Evaluation** **Former Hillcrest Golf Course** **St. Paul, Minnesota**	BORING: **GP-9** LOCATION: See attached sketch NORTHING: / EASTING:
DRILLER: Range / LOGGED BY: J. Michael	START DATE: 05/07/19 / END DATE: 05/07/19
SURFACE ELEVATION: / RIG: Subcontractor / METHOD: Direct Push	SURFACING: Grass / WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1.0		FILL: SANDY LEAN CLAY (CL), with organic, dark brown					Soil sample GP-9 (0-1') @ 15:00 collected for analytical testing
7.0		SANDY LEAN CLAY (CL), brown, moist, with pebbles			0.1		
					0.1		
		5					Soil sample GP-9 (5-6') @ 15:10 collected for analytical testing
					0.2		
15.0		SANDY LEAN CLAY (CL), gray and tan			0.2		
		10					
					0.1		
					0.3		
		15 END OF BORING Boring immediately backfilled					

Appendix D

Laboratory Analytical Reports

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

April 26, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on April 17, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10471163

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10471163001	**ST-2 (0-2)**	Solid	04/12/19 11:50	04/17/19 11:15
10471163002	**ST-5 (1-3)**	Solid	04/12/19 13:40	04/17/19 11:15
10471163003	**ST-6 (2-4)**	Solid	04/12/19 15:00	04/17/19 11:15
10471163004	**ST-10 (1-3)**	Solid	04/12/19 17:00	04/17/19 11:15
10471163005	**ST-3 (0-2)**	Solid	04/13/19 08:30	04/17/19 11:15
10471163008	**ST-8 (5-7)**	Solid	04/13/19 10:45	04/17/19 11:15
10471163009	**ST-12 (2-4)**	Solid	04/13/19 12:00	04/17/19 11:15
10471163011	**ST-3 W**	Water	04/13/19 09:00	04/17/19 11:15
10471163012	**ST-12 W**	Water	04/13/19 12:30	04/17/19 11:15
10471163013	**ST-8 W**	Water	04/13/19 14:45	04/17/19 11:15
10471163014	**Trip Blank-WT**	Water	04/13/19 00:00	04/17/19 11:15
10471163015	**Trip Blank-SL**	Solid	04/13/19 00:00	04/17/19 11:15
10471163016	**ST-11 (4-6)**	Solid	04/13/19 13:15	04/17/19 11:15

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10471163001	**ST-2 (0-2)**	EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163002	**ST-5 (1-3)**	EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471163003	**ST-6 (2-4)**	WI MOD DRO	ST1	2	PASI-M
		WI MOD GRO	AMC	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163004	**ST-10 (1-3)**	WI MOD DRO	ST1	2	PASI-M
		WI MOD GRO	AMC	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163005	**ST-3 (0-2)**	WI MOD DRO	ST1	2	PASI-M
		WI MOD GRO	AMC	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163008	**ST-8 (5-7)**	WI MOD DRO	ST1	2	PASI-M
		WI MOD GRO	AMC	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163009	**ST-12 (2-4)**	EPA 6010D	IP	7	PASI-M

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
10471163011	**ST-3 W**	EPA 8081B	XV1	24	PASI-M
		WI MOD DRO	ST1	2	PASI-M
		WI MOD GRO	AMC	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8270D by SIM	SNG	18	PASI-M
		EPA 8260B	MJD	70	PASI-M
10471163012	**ST-12 W**	EPA 8081B	XV1	24	PASI-M
		WI MOD DRO	ST1	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8270D by SIM	SNG	18	PASI-M
10471163013	**ST-8 W**	WI MOD DRO	ST1	2	PASI-M
		EPA 8260B	MJD	70	PASI-M
10471163014	**Trip Blank-WT**	WI MOD GRO	AMC	2	PASI-M
		EPA 8260B	MJD	70	PASI-M
10471163015	**Trip Blank-SL**	WI MOD GRO	AMC	2	PASI-M
		EPA 8260B	GDM	70	PASI-M
10471163016	**ST-11 (4-6)**	EPA 6010D	DM	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10471163001	**ST-2 (0-2)**					
EPA 6010D	Arsenic	3.9	mg/kg	1.1	04/19/19 12:56	
EPA 6010D	Barium	50.8	mg/kg	0.56	04/19/19 12:56	
EPA 6010D	Chromium	17.3	mg/kg	0.56	04/19/19 12:56	
EPA 6010D	Lead	4.5	mg/kg	0.56	04/19/19 12:56	
EPA 7471B	Mercury	0.22	mg/kg	0.020	04/22/19 14:55	
ASTM D2974	Percent Moisture	12.8	%	0.10	04/18/19 10:50	
EPA 8260B	Xylene (Total)	277	ug/kg	179	04/19/19 13:25	
10471163002	**ST-5 (1-3)**					
EPA 6010D	Barium	64.1	mg/kg	2.7	04/19/19 13:34	
EPA 6010D	Chromium	29.9	mg/kg	2.7	04/19/19 13:34	
EPA 6010D	Lead	6.9	mg/kg	2.7	04/19/19 13:34	
EPA 7471B	Mercury	0.044	mg/kg	0.020	04/22/19 15:01	
ASTM D2974	Percent Moisture	13.9	%	0.10	04/18/19 10:50	
10471163003	**ST-6 (2-4)**					
EPA 6010D	Arsenic	1.7	mg/kg	1.0	04/19/19 13:02	
EPA 6010D	Barium	23.0	mg/kg	0.50	04/19/19 13:02	
EPA 6010D	Chromium	16.7	mg/kg	0.50	04/19/19 13:02	
EPA 6010D	Lead	2.4	mg/kg	0.50	04/19/19 13:02	
ASTM D2974	Percent Moisture	7.0	%	0.10	04/18/19 10:50	
10471163004	**ST-10 (1-3)**					
EPA 6010D	Arsenic	2.0	mg/kg	1.0	04/19/19 13:13	
EPA 6010D	Barium	30.5	mg/kg	0.51	04/19/19 13:13	
EPA 6010D	Chromium	16.9	mg/kg	0.51	04/19/19 13:13	
EPA 6010D	Lead	2.7	mg/kg	0.51	04/19/19 13:13	
EPA 7471B	Mercury	0.027	mg/kg	0.021	04/22/19 15:05	
ASTM D2974	Percent Moisture	11.7	%	0.10	04/18/19 10:50	
10471163005	**ST-3 (0-2)**					
WI MOD DRO	WDRO C10-C28	41.0	mg/kg	10.6	04/21/19 10:59	T6
EPA 6010D	Arsenic	15.7	mg/kg	1.2	04/19/19 13:16	
EPA 6010D	Barium	127	mg/kg	0.62	04/19/19 13:16	
EPA 6010D	Cadmium	0.61	mg/kg	0.19	04/19/19 13:16	
EPA 6010D	Chromium	18.7	mg/kg	0.62	04/19/19 13:16	
EPA 6010D	Lead	41.6	mg/kg	0.62	04/19/19 13:16	
EPA 7471B	Mercury	6.3	mg/kg	0.27	04/23/19 13:11	
ASTM D2974	Percent Moisture	22.8	%	0.10	04/18/19 10:51	
EPA 8270D by SIM	Benzo(a)pyrene	13.0	ug/kg	12.9	04/24/19 00:26	
EPA 8270D by SIM	Benzo(b)fluoranthene	18.9	ug/kg	12.9	04/24/19 00:26	
EPA 8270D by SIM	Chrysene	13.5	ug/kg	12.9	04/24/19 00:26	
EPA 8270D by SIM	Fluoranthene	25.9	ug/kg	12.9	04/24/19 00:26	
EPA 8270D by SIM	Pyrene	20.4	ug/kg	12.9	04/24/19 00:26	
EPA 8270D by SIM	Total BaP Eq. MN 2006sh. ND=0	15.0	ug/kg	12.9	04/24/19 00:26	
10471163008	**ST-8 (5-7)**					
EPA 6010D	Barium	48.1	mg/kg	0.59	04/19/19 13:19	
EPA 6010D	Chromium	11.9	mg/kg	0.59	04/19/19 13:19	

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10471163008	**ST-8 (5-7)**					
EPA 6010D	Lead	5.1	mg/kg	0.59	04/19/19 13:19	
EPA 7471B	Mercury	0.028	mg/kg	0.025	04/22/19 15:10	
ASTM D2974	Percent Moisture	21.8	%	0.10	04/18/19 12:37	
10471163009	**ST-12 (2-4)**					
EPA 6010D	Arsenic	6.4	mg/kg	1.2	04/19/19 13:22	
EPA 6010D	Barium	62.5	mg/kg	0.59	04/19/19 13:22	
EPA 6010D	Chromium	27.3	mg/kg	0.59	04/19/19 13:22	
EPA 6010D	Lead	6.4	mg/kg	0.59	04/19/19 13:22	
EPA 7471B	Mercury	0.031	mg/kg	0.022	04/22/19 15:12	
ASTM D2974	Percent Moisture	18.1	%	0.10	04/18/19 12:37	
10471163011	**ST-3 W**					
EPA 6010D	Barium, Dissolved	125	ug/L	10.0	04/23/19 09:33	
10471163012	**ST-12 W**					
EPA 6010D	Barium, Dissolved	15.2	ug/L	10.0	04/23/19 09:48	
10471163013	**ST-8 W**					
WI MOD DRO	WDRO C10-C28	0.54	mg/L	0.15	04/19/19 12:14	T6
10471163016	**ST-11 (4-6)**					
EPA 6010D	Arsenic	1.7	mg/kg	1.1	04/22/19 15:36	
EPA 6010D	Barium	26.1	mg/kg	0.55	04/22/19 15:36	
EPA 6010D	Chromium	12.6	mg/kg	0.55	04/22/19 15:36	
EPA 6010D	Lead	2.8	mg/kg	0.55	04/22/19 15:36	
ASTM D2974	Percent Moisture	8.3	%	0.10	04/18/19 15:48	

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8081B**
Description: 8081B GCS Pesticides
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
2 samples were analyzed for EPA 8081B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA Mod. 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

QC Batch: 600368

R1: RPD value was outside control limits.
- LCSD (Lab ID: 3245400)
  - Aldrin

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600368

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **WI MOD DRO**
Description: WIDRO GCS
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
4 samples were analyzed for WI MOD DRO. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with WI MOD DRO with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: 600519

T6: High boiling point hydrocarbons are present in the sample.

- ST-3 (0-2) (Lab ID: 10471163005)
    - WDRO C10-C28

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **WI MOD DRO**
Description: WIDRO LV GCS
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
3 samples were analyzed for WI MOD DRO. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with WI MOD DRO with any exceptions noted below.

QC Batch: 600221

A5: Greater than 5% sediment in sample determined by visual observation. Aqueous portion decanted from the sediment and extracted. The sample container could not be rinsed with solvent per the method requirement.

- ST-12 W (Lab ID: 10471163012)
- ST-3 W (Lab ID: 10471163011)
- ST-8 W (Lab ID: 10471163013)

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600221

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471164008

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3244823)
  - WDRO C10-C28

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **WI MOD DRO**
Description: WIDRO LV GCS
Client: Braun Intertec Corporation
Date: April 26, 2019

Analyte Comments:

QC Batch: 600221

T6: High boiling point hydrocarbons are present in the sample.
- ST-8 W (Lab ID: 10471163013)
  - WDRO C10-C28

T7: Low boiling point hydrocarbons are present in the sample.
- MS (Lab ID: 3244823)
  - WDRO C10-C28
- MSD (Lab ID: 3244824)
  - WDRO C10-C28

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **WI MOD GRO**
Description: WIGRO GCV
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
5 samples were analyzed for WI MOD GRO. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 5030 Medium Soil with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **WI MOD GRO**
Description: WIGRO GCV
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
2 samples were analyzed for WI MOD GRO. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
8 samples were analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600490

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471163016

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MSD (Lab ID: 3246217)
  - Selenium

Additional Comments:

Analyte Comments:

QC Batch: 600191

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

- ST-5 (1-3) (Lab ID: 10471163002)
  - Silver
  - Arsenic
  - Cadmium
  - Selenium

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 6010D**
Description: 6010D MET ICP, Lab Filtered
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
2 samples were analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10471163

Method: **EPA 7470A**
Description: 7470A Mercury, Lab Filtered
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
2 samples were analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 7471B**
Description: 7471B Mercury
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
8 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10471163

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
8 samples were analyzed for EPA 8270D by SIM. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3550 with any exceptions noted below.
The samples were prepared in accordance with EPA Mod. 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600235

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471137001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MSD (Lab ID: 3244856)
  - Pyrene

QC Batch: 600358

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471190002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3245352)
  - Fluoranthene
- MSD (Lab ID: 3245353)

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: April 26, 2019

QC Batch: 600358

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471190002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Chrysene
- Fluoranthene
- Pyrene

R1: RPD value was outside control limits.

- MSD (Lab ID: 3245353)
    - Benzo(a)anthracene
    - Benzo(a)pyrene
    - Benzo(b)fluoranthene
    - Chrysene
    - Fluoranthene
    - Pyrene

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8260B**
Description: 8260B MSV 5030 Med Level
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
6 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 5035/5030B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

QC Batch: 600244

CH: The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.

- LCS (Lab ID: 3244879)
  - Chloroethane
  - Trichlorofluoromethane
- MS (Lab ID: 3244880)
  - Chloroethane
  - Trichlorofluoromethane
- MSD (Lab ID: 3244881)
  - Chloroethane
  - Trichlorofluoromethane

QC Batch: 600248

CH: The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.

- LCS (Lab ID: 3244888)
  - Chloroethane
  - Trichlorofluoromethane
- MS (Lab ID: 3244889)
  - Chloroethane
  - Trichlorofluoromethane
- MSD (Lab ID: 3244890)
  - Chloroethane
  - Trichlorofluoromethane

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8260B**
Description: 8260B MSV 5030 Med Level
Client: Braun Intertec Corporation
Date: April 26, 2019

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: 600244

N2: The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

- BLANK (Lab ID: 3244878)
  - Dichlorofluoromethane
- LCS (Lab ID: 3244879)
  - Dichlorofluoromethane
- MS (Lab ID: 3244880)
  - Dichlorofluoromethane
- MSD (Lab ID: 3244881)
  - Dichlorofluoromethane
- ST-2 (0-2) (Lab ID: 10471163001)
  - Dichlorofluoromethane
- ST-3 (0-2) (Lab ID: 10471163005)
  - Dichlorofluoromethane
- ST-8 (5-7) (Lab ID: 10471163008)
  - Dichlorofluoromethane
- Trip Blank-SL (Lab ID: 10471163015)
  - Dichlorofluoromethane

QC Batch: 600248

N2: The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

- BLANK (Lab ID: 3244887)
  - Dichlorofluoromethane
- LCS (Lab ID: 3244888)
  - Dichlorofluoromethane
- MS (Lab ID: 3244889)
  - Dichlorofluoromethane
- MSD (Lab ID: 3244890)
  - Dichlorofluoromethane
- ST-10 (1-3) (Lab ID: 10471163004)
  - Dichlorofluoromethane

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8260B**
Description: 8260B MSV 5030 Med Level
Client: Braun Intertec Corporation
Date: April 26, 2019

Analyte Comments:

QC Batch: 600248

N2: The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

- ST-6 (2-4) (Lab ID: 10471163003)
    - Dichlorofluoromethane

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8260B**
Description: 8260B VOC
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
3 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600288

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471096001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3245033)
  - Acetone

R1: RPD value was outside control limits.

- MSD (Lab ID: 3245034)
  - Tetrahydrofuran
  - cis-1,2-Dichloroethene

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Method: **EPA 8260B**
Description: 8260B VOC
Client: Braun Intertec Corporation
Date: April 26, 2019

Analyte Comments:

QC Batch: 600288

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MSD (Lab ID: 3245034)
  - Acetone

N2: The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

- BLANK (Lab ID: 3245031)
  - Dichlorofluoromethane
- LCS (Lab ID: 3245032)
  - Dichlorofluoromethane
- MS (Lab ID: 3245033)
  - Dichlorofluoromethane
- MSD (Lab ID: 3245034)
  - Dichlorofluoromethane
- ST-3 W (Lab ID: 10471163011)
  - Dichlorofluoromethane
- ST-8 W (Lab ID: 10471163013)
  - Dichlorofluoromethane
- Trip Blank-WT (Lab ID: 10471163014)
  - Dichlorofluoromethane

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-2 (0-2) **Lab ID: 10471163001** Collected: 04/12/19 11:50 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**3.9**	mg/kg	1.1	1	04/18/19 09:44	04/19/19 12:56	7440-38-2	
Barium	**50.8**	mg/kg	0.56	1	04/18/19 09:44	04/19/19 12:56	7440-39-3	
Cadmium	ND	mg/kg	0.17	1	04/18/19 09:44	04/19/19 12:56	7440-43-9	
Chromium	**17.3**	mg/kg	0.56	1	04/18/19 09:44	04/19/19 12:56	7440-47-3	
Lead	**4.5**	mg/kg	0.56	1	04/18/19 09:44	04/19/19 12:56	7439-92-1	
Selenium	ND	mg/kg	1.1	1	04/18/19 09:44	04/19/19 12:56	7782-49-2	
Silver	ND	mg/kg	0.56	1	04/18/19 09:44	04/19/19 12:56	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.22**	mg/kg	0.020	1	04/18/19 10:14	04/22/19 14:55	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**12.8**	%	0.10	1		04/18/19 10:50		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	83-32-9	
Acenaphthylene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	208-96-8	
Anthracene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	120-12-7	
Benzo(a)anthracene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	56-55-3	
Benzo(a)pyrene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	207-08-9	
Chrysene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	53-70-3	
Fluoranthene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	206-44-0	
Fluorene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	193-39-5	
Naphthalene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	91-20-3	
Phenanthrene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	85-01-8	
Pyrene	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	11.5	1	04/18/19 18:19	04/23/19 18:20		
Surrogates								
2-Fluorobiphenyl (S)	78	%.	30-125	1	04/18/19 18:19	04/23/19 18:20	321-60-8	
p-Terphenyl-d14 (S)	79	%.	30-125	1	04/18/19 18:19	04/23/19 18:20	1718-51-0	
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1200	1	04/18/19 10:44	04/19/19 13:25	67-64-1	
Allyl chloride	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	107-05-1	
Benzene	ND	ug/kg	23.9	1	04/18/19 10:44	04/19/19 13:25	71-43-2	
Bromobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	108-86-1	
Bromochloromethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	74-97-5	
Bromodichloromethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	75-27-4	
Bromoform	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	75-25-2	
Bromomethane	ND	ug/kg	598	1	04/18/19 10:44	04/19/19 13:25	74-83-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-2 (0-2) **Lab ID: 10471163001** Collected: 04/12/19 11:50 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
2-Butanone (MEK)	ND	ug/kg	299	1	04/18/19 10:44	04/19/19 13:25	78-93-3	
n-Butylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	104-51-8	
sec-Butylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	135-98-8	
tert-Butylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	98-06-6	
Carbon tetrachloride	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	56-23-5	
Chlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	108-90-7	
Chloroethane	ND	ug/kg	598	1	04/18/19 10:44	04/19/19 13:25	75-00-3	
Chloroform	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	67-66-3	
Chloromethane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	74-87-3	
2-Chlorotoluene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	95-49-8	
4-Chlorotoluene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	598	1	04/18/19 10:44	04/19/19 13:25	96-12-8	
Dibromochloromethane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	106-93-4	
Dibromomethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	75-71-8	
1,1-Dichloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	75-34-3	
1,2-Dichloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	107-06-2	
1,1-Dichloroethene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	156-60-5	
Dichlorofluoromethane	ND	ug/kg	598	1	04/18/19 10:44	04/19/19 13:25	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	78-87-5	
1,3-Dichloropropane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	142-28-9	
2,2-Dichloropropane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	594-20-7	
1,1-Dichloropropene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	60-29-7	
Ethylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	299	1	04/18/19 10:44	04/19/19 13:25	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	98-82-8	
p-Isopropyltoluene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	99-87-6	
Methylene Chloride	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	299	1	04/18/19 10:44	04/19/19 13:25	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	1634-04-4	
Naphthalene	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	91-20-3	
n-Propylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	103-65-1	
Styrene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	79-34-5	
Tetrachloroethene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	127-18-4	
Tetrahydrofuran	ND	ug/kg	2390	1	04/18/19 10:44	04/19/19 13:25	109-99-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-2 (0-2) **Lab ID: 10471163001** Collected: 04/12/19 11:50 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Toluene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	79-00-5	
Trichloroethene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	79-01-6	
Trichlorofluoromethane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	239	1	04/18/19 10:44	04/19/19 13:25	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	59.8	1	04/18/19 10:44	04/19/19 13:25	108-67-8	
Vinyl chloride	ND	ug/kg	23.9	1	04/18/19 10:44	04/19/19 13:25	75-01-4	
Xylene (Total)	**277**	ug/kg	179	1	04/18/19 10:44	04/19/19 13:25	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	102	%.	75-125	1	04/18/19 10:44	04/19/19 13:25	17060-07-0	
Toluene-d8 (S)	100	%.	75-125	1	04/18/19 10:44	04/19/19 13:25	2037-26-5	
4-Bromofluorobenzene (S)	100	%.	75-125	1	04/18/19 10:44	04/19/19 13:25	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-5 (1-3) **Lab ID: 10471163002** Collected: 04/12/19 13:40 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	ND	mg/kg	5.3	5	04/18/19 09:44	04/19/19 13:34	7440-38-2	D3
Barium	**64.1**	mg/kg	2.7	5	04/18/19 09:44	04/19/19 13:34	7440-39-3	
Cadmium	ND	mg/kg	0.80	5	04/18/19 09:44	04/19/19 13:34	7440-43-9	D3
Chromium	**29.9**	mg/kg	2.7	5	04/18/19 09:44	04/19/19 13:34	7440-47-3	
Lead	**6.9**	mg/kg	2.7	5	04/18/19 09:44	04/19/19 13:34	7439-92-1	
Selenium	ND	mg/kg	5.3	5	04/18/19 09:44	04/19/19 13:34	7782-49-2	D3
Silver	ND	mg/kg	2.7	5	04/18/19 09:44	04/19/19 13:34	7440-22-4	D3
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.044**	mg/kg	0.020	1	04/18/19 10:14	04/22/19 15:01	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**13.9**	%	0.10	1		04/18/19 10:50		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-6 (2-4) **Lab ID: 10471163003** Collected: 04/12/19 15:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	ND	mg/kg	8.4	1	04/19/19 07:32	04/21/19 11:19		
Surrogates								
n-Triacontane (S)	100	%.	50-150	1	04/19/19 07:32	04/21/19 11:19	638-68-6	
WIGRO GCV	Analytical Method: WI MOD GRO Preparation Method: EPA 5030 Medium Soil							
Gasoline Range Organics	ND	mg/kg	10.8	1	04/24/19 14:01	04/25/19 18:45		
Surrogates								
a,a,a-Trifluorotoluene (S)	107	%.	80-150	1	04/24/19 14:01	04/25/19 18:45	98-08-8	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**1.7**	mg/kg	1.0	1	04/18/19 09:44	04/19/19 13:02	7440-38-2	
Barium	**23.0**	mg/kg	0.50	1	04/18/19 09:44	04/19/19 13:02	7440-39-3	
Cadmium	ND	mg/kg	0.15	1	04/18/19 09:44	04/19/19 13:02	7440-43-9	
Chromium	**16.7**	mg/kg	0.50	1	04/18/19 09:44	04/19/19 13:02	7440-47-3	
Lead	**2.4**	mg/kg	0.50	1	04/18/19 09:44	04/19/19 13:02	7439-92-1	
Selenium	ND	mg/kg	1.0	1	04/18/19 09:44	04/19/19 13:02	7782-49-2	
Silver	ND	mg/kg	0.50	1	04/18/19 09:44	04/19/19 13:02	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	ND	mg/kg	0.020	1	04/18/19 10:14	04/22/19 15:03	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**7.0**	%	0.10	1		04/18/19 10:50		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	83-32-9	
Acenaphthylene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	208-96-8	
Anthracene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	120-12-7	
Benzo(a)anthracene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	56-55-3	
Benzo(a)pyrene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	207-08-9	
Chrysene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	53-70-3	
Fluoranthene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	206-44-0	
Fluorene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	193-39-5	
Naphthalene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	91-20-3	
Phenanthrene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	85-01-8	
Pyrene	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	10.7	1	04/18/19 10:23	04/23/19 23:37		
Surrogates								
2-Fluorobiphenyl (S)	70	%.	30-125	1	04/18/19 10:23	04/23/19 23:37	321-60-8	
p-Terphenyl-d14 (S)	80	%.	30-125	1	04/18/19 10:23	04/23/19 23:37	1718-51-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-6 (2-4) **Lab ID: 10471163003** Collected: 04/12/19 15:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1080	1	04/18/19 13:22	04/18/19 22:06	67-64-1	
Allyl chloride	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	107-05-1	
Benzene	ND	ug/kg	21.5	1	04/18/19 13:22	04/18/19 22:06	71-43-2	
Bromobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	108-86-1	
Bromochloromethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	74-97-5	
Bromodichloromethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	75-27-4	
Bromoform	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	75-25-2	
Bromomethane	ND	ug/kg	539	1	04/18/19 13:22	04/18/19 22:06	74-83-9	
2-Butanone (MEK)	ND	ug/kg	269	1	04/18/19 13:22	04/18/19 22:06	78-93-3	
n-Butylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	104-51-8	
sec-Butylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	135-98-8	
tert-Butylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	98-06-6	
Carbon tetrachloride	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	56-23-5	
Chlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	108-90-7	
Chloroethane	ND	ug/kg	539	1	04/18/19 13:22	04/18/19 22:06	75-00-3	
Chloroform	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	67-66-3	
Chloromethane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	74-87-3	
2-Chlorotoluene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	95-49-8	
4-Chlorotoluene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	539	1	04/18/19 13:22	04/18/19 22:06	96-12-8	
Dibromochloromethane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	106-93-4	
Dibromomethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	75-71-8	
1,1-Dichloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	75-34-3	
1,2-Dichloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	107-06-2	
1,1-Dichloroethene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	156-60-5	
Dichlorofluoromethane	ND	ug/kg	539	1	04/18/19 13:22	04/18/19 22:06	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	78-87-5	
1,3-Dichloropropane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	142-28-9	
2,2-Dichloropropane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	594-20-7	
1,1-Dichloropropene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	60-29-7	
Ethylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	269	1	04/18/19 13:22	04/18/19 22:06	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	98-82-8	
p-Isopropyltoluene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	99-87-6	
Methylene Chloride	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	269	1	04/18/19 13:22	04/18/19 22:06	108-10-1	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-6 (2-4) **Lab ID: 10471163003** Collected: 04/12/19 15:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Methyl-tert-butyl ether	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	1634-04-4	
Naphthalene	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	91-20-3	
n-Propylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	103-65-1	
Styrene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	79-34-5	
Tetrachloroethene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	127-18-4	
Tetrahydrofuran	ND	ug/kg	2150	1	04/18/19 13:22	04/18/19 22:06	109-99-9	
Toluene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	79-00-5	
Trichloroethene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	79-01-6	
Trichlorofluoromethane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	215	1	04/18/19 13:22	04/18/19 22:06	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	53.9	1	04/18/19 13:22	04/18/19 22:06	108-67-8	
Vinyl chloride	ND	ug/kg	21.5	1	04/18/19 13:22	04/18/19 22:06	75-01-4	
Xylene (Total)	ND	ug/kg	162	1	04/18/19 13:22	04/18/19 22:06	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	99	%.	75-125	1	04/18/19 13:22	04/18/19 22:06	17060-07-0	
Toluene-d8 (S)	102	%.	75-125	1	04/18/19 13:22	04/18/19 22:06	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125	1	04/18/19 13:22	04/18/19 22:06	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-10 (1-3) **Lab ID: 10471163004** Collected: 04/12/19 17:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	ND	mg/kg	8.6	1	04/19/19 07:32	04/21/19 11:13		
Surrogates								
n-Triacontane (S)	100	%.	50-150	1	04/19/19 07:32	04/21/19 11:13	638-68-6	
WIGRO GCV	Analytical Method: WI MOD GRO Preparation Method: EPA 5030 Medium Soil							
Gasoline Range Organics	ND	mg/kg	11.5	1	04/24/19 14:01	04/25/19 19:10		
Surrogates								
a,a,a-Trifluorotoluene (S)	98	%.	80-150	1	04/24/19 14:01	04/25/19 19:10	98-08-8	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**2.0**	mg/kg	1.0	1	04/18/19 09:44	04/19/19 13:13	7440-38-2	
Barium	**30.5**	mg/kg	0.51	1	04/18/19 09:44	04/19/19 13:13	7440-39-3	
Cadmium	ND	mg/kg	0.15	1	04/18/19 09:44	04/19/19 13:13	7440-43-9	
Chromium	**16.9**	mg/kg	0.51	1	04/18/19 09:44	04/19/19 13:13	7440-47-3	
Lead	**2.7**	mg/kg	0.51	1	04/18/19 09:44	04/19/19 13:13	7439-92-1	
Selenium	ND	mg/kg	1.0	1	04/18/19 09:44	04/19/19 13:13	7782-49-2	
Silver	ND	mg/kg	0.51	1	04/18/19 09:44	04/19/19 13:13	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.027**	mg/kg	0.021	1	04/18/19 10:14	04/22/19 15:05	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**11.7**	%	0.10	1		04/18/19 10:50		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	83-32-9	
Acenaphthylene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	208-96-8	
Anthracene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	120-12-7	
Benzo(a)anthracene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	56-55-3	
Benzo(a)pyrene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	207-08-9	
Chrysene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	53-70-3	
Fluoranthene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	206-44-0	
Fluorene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	193-39-5	
Naphthalene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	91-20-3	
Phenanthrene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	85-01-8	
Pyrene	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	11.3	1	04/18/19 10:23	04/24/19 00:02		
Surrogates								
2-Fluorobiphenyl (S)	76	%.	30-125	1	04/18/19 10:23	04/24/19 00:02	321-60-8	
p-Terphenyl-d14 (S)	78	%.	30-125	1	04/18/19 10:23	04/24/19 00:02	1718-51-0	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf

Pace Project No.: 10471163

Sample: ST-10 (1-3) **Lab ID: 10471163004** Collected: 04/12/19 17:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1100	1	04/18/19 13:22	04/18/19 21:48	67-64-1	
Allyl chloride	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	107-05-1	
Benzene	ND	ug/kg	22.0	1	04/18/19 13:22	04/18/19 21:48	71-43-2	
Bromobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	108-86-1	
Bromochloromethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	74-97-5	
Bromodichloromethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	75-27-4	
Bromoform	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	75-25-2	
Bromomethane	ND	ug/kg	550	1	04/18/19 13:22	04/18/19 21:48	74-83-9	
2-Butanone (MEK)	ND	ug/kg	275	1	04/18/19 13:22	04/18/19 21:48	78-93-3	
n-Butylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	104-51-8	
sec-Butylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	135-98-8	
tert-Butylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	98-06-6	
Carbon tetrachloride	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	56-23-5	
Chlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	108-90-7	
Chloroethane	ND	ug/kg	550	1	04/18/19 13:22	04/18/19 21:48	75-00-3	
Chloroform	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	67-66-3	
Chloromethane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	74-87-3	
2-Chlorotoluene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	95-49-8	
4-Chlorotoluene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	550	1	04/18/19 13:22	04/18/19 21:48	96-12-8	
Dibromochloromethane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	106-93-4	
Dibromomethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	75-71-8	
1,1-Dichloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	75-34-3	
1,2-Dichloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	107-06-2	
1,1-Dichloroethene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	156-60-5	
Dichlorofluoromethane	ND	ug/kg	550	1	04/18/19 13:22	04/18/19 21:48	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	78-87-5	
1,3-Dichloropropane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	142-28-9	
2,2-Dichloropropane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	594-20-7	
1,1-Dichloropropene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	60-29-7	
Ethylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	275	1	04/18/19 13:22	04/18/19 21:48	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	98-82-8	
p-Isopropyltoluene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	99-87-6	
Methylene Chloride	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	275	1	04/18/19 13:22	04/18/19 21:48	108-10-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-10 (1-3) **Lab ID: 10471163004** Collected: 04/12/19 17:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Methyl-tert-butyl ether	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	1634-04-4	
Naphthalene	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	91-20-3	
n-Propylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	103-65-1	
Styrene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	79-34-5	
Tetrachloroethene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	127-18-4	
Tetrahydrofuran	ND	ug/kg	2200	1	04/18/19 13:22	04/18/19 21:48	109-99-9	
Toluene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	79-00-5	
Trichloroethene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	79-01-6	
Trichlorofluoromethane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	220	1	04/18/19 13:22	04/18/19 21:48	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	55.0	1	04/18/19 13:22	04/18/19 21:48	108-67-8	
Vinyl chloride	ND	ug/kg	22.0	1	04/18/19 13:22	04/18/19 21:48	75-01-4	
Xylene (Total)	ND	ug/kg	165	1	04/18/19 13:22	04/18/19 21:48	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	99	%.	75-125	1	04/18/19 13:22	04/18/19 21:48	17060-07-0	
Toluene-d8 (S)	100	%.	75-125	1	04/18/19 13:22	04/18/19 21:48	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125	1	04/18/19 13:22	04/18/19 21:48	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 (0-2) **Lab ID: 10471163005** Collected: 04/13/19 08:30 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	**41.0**	mg/kg	10.6	1	04/19/19 07:32	04/21/19 10:59		T6
Surrogates								
n-Triacontane (S)	95	%.	50-150	1	04/19/19 07:32	04/21/19 10:59	638-68-6	
WIGRO GCV	Analytical Method: WI MOD GRO Preparation Method: EPA 5030 Medium Soil							
Gasoline Range Organics	ND	mg/kg	14.5	1	04/24/19 14:01	04/25/19 19:38		
Surrogates								
a,a,a-Trifluorotoluene (S)	104	%.	80-150	1	04/24/19 14:01	04/25/19 19:38	98-08-8	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**15.7**	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:16	7440-38-2	
Barium	**127**	mg/kg	0.62	1	04/18/19 09:44	04/19/19 13:16	7440-39-3	
Cadmium	**0.61**	mg/kg	0.19	1	04/18/19 09:44	04/19/19 13:16	7440-43-9	
Chromium	**18.7**	mg/kg	0.62	1	04/18/19 09:44	04/19/19 13:16	7440-47-3	
Lead	**41.6**	mg/kg	0.62	1	04/18/19 09:44	04/19/19 13:16	7439-92-1	
Selenium	ND	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:16	7782-49-2	
Silver	ND	mg/kg	0.62	1	04/18/19 09:44	04/19/19 13:16	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**6.3**	mg/kg	0.27	10	04/18/19 10:14	04/23/19 13:11	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.8**	%	0.10	1		04/18/19 10:51		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	83-32-9	
Acenaphthylene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	208-96-8	
Anthracene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	120-12-7	
Benzo(a)anthracene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	56-55-3	
Benzo(a)pyrene	**13.0**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	50-32-8	
Benzo(b)fluoranthene	**18.9**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	207-08-9	
Chrysene	**13.5**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	53-70-3	
Fluoranthene	**25.9**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	206-44-0	
Fluorene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	193-39-5	
Naphthalene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	91-20-3	
Phenanthrene	ND	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	85-01-8	
Pyrene	**20.4**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	**15.0**	ug/kg	12.9	1	04/18/19 10:23	04/24/19 00:26		
Surrogates								
2-Fluorobiphenyl (S)	63	%.	30-125	1	04/18/19 10:23	04/24/19 00:26	321-60-8	
p-Terphenyl-d14 (S)	61	%.	30-125	1	04/18/19 10:23	04/24/19 00:26	1718-51-0	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 (0-2) **Lab ID: 10471163005** Collected: 04/13/19 08:30 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1360	1	04/18/19 10:44	04/19/19 13:43	67-64-1	
Allyl chloride	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	107-05-1	
Benzene	ND	ug/kg	27.2	1	04/18/19 10:44	04/19/19 13:43	71-43-2	
Bromobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	108-86-1	
Bromochloromethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	74-97-5	
Bromodichloromethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	75-27-4	
Bromoform	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	75-25-2	
Bromomethane	ND	ug/kg	681	1	04/18/19 10:44	04/19/19 13:43	74-83-9	
2-Butanone (MEK)	ND	ug/kg	340	1	04/18/19 10:44	04/19/19 13:43	78-93-3	
n-Butylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	104-51-8	
sec-Butylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	135-98-8	
tert-Butylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	98-06-6	
Carbon tetrachloride	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	56-23-5	
Chlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	108-90-7	
Chloroethane	ND	ug/kg	681	1	04/18/19 10:44	04/19/19 13:43	75-00-3	
Chloroform	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	67-66-3	
Chloromethane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	74-87-3	
2-Chlorotoluene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	95-49-8	
4-Chlorotoluene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	681	1	04/18/19 10:44	04/19/19 13:43	96-12-8	
Dibromochloromethane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	106-93-4	
Dibromomethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	75-71-8	
1,1-Dichloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	75-34-3	
1,2-Dichloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	107-06-2	
1,1-Dichloroethene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	156-60-5	
Dichlorofluoromethane	ND	ug/kg	681	1	04/18/19 10:44	04/19/19 13:43	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	78-87-5	
1,3-Dichloropropane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	142-28-9	
2,2-Dichloropropane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	594-20-7	
1,1-Dichloropropene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	60-29-7	
Ethylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	340	1	04/18/19 10:44	04/19/19 13:43	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	98-82-8	
p-Isopropyltoluene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	99-87-6	
Methylene Chloride	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	340	1	04/18/19 10:44	04/19/19 13:43	108-10-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 (0-2) **Lab ID: 10471163005** Collected: 04/13/19 08:30 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Methyl-tert-butyl ether	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	1634-04-4	
Naphthalene	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	91-20-3	
n-Propylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	103-65-1	
Styrene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	79-34-5	
Tetrachloroethene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	127-18-4	
Tetrahydrofuran	ND	ug/kg	2720	1	04/18/19 10:44	04/19/19 13:43	109-99-9	
Toluene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	79-00-5	
Trichloroethene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	79-01-6	
Trichlorofluoromethane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	272	1	04/18/19 10:44	04/19/19 13:43	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	68.1	1	04/18/19 10:44	04/19/19 13:43	108-67-8	
Vinyl chloride	ND	ug/kg	27.2	1	04/18/19 10:44	04/19/19 13:43	75-01-4	
Xylene (Total)	ND	ug/kg	204	1	04/18/19 10:44	04/19/19 13:43	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	105	%.	75-125	1	04/18/19 10:44	04/19/19 13:43	17060-07-0	
Toluene-d8 (S)	102	%.	75-125	1	04/18/19 10:44	04/19/19 13:43	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125	1	04/18/19 10:44	04/19/19 13:43	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-8 (5-7) **Lab ID: 10471163008** Collected: 04/13/19 10:45 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	ND	mg/kg	10.1	1	04/19/19 07:32	04/21/19 11:06		
Surrogates								
n-Triacontane (S)	95	%.	50-150	1	04/19/19 07:32	04/21/19 11:06	638-68-6	
WIGRO GCV	Analytical Method: WI MOD GRO Preparation Method: EPA 5030 Medium Soil							
Gasoline Range Organics	ND	mg/kg	12.4	1	04/24/19 14:01	04/25/19 13:26		
Surrogates								
a,a,a-Trifluorotoluene (S)	94	%.	80-150	1	04/24/19 14:01	04/25/19 13:26	98-08-8	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	ND	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:19	7440-38-2	
Barium	**48.1**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:19	7440-39-3	
Cadmium	ND	mg/kg	0.18	1	04/18/19 09:44	04/19/19 13:19	7440-43-9	
Chromium	**11.9**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:19	7440-47-3	
Lead	**5.1**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:19	7439-92-1	
Selenium	ND	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:19	7782-49-2	
Silver	ND	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:19	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.028**	mg/kg	0.025	1	04/18/19 10:14	04/22/19 15:10	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**21.8**	%	0.10	1		04/18/19 12:37		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	83-32-9	
Acenaphthylene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	208-96-8	
Anthracene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	120-12-7	
Benzo(a)anthracene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	56-55-3	
Benzo(a)pyrene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	207-08-9	
Chrysene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	53-70-3	
Fluoranthene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	206-44-0	
Fluorene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	193-39-5	
Naphthalene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	91-20-3	
Phenanthrene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	85-01-8	
Pyrene	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	12.8	1	04/18/19 10:23	04/24/19 00:50		
Surrogates								
2-Fluorobiphenyl (S)	67	%.	30-125	1	04/18/19 10:23	04/24/19 00:50	321-60-8	
p-Terphenyl-d14 (S)	66	%.	30-125	1	04/18/19 10:23	04/24/19 00:50	1718-51-0	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-8 (5-7) **Lab ID: 10471163008** Collected: 04/13/19 10:45 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1280	1	04/18/19 10:44	04/19/19 14:01	67-64-1	
Allyl chloride	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	107-05-1	
Benzene	ND	ug/kg	25.6	1	04/18/19 10:44	04/19/19 14:01	71-43-2	
Bromobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	108-86-1	
Bromochloromethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	74-97-5	
Bromodichloromethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	75-27-4	
Bromoform	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	75-25-2	
Bromomethane	ND	ug/kg	640	1	04/18/19 10:44	04/19/19 14:01	74-83-9	
2-Butanone (MEK)	ND	ug/kg	320	1	04/18/19 10:44	04/19/19 14:01	78-93-3	
n-Butylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	104-51-8	
sec-Butylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	135-98-8	
tert-Butylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	98-06-6	
Carbon tetrachloride	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	56-23-5	
Chlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	108-90-7	
Chloroethane	ND	ug/kg	640	1	04/18/19 10:44	04/19/19 14:01	75-00-3	
Chloroform	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	67-66-3	
Chloromethane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	74-87-3	
2-Chlorotoluene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	95-49-8	
4-Chlorotoluene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	640	1	04/18/19 10:44	04/19/19 14:01	96-12-8	
Dibromochloromethane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	106-93-4	
Dibromomethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	75-71-8	
1,1-Dichloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	75-34-3	
1,2-Dichloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	107-06-2	
1,1-Dichloroethene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	156-60-5	
Dichlorofluoromethane	ND	ug/kg	640	1	04/18/19 10:44	04/19/19 14:01	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	78-87-5	
1,3-Dichloropropane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	142-28-9	
2,2-Dichloropropane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	594-20-7	
1,1-Dichloropropene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	60-29-7	
Ethylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	320	1	04/18/19 10:44	04/19/19 14:01	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	98-82-8	
p-Isopropyltoluene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	99-87-6	
Methylene Chloride	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	320	1	04/18/19 10:44	04/19/19 14:01	108-10-1	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-8 (5-7) **Lab ID: 10471163008** Collected: 04/13/19 10:45 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Methyl-tert-butyl ether	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	1634-04-4	
Naphthalene	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	91-20-3	
n-Propylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	103-65-1	
Styrene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	79-34-5	
Tetrachloroethene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	127-18-4	
Tetrahydrofuran	ND	ug/kg	2560	1	04/18/19 10:44	04/19/19 14:01	109-99-9	
Toluene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	79-00-5	
Trichloroethene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	79-01-6	
Trichlorofluoromethane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	256	1	04/18/19 10:44	04/19/19 14:01	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	64.0	1	04/18/19 10:44	04/19/19 14:01	108-67-8	
Vinyl chloride	ND	ug/kg	25.6	1	04/18/19 10:44	04/19/19 14:01	75-01-4	
Xylene (Total)	ND	ug/kg	192	1	04/18/19 10:44	04/19/19 14:01	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	106	%.	75-125	1	04/18/19 10:44	04/19/19 14:01	17060-07-0	
Toluene-d8 (S)	99	%.	75-125	1	04/18/19 10:44	04/19/19 14:01	2037-26-5	
4-Bromofluorobenzene (S)	101	%.	75-125	1	04/18/19 10:44	04/19/19 14:01	460-00-4	

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-12 (2-4) **Lab ID: 10471163009** Collected: 04/13/19 12:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**6.4**	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:22	7440-38-2	
Barium	**62.5**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:22	7440-39-3	
Cadmium	ND	mg/kg	0.18	1	04/18/19 09:44	04/19/19 13:22	7440-43-9	
Chromium	**27.3**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:22	7440-47-3	
Lead	**6.4**	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:22	7439-92-1	
Selenium	ND	mg/kg	1.2	1	04/18/19 09:44	04/19/19 13:22	7782-49-2	
Silver	ND	mg/kg	0.59	1	04/18/19 09:44	04/19/19 13:22	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.031**	mg/kg	0.022	1	04/18/19 10:14	04/22/19 15:12	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**18.1**	%	0.10	1		04/18/19 12:37		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	83-32-9	
Acenaphthylene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	208-96-8	
Anthracene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	120-12-7	
Benzo(a)anthracene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	56-55-3	
Benzo(a)pyrene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	207-08-9	
Chrysene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	53-70-3	
Fluoranthene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	206-44-0	
Fluorene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	193-39-5	
Naphthalene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	91-20-3	
Phenanthrene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	85-01-8	
Pyrene	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	12.1	1	04/18/19 18:19	04/23/19 18:44		
Surrogates								
2-Fluorobiphenyl (S)	77	%.	30-125	1	04/18/19 18:19	04/23/19 18:44	321-60-8	
p-Terphenyl-d14 (S)	82	%.	30-125	1	04/18/19 18:19	04/23/19 18:44	1718-51-0	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 W **Lab ID: 10471163011** Collected: 04/13/19 09:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8081B GCS Pesticides	Analytical Method: EPA 8081B Preparation Method: EPA Mod. 3510C							
Aldrin	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	309-00-2	
alpha-BHC	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	319-84-6	
beta-BHC	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	319-85-7	
delta-BHC	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	319-86-8	
gamma-BHC (Lindane)	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	58-89-9	
Chlordane (Technical)	ND	ug/L	0.63	1	04/18/19 17:50	04/24/19 08:25	57-74-9	
alpha-Chlordane	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	5103-71-9	
gamma-Chlordane	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	5103-74-2	
4,4'-DDD	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	72-54-8	
4,4'-DDE	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	72-55-9	
4,4'-DDT	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	50-29-3	
Dieldrin	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	60-57-1	
Endosulfan I	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	959-98-8	
Endosulfan II	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	33213-65-9	
Endosulfan sulfate	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	1031-07-8	
Endrin	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	72-20-8	
Endrin aldehyde	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	7421-93-4	
Endrin ketone	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:25	53494-70-5	
Heptachlor	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	76-44-8	
Heptachlor epoxide	ND	ug/L	0.063	1	04/18/19 17:50	04/24/19 08:25	1024-57-3	
Methoxychlor	ND	ug/L	0.63	1	04/18/19 17:50	04/24/19 08:25	72-43-5	
Toxaphene	ND	ug/L	1.9	1	04/18/19 17:50	04/24/19 08:25	8001-35-2	
Surrogates								
Tetrachloro-m-xylene (S)	96	%.	52-125	1	04/18/19 17:50	04/24/19 08:25	877-09-8	
Decachlorobiphenyl (S)	72	%.	30-141	1	04/18/19 17:50	04/24/19 08:25	2051-24-3	
WIDRO LV GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	ND	mg/L	0.14	1	04/18/19 09:01	04/19/19 14:06		
Surrogates								
n-Triacontane (S)	105	%.	50-150	1	04/18/19 09:01	04/19/19 14:06	638-68-6	A5
WIGRO GCV	Analytical Method: WI MOD GRO							
Gasoline Range Organics	ND	ug/L	100	1		04/25/19 06:23		
Surrogates								
a,a,a-Trifluorotoluene (S)	95	%.	80-150	1		04/25/19 06:23	98-08-8	
6010D MET ICP, Lab Filtered	Analytical Method: EPA 6010D Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	20.0	1	04/22/19 07:13	04/23/19 09:33	7440-38-2	
Barium, Dissolved	**125**	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:33	7440-39-3	
Cadmium, Dissolved	ND	ug/L	3.0	1	04/22/19 07:13	04/23/19 09:33	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:33	7440-47-3	
Lead, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:33	7439-92-1	
Selenium, Dissolved	ND	ug/L	20.0	1	04/22/19 07:13	04/23/19 09:33	7782-49-2	
Silver, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:33	7440-22-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 W **Lab ID: 10471163011** Collected: 04/13/19 09:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470A Mercury, Lab Filtered	Analytical Method: EPA 7470A Preparation Method: EPA 7470A							
Mercury, Dissolved	ND	ug/L	0.20	1	04/22/19 10:16	04/23/19 15:17	7439-97-6	
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA Mod. 3510C							
Acenaphthene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	83-32-9	
Acenaphthylene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	208-96-8	
Anthracene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	207-08-9	
Chrysene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	53-70-3	
Fluoranthene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	206-44-0	
Fluorene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	193-39-5	
Naphthalene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	91-20-3	
Phenanthrene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	85-01-8	
Pyrene	ND	ug/L	0.044	1	04/18/19 13:58	04/24/19 03:41	129-00-0	
Surrogates								
2-Fluorobiphenyl (S)	72	%.	47-125	1	04/18/19 13:58	04/24/19 03:41	321-60-8	
p-Terphenyl-d14 (S)	77	%.	62-125	1	04/18/19 13:58	04/24/19 03:41	1718-51-0	
8260B VOC	Analytical Method: EPA 8260B							
Acetone	ND	ug/L	20.0	1		04/18/19 17:16	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		04/18/19 17:16	107-05-1	
Benzene	ND	ug/L	1.0	1		04/18/19 17:16	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		04/18/19 17:16	108-86-1	
Bromochloromethane	ND	ug/L	1.0	1		04/18/19 17:16	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		04/18/19 17:16	75-27-4	
Bromoform	ND	ug/L	4.0	1		04/18/19 17:16	75-25-2	
Bromomethane	ND	ug/L	4.0	1		04/18/19 17:16	74-83-9	
2-Butanone (MEK)	ND	ug/L	5.0	1		04/18/19 17:16	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		04/18/19 17:16	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	108-90-7	
Chloroethane	ND	ug/L	1.0	1		04/18/19 17:16	75-00-3	
Chloroform	ND	ug/L	4.0	1		04/18/19 17:16	67-66-3	
Chloromethane	ND	ug/L	4.0	1		04/18/19 17:16	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 17:16	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 17:16	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	10.0	1		04/18/19 17:16	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		04/18/19 17:16	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		04/18/19 17:16	106-93-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 W **Lab ID: 10471163011** Collected: 04/13/19 09:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC	Analytical Method: EPA 8260B							
Dibromomethane	ND	ug/L	4.0	1		04/18/19 17:16	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		04/18/19 17:16	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		04/18/19 17:16	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		04/18/19 17:16	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		04/18/19 17:16	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 17:16	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 17:16	156-60-5	
Dichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 17:16	75-43-4	N2
1,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 17:16	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		04/18/19 17:16	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 17:16	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		04/18/19 17:16	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 17:16	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 17:16	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/L	4.0	1		04/18/19 17:16	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	1.0	1		04/18/19 17:16	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		04/18/19 17:16	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		04/18/19 17:16	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		04/18/19 17:16	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		04/18/19 17:16	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		04/18/19 17:16	1634-04-4	
Naphthalene	ND	ug/L	4.0	1		04/18/19 17:16	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	103-65-1	
Styrene	ND	ug/L	1.0	1		04/18/19 17:16	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 17:16	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 17:16	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		04/18/19 17:16	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		04/18/19 17:16	109-99-9	
Toluene	ND	ug/L	1.0	1		04/18/19 17:16	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 17:16	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		04/18/19 17:16	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		04/18/19 17:16	79-00-5	
Trichloroethene	ND	ug/L	0.40	1		04/18/19 17:16	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 17:16	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		04/18/19 17:16	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		04/18/19 17:16	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 17:16	108-67-8	
Vinyl chloride	ND	ug/L	0.20	1		04/18/19 17:16	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		04/18/19 17:16	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	100	%.	75-125	1		04/18/19 17:16	17060-07-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-3 W **Lab ID: 10471163011** Collected: 04/13/19 09:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC	Analytical Method: EPA 8260B							
Surrogates								
Toluene-d8 (S)	96	%.	75-125	1		04/18/19 17:16	2037-26-5	
4-Bromofluorobenzene (S)	103	%.	75-125	1		04/18/19 17:16	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-12 W | **Lab ID: 10471163012** | Collected: 04/13/19 12:30 | Received: 04/17/19 11:15 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8081B GCS Pesticides	Analytical Method: EPA 8081B Preparation Method: EPA Mod. 3510C							
Aldrin	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	309-00-2	
alpha-BHC	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	319-84-6	
beta-BHC	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	319-85-7	
delta-BHC	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	319-86-8	
gamma-BHC (Lindane)	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	58-89-9	
Chlordane (Technical)	ND	ug/L	0.67	1	04/18/19 17:50	04/24/19 08:44	57-74-9	
alpha-Chlordane	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	5103-71-9	
gamma-Chlordane	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	5103-74-2	
4,4'-DDD	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	72-54-8	
4,4'-DDE	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	72-55-9	
4,4'-DDT	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	50-29-3	
Dieldrin	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	60-57-1	
Endosulfan I	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	959-98-8	
Endosulfan II	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	33213-65-9	
Endosulfan sulfate	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	1031-07-8	
Endrin	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	72-20-8	
Endrin aldehyde	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	7421-93-4	
Endrin ketone	ND	ug/L	0.13	1	04/18/19 17:50	04/24/19 08:44	53494-70-5	
Heptachlor	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	76-44-8	
Heptachlor epoxide	ND	ug/L	0.067	1	04/18/19 17:50	04/24/19 08:44	1024-57-3	
Methoxychlor	ND	ug/L	0.67	1	04/18/19 17:50	04/24/19 08:44	72-43-5	
Toxaphene	ND	ug/L	2.0	1	04/18/19 17:50	04/24/19 08:44	8001-35-2	
Surrogates								
Tetrachloro-m-xylene (S)	96	%.	52-125	1	04/18/19 17:50	04/24/19 08:44	877-09-8	
Decachlorobiphenyl (S)	80	%.	30-141	1	04/18/19 17:50	04/24/19 08:44	2051-24-3	
WIDRO LV GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	ND	mg/L	0.14	1	04/18/19 09:01	04/19/19 14:14		
Surrogates								
n-Triacontane (S)	103	%.	50-150	1	04/18/19 09:01	04/19/19 14:14	638-68-6	A5
6010D MET ICP, Lab Filtered	Analytical Method: EPA 6010D Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	20.0	1	04/22/19 07:13	04/23/19 09:48	7440-38-2	
Barium, Dissolved	**15.2**	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:48	7440-39-3	
Cadmium, Dissolved	ND	ug/L	3.0	1	04/22/19 07:13	04/23/19 09:48	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:48	7440-47-3	
Lead, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:48	7439-92-1	
Selenium, Dissolved	ND	ug/L	20.0	1	04/22/19 07:13	04/23/19 09:48	7782-49-2	
Silver, Dissolved	ND	ug/L	10.0	1	04/22/19 07:13	04/23/19 09:48	7440-22-4	
7470A Mercury, Lab Filtered	Analytical Method: EPA 7470A Preparation Method: EPA 7470A							
Mercury, Dissolved	ND	ug/L	0.20	1	04/22/19 10:16	04/23/19 15:19	7439-97-6	
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA Mod. 3510C							
Acenaphthene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	83-32-9	
Acenaphthylene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	208-96-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-12 W **Lab ID: 10471163012** Collected: 04/13/19 12:30 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA Mod. 3510C							
Anthracene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	120-12-7	
Benzo(a)anthracene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	56-55-3	
Benzo(a)pyrene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	207-08-9	
Chrysene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	53-70-3	
Fluoranthene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	206-44-0	
Fluorene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	193-39-5	
Naphthalene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	91-20-3	
Phenanthrene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	85-01-8	
Pyrene	ND	ug/L	0.048	1	04/18/19 13:58	04/24/19 04:05	129-00-0	
Surrogates								
2-Fluorobiphenyl (S)	70	%.	47-125	1	04/18/19 13:58	04/24/19 04:05	321-60-8	
p-Terphenyl-d14 (S)	78	%.	62-125	1	04/18/19 13:58	04/24/19 04:05	1718-51-0	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-8 W | **Lab ID: 10471163013** | Collected: 04/13/19 14:45 | Received: 04/17/19 11:15 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO LV GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	**0.54**	mg/L	0.15	1	04/18/19 09:01	04/19/19 12:14		T6
Surrogates								
n-Triacontane (S)	103	%.	50-150	1	04/18/19 09:01	04/19/19 12:14	638-68-6	A5
8260B VOC	Analytical Method: EPA 8260B							
Acetone	ND	ug/L	20.0	1		04/18/19 16:28	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		04/18/19 16:28	107-05-1	
Benzene	ND	ug/L	1.0	1		04/18/19 16:28	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		04/18/19 16:28	108-86-1	
Bromochloromethane	ND	ug/L	1.0	1		04/18/19 16:28	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		04/18/19 16:28	75-27-4	
Bromoform	ND	ug/L	4.0	1		04/18/19 16:28	75-25-2	
Bromomethane	ND	ug/L	4.0	1		04/18/19 16:28	74-83-9	
2-Butanone (MEK)	ND	ug/L	5.0	1		04/18/19 16:28	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		04/18/19 16:28	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	108-90-7	
Chloroethane	ND	ug/L	1.0	1		04/18/19 16:28	75-00-3	
Chloroform	ND	ug/L	4.0	1		04/18/19 16:28	67-66-3	
Chloromethane	ND	ug/L	4.0	1		04/18/19 16:28	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 16:28	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 16:28	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	10.0	1		04/18/19 16:28	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		04/18/19 16:28	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		04/18/19 16:28	106-93-4	
Dibromomethane	ND	ug/L	4.0	1		04/18/19 16:28	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		04/18/19 16:28	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		04/18/19 16:28	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		04/18/19 16:28	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		04/18/19 16:28	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 16:28	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 16:28	156-60-5	
Dichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 16:28	75-43-4	N2
1,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 16:28	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		04/18/19 16:28	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 16:28	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		04/18/19 16:28	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 16:28	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 16:28	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/L	4.0	1		04/18/19 16:28	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	1.0	1		04/18/19 16:28	87-68-3	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-8 W **Lab ID: 10471163013** Collected: 04/13/19 14:45 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC	Analytical Method: EPA 8260B							
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		04/18/19 16:28	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		04/18/19 16:28	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		04/18/19 16:28	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		04/18/19 16:28	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		04/18/19 16:28	1634-04-4	
Naphthalene	ND	ug/L	4.0	1		04/18/19 16:28	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	103-65-1	
Styrene	ND	ug/L	1.0	1		04/18/19 16:28	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 16:28	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 16:28	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		04/18/19 16:28	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		04/18/19 16:28	109-99-9	
Toluene	ND	ug/L	1.0	1		04/18/19 16:28	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 16:28	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		04/18/19 16:28	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		04/18/19 16:28	79-00-5	
Trichloroethene	ND	ug/L	0.40	1		04/18/19 16:28	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 16:28	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		04/18/19 16:28	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		04/18/19 16:28	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 16:28	108-67-8	
Vinyl chloride	ND	ug/L	0.20	1		04/18/19 16:28	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		04/18/19 16:28	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	101	%.	75-125	1		04/18/19 16:28	17060-07-0	
Toluene-d8 (S)	99	%.	75-125	1		04/18/19 16:28	2037-26-5	
4-Bromofluorobenzene (S)	104	%.	75-125	1		04/18/19 16:28	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: Trip Blank-WT **Lab ID: 10471163014** Collected: 04/13/19 00:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIGRO GCV	Analytical Method: WI MOD GRO							
Gasoline Range Organics	ND	ug/L	100	1		04/25/19 12:48		
Surrogates								
a,a,a-Trifluorotoluene (S)	103	%.	80-150	1		04/25/19 12:48	98-08-8	
8260B VOC	Analytical Method: EPA 8260B							
Acetone	ND	ug/L	20.0	1		04/18/19 15:56	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		04/18/19 15:56	107-05-1	
Benzene	ND	ug/L	1.0	1		04/18/19 15:56	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		04/18/19 15:56	108-86-1	
Bromochloromethane	ND	ug/L	1.0	1		04/18/19 15:56	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		04/18/19 15:56	75-27-4	
Bromoform	ND	ug/L	4.0	1		04/18/19 15:56	75-25-2	
Bromomethane	ND	ug/L	4.0	1		04/18/19 15:56	74-83-9	
2-Butanone (MEK)	ND	ug/L	5.0	1		04/18/19 15:56	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		04/18/19 15:56	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	108-90-7	
Chloroethane	ND	ug/L	1.0	1		04/18/19 15:56	75-00-3	
Chloroform	ND	ug/L	4.0	1		04/18/19 15:56	67-66-3	
Chloromethane	ND	ug/L	4.0	1		04/18/19 15:56	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 15:56	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		04/18/19 15:56	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	10.0	1		04/18/19 15:56	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		04/18/19 15:56	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		04/18/19 15:56	106-93-4	
Dibromomethane	ND	ug/L	4.0	1		04/18/19 15:56	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		04/18/19 15:56	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		04/18/19 15:56	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		04/18/19 15:56	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		04/18/19 15:56	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 15:56	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		04/18/19 15:56	156-60-5	
Dichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 15:56	75-43-4	N2
1,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 15:56	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		04/18/19 15:56	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		04/18/19 15:56	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		04/18/19 15:56	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 15:56	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		04/18/19 15:56	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/L	4.0	1		04/18/19 15:56	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	1.0	1		04/18/19 15:56	87-68-3	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: Trip Blank-WT **Lab ID: 10471163014** Collected: 04/13/19 00:00 Received: 04/17/19 11:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC	Analytical Method: EPA 8260B							
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		04/18/19 15:56	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		04/18/19 15:56	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		04/18/19 15:56	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		04/18/19 15:56	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		04/18/19 15:56	1634-04-4	
Naphthalene	ND	ug/L	4.0	1		04/18/19 15:56	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	103-65-1	
Styrene	ND	ug/L	1.0	1		04/18/19 15:56	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 15:56	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		04/18/19 15:56	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		04/18/19 15:56	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		04/18/19 15:56	109-99-9	
Toluene	ND	ug/L	1.0	1		04/18/19 15:56	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		04/18/19 15:56	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		04/18/19 15:56	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		04/18/19 15:56	79-00-5	
Trichloroethene	ND	ug/L	0.40	1		04/18/19 15:56	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		04/18/19 15:56	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		04/18/19 15:56	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		04/18/19 15:56	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		04/18/19 15:56	108-67-8	
Vinyl chloride	ND	ug/L	0.20	1		04/18/19 15:56	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		04/18/19 15:56	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	103	%.	75-125	1		04/18/19 15:56	17060-07-0	
Toluene-d8 (S)	97	%.	75-125	1		04/18/19 15:56	2037-26-5	
4-Bromofluorobenzene (S)	102	%.	75-125	1		04/18/19 15:56	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: Trip Blank-SL **Lab ID: 10471163015** Collected: 04/13/19 00:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIGRO GCV	Analytical Method: WI MOD GRO Preparation Method: EPA 5030 Medium Soil							
Gasoline Range Organics	ND	mg/kg	10.0	1	04/24/19 14:01	04/26/19 00:10		
Surrogates								
a,a,a-Trifluorotoluene (S)	95	%.	80-150	1	04/24/19 14:01	04/26/19 00:10	98-08-8	
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	1000	1	04/18/19 10:44	04/18/19 16:41	67-64-1	
Allyl chloride	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	107-05-1	
Benzene	ND	ug/kg	20.0	1	04/18/19 10:44	04/18/19 16:41	71-43-2	
Bromobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	108-86-1	
Bromochloromethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	74-97-5	
Bromodichloromethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	75-27-4	
Bromoform	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	75-25-2	
Bromomethane	ND	ug/kg	500	1	04/18/19 10:44	04/18/19 16:41	74-83-9	
2-Butanone (MEK)	ND	ug/kg	250	1	04/18/19 10:44	04/18/19 16:41	78-93-3	
n-Butylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	104-51-8	
sec-Butylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	135-98-8	
tert-Butylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	98-06-6	
Carbon tetrachloride	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	56-23-5	
Chlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	108-90-7	
Chloroethane	ND	ug/kg	500	1	04/18/19 10:44	04/18/19 16:41	75-00-3	
Chloroform	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	67-66-3	
Chloromethane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	74-87-3	
2-Chlorotoluene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	95-49-8	
4-Chlorotoluene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	500	1	04/18/19 10:44	04/18/19 16:41	96-12-8	
Dibromochloromethane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	106-93-4	
Dibromomethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	75-71-8	
1,1-Dichloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	75-34-3	
1,2-Dichloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	107-06-2	
1,1-Dichloroethene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	156-60-5	
Dichlorofluoromethane	ND	ug/kg	500	1	04/18/19 10:44	04/18/19 16:41	75-43-4	N2
1,2-Dichloropropane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	78-87-5	
1,3-Dichloropropane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	142-28-9	
2,2-Dichloropropane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	594-20-7	
1,1-Dichloropropene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	60-29-7	
Ethylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	100-41-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: Trip Blank-SL **Lab ID: 10471163015** Collected: 04/13/19 00:00 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5030 Med Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035/5030B							
Hexachloro-1,3-butadiene	ND	ug/kg	250	1	04/18/19 10:44	04/18/19 16:41	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	98-82-8	
p-Isopropyltoluene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	99-87-6	
Methylene Chloride	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	250	1	04/18/19 10:44	04/18/19 16:41	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	1634-04-4	
Naphthalene	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	91-20-3	
n-Propylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	103-65-1	
Styrene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	79-34-5	
Tetrachloroethene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	127-18-4	
Tetrahydrofuran	ND	ug/kg	2000	1	04/18/19 10:44	04/18/19 16:41	109-99-9	
Toluene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	79-00-5	
Trichloroethene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	79-01-6	
Trichlorofluoromethane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	200	1	04/18/19 10:44	04/18/19 16:41	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/kg	50.0	1	04/18/19 10:44	04/18/19 16:41	108-67-8	
Vinyl chloride	ND	ug/kg	20.0	1	04/18/19 10:44	04/18/19 16:41	75-01-4	
Xylene (Total)	ND	ug/kg	150	1	04/18/19 10:44	04/18/19 16:41	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	104	%.	75-125	1	04/18/19 10:44	04/18/19 16:41	17060-07-0	
Toluene-d8 (S)	101	%.	75-125	1	04/18/19 10:44	04/18/19 16:41	2037-26-5	
4-Bromofluorobenzene (S)	102	%.	75-125	1	04/18/19 10:44	04/18/19 16:41	460-00-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Sample: ST-11 (4-6) **Lab ID: 10471163016** Collected: 04/13/19 13:15 Received: 04/17/19 11:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**1.7**	mg/kg	1.1	1	04/19/19 10:45	04/22/19 15:36	7440-38-2	
Barium	**26.1**	mg/kg	0.55	1	04/19/19 10:45	04/22/19 15:36	7440-39-3	
Cadmium	ND	mg/kg	0.16	1	04/19/19 10:45	04/22/19 15:36	7440-43-9	
Chromium	**12.6**	mg/kg	0.55	1	04/19/19 10:45	04/22/19 15:36	7440-47-3	
Lead	**2.8**	mg/kg	0.55	1	04/19/19 10:45	04/22/19 15:36	7439-92-1	
Selenium	ND	mg/kg	1.1	1	04/19/19 10:45	04/22/19 15:36	7782-49-2	M1
Silver	ND	mg/kg	0.55	1	04/19/19 10:45	04/22/19 15:36	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	ND	mg/kg	0.020	1	04/19/19 11:11	04/22/19 16:05	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**8.3**	%	0.10	1		04/18/19 15:48		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 601478 | Analysis Method: WI MOD GRO
QC Batch Method: EPA 5030 Medium Soil | Analysis Description: WIGRO Solid GCV
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008, 10471163015

METHOD BLANK: 3250602 | Matrix: Solid
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008, 10471163015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Gasoline Range Organics	mg/kg	ND	10.0	04/25/19 10:59	
a,a,a-Trifluorotoluene (S)	%.	95	80-150	04/25/19 10:59	

LABORATORY CONTROL SAMPLE & LCSD: 3250603 3250604

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Gasoline Range Organics	mg/kg	50	44.5	50.7	89	101	80-120	13	20	
a,a,a-Trifluorotoluene (S)	%.				93	93	80-150			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3250847 3250848

Parameter	Units	10471163008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Gasoline Range Organics	mg/kg	ND	63.2	66.4	60.0	71.5	95	108	80-120	17	20	
a,a,a-Trifluorotoluene (S)	%.						100	98	80-150			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 601179 Analysis Method: WI MOD GRO
QC Batch Method: WI MOD GRO Analysis Description: WIGRO GCV Water
Associated Lab Samples: 10471163011, 10471163014

METHOD BLANK: 3249209 Matrix: Water
Associated Lab Samples: 10471163011, 10471163014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Gasoline Range Organics	ug/L	ND	100	04/25/19 03:46	
a,a,a-Trifluorotoluene (S)	%.	101	80-150	04/25/19 03:46	

LABORATORY CONTROL SAMPLE & LCSD: 3249210 3249211

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Gasoline Range Organics	ug/L	1000	991	954	99	95	80-120	4	20	
a,a,a-Trifluorotoluene (S)	%.				101	102	80-150			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249212 3249213

Parameter	Units	10471164008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Gasoline Range Organics	ug/L	693	1000	1000	1780	1770	109	108	80-120	0	20	G-
a,a,a-Trifluorotoluene (S)	%.						105	103	80-150			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600538 | Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A | Analysis Description: 7470A Mercury Water Dissolved
Associated Lab Samples: 10471163011, 10471163012

METHOD BLANK: 3246326 | Matrix: Water
Associated Lab Samples: 10471163011, 10471163012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury, Dissolved	ug/L	ND	0.20	04/23/19 15:13	

LABORATORY CONTROL SAMPLE: 3246327

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury, Dissolved	ug/L	5	4.8	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246328 3246329

Parameter	Units	10471163012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury, Dissolved	ug/L	ND	5	5	5.0	4.8	99	95	80-120	5	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600199 Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10471163001, 10471163002, 10471163003, 10471163004, 10471163005, 10471163008, 10471163009

METHOD BLANK: 3244751 Matrix: Solid
Associated Lab Samples: 10471163001, 10471163002, 10471163003, 10471163004, 10471163005, 10471163008, 10471163009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.018	04/22/19 14:41	

LABORATORY CONTROL SAMPLE: 3244752

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.48	0.50	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244753 3244754

Parameter	Units	10471162001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.49	0.49	0.52	0.51	104	101	80-120	3	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600493 | Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B | Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10471163016

METHOD BLANK: 3246226 | Matrix: Solid
Associated Lab Samples: 10471163016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.018	04/22/19 16:01	

LABORATORY CONTROL SAMPLE: 3246227

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.47	0.50	106	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246228 3246229

Parameter	Units	10471163016 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.51	0.55	0.55	0.58	105	103	80-120	5	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600191 Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 Analysis Description: 6010D Solids
Associated Lab Samples: 10471163001, 10471163002, 10471163003, 10471163004, 10471163005, 10471163008, 10471163009

METHOD BLANK: 3244719 Matrix: Solid
Associated Lab Samples: 10471163001, 10471163002, 10471163003, 10471163004, 10471163005, 10471163008, 10471163009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.91	04/19/19 11:39	
Barium	mg/kg	ND	0.45	04/19/19 11:39	
Cadmium	mg/kg	ND	0.14	04/19/19 11:39	
Chromium	mg/kg	ND	0.45	04/19/19 11:39	
Lead	mg/kg	ND	0.45	04/19/19 11:39	
Selenium	mg/kg	ND	0.91	04/19/19 11:39	
Silver	mg/kg	ND	0.45	04/19/19 11:39	

LABORATORY CONTROL SAMPLE: 3244720

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	50	46.4	93	80-120	
Barium	mg/kg	50	49.7	99	80-120	
Cadmium	mg/kg	50	49.0	98	80-120	
Chromium	mg/kg	50	49.5	99	80-120	
Lead	mg/kg	50	48.8	98	80-120	
Selenium	mg/kg	50	47.7	95	80-120	
Silver	mg/kg	25	23.6	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244721 3244722

Parameter	Units	10471137001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	1.3	50.1	49.2	42.9	42.5	83	84	75-125	1	20	
Barium	mg/kg	16.5	50.1	49.2	60.5	62.1	88	93	75-125	3	20	
Cadmium	mg/kg	ND	50.1	49.2	42.1	41.4	84	84	75-125	2	20	
Chromium	mg/kg	4.5	50.1	49.2	47.8	47.3	87	87	75-125	1	20	
Lead	mg/kg	3.4	50.1	49.2	43.9	43.1	81	81	75-125	2	20	
Selenium	mg/kg	ND	50.1	49.2	42.5	42.2	85	86	75-125	1	20	
Silver	mg/kg	ND	25	24.5	21.6	21.4	86	87	75-125	1	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600490 — Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 — Analysis Description: 6010D Solids
Associated Lab Samples: 10471163016

METHOD BLANK: 3246214 — Matrix: Solid
Associated Lab Samples: 10471163016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.93	04/22/19 15:32	
Barium	mg/kg	ND	0.47	04/22/19 15:32	
Cadmium	mg/kg	ND	0.14	04/22/19 15:32	
Chromium	mg/kg	ND	0.47	04/22/19 15:32	
Lead	mg/kg	ND	0.47	04/22/19 15:32	
Selenium	mg/kg	ND	0.93	04/22/19 15:32	
Silver	mg/kg	ND	0.47	04/22/19 15:32	

LABORATORY CONTROL SAMPLE: 3246215

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	49.5	48.7	98	80-120	
Barium	mg/kg	49.5	52.3	106	80-120	
Cadmium	mg/kg	49.5	51.9	105	80-120	
Chromium	mg/kg	49.5	52.6	106	80-120	
Lead	mg/kg	49.5	51.5	104	80-120	
Selenium	mg/kg	49.5	47.7	96	80-120	
Silver	mg/kg	24.8	25.5	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246216 3246217

Parameter	Units	10471163016 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	1.7	50.5	50.9	42.2	40.7	80	77	75-125	4	20	
Barium	mg/kg	26.1	50.5	50.9	71.2	68.2	89	83	75-125	4	20	
Cadmium	mg/kg	ND	50.5	50.9	42.1	40.6	83	79	75-125	4	20	
Chromium	mg/kg	12.6	50.5	50.9	57.6	54.7	89	82	75-125	5	20	
Lead	mg/kg	2.8	50.5	50.9	44.4	43.1	82	79	75-125	3	20	
Selenium	mg/kg	ND	50.5	50.9	38.7	37.5	77	74	75-125	3	20	M1
Silver	mg/kg	ND	25.2	25.5	21.8	20.9	86	82	75-125	4	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600537 Analysis Method: EPA 6010D
QC Batch Method: EPA 3010 Analysis Description: 6010D Water Dissolved
Associated Lab Samples: 10471163011, 10471163012

METHOD BLANK: 3246322 Matrix: Water
Associated Lab Samples: 10471163011, 10471163012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic, Dissolved	ug/L	ND	20.0	04/23/19 09:24	
Barium, Dissolved	ug/L	ND	10.0	04/23/19 09:24	
Cadmium, Dissolved	ug/L	ND	3.0	04/23/19 09:24	
Chromium, Dissolved	ug/L	ND	10.0	04/23/19 09:24	
Lead, Dissolved	ug/L	ND	10.0	04/23/19 09:24	
Selenium, Dissolved	ug/L	ND	20.0	04/23/19 09:24	
Silver, Dissolved	ug/L	ND	10.0	04/23/19 09:24	

LABORATORY CONTROL SAMPLE: 3246323

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic, Dissolved	ug/L	1000	1010	101	80-120	
Barium, Dissolved	ug/L	1000	1060	106	80-120	
Cadmium, Dissolved	ug/L	1000	1040	104	80-120	
Chromium, Dissolved	ug/L	1000	1040	104	80-120	
Lead, Dissolved	ug/L	1000	1040	104	80-120	
Selenium, Dissolved	ug/L	1000	1030	103	80-120	
Silver, Dissolved	ug/L	500	509	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246324 3246325

Parameter	Units	10471163011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic, Dissolved	ug/L	ND	1000	1000	1030	1050	103	105	75-125	2	20	
Barium, Dissolved	ug/L	125	1000	1000	1170	1190	105	107	75-125	2	20	
Cadmium, Dissolved	ug/L	ND	1000	1000	1020	1040	102	104	75-125	2	20	
Chromium, Dissolved	ug/L	ND	1000	1000	1040	1050	103	105	75-125	1	20	
Lead, Dissolved	ug/L	ND	1000	1000	1020	1030	101	103	75-125	1	20	
Selenium, Dissolved	ug/L	ND	1000	1000	1040	1050	104	105	75-125	1	20	
Silver, Dissolved	ug/L	ND	500	500	518	529	104	106	75-125	2	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600219 — Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 — Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10471163001, 10471163002, 10471163003, 10471163004, 10471163005

SAMPLE DUPLICATE: 3244818

Parameter	Units	10471137001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.5	7.7	2	30	

SAMPLE DUPLICATE: 3244819

Parameter	Units	10471163005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	22.8	22.4	2	30	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600228 | Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 | Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10471163008, 10471163009

SAMPLE DUPLICATE: 3244836

Parameter	Units	10470518017 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	21.7	22.1	2	30	

SAMPLE DUPLICATE: 3245000

Parameter	Units	10471163008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	21.8	21.2	3	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600406 | Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 | Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10471163016

SAMPLE DUPLICATE: 3245570

Parameter	Units	10471247001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	66.7	60.9	9	30	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600244 | Analysis Method: EPA 8260B
QC Batch Method: EPA 5035/5030B | Analysis Description: 8260B MSV 5030 Med Level
Associated Lab Samples: 10471163001, 10471163005, 10471163008, 10471163015

METHOD BLANK: 3244878 | Matrix: Solid
Associated Lab Samples: 10471163001, 10471163005, 10471163008, 10471163015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,1,1-Trichloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,1,2,2-Tetrachloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,1,2-Trichloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	200	04/18/19 13:23	
1,1-Dichloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,1-Dichloroethene	ug/kg	ND	50.0	04/18/19 13:23	
1,1-Dichloropropene	ug/kg	ND	50.0	04/18/19 13:23	
1,2,3-Trichlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,2,3-Trichloropropane	ug/kg	ND	200	04/18/19 13:23	
1,2,4-Trichlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,2,4-Trimethylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,2-Dibromo-3-chloropropane	ug/kg	ND	500	04/18/19 13:23	
1,2-Dibromoethane (EDB)	ug/kg	ND	50.0	04/18/19 13:23	
1,2-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,2-Dichloroethane	ug/kg	ND	50.0	04/18/19 13:23	
1,2-Dichloropropane	ug/kg	ND	50.0	04/18/19 13:23	
1,3,5-Trimethylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,3-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
1,3-Dichloropropane	ug/kg	ND	50.0	04/18/19 13:23	
1,4-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
2,2-Dichloropropane	ug/kg	ND	200	04/18/19 13:23	
2-Butanone (MEK)	ug/kg	ND	250	04/18/19 13:23	
2-Chlorotoluene	ug/kg	ND	50.0	04/18/19 13:23	
4-Chlorotoluene	ug/kg	ND	50.0	04/18/19 13:23	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	250	04/18/19 13:23	
Acetone	ug/kg	ND	1000	04/18/19 13:23	
Allyl chloride	ug/kg	ND	200	04/18/19 13:23	
Benzene	ug/kg	ND	20.0	04/18/19 13:23	
Bromobenzene	ug/kg	ND	50.0	04/18/19 13:23	
Bromochloromethane	ug/kg	ND	50.0	04/18/19 13:23	
Bromodichloromethane	ug/kg	ND	50.0	04/18/19 13:23	
Bromoform	ug/kg	ND	200	04/18/19 13:23	
Bromomethane	ug/kg	ND	500	04/18/19 13:23	
Carbon tetrachloride	ug/kg	ND	50.0	04/18/19 13:23	
Chlorobenzene	ug/kg	ND	50.0	04/18/19 13:23	
Chloroethane	ug/kg	ND	500	04/18/19 13:23	
Chloroform	ug/kg	ND	50.0	04/18/19 13:23	
Chloromethane	ug/kg	ND	200	04/18/19 13:23	
cis-1,2-Dichloroethene	ug/kg	ND	50.0	04/18/19 13:23	
cis-1,3-Dichloropropene	ug/kg	ND	50.0	04/18/19 13:23	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

METHOD BLANK: 3244878 Matrix: Solid

Associated Lab Samples: 10471163001, 10471163005, 10471163008, 10471163015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dibromochloromethane	ug/kg	ND	200	04/18/19 13:23	
Dibromomethane	ug/kg	ND	50.0	04/18/19 13:23	
Dichlorodifluoromethane	ug/kg	ND	200	04/18/19 13:23	
Dichlorofluoromethane	ug/kg	ND	500	04/18/19 13:23	N2
Diethyl ether (Ethyl ether)	ug/kg	ND	200	04/18/19 13:23	
Ethylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
Hexachloro-1,3-butadiene	ug/kg	ND	250	04/18/19 13:23	
Isopropylbenzene (Cumene)	ug/kg	ND	50.0	04/18/19 13:23	
Methyl-tert-butyl ether	ug/kg	ND	50.0	04/18/19 13:23	
Methylene Chloride	ug/kg	ND	200	04/18/19 13:23	
n-Butylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
n-Propylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
Naphthalene	ug/kg	ND	200	04/18/19 13:23	
p-Isopropyltoluene	ug/kg	ND	50.0	04/18/19 13:23	
sec-Butylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
Styrene	ug/kg	ND	50.0	04/18/19 13:23	
tert-Butylbenzene	ug/kg	ND	50.0	04/18/19 13:23	
Tetrachloroethene	ug/kg	ND	50.0	04/18/19 13:23	
Tetrahydrofuran	ug/kg	ND	2000	04/18/19 13:23	
Toluene	ug/kg	ND	50.0	04/18/19 13:23	
trans-1,2-Dichloroethene	ug/kg	ND	50.0	04/18/19 13:23	
trans-1,3-Dichloropropene	ug/kg	ND	50.0	04/18/19 13:23	
Trichloroethene	ug/kg	ND	50.0	04/18/19 13:23	
Trichlorofluoromethane	ug/kg	ND	200	04/18/19 13:23	
Vinyl chloride	ug/kg	ND	20.0	04/18/19 13:23	
Xylene (Total)	ug/kg	ND	150	04/18/19 13:23	
1,2-Dichloroethane-d4 (S)	%.	102	75-125	04/18/19 13:23	
4-Bromofluorobenzene (S)	%.	95	75-125	04/18/19 13:23	
Toluene-d8 (S)	%.	99	75-125	04/18/19 13:23	

LABORATORY CONTROL SAMPLE: 3244879

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	1000	866	87	53-125	
1,1,1-Trichloroethane	ug/kg	1000	825	83	53-146	
1,1,2,2-Tetrachloroethane	ug/kg	1000	793	79	51-125	
1,1,2-Trichloroethane	ug/kg	1000	792	79	55-125	
1,1,2-Trichlorotrifluoroethane	ug/kg	1000	815	81	49-150	
1,1-Dichloroethane	ug/kg	1000	765	76	56-125	
1,1-Dichloroethene	ug/kg	1000	834	83	48-148	
1,1-Dichloropropene	ug/kg	1000	837	84	55-142	
1,2,3-Trichlorobenzene	ug/kg	1000	776	78	47-125	
1,2,3-Trichloropropane	ug/kg	1000	778	78	52-125	
1,2,4-Trichlorobenzene	ug/kg	1000	748	75	48-125	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3244879

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/kg	1000	853	85	51-126	
1,2-Dibromo-3-chloropropane	ug/kg	2500	1860	74	50-125	
1,2-Dibromoethane (EDB)	ug/kg	1000	824	82	52-125	
1,2-Dichlorobenzene	ug/kg	1000	788	79	50-125	
1,2-Dichloroethane	ug/kg	1000	741	74	51-125	
1,2-Dichloropropane	ug/kg	1000	812	81	57-125	
1,3,5-Trimethylbenzene	ug/kg	1000	832	83	52-127	
1,3-Dichlorobenzene	ug/kg	1000	785	79	50-128	
1,3-Dichloropropane	ug/kg	1000	812	81	55-125	
1,4-Dichlorobenzene	ug/kg	1000	721	72	51-125	
2,2-Dichloropropane	ug/kg	1000	763	76	41-136	
2-Butanone (MEK)	ug/kg	5000	3770	75	43-125	
2-Chlorotoluene	ug/kg	1000	810	81	52-126	
4-Chlorotoluene	ug/kg	1000	813	81	53-126	
4-Methyl-2-pentanone (MIBK)	ug/kg	5000	4040	81	39-125	
Acetone	ug/kg	5000	4240	85	46-136	
Allyl chloride	ug/kg	1000	735	73	48-130	
Benzene	ug/kg	1000	745	75	48-125	
Bromobenzene	ug/kg	1000	744	74	51-125	
Bromochloromethane	ug/kg	1000	790	79	52-125	
Bromodichloromethane	ug/kg	1000	780	78	51-131	
Bromoform	ug/kg	1000	777	78	52-125	
Bromomethane	ug/kg	1000	999	100	30-150	
Carbon tetrachloride	ug/kg	1000	814	81	59-129	
Chlorobenzene	ug/kg	1000	803	80	54-125	
Chloroethane	ug/kg	1000	1040	104	61-132	CH
Chloroform	ug/kg	1000	830	83	52-125	
Chloromethane	ug/kg	1000	762	76	46-125	
cis-1,2-Dichloroethene	ug/kg	1000	770	77	54-127	
cis-1,3-Dichloropropene	ug/kg	1000	795	79	50-134	
Dibromochloromethane	ug/kg	1000	852	85	54-125	
Dibromomethane	ug/kg	1000	779	78	51-125	
Dichlorodifluoromethane	ug/kg	1000	634	63	42-125	
Dichlorofluoromethane	ug/kg	1000	1040	104	30-150	N2
Diethyl ether (Ethyl ether)	ug/kg	1000	785	79	50-127	
Ethylbenzene	ug/kg	1000	779	78	51-125	
Hexachloro-1,3-butadiene	ug/kg	1000	725	73	41-133	
Isopropylbenzene (Cumene)	ug/kg	1000	839	84	54-134	
Methyl-tert-butyl ether	ug/kg	1000	735	74	53-125	
Methylene Chloride	ug/kg	1000	778	78	48-125	
n-Butylbenzene	ug/kg	1000	806	81	49-135	
n-Propylbenzene	ug/kg	1000	817	82	55-129	
Naphthalene	ug/kg	1000	752	75	51-125	
p-Isopropyltoluene	ug/kg	1000	862	86	53-134	
sec-Butylbenzene	ug/kg	1000	832	83	52-134	
Styrene	ug/kg	1000	864	86	53-128	
tert-Butylbenzene	ug/kg	1000	819	82	51-133	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3244879

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Tetrachloroethene	ug/kg	1000	848	85	54-131	
Tetrahydrofuran	ug/kg	10000	9040	90	42-145	
Toluene	ug/kg	1000	764	76	51-125	
trans-1,2-Dichloroethene	ug/kg	1000	758	76	50-130	
trans-1,3-Dichloropropene	ug/kg	1000	838	84	52-125	
Trichloroethene	ug/kg	1000	809	81	55-131	
Trichlorofluoromethane	ug/kg	1000	1110	111	30-150	CH
Vinyl chloride	ug/kg	1000	789	79	58-125	
Xylene (Total)	ug/kg	3000	2480	83	52-125	
1,2-Dichloroethane-d4 (S)	%.			94	75-125	
4-Bromofluorobenzene (S)	%.			97	75-125	
Toluene-d8 (S)	%.			99	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244880 3244881

Parameter	Units	10471137001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/kg	ND	1320	1320	1420	1380	108	104	68-150	3	30	
1,1,1-Trichloroethane	ug/kg	ND	1320	1320	1330	1320	101	100	63-150	1	30	
1,1,2,2-Tetrachloroethane	ug/kg	ND	1320	1320	1400	1330	106	101	60-146	5	30	
1,1,2-Trichloroethane	ug/kg	ND	1320	1320	1330	1280	101	97	63-143	4	30	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	1320	1320	1280	1230	97	93	30-150	4	30	
1,1-Dichloroethane	ug/kg	ND	1320	1320	1200	1160	91	88	63-144	3	30	
1,1-Dichloroethene	ug/kg	ND	1320	1320	1310	1260	99	95	30-150	4	30	
1,1-Dichloropropene	ug/kg	ND	1320	1320	1380	1360	104	103	54-150	1	30	
1,2,3-Trichlorobenzene	ug/kg	ND	1320	1320	1430	1360	108	103	63-142	5	30	
1,2,3-Trichloropropane	ug/kg	ND	1320	1320	1370	1310	104	99	59-147	4	30	
1,2,4-Trichlorobenzene	ug/kg	ND	1320	1320	1350	1310	102	99	66-142	3	30	
1,2,4-Trimethylbenzene	ug/kg	ND	1320	1320	1490	1450	113	110	65-145	3	30	
1,2-Dibromo-3-chloropropane	ug/kg	ND	3300	3310	3470	3210	105	97	60-142	8	30	
1,2-Dibromoethane (EDB)	ug/kg	ND	1320	1320	1390	1350	106	102	67-135	3	30	
1,2-Dichlorobenzene	ug/kg	ND	1320	1320	1340	1300	101	98	68-141	3	30	
1,2-Dichloroethane	ug/kg	ND	1320	1320	1250	1200	94	91	56-132	4	30	
1,2-Dichloropropane	ug/kg	ND	1320	1320	1300	1220	98	93	58-150	6	30	
1,3,5-Trimethylbenzene	ug/kg	ND	1320	1320	1450	1410	110	107	66-148	2	30	
1,3-Dichlorobenzene	ug/kg	ND	1320	1320	1370	1320	104	100	63-148	4	30	
1,3-Dichloropropane	ug/kg	ND	1320	1320	1350	1310	102	99	63-142	3	30	
1,4-Dichlorobenzene	ug/kg	ND	1320	1320	1290	1230	98	93	68-140	5	30	
2,2-Dichloropropane	ug/kg	ND	1320	1320	1260	1240	96	94	62-143	2	30	
2-Butanone (MEK)	ug/kg	ND	6610	6610	6970	6740	106	102	53-138	3	30	
2-Chlorotoluene	ug/kg	ND	1320	1320	1380	1340	105	102	64-145	3	30	
4-Chlorotoluene	ug/kg	ND	1320	1320	1420	1390	108	105	63-149	2	30	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	6610	6610	7160	6660	109	101	47-150	7	30	

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REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244880 3244881

Parameter	Units	10471137001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acetone	ug/kg	ND	6610	6610	7770	8570	118	130	64-150	10	30	
Allyl chloride	ug/kg	ND	1320	1320	1170	1160	88	88	49-146	1	30	
Benzene	ug/kg	ND	1320	1320	1260	1220	95	92	63-136	3	30	
Bromobenzene	ug/kg	ND	1320	1320	1300	1250	99	94	63-142	4	30	
Bromochloromethane	ug/kg	ND	1320	1320	1280	1250	97	95	61-139	2	30	
Bromodichloromethane	ug/kg	ND	1320	1320	1330	1240	101	94	63-150	7	30	
Bromoform	ug/kg	ND	1320	1320	1390	1320	105	100	64-140	5	30	
Bromomethane	ug/kg	ND	1320	1320	1360	1360	103	103	56-148	0	30	
Carbon tetrachloride	ug/kg	ND	1320	1320	1340	1270	101	96	75-148	5	30	
Chlorobenzene	ug/kg	ND	1320	1320	1300	1260	98	96	62-147	3	30	
Chloroethane	ug/kg	ND	1320	1320	1410	1490	107	113	37-150	6	30	CH
Chloroform	ug/kg	ND	1320	1320	1330	1320	101	100	66-130	1	30	
Chloromethane	ug/kg	ND	1320	1320	1060	1110	80	84	35-131	5	30	
cis-1,2-Dichloroethene	ug/kg	ND	1320	1320	1280	1220	97	93	63-143	4	30	
cis-1,3-Dichloropropene	ug/kg	ND	1320	1320	1350	1290	102	98	60-150	4	30	
Dibromochloromethane	ug/kg	ND	1320	1320	1410	1390	107	105	64-144	1	30	
Dibromomethane	ug/kg	ND	1320	1320	1320	1270	100	96	59-148	4	30	
Dichlorodifluoromethane	ug/kg	ND	1320	1320	775	817	59	62	30-125	5	30	
Dichlorofluoromethane	ug/kg	ND	1320	1320	1450	1450	110	109	39-150	0	30	N2
Diethyl ether (Ethyl ether)	ug/kg	ND	1320	1320	1230	1190	93	90	59-149	3	30	
Ethylbenzene	ug/kg	ND	1320	1320	1300	1280	99	97	64-142	2	30	
Hexachloro-1,3-butadiene	ug/kg	ND	1320	1320	1400	1350	106	102	58-150	4	30	
Isopropylbenzene (Cumene)	ug/kg	ND	1320	1320	1460	1420	110	108	67-150	2	30	
Methyl-tert-butyl ether	ug/kg	ND	1320	1320	1290	1230	97	93	69-134	5	30	
Methylene Chloride	ug/kg	ND	1320	1320	1250	1210	93	89	56-134	4	30	
n-Butylbenzene	ug/kg	ND	1320	1320	1470	1420	111	107	64-150	4	30	
n-Propylbenzene	ug/kg	ND	1320	1320	1410	1390	107	105	65-150	1	30	
Naphthalene	ug/kg	ND	1320	1320	1420	1340	108	101	63-148	6	30	
p-Isopropyltoluene	ug/kg	ND	1320	1320	1560	1500	118	114	69-150	3	30	
sec-Butylbenzene	ug/kg	ND	1320	1320	1500	1480	113	112	69-150	1	30	
Styrene	ug/kg	ND	1320	1320	1460	1430	110	108	63-150	2	30	
tert-Butylbenzene	ug/kg	ND	1320	1320	1490	1440	113	109	67-150	3	30	
Tetrachloroethene	ug/kg	ND	1320	1320	1370	1360	104	103	62-150	1	30	
Tetrahydrofuran	ug/kg	ND	13200	13200	15800	14300	120	109	53-150	10	30	
Toluene	ug/kg	ND	1320	1320	1250	1230	94	93	61-141	1	30	
trans-1,2-Dichloroethene	ug/kg	ND	1320	1320	1270	1220	97	92	52-148	4	30	
trans-1,3-Dichloropropene	ug/kg	ND	1320	1320	1420	1400	107	106	62-142	1	30	
Trichloroethene	ug/kg	ND	1320	1320	1330	1290	101	97	59-150	4	30	
Trichlorofluoromethane	ug/kg	ND	1320	1320	1470	1530	111	116	30-150	4	30	CH
Vinyl chloride	ug/kg	ND	1320	1320	1080	1150	82	87	44-144	6	30	
Xylene (Total)	ug/kg	ND	3960	3970	4200	4100	106	103	67-145	3	30	
1,2-Dichloroethane-d4 (S)	%.						93	96	75-125			
4-Bromofluorobenzene (S)	%.						97	98	75-125			
Toluene-d8 (S)	%.						98	99	75-125			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600248 | Analysis Method: EPA 8260B
QC Batch Method: EPA 5035/5030B | Analysis Description: 8260B MSV 5030 Med Level
Associated Lab Samples: 10471163003, 10471163004

METHOD BLANK: 3244887 | Matrix: Solid
Associated Lab Samples: 10471163003, 10471163004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,1,1-Trichloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,1,2,2-Tetrachloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,1,2-Trichloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	200	04/18/19 21:12	
1,1-Dichloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,1-Dichloroethene	ug/kg	ND	50.0	04/18/19 21:12	
1,1-Dichloropropene	ug/kg	ND	50.0	04/18/19 21:12	
1,2,3-Trichlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,2,3-Trichloropropane	ug/kg	ND	200	04/18/19 21:12	
1,2,4-Trichlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,2,4-Trimethylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,2-Dibromo-3-chloropropane	ug/kg	ND	500	04/18/19 21:12	
1,2-Dibromoethane (EDB)	ug/kg	ND	50.0	04/18/19 21:12	
1,2-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,2-Dichloroethane	ug/kg	ND	50.0	04/18/19 21:12	
1,2-Dichloropropane	ug/kg	ND	50.0	04/18/19 21:12	
1,3,5-Trimethylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,3-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
1,3-Dichloropropane	ug/kg	ND	50.0	04/18/19 21:12	
1,4-Dichlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
2,2-Dichloropropane	ug/kg	ND	200	04/18/19 21:12	
2-Butanone (MEK)	ug/kg	ND	250	04/18/19 21:12	
2-Chlorotoluene	ug/kg	ND	50.0	04/18/19 21:12	
4-Chlorotoluene	ug/kg	ND	50.0	04/18/19 21:12	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	250	04/18/19 21:12	
Acetone	ug/kg	ND	1000	04/18/19 21:12	
Allyl chloride	ug/kg	ND	200	04/18/19 21:12	
Benzene	ug/kg	ND	20.0	04/18/19 21:12	
Bromobenzene	ug/kg	ND	50.0	04/18/19 21:12	
Bromochloromethane	ug/kg	ND	50.0	04/18/19 21:12	
Bromodichloromethane	ug/kg	ND	50.0	04/18/19 21:12	
Bromoform	ug/kg	ND	200	04/18/19 21:12	
Bromomethane	ug/kg	ND	500	04/18/19 21:12	
Carbon tetrachloride	ug/kg	ND	50.0	04/18/19 21:12	
Chlorobenzene	ug/kg	ND	50.0	04/18/19 21:12	
Chloroethane	ug/kg	ND	500	04/18/19 21:12	
Chloroform	ug/kg	ND	50.0	04/18/19 21:12	
Chloromethane	ug/kg	ND	200	04/18/19 21:12	
cis-1,2-Dichloroethene	ug/kg	ND	50.0	04/18/19 21:12	
cis-1,3-Dichloropropene	ug/kg	ND	50.0	04/18/19 21:12	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

METHOD BLANK: 3244887 Matrix: Solid
Associated Lab Samples: 10471163003, 10471163004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dibromochloromethane	ug/kg	ND	200	04/18/19 21:12	
Dibromomethane	ug/kg	ND	50.0	04/18/19 21:12	
Dichlorodifluoromethane	ug/kg	ND	200	04/18/19 21:12	
Dichlorofluoromethane	ug/kg	ND	500	04/18/19 21:12	N2
Diethyl ether (Ethyl ether)	ug/kg	ND	200	04/18/19 21:12	
Ethylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
Hexachloro-1,3-butadiene	ug/kg	ND	250	04/18/19 21:12	
Isopropylbenzene (Cumene)	ug/kg	ND	50.0	04/18/19 21:12	
Methyl-tert-butyl ether	ug/kg	ND	50.0	04/18/19 21:12	
Methylene Chloride	ug/kg	ND	200	04/18/19 21:12	
n-Butylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
n-Propylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
Naphthalene	ug/kg	ND	200	04/18/19 21:12	
p-Isopropyltoluene	ug/kg	ND	50.0	04/18/19 21:12	
sec-Butylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
Styrene	ug/kg	ND	50.0	04/18/19 21:12	
tert-Butylbenzene	ug/kg	ND	50.0	04/18/19 21:12	
Tetrachloroethene	ug/kg	ND	50.0	04/18/19 21:12	
Tetrahydrofuran	ug/kg	ND	2000	04/18/19 21:12	
Toluene	ug/kg	ND	50.0	04/18/19 21:12	
trans-1,2-Dichloroethene	ug/kg	ND	50.0	04/18/19 21:12	
trans-1,3-Dichloropropene	ug/kg	ND	50.0	04/18/19 21:12	
Trichloroethene	ug/kg	ND	50.0	04/18/19 21:12	
Trichlorofluoromethane	ug/kg	ND	200	04/18/19 21:12	
Vinyl chloride	ug/kg	ND	20.0	04/18/19 21:12	
Xylene (Total)	ug/kg	ND	150	04/18/19 21:12	
1,2-Dichloroethane-d4 (S)	%.	99	75-125	04/18/19 21:12	
4-Bromofluorobenzene (S)	%.	103	75-125	04/18/19 21:12	
Toluene-d8 (S)	%.	101	75-125	04/18/19 21:12	

LABORATORY CONTROL SAMPLE: 3244888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	1000	1020	102	53-125	
1,1,1-Trichloroethane	ug/kg	1000	964	96	53-146	
1,1,2,2-Tetrachloroethane	ug/kg	1000	952	95	51-125	
1,1,2-Trichloroethane	ug/kg	1000	888	89	55-125	
1,1,2-Trichlorotrifluoroethane	ug/kg	1000	881	88	49-150	
1,1-Dichloroethane	ug/kg	1000	837	84	56-125	
1,1-Dichloroethene	ug/kg	1000	845	84	48-148	
1,1-Dichloropropene	ug/kg	1000	903	90	55-142	
1,2,3-Trichlorobenzene	ug/kg	1000	912	91	47-125	
1,2,3-Trichloropropane	ug/kg	1000	936	94	52-125	
1,2,4-Trichlorobenzene	ug/kg	1000	910	91	48-125	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3244888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/kg	1000	1010	101	51-126	
1,2-Dibromo-3-chloropropane	ug/kg	2500	2430	97	50-125	
1,2-Dibromoethane (EDB)	ug/kg	1000	943	94	52-125	
1,2-Dichlorobenzene	ug/kg	1000	918	92	50-125	
1,2-Dichloroethane	ug/kg	1000	819	82	51-125	
1,2-Dichloropropane	ug/kg	1000	859	86	57-125	
1,3,5-Trimethylbenzene	ug/kg	1000	986	99	52-127	
1,3-Dichlorobenzene	ug/kg	1000	907	91	50-128	
1,3-Dichloropropane	ug/kg	1000	923	92	55-125	
1,4-Dichlorobenzene	ug/kg	1000	819	82	51-125	
2,2-Dichloropropane	ug/kg	1000	856	86	41-136	
2-Butanone (MEK)	ug/kg	5000	4120	82	43-125	
2-Chlorotoluene	ug/kg	1000	882	88	52-126	
4-Chlorotoluene	ug/kg	1000	931	93	53-126	
4-Methyl-2-pentanone (MIBK)	ug/kg	5000	4730	95	39-125	
Acetone	ug/kg	5000	4560	91	46-136	
Allyl chloride	ug/kg	1000	823	82	48-130	
Benzene	ug/kg	1000	848	85	48-125	
Bromobenzene	ug/kg	1000	1140	114	51-125	
Bromochloromethane	ug/kg	1000	875	88	52-125	
Bromodichloromethane	ug/kg	1000	893	89	51-131	
Bromoform	ug/kg	1000	974	97	52-125	
Bromomethane	ug/kg	1000	940	94	30-150	
Carbon tetrachloride	ug/kg	1000	930	93	59-129	
Chlorobenzene	ug/kg	1000	894	89	54-125	
Chloroethane	ug/kg	1000	1030	103	61-132	CH
Chloroform	ug/kg	1000	946	95	52-125	
Chloromethane	ug/kg	1000	884	88	46-125	
cis-1,2-Dichloroethene	ug/kg	1000	889	89	54-127	
cis-1,3-Dichloropropene	ug/kg	1000	938	94	50-134	
Dibromochloromethane	ug/kg	1000	1010	101	54-125	
Dibromomethane	ug/kg	1000	867	87	51-125	
Dichlorodifluoromethane	ug/kg	1000	751	75	42-125	
Dichlorofluoromethane	ug/kg	1000	980	98	30-150	N2
Diethyl ether (Ethyl ether)	ug/kg	1000	797	80	50-127	
Ethylbenzene	ug/kg	1000	866	87	51-125	
Hexachloro-1,3-butadiene	ug/kg	1000	862	86	41-133	
Isopropylbenzene (Cumene)	ug/kg	1000	980	98	54-134	
Methyl-tert-butyl ether	ug/kg	1000	900	90	53-125	
Methylene Chloride	ug/kg	1000	847	85	48-125	
n-Butylbenzene	ug/kg	1000	938	94	49-135	
n-Propylbenzene	ug/kg	1000	948	95	55-129	
Naphthalene	ug/kg	1000	1060	106	51-125	
p-Isopropyltoluene	ug/kg	1000	996	100	53-134	
sec-Butylbenzene	ug/kg	1000	1010	101	52-134	
Styrene	ug/kg	1000	1020	102	53-128	
tert-Butylbenzene	ug/kg	1000	1010	101	51-133	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3244888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Tetrachloroethene	ug/kg	1000	887	89	54-131	
Tetrahydrofuran	ug/kg	10000	10300	103	42-145	
Toluene	ug/kg	1000	820	82	51-125	
trans-1,2-Dichloroethene	ug/kg	1000	856	86	50-130	
trans-1,3-Dichloropropene	ug/kg	1000	950	95	52-125	
Trichloroethene	ug/kg	1000	873	87	55-131	
Trichlorofluoromethane	ug/kg	1000	1050	105	30-150	CH
Vinyl chloride	ug/kg	1000	879	88	58-125	
Xylene (Total)	ug/kg	3000	2780	93	52-125	
1,2-Dichloroethane-d4 (S)	%.			95	75-125	
4-Bromofluorobenzene (S)	%.			101	75-125	
Toluene-d8 (S)	%.			99	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244889 3244890

Parameter	Units	10471163003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/kg	ND	1120	1170	1180	1290	105	111	68-150	10	30	
1,1,1-Trichloroethane	ug/kg	ND	1120	1170	1110	1250	99	107	63-150	12	30	
1,1,2,2-Tetrachloroethane	ug/kg	ND	1120	1170	1100	1190	98	102	60-146	8	30	
1,1,2-Trichloroethane	ug/kg	ND	1120	1170	1060	1140	95	98	63-143	7	30	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	1120	1170	955	1070	85	92	30-150	11	30	
1,1-Dichloroethane	ug/kg	ND	1120	1170	966	1050	86	90	63-144	9	30	
1,1-Dichloroethene	ug/kg	ND	1120	1170	950	1010	85	86	30-150	6	30	
1,1-Dichloropropene	ug/kg	ND	1120	1170	1020	1140	91	98	54-150	11	30	
1,2,3-Trichlorobenzene	ug/kg	ND	1120	1170	1080	1170	96	100	63-142	8	30	
1,2,3-Trichloropropane	ug/kg	ND	1120	1170	1080	1180	96	101	59-147	9	30	
1,2,4-Trichlorobenzene	ug/kg	ND	1120	1170	1100	1150	98	99	66-142	5	30	
1,2,4-Trimethylbenzene	ug/kg	ND	1120	1170	1150	1240	103	106	65-145	8	30	
1,2-Dibromo-3-chloropropane	ug/kg	ND	2790	2920	2880	3030	103	104	60-142	5	30	
1,2-Dibromoethane (EDB)	ug/kg	ND	1120	1170	1140	1240	102	106	67-135	8	30	
1,2-Dichlorobenzene	ug/kg	ND	1120	1170	1060	1170	95	101	68-141	10	30	
1,2-Dichloroethane	ug/kg	ND	1120	1170	979	1080	87	92	56-132	9	30	
1,2-Dichloropropane	ug/kg	ND	1120	1170	1000	1110	90	95	58-150	10	30	
1,3,5-Trimethylbenzene	ug/kg	ND	1120	1170	1140	1230	101	106	66-148	8	30	
1,3-Dichlorobenzene	ug/kg	ND	1120	1170	1080	1150	96	98	63-148	6	30	
1,3-Dichloropropane	ug/kg	ND	1120	1170	1090	1180	97	101	63-142	8	30	
1,4-Dichlorobenzene	ug/kg	ND	1120	1170	982	1060	88	90	68-140	7	30	
2,2-Dichloropropane	ug/kg	ND	1120	1170	988	1100	88	95	62-143	11	30	
2-Butanone (MEK)	ug/kg	ND	5600	5840	4760	5290	85	91	53-138	11	30	
2-Chlorotoluene	ug/kg	ND	1120	1170	1070	1170	96	100	64-145	8	30	
4-Chlorotoluene	ug/kg	ND	1120	1170	1090	1200	97	102	63-149	9	30	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	5600	5840	5690	6090	102	104	47-150	7	30	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244889 3244890

Parameter	Units	10471163003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acetone	ug/kg	ND	5600	5840	5420	5500	97	94	64-150	2	30	
Allyl chloride	ug/kg	ND	1120	1170	913	985	82	84	49-146	8	30	
Benzene	ug/kg	ND	1120	1170	973	1060	87	91	63-136	9	30	
Bromobenzene	ug/kg	ND	1120	1170	1170	1150	105	99	63-142	2	30	
Bromochloromethane	ug/kg	ND	1120	1170	1040	1120	93	95	61-139	7	30	
Bromodichloromethane	ug/kg	ND	1120	1170	1050	1160	94	100	63-150	10	30	
Bromoform	ug/kg	ND	1120	1170	1140	1230	102	106	64-140	8	30	
Bromomethane	ug/kg	ND	1120	1170	1030	1160	92	99	56-148	11	30	
Carbon tetrachloride	ug/kg	ND	1120	1170	1040	1140	93	98	75-148	9	30	
Chlorobenzene	ug/kg	ND	1120	1170	1050	1120	94	96	62-147	6	30	
Chloroethane	ug/kg	ND	1120	1170	1110	1250	99	107	37-150	12	30	CH
Chloroform	ug/kg	ND	1120	1170	1100	1230	98	105	66-130	11	30	
Chloromethane	ug/kg	ND	1120	1170	910	985	81	84	35-131	8	30	
cis-1,2-Dichloroethene	ug/kg	ND	1120	1170	1020	1110	91	95	63-143	8	30	
cis-1,3-Dichloropropene	ug/kg	ND	1120	1170	1100	1190	98	101	60-150	8	30	
Dibromochloromethane	ug/kg	ND	1120	1170	1200	1330	107	114	64-144	10	30	
Dibromomethane	ug/kg	ND	1120	1170	1040	1140	93	98	59-148	9	30	
Dichlorodifluoromethane	ug/kg	ND	1120	1170	691	745	62	64	30-125	8	30	
Dichlorofluoromethane	ug/kg	ND	1120	1170	1110	1230	99	105	39-150	10	30	N2
Diethyl ether (Ethyl ether)	ug/kg	ND	1120	1170	925	974	83	83	59-149	5	30	
Ethylbenzene	ug/kg	ND	1120	1170	1010	1120	90	96	64-142	10	30	
Hexachloro-1,3-butadiene	ug/kg	ND	1120	1170	1020	1090	91	93	58-150	6	30	
Isopropylbenzene (Cumene)	ug/kg	ND	1120	1170	1160	1260	104	108	67-150	8	30	
Methyl-tert-butyl ether	ug/kg	ND	1120	1170	1070	1180	95	101	69-134	10	30	
Methylene Chloride	ug/kg	ND	1120	1170	975	1080	87	92	56-134	10	30	
n-Butylbenzene	ug/kg	ND	1120	1170	1080	1170	97	100	64-150	8	30	
n-Propylbenzene	ug/kg	ND	1120	1170	1090	1180	98	101	65-150	8	30	
Naphthalene	ug/kg	ND	1120	1170	1220	1320	109	113	63-148	7	30	
p-Isopropyltoluene	ug/kg	ND	1120	1170	1160	1270	103	108	69-150	9	30	
sec-Butylbenzene	ug/kg	ND	1120	1170	1170	1240	105	106	69-150	6	30	
Styrene	ug/kg	ND	1120	1170	1220	1300	109	111	63-150	7	30	
tert-Butylbenzene	ug/kg	ND	1120	1170	1160	1260	103	108	67-150	8	30	
Tetrachloroethene	ug/kg	ND	1120	1170	1050	1140	94	98	62-150	8	30	
Tetrahydrofuran	ug/kg	ND	11200	11700	11800	13200	105	113	53-150	12	30	
Toluene	ug/kg	ND	1120	1170	984	1080	88	92	61-141	9	30	
trans-1,2-Dichloroethene	ug/kg	ND	1120	1170	964	1060	86	91	52-148	10	30	
trans-1,3-Dichloropropene	ug/kg	ND	1120	1170	1120	1210	100	103	62-142	7	30	
Trichloroethene	ug/kg	ND	1120	1170	995	1070	89	92	59-150	8	30	
Trichlorofluoromethane	ug/kg	ND	1120	1170	1170	1240	105	106	30-150	5	30	CH
Vinyl chloride	ug/kg	ND	1120	1170	931	1030	83	88	44-144	10	30	
Xylene (Total)	ug/kg	ND	3350	3500	3250	3520	97	100	67-145	8	30	
1,2-Dichloroethane-d4 (S)	%.						94	96	75-125			
4-Bromofluorobenzene (S)	%.						101	100	75-125			
Toluene-d8 (S)	%.						101	99	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600288 | Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B | Analysis Description: 8260B MSV 465 W
Associated Lab Samples: 10471163011, 10471163013, 10471163014

METHOD BLANK: 3245031 | Matrix: Water
Associated Lab Samples: 10471163011, 10471163013, 10471163014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1,1-Trichloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1,2-Trichloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1-Dichloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,1-Dichloroethene	ug/L	ND	1.0	04/18/19 12:13	
1,1-Dichloropropene	ug/L	ND	1.0	04/18/19 12:13	
1,2,3-Trichlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
1,2,3-Trichloropropane	ug/L	ND	4.0	04/18/19 12:13	
1,2,4-Trichlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
1,2,4-Trimethylbenzene	ug/L	ND	1.0	04/18/19 12:13	
1,2-Dibromo-3-chloropropane	ug/L	ND	10.0	04/18/19 12:13	MN
1,2-Dibromoethane (EDB)	ug/L	ND	1.0	04/18/19 12:13	
1,2-Dichlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
1,2-Dichloroethane	ug/L	ND	1.0	04/18/19 12:13	
1,2-Dichloropropane	ug/L	ND	4.0	04/18/19 12:13	
1,3,5-Trimethylbenzene	ug/L	ND	1.0	04/18/19 12:13	
1,3-Dichlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
1,3-Dichloropropane	ug/L	ND	1.0	04/18/19 12:13	
1,4-Dichlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
2,2-Dichloropropane	ug/L	ND	4.0	04/18/19 12:13	
2-Butanone (MEK)	ug/L	ND	5.0	04/18/19 12:13	
2-Chlorotoluene	ug/L	ND	1.0	04/18/19 12:13	
4-Chlorotoluene	ug/L	ND	1.0	04/18/19 12:13	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	04/18/19 12:13	
Acetone	ug/L	ND	20.0	04/18/19 12:13	
Allyl chloride	ug/L	ND	4.0	04/18/19 12:13	
Benzene	ug/L	ND	1.0	04/18/19 12:13	
Bromobenzene	ug/L	ND	1.0	04/18/19 12:13	
Bromochloromethane	ug/L	ND	1.0	04/18/19 12:13	
Bromodichloromethane	ug/L	ND	1.0	04/18/19 12:13	
Bromoform	ug/L	ND	4.0	04/18/19 12:13	
Bromomethane	ug/L	ND	4.0	04/18/19 12:13	
Carbon tetrachloride	ug/L	ND	1.0	04/18/19 12:13	
Chlorobenzene	ug/L	ND	1.0	04/18/19 12:13	
Chloroethane	ug/L	ND	1.0	04/18/19 12:13	
Chloroform	ug/L	ND	4.0	04/18/19 12:13	MN
Chloromethane	ug/L	ND	4.0	04/18/19 12:13	
cis-1,2-Dichloroethene	ug/L	ND	1.0	04/18/19 12:13	
cis-1,3-Dichloropropene	ug/L	ND	4.0	04/18/19 12:13	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

METHOD BLANK: 3245031 Matrix: Water
Associated Lab Samples: 10471163011, 10471163013, 10471163014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dibromochloromethane	ug/L	ND	1.0	04/18/19 12:13	
Dibromomethane	ug/L	ND	4.0	04/18/19 12:13	
Dichlorodifluoromethane	ug/L	ND	1.0	04/18/19 12:13	
Dichlorofluoromethane	ug/L	ND	1.0	04/18/19 12:13	N2
Diethyl ether (Ethyl ether)	ug/L	ND	4.0	04/18/19 12:13	
Ethylbenzene	ug/L	ND	1.0	04/18/19 12:13	
Hexachloro-1,3-butadiene	ug/L	ND	1.0	04/18/19 12:13	
Isopropylbenzene (Cumene)	ug/L	ND	1.0	04/18/19 12:13	
Methyl-tert-butyl ether	ug/L	ND	1.0	04/18/19 12:13	
Methylene Chloride	ug/L	ND	4.0	04/18/19 12:13	
n-Butylbenzene	ug/L	ND	1.0	04/18/19 12:13	
n-Propylbenzene	ug/L	ND	1.0	04/18/19 12:13	
Naphthalene	ug/L	ND	4.0	04/18/19 12:13	
p-Isopropyltoluene	ug/L	ND	1.0	04/18/19 12:13	
sec-Butylbenzene	ug/L	ND	1.0	04/18/19 12:13	
Styrene	ug/L	ND	1.0	04/18/19 12:13	
tert-Butylbenzene	ug/L	ND	1.0	04/18/19 12:13	
Tetrachloroethene	ug/L	ND	1.0	04/18/19 12:13	
Tetrahydrofuran	ug/L	ND	10.0	04/18/19 12:13	
Toluene	ug/L	ND	1.0	04/18/19 12:13	
trans-1,2-Dichloroethene	ug/L	ND	1.0	04/18/19 12:13	
trans-1,3-Dichloropropene	ug/L	ND	4.0	04/18/19 12:13	
Trichloroethene	ug/L	ND	0.40	04/18/19 12:13	
Trichlorofluoromethane	ug/L	ND	1.0	04/18/19 12:13	
Vinyl chloride	ug/L	ND	0.20	04/18/19 12:13	
Xylene (Total)	ug/L	ND	3.0	04/18/19 12:13	
1,2-Dichloroethane-d4 (S)	%.	101	75-125	04/18/19 12:13	
4-Bromofluorobenzene (S)	%.	105	75-125	04/18/19 12:13	
Toluene-d8 (S)	%.	97	75-125	04/18/19 12:13	

LABORATORY CONTROL SAMPLE: 3245032

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	20	22.7	113	75-125	
1,1,1-Trichloroethane	ug/L	20	22.3	112	75-125	
1,1,2,2-Tetrachloroethane	ug/L	20	21.0	105	71-128	
1,1,2-Trichloroethane	ug/L	20	21.5	108	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	20	23.1	116	73-125	
1,1-Dichloroethane	ug/L	20	19.8	99	75-125	
1,1-Dichloroethene	ug/L	20	21.9	109	69-125	
1,1-Dichloropropene	ug/L	20	22.2	111	73-125	
1,2,3-Trichlorobenzene	ug/L	20	18.0	90	70-129	
1,2,3-Trichloropropane	ug/L	20	21.3	106	75-125	
1,2,4-Trichlorobenzene	ug/L	20	20.4	102	71-126	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3245032

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	20.8	104	73-127	
1,2-Dibromo-3-chloropropane	ug/L	50	45.1	90	66-127	
1,2-Dibromoethane (EDB)	ug/L	20	22.1	110	75-125	
1,2-Dichlorobenzene	ug/L	20	20.5	103	75-125	
1,2-Dichloroethane	ug/L	20	20.6	103	71-125	
1,2-Dichloropropane	ug/L	20	19.8	99	72-125	
1,3,5-Trimethylbenzene	ug/L	20	21.3	106	75-125	
1,3-Dichlorobenzene	ug/L	20	20.2	101	75-125	
1,3-Dichloropropane	ug/L	20	21.1	106	75-125	
1,4-Dichlorobenzene	ug/L	20	20.0	100	75-125	
2,2-Dichloropropane	ug/L	20	22.1	110	65-127	
2-Butanone (MEK)	ug/L	100	92.8	93	74-125	
2-Chlorotoluene	ug/L	20	20.2	101	74-125	
4-Chlorotoluene	ug/L	20	20.4	102	75-125	
4-Methyl-2-pentanone (MIBK)	ug/L	100	97.2	97	75-132	
Acetone	ug/L	100	103	103	30-150	
Allyl chloride	ug/L	20	21.0	105	75-125	
Benzene	ug/L	20	20.2	101	75-125	
Bromobenzene	ug/L	20	21.9	110	75-125	
Bromochloromethane	ug/L	20	21.1	105	74-126	
Bromodichloromethane	ug/L	20	22.5	113	75-125	
Bromoform	ug/L	20	20.9	105	74-125	
Bromomethane	ug/L	20	24.5	122	30-150	
Carbon tetrachloride	ug/L	20	22.6	113	70-125	
Chlorobenzene	ug/L	20	21.1	106	75-125	
Chloroethane	ug/L	20	22.8	114	64-129	
Chloroform	ug/L	20	21.4	107	75-125	
Chloromethane	ug/L	20	17.3	86	67-125	
cis-1,2-Dichloroethene	ug/L	20	21.6	108	73-125	
cis-1,3-Dichloropropene	ug/L	20	22.6	113	75-125	
Dibromochloromethane	ug/L	20	22.1	111	75-125	
Dibromomethane	ug/L	20	21.4	107	75-125	
Dichlorodifluoromethane	ug/L	20	20.5	102	65-129	
Dichlorofluoromethane	ug/L	20	22.2	111	75-125	N2
Diethyl ether (Ethyl ether)	ug/L	20	22.6	113	74-125	
Ethylbenzene	ug/L	20	20.5	103	75-125	
Hexachloro-1,3-butadiene	ug/L	20	23.3	117	66-137	
Isopropylbenzene (Cumene)	ug/L	20	20.6	103	75-125	
Methyl-tert-butyl ether	ug/L	20	20.6	103	75-125	
Methylene Chloride	ug/L	20	21.4	107	72-125	
n-Butylbenzene	ug/L	20	21.0	105	69-132	
n-Propylbenzene	ug/L	20	20.7	104	74-125	
Naphthalene	ug/L	20	17.1	85	63-125	
p-Isopropyltoluene	ug/L	20	20.7	104	75-125	
sec-Butylbenzene	ug/L	20	21.0	105	75-125	
Styrene	ug/L	20	21.8	109	75-125	
tert-Butylbenzene	ug/L	20	20.7	104	75-125	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE: 3245032

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Tetrachloroethene	ug/L	20	21.7	109	75-125	
Tetrahydrofuran	ug/L	200	208	104	30-150	
Toluene	ug/L	20	20.8	104	75-125	
trans-1,2-Dichloroethene	ug/L	20	22.2	111	70-125	
trans-1,3-Dichloropropene	ug/L	20	22.0	110	75-125	
Trichloroethene	ug/L	20	22.0	110	74-125	
Trichlorofluoromethane	ug/L	20	22.4	112	74-125	
Vinyl chloride	ug/L	20	18.8	94	71-125	
Xylene (Total)	ug/L	60	60.6	101	75-125	
1,2-Dichloroethane-d4 (S)	%.			102	75-125	
4-Bromofluorobenzene (S)	%.			103	75-125	
Toluene-d8 (S)	%.			101	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3245033 3245034

Parameter	Units	10471096001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/L	ND	20	20	20.6	22.4	103	112	30-150	8	30	
1,1,1-Trichloroethane	ug/L	ND	20	20	21.3	26.4	107	132	30-150	21	30	
1,1,2,2-Tetrachloroethane	ug/L	ND	20	20	20.0	20.3	100	102	30-150	2	30	
1,1,2-Trichloroethane	ug/L	ND	20	20	19.8	21.0	99	105	30-150	6	30	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	20	20	21.9	22.9	109	114	30-150	4	30	
1,1-Dichloroethane	ug/L	ND	20	20	20.7	22.2	104	111	30-150	7	30	
1,1-Dichloroethene	ug/L	ND	20	20	20.2	21.8	101	109	30-150	8	30	
1,1-Dichloropropene	ug/L	ND	20	20	20.6	22.0	103	110	30-150	6	30	
1,2,3-Trichlorobenzene	ug/L	ND	20	20	17.8	19.6	89	98	30-150	10	30	
1,2,3-Trichloropropane	ug/L	ND	20	20	20.6	21.3	103	106	30-150	3	30	
1,2,4-Trichlorobenzene	ug/L	ND	20	20	18.2	20.0	91	100	30-150	10	30	
1,2,4-Trimethylbenzene	ug/L	ND	20	20	18.8	20.4	93	100	30-150	8	30	
1,2-Dibromo-3-chloropropane	ug/L	ND	50	50	44.7	46.1	89	92	30-150	3	30	
1,2-Dibromoethane (EDB)	ug/L	ND	20	20	20.5	21.8	102	109	30-150	6	30	
1,2-Dichlorobenzene	ug/L	ND	20	20	18.4	20.0	92	100	30-150	8	30	
1,2-Dichloroethane	ug/L	ND	20	20	19.1	20.2	95	101	30-150	6	30	
1,2-Dichloropropane	ug/L	ND	20	20	18.4	19.6	92	98	30-150	7	30	
1,3,5-Trimethylbenzene	ug/L	ND	20	20	19.1	20.1	95	100	30-150	5	30	
1,3-Dichlorobenzene	ug/L	ND	20	20	18.1	19.7	90	98	30-150	9	30	
1,3-Dichloropropane	ug/L	ND	20	20	19.4	20.9	97	105	30-150	8	30	
1,4-Dichlorobenzene	ug/L	ND	20	20	17.9	19.1	90	95	30-150	6	30	
2,2-Dichloropropane	ug/L	ND	20	20	20.7	27.4	104	137	30-150	28	30	
2-Butanone (MEK)	ug/L	ND	100	100	84.9	86.3	85	86	30-150	2	30	
2-Chlorotoluene	ug/L	ND	20	20	19.1	20.0	96	100	30-150	5	30	
4-Chlorotoluene	ug/L	ND	20	20	20.0	20.0	100	100	30-150	0	30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	100	100	94.3	96.0	94	96	30-150	2	30	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3245033 3245034

Parameter	Units	10471096001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acetone	ug/L	1170	100	100	1150	1270	-15	102	30-150	10	30	E,M1
Allyl chloride	ug/L	ND	20	20	18.4	19.1	92	96	30-147	4	30	
Benzene	ug/L	ND	20	20	19.7	20.9	94	101	30-150	6	30	
Bromobenzene	ug/L	ND	20	20	19.7	21.2	98	106	30-150	8	30	
Bromochloromethane	ug/L	ND	20	20	19.9	26.0	100	130	30-150	26	30	
Bromodichloromethane	ug/L	ND	20	20	20.3	21.9	101	109	30-150	7	30	
Bromoform	ug/L	ND	20	20	19.6	20.6	98	103	30-150	5	30	
Bromomethane	ug/L	ND	20	20	20.6	22.4	103	112	30-150	8	30	
Carbon tetrachloride	ug/L	ND	20	20	21.9	27.6	110	138	30-150	23	30	
Chlorobenzene	ug/L	ND	20	20	19.4	20.6	97	103	30-150	6	30	
Chloroethane	ug/L	ND	20	20	21.5	22.8	107	114	30-150	6	30	
Chloroform	ug/L	ND	20	20	20.3	27.1	101	135	30-150	29	30	
Chloromethane	ug/L	ND	20	20	16.1	16.8	81	84	30-150	4	30	
cis-1,2-Dichloroethene	ug/L	ND	20	20	19.8	28.3	99	141	30-150	35	30	R1
cis-1,3-Dichloropropene	ug/L	ND	20	20	20.5	21.8	102	109	30-145	6	30	
Dibromochloromethane	ug/L	ND	20	20	20.8	22.0	104	110	30-150	6	30	
Dibromomethane	ug/L	ND	20	20	19.9	20.5	100	102	30-150	3	30	
Dichlorodifluoromethane	ug/L	ND	20	20	18.4	18.6	92	93	30-150	1	30	
Dichlorofluoromethane	ug/L	ND	20	20	20.7	21.6	104	108	30-150	4	30	N2
Diethyl ether (Ethyl ether)	ug/L	ND	20	20	20.2	21.4	101	107	30-150	6	30	
Ethylbenzene	ug/L	ND	20	20	19.0	20.2	95	101	30-150	6	30	
Hexachloro-1,3-butadiene	ug/L	ND	20	20	19.6	21.3	98	106	30-150	8	30	
Isopropylbenzene (Cumene)	ug/L	ND	20	20	18.9	20.1	94	101	30-150	6	30	
Methyl-tert-butyl ether	ug/L	ND	20	20	17.8	18.7	89	93	30-150	5	30	
Methylene Chloride	ug/L	ND	20	20	18.3	19.6	92	98	30-146	7	30	
n-Butylbenzene	ug/L	ND	20	20	17.8	19.5	89	97	30-150	9	30	
n-Propylbenzene	ug/L	ND	20	20	18.8	20.2	94	101	30-150	7	30	
Naphthalene	ug/L	ND	20	20	18.2	19.1	91	95	30-150	4	30	
p-Isopropyltoluene	ug/L	ND	20	20	18.0	19.6	90	98	30-150	8	30	
sec-Butylbenzene	ug/L	ND	20	20	18.5	19.8	92	99	30-150	7	30	
Styrene	ug/L	ND	20	20	20.2	21.5	101	107	30-150	6	30	
tert-Butylbenzene	ug/L	ND	20	20	18.7	19.8	93	99	30-150	6	30	
Tetrachloroethene	ug/L	ND	20	20	20.6	21.6	103	108	30-150	5	30	
Tetrahydrofuran	ug/L	ND	200	200	197	276	98	138	30-150	33	30	R1
Toluene	ug/L	ND	20	20	20.0	21.0	97	102	30-150	5	30	
trans-1,2-Dichloroethene	ug/L	ND	20	20	19.2	20.4	96	102	30-150	6	30	
trans-1,3-Dichloropropene	ug/L	ND	20	20	20.3	21.8	101	109	30-150	8	30	
Trichloroethene	ug/L	ND	20	20	20.5	21.5	102	107	30-150	5	30	
Trichlorofluoromethane	ug/L	ND	20	20	20.1	22.1	100	111	30-150	10	30	
Vinyl chloride	ug/L	ND	20	20	16.9	17.5	85	87	30-150	3	30	
Xylene (Total)	ug/L	ND	60	60	57.4	60.9	96	101	30-150	6	30	
1,2-Dichloroethane-d4 (S)	%.						103	103	75-125			
4-Bromofluorobenzene (S)	%.						104	104	75-125			
Toluene-d8 (S)	%.						101	102	75-125			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600368 | Analysis Method: EPA 8081B
QC Batch Method: EPA Mod. 3510C | Analysis Description: 8081B GCS Pesticides
Associated Lab Samples: 10471163011, 10471163012

METHOD BLANK: 3245398 | Matrix: Water
Associated Lab Samples: 10471163011, 10471163012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	04/24/19 07:31	
4,4'-DDE	ug/L	ND	0.10	04/24/19 07:31	
4,4'-DDT	ug/L	ND	0.10	04/24/19 07:31	
Aldrin	ug/L	ND	0.050	04/24/19 07:31	
alpha-BHC	ug/L	ND	0.050	04/24/19 07:31	
alpha-Chlordane	ug/L	ND	0.050	04/24/19 07:31	
beta-BHC	ug/L	ND	0.050	04/24/19 07:31	
Chlordane (Technical)	ug/L	ND	0.50	04/24/19 07:31	
delta-BHC	ug/L	ND	0.050	04/24/19 07:31	
Dieldrin	ug/L	ND	0.10	04/24/19 07:31	
Endosulfan I	ug/L	ND	0.050	04/24/19 07:31	
Endosulfan II	ug/L	ND	0.10	04/24/19 07:31	
Endosulfan sulfate	ug/L	ND	0.10	04/24/19 07:31	
Endrin	ug/L	ND	0.10	04/24/19 07:31	
Endrin aldehyde	ug/L	ND	0.10	04/24/19 07:31	
Endrin ketone	ug/L	ND	0.10	04/24/19 07:31	
gamma-BHC (Lindane)	ug/L	ND	0.050	04/24/19 07:31	
gamma-Chlordane	ug/L	ND	0.050	04/24/19 07:31	
Heptachlor	ug/L	ND	0.050	04/24/19 07:31	
Heptachlor epoxide	ug/L	ND	0.050	04/24/19 07:31	
Methoxychlor	ug/L	ND	0.50	04/24/19 07:31	
Toxaphene	ug/L	ND	1.5	04/24/19 07:31	
Decachlorobiphenyl (S)	%.	98	30-141	04/24/19 07:31	
Tetrachloro-m-xylene (S)	%.	80	52-125	04/24/19 07:31	

LABORATORY CONTROL SAMPLE & LCSD: 3245399 | 3245400

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
4,4'-DDD	ug/L	1	1.1	0.93	107	93	75-125	14	20	
4,4'-DDE	ug/L	1	1.1	1.0	109	104	75-125	4	20	
4,4'-DDT	ug/L	1	1.1	1.0	110	103	75-125	6	20	
Aldrin	ug/L	0.5	0.37	0.51	73	101	41-125	32	20	R1
alpha-BHC	ug/L	0.5	0.53	0.55	106	109	75-125	3	20	
alpha-Chlordane	ug/L	0.5	0.53	0.51	106	102	75-125	4	20	
beta-BHC	ug/L	0.5	0.53	0.47	107	95	75-125	12	20	
delta-BHC	ug/L	0.5	0.34	0.35	68	71	52-130	4	20	
Dieldrin	ug/L	1	1.1	1.0	112	100	75-125	11	20	
Endosulfan I	ug/L	0.5	0.55	0.52	109	103	75-125	6	20	
Endosulfan II	ug/L	1	1.1	1.1	111	106	75-125	5	20	
Endosulfan sulfate	ug/L	1	1.0	0.86	104	86	75-125	19	20	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

LABORATORY CONTROL SAMPLE & LCSD: 3245399 3245400

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Endrin	ug/L	1	1.1	1.1	113	111	75-125	2	20	
Endrin aldehyde	ug/L	1	1.1	0.99	107	99	75-125	8	20	
Endrin ketone	ug/L	1	1.1	1.0	111	100	75-125	11	20	
gamma-BHC (Lindane)	ug/L	0.5	0.54	0.56	107	113	75-125	5	20	
gamma-Chlordane	ug/L	0.5	0.51	0.51	103	102	72-125	1	20	
Heptachlor	ug/L	0.5	0.51	0.54	102	107	68-125	5	20	
Heptachlor epoxide	ug/L	0.5	0.55	0.51	110	102	75-125	7	20	
Methoxychlor	ug/L	5	5.5	4.9	110	98	75-125	12	20	
Decachlorobiphenyl (S)	%.				98	94	30-141			
Tetrachloro-m-xylene (S)	%.				95	80	52-125			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600235 Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3550 Analysis Description: 8270D Solid PAH by SIM MSSV
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008

METHOD BLANK: 3244853 Matrix: Solid
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acenaphthene	ug/kg	ND	10.0	04/19/19 18:41	
Acenaphthylene	ug/kg	ND	10.0	04/19/19 18:41	
Anthracene	ug/kg	ND	10.0	04/19/19 18:41	
Benzo(a)anthracene	ug/kg	ND	10.0	04/19/19 18:41	
Benzo(a)pyrene	ug/kg	ND	10.0	04/19/19 18:41	
Benzo(b)fluoranthene	ug/kg	ND	10.0	04/19/19 18:41	
Benzo(g,h,i)perylene	ug/kg	ND	10.0	04/19/19 18:41	
Benzo(k)fluoranthene	ug/kg	ND	10.0	04/19/19 18:41	
Chrysene	ug/kg	ND	10.0	04/19/19 18:41	
Dibenz(a,h)anthracene	ug/kg	ND	10.0	04/19/19 18:41	
Fluoranthene	ug/kg	ND	10.0	04/19/19 18:41	
Fluorene	ug/kg	ND	10.0	04/19/19 18:41	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	10.0	04/19/19 18:41	
Naphthalene	ug/kg	ND	10.0	04/19/19 18:41	
Phenanthrene	ug/kg	ND	10.0	04/19/19 18:41	
Pyrene	ug/kg	ND	10.0	04/19/19 18:41	
2-Fluorobiphenyl (S)	%.	74	30-125	04/19/19 18:41	
p-Terphenyl-d14 (S)	%.	83	30-125	04/19/19 18:41	

LABORATORY CONTROL SAMPLE: 3244854

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/kg	33.3	25.7	77	46-125	
Acenaphthylene	ug/kg	33.3	25.4	76	44-125	
Anthracene	ug/kg	33.3	30.7	92	62-125	
Benzo(a)anthracene	ug/kg	33.3	26.9	81	53-125	
Benzo(a)pyrene	ug/kg	33.3	28.7	86	62-125	
Benzo(b)fluoranthene	ug/kg	33.3	29.4	88	51-125	
Benzo(g,h,i)perylene	ug/kg	33.3	29.6	89	58-125	
Benzo(k)fluoranthene	ug/kg	33.3	29.9	90	59-125	
Chrysene	ug/kg	33.3	29.5	88	59-125	
Dibenz(a,h)anthracene	ug/kg	33.3	32.8	98	60-125	
Fluoranthene	ug/kg	33.3	31.9	96	67-125	
Fluorene	ug/kg	33.3	27.7	83	51-125	
Indeno(1,2,3-cd)pyrene	ug/kg	33.3	30.4	91	59-125	
Naphthalene	ug/kg	33.3	26.5	80	47-125	
Phenanthrene	ug/kg	33.3	29.7	89	61-125	
Pyrene	ug/kg	33.3	27.8	84	52-125	
2-Fluorobiphenyl (S)	%.			73	30-125	
p-Terphenyl-d14 (S)	%.			84	30-125	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244855 3244856

Parameter	Units	10471137001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthene	ug/kg	ND	36	36	28.5	28.5	79	79	30-125	0	30	
Acenaphthylene	ug/kg	ND	36	36	30.4	30.0	84	83	30-125	1	30	
Anthracene	ug/kg	ND	36	36	36.7	36.2	74	73	30-131	1	30	
Benzo(a)anthracene	ug/kg	0.027 mg/kg	36	36	53.7	49.4	73	61	30-126	8	30	
Benzo(a)pyrene	ug/kg	0.033 mg/kg	36	36	59.3	51.8	73	53	30-150	13	30	
Benzo(b)fluoranthene	ug/kg	0.042 mg/kg	36	36	69.0	57.9	76	45	30-150	18	30	
Benzo(g,h,i)perylene	ug/kg	0.026 mg/kg	36	36	55.0	47.6	79	59	30-150	14	30	
Benzo(k)fluoranthene	ug/kg	0.013 mg/kg	36	36	43.0	41.2	83	78	30-150	4	30	
Chrysene	ug/kg	0.031 mg/kg	36	36	60.9	51.8	84	59	30-150	16	30	
Dibenz(a,h)anthracene	ug/kg	ND	36	36	36.5	35.4	101	98	30-143	3	30	
Fluoranthene	ug/kg	0.060 mg/kg	36	36	88.9	73.8	79	37	30-143	19	30	
Fluorene	ug/kg	ND	36	36	30.2	30.6	84	85	30-138	1	30	
Indeno(1,2,3-cd)pyrene	ug/kg	0.021 mg/kg	36	36	50.7	44.7	83	66	30-150	13	30	
Naphthalene	ug/kg	ND	36	36	23.1	25.3	64	70	30-125	9	30	
Phenanthrene	ug/kg	0.031 mg/kg	36	36	56.1	47.1	70	45	30-142	18	30	
Pyrene	ug/kg	0.056 mg/kg	36	36	77.2	64.5	60	24	30-149	18	30	M1
2-Fluorobiphenyl (S)	%.						71	67	30-125			
p-Terphenyl-d14 (S)	%.						76	77	30-125			

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REPORT OF LABORATORY ANALYSIS

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Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600358 | Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3550 | Analysis Description: 8270D Solid PAH by SIM MSSV
Associated Lab Samples: 10471163001, 10471163009

METHOD BLANK: 3245350 | Matrix: Solid
Associated Lab Samples: 10471163001, 10471163009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acenaphthene	ug/kg	ND	10.0	04/23/19 17:31	
Acenaphthylene	ug/kg	ND	10.0	04/23/19 17:31	
Anthracene	ug/kg	ND	10.0	04/23/19 17:31	
Benzo(a)anthracene	ug/kg	ND	10.0	04/23/19 17:31	
Benzo(a)pyrene	ug/kg	ND	10.0	04/23/19 17:31	
Benzo(b)fluoranthene	ug/kg	ND	10.0	04/23/19 17:31	
Benzo(g,h,i)perylene	ug/kg	ND	10.0	04/23/19 17:31	
Benzo(k)fluoranthene	ug/kg	ND	10.0	04/23/19 17:31	
Chrysene	ug/kg	ND	10.0	04/23/19 17:31	
Dibenz(a,h)anthracene	ug/kg	ND	10.0	04/23/19 17:31	
Fluoranthene	ug/kg	ND	10.0	04/23/19 17:31	
Fluorene	ug/kg	ND	10.0	04/23/19 17:31	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	10.0	04/23/19 17:31	
Naphthalene	ug/kg	ND	10.0	04/23/19 17:31	
Phenanthrene	ug/kg	ND	10.0	04/23/19 17:31	
Pyrene	ug/kg	ND	10.0	04/23/19 17:31	
2-Fluorobiphenyl (S)	%.	83	30-125	04/23/19 17:31	
p-Terphenyl-d14 (S)	%.	88	30-125	04/23/19 17:31	

LABORATORY CONTROL SAMPLE: 3245351

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/kg	33.3	26.9	81	46-125	
Acenaphthylene	ug/kg	33.3	26.5	80	44-125	
Anthracene	ug/kg	33.3	33.4	100	62-125	
Benzo(a)anthracene	ug/kg	33.3	26.5	79	53-125	
Benzo(a)pyrene	ug/kg	33.3	29.0	87	62-125	
Benzo(b)fluoranthene	ug/kg	33.3	30.9	93	51-125	
Benzo(g,h,i)perylene	ug/kg	33.3	31.5	94	58-125	
Benzo(k)fluoranthene	ug/kg	33.3	32.5	97	59-125	
Chrysene	ug/kg	33.3	30.6	92	59-125	
Dibenz(a,h)anthracene	ug/kg	33.3	35.1	105	60-125	
Fluoranthene	ug/kg	33.3	32.9	99	67-125	
Fluorene	ug/kg	33.3	27.5	82	51-125	
Indeno(1,2,3-cd)pyrene	ug/kg	33.3	32.9	99	59-125	
Naphthalene	ug/kg	33.3	29.3	88	47-125	
Phenanthrene	ug/kg	33.3	30.2	91	61-125	
Pyrene	ug/kg	33.3	27.1	81	52-125	
2-Fluorobiphenyl (S)	%.			81	30-125	
p-Terphenyl-d14 (S)	%.			82	30-125	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3245352 3245353

Parameter	Units	10471190002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthene	ug/kg	<0.50	41.2	41.2	32.6	29.8	79	72	30-125	9	30	
Acenaphthylene	ug/kg	<0.61	41.2	41.2	34.2	41.0	83	99	30-125	18	30	
Anthracene	ug/kg	<0.57	41.2	41.2	43.2	45.4	105	110	30-131	5	30	
Benzo(a)anthracene	ug/kg	<1.3	41.2	41.2	49.2	79.6	119	193	30-126	47	30	M1,R1
Benzo(a)pyrene	ug/kg	<0.84	41.2	41.2	54.1	80.1	131	194	30-150	39	30	M1,R1
Benzo(b)fluoranthene	ug/kg	<0.46	41.2	41.2	52.5	94.1	127	228	30-150	57	30	M1,R1
Benzo(g,h,i)perylene	ug/kg	<0.78	41.2	41.2	48.3	62.3	117	151	30-150	25	30	M1
Benzo(k)fluoranthene	ug/kg	<1.0	41.2	41.2	43.6	51.8	106	125	30-150	17	30	
Chrysene	ug/kg	<1.7	41.2	41.2	54.8	79.9	133	194	30-150	37	30	M1,R1
Dibenz(a,h)anthracene	ug/kg	<0.56	41.2	41.2	37.5	40.6	91	98	30-143	8	30	
Fluoranthene	ug/kg	<0.52	41.2	41.2	61.5	105	149	256	30-143	53	30	M1,R1
Fluorene	ug/kg	<0.38	41.2	41.2	31.2	30.9	76	75	30-138	1	30	
Indeno(1,2,3-cd)pyrene	ug/kg	<0.82	41.2	41.2	44.3	58.3	107	141	30-150	27	30	
Naphthalene	ug/kg	<0.94	41.2	41.2	40.4	43.3	98	105	30-125	7	30	
Phenanthrene	ug/kg	<2.4	41.2	41.2	47.7	54.3	116	132	30-142	13	30	
Pyrene	ug/kg	13.1	41.2	41.2	66.6	104	130	219	30-149	43	30	M1,R1
2-Fluorobiphenyl (S)	%.						77	74	30-125			
p-Terphenyl-d14 (S)	%.						79	78	30-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600364 Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA Mod. 3510C Analysis Description: 8270D PAH by SIM MSSV
Associated Lab Samples: 10471163011, 10471163012

METHOD BLANK: 3245384 Matrix: Water
Associated Lab Samples: 10471163011, 10471163012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acenaphthene	ug/L	ND	0.040	04/23/19 08:43	
Acenaphthylene	ug/L	ND	0.040	04/23/19 08:43	
Anthracene	ug/L	ND	0.040	04/23/19 08:43	
Benzo(a)anthracene	ug/L	ND	0.040	04/23/19 08:43	
Benzo(a)pyrene	ug/L	ND	0.040	04/23/19 08:43	
Benzo(b)fluoranthene	ug/L	ND	0.040	04/23/19 08:43	
Benzo(g,h,i)perylene	ug/L	ND	0.040	04/23/19 08:43	
Benzo(k)fluoranthene	ug/L	ND	0.040	04/23/19 08:43	
Chrysene	ug/L	ND	0.040	04/23/19 08:43	
Dibenz(a,h)anthracene	ug/L	ND	0.040	04/23/19 08:43	
Fluoranthene	ug/L	ND	0.040	04/23/19 08:43	
Fluorene	ug/L	ND	0.040	04/23/19 08:43	
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.040	04/23/19 08:43	
Naphthalene	ug/L	ND	0.040	04/23/19 08:43	
Phenanthrene	ug/L	ND	0.040	04/23/19 08:43	
Pyrene	ug/L	ND	0.040	04/23/19 08:43	
2-Fluorobiphenyl (S)	%.	86	47-125	04/23/19 08:43	
p-Terphenyl-d14 (S)	%.	92	62-125	04/23/19 08:43	

LABORATORY CONTROL SAMPLE: 3245385

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/L	1	0.86	86	50-125	
Acenaphthylene	ug/L	1	0.90	90	46-125	
Anthracene	ug/L	1	1.1	111	59-125	
Benzo(a)anthracene	ug/L	1	0.85	85	55-125	
Benzo(a)pyrene	ug/L	1	0.88	88	66-125	
Benzo(b)fluoranthene	ug/L	1	0.88	88	64-125	
Benzo(g,h,i)perylene	ug/L	1	0.92	92	58-125	
Benzo(k)fluoranthene	ug/L	1	0.89	89	60-125	
Chrysene	ug/L	1	0.93	93	62-125	
Dibenz(a,h)anthracene	ug/L	1	1.0	101	51-125	
Fluoranthene	ug/L	1	0.96	96	64-125	
Fluorene	ug/L	1	0.90	90	55-125	
Indeno(1,2,3-cd)pyrene	ug/L	1	0.95	95	61-125	
Naphthalene	ug/L	1	0.96	96	48-125	
Phenanthrene	ug/L	1	0.95	95	63-125	
Pyrene	ug/L	1	0.87	87	61-125	
2-Fluorobiphenyl (S)	%.			88	47-125	
p-Terphenyl-d14 (S)	%.			86	62-125	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
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(612)607-1700

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3245386 3245387

Parameter	Units	10471226001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthene	ug/L	ND	0.96	0.96	0.69	0.69	72	72	46-125	0	30	
Acenaphthylene	ug/L	ND	0.96	0.96	0.69	0.68	71	70	48-125	1	30	
Anthracene	ug/L	ND	0.96	0.96	0.96	0.90	100	93	59-125	7	30	
Benzo(a)anthracene	ug/L	ND	0.96	0.96	0.70	0.68	73	71	56-125	4	30	
Benzo(a)pyrene	ug/L	ND	0.96	0.96	0.70	0.72	73	75	58-125	3	30	
Benzo(b)fluoranthene	ug/L	ND	0.96	0.96	0.73	0.70	76	72	51-125	5	30	
Benzo(g,h,i)perylene	ug/L	ND	0.96	0.96	0.73	0.72	76	75	50-125	0	30	
Benzo(k)fluoranthene	ug/L	ND	0.96	0.96	0.77	0.72	80	75	52-125	7	30	
Chrysene	ug/L	ND	0.96	0.96	0.84	0.80	88	83	58-125	5	30	
Dibenz(a,h)anthracene	ug/L	ND	0.96	0.96	0.75	0.73	78	76	45-125	2	30	
Fluoranthene	ug/L	ND	0.96	0.96	0.88	0.83	91	86	60-125	6	30	
Fluorene	ug/L	ND	0.96	0.96	0.74	0.73	76	75	47-125	1	30	
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.96	0.96	0.73	0.70	76	72	48-125	5	30	
Naphthalene	ug/L	ND	0.96	0.96	0.66	0.66	69	69	38-125	0	30	
Phenanthrene	ug/L	ND	0.96	0.96	0.83	0.76	87	80	60-125	8	30	
Pyrene	ug/L	ND	0.96	0.96	0.80	0.77	83	80	62-125	4	30	
2-Fluorobiphenyl (S)	%.						65	65	47-125			
p-Terphenyl-d14 (S)	%.						81	76	62-125			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600519 | Analysis Method: WI MOD DRO
QC Batch Method: WI MOD DRO | Analysis Description: WIDRO GCS
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008

METHOD BLANK: 3246278 | Matrix: Solid
Associated Lab Samples: 10471163003, 10471163004, 10471163005, 10471163008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
WDRO C10-C28	mg/kg	ND	10.0	04/21/19 09:52	
n-Triacontane (S)	%.	111	50-150	04/21/19 09:52	

LABORATORY CONTROL SAMPLE & LCSD: 3246279 | 3246280

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
WDRO C10-C28	mg/kg	80	94.7	77.3	118	97	70-120	20	20	
n-Triacontane (S)	%.				141	113	50-150			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

QC Batch: 600221 Analysis Method: WI MOD DRO
QC Batch Method: WI MOD DRO Analysis Description: WIDRO Low Volume GCS
Associated Lab Samples: 10471163011, 10471163012, 10471163013

METHOD BLANK: 3244820 Matrix: Water
Associated Lab Samples: 10471163011, 10471163012, 10471163013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
WDRO C10-C28	mg/L	ND	0.10	04/19/19 11:42	
n-Triacontane (S)	%.	86	50-150	04/19/19 11:42	

LABORATORY CONTROL SAMPLE & LCSD: 3244821 3244822

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
WDRO C10-C28	mg/L	0.8	0.80	0.69	100	87	75-115	15	20	
n-Triacontane (S)	%.				101	96	50-150			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3244823 3244824

Parameter	Units	10471164008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
WDRO C10-C28	mg/L	0.19	0.89	0.85	0.76	0.91	65	85	75-115	18	20	M1,T7
n-Triacontane (S)	%.						74	98	50-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10471163

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: 601056

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

A5	Greater than 5% sediment in sample determined by visual observation. Aqueous portion decanted from the sediment and extracted. The sample container could not be rinsed with solvent per the method requirement.
CH	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
G-	Early peaks present outside the GRO window.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
MN	The reporting limit has been raised in accordance with Minnesota Statutes 4740.2100 Subpart 8. C, D. Reporting Limit Evaluation Rule.
N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.
R1	RPD value was outside control limits.
T6	High boiling point hydrocarbons are present in the sample.

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QUALIFIERS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

ANALYTE QUALIFIERS

T7	Low boiling point hydrocarbons are present in the sample.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10471163011	**ST-3 W**	EPA Mod. 3510C	600368	EPA 8081B	601056
10471163012	**ST-12 W**	EPA Mod. 3510C	600368	EPA 8081B	601056
10471163003	**ST-6 (2-4)**	WI MOD DRO	600519	WI MOD DRO	600752
10471163004	**ST-10 (1-3)**	WI MOD DRO	600519	WI MOD DRO	600752
10471163005	**ST-3 (0-2)**	WI MOD DRO	600519	WI MOD DRO	600752
10471163008	**ST-8 (5-7)**	WI MOD DRO	600519	WI MOD DRO	600752
10471163011	**ST-3 W**	WI MOD DRO	600221	WI MOD DRO	600609
10471163012	**ST-12 W**	WI MOD DRO	600221	WI MOD DRO	600609
10471163013	**ST-8 W**	WI MOD DRO	600221	WI MOD DRO	600609
10471163003	**ST-6 (2-4)**	EPA 5030 Medium Soil	601478	WI MOD GRO	601678
10471163004	**ST-10 (1-3)**	EPA 5030 Medium Soil	601478	WI MOD GRO	601678
10471163005	**ST-3 (0-2)**	EPA 5030 Medium Soil	601478	WI MOD GRO	601678
10471163008	**ST-8 (5-7)**	EPA 5030 Medium Soil	601478	WI MOD GRO	601678
10471163015	**Trip Blank-SL**	EPA 5030 Medium Soil	601478	WI MOD GRO	601678
10471163011	**ST-3 W**	WI MOD GRO	601179		
10471163014	**Trip Blank-WT**	WI MOD GRO	601179		
10471163001	**ST-2 (0-2)**	EPA 3050	600191	EPA 6010D	600516
10471163002	**ST-5 (1-3)**	EPA 3050	600191	EPA 6010D	600516
10471163003	**ST-6 (2-4)**	EPA 3050	600191	EPA 6010D	600516
10471163004	**ST-10 (1-3)**	EPA 3050	600191	EPA 6010D	600516
10471163005	**ST-3 (0-2)**	EPA 3050	600191	EPA 6010D	600516
10471163008	**ST-8 (5-7)**	EPA 3050	600191	EPA 6010D	600516
10471163009	**ST-12 (2-4)**	EPA 3050	600191	EPA 6010D	600516
10471163016	**ST-11 (4-6)**	EPA 3050	600490	EPA 6010D	600848
10471163011	**ST-3 W**	EPA 3010	600537	EPA 6010D	600955
10471163012	**ST-12 W**	EPA 3010	600537	EPA 6010D	600955
10471163011	**ST-3 W**	EPA 7470A	600538	EPA 7470A	600998
10471163012	**ST-12 W**	EPA 7470A	600538	EPA 7470A	600998
10471163001	**ST-2 (0-2)**	EPA 7471B	600199	EPA 7471B	600457
10471163002	**ST-5 (1-3)**	EPA 7471B	600199	EPA 7471B	600457
10471163003	**ST-6 (2-4)**	EPA 7471B	600199	EPA 7471B	600457
10471163004	**ST-10 (1-3)**	EPA 7471B	600199	EPA 7471B	600457
10471163005	**ST-3 (0-2)**	EPA 7471B	600199	EPA 7471B	600457
10471163008	**ST-8 (5-7)**	EPA 7471B	600199	EPA 7471B	600457
10471163009	**ST-12 (2-4)**	EPA 7471B	600199	EPA 7471B	600457
10471163016	**ST-11 (4-6)**	EPA 7471B	600493	EPA 7471B	600917
10471163001	**ST-2 (0-2)**	ASTM D2974	600219		
10471163002	**ST-5 (1-3)**	ASTM D2974	600219		
10471163003	**ST-6 (2-4)**	ASTM D2974	600219		
10471163004	**ST-10 (1-3)**	ASTM D2974	600219		
10471163005	**ST-3 (0-2)**	ASTM D2974	600219		
10471163008	**ST-8 (5-7)**	ASTM D2974	600228		
10471163009	**ST-12 (2-4)**	ASTM D2974	600228		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10471163

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10471163016	**ST-11 (4-6)**	ASTM D2974	600406		
10471163001	**ST-2 (0-2)**	EPA 3550	600358	EPA 8270D by SIM	601305
10471163003	**ST-6 (2-4)**	EPA 3550	600235	EPA 8270D by SIM	600714
10471163004	**ST-10 (1-3)**	EPA 3550	600235	EPA 8270D by SIM	600714
10471163005	**ST-3 (0-2)**	EPA 3550	600235	EPA 8270D by SIM	600714
10471163008	**ST-8 (5-7)**	EPA 3550	600235	EPA 8270D by SIM	600714
10471163009	**ST-12 (2-4)**	EPA 3550	600358	EPA 8270D by SIM	601305
10471163011	**ST-3 W**	EPA Mod. 3510C	600364	EPA 8270D by SIM	601108
10471163012	**ST-12 W**	EPA Mod. 3510C	600364	EPA 8270D by SIM	601108
10471163001	**ST-2 (0-2)**	EPA 5035/5030B	600244	EPA 8260B	600340
10471163003	**ST-6 (2-4)**	EPA 5035/5030B	600248	EPA 8260B	600426
10471163004	**ST-10 (1-3)**	EPA 5035/5030B	600248	EPA 8260B	600426
10471163005	**ST-3 (0-2)**	EPA 5035/5030B	600244	EPA 8260B	600340
10471163008	**ST-8 (5-7)**	EPA 5035/5030B	600244	EPA 8260B	600340
10471163015	**Trip Blank-SL**	EPA 5035/5030B	600244	EPA 8260B	600340
10471163011	**ST-3 W**	EPA 8260B	600288		
10471163013	**ST-8 W**	EPA 8260B	600288		
10471163014	**Trip Blank-WT**	EPA 8260B	600288		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

2301647

Section A
Required Client Information:

Company:	Braun Intertec
Address:	
Email To:	Mkeefer@braunintertec.com
Phone:	952 334 3748
Fax:	—
Requested Due Date/TAT:	Standard

Section B
Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	B1903316
Project Name:	Former Hillcrest Golf Course
Project Number:	B1903316

Section C
Invoice Information:

Attention:	Maven / Concur
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	34125

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☒ OTHER UIC

Site Location STATE: MN

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

WO#: 10471163
10471163

Requested Analysis Filtered (Y/N)

Preservatives: Unpreserved, H_2SO_4, HNO_3, HCl, NaOH, $Na_2S_2O_3$, Methanol, Other

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test	VOCs	RCRA metals	PAHs	DRO	GRO	Organochlorine pesticides	Hold	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ST-2 (0-2)	SL	G			4-12-19	1150					X	X	X						001
2	ST-5 (1-3)	SL	G			4-12-19	1340						X							002
3	ST-6 (2-4)	SL	G			4-12-19	1500					X	X	X	X	X				003
4	ST-10 (1-3)	SL	G			4-12-19	1700					X	X	X	X	X				004
5	ST-3 (0-2)	SL	G			4-13-19	830					X	X	X	X	X				005
6	ST-3 (5-7)	SL	G			4-13-19	845											X		006
7	ST-4 (4-6)	SL	G			4-13-19	945											X		007
8	ST-8 (5-7)	SL	G			4-13-19	1045					X	X	X	X	X				008
9	ST-12 (2-4)	SL	G			4-13-19	1200						X	X						009
10	ST-12 (6-8)	SL	G			4-13-19	1210											X		010
11	ST-3 W	WT	G			4-13-19	900					X	X	X	X	X	X			011
12	ST-12 W	WT	G			4-13-19	1230					X	X	X	X	X	X			012

ADDITIONAL COMMENTS

All water is unfiltered - Metals need to be Lab Filtered!

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Mkeefer / BIC	4-17-19	935	[illegible] Pace	4/17/19	935	3.3 2.1	Y	N	Y
[illegible] / Pace	4.17.19	1115	[illegible] Pace	4.17.19	1115	2.0 2.4 3.3	Y	N	Y

2.0
2.4
3.3

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mark Keefer

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 4-15-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 2 of 2

2301646

Section A Required Client Information:

Company:	Braun Intertec
Address:	
Email To:	Mkeefe@braunintertec.com
Phone:	952 334 3748
Fax:	—
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Mark Keefe
Copy To:	
Purchase Order No.:	B1903316
Project Name:	Former Hillcrest Golf Course
Project Number:	B1903316

Section C Invoice Information:

Attention:	Concur / Mark K
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER

Site Location STATE:

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	Composite Start DATE	Composite Start TIME	Composite End/Grab DATE	Composite End/Grab TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test	VOCs	DRO	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ST-BW	WT	G			4-13-19	1445		2				X						X	X		013
2	Trip Blank	WT				—	—												X			014/015
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
water sample is unfiltered	Mirwro / BIC	4-17-19	935	[illegible] / Pace	4/17/19	9:35	3.3 2.1	Y	N	Y
	[illegible signature]	4.17.19	1115	[illegible] / Pace	4/17/19	1115	2.0 2.4 3.3	Y	N	Y

2.0 2.1 3.3

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mark Keefe

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 4-15-19

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.27**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Braun Intertec

Project #: WO#: 10471163
PM: BM2 Due Date: 04/24/19
CLIENT: Braun-BLM

Courier: ☐ Fed Ex ☑ Pace ☐ UPS ☐ SpeeDee ☐ USPS ☐ Commercial ☐ Client See Exception ☐

Tracking Number:

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☑ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☑ T3(0459) ☐ T4(0254) ☐ T5(0048) **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 2.0, 2.4, 7.3 °C
Correction Factor: TNC **Cooler Temp Corrected w/temp blank:** 2.0, 2.4, 2.3 °C
Average Corrected Temp (no temp blank only): ______ °C See Exceptions ☐

USDA Regulated Soil: (☑ N/A, water sample/Other: ______) **Date/Initials of Person Examining Contents:** RS 4/18/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☑ No
Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☐ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Volume?	☑ Yes	☐ No		7.
Correct Containers Used? -Pace Containers Used?	☑ Yes ☑ Yes	☐ No ☐ No		8.
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☑ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☑ Water ☑ Soil ☐ Oil ☐ Other	☑ Yes	☐ No		11. If no, write ID/ Date/Time on Container Below: See Exception ☑ Sample arrived with no label (2 NaHSO4 1 VG9H) but sample 13 is not present, so it could be sample 13.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☐ N/A	12. Sample # Extra sample (soil) arrived, not on COC
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☑ Yes	☐ No	☐ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No pH Paper Lot# See Exception ☐ Res. Chlorine / 0-6 Roll / 0-6 Strip / 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☑ No	☐ N/A	13. See Exception ☑
Trip Blank Present?	☑ Yes	☐ No	☐ N/A	14.
Trip Blank Custody Seals Present?	☑ Yes	☐ No	☐ N/A	Pace Trip Blank Lot # (if purchased): 15755 / 111268-3

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: BM **Date:** 4/18/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: RS

Pace Analytical	Document Name: **Headspace Exception**	Document Revised: 17Dec2018 Page 1 of 1
	Document No.: **F-MN-C-276-Rev.01**	Issuing Authority: Pace Minnesota Quality Office

Sample ID	Headspace greater than 6mm	Headspace less than 6mm	No Headspace	Total Vials	Sediment Present?
ST-3W	0	6	0	6	Y
Trip blank	0	1	1	2	N

Pace Analytical	Document Name: **SCUR Exception Form – Coolers Above 6°C**	Document Revised: 08Apr2019 Page 1 of 1
	Document No.: **F-MN-C-298-Rev.02**	Issuing Authority: Pace Minnesota Quality Office

During sample triage, this form is to be placed in each cooler that arrives above 6.0 degrees Celsius

SCUR Exceptions:

Workorder #:

Out of Temp Sample IDs	Container Type	# of Containers

PM Notified? ☐Yes ☐No

If yes, indicate who was contacted/date/time.
If no, indicate reason why.

Multiple Cooler Project? ☐Yes ☐No
If you answered yes, fill out information to the left.

No Temp Blank		
Read Temp	Corrected Temp	Average Temp

Tracking Number/Temperature	

Other Issues		
Issue Type: Extra Sample	**Container Type**	**# of Containers**
Sample ID Time:		
ST-11 (4-6) 13:15	JGFU	1
"	DWC	1

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	
								☐Yes ☐No	

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BMZ

Received with Custody Seal: Yes No

Custody Seal Intact: Yes No NA

	Temp Read	Corrected Temp	Correction Factor
Temperature C:	See COC		0.1

IR Gun # B88A0143310092

☐ Samples on ice, cooling process has begun

Rush/Short Hold: N

Containers Intact: Yes No

Re-packed and Re-Iced: Y

Temp Blank Included: Yes No

Shipped By/Date: [illegible] 4/17/19

Notes:

Data File: \\192.168.10.12\chem\10gcs9.i\042119dro.b/042119000019.D

Report Date: 04/21/2019

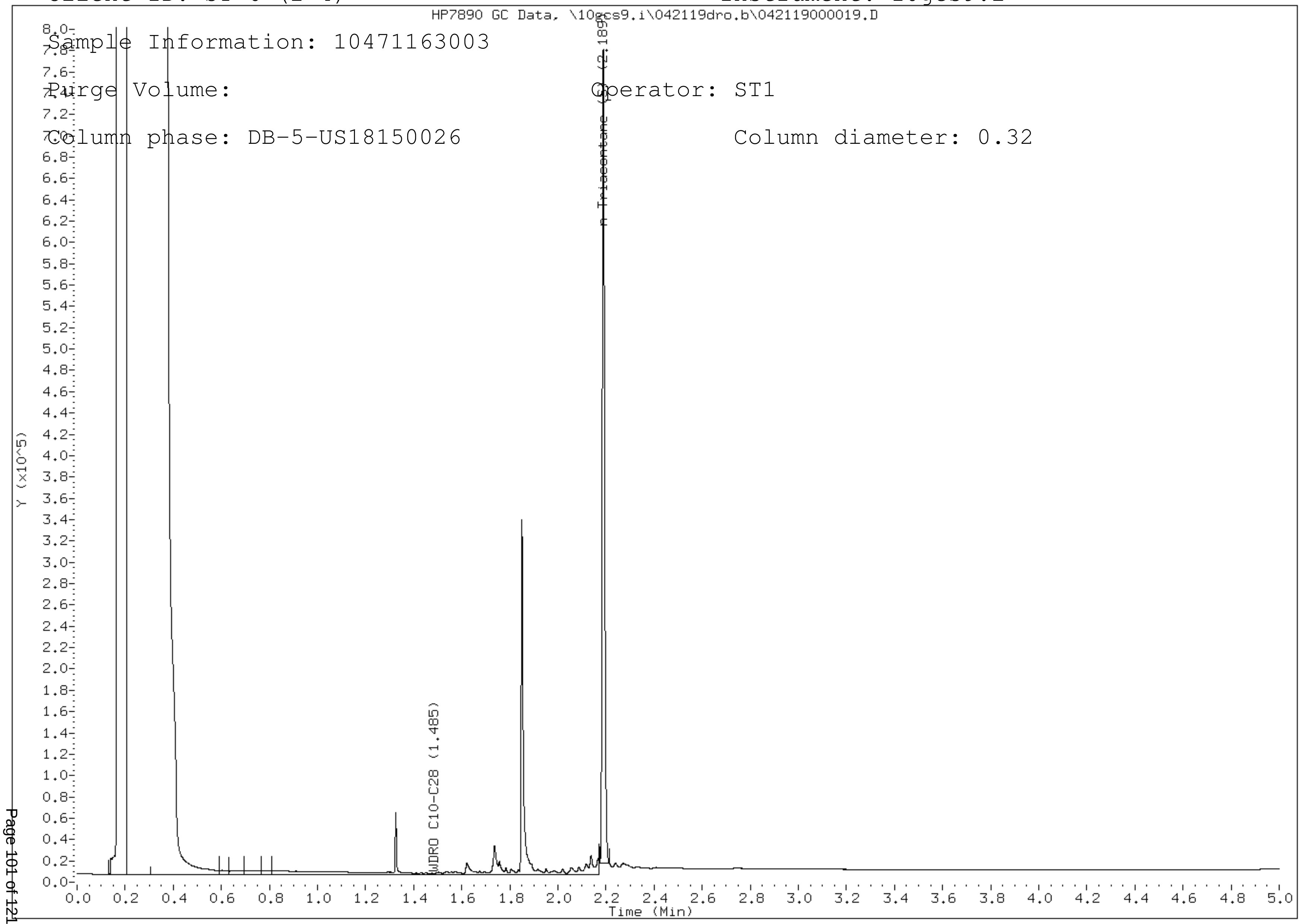
Sample ID: 10471163003

Client ID: ST-6 (2-4) Instrument: 10gcs9.i

Sample Information: 10471163003

Purge Volume: Operator: ST1

Column phase: DB-5-US18150026 Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcs9.i\042119dro.b/042119000018.D

Report Date: 04/21/2019

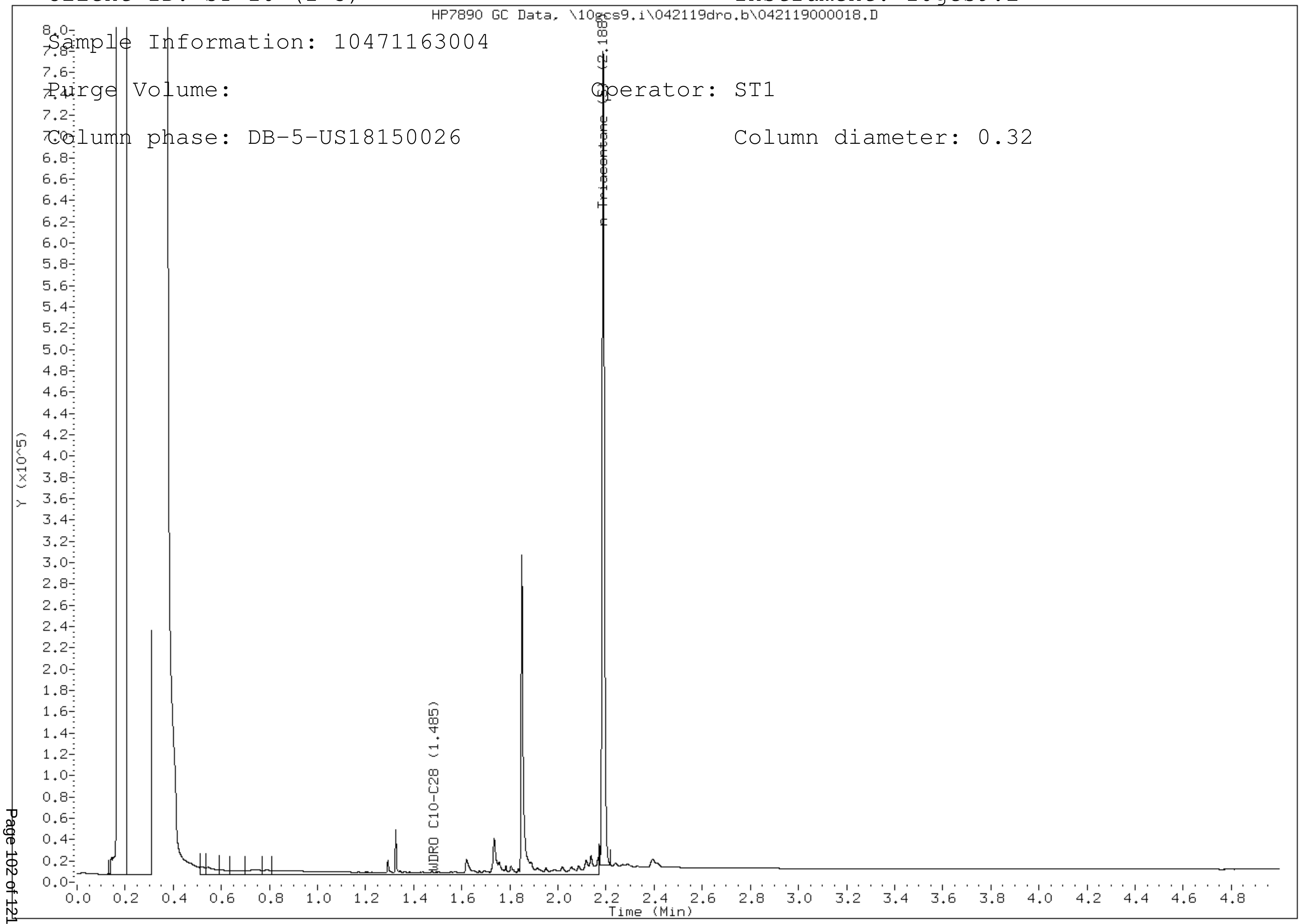
Sample ID: 10471163004

Client ID: ST-10 (1-3)　　Instrument: 10gcs9.i

Sample Information: 10471163004

Purge Volume:　　Operator: ST1

Column phase: DB-5-US18150026　　Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcs9.i\042119dro.b/042119000016.D

Report Date: 04/21/2019

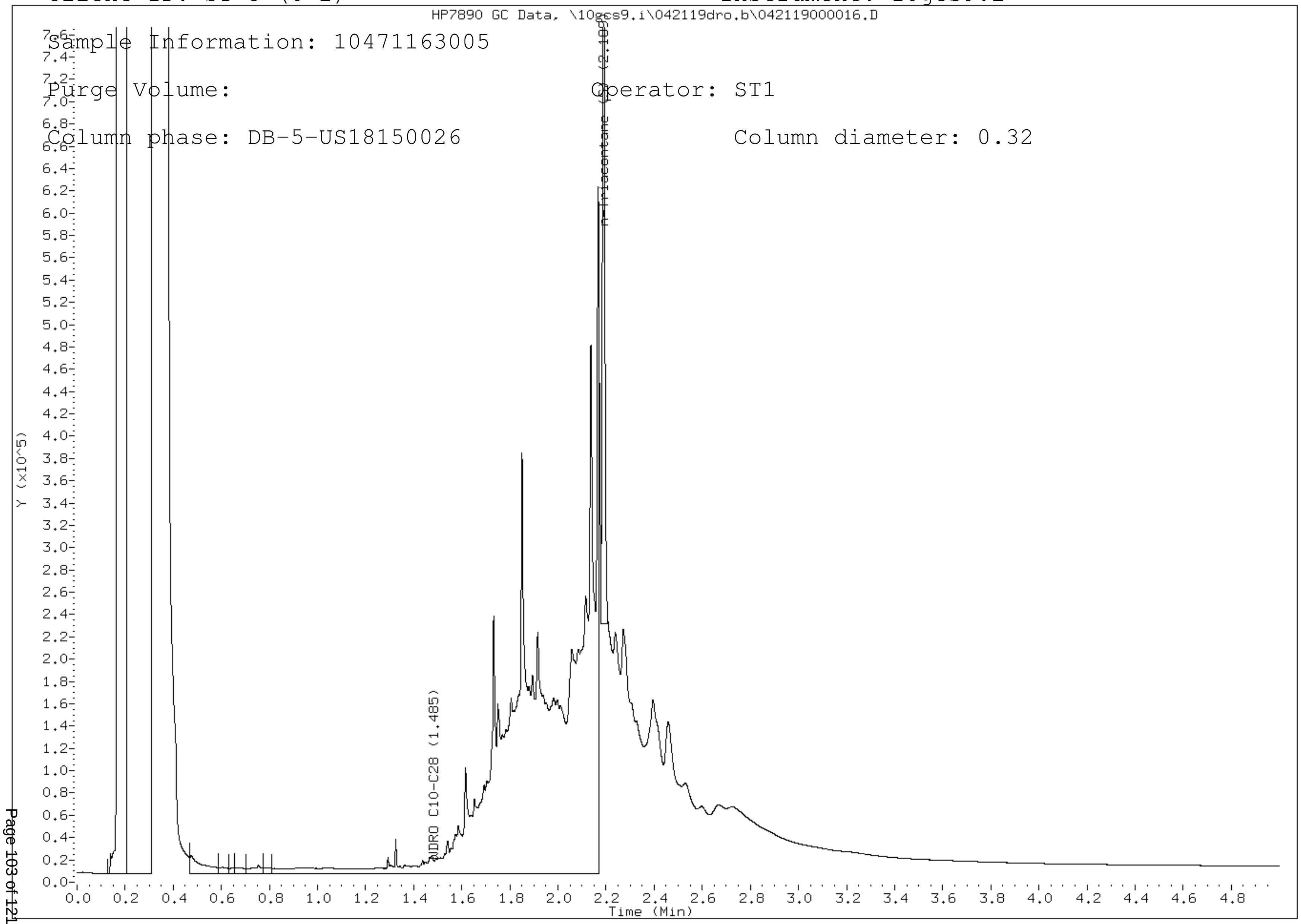
Sample ID: 10471163005

Client ID: ST-3 (0-2) Instrument: 10gcs9.i

Sample Information: 10471163005

Purge Volume: Operator: ST1

Column phase: DB-5-US18150026 Column diameter: 0.32



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Report Date: 04/21/2019

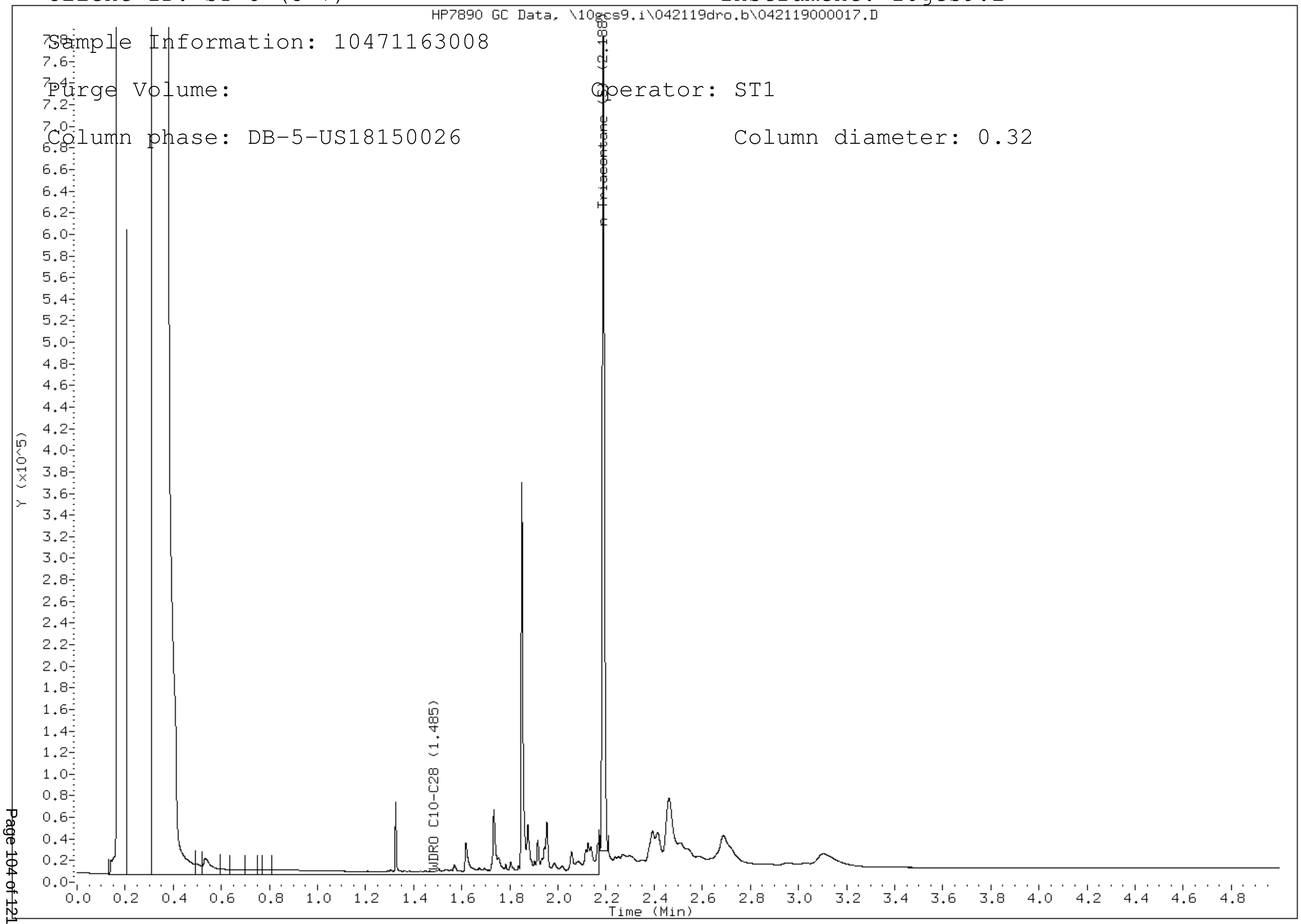
Sample ID: 10471163008

Client ID: ST-8 (5-7)   Instrument: 10gcs9.i

Sample Information: 10471163008

Purge Volume: Operator: ST1

Column phase: DB-5-US18150026   Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcs4.i\041919droLL.b/04190037.D

Report Date: 04/19/2019

Sample ID: 10471163011

Client ID: ST-3 W

Instrument: 10gcs4.i

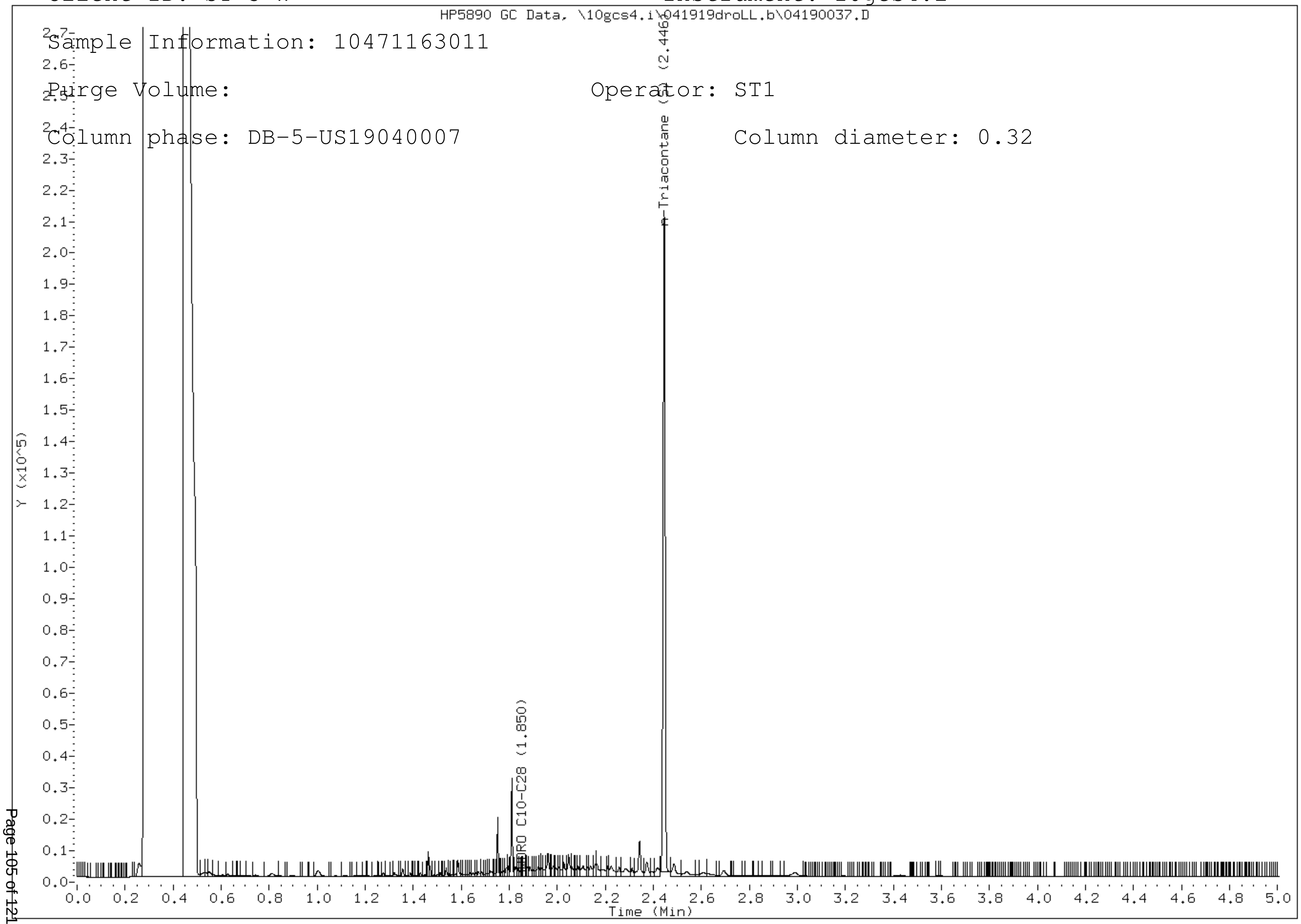
Sample Information: 10471163011

Purge Volume:

Operator: ST1

Column phase: DB-5-US19040007

Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcs4.i\041919droLL.b/04190038.D

Report Date: 04/19/2019

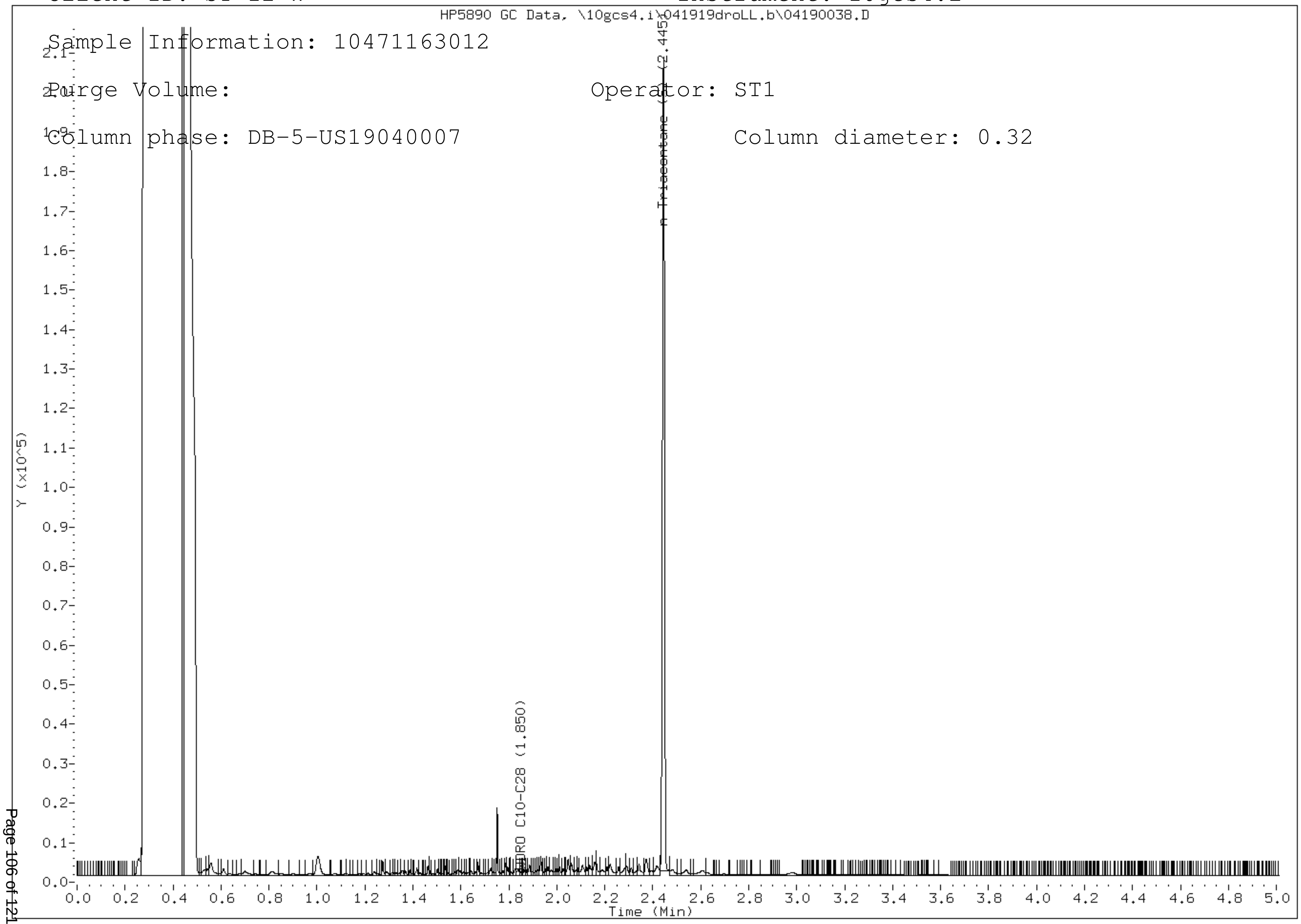
Sample ID: 10471163012

Client ID: ST-12 W Instrument: 10gcs4.i

Sample Information: 10471163012

Purge Volume: Operator: ST1

Column phase: DB-5-US19040007 Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcs4.i\041919droLL.b/04190023.D

Report Date: 04/19/2019

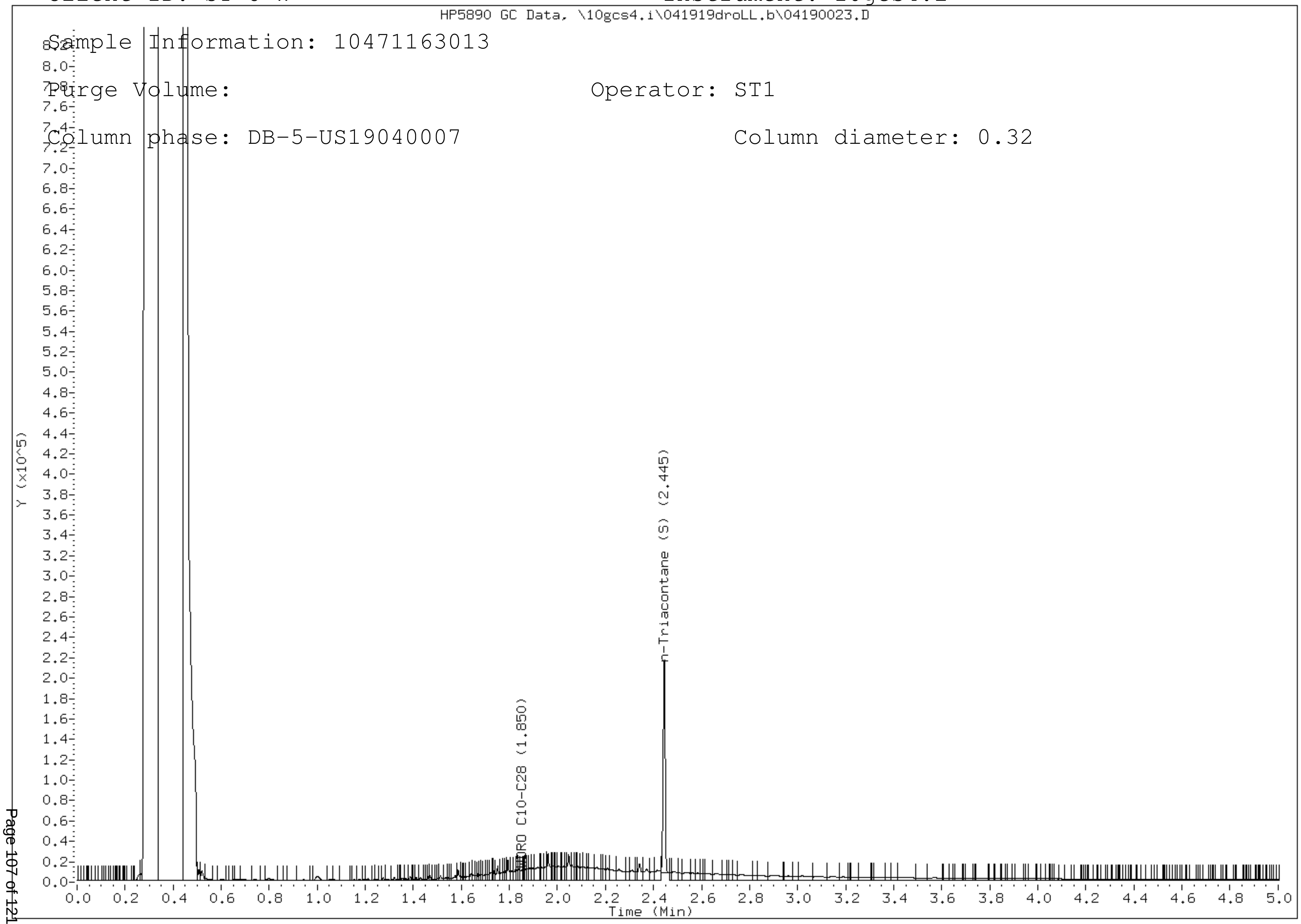
Sample ID: 10471163013

Client ID: ST-8 W Instrument: 10gcs4.i

Sample Information: 10471163013

Purge Volume: Operator: ST1

Column phase: DB-5-US19040007 Column diameter: 0.32



Data File: \\192.168.10.12\chem\10gcv9.i\042519-1.b/115020.d

Report Date: 04/26/2019

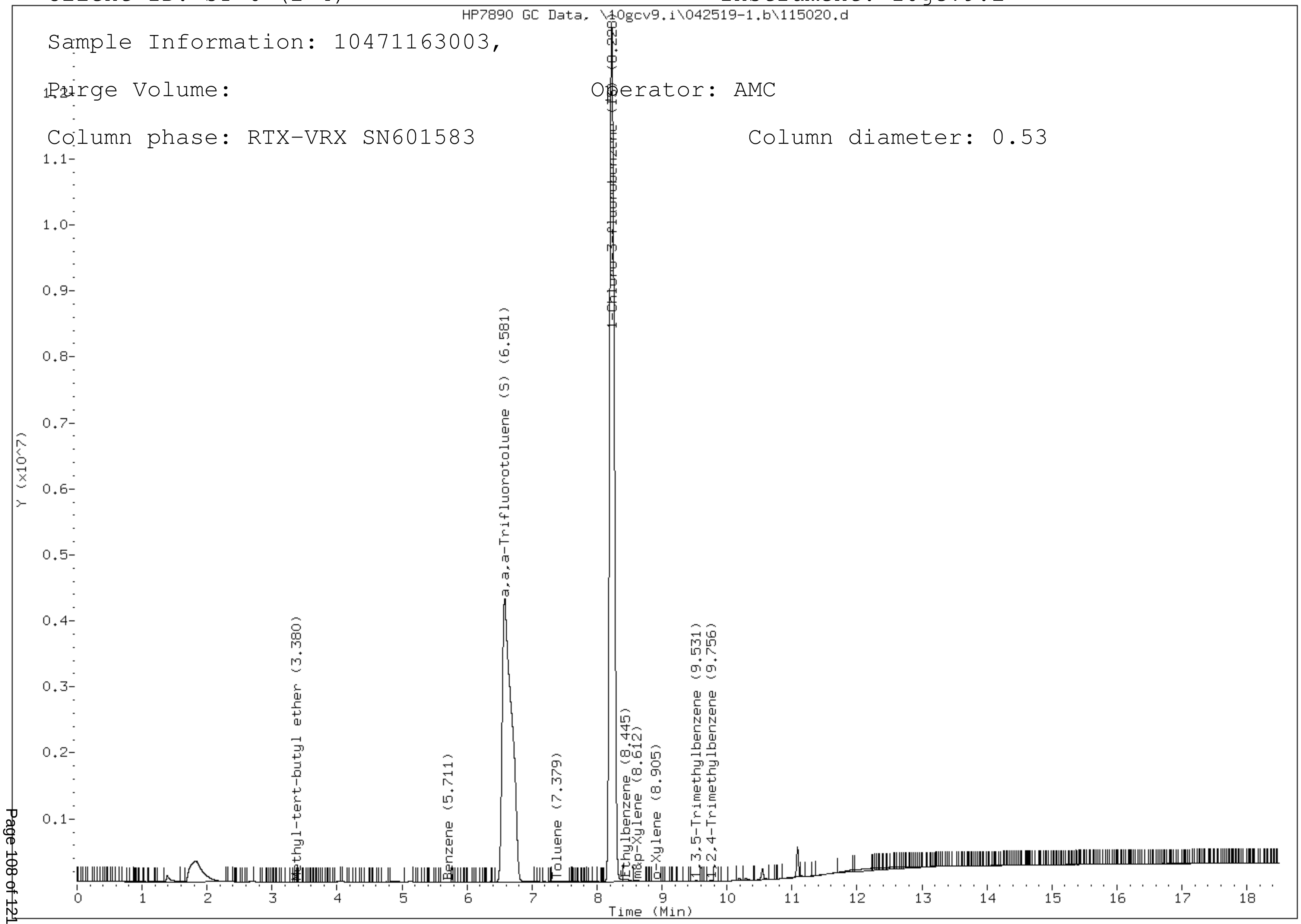
Sample ID: 10471163003

Client ID: ST-6 (2-4) Instrument: 10gcv9.i

Sample Information: 10471163003,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



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Report Date: 04/26/2019

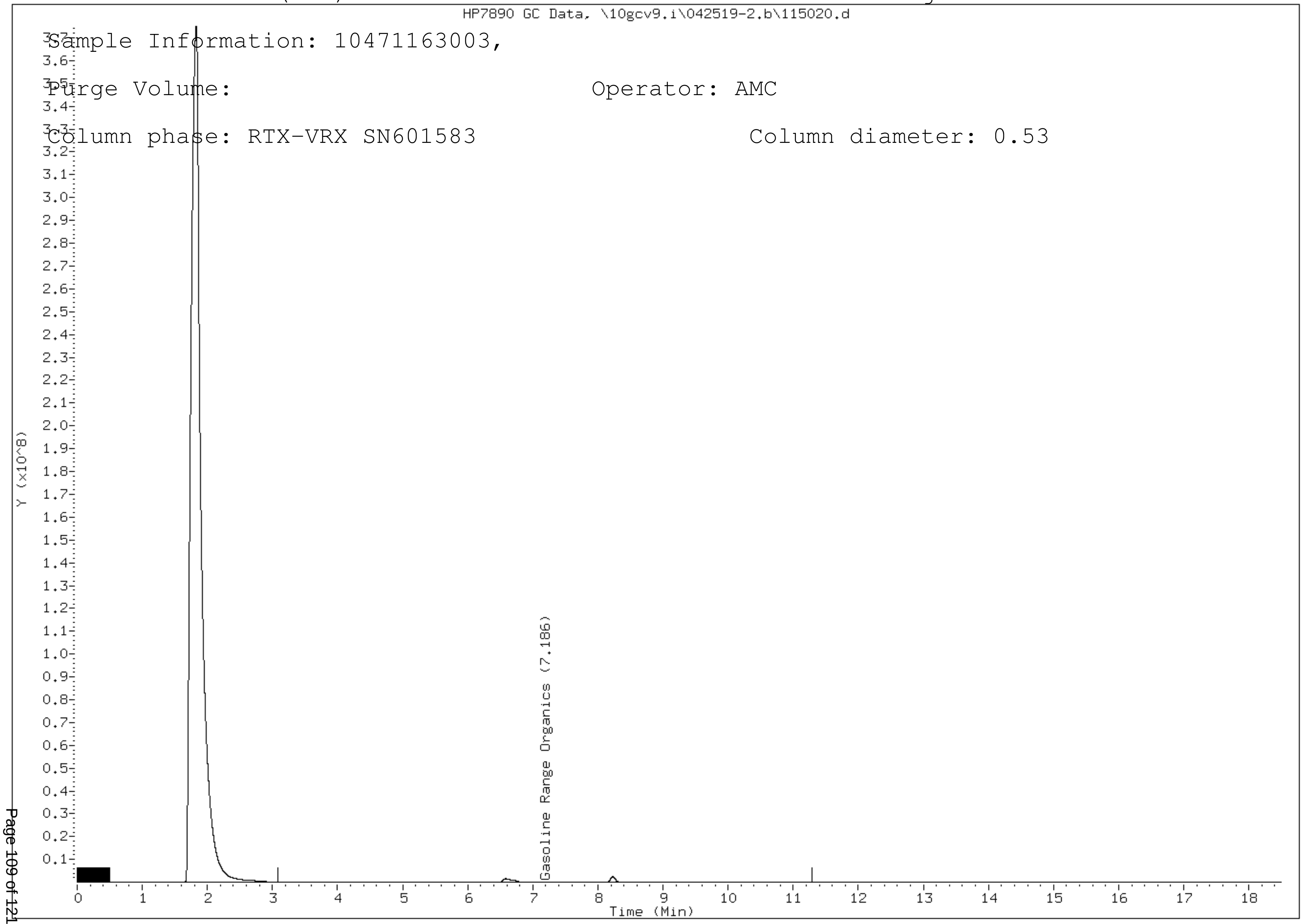
Sample ID: 10471163003

Client ID: ST-6 (2-4) Instrument: 10gcv9.i

Sample Information: 10471163003,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



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Report Date: 04/26/2019

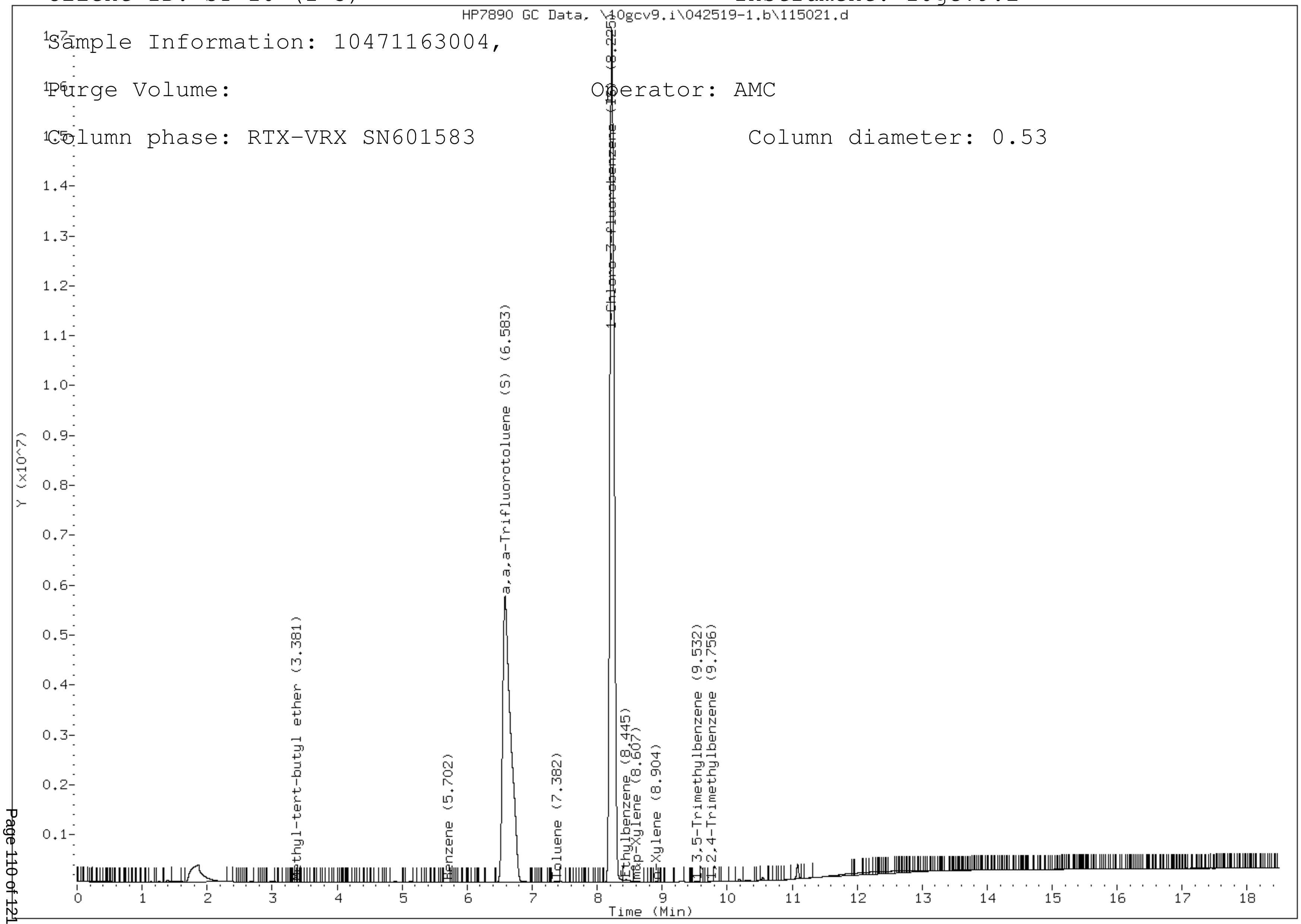
Sample ID: 10471163004

Client ID: ST-10 (1-3) Instrument: 10gcv9.i

Sample Information: 10471163004,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



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Report Date: 04/26/2019

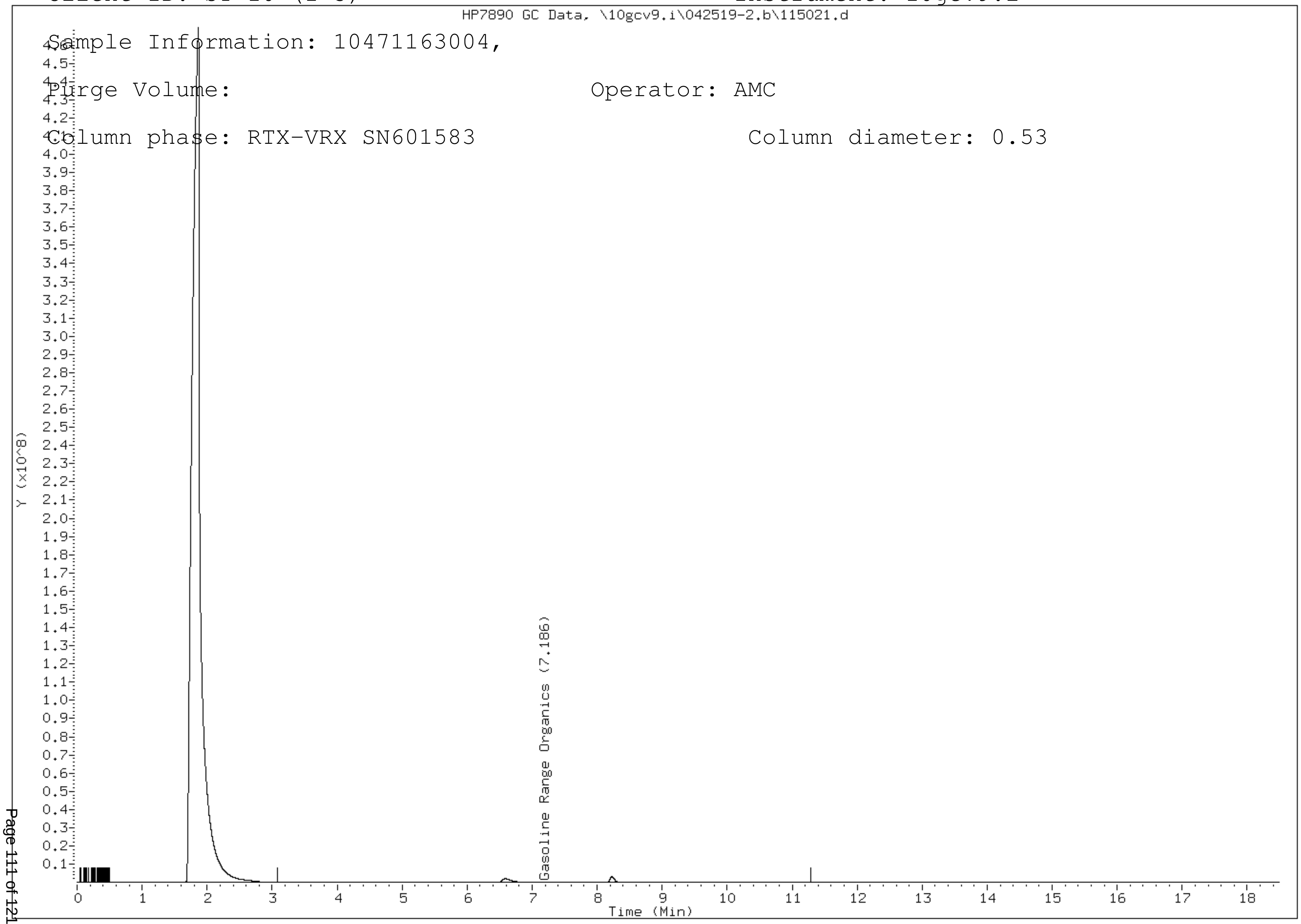
Sample ID: 10471163004

Client ID: ST-10 (1-3) Instrument: 10gcv9.i

Sample Information: 10471163004,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



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Report Date: 04/26/2019

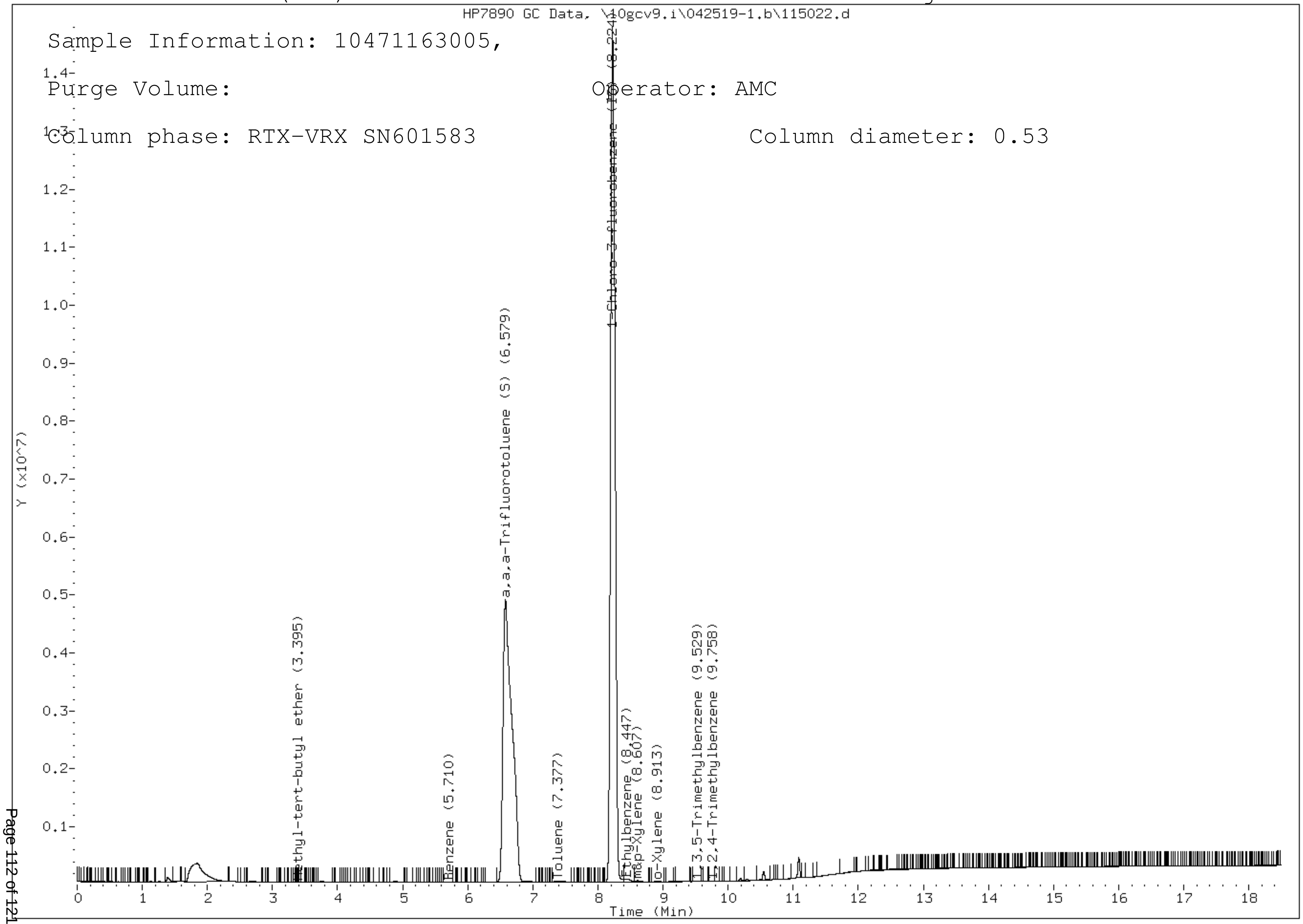
Sample ID: 10471163005

Client ID: ST-3 (0-2) Instrument: 10gcv9.i

Sample Information: 10471163005,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



Data File: \\192.168.10.12\chem\10gcv9.i\042519-2.b/115022.d

Report Date: 04/26/2019

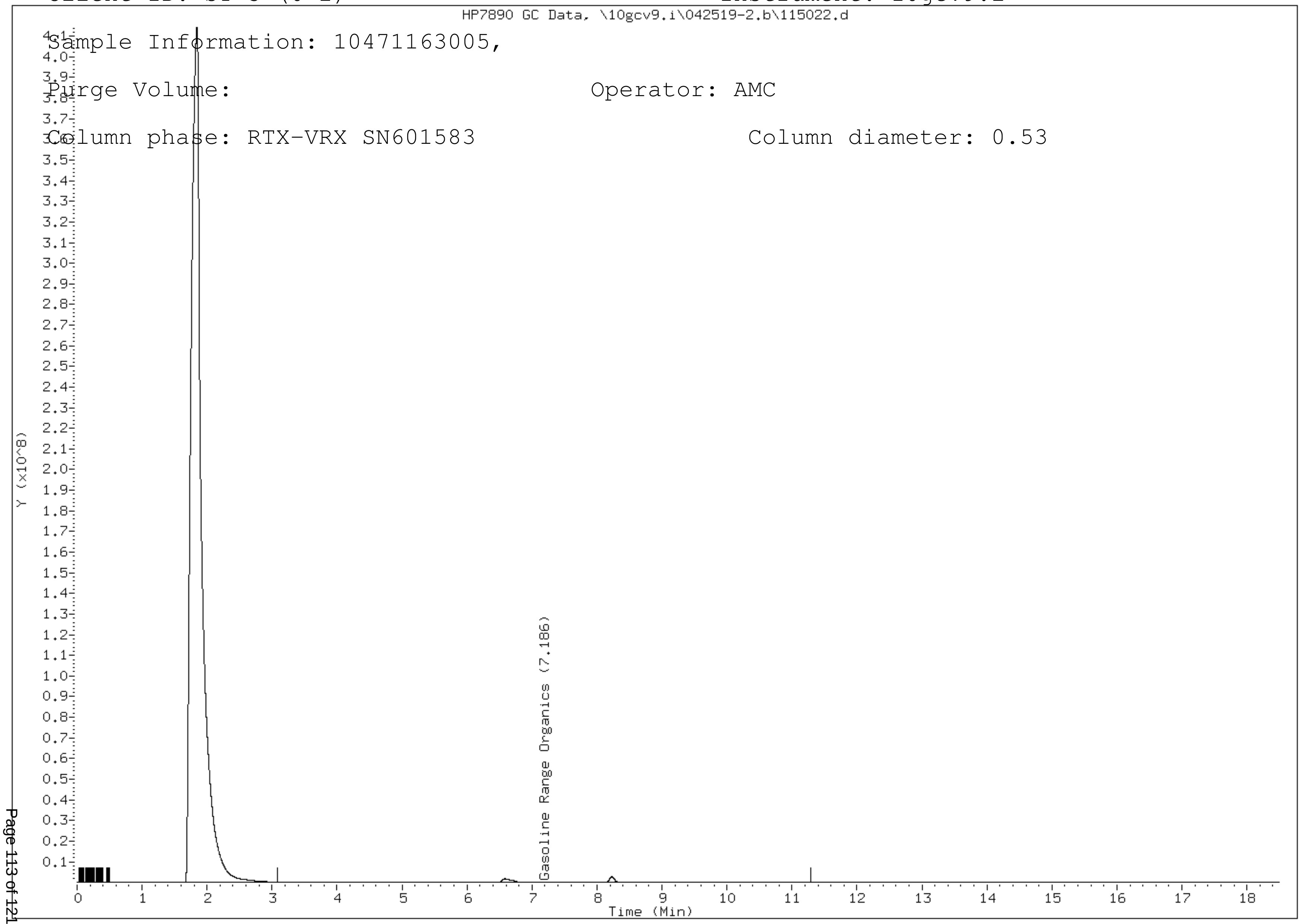
Sample ID: 10471163005

Client ID: ST-3 (0-2)   Instrument: 10gcv9.i

Sample Information: 10471163005,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583   Column diameter: 0.53



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Report Date: 04/26/2019

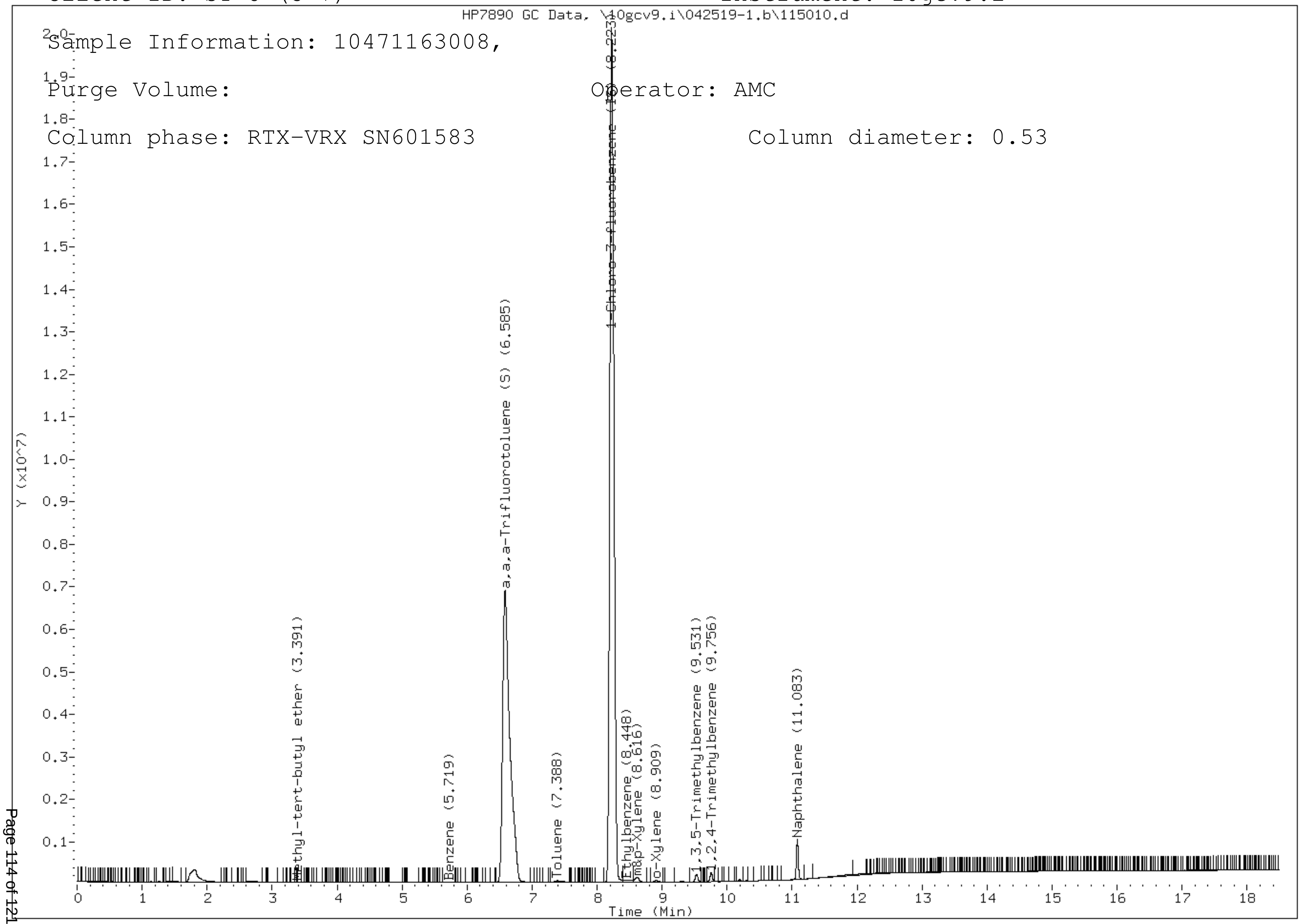
Sample ID: 10471163008

Client ID: ST-8 (5-7) Instrument: 10gcv9.i

Sample Information: 10471163008,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



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Report Date: 04/26/2019

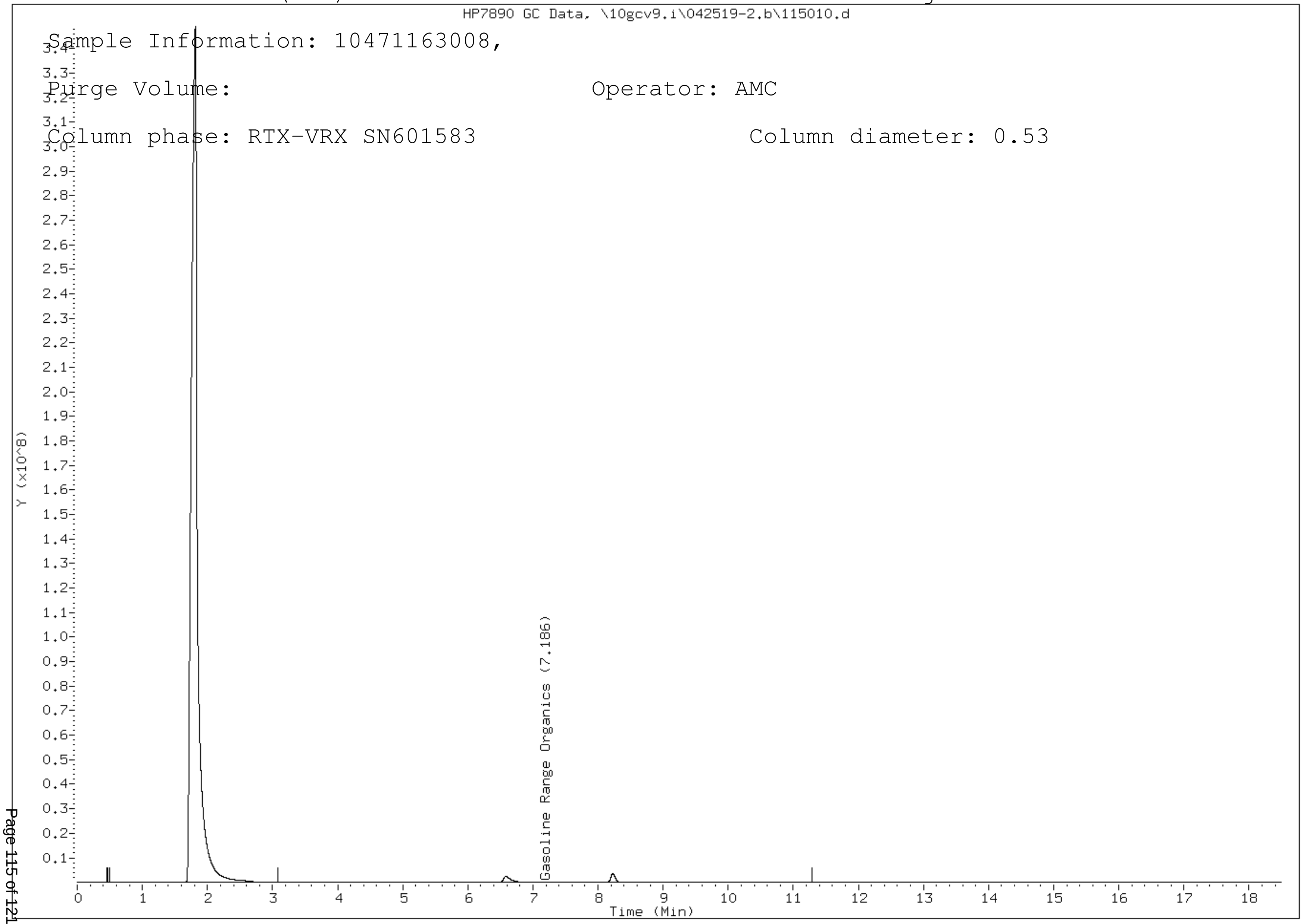
Sample ID: 10471163008

Client ID: ST-8 (5-7) Instrument: 10gcv9.i

Sample Information: 10471163008,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



Data File: \\192.168.10.12\chem\10gcv9.i\042519-1.b/115033.d

Report Date: 04/26/2019

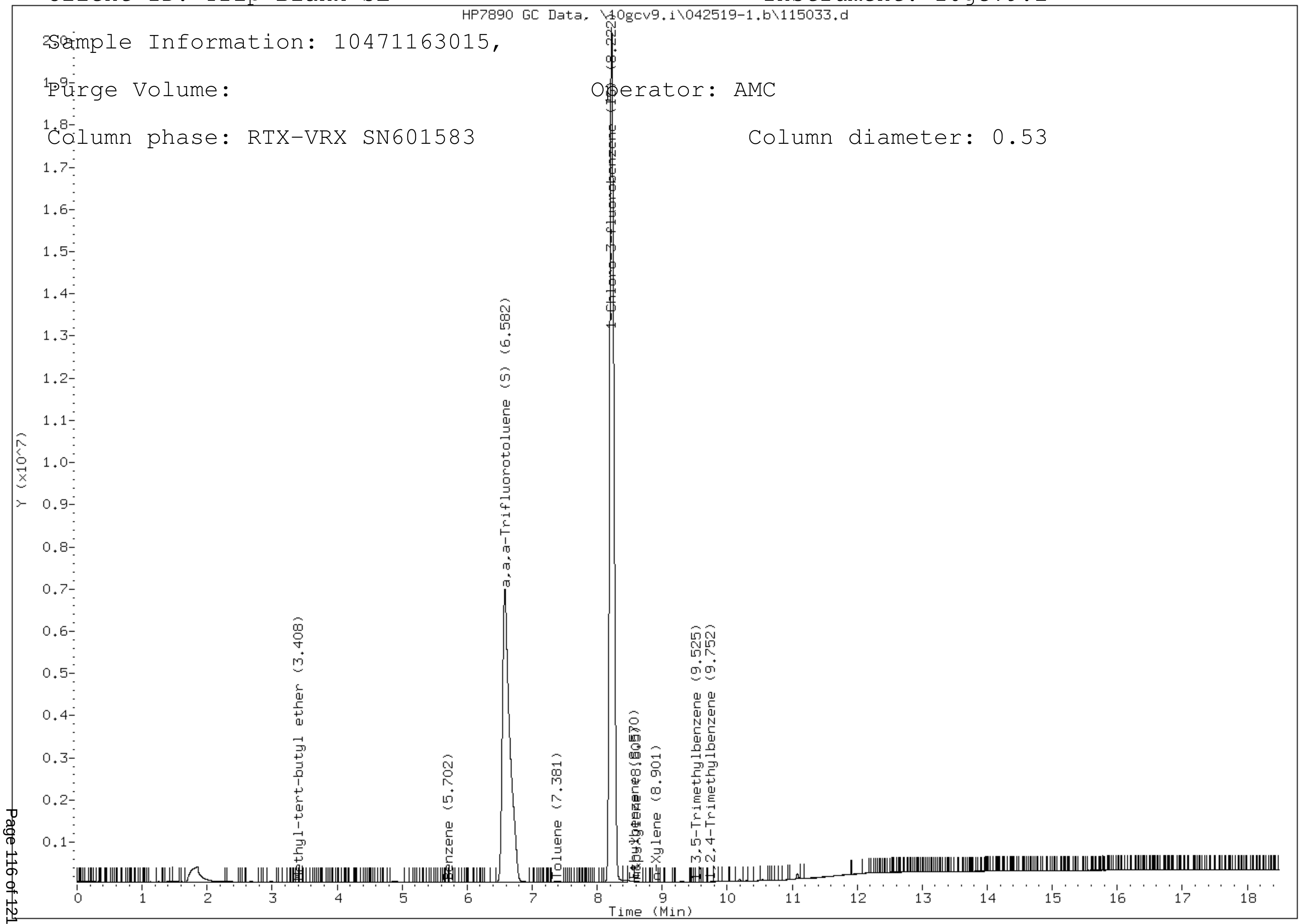
Sample ID: 10471163015

Client ID: Trip Blank-SL   Instrument: 10gcv9.i

Sample Information: 10471163015,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583   Column diameter: 0.53



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Report Date: 04/26/2019

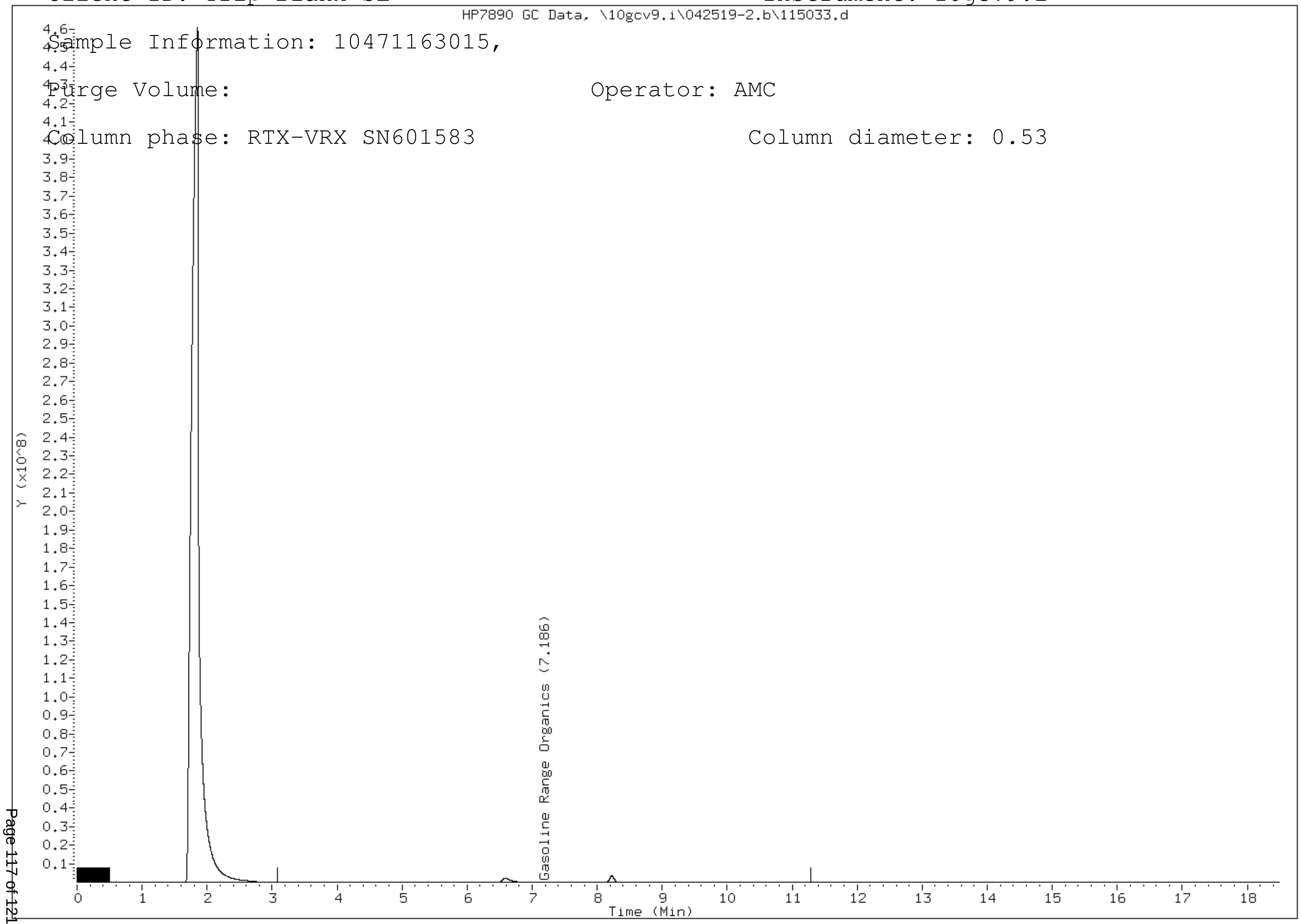
Sample ID: 10471163015

Client ID: Trip Blank-SL Instrument: 10gcv9.i

Sample Information: 10471163015,

Purge Volume: Operator: AMC

Column phase: RTX-VRX SN601583 Column diameter: 0.53



Data File: \\192.168.10.12\chem\10gcv5.i\042419-1.b/114049.d

Report Date: 04/25/2019

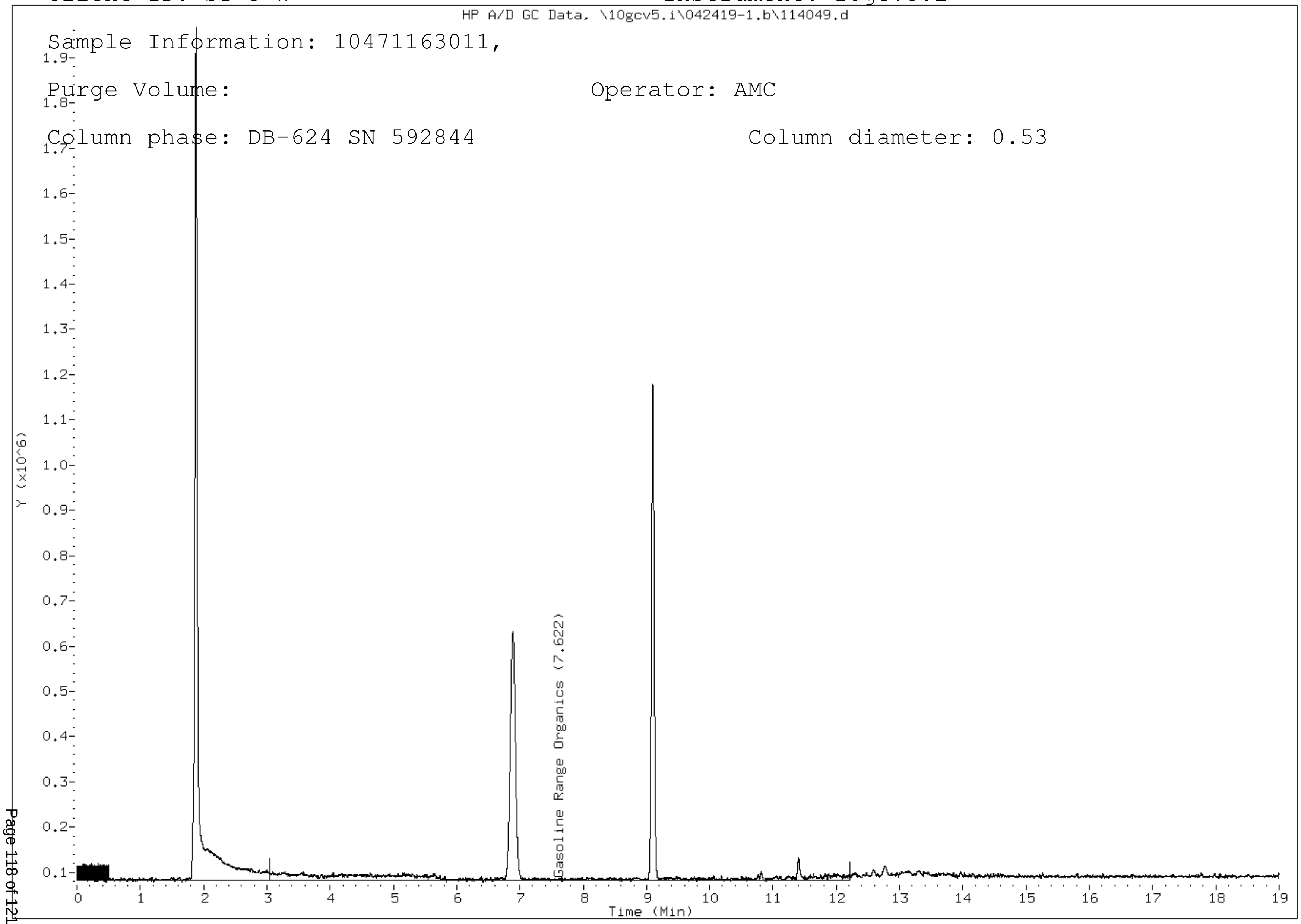
Sample ID: 10471163011

Client ID: ST-3 W   Instrument: 10gcv5.i

Sample Information: 10471163011,

Purge Volume: Operator: AMC

Column phase: DB-624 SN 592844   Column diameter: 0.53



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Report Date: 04/25/2019

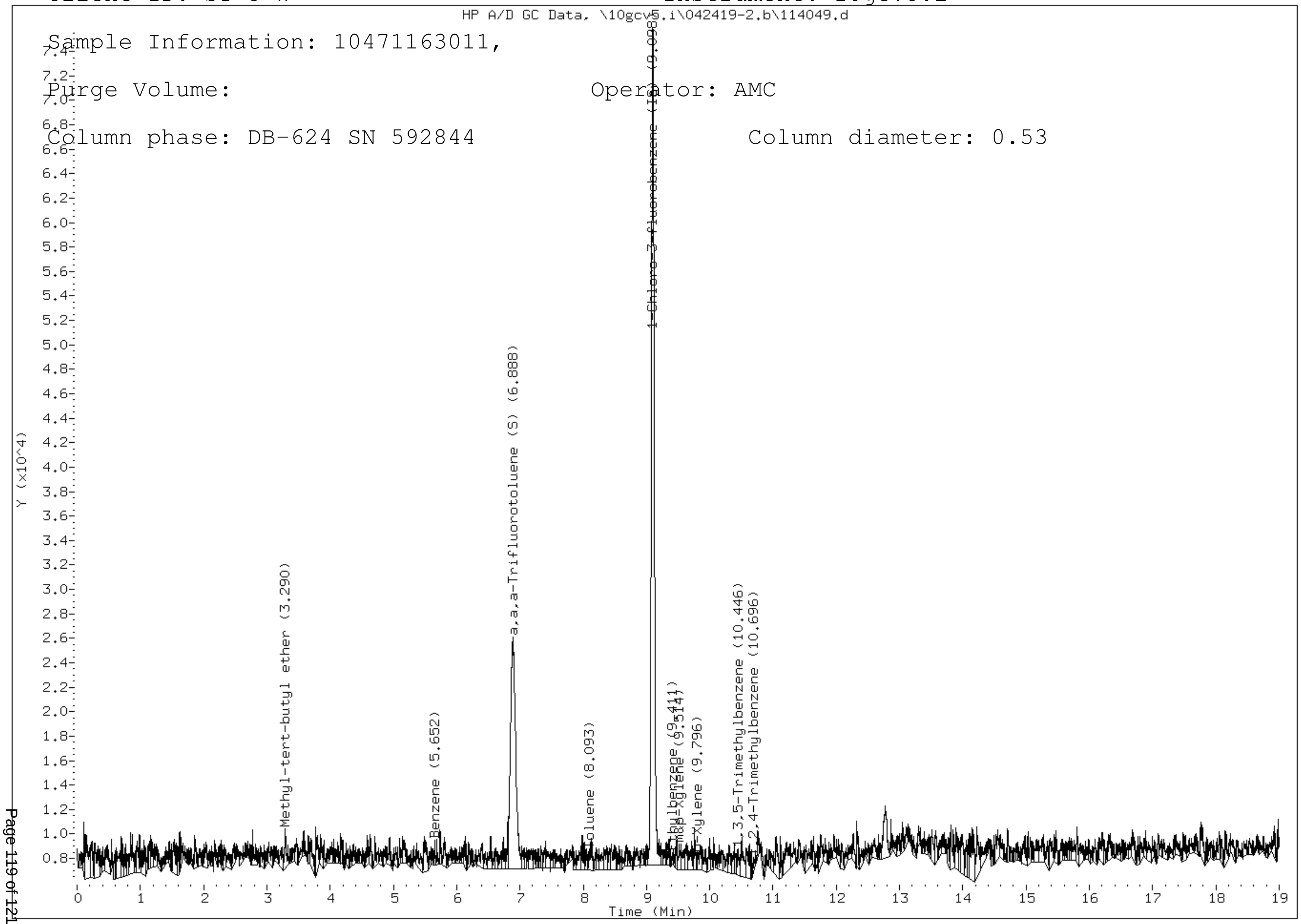
Sample ID: 10471163011

Client ID: ST-3 W Instrument: 10gcv5.i

Sample Information: 10471163011,

Purge Volume: Operator: AMC

Column phase: DB-624 SN 592844 Column diameter: 0.53



Data File: \\192.168.10.12\chem\10gcv5.i\042419-1.b/114062.d

Report Date: 04/25/2019

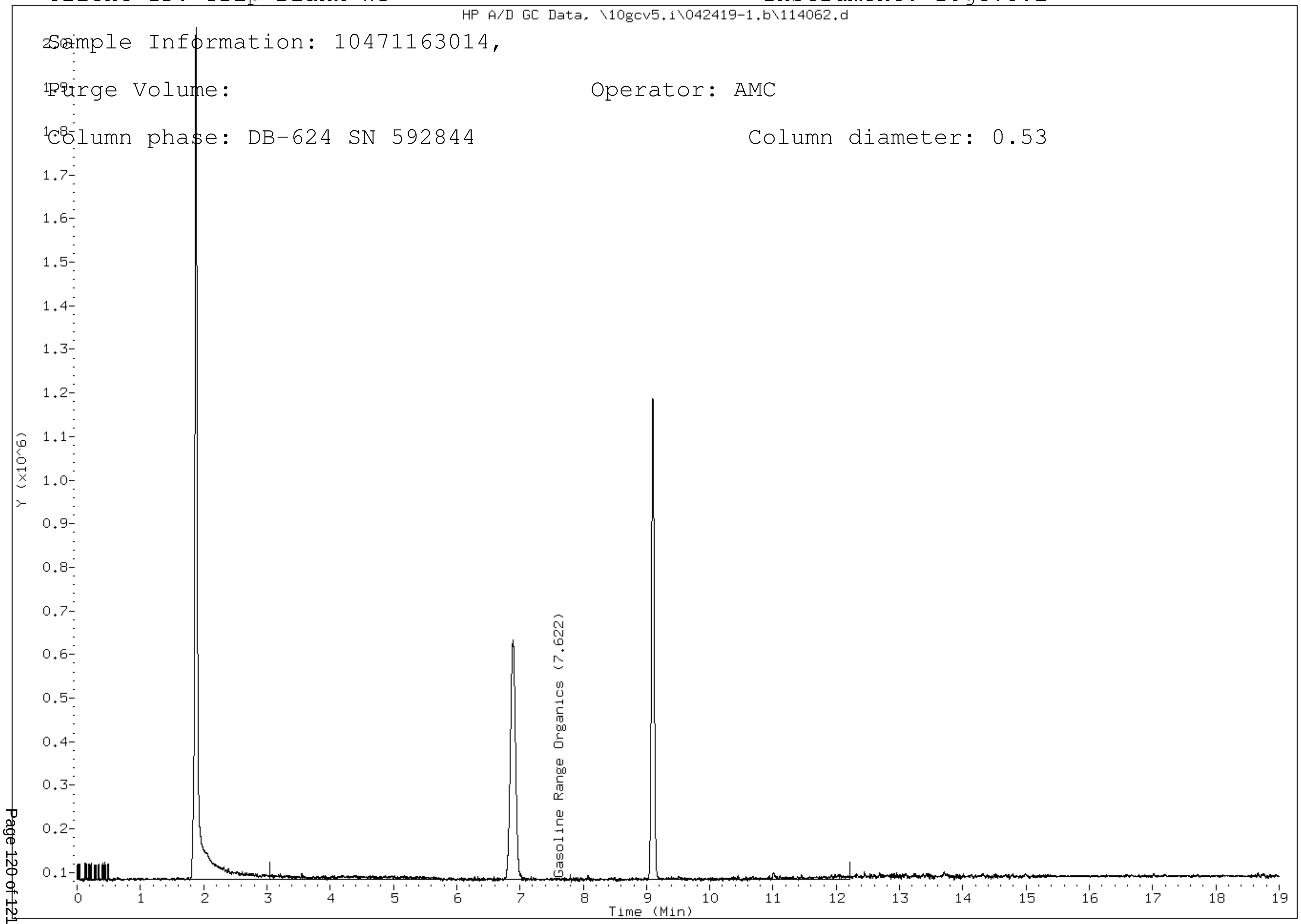
Sample ID: 10471163014

Client ID: Trip Blank-WT Instrument: 10gcv5.i

Sample Information: 10471163014,

Purge Volume: Operator: AMC

Column phase: DB-624 SN 592844 Column diameter: 0.53



Data File: \\192.168.10.12\chem\10gcv5.i\042419-2.b/114062.d

Report Date: 04/25/2019

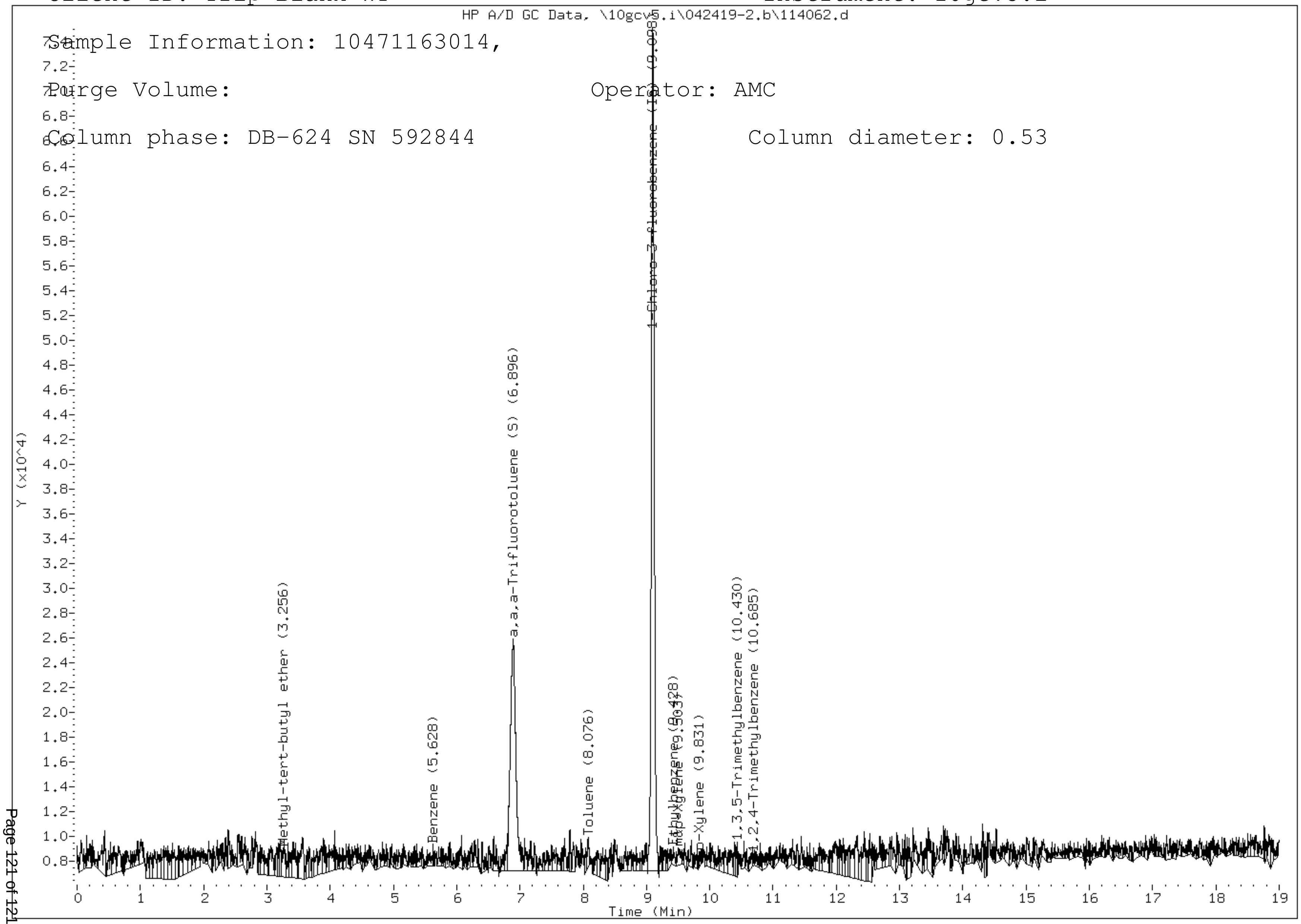
Sample ID: 10471163014

Client ID: Trip Blank-WT　　　　　　　　　　Instrument: 10gcv5.i

Sample Information: 10471163014,

Purge Volume:　　　　　　　　　　Operator: AMC

Column phase: DB-624 SN 592844　　　　　　　　　　Column diameter: 0.53



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 15, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on May 08, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10474078001	**GP-1 0-1**	Solid	05/07/19 17:30	05/08/19 15:27
10474078002	**GP-1 1-2**	Solid	05/07/19 17:35	05/08/19 15:27
10474078004	**GP-2 0-1**	Solid	05/07/19 17:10	05/08/19 15:27
10474078005	**GP-2 4-5**	Solid	05/07/19 17:15	05/08/19 15:27
10474078007	**GP-3 0-1**	Solid	05/07/19 16:50	05/08/19 15:27
10474078008	**GP-3 1-2**	Solid	05/07/19 16:55	05/08/19 15:27
10474078010	**GP-4 1-2**	Solid	05/07/19 16:30	05/08/19 15:27
10474078011	**GP-4 2-3**	Solid	05/07/19 16:35	05/08/19 15:27
10474078013	**GP-5 1-2**	Solid	05/07/19 16:00	05/08/19 15:27
10474078014	**GP-5 2-3**	Solid	05/07/19 16:05	05/08/19 15:27
10474078016	**GP-6 1-2**	Solid	05/07/19 15:30	05/08/19 15:27
10474078019	**GP-7 1-2**	Solid	05/07/19 14:00	05/08/19 15:27
10474078020	**GP-7 3-4**	Solid	05/07/19 14:05	05/08/19 15:27
10474078022	**GP-8 1-2**	Solid	05/07/19 13:30	05/08/19 15:27
10474078023	**GP-8 3-4**	Solid	05/07/19 13:35	05/08/19 15:27
10474078025	**GP-8**	Water	05/07/19 15:40	05/08/19 15:27
10474078026	**GP-9 0-1'**	Solid	05/07/19 15:00	05/08/19 15:27
10474078027	**GP-9 5-6'**	Solid	05/07/19 15:10	05/08/19 15:27

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10474078001	**GP-1 0-1**	EPA 6010D	DM	1	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078002	**GP-1 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078004	**GP-2 0-1**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078005	**GP-2 4-5**	EPA 6010D	DM	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M
10474078007	**GP-3 0-1**	EPA 6010D	DM	1	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078008	**GP-3 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078010	**GP-4 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078011	**GP-4 2-3**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078013	**GP-5 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078014	**GP-5 2-3**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078016	**GP-6 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078019	**GP-7 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078020	**GP-7 3-4**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078022	**GP-8 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078023	**GP-8 3-4**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078025	**GP-8**	EPA 8081B	XV1	24	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10474078026	**GP-9 0-1'**	EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474078027	**GP-9 5-6'**	EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10474078001	**GP-1 0-1**					
EPA 6010D	Arsenic	2.1	mg/kg	1.1	05/14/19 14:24	
ASTM D2974	Percent Moisture	8.4	%	0.10	05/13/19 12:50	
10474078002	**GP-1 1-2**					
ASTM D2974	Percent Moisture	6.3	%	0.10	05/13/19 12:51	
10474078004	**GP-2 0-1**					
EPA 7471B	Mercury	0.13	mg/kg	0.023	05/14/19 19:34	
ASTM D2974	Percent Moisture	19.7	%	0.10	05/13/19 12:51	
10474078005	**GP-2 4-5**					
EPA 6010D	Arsenic	2.0	mg/kg	1.1	05/14/19 14:25	
EPA 6010D	Barium	54.5	mg/kg	0.54	05/14/19 14:25	
EPA 6010D	Chromium	17.4	mg/kg	0.54	05/14/19 14:25	
EPA 6010D	Lead	20.9	mg/kg	0.54	05/14/19 14:25	
EPA 7471B	Mercury	0.12	mg/kg	0.022	05/14/19 19:36	
ASTM D2974	Percent Moisture	10.8	%	0.10	05/13/19 12:51	
EPA 8270D by SIM	Acenaphthene	305	ug/kg	11.1	05/14/19 20:17	
EPA 8270D by SIM	Anthracene	516	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Benzo(a)anthracene	1000	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Benzo(a)pyrene	780	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Benzo(b)fluoranthene	1060	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Benzo(g,h,i)perylene	398	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Benzo(k)fluoranthene	422	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Chrysene	862	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Dibenz(a,h)anthracene	138	ug/kg	11.1	05/14/19 20:17	
EPA 8270D by SIM	Fluoranthene	2160	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Fluorene	303	ug/kg	11.1	05/14/19 20:17	
EPA 8270D by SIM	Indeno(1,2,3-cd)pyrene	369	ug/kg	11.1	05/14/19 20:17	
EPA 8270D by SIM	Naphthalene	35.5	ug/kg	11.1	05/14/19 20:17	
EPA 8270D by SIM	Phenanthrene	2050	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Pyrene	1770	ug/kg	111	05/15/19 10:10	
EPA 8270D by SIM	Total BaP Eq. MN 2006sh. ND=0	1150	ug/kg	111	05/15/19 10:10	
10474078007	**GP-3 0-1**					
EPA 6010D	Arsenic	2.2	mg/kg	1.1	05/14/19 14:27	
EPA 7471B	Mercury	0.068	mg/kg	0.021	05/14/19 19:43	
ASTM D2974	Percent Moisture	12.8	%	0.10	05/13/19 12:51	
10474078008	**GP-3 1-2**					
EPA 7471B	Mercury	0.026	mg/kg	0.021	05/14/19 19:45	
ASTM D2974	Percent Moisture	13.9	%	0.10	05/13/19 12:52	
10474078010	**GP-4 1-2**					
EPA 7471B	Mercury	1.4	mg/kg	0.043	05/14/19 20:15	
ASTM D2974	Percent Moisture	14.7	%	0.10	05/13/19 12:52	
10474078011	**GP-4 2-3**					
EPA 7471B	Mercury	0.047	mg/kg	0.024	05/14/19 19:49	
ASTM D2974	Percent Moisture	18.3	%	0.10	05/13/19 12:52	

REPORT OF LABORATORY ANALYSIS

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10474078013	**GP-5 1-2**					
EPA 7471B	Mercury	6.1	mg/kg	0.23	05/14/19 20:17	
ASTM D2974	Percent Moisture	11.9	%	0.10	05/13/19 12:52	
10474078014	**GP-5 2-3**					
EPA 7471B	Mercury	0.067	mg/kg	0.021	05/14/19 19:54	
ASTM D2974	Percent Moisture	13.7	%	0.10	05/13/19 12:53	
10474078016	**GP-6 1-2**					
EPA 7471B	Mercury	0.099	mg/kg	0.021	05/14/19 19:56	
ASTM D2974	Percent Moisture	8.0	%	0.10	05/13/19 12:53	
10474078019	**GP-7 1-2**					
EPA 7471B	Mercury	0.094	mg/kg	0.022	05/14/19 19:58	
ASTM D2974	Percent Moisture	15.9	%	0.10	05/13/19 12:53	
10474078020	**GP-7 3-4**					
EPA 7471B	Mercury	0.041	mg/kg	0.023	05/14/19 20:04	
ASTM D2974	Percent Moisture	21.8	%	0.10	05/13/19 12:53	
10474078022	**GP-8 1-2**					
EPA 7471B	Mercury	2.3	mg/kg	0.13	05/14/19 20:19	
ASTM D2974	Percent Moisture	27.9	%	0.10	05/13/19 12:53	
10474078023	**GP-8 3-4**					
EPA 7471B	Mercury	0.74	mg/kg	0.023	05/14/19 20:08	
ASTM D2974	Percent Moisture	12.4	%	0.10	05/13/19 12:53	
10474078025	**GP-8**					
EPA 6010D	Barium, Dissolved	153	ug/L	10.0	05/14/19 17:38	
10474078026	**GP-9 0-1'**					
EPA 6010D	Arsenic	4.6	mg/kg	1.1	05/14/19 14:28	
EPA 6010D	Barium	62.9	mg/kg	0.53	05/14/19 14:28	
EPA 6010D	Chromium	16.1	mg/kg	0.53	05/14/19 14:28	
EPA 6010D	Lead	6.3	mg/kg	0.53	05/14/19 14:28	
EPA 7471B	Mercury	0.23	mg/kg	0.023	05/14/19 20:11	
ASTM D2974	Percent Moisture	13.0	%	0.10	05/13/19 12:54	
10474078027	**GP-9 5-6'**					
EPA 6010D	Arsenic	4.9	mg/kg	1.2	05/14/19 14:36	
EPA 6010D	Barium	70.5	mg/kg	0.59	05/14/19 14:36	
EPA 6010D	Chromium	12.9	mg/kg	0.59	05/14/19 14:36	
EPA 6010D	Lead	6.2	mg/kg	0.59	05/14/19 14:36	
EPA 7471B	Mercury	0.033	mg/kg	0.022	05/14/19 20:13	
ASTM D2974	Percent Moisture	16.8	%	0.10	05/13/19 12:54	

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Method: **EPA 8081B**
Description: 8081B GCS Pesticides
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
1 sample was analyzed for EPA 8081B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA Mod. 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 605545

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
5 samples were analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Method: **EPA 6010D**
Description: 6010D MET ICP, Lab Filtered
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
1 sample was analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Method: **EPA 7470A**
Description: 7470A Mercury, Lab Filtered
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
1 sample was analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10474078

Method: **EPA 7471B**
Description: 7471B Mercury
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
17 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10474078

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: May 15, 2019

General Information:
2 samples were analyzed for EPA 8270D by SIM. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3550 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 605368

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10473490004

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3272916)
  - Pyrene

R1: RPD value was outside control limits.

- MSD (Lab ID: 3272917)
  - Pyrene

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-1 0-1 **Lab ID: 10474078001** Collected: 05/07/19 17:30 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**2.1**	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:24	7440-38-2	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	ND	mg/kg	0.020	1	05/09/19 19:10	05/14/19 19:26	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**8.4**	%	0.10	1		05/13/19 12:50		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-1 1-2 **Lab ID: 10474078002** Collected: 05/07/19 17:35 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	ND	mg/kg	0.019	1	05/09/19 19:10	05/14/19 19:32	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**6.3**	%	0.10	1		05/13/19 12:51		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-2 0-1 **Lab ID: 10474078004** Collected: 05/07/19 17:10 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.13**	mg/kg	0.023	1	05/09/19 19:10	05/14/19 19:34	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**19.7**	%	0.10	1		05/13/19 12:51		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-2 4-5 **Lab ID: 10474078005** Collected: 05/07/19 17:15 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**2.0**	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:25	7440-38-2	
Barium	**54.5**	mg/kg	0.54	1	05/10/19 15:48	05/14/19 14:25	7440-39-3	
Cadmium	ND	mg/kg	0.16	1	05/10/19 15:48	05/14/19 14:25	7440-43-9	
Chromium	**17.4**	mg/kg	0.54	1	05/10/19 15:48	05/14/19 14:25	7440-47-3	
Lead	**20.9**	mg/kg	0.54	1	05/10/19 15:48	05/14/19 14:25	7439-92-1	
Selenium	ND	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:25	7782-49-2	
Silver	ND	mg/kg	0.54	1	05/10/19 15:48	05/14/19 14:25	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.12**	mg/kg	0.022	1	05/09/19 19:10	05/14/19 19:36	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**10.8**	%	0.10	1		05/13/19 12:51		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	**305**	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	83-32-9	
Acenaphthylene	ND	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	208-96-8	
Anthracene	**516**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	120-12-7	
Benzo(a)anthracene	**1000**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	56-55-3	
Benzo(a)pyrene	**780**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	50-32-8	
Benzo(b)fluoranthene	**1060**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	205-99-2	
Benzo(g,h,i)perylene	**398**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	191-24-2	
Benzo(k)fluoranthene	**422**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	207-08-9	
Chrysene	**862**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	218-01-9	
Dibenz(a,h)anthracene	**138**	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	53-70-3	
Fluoranthene	**2160**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	206-44-0	
Fluorene	**303**	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	86-73-7	
Indeno(1,2,3-cd)pyrene	**369**	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	193-39-5	
Naphthalene	**35.5**	ug/kg	11.1	1	05/13/19 10:56	05/14/19 20:17	91-20-3	
Phenanthrene	**2050**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	85-01-8	
Pyrene	**1770**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	**1150**	ug/kg	111	10	05/13/19 10:56	05/15/19 10:10		
Surrogates								
2-Fluorobiphenyl (S)	71	%.	30-125	1	05/13/19 10:56	05/14/19 20:17	321-60-8	
p-Terphenyl-d14 (S)	76	%.	30-125	1	05/13/19 10:56	05/14/19 20:17	1718-51-0	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-3 0-1 **Lab ID: 10474078007** Collected: 05/07/19 16:50 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**2.2**	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:27	7440-38-2	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.068**	mg/kg	0.021	1	05/09/19 19:10	05/14/19 19:43	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**12.8**	%	0.10	1		05/13/19 12:51		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-3 1-2 **Lab ID: 10474078008** Collected: 05/07/19 16:55 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.026**	mg/kg	0.021	1	05/09/19 19:10	05/14/19 19:45	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**13.9**	%	0.10	1		05/13/19 12:52		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-4 1-2 **Lab ID: 10474078010** Collected: 05/07/19 16:30 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**1.4**	mg/kg	0.043	2	05/09/19 19:10	05/14/19 20:15	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**14.7**	%	0.10	1		05/13/19 12:52		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-4 2-3 **Lab ID: 10474078011** Collected: 05/07/19 16:35 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.047**	mg/kg	0.024	1	05/09/19 19:10	05/14/19 19:49	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**18.3**	%	0.10	1		05/13/19 12:52		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-5 1-2 **Lab ID: 10474078013** Collected: 05/07/19 16:00 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**6.1**	mg/kg	0.23	10	05/09/19 19:10	05/14/19 20:17	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**11.9**	%	0.10	1		05/13/19 12:52		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-5 2-3 **Lab ID: 10474078014** Collected: 05/07/19 16:05 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.067**	mg/kg	0.021	1	05/09/19 19:10	05/14/19 19:54	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**13.7**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-6 1-2 **Lab ID: 10474078016** Collected: 05/07/19 15:30 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.099**	mg/kg	0.021	1	05/09/19 19:10	05/14/19 19:56	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**8.0**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-7 1-2 **Lab ID: 10474078019** Collected: 05/07/19 14:00 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.094**	mg/kg	0.022	1	05/09/19 19:10	05/14/19 19:58	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**15.9**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-7 3-4 **Lab ID: 10474078020** Collected: 05/07/19 14:05 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.041**	mg/kg	0.023	1	05/09/19 19:10	05/14/19 20:04	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**21.8**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-8 1-2 **Lab ID: 10474078022** Collected: 05/07/19 13:30 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**2.3**	mg/kg	0.13	5	05/09/19 19:10	05/14/19 20:19	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**27.9**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-8 3-4 **Lab ID: 10474078023** Collected: 05/07/19 13:35 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.74**	mg/kg	0.023	1	05/09/19 19:10	05/14/19 20:08	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**12.4**	%	0.10	1		05/13/19 12:53		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-8 **Lab ID: 10474078025** Collected: 05/07/19 15:40 Received: 05/08/19 15:27 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8081B GCS Pesticides	Analytical Method: EPA 8081B Preparation Method: EPA Mod. 3510C							
Aldrin	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	309-00-2	
alpha-BHC	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	319-84-6	
beta-BHC	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	319-85-7	
delta-BHC	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	319-86-8	
gamma-BHC (Lindane)	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	58-89-9	
Chlordane (Technical)	ND	ug/L	0.66	1	05/13/19 16:35	05/14/19 16:45	57-74-9	
alpha-Chlordane	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	5103-71-9	
gamma-Chlordane	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	5103-74-2	
4,4'-DDD	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	72-54-8	
4,4'-DDE	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	72-55-9	
4,4'-DDT	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	50-29-3	
Dieldrin	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	60-57-1	
Endosulfan I	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	959-98-8	
Endosulfan II	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	33213-65-9	
Endosulfan sulfate	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	1031-07-8	
Endrin	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	72-20-8	
Endrin aldehyde	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	7421-93-4	
Endrin ketone	ND	ug/L	0.13	1	05/13/19 16:35	05/14/19 16:45	53494-70-5	
Heptachlor	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	76-44-8	
Heptachlor epoxide	ND	ug/L	0.066	1	05/13/19 16:35	05/14/19 16:45	1024-57-3	
Methoxychlor	ND	ug/L	0.66	1	05/13/19 16:35	05/14/19 16:45	72-43-5	
Toxaphene	ND	ug/L	2.0	1	05/13/19 16:35	05/14/19 16:45	8001-35-2	
Surrogates								
Tetrachloro-m-xylene (S)	99	%.	52-125	1	05/13/19 16:35	05/14/19 16:45	877-09-8	
Decachlorobiphenyl (S)	71	%.	30-141	1	05/13/19 16:35	05/14/19 16:45	2051-24-3	
6010D MET ICP, Lab Filtered	Analytical Method: EPA 6010D Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	20.0	1	05/10/19 09:18	05/14/19 17:38	7440-38-2	
Barium, Dissolved	**153**	ug/L	10.0	1	05/10/19 09:18	05/14/19 17:38	7440-39-3	
Cadmium, Dissolved	ND	ug/L	3.0	1	05/10/19 09:18	05/14/19 17:38	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/10/19 09:18	05/14/19 17:38	7440-47-3	
Lead, Dissolved	ND	ug/L	10.0	1	05/10/19 09:18	05/14/19 17:38	7439-92-1	
Selenium, Dissolved	ND	ug/L	20.0	1	05/10/19 09:18	05/14/19 17:38	7782-49-2	
Silver, Dissolved	ND	ug/L	10.0	1	05/10/19 09:18	05/14/19 17:38	7440-22-4	
7470A Mercury, Lab Filtered	Analytical Method: EPA 7470A Preparation Method: EPA 7470A							
Mercury, Dissolved	ND	ug/L	0.20	1	05/10/19 11:57	05/14/19 17:14	7439-97-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-9 0-1' **Lab ID: 10474078026** Collected: 05/07/19 15:00 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**4.6**	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:28	7440-38-2	
Barium	**62.9**	mg/kg	0.53	1	05/10/19 15:48	05/14/19 14:28	7440-39-3	
Cadmium	ND	mg/kg	0.16	1	05/10/19 15:48	05/14/19 14:28	7440-43-9	
Chromium	**16.1**	mg/kg	0.53	1	05/10/19 15:48	05/14/19 14:28	7440-47-3	
Lead	**6.3**	mg/kg	0.53	1	05/10/19 15:48	05/14/19 14:28	7439-92-1	
Selenium	ND	mg/kg	1.1	1	05/10/19 15:48	05/14/19 14:28	7782-49-2	
Silver	ND	mg/kg	0.53	1	05/10/19 15:48	05/14/19 14:28	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.23**	mg/kg	0.023	1	05/09/19 19:10	05/14/19 20:11	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**13.0**	%	0.10	1		05/13/19 12:54		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Sample: GP-9 5-6' **Lab ID: 10474078027** Collected: 05/07/19 15:10 Received: 05/08/19 15:27 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**4.9**	mg/kg	1.2	1	05/10/19 15:48	05/14/19 14:36	7440-38-2	
Barium	**70.5**	mg/kg	0.59	1	05/10/19 15:48	05/14/19 14:36	7440-39-3	
Cadmium	ND	mg/kg	0.18	1	05/10/19 15:48	05/14/19 14:36	7440-43-9	
Chromium	**12.9**	mg/kg	0.59	1	05/10/19 15:48	05/14/19 14:36	7440-47-3	
Lead	**6.2**	mg/kg	0.59	1	05/10/19 15:48	05/14/19 14:36	7439-92-1	
Selenium	ND	mg/kg	1.2	1	05/10/19 15:48	05/14/19 14:36	7782-49-2	
Silver	ND	mg/kg	0.59	1	05/10/19 15:48	05/14/19 14:36	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.033**	mg/kg	0.022	1	05/09/19 19:10	05/14/19 20:13	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**16.8**	%	0.10	1		05/13/19 12:54		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	83-32-9	
Acenaphthylene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	208-96-8	
Anthracene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	120-12-7	
Benzo(a)anthracene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	56-55-3	
Benzo(a)pyrene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	207-08-9	
Chrysene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	53-70-3	
Fluoranthene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	206-44-0	
Fluorene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	86-73-7	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	193-39-5	
Naphthalene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	91-20-3	
Phenanthrene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	85-01-8	
Pyrene	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	ND	ug/kg	12.0	1	05/13/19 10:56	05/14/19 20:38		
Surrogates								
2-Fluorobiphenyl (S)	62	%.	30-125	1	05/13/19 10:56	05/14/19 20:38	321-60-8	
p-Terphenyl-d14 (S)	59	%.	30-125	1	05/13/19 10:56	05/14/19 20:38	1718-51-0	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605025 — Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A — Analysis Description: 7470A Mercury Water Dissolved
Associated Lab Samples: 10474078025

METHOD BLANK: 3270920 — Matrix: Water
Associated Lab Samples: 10474078025

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury, Dissolved	ug/L	ND	0.20	05/14/19 16:36	

LABORATORY CONTROL SAMPLE: 3270921

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury, Dissolved	ug/L	5	5.0	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3270922 3270923

Parameter	Units	10473870011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury, Dissolved	ug/L	ND	5	5	5.0	5.0	100	100	80-120	0	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 604856 — Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B — Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10474078001, 10474078002, 10474078004, 10474078005, 10474078007, 10474078008, 10474078010, 10474078011, 10474078013, 10474078014, 10474078016, 10474078019, 10474078020, 10474078022, 10474078023, 10474078026, 10474078027

METHOD BLANK: 3269933 — Matrix: Solid
Associated Lab Samples: 10474078001, 10474078002, 10474078004, 10474078005, 10474078007, 10474078008, 10474078010, 10474078011, 10474078013, 10474078014, 10474078016, 10474078019, 10474078020, 10474078022, 10474078023, 10474078026, 10474078027

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.018	05/14/19 19:22	

LABORATORY CONTROL SAMPLE: 3269934

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.44	0.48	109	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3269935 3269936

Parameter	Units	10474078001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.52	0.55	0.58	0.60	108	109	80-120	4	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 604846 Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 Analysis Description: 6010D Solids
Associated Lab Samples: 10474078001, 10474078005, 10474078007

METHOD BLANK: 3269887 Matrix: Solid
Associated Lab Samples: 10474078001, 10474078005, 10474078007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.97	05/14/19 13:57	
Barium	mg/kg	ND	0.49	05/14/19 13:57	
Cadmium	mg/kg	ND	0.15	05/14/19 13:57	
Chromium	mg/kg	ND	0.49	05/14/19 13:57	
Lead	mg/kg	ND	0.49	05/14/19 13:57	
Selenium	mg/kg	ND	0.97	05/14/19 13:57	
Silver	mg/kg	ND	0.49	05/14/19 13:57	

LABORATORY CONTROL SAMPLE: 3269888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.6	44.0	92	80-120	
Barium	mg/kg	47.6	46.8	98	80-120	
Cadmium	mg/kg	47.6	46.7	98	80-120	
Chromium	mg/kg	47.6	46.9	99	80-120	
Lead	mg/kg	47.6	46.2	97	80-120	
Selenium	mg/kg	47.6	41.5	87	80-120	
Silver	mg/kg	23.8	22.7	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3269889 3269890

Parameter	Units	10474026001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	ND	53.5	55.5	52.9	56.5	89	92	75-125	7	20	
Barium	mg/kg	90.8	53.5	55.5	142	153	96	113	75-125	8	20	
Cadmium	mg/kg	ND	53.5	55.5	41.0	43.8	77	79	75-125	7	20	
Chromium	mg/kg	22.5	53.5	55.5	73.0	78.2	94	100	75-125	7	20	
Lead	mg/kg	9.7	53.5	55.5	60.6	65.8	95	101	75-125	8	20	
Selenium	mg/kg	ND	53.5	55.5	47.8	52.4	89	94	75-125	9	20	
Silver	mg/kg	ND	26.7	27.8	21.1	22.4	79	81	75-125	6	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605037 Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 Analysis Description: 6010D Solids
Associated Lab Samples: 10474078026, 10474078027

METHOD BLANK: 3270953 Matrix: Solid
Associated Lab Samples: 10474078026, 10474078027

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.93	05/14/19 13:07	
Barium	mg/kg	ND	0.46	05/14/19 13:07	
Cadmium	mg/kg	ND	0.14	05/14/19 13:07	
Chromium	mg/kg	ND	0.46	05/14/19 13:07	
Lead	mg/kg	ND	0.46	05/14/19 13:07	
Selenium	mg/kg	ND	0.93	05/14/19 13:07	
Silver	mg/kg	ND	0.46	05/14/19 13:07	

LABORATORY CONTROL SAMPLE: 3270954

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	48.1	44.0	92	80-120	
Barium	mg/kg	48.1	48.6	101	80-120	
Cadmium	mg/kg	48.1	44.2	92	80-120	
Chromium	mg/kg	48.1	48.2	100	80-120	
Lead	mg/kg	48.1	44.8	93	80-120	
Selenium	mg/kg	48.1	43.4	90	80-120	
Silver	mg/kg	24	21.6	90	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3270955 3270956

Parameter	Units	10473908001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	ND	52.2	49.3	55.1	53.0	100	102	75-125	4	20	
Barium	mg/kg	25.2	52.2	49.3	81.6	84.0	108	119	75-125	3	20	
Cadmium	mg/kg	ND	52.2	49.3	52.0	48.3	100	98	75-125	7	20	
Chromium	mg/kg	13.8	52.2	49.3	70.6	68.8	109	112	75-125	3	20	
Lead	mg/kg	ND	52.2	49.3	55.2	51.5	101	100	75-125	7	20	
Selenium	mg/kg	ND	52.2	49.3	46.4	42.7	89	87	75-125	8	20	
Silver	mg/kg	ND	26.2	24.7	25.8	24.4	99	99	75-125	6	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605005 Analysis Method: EPA 6010D
QC Batch Method: EPA 3010 Analysis Description: 6010D Water Dissolved
Associated Lab Samples: 10474078025

METHOD BLANK: 3270867 Matrix: Water
Associated Lab Samples: 10474078025

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic, Dissolved	ug/L	ND	20.0	05/14/19 16:36	
Barium, Dissolved	ug/L	ND	10.0	05/14/19 16:36	
Cadmium, Dissolved	ug/L	ND	3.0	05/14/19 16:36	
Chromium, Dissolved	ug/L	ND	10.0	05/14/19 16:36	
Lead, Dissolved	ug/L	ND	10.0	05/14/19 16:36	
Selenium, Dissolved	ug/L	ND	20.0	05/14/19 16:36	
Silver, Dissolved	ug/L	ND	10.0	05/14/19 16:36	

LABORATORY CONTROL SAMPLE: 3270868

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic, Dissolved	ug/L	1000	989	99	80-120	
Barium, Dissolved	ug/L	1000	1040	104	80-120	
Cadmium, Dissolved	ug/L	1000	991	99	80-120	
Chromium, Dissolved	ug/L	1000	1020	102	80-120	
Lead, Dissolved	ug/L	1000	1000	100	80-120	
Selenium, Dissolved	ug/L	1000	981	98	80-120	
Silver, Dissolved	ug/L	500	484	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3270869 3270870

Parameter	Units	10473870005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic, Dissolved	ug/L	ND	1000	1000	999	998	100	100	75-125	0	20	
Barium, Dissolved	ug/L	201	1000	1000	1200	1190	100	99	75-125	1	20	
Cadmium, Dissolved	ug/L	ND	1000	1000	954	951	95	95	75-125	0	20	
Chromium, Dissolved	ug/L	ND	1000	1000	991	988	99	99	75-125	0	20	
Lead, Dissolved	ug/L	ND	1000	1000	948	945	95	95	75-125	0	20	
Selenium, Dissolved	ug/L	ND	1000	1000	963	958	96	96	75-125	1	20	
Silver, Dissolved	ug/L	ND	500	500	482	479	96	96	75-125	1	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605387 | Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 | Analysis Description: Dry Weight / %M by ASTM D2974

Associated Lab Samples: 10474078001, 10474078002, 10474078004, 10474078005, 10474078007, 10474078008, 10474078010, 10474078011, 10474078013, 10474078014, 10474078016, 10474078019, 10474078020, 10474078022, 10474078023, 10474078026, 10474078027

SAMPLE DUPLICATE: 3272965

Parameter	Units	10474078001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	8.4	8.7	4	30	

SAMPLE DUPLICATE: 3272966

Parameter	Units	10474077010 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.5	13.1	4	30	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605545 | Analysis Method: EPA 8081B
QC Batch Method: EPA Mod. 3510C | Analysis Description: 8081B GCS Pesticides
Associated Lab Samples: 10474078025

METHOD BLANK: 3273466 | Matrix: Water
Associated Lab Samples: 10474078025

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/L	ND	0.10	05/14/19 15:31	
4,4'-DDE	ug/L	ND	0.10	05/14/19 15:31	
4,4'-DDT	ug/L	ND	0.10	05/14/19 15:31	
Aldrin	ug/L	ND	0.050	05/14/19 15:31	
alpha-BHC	ug/L	ND	0.050	05/14/19 15:31	
alpha-Chlordane	ug/L	ND	0.050	05/14/19 15:31	
beta-BHC	ug/L	ND	0.050	05/14/19 15:31	
Chlordane (Technical)	ug/L	ND	0.50	05/14/19 15:31	
delta-BHC	ug/L	ND	0.050	05/14/19 15:31	
Dieldrin	ug/L	ND	0.10	05/14/19 15:31	
Endosulfan I	ug/L	ND	0.050	05/14/19 15:31	
Endosulfan II	ug/L	ND	0.10	05/14/19 15:31	
Endosulfan sulfate	ug/L	ND	0.10	05/14/19 15:31	
Endrin	ug/L	ND	0.10	05/14/19 15:31	
Endrin aldehyde	ug/L	ND	0.10	05/14/19 15:31	
Endrin ketone	ug/L	ND	0.10	05/14/19 15:31	
gamma-BHC (Lindane)	ug/L	ND	0.050	05/14/19 15:31	
gamma-Chlordane	ug/L	ND	0.050	05/14/19 15:31	
Heptachlor	ug/L	ND	0.050	05/14/19 15:31	
Heptachlor epoxide	ug/L	ND	0.050	05/14/19 15:31	
Methoxychlor	ug/L	ND	0.50	05/14/19 15:31	
Toxaphene	ug/L	ND	1.5	05/14/19 15:31	
Decachlorobiphenyl (S)	%.	99	30-141	05/14/19 15:31	
Tetrachloro-m-xylene (S)	%.	89	52-125	05/14/19 15:31	

LABORATORY CONTROL SAMPLE & LCSD: 3273467 | 3273468

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
4,4'-DDD	ug/L	1	1.0	1.0	103	103	75-125	0	20	
4,4'-DDE	ug/L	1	1.1	1.0	105	105	75-125	0	20	
4,4'-DDT	ug/L	1	1.0	1.1	105	106	75-125	1	20	
Aldrin	ug/L	0.5	0.51	0.49	103	97	41-125	6	20	
alpha-BHC	ug/L	0.5	0.54	0.55	109	110	75-125	1	20	
alpha-Chlordane	ug/L	0.5	0.52	0.51	103	102	75-125	1	20	
beta-BHC	ug/L	0.5	0.52	0.52	103	103	75-125	0	20	
delta-BHC	ug/L	0.5	0.52	0.52	103	104	52-130	0	20	
Dieldrin	ug/L	1	1.1	1.1	106	106	75-125	1	20	
Endosulfan I	ug/L	0.5	0.52	0.52	104	103	75-125	0	20	
Endosulfan II	ug/L	1	1.1	1.0	105	105	75-125	0	20	
Endosulfan sulfate	ug/L	1	1.0	1.0	104	104	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

LABORATORY CONTROL SAMPLE & LCSD: 3273467 3273468

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Endrin	ug/L	1	1.1	1.1	106	106	75-125	0	20	
Endrin aldehyde	ug/L	1	1.0	1.0	103	103	75-125	0	20	
Endrin ketone	ug/L	1	1.0	1.0	104	104	75-125	0	20	
gamma-BHC (Lindane)	ug/L	0.5	0.54	0.54	107	108	75-125	0	20	
gamma-Chlordane	ug/L	0.5	0.50	0.50	100	99	72-125	1	20	
Heptachlor	ug/L	0.5	0.51	0.48	101	97	68-125	4	20	
Heptachlor epoxide	ug/L	0.5	0.52	0.52	105	104	75-125	1	20	
Methoxychlor	ug/L	5	5.2	5.3	104	106	75-125	1	20	
Decachlorobiphenyl (S)	%.				105	108	30-141			
Tetrachloro-m-xylene (S)	%.				100	100	52-125			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

QC Batch: 605368 | Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3550 | Analysis Description: 8270D Solid PAH by SIM MSSV
Associated Lab Samples: 10474078005, 10474078027

METHOD BLANK: 3272914 | Matrix: Solid
Associated Lab Samples: 10474078005, 10474078027

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acenaphthene	ug/kg	ND	10.0	05/14/19 18:05	
Acenaphthylene	ug/kg	ND	10.0	05/14/19 18:05	
Anthracene	ug/kg	ND	10.0	05/14/19 18:05	
Benzo(a)anthracene	ug/kg	ND	10.0	05/14/19 18:05	
Benzo(a)pyrene	ug/kg	ND	10.0	05/14/19 18:05	
Benzo(b)fluoranthene	ug/kg	ND	10.0	05/14/19 18:05	
Benzo(g,h,i)perylene	ug/kg	ND	10.0	05/14/19 18:05	
Benzo(k)fluoranthene	ug/kg	ND	10.0	05/14/19 18:05	
Chrysene	ug/kg	ND	10.0	05/14/19 18:05	
Dibenz(a,h)anthracene	ug/kg	ND	10.0	05/14/19 18:05	
Fluoranthene	ug/kg	ND	10.0	05/14/19 18:05	
Fluorene	ug/kg	ND	10.0	05/14/19 18:05	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	10.0	05/14/19 18:05	
Naphthalene	ug/kg	ND	10.0	05/14/19 18:05	
Phenanthrene	ug/kg	ND	10.0	05/14/19 18:05	
Pyrene	ug/kg	ND	10.0	05/14/19 18:05	
2-Fluorobiphenyl (S)	%.	71	30-125	05/14/19 18:05	
p-Terphenyl-d14 (S)	%.	82	30-125	05/14/19 18:05	

LABORATORY CONTROL SAMPLE: 3272915

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/kg	33.3	22.9	69	46-125	
Acenaphthylene	ug/kg	33.3	23.2	70	44-125	
Anthracene	ug/kg	33.3	21.0	63	62-125	
Benzo(a)anthracene	ug/kg	33.3	26.7	80	53-125	
Benzo(a)pyrene	ug/kg	33.3	24.4	73	62-125	
Benzo(b)fluoranthene	ug/kg	33.3	25.9	78	51-125	
Benzo(g,h,i)perylene	ug/kg	33.3	24.0	72	58-125	
Benzo(k)fluoranthene	ug/kg	33.3	23.4	70	59-125	
Chrysene	ug/kg	33.3	25.8	77	59-125	
Dibenz(a,h)anthracene	ug/kg	33.3	24.9	75	60-125	
Fluoranthene	ug/kg	33.3	23.6	71	67-125	
Fluorene	ug/kg	33.3	23.5	71	51-125	
Indeno(1,2,3-cd)pyrene	ug/kg	33.3	24.5	73	59-125	
Naphthalene	ug/kg	33.3	22.6	68	47-125	
Phenanthrene	ug/kg	33.3	24.1	72	61-125	
Pyrene	ug/kg	33.3	25.2	76	52-125	
2-Fluorobiphenyl (S)	%.			69	30-125	
p-Terphenyl-d14 (S)	%.			79	30-125	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3272916 3272917

Parameter	Units	10473490004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthene	ug/kg	ND	33.3	33.2	28.5	27.6	85	83	30-125	3	30	
Acenaphthylene	ug/kg	ND	33.3	33.2	25.7	23.4	77	70	30-125	9	30	
Anthracene	ug/kg	ND	33.3	33.2	24.4	22.5	73	68	30-131	8	30	
Benzo(a)anthracene	ug/kg	0.017 mg/kg	33.3	33.2	39.8	36.4	69	59	30-126	9	30	
Benzo(a)pyrene	ug/kg	0.010 mg/kg	33.3	33.2	32.6	31.3	67	63	30-150	4	30	
Benzo(b)fluoranthene	ug/kg	0.015 mg/kg	33.3	33.2	37.7	37.2	67	66	30-150	1	30	
Benzo(g,h,i)perylene	ug/kg	ND	33.3	33.2	29.9	27.4	90	82	30-150	9	30	
Benzo(k)fluoranthene	ug/kg	ND	33.3	33.2	27.0	26.8	81	81	30-150	1	30	
Chrysene	ug/kg	0.025 mg/kg	33.3	33.2	35.7	45.8	32	62	30-150	25	30	
Dibenz(a,h)anthracene	ug/kg	ND	33.3	33.2	23.7	22.7	71	68	30-143	5	30	
Fluoranthene	ug/kg	0.025 mg/kg	33.3	33.2	40.9	43.0	48	54	30-143	5	30	
Fluorene	ug/kg	ND	33.3	33.2	25.6	23.7	77	71	30-138	8	30	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	33.3	33.2	27.9	26.1	84	78	30-150	7	30	
Naphthalene	ug/kg	ND	33.3	33.2	30.0	28.0	90	84	30-125	7	30	
Phenanthrene	ug/kg	0.016 mg/kg	33.3	33.2	35.5	33.5	58	52	30-142	6	30	
Pyrene	ug/kg	0.050 mg/kg	33.3	33.2	52.2	72.4	8	68	30-149	32	30	M1,R1
2-Fluorobiphenyl (S)	%.						63	58	30-125			
p-Terphenyl-d14 (S)	%.						66	57	30-125			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10474078

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: 605720

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

R1 RPD value was outside control limits.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10474078

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10474078025	**GP-8**	EPA Mod. 3510C	605545	EPA 8081B	605720
10474078001	**GP-1 0-1**	EPA 3050	604846	EPA 6010D	605340
10474078005	**GP-2 4-5**	EPA 3050	604846	EPA 6010D	605340
10474078007	**GP-3 0-1**	EPA 3050	604846	EPA 6010D	605340
10474078026	**GP-9 0-1'**	EPA 3050	605037	EPA 6010D	605349
10474078027	**GP-9 5-6'**	EPA 3050	605037	EPA 6010D	605349
10474078025	**GP-8**	EPA 3010	605005	EPA 6010D	605356
10474078025	**GP-8**	EPA 7470A	605025	EPA 7470A	605451
10474078001	**GP-1 0-1**	EPA 7471B	604856	EPA 7471B	605056
10474078002	**GP-1 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078004	**GP-2 0-1**	EPA 7471B	604856	EPA 7471B	605056
10474078005	**GP-2 4-5**	EPA 7471B	604856	EPA 7471B	605056
10474078007	**GP-3 0-1**	EPA 7471B	604856	EPA 7471B	605056
10474078008	**GP-3 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078010	**GP-4 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078011	**GP-4 2-3**	EPA 7471B	604856	EPA 7471B	605056
10474078013	**GP-5 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078014	**GP-5 2-3**	EPA 7471B	604856	EPA 7471B	605056
10474078016	**GP-6 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078019	**GP-7 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078020	**GP-7 3-4**	EPA 7471B	604856	EPA 7471B	605056
10474078022	**GP-8 1-2**	EPA 7471B	604856	EPA 7471B	605056
10474078023	**GP-8 3-4**	EPA 7471B	604856	EPA 7471B	605056
10474078026	**GP-9 0-1'**	EPA 7471B	604856	EPA 7471B	605056
10474078027	**GP-9 5-6'**	EPA 7471B	604856	EPA 7471B	605056
10474078001	**GP-1 0-1**	ASTM D2974	605387		
10474078002	**GP-1 1-2**	ASTM D2974	605387		
10474078004	**GP-2 0-1**	ASTM D2974	605387		
10474078005	**GP-2 4-5**	ASTM D2974	605387		
10474078007	**GP-3 0-1**	ASTM D2974	605387		
10474078008	**GP-3 1-2**	ASTM D2974	605387		
10474078010	**GP-4 1-2**	ASTM D2974	605387		
10474078011	**GP-4 2-3**	ASTM D2974	605387		
10474078013	**GP-5 1-2**	ASTM D2974	605387		
10474078014	**GP-5 2-3**	ASTM D2974	605387		
10474078016	**GP-6 1-2**	ASTM D2974	605387		
10474078019	**GP-7 1-2**	ASTM D2974	605387		
10474078020	**GP-7 3-4**	ASTM D2974	605387		
10474078022	**GP-8 1-2**	ASTM D2974	605387		
10474078023	**GP-8 3-4**	ASTM D2974	605387		
10474078026	**GP-9 0-1'**	ASTM D2974	605387		
10474078027	**GP-9 5-6'**	ASTM D2974	605387		
10474078005	**GP-2 4-5**	EPA 3550	605368	EPA 8270D by SIM	605883
10474078027	**GP-9 5-6'**	EPA 3550	605368	EPA 8270D by SIM	605883

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CHAIN-OF-CUSTODY / Analytical Request D

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be compl

WO# : 10474078

10474078

Section A
Required Client Information:

Company: Braun Intertec
Address: 11001 Hampshire Ave
Email To: akeefer@braunintertec.com
Phone: 952 3343748 Fax:
Requested Due Date/TAT: Standard

Section B
Required Project Information:

Report To: Mark Keefer
Copy To:
Purchase Order No.: B1903316
Project Name: Former Hillcrest Golfcourse
Project Number: B1903316

Section C
Invoice Information:

Attention: Mark Keefer
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

23UU331

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MN

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes	MATRIX / CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Mercury	Arsenic	RCRA metals	PAHs	Hold	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	GP-1 0-1	SL	G	5-7-19	1730														X	X					001
2	GP-1 1-2				1735														X						002
3	GP-1 4-5				1740																		X		003
4	GP-2 0-1				1710														X						004
5	GP-2 4-5				1715																X	X			005
6	GP-2 8-9				1720																		X		006
7	GP-3 0-1				1650														X	X					007
8	GP-3 1-2				1655														X						008
9	GP-3 4-5				1700																		X		009
10	GP-4 1-2				1630														X						010
11	GP-4 2-3				1635														X						011
12	GP-4 4-5				1640																		X		012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Mark Keefer / BIC	5-8-19	14:50	RM Pace	5/8/19	14:50	0.7 1.5	Y	N	Y
				[signature] Pace	5/8/19	1527	2.8 5.7	Y	N	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mark Keefer
SIGNATURE of SAMPLER: [signature]
DATE Signed (MM/DD/YY): 5-7-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

![Pace Analytical]

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 2 of 3

2300332

Section A Required Client Information:

Company:	BIC
Address:	1001 Hampshire Ave S
Email To:	
Phone:	952 334 3748
Fax:	
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Marc Keefer
Copy To:	
Purchase Order No.:	B1903316
Project Name:	Former Hillcrest Golfcourse
Project Number:	B1903316

Section C Invoice Information:

Attention:	Same
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ______

Site Location STATE: ______

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Mercury	Arsenic	RCRA Metals	PAHs	Hold	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	GP-5 1-2	SL	G	5-7-19	1600														X						013
2	GP-5 2-3				1605														X						014
3	GP-5 4-5				1610																		X		015
4	GP-6 1-2				1530														X						016
5	GP-6 2-3				1535																		X		017
6	GP-6 4-5				1540																		X		018
7	GP-7 1-2				1400														X						019
8	GP-7 3-4				1405														X						020
9	GP-7 4-5				1415																		X		021
10	GP-8 1-2				1330														X						022
11	GP-8 3-4				1335														X						023
12	GP-8 4-5				1345																		X		024

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Marc Keefer / BIC	5-8-19	14:50	BL M Pace	5/8/19	14:50	0.7 1.5	Y	N	Y
				[signature] Pace	5/11/19	1527	2.8 5.4	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Marc Keefer

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5-7-19

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 3 of 3

2300328

Section A
Required Client Information:

Company:	Braun Intertec
Address:	11001 Hampshire Ave
	Mpls MN
Email To:	
Phone:	Fax:
Requested Due Date/TAT:	

Section B
Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	
Project Name:	Hillcrest GC
Project Number:	B1903316

Section C
Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE:

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N): N N

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	GP-2 0-1'	SL	G			5/7	1710													
2	GP-2 4-5'						1715													
3	GP-2 8-9'						1720													
4	GP-1 0-1'						1730													
5	GP-1 1-2'						1735													
6	GP-1 4-5'						1740													
7	GP-8	WT				5/7	1540													025
8																				
9																				
10																				
11																				
12																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
water needs to be	[signature]	5/8	1450	[signature] Pace	5/8/19	14:50	0.3 1.3	Y	N	Y
Lab filtered				[signature] Pace	5/8/19	15:27	2.8 5.7	Y	N	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jay Moldenhauer

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/7/19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.27**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Braun Intertec

Project #: WO# : 10474078

PM: BM2 Due Date: 05/15/19

CLIENT: Braun-BLM

Courier: ☐ Fed Ex ☒ Pace ☐ UPS ☐ SpeeDee ☐ USPS ☐ Commercial ☐ Client See Exception ☐

Tracking Number:

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☒ T3(0459) ☐ T4(0254) ☐ T5(0048) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** _____ °C	**Average Corrected Temp (no temp blank only):** See Exceptions ☐
Correction Factor: _____ **Cooler Temp Corrected w/temp blank:** _____ °C	5.7; 2.8 °C

USDA Regulated Soil: (☐ N/A, water sample/Other:) **Date/Initials of Person Examining Contents:** 5/8/M

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes	☐ No		1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Volume?	☒ Yes	☐ No		7.
Correct Containers Used? -Pace Containers Used?	☒ Yes ☒ Yes	☐ No ☐ No		8.
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☒ Water ☒ Soil ☐ Oil ☐ Other	☒ Yes	☐ No		11. If no, write ID/ Date/Time on Container Below: See Exception ☐ Samples 25-30 are missing and we received 2 samples that were not on the COC: GP-9 0-1' + GP-9 5-6'
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes	☐ No	☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No pH Paper Lot# See Exception ☐ Res. Chlorine / 0-6 Roll / 0-6 Strip / 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	13. See Exception ☐
Trip Blank Present?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	Pace Trip Blank Lot # (if purchased):

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Mark Keefer Date/Time: 5/9/19 @ 12:50

Comments/Resolution: Page three of the COC is incorrect. Analyze sample -025 for dissolved RCRA metals and 8081 pesticides, sample -026 for RCRA metals, and sample -027 for RCRA metals and PAHs.

Project Manager Review: BM Date: 5/9/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by:

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BMZ

Received with Custody Seal: Yes ~~No~~

Custody Seal Intact: Yes No ~~NA~~

	Temp Read	Corrected Temp	Correction Factor
Temperature C: IR Gun # B88A0143310092	0.5/1.7	0.6/1.8	0.1

☐ Samples on ice, cooling process has begun

Rush/Short Hold: N

Containers Intact: Yes No

Re-packed and Re-Iced: Y

Temp Blank Included: Yes No

Shipped By/Date: BMZ 5/8/19

Notes:

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

April 26, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on April 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10471584001	**SS-1 (0-6")**	Solid	04/19/19 11:00	04/19/19 16:50
10471584002	**SS-2 (0-6")**	Solid	04/19/19 11:15	04/19/19 16:50
10471584003	**SS-3 (0-6")**	Solid	04/19/19 11:35	04/19/19 16:50
10471584004	**SS-4 (0-6")**	Solid	04/19/19 12:05	04/19/19 16:50
10471584005	**SS-5 (0-6")**	Solid	04/19/19 12:15	04/19/19 16:50
10471584006	**SS-6 (0-1')**	Solid	04/19/19 12:35	04/19/19 16:50
10471584007	**SS-7 (0-1')**	Solid	04/19/19 12:45	04/19/19 16:50

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10471584001	**SS-1 (0-6")**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584002	**SS-2 (0-6")**	EPA 6010D	DM	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584003	**SS-3 (0-6")**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584004	**SS-4 (0-6")**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584005	**SS-5 (0-6")**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584006	**SS-6 (0-1')**	EPA 8081B	XV1	24	PASI-M
		EPA 6010D	DM	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10471584007	**SS-7 (0-1')**	EPA 8081B	XV1	24	PASI-M
		EPA 6010D	DM	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10471584001	**SS-1 (0-6")**					
EPA 7471B	Mercury	18.6	mg/kg	0.45	04/24/19 17:51	
ASTM D2974	Percent Moisture	14.7	%	0.10	04/22/19 14:33	
10471584002	**SS-2 (0-6")**					
EPA 6010D	Barium	16.2	mg/kg	0.74	04/23/19 14:37	
EPA 6010D	Chromium	6.5	mg/kg	0.74	04/23/19 14:37	
EPA 6010D	Lead	2.6	mg/kg	0.74	04/23/19 14:37	
EPA 7471B	Mercury	0.089	mg/kg	0.030	04/24/19 13:09	
ASTM D2974	Percent Moisture	36.5	%	0.10	04/22/19 14:34	
10471584003	**SS-3 (0-6")**					
EPA 7471B	Mercury	43.4	mg/kg	1.2	04/24/19 17:53	
ASTM D2974	Percent Moisture	16.6	%	0.10	04/22/19 14:34	
10471584004	**SS-4 (0-6")**					
EPA 7471B	Mercury	21.1	mg/kg	1.1	04/24/19 17:55	
ASTM D2974	Percent Moisture	13.2	%	0.10	04/22/19 14:34	
10471584005	**SS-5 (0-6")**					
EPA 7471B	Mercury	45.3	mg/kg	2.1	04/24/19 17:57	
ASTM D2974	Percent Moisture	12.3	%	0.10	04/23/19 11:02	
10471584006	**SS-6 (0-1')**					
EPA 6010D	Arsenic	2.7	mg/kg	1.3	04/23/19 14:39	
EPA 6010D	Barium	42.1	mg/kg	0.63	04/23/19 14:39	
EPA 6010D	Cadmium	0.49	mg/kg	0.19	04/23/19 14:39	
EPA 6010D	Chromium	17.3	mg/kg	0.63	04/23/19 14:39	
EPA 6010D	Lead	12.9	mg/kg	0.63	04/23/19 14:39	
EPA 7471B	Mercury	2.8	mg/kg	0.12	04/24/19 17:59	
ASTM D2974	Percent Moisture	23.5	%	0.10	04/23/19 11:02	
10471584007	**SS-7 (0-1')**					
EPA 6010D	Arsenic	1.8	mg/kg	1.2	04/23/19 14:40	
EPA 6010D	Barium	21.9	mg/kg	0.62	04/23/19 14:40	
EPA 6010D	Chromium	6.6	mg/kg	0.62	04/23/19 14:40	
EPA 6010D	Lead	3.6	mg/kg	0.62	04/23/19 14:40	
EPA 7471B	Mercury	0.25	mg/kg	0.024	04/24/19 13:32	
ASTM D2974	Percent Moisture	26.4	%	0.10	04/23/19 11:02	

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Method: **EPA 8081B**
Description: 8081B GCS Pesticides
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
2 samples were analyzed for EPA 8081B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3550 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600960

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471584006

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3248471)
  - alpha-Chlordane
- MSD (Lab ID: 3248472)
  - alpha-Chlordane

R1: RPD value was outside control limits.

- MSD (Lab ID: 3248472)
  - delta-BHC

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Method: **EPA 8081B**
Description: 8081B GCS Pesticides
Client: Braun Intertec Corporation
Date: April 26, 2019

Analyte Comments:

QC Batch: 600960

1M: Sample was brown in color.
- MS (Lab ID: 3248471)
  - Tetrachloro-m-xylene (S)
- MSD (Lab ID: 3248472)
  - Tetrachloro-m-xylene (S)
- SS-6 (0-1') (Lab ID: 10471584006)
  - Tetrachloro-m-xylene (S)
- SS-7 (0-1') (Lab ID: 10471584007)
  - Tetrachloro-m-xylene (S)

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- MS (Lab ID: 3248471)
  - Tetrachloro-m-xylene (S)
- MSD (Lab ID: 3248472)
  - Tetrachloro-m-xylene (S)
- SS-6 (0-1') (Lab ID: 10471584006)
  - Tetrachloro-m-xylene (S)
- SS-7 (0-1') (Lab ID: 10471584007)
  - Tetrachloro-m-xylene (S)

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
3 samples were analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 600802

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10471577001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3247967)
  - Barium
  - Lead
- MSD (Lab ID: 3247968)
  - Barium
  - Lead

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest
Pace Project No.:	10471584

Method: **EPA 7471B**
Description: 7471B Mercury
Client: Braun Intertec Corporation
Date: April 26, 2019

General Information:
7 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-1 (0-6") **Lab ID: 10471584001** Collected: 04/19/19 11:00 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**18.6**	mg/kg	0.45	20	04/22/19 10:27	04/24/19 17:51	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**14.7**	%	0.10	1		04/22/19 14:33		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-2 (0-6") **Lab ID: 10471584002** Collected: 04/19/19 11:15 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	ND	mg/kg	1.5	1	04/22/19 11:09	04/23/19 14:37	7440-38-2	
Barium	**16.2**	mg/kg	0.74	1	04/22/19 11:09	04/23/19 14:37	7440-39-3	
Cadmium	ND	mg/kg	0.22	1	04/22/19 11:09	04/23/19 14:37	7440-43-9	
Chromium	**6.5**	mg/kg	0.74	1	04/22/19 11:09	04/23/19 14:37	7440-47-3	
Lead	**2.6**	mg/kg	0.74	1	04/22/19 11:09	04/23/19 14:37	7439-92-1	
Selenium	ND	mg/kg	1.5	1	04/22/19 11:09	04/23/19 14:37	7782-49-2	
Silver	ND	mg/kg	0.74	1	04/22/19 11:09	04/23/19 14:37	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.089**	mg/kg	0.030	1	04/22/19 10:27	04/24/19 13:09	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**36.5**	%	0.10	1		04/22/19 14:34		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-3 (0-6") **Lab ID: 10471584003** Collected: 04/19/19 11:35 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**43.4**	mg/kg	1.2	50	04/22/19 10:27	04/24/19 17:53	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**16.6**	%	0.10	1		04/22/19 14:34		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-4 (0-6") **Lab ID: 10471584004** Collected: 04/19/19 12:05 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**21.1**	mg/kg	1.1	50	04/22/19 10:27	04/24/19 17:55	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**13.2**	%	0.10	1		04/22/19 14:34		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-5 (0-6") **Lab ID: 10471584005** Collected: 04/19/19 12:15 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**45.3**	mg/kg	2.1	100	04/22/19 10:27	04/24/19 17:57	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**12.3**	%	0.10	1		04/23/19 11:02		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-6 (0-1') **Lab ID: 10471584006** Collected: 04/19/19 12:35 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8081B GCS Pesticides	Analytical Method: EPA 8081B Preparation Method: EPA 3550							
Aldrin	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	309-00-2	
alpha-BHC	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	319-84-6	
beta-BHC	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	319-85-7	
delta-BHC	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	319-86-8	R1
gamma-BHC (Lindane)	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	58-89-9	
Chlordane (Technical)	ND	ug/kg	109	5	04/22/19 12:27	04/24/19 20:37	57-74-9	
alpha-Chlordane	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	5103-71-9	M1
gamma-Chlordane	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	5103-74-2	
4,4'-DDD	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	72-54-8	
4,4'-DDE	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	72-55-9	
4,4'-DDT	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	50-29-3	
Dieldrin	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	60-57-1	
Endosulfan I	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	959-98-8	
Endosulfan II	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	33213-65-9	
Endosulfan sulfate	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	1031-07-8	
Endrin	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	72-20-8	
Endrin aldehyde	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	7421-93-4	
Endrin ketone	ND	ug/kg	21.7	5	04/22/19 12:27	04/24/19 20:37	53494-70-5	
Heptachlor	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	76-44-8	
Heptachlor epoxide	ND	ug/kg	10.9	5	04/22/19 12:27	04/24/19 20:37	1024-57-3	
Methoxychlor	ND	ug/kg	109	5	04/22/19 12:27	04/24/19 20:37	72-43-5	
Toxaphene	ND	ug/kg	326	5	04/22/19 12:27	04/24/19 20:37	8001-35-2	
Surrogates								
Tetrachloro-m-xylene (S)	114	%.	30-150	5	04/22/19 12:27	04/24/19 20:37	877-09-8	1M,D3
Decachlorobiphenyl (S)	120	%.	30-150	5	04/22/19 12:27	04/24/19 20:37	2051-24-3	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**2.7**	mg/kg	1.3	1	04/22/19 11:09	04/23/19 14:39	7440-38-2	
Barium	**42.1**	mg/kg	0.63	1	04/22/19 11:09	04/23/19 14:39	7440-39-3	
Cadmium	**0.49**	mg/kg	0.19	1	04/22/19 11:09	04/23/19 14:39	7440-43-9	
Chromium	**17.3**	mg/kg	0.63	1	04/22/19 11:09	04/23/19 14:39	7440-47-3	
Lead	**12.9**	mg/kg	0.63	1	04/22/19 11:09	04/23/19 14:39	7439-92-1	
Selenium	ND	mg/kg	1.3	1	04/22/19 11:09	04/23/19 14:39	7782-49-2	
Silver	ND	mg/kg	0.63	1	04/22/19 11:09	04/23/19 14:39	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**2.8**	mg/kg	0.12	5	04/22/19 10:27	04/24/19 17:59	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**23.5**	%	0.10	1		04/23/19 11:02		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Sample: SS-7 (0-1') **Lab ID: 10471584007** Collected: 04/19/19 12:45 Received: 04/19/19 16:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8081B GCS Pesticides	Analytical Method: EPA 8081B Preparation Method: EPA 3550							
Aldrin	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	309-00-2	
alpha-BHC	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	319-84-6	
beta-BHC	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	319-85-7	
delta-BHC	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	319-86-8	
gamma-BHC (Lindane)	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	58-89-9	
Chlordane (Technical)	ND	ug/kg	113	5	04/22/19 12:27	04/24/19 22:27	57-74-9	
alpha-Chlordane	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	5103-71-9	
gamma-Chlordane	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	5103-74-2	
4,4'-DDD	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	72-54-8	
4,4'-DDE	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	72-55-9	
4,4'-DDT	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	50-29-3	
Dieldrin	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	60-57-1	
Endosulfan I	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	959-98-8	
Endosulfan II	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	33213-65-9	
Endosulfan sulfate	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	1031-07-8	
Endrin	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	72-20-8	
Endrin aldehyde	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	7421-93-4	
Endrin ketone	ND	ug/kg	22.6	5	04/22/19 12:27	04/24/19 22:27	53494-70-5	
Heptachlor	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	76-44-8	
Heptachlor epoxide	ND	ug/kg	11.3	5	04/22/19 12:27	04/24/19 22:27	1024-57-3	
Methoxychlor	ND	ug/kg	113	5	04/22/19 12:27	04/24/19 22:27	72-43-5	
Toxaphene	ND	ug/kg	339	5	04/22/19 12:27	04/24/19 22:27	8001-35-2	
Surrogates								
Tetrachloro-m-xylene (S)	119	%.	30-150	5	04/22/19 12:27	04/24/19 22:27	877-09-8	1M,D3
Decachlorobiphenyl (S)	122	%.	30-150	5	04/22/19 12:27	04/24/19 22:27	2051-24-3	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**1.8**	mg/kg	1.2	1	04/22/19 11:09	04/23/19 14:40	7440-38-2	
Barium	**21.9**	mg/kg	0.62	1	04/22/19 11:09	04/23/19 14:40	7440-39-3	
Cadmium	ND	mg/kg	0.19	1	04/22/19 11:09	04/23/19 14:40	7440-43-9	
Chromium	**6.6**	mg/kg	0.62	1	04/22/19 11:09	04/23/19 14:40	7440-47-3	
Lead	**3.6**	mg/kg	0.62	1	04/22/19 11:09	04/23/19 14:40	7439-92-1	
Selenium	ND	mg/kg	1.2	1	04/22/19 11:09	04/23/19 14:40	7782-49-2	
Silver	ND	mg/kg	0.62	1	04/22/19 11:09	04/23/19 14:40	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.25**	mg/kg	0.024	1	04/22/19 10:27	04/24/19 13:32	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**26.4**	%	0.10	1		04/23/19 11:02		

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

QC Batch: 600804 Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10471584001, 10471584002, 10471584003, 10471584004, 10471584005, 10471584006, 10471584007

METHOD BLANK: 3247973 Matrix: Solid
Associated Lab Samples: 10471584001, 10471584002, 10471584003, 10471584004, 10471584005, 10471584006, 10471584007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.019	04/24/19 12:26	

LABORATORY CONTROL SAMPLE: 3247974

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.48	0.53	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3247975 3247976

Parameter	Units	10471574001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	<0.021	0.48	0.48	0.50	0.52	103	106	80-120	3	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

QC Batch: 600802 | Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 | Analysis Description: 6010D Solids
Associated Lab Samples: 10471584002, 10471584006, 10471584007

METHOD BLANK: 3247965 | Matrix: Solid
Associated Lab Samples: 10471584002, 10471584006, 10471584007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.97	04/23/19 13:48	
Barium	mg/kg	ND	0.49	04/23/19 13:48	
Cadmium	mg/kg	ND	0.15	04/23/19 13:48	
Chromium	mg/kg	ND	0.49	04/23/19 13:48	
Lead	mg/kg	ND	0.49	04/23/19 13:48	
Selenium	mg/kg	ND	0.97	04/23/19 13:48	
Silver	mg/kg	ND	0.49	04/23/19 13:48	

LABORATORY CONTROL SAMPLE: 3247966

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.2	42.0	89	80-120	
Barium	mg/kg	47.2	46.3	98	80-120	
Cadmium	mg/kg	47.2	46.2	98	80-120	
Chromium	mg/kg	47.2	46.4	98	80-120	
Lead	mg/kg	47.2	45.7	97	80-120	
Selenium	mg/kg	47.2	41.7	88	80-120	
Silver	mg/kg	23.6	22.4	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3247967 3247968

Parameter	Units	10471577001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	9.3	65.1	69	60.7	70.1	79	88	75-125	15	20	
Barium	mg/kg	181	65.1	69	197	191	24	13	75-125	3	20	M1
Cadmium	mg/kg	0.32	65.1	69	55.8	60.3	85	87	75-125	8	20	
Chromium	mg/kg	12.6	65.1	69	69.8	75.8	88	92	75-125	8	20	
Lead	mg/kg	38.1	65.1	69	78.3	80.1	62	61	75-125	2	20	M1
Selenium	mg/kg	<1.3	65.1	69	52.6	56.2	80	81	75-125	7	20	
Silver	mg/kg	<0.67	32.6	34.6	29.4	31.5	90	91	75-125	7	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

QC Batch: 601026 | Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 | Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10471584001, 10471584002, 10471584003, 10471584004

SAMPLE DUPLICATE: 3248660

Parameter	Units	10471584002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	36.5	37.8	4	30	

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REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

QC Batch: 601102 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10471584005, 10471584006, 10471584007

SAMPLE DUPLICATE: 3248946

Parameter	Units	10471717001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	81.9	81.6	0	30	

SAMPLE DUPLICATE: 3249015

Parameter	Units	10471690004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	0.52	0.55	5	30	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

QC Batch: 600960 Analysis Method: EPA 8081B
QC Batch Method: EPA 3550 Analysis Description: 8081S GCS Pesticides
Associated Lab Samples: 10471584006, 10471584007

METHOD BLANK: 3248469 Matrix: Solid
Associated Lab Samples: 10471584006, 10471584007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
4,4'-DDD	ug/kg	ND	3.3	04/24/19 20:00	
4,4'-DDE	ug/kg	ND	3.3	04/24/19 20:00	
4,4'-DDT	ug/kg	ND	3.3	04/24/19 20:00	
Aldrin	ug/kg	ND	1.7	04/24/19 20:00	
alpha-BHC	ug/kg	ND	1.7	04/24/19 20:00	
alpha-Chlordane	ug/kg	ND	1.7	04/24/19 20:00	
beta-BHC	ug/kg	ND	1.7	04/24/19 20:00	
Chlordane (Technical)	ug/kg	ND	16.7	04/24/19 20:00	
delta-BHC	ug/kg	ND	1.7	04/24/19 20:00	
Dieldrin	ug/kg	ND	3.3	04/24/19 20:00	
Endosulfan I	ug/kg	ND	1.7	04/24/19 20:00	
Endosulfan II	ug/kg	ND	3.3	04/24/19 20:00	
Endosulfan sulfate	ug/kg	ND	3.3	04/24/19 20:00	
Endrin	ug/kg	ND	3.3	04/24/19 20:00	
Endrin aldehyde	ug/kg	ND	3.3	04/24/19 20:00	
Endrin ketone	ug/kg	ND	3.3	04/24/19 20:00	
gamma-BHC (Lindane)	ug/kg	ND	1.7	04/24/19 20:00	
gamma-Chlordane	ug/kg	ND	1.7	04/24/19 20:00	
Heptachlor	ug/kg	ND	1.7	04/24/19 20:00	
Heptachlor epoxide	ug/kg	ND	1.7	04/24/19 20:00	
Methoxychlor	ug/kg	ND	16.7	04/24/19 20:00	
Toxaphene	ug/kg	ND	50.0	04/24/19 20:00	
Decachlorobiphenyl (S)	%.	109	30-150	04/24/19 20:00	
Tetrachloro-m-xylene (S)	%.	111	30-150	04/24/19 20:00	

LABORATORY CONTROL SAMPLE: 3248470

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4,4'-DDD	ug/kg	33.3	36.1	108	75-125	
4,4'-DDE	ug/kg	33.3	37.3	112	75-125	
4,4'-DDT	ug/kg	33.3	37.7	113	73-125	
Aldrin	ug/kg	16.7	18.9	113	75-125	
alpha-BHC	ug/kg	16.7	18.7	112	75-125	
alpha-Chlordane	ug/kg	16.7	17.8	107	75-125	
beta-BHC	ug/kg	16.7	17.9	107	75-125	
delta-BHC	ug/kg	16.7	15.1	90	46-132	
Dieldrin	ug/kg	33.3	37.0	111	75-125	
Endosulfan I	ug/kg	16.7	18.1	109	68-125	
Endosulfan II	ug/kg	33.3	36.5	109	75-125	
Endosulfan sulfate	ug/kg	33.3	35.8	107	72-125	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

LABORATORY CONTROL SAMPLE: 3248470

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endrin	ug/kg	33.3	37.1	111	75-125	
Endrin aldehyde	ug/kg	33.3	36.1	108	75-125	
Endrin ketone	ug/kg	33.3	37.2	112	75-125	
gamma-BHC (Lindane)	ug/kg	16.7	18.5	111	75-125	
gamma-Chlordane	ug/kg	16.7	17.6	105	72-125	
Heptachlor	ug/kg	16.7	18.4	111	75-125	
Heptachlor epoxide	ug/kg	16.7	18.2	109	75-125	
Methoxychlor	ug/kg	167	185	111	73-125	
Decachlorobiphenyl (S)	%.			107	30-150	
Tetrachloro-m-xylene (S)	%.			110	30-150	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3248471 3248472

Parameter	Units	10471584006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
4,4'-DDD	ug/kg	ND	43.4	43.5	45.0	45.6	104	105	30-150	1	20	
4,4'-DDE	ug/kg	ND	43.4	43.5	48.5	49.0	105	106	52-147	1	20	
4,4'-DDT	ug/kg	ND	43.4	43.5	46.7	47.4	108	109	53-142	1	20	
Aldrin	ug/kg	ND	21.7	21.7	24.0	25.1	111	116	70-125	5	20	
alpha-BHC	ug/kg	ND	21.7	21.7	22.8	24.9	105	115	58-136	9	20	
alpha-Chlordane	ug/kg	ND	21.7	21.7	44.7	42.9	172	164	65-135	4	20	M1
beta-BHC	ug/kg	ND	21.7	21.7	28.4	27.7	131	128	30-150	2	20	
delta-BHC	ug/kg	ND	21.7	21.7	13.5	18.6	62	86	36-140	32	20	R1
Dieldrin	ug/kg	ND	43.4	43.5	47.1	48.2	109	111	41-150	2	20	
Endosulfan I	ug/kg	ND	21.7	21.7	24.7	25.2	114	116	55-128	2	20	
Endosulfan II	ug/kg	ND	43.4	43.5	48.1	48.9	111	112	73-127	2	20	
Endosulfan sulfate	ug/kg	ND	43.4	43.5	43.5	46.2	100	106	56-129	6	20	
Endrin	ug/kg	ND	43.4	43.5	47.9	48.7	111	112	64-125	2	20	
Endrin aldehyde	ug/kg	ND	43.4	43.5	57.6	55.2	133	127	52-149	4	20	
Endrin ketone	ug/kg	ND	43.4	43.5	48.3	47.5	111	109	62-147	2	20	
gamma-BHC (Lindane)	ug/kg	ND	21.7	21.7	23.3	24.9	107	114	66-126	7	20	
gamma-Chlordane	ug/kg	ND	21.7	21.7	27.4	29.0	103	110	30-150	6	20	
Heptachlor	ug/kg	ND	21.7	21.7	24.8	25.7	115	118	72-128	3	20	
Heptachlor epoxide	ug/kg	ND	21.7	21.7	25.6	26.3	118	121	63-134	3	20	
Methoxychlor	ug/kg	ND	217	217	257	256	119	118	67-134	1	20	
Decachlorobiphenyl (S)	%.						116	114	30-150			
Tetrachloro-m-xylene (S)	%.						113	115	30-150			1M,D3

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QUALIFIERS

Project:	B1903316 Former Hillcrest
Pace Project No.:	10471584

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

1M	Sample was brown in color.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest
Pace Project No.: 10471584

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10471584006	**SS-6 (0-1')**	EPA 3550	600960	EPA 8081B	601315
10471584007	**SS-7 (0-1')**	EPA 3550	600960	EPA 8081B	601315
10471584002	**SS-2 (0-6")**	EPA 3050	600802	EPA 6010D	601087
10471584006	**SS-6 (0-1')**	EPA 3050	600802	EPA 6010D	601087
10471584007	**SS-7 (0-1')**	EPA 3050	600802	EPA 6010D	601087
10471584001	**SS-1 (0-6")**	EPA 7471B	600804	EPA 7471B	600990
10471584002	**SS-2 (0-6")**	EPA 7471B	600804	EPA 7471B	600990
10471584003	**SS-3 (0-6")**	EPA 7471B	600804	EPA 7471B	600990
10471584004	**SS-4 (0-6")**	EPA 7471B	600804	EPA 7471B	600990
10471584005	**SS-5 (0-6")**	EPA 7471B	600804	EPA 7471B	600990
10471584006	**SS-6 (0-1')**	EPA 7471B	600804	EPA 7471B	600990
10471584007	**SS-7 (0-1')**	EPA 7471B	600804	EPA 7471B	600990
10471584001	**SS-1 (0-6")**	ASTM D2974	601026		
10471584002	**SS-2 (0-6")**	ASTM D2974	601026		
10471584003	**SS-3 (0-6")**	ASTM D2974	601026		
10471584004	**SS-4 (0-6")**	ASTM D2974	601026		
10471584005	**SS-5 (0-6")**	ASTM D2974	601102		
10471584006	**SS-6 (0-1')**	ASTM D2974	601102		
10471584007	**SS-7 (0-1')**	ASTM D2974	601102		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

2271881

Section A Required Client Information:
Company: BRAUN INTERTEC
Address: BLOOMINGTON
Email To: mkeefer@braunintertec.com
Phone:
Fax:
Requested Due Date/TAT: 5-DAY-STD

Section B Required Project Information:
Report To: MARK KEEFER
Copy To: KEN LARSEN
Purchase Order No.:
Project Name: FORMER HILLCREST
Project Number: B1903316

Section C Invoice Information:
Attention: Same - Concur
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #: 34125

REGULATORY AGENCY
NPDES | GROUND WATER | DRINKING WATER | UST | RCRA | ☑ OTHER VIC

Site Location STATE: MN

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

WO#: 10471584
10471584

Preservatives columns: Unpreserved, H_2SO_4, HNO_3, HCl, NaOH, $Na_2S_2O_3$, Methanol, Other

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test	Total Mercury	RCRA Metals	PAHs	DRO	Pesticides (8081B)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	SS-1 (0-6")	SL	C	4/19	10:55A	4/19	11:00A		2										X						001
2	SS-2 (0-6")	SL	C	4/19	11:10A	4/19	11:15A		2											X					002
3	SS-3 (0-6")	SL	C	4/19	11:30A	4/19	11:35A		2										X						003
4	SS-4 (0-6")	SL	C	4/19	12:00A	4/19	12:05P		2										X						004
5	SS-5 (0-6")	SL	C	4/15	12:10	4/19	12:15P		2										X						005
6	SS-6 (0-1')	SL	G	4/19	—	4/19	12:35P		2											X			X		006
7	SS-7 (0-1')	SL	G	4/19	—	4/19	12:45P		3											X			X		007
8																									
9																									
10																									
11																									
12																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PROJECT SPECIFIC PACE	[signature]	4/19/19	1500	[signature] Pace	4/19/19	1500	5.9	Y	N	Y
PRICE QUOTE	[signature]	4-19-19	1650	[signature]	4/19/19	1650	2.2	Y	N	Y

SAMPLE CONDITIONS

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: KENNETH LARSEN
SIGNATURE of SAMPLER: [signature]
DATE Signed (MM/DD/YY): 04/19/19

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.27**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Braun

Project #:

WO#: 10471584
PM: BM2 **Due Date: 04/26/19**
CLIENT: Braun-BLM

Courier: ☐ Fed Ex ☒ Pace ☐ UPS ☐ SpeeDee ☐ USPS ☐ Commercial ☐ Client ☐ See Exception

Tracking Number: ______

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: ______ **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☒ T1(0461) ☐ T2(1336) ☐ T3(0459) ☐ T4(0254) ☐ T5(0048) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 3.6 °C	**Average Corrected Temp (no temp blank only):** ____ °C See Exceptions ☐
Correction Factor: +0.1 **Cooler Temp Corrected w/temp blank:** 3.7 °C	

USDA Regulated Soil: (☐ N/A, water sample/Other: ______) **Date/Initials of Person Examining Contents:** Fv 4/19/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes	☐ No		1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Volume?	☒ Yes	☐ No		7.
Correct Containers Used?	☒ Yes	☐ No		8.
-Pace Containers Used?	☒ Yes	☐ No		
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☐ Water ☒ Soil ☐ Oil ☐ Other	☒ Yes	☐ No		11. **If no, write ID/ Date/Time on Container Below:** See Exception ☐
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes	☐ No	☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** See Exception ☐ Res. Chlorine / 0-6 Roll / 0-6 Strip / 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	13. See Exception ☐
Trip Blank Present?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	Pace Trip Blank Lot # (if purchased): N/A

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: ______ Date/Time: ______

Comments/Resolution: ______

Project Manager Review: BM **Date:** 4/22/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: GV

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BMZ

Received with Custody Seal: Yes No

Custody Seal Intact: Yes No NA

	Temp Read	Corrected Temp	Correction Factor
Temperature C: IR Gun # B88A0143310092	5.8	5.9	0.1

☐ Samples on Ice, cooling process has begun

Rush/Short Hold: N

Containers Intact: Yes No

Re-packed and Re-Iced: Y

Temp Blank Included: Yes No

Shipped By/Date: [signature] 4/14/19

Notes:

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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(612)607-1700

May 14, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on May 01, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This report was revised on May 14, 2019 to include results of TCLP mercury analysis for Pace samples 10472982005 and 10472982006.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
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CERTIFICATIONS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10472982001	**SS-8 (0-6')**	Solid	05/01/19 13:10	05/01/19 18:00
10472982002	**SS-9 (0-6')**	Solid	05/01/19 13:15	05/01/19 18:00
10472982003	**SS-10 (0-6')**	Solid	05/01/19 13:20	05/01/19 18:00
10472982004	**SS-3B (0-6')**	Solid	05/01/19 13:25	05/01/19 18:00
10472982005	**SS-3C (0-6')**	Solid	05/01/19 13:30	05/01/19 18:00
10472982006	**SS-3D (0-6')**	Solid	05/01/19 13:35	05/01/19 18:00

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10472982001	**SS-8 (0-6')**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10472982002	**SS-9 (0-6')**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10472982003	**SS-10 (0-6')**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10472982004	**SS-3B (0-6')**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10472982005	**SS-3C (0-6')**	EPA 7470A	LMW	1	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10472982006	**SS-3D (0-6')**	EPA 7470A	LMW	1	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10472982001	**SS-8 (0-6')**					
EPA 7471B	Mercury	6.8	mg/kg	0.27	05/06/19 16:08	
ASTM D2974	Percent Moisture	24.8	%	0.10	05/02/19 12:54	
10472982002	**SS-9 (0-6')**					
EPA 7471B	Mercury	0.45	mg/kg	0.026	05/06/19 13:09	
ASTM D2974	Percent Moisture	24.2	%	0.10	05/02/19 12:54	
10472982003	**SS-10 (0-6')**					
EPA 7471B	Mercury	4.7	mg/kg	0.26	05/06/19 16:10	
ASTM D2974	Percent Moisture	26.4	%	0.10	05/02/19 12:55	
10472982004	**SS-3B (0-6')**					
EPA 7471B	Mercury	17.8	mg/kg	0.51	05/06/19 16:12	
ASTM D2974	Percent Moisture	21.0	%	0.10	05/02/19 12:55	
10472982005	**SS-3C (0-6')**					
EPA 7470A	Mercury	53.7	ug/L	1.0	05/13/19 14:22	
EPA 7471B	Mercury	144	mg/kg	5.1	05/06/19 16:27	
ASTM D2974	Percent Moisture	21.4	%	0.10	05/02/19 12:55	
10472982006	**SS-3D (0-6')**					
EPA 7470A	Mercury	88.5	ug/L	2.0	05/13/19 14:25	
EPA 7471B	Mercury	113	mg/kg	5.7	05/06/19 16:29	
ASTM D2974	Percent Moisture	30.3	%	0.10	05/02/19 12:55	

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Method: **EPA 7470A**
Description: 7470A Mercury, TCLP
Client: Braun Intertec Corporation
Date: May 14, 2019

General Information:
2 samples were analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	B1903316 Former Hillcrest-Revised Report
Pace Project No.:	10472982

Method: **EPA 7471B**
Description: 7471B Mercury
Client: Braun Intertec Corporation
Date: May 14, 2019

General Information:
6 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-8 (0-6') **Lab ID: 10472982001** Collected: 05/01/19 13:10 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**6.8**	mg/kg	0.27	10	05/02/19 18:32	05/06/19 16:08	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**24.8**	%	0.10	1		05/02/19 12:54		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-9 (0-6') **Lab ID: 10472982002** Collected: 05/01/19 13:15 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.45**	mg/kg	0.026	1	05/02/19 18:32	05/06/19 13:09	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**24.2**	%	0.10	1		05/02/19 12:54		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-10 (0-6') **Lab ID: 10472982003** Collected: 05/01/19 13:20 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**4.7**	mg/kg	0.26	10	05/02/19 18:32	05/06/19 16:10	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**26.4**	%	0.10	1		05/02/19 12:55		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-3B (0-6') **Lab ID: 10472982004** Collected: 05/01/19 13:25 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**17.8**	mg/kg	0.51	20	05/02/19 18:32	05/06/19 16:12	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**21.0**	%	0.10	1		05/02/19 12:55		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-3C (0-6') **Lab ID: 10472982005** Collected: 05/01/19 13:30 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 05/09/19 16:24 Initial pH: 6.99; Final pH: 1.61							
Mercury	**53.7**	ug/L	1.0	5	05/10/19 14:05	05/13/19 14:22	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**144**	mg/kg	5.1	200	05/02/19 18:32	05/06/19 16:27	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**21.4**	%	0.10	1		05/02/19 12:55		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Sample: SS-3D (0-6') **Lab ID: 10472982006** Collected: 05/01/19 13:35 Received: 05/01/19 18:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 05/09/19 16:24 Initial pH: 5.02; Final pH: 1.69							
Mercury	**88.5**	ug/L	2.0	10	05/10/19 14:05	05/13/19 14:25	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**113**	mg/kg	5.7	200	05/02/19 18:32	05/06/19 16:29	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**30.3**	%	0.10	1		05/02/19 12:55		

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

QC Batch: 605106 | Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A | Analysis Description: 7470A Mercury TCLP
Associated Lab Samples: 10472982005, 10472982006

METHOD BLANK: 3271204 | Matrix: Water
Associated Lab Samples: 10472982005, 10472982006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/13/19 13:12	

METHOD BLANK: 3269373 | Matrix: Water
Associated Lab Samples: 10472982005, 10472982006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/13/19 14:20	

LABORATORY CONTROL SAMPLE: 3271205

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	15	15.4	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3271206 3271207

Parameter	Units	10472770002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	15	15	15.9	15.8	106	105	80-120	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

QC Batch: 603278 | Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B | Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10472982001, 10472982002, 10472982003, 10472982004, 10472982005, 10472982006

METHOD BLANK: 3261237 Matrix: Solid
Associated Lab Samples: 10472982001, 10472982002, 10472982003, 10472982004, 10472982005, 10472982006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.018	05/06/19 12:34	

LABORATORY CONTROL SAMPLE: 3261238

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.45	0.48	107	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3261239 3261240

Parameter	Units	10472889001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.56	0.53	0.62	0.54	109	102	80-120	14	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

QC Batch: 603315 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10472982001, 10472982002, 10472982003, 10472982004, 10472982005, 10472982006

SAMPLE DUPLICATE: 3261789

Parameter	Units	10472980004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	24.7	24.9	1	30	

SAMPLE DUPLICATE: 3261790

Parameter	Units	10472839002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	11.2	10.1	11	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest-Revised Report
Pace Project No.: 10472982

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10472982005	**SS-3C (0-6')**	EPA 7470A	605106	EPA 7470A	605448
10472982006	**SS-3D (0-6')**	EPA 7470A	605106	EPA 7470A	605448
10472982001	**SS-8 (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982002	**SS-9 (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982003	**SS-10 (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982004	**SS-3B (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982005	**SS-3C (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982006	**SS-3D (0-6')**	EPA 7471B	603278	EPA 7471B	603540
10472982001	**SS-8 (0-6')**	ASTM D2974	603315		
10472982002	**SS-9 (0-6')**	ASTM D2974	603315		
10472982003	**SS-10 (0-6')**	ASTM D2974	603315		
10472982004	**SS-3B (0-6')**	ASTM D2974	603315		
10472982005	**SS-3C (0-6')**	ASTM D2974	603315		
10472982006	**SS-3D (0-6')**	ASTM D2974	603315		

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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Page: of

2271896

Section A Required Client Information:

Company:	Braun
Address:	Ken Larsen
Email To:	mKeefer@braunintertec.com
Phone:	Fax:
Requested Due Date/TAT:	MONDAY 5/6/19

Section B Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	
Project Name:	FORMER HILLCREST GOLF COURSE
Project Number:	

Section C Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ______

Site Location STATE: ______

Requested Analysis Filtered (Y/N)

WO#: 10472982
10472982

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	TOTAL MERCURY	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	SS-8 (0-6")		G	5/1/19	1:05	5/1/19	1:10P		1	X									X		W1
2	SS-9 (0-6")		G	5/1/19	1:12	5/1/19	1:15P		1	X									X		W2
3	SS-10 (0-6")		G	5/1/19	---	5/1/19	1:20P		1	X									X		W3
4	SS-3B (0-6")		G	5/1/19	---	5/1/19	1:25P		1	X									X		W4
5	SS-3C (0-6")		G	5/1/19	---	5/1/19	1:30P		1	X									X		W5
6	SS-3D (0-6")		G	5/1/19	---	5/1/19	1:35P		1	X									X		006
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	[signature]	5/1/19	2:45P	[signature] Pace	5/1/19	14:45	1.1	Y	Y	Y
	[signature] Pace	5.1.19	1800	[signature]	5/1/19	1800	~~0.0~~ 0.1	Y	N	Y

5

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: KENNETH LARSEN

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/1/19

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.27**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Braun

Project #: **WO# : 10472982**

PM: BM2 Due Date: 05/09/19
CLIENT: Braun-BLM

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☒ Pace ☐ SpeeDee ☐ Commercial ☐ See Exception

Tracking Number:

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other: **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☐ T3(0459) ☐ T4(0254) ☒ T5(0048) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** ______ °C	**Average Corrected Temp (no temp blank only):** ______ °C See Exceptions ☐
Correction Factor: ______ **Cooler Temp Corrected w/temp blank:** ______ °C	

USDA Regulated Soil: (☐ N/A, water sample/Other: ______) **Date/Initials of Person Examining Contents:** KN 5/1/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes ☐ No	1.
Chain of Custody Relinquished?	☒ Yes ☐ No	2.
Sampler Name and/or Signature on COC?	☒ Yes ☐ No ☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes ☐ No	4.
Short Hold Time Analysis (<72 hr)?	☐ Yes ☒ No	5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☒ Yes ☐ No	6.
Sufficient Volume?	☒ Yes ☐ No	7.
Correct Containers Used? -Pace Containers Used?	☒ Yes ☐ No ☒ Yes ☐ No	8.
Containers Intact?	☒ Yes ☐ No	9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes ☐ No ☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☐ Water ☒ Soil ☐ Oil ☐ Other	☒ Yes ☐ No	11. **If no, write ID/ Date/Time on Container Below:** See Exception ☐
All containers needing acid/base preservation have been checked?	☐ Yes ☐ No ☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes ☐ No ☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes ☐ No ☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** See Exception ☐ Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes ☐ No ☒ N/A	13. See Exception ☐
Trip Blank Present? Trip Blank Custody Seals Present?	☐ Yes ☐ No ☒ N/A ☐ Yes ☐ No ☒ N/A	14. Pace Trip Blank Lot # (if purchased): NA

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: ______ Date/Time: ______

Comments/Resolution: ______

Project Manager Review: BM **Date:** 5/2/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: br

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BM2

Received with Custody Seal: Yes No

Custody Seal Intact: Yes No NA

	Temp Read	Corrected Temp	Correction Factor
Temperature C:	1.0	1.1	0.1

IR Gun # B88A0143310092

☐ Samples on Ice, cooling process has begun

Rush/Short Hold: Rush - 3 Day

Containers Intact: Yes No

Re-packed and Re-Iced: Y

Temp Blank Included: Yes No

Shipped By/Date: [illegible] 5/1/19

Notes:

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 21, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on May 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project:	B1903316 Former Hillcrest GC
Pace Project No.:	10474486

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10474486001	**SS-8 1-2**	Solid	05/10/19 07:40	05/10/19 17:20
10474486002	**SS-11 0-0.5**	Solid	05/10/19 08:00	05/10/19 17:20
10474486003	**SS-12 0-0.5**	Solid	05/10/19 08:05	05/10/19 17:20
10474486004	**SS-3E 0-0.5**	Solid	05/10/19 08:15	05/10/19 17:20
10474486005	**SS-3F 0-0.5**	Solid	05/10/19 08:20	05/10/19 17:20
10474486006	**SS-13 0-0.5**	Solid	05/10/19 08:25	05/10/19 17:20
10474486007	**SS-14 0-0.5**	Solid	05/10/19 08:45	05/10/19 17:20
10474486008	**SS-15 0-0.5**	Solid	05/10/19 08:50	05/10/19 17:20
10474486009	**SS-16 0-0.5**	Solid	05/10/19 09:00	05/10/19 17:20
10474486010	**SS-5B 0-0.5**	Solid	05/10/19 09:10	05/10/19 17:20
10474486011	**SS-5C 0-0.5**	Solid	05/10/19 09:15	05/10/19 17:20
10474486012	**SS-5A 0-0.5**	Solid	05/10/19 09:20	05/10/19 17:20
10474486013	**Maint Berm**	Solid	05/10/19 09:40	05/10/19 17:20

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10474486001	**SS-8 1-2**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486002	**SS-11 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486003	**SS-12 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486004	**SS-3E 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486005	**SS-3F 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486006	**SS-13 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486007	**SS-14 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486008	**SS-15 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486009	**SS-16 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486010	**SS-5B 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486011	**SS-5C 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486012	**SS-5A 0-0.5**	EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10474486013	**Maint Berm**	WI MOD DRO	CH3	2	PASI-M
		EPA 6010D	IP	7	PASI-M
		EPA 7471B	LMW	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	SNG	19	PASI-M

REPORT OF LABORATORY ANALYSIS

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10474486001	**SS-8 1-2**					
EPA 7471B	Mercury	0.030	mg/kg	0.022	05/14/19 21:35	
ASTM D2974	Percent Moisture	16.9	%	0.10	05/16/19 13:48	
10474486002	**SS-11 0-0.5**					
EPA 7471B	Mercury	5.2	mg/kg	0.24	05/14/19 22:38	
ASTM D2974	Percent Moisture	22.9	%	0.10	05/16/19 13:48	
10474486003	**SS-12 0-0.5**					
EPA 7471B	Mercury	5.0	mg/kg	0.24	05/14/19 22:40	
ASTM D2974	Percent Moisture	25.8	%	0.10	05/16/19 13:48	
10474486004	**SS-3E 0-0.5**					
EPA 7471B	Mercury	15.1	mg/kg	0.60	05/14/19 22:54	
ASTM D2974	Percent Moisture	37.2	%	0.10	05/16/19 13:48	
10474486005	**SS-3F 0-0.5**					
EPA 7471B	Mercury	9.9	mg/kg	0.23	05/14/19 22:44	
ASTM D2974	Percent Moisture	22.6	%	0.10	05/16/19 13:48	
10474486006	**SS-13 0-0.5**					
EPA 7471B	Mercury	5.1	mg/kg	0.27	05/14/19 22:16	
ASTM D2974	Percent Moisture	33.6	%	0.10	05/16/19 13:48	
10474486007	**SS-14 0-0.5**					
EPA 7471B	Mercury	4.4	mg/kg	0.28	05/14/19 22:18	
ASTM D2974	Percent Moisture	31.0	%	0.10	05/16/19 13:49	
10474486008	**SS-15 0-0.5**					
EPA 7471B	Mercury	7.0	mg/kg	0.23	05/14/19 22:20	
ASTM D2974	Percent Moisture	19.1	%	0.10	05/16/19 13:49	
10474486009	**SS-16 0-0.5**					
EPA 7471B	Mercury	4.5	mg/kg	0.25	05/14/19 22:26	
ASTM D2974	Percent Moisture	22.1	%	0.10	05/16/19 13:49	
10474486010	**SS-5B 0-0.5**					
EPA 7471B	Mercury	46.3	mg/kg	2.4	05/14/19 22:58	
ASTM D2974	Percent Moisture	25.0	%	0.10	05/16/19 14:51	
10474486011	**SS-5C 0-0.5**					
EPA 7471B	Mercury	8.2	mg/kg	0.25	05/14/19 22:30	
ASTM D2974	Percent Moisture	23.7	%	0.10	05/16/19 14:51	
10474486012	**SS-5A 0-0.5**					
EPA 7471B	Mercury	6.5	mg/kg	0.24	05/14/19 22:34	
ASTM D2974	Percent Moisture	22.6	%	0.10	05/16/19 14:51	
10474486013	**Maint Berm**					
WI MOD DRO	WDRO C10-C28	16.3	mg/kg	9.9	05/17/19 00:10	
EPA 6010D	Arsenic	3.7	mg/kg	1.2	05/17/19 12:52	
EPA 6010D	Barium	53.4	mg/kg	0.60	05/17/19 12:52	
EPA 6010D	Cadmium	0.65	mg/kg	0.18	05/17/19 12:52	

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SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10474486013	**Maint Berm**					
EPA 6010D	Chromium	18.2	mg/kg	0.60	05/17/19 12:52	
EPA 6010D	Lead	16.5	mg/kg	0.60	05/17/19 12:52	
EPA 7471B	Mercury	4.9	mg/kg	0.25	05/14/19 22:36	
ASTM D2974	Percent Moisture	22.6	%	0.10	05/16/19 14:51	
EPA 8270D by SIM	Benzo(a)anthracene	31.7	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Benzo(a)pyrene	39.3	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Benzo(b)fluoranthene	58.3	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Benzo(g,h,i)perylene	34.3	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Benzo(k)fluoranthene	23.3	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Chrysene	37.9	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Fluoranthene	69.5	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Indeno(1,2,3-cd)pyrene	26.4	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Phenanthrene	21.6	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Pyrene	56.1	ug/kg	12.9	05/20/19 13:44	
EPA 8270D by SIM	Total BaP Eq. MN 2006sh. ND=0	53.6	ug/kg	12.9	05/20/19 13:44	

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **WI MOD DRO**
Description: WIDRO GCS
Client: Braun Intertec Corporation
Date: May 21, 2019

General Information:
1 sample was analyzed for WI MOD DRO. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with WI MOD DRO with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: Braun Intertec Corporation
Date: May 21, 2019

General Information:
1 sample was analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 605610

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10474363003

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3273904)
  - Lead
- MSD (Lab ID: 3273905)
  - Lead

R1: RPD value was outside control limits.

- MSD (Lab ID: 3273905)
  - Lead

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **EPA 7471B**
Description: 7471B Mercury
Client: Braun Intertec Corporation
Date: May 21, 2019

General Information:
13 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: May 21, 2019

General Information:
1 sample was analyzed for EPA 8270D by SIM. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3550 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 606756

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10473507024

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3279718)
    - Acenaphthene
    - Anthracene
    - Benzo(a)anthracene
    - Benzo(a)pyrene
    - Benzo(b)fluoranthene
    - Benzo(g,h,i)perylene
    - Benzo(k)fluoranthene
    - Chrysene
    - Dibenz(a,h)anthracene

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: May 21, 2019

QC Batch: 606756

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10473507024

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene
- Pyrene

- MSD (Lab ID: 3279719)
  - Benzo(a)anthracene
  - Benzo(a)pyrene
  - Benzo(b)fluoranthene
  - Chrysene
  - Fluoranthene
  - Phenanthrene
  - Pyrene

R1: RPD value was outside control limits.

- MSD (Lab ID: 3279719)
  - Acenaphthene
  - Anthracene
  - Benzo(a)anthracene
  - Benzo(a)pyrene
  - Benzo(b)fluoranthene
  - Benzo(g,h,i)perylene
  - Benzo(k)fluoranthene
  - Chrysene
  - Dibenz(a,h)anthracene
  - Fluoranthene
  - Fluorene
  - Indeno(1,2,3-cd)pyrene
  - Naphthalene
  - Phenanthrene
  - Pyrene

Additional Comments:

Analyte Comments:

QC Batch: 606756

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MS (Lab ID: 3279718)
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluoranthene

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PROJECT NARRATIVE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Method: **EPA 8270D by SIM**
Description: 8270D MSSV PAH by SIM
Client: Braun Intertec Corporation
Date: May 21, 2019

Analyte Comments:

QC Batch: 606756

E: Analyte concentration exceeded the calibration range. The reported result is estimated.
- MS (Lab ID: 3279718)
  - Phenanthrene
  - Pyrene

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-8 1-2 **Lab ID: 10474486001** Collected: 05/10/19 07:40 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**0.030**	mg/kg	0.022	1	05/14/19 13:01	05/14/19 21:35	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**16.9**	%	0.10	1		05/16/19 13:48		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-11 0-0.5 **Lab ID: 10474486002** Collected: 05/10/19 08:00 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**5.2**	mg/kg	0.24	10	05/14/19 13:01	05/14/19 22:38	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.9**	%	0.10	1		05/16/19 13:48		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-12 0-0.5 **Lab ID: 10474486003** Collected: 05/10/19 08:05 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**5.0**	mg/kg	0.24	10	05/14/19 13:01	05/14/19 22:40	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**25.8**	%	0.10	1		05/16/19 13:48		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-3E 0-0.5 **Lab ID: 10474486004** Collected: 05/10/19 08:15 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**15.1**	mg/kg	0.60	20	05/14/19 13:01	05/14/19 22:54	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**37.2**	%	0.10	1		05/16/19 13:48		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-3F 0-0.5 **Lab ID: 10474486005** Collected: 05/10/19 08:20 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**9.9**	mg/kg	0.23	10	05/14/19 13:01	05/14/19 22:44	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.6**	%	0.10	1		05/16/19 13:48		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-13 0-0.5 **Lab ID: 10474486006** Collected: 05/10/19 08:25 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**5.1**	mg/kg	0.27	10	05/14/19 13:01	05/14/19 22:16	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**33.6**	%	0.10	1		05/16/19 13:48		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-14 0-0.5 **Lab ID: 10474486007** Collected: 05/10/19 08:45 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**4.4**	mg/kg	0.28	10	05/14/19 13:01	05/14/19 22:18	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**31.0**	%	0.10	1		05/16/19 13:49		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-15 0-0.5 **Lab ID: 10474486008** Collected: 05/10/19 08:50 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**7.0**	mg/kg	0.23	10	05/14/19 13:01	05/14/19 22:20	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**19.1**	%	0.10	1		05/16/19 13:49		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-16 0-0.5 **Lab ID: 10474486009** Collected: 05/10/19 09:00 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**4.5**	mg/kg	0.25	10	05/14/19 13:01	05/14/19 22:26	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.1**	%	0.10	1		05/16/19 13:49		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-5B 0-0.5 **Lab ID: 10474486010** Collected: 05/10/19 09:10 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**46.3**	mg/kg	2.4	100	05/14/19 13:01	05/14/19 22:58	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**25.0**	%	0.10	1		05/16/19 14:51		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-5C 0-0.5 **Lab ID: 10474486011** Collected: 05/10/19 09:15 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**8.2**	mg/kg	0.25	10	05/14/19 13:01	05/14/19 22:30	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**23.7**	%	0.10	1		05/16/19 14:51		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: SS-5A 0-0.5 **Lab ID: 10474486012** Collected: 05/10/19 09:20 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**6.5**	mg/kg	0.24	10	05/14/19 13:01	05/14/19 22:34	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.6**	%	0.10	1		05/16/19 14:51		

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Sample: Maint Berm **Lab ID: 10474486013** Collected: 05/10/19 09:40 Received: 05/10/19 17:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS	Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO							
WDRO C10-C28	**16.3**	mg/kg	9.9	1	05/14/19 17:59	05/17/19 00:10		
Surrogates								
n-Triacontane (S)	86	%.	50-150	1	05/14/19 17:59	05/17/19 00:10	638-68-6	
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050							
Arsenic	**3.7**	mg/kg	1.2	1	05/15/19 15:36	05/17/19 12:52	7440-38-2	
Barium	**53.4**	mg/kg	0.60	1	05/15/19 15:36	05/17/19 12:52	7440-39-3	
Cadmium	**0.65**	mg/kg	0.18	1	05/15/19 15:36	05/17/19 12:52	7440-43-9	
Chromium	**18.2**	mg/kg	0.60	1	05/15/19 15:36	05/17/19 12:52	7440-47-3	
Lead	**16.5**	mg/kg	0.60	1	05/15/19 15:36	05/17/19 12:52	7439-92-1	
Selenium	ND	mg/kg	1.2	1	05/15/19 15:36	05/17/19 12:52	7782-49-2	
Silver	ND	mg/kg	0.60	1	05/15/19 15:36	05/17/19 12:52	7440-22-4	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B							
Mercury	**4.9**	mg/kg	0.25	10	05/14/19 13:01	05/14/19 22:36	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974							
Percent Moisture	**22.6**	%	0.10	1		05/16/19 14:51		
8270D MSSV PAH by SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	83-32-9	
Acenaphthylene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	208-96-8	
Anthracene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	120-12-7	
Benzo(a)anthracene	**31.7**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	56-55-3	
Benzo(a)pyrene	**39.3**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	50-32-8	
Benzo(b)fluoranthene	**58.3**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	205-99-2	
Benzo(g,h,i)perylene	**34.3**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	191-24-2	
Benzo(k)fluoranthene	**23.3**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	207-08-9	
Chrysene	**37.9**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	53-70-3	
Fluoranthene	**69.5**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	206-44-0	
Fluorene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	86-73-7	
Indeno(1,2,3-cd)pyrene	**26.4**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	193-39-5	
Naphthalene	ND	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	91-20-3	
Phenanthrene	**21.6**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	85-01-8	
Pyrene	**56.1**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44	129-00-0	
Total BaP Eq. MN 2006sh. ND=0	**53.6**	ug/kg	12.9	1	05/17/19 14:51	05/20/19 13:44		
Surrogates								
2-Fluorobiphenyl (S)	72	%.	30-125	1	05/17/19 14:51	05/20/19 13:44	321-60-8	
p-Terphenyl-d14 (S)	67	%.	30-125	1	05/17/19 14:51	05/20/19 13:44	1718-51-0	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 605624 Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10474486001, 10474486002, 10474486003, 10474486004, 10474486005, 10474486006, 10474486007, 10474486008, 10474486009, 10474486010, 10474486011, 10474486012, 10474486013

METHOD BLANK: 3273958 Matrix: Solid
Associated Lab Samples: 10474486001, 10474486002, 10474486003, 10474486004, 10474486005, 10474486006, 10474486007, 10474486008, 10474486009, 10474486010, 10474486011, 10474486012, 10474486013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.019	05/14/19 21:09	

LABORATORY CONTROL SAMPLE: 3273959

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.44	0.50	114	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3273960 3273961

Parameter	Units	10474246001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	0.030	0.49	0.5	0.55	0.56	106	105	80-120	2	20	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 605610 | Analysis Method: EPA 6010D
QC Batch Method: EPA 3050 | Analysis Description: 6010D Solids
Associated Lab Samples: 10474486013

METHOD BLANK: 3273902 | Matrix: Solid
Associated Lab Samples: 10474486013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	0.96	05/17/19 12:11	
Barium	mg/kg	ND	0.48	05/17/19 12:11	
Cadmium	mg/kg	ND	0.14	05/17/19 12:11	
Chromium	mg/kg	ND	0.48	05/17/19 12:11	
Lead	mg/kg	ND	0.48	05/17/19 12:11	
Selenium	mg/kg	ND	0.96	05/17/19 12:11	
Silver	mg/kg	ND	0.48	05/17/19 12:11	

LABORATORY CONTROL SAMPLE: 3273903

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.6	43.4	91	80-120	
Barium	mg/kg	47.6	45.2	95	80-120	
Cadmium	mg/kg	47.6	44.3	93	80-120	
Chromium	mg/kg	47.6	44.0	92	80-120	
Lead	mg/kg	47.6	43.6	92	80-120	
Selenium	mg/kg	47.6	43.4	91	80-120	
Silver	mg/kg	23.8	21.2	89	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3273904 3273905

Parameter	Units	10474363003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	7.9	55.9	55.3	65.0	58.7	102	92	75-125	10	20	
Barium	mg/kg	152	55.9	55.3	203	196	90	79	75-125	3	20	
Cadmium	mg/kg	1.1	55.9	55.3	58.4	53.1	103	94	75-125	9	20	
Chromium	mg/kg	18.8	55.9	55.3	77.2	69.4	105	91	75-125	11	20	
Lead	mg/kg	200	55.9	55.3	281	200	146	0	75-125	34	20	M1,R1
Selenium	mg/kg	ND	55.9	55.3	48.1	45.1	86	81	75-125	7	20	
Silver	mg/kg	ND	28	27.7	28.2	25.4	100	91	75-125	10	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 606358 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10474486001, 10474486002, 10474486003, 10474486004, 10474486005, 10474486006, 10474486007, 10474486008, 10474486009

SAMPLE DUPLICATE: 3277724

Parameter	Units	10474486009 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	22.1	23.3	5	30	

SAMPLE DUPLICATE: 3277740

Parameter	Units	10474396001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.9	12.7	2	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 606364 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10474486010, 10474486011, 10474486012, 10474486013

SAMPLE DUPLICATE: 3277741

Parameter	Units	10474486010 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	25.0	24.8	1	30	

SAMPLE DUPLICATE: 3278123

Parameter	Units	10474439003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	14.4	14.0	3	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 606756 | Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3550 | Analysis Description: 8270D Solid PAH by SIM MSSV
Associated Lab Samples: 10474486013

METHOD BLANK: 3279716 | Matrix: Solid
Associated Lab Samples: 10474486013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acenaphthene	ug/kg	ND	10.0	05/20/19 09:29	
Acenaphthylene	ug/kg	ND	10.0	05/20/19 09:29	
Anthracene	ug/kg	ND	10.0	05/20/19 09:29	
Benzo(a)anthracene	ug/kg	ND	10.0	05/20/19 09:29	
Benzo(a)pyrene	ug/kg	ND	10.0	05/20/19 09:29	
Benzo(b)fluoranthene	ug/kg	ND	10.0	05/20/19 09:29	
Benzo(g,h,i)perylene	ug/kg	ND	10.0	05/20/19 09:29	
Benzo(k)fluoranthene	ug/kg	ND	10.0	05/20/19 09:29	
Chrysene	ug/kg	ND	10.0	05/20/19 09:29	
Dibenz(a,h)anthracene	ug/kg	ND	10.0	05/20/19 09:29	
Fluoranthene	ug/kg	ND	10.0	05/20/19 09:29	
Fluorene	ug/kg	ND	10.0	05/20/19 09:29	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	10.0	05/20/19 09:29	
Naphthalene	ug/kg	ND	10.0	05/20/19 09:29	
Phenanthrene	ug/kg	ND	10.0	05/20/19 09:29	
Pyrene	ug/kg	ND	10.0	05/20/19 09:29	
2-Fluorobiphenyl (S)	%.	91	30-125	05/20/19 09:29	
p-Terphenyl-d14 (S)	%.	98	30-125	05/20/19 09:29	

LABORATORY CONTROL SAMPLE: 3279717

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/kg	33.3	27.7	83	46-125	
Acenaphthylene	ug/kg	33.3	28.8	86	44-125	
Anthracene	ug/kg	33.3	29.8	89	62-125	
Benzo(a)anthracene	ug/kg	33.3	32.9	99	53-125	
Benzo(a)pyrene	ug/kg	33.3	32.7	98	62-125	
Benzo(b)fluoranthene	ug/kg	33.3	32.3	97	51-125	
Benzo(g,h,i)perylene	ug/kg	33.3	31.9	96	58-125	
Benzo(k)fluoranthene	ug/kg	33.3	31.8	95	59-125	
Chrysene	ug/kg	33.3	30.6	92	59-125	
Dibenz(a,h)anthracene	ug/kg	33.3	32.9	99	60-125	
Fluoranthene	ug/kg	33.3	32.5	97	67-125	
Fluorene	ug/kg	33.3	28.2	84	51-125	
Indeno(1,2,3-cd)pyrene	ug/kg	33.3	32.6	98	59-125	
Naphthalene	ug/kg	33.3	27.8	84	47-125	
Phenanthrene	ug/kg	33.3	27.9	84	61-125	
Pyrene	ug/kg	33.3	30.9	93	52-125	
2-Fluorobiphenyl (S)	%.			82	30-125	
p-Terphenyl-d14 (S)	%.			91	30-125	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3279718 3279719

Parameter	Units	10473507024 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthene	ug/kg	11.1J	39.5	39.5	144	32.4	338	54	30-125	127	30	M1,R1
Acenaphthylene	ug/kg	5.5J	39.5	39.5	36.5	37.2	79	80	30-125	2	30	
Anthracene	ug/kg	33.8	39.5	39.5	279	46.0	622	31	30-131	143	30	M1,R1
Benzo(a)anthracene	ug/kg	87.3	39.5	39.5	501	84.0	1050	-8	30-126	143	30	E,M1, R1
Benzo(a)pyrene	ug/kg	80.7	39.5	39.5	424	86.9	870	16	30-150	132	30	E,M1, R1
Benzo(b)fluoranthene	ug/kg	113	39.5	39.5	518	113	1030	1	30-150	128	30	E,M1, R1
Benzo(g,h,i)perylene	ug/kg	58.3	39.5	39.5	255	72.7	500	37	30-150	111	30	M1,R1
Benzo(k)fluoranthene	ug/kg	46.6	39.5	39.5	261	58.3	544	30	30-150	127	30	M1,R1
Chrysene	ug/kg	90.6	39.5	39.5	479	88.6	984	-5	30-150	138	30	E,M1, R1
Dibenz(a,h)anthracene	ug/kg	17.1	39.5	39.5	101	40.7	212	60	30-143	85	30	M1,R1
Fluoranthene	ug/kg	179	39.5	39.5	1080	126	2280	-136	30-143	158	30	E,M1, R1
Fluorene	ug/kg	11.0J	39.5	39.5	128	31.8	296	53	30-138	120	30	M1,R1
Indeno(1,2,3-cd)pyrene	ug/kg	50.5	39.5	39.5	243	65.1	487	37	30-150	115	30	M1,R1
Naphthalene	ug/kg	9.9J	39.5	39.5	47.4	34.6	95	63	30-125	31	30	R1
Phenanthrene	ug/kg	125	39.5	39.5	911	83.0	1990	-105	30-142	167	30	E,M1, R1
Pyrene	ug/kg	157	39.5	39.5	913	116	1910	-103	30-149	155	30	E,M1, R1
2-Fluorobiphenyl (S)	%.						64	66	30-125			
p-Terphenyl-d14 (S)	%.						62	65	30-125			

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

QC Batch: 605762 Analysis Method: WI MOD DRO
QC Batch Method: WI MOD DRO Analysis Description: WIDRO GCS
Associated Lab Samples: 10474486013

METHOD BLANK: 3274729 Matrix: Solid
Associated Lab Samples: 10474486013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
WDRO C10-C28	mg/kg	ND	10.0	05/16/19 19:17	
n-Triacontane (S)	%.	95	50-150	05/16/19 19:17	

LABORATORY CONTROL SAMPLE & LCSD: 3274730 3274731

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
WDRO C10-C28	mg/kg	80	79.4	78.0	99	97	70-120	2	20	
n-Triacontane (S)	%.				105	102	50-150			

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest GC
Pace Project No.: 10474486

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10474486013	**Maint Berm**	WI MOD DRO	605762	WI MOD DRO	606520
10474486013	**Maint Berm**	EPA 3050	605610	EPA 6010D	606318
10474486001	**SS-8 1-2**	EPA 7471B	605624	EPA 7471B	605869
10474486002	**SS-11 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486003	**SS-12 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486004	**SS-3E 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486005	**SS-3F 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486006	**SS-13 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486007	**SS-14 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486008	**SS-15 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486009	**SS-16 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486010	**SS-5B 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486011	**SS-5C 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486012	**SS-5A 0-0.5**	EPA 7471B	605624	EPA 7471B	605869
10474486013	**Maint Berm**	EPA 7471B	605624	EPA 7471B	605869
10474486001	**SS-8 1-2**	ASTM D2974	606358		
10474486002	**SS-11 0-0.5**	ASTM D2974	606358		
10474486003	**SS-12 0-0.5**	ASTM D2974	606358		
10474486004	**SS-3E 0-0.5**	ASTM D2974	606358		
10474486005	**SS-3F 0-0.5**	ASTM D2974	606358		
10474486006	**SS-13 0-0.5**	ASTM D2974	606358		
10474486007	**SS-14 0-0.5**	ASTM D2974	606358		
10474486008	**SS-15 0-0.5**	ASTM D2974	606358		
10474486009	**SS-16 0-0.5**	ASTM D2974	606358		
10474486010	**SS-5B 0-0.5**	ASTM D2974	606364		
10474486011	**SS-5C 0-0.5**	ASTM D2974	606364		
10474486012	**SS-5A 0-0.5**	ASTM D2974	606364		
10474486013	**Maint Berm**	ASTM D2974	606364		
10474486013	**Maint Berm**	EPA 3550	606756	EPA 8270D by SIM	606966

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WO#: 10474486
10474486

Page: 1 of 2

2300336

Section A Required Client Information:

Company:	Braun Intertec
Address:	
Email To:	mkeefe@braunintertec.com
Phone:	952 334 3748
Fax:	
Requested Due Date/TAT:	5-17-19

Section B Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	B1903316
Project Name:	Former Hillcrest GC
Project Number:	B1903316

Section C Invoice Information:

Attention:	Mark K
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ____

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

Requested Analysis Filtered (Y/N)

Preservatives: Unpreserved, H_2SO_4, HNO_3, HCl, NaOH, $Na_2S_2O_3$, Methanol, Other

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Mercury PAHs RCRA	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	SS-8 1-2	SL	G		~~940~~		740		1										X		001
2	SS-11 0-0.5	|	G				800		1										X		002
3	SS-12 0-0.5	|	G				805		1										X		003
4	SS-3E 0-0.5	|	G				815		1										X		004
5	SS-3F 0-0.5	|	G				820		1										X		005
6	SS-13 0-0.5	|	G				825		1										X		006
7	SS-14 0-0.5	|	G				845		1										X		007
8	SS-15 0-0.5	|	G				850		1										X		008
9	SS-16 0-0.5	|	G				900		1										X		009
10	SS-5B 0-0.5	|	G				9:10		1										X		010
11	SS-5C 0-0.5	|	G				9:15		1										X		011
12	SS-5A 0-0.5	|	G				9:20		1										X		012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Mark Keefer / BI	5-10-19	14:20	[illegible] Pace	5/10/19	14:20	3.1	Y	N	Y
	[illegible] / Pace	5.10.19	1720	[illegible]	5/10/19	1720	0.6	Y	N	Y

SAMPLE CONDITIONS

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mark Keefe

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5-10-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 2 of 2

2300337

Section A
Required Client Information:

Company:	Braun Intertec
Address:	
Email To:	
Phone: 952 334 3748	Fax:
Requested Due Date/TAT:	5-17-19

Section B
Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	B1903316
Project Name:	Former Hillcrest GC
Project Number:	B1903316

Section C
Invoice Information:

Attention:	Mark K
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ______

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	RCRA	PAHs	DRO	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Maint Berm	SL	C			5-10-19	940		4										X	X	X		03
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Mark Keefer / BI	5-10-19	14:20	[illegible] Pace	5/10/19	14:20	3.1	Y	N	Y
	[signature]	5.10.19	1720	[signature]	5/10/19	1720	0.6	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mark Keefer

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5-10-19

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.27**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Braun Intertec

Project #: WO#: 10474486

PM: BM2 Due Date: 05/20/19

CLIENT: Braun-BLM

Courier: ☐ Fed Ex ☑ Pace ☐ UPS ☐ SpeeDee ☐ USPS ☐ Commercial ☐ Client See Exception ☐

Tracking Number:

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☑ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☐ T3(0459) ☐ T4(0254) ☑ T5(0048) **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 0.7 °C	**Average Corrected Temp (no temp blank only):** ____ °C See Exceptions ☐
Correction Factor: -0.1 **Cooler Temp Corrected w/temp blank:** 0.6 °C	

USDA Regulated Soil: (☐ N/A, water sample/Other: ________) **Date/Initials of Person Examining Contents:** FE 5/13/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	☑ Yes ☐ No	1.
Chain of Custody Relinquished?	☑ Yes ☐ No	2.
Sampler Name and/or Signature on COC?	☑ Yes ☐ No ☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes ☐ No	4.
Short Hold Time Analysis (<72 hr)?	☐ Yes ☑ No	5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☑ Yes ☐ No	6.
Sufficient Volume?	☑ Yes ☐ No	7.
Correct Containers Used? -Pace Containers Used?	☑ Yes ☐ No / ☑ Yes ☐ No	8.
Containers Intact?	☑ Yes ☐ No	9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes ☐ No ☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☑ Yes ☐ No	11. **If no, write ID/ Date/Time on Container Below:** See Exception ☐
Matrix: ☐ Water ☑ Soil ☐ Oil ☐ Other		
All containers needing acid/base preservation have been checked?	☐ Yes ☐ No ☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes ☐ No ☑ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes ☐ No ☑ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** See Exception ☐ Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes ☐ No ☑ N/A	13. See Exception ☐
Trip Blank Present?	☐ Yes ☑ No ☑ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes ☐ No ☑ N/A	Pace Trip Blank Lot # (if purchased): N/A

FE 5/13/19

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: ________ Date/Time: ________

Comments/Resolution: ________

Project Manager Review: Oyeyemi Odujole **Date:** 5/13/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: FE

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BMZ

Received with Custody Seal: Yes No

Custody Seal Intact: Yes No NA

Temperature C:	Temp Read	Corrected Temp	Correction Factor
IR Gun # B88A0143310092	3.0	3.1	0.1

☐ Samples on Ice, cooling process has begun

Rush/Short Hold: N

Containers Intact: Yes No

Re-packed and Re-Iced: Y

Temp Blank Included: Yes No

Shipped By/Date: [illegible] 5/20/19

Notes:

Data File: \\192.168.10.12\chem\10gcs9.i\051619dro.b/051619000117.D

Report Date: 05/17/2019

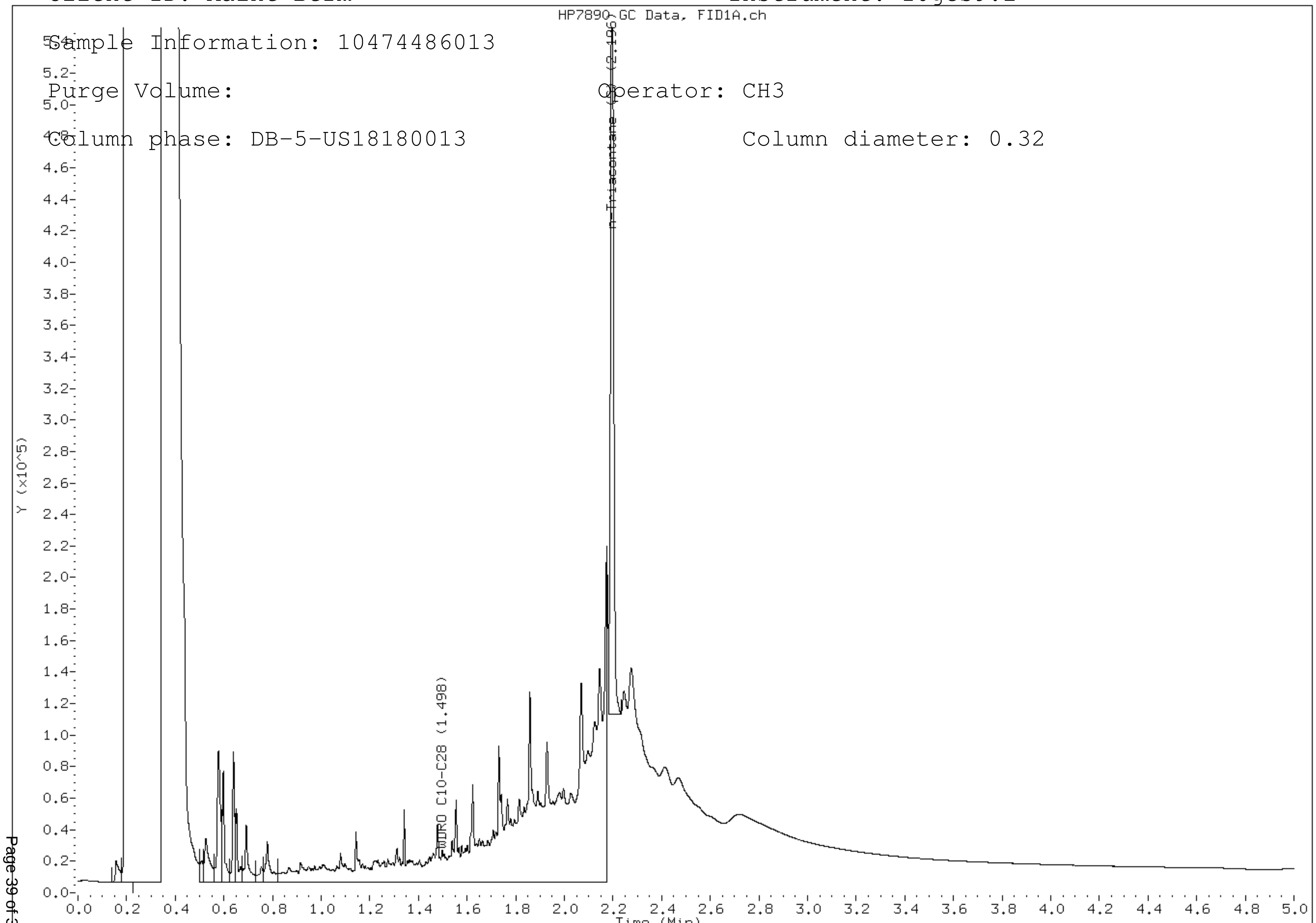
Sample ID: 10474486013

Client ID: Maint Berm Instrument: 10gcs9.i

Sample Information: 10474486013

Purge Volume: Operator: CH3

Column phase: DB-5-US18180013 Column diameter: 0.32



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 14, 2019

Mark Keefer
Braun Intertec
11001 Hampshire Ave S
Bloomington, MN 55438

RE: Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Dear Mark Keefer:

Enclosed are the analytical results for sample(s) received by the laboratory on May 08, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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CERTIFICATIONS

Project:	B1903316 Former Hillcrest Golf
Pace Project No.:	10473907

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10473907001	**SSV-1**	Air	05/07/19 11:50	05/08/19 08:30
10473907002	**SV-2**	Air	05/07/19 15:26	05/08/19 08:30
10473907003	**SV-1**	Air	05/07/19 16:52	05/08/19 08:30

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SAMPLE ANALYTE COUNT

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10473907001	**SSV-1**	TO-15	MJL	61	PASI-M
10473907002	**SV-2**	TO-15	MJL	63	PASI-M
10473907003	**SV-1**	TO-15	MJL	69	PASI-M

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(612)607-1700

SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10473907001	**SSV-1**					
TO-15	Acetone	58.5	ug/m3	9.4	05/11/19 20:05	
TO-15	Dichlorodifluoromethane	2.1	ug/m3	1.6	05/11/19 20:05	
TO-15	Ethanol	31.7	ug/m3	3.0	05/11/19 20:05	
TO-15	n-Hexane	21.7	ug/m3	2.8	05/11/19 20:05	
TO-15	Methylene Chloride	12.8	ug/m3	5.5	05/11/19 20:05	
TO-15	Tetrahydrofuran	7.8	ug/m3	0.93	05/11/19 20:05	
TO-15	1,2,4-Trimethylbenzene	2.8	ug/m3	1.5	05/11/19 20:05	
10473907002	**SV-2**					
TO-15	Acetone	30.3	ug/m3	9.0	05/11/19 20:34	
TO-15	Benzene	2.8	ug/m3	0.48	05/11/19 20:34	
TO-15	2-Butanone (MEK)	5.7	ug/m3	4.5	05/11/19 20:34	
TO-15	Chloromethane	1.0	ug/m3	0.63	05/11/19 20:34	
TO-15	1,3-Dichlorobenzene	28.0	ug/m3	1.8	05/11/19 20:34	
TO-15	Dichlorodifluoromethane	2.2	ug/m3	1.5	05/11/19 20:34	
TO-15	Ethanol	43.4	ug/m3	2.9	05/11/19 20:34	
TO-15	Ethyl acetate	3.1	ug/m3	1.1	05/11/19 20:34	
TO-15	Ethylbenzene	1.6	ug/m3	1.3	05/11/19 20:34	
TO-15	n-Heptane	4.0	ug/m3	1.2	05/11/19 20:34	
TO-15	n-Hexane	3.1	ug/m3	2.7	05/11/19 20:34	
TO-15	2-Propanol	69.5	ug/m3	9.3	05/11/19 20:34	
TO-15	Propylene	89.2	ug/m3	1.3	05/11/19 20:34	E
TO-15	Toluene	5.8	ug/m3	1.1	05/11/19 20:34	
TO-15	1,2,4-Trimethylbenzene	2.2	ug/m3	1.5	05/11/19 20:34	
TO-15	m&p-Xylene	4.2	ug/m3	2.6	05/11/19 20:34	
TO-15	o-Xylene	2.0	ug/m3	1.3	05/11/19 20:34	
TO-15	3.317:1-Propene, 2-methyl-	16.7J	ppbv		05/11/19 20:34	N
TO-15	12.236:Cyclohexene, 1-methyl-4	13.0J	ppbv		05/11/19 20:34	N
10473907003	**SV-1**					
TO-15	Acetone	48.6	ug/m3	9.5	05/11/19 21:03	
TO-15	Benzene	31.4	ug/m3	0.51	05/11/19 21:03	
TO-15	2-Butanone (MEK)	13.0	ug/m3	4.7	05/11/19 21:03	
TO-15	Carbon disulfide	3.7	ug/m3	1.0	05/11/19 21:03	
TO-15	Cyclohexane	7.1	ug/m3	2.8	05/11/19 21:03	
TO-15	1,3-Dichlorobenzene	99.8	ug/m3	1.9	05/11/19 21:03	
TO-15	Dichlorodifluoromethane	5.7	ug/m3	1.6	05/11/19 21:03	
TO-15	Ethanol	86.7	ug/m3	3.0	05/11/19 21:03	
TO-15	Ethyl acetate	7.3	ug/m3	1.2	05/11/19 21:03	
TO-15	Ethylbenzene	3.0	ug/m3	1.4	05/11/19 21:03	
TO-15	n-Heptane	15.3	ug/m3	1.3	05/11/19 21:03	
TO-15	n-Hexane	44.6	ug/m3	2.8	05/11/19 21:03	
TO-15	2-Propanol	165	ug/m3	9.9	05/11/19 21:03	
TO-15	Propylene	639	ug/m3	1.4	05/11/19 21:03	E
TO-15	Toluene	18.8	ug/m3	1.2	05/11/19 21:03	
TO-15	1,2,4-Trimethylbenzene	3.4	ug/m3	1.6	05/11/19 21:03	
TO-15	m&p-Xylene	6.8	ug/m3	2.8	05/11/19 21:03	
TO-15	o-Xylene	3.0	ug/m3	1.4	05/11/19 21:03	

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1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SUMMARY OF DETECTION

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
10473907003	**SV-1**					
TO-15	3.330:1-Propene, 2-methyl-	141J	ppbv		05/11/19 21:03	N
TO-15	3.895:2-Pentyne	26.0J	ppbv		05/11/19 21:03	N
TO-15	4.388:Pentane, 2-methyl-	24.3J	ppbv		05/11/19 21:03	N
TO-15	4.552:Unknown	9.1J	ppbv		05/11/19 21:03	
TO-15	4.631:1-Hexene	14.9J	ppbv		05/11/19 21:03	N
TO-15	5.197:Unknown	8.0J	ppbv		05/11/19 21:03	
TO-15	5.331:1,3,5-Hexatriene, (Z)-	17.7J	ppbv		05/11/19 21:03	N
TO-15	12.236:Cyclohexene, 1-methyl-4	16.4J	ppbv		05/11/19 21:03	N

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(612)607-1700

PROJECT NARRATIVE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Method: **TO-15**
Description: TO15 MSV AIR (TICS)
Client: Braun Intertec Corporation
Date: May 14, 2019

General Information:
3 samples were analyzed for TO-15. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: 605273

E: Analyte concentration exceeded the calibration range. The reported result is estimated.
- SV-1 (Lab ID: 10473907003)
  - Propylene
- SV-2 (Lab ID: 10473907002)
  - Propylene

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SSV-1 **Lab ID: 10473907001** Collected: 05/07/19 11:50 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Acetone	**58.5**	ug/m3	9.4	1.55		05/11/19 20:05	67-64-1	
Benzene	ND	ug/m3	0.50	1.55		05/11/19 20:05	71-43-2	
Benzyl chloride	ND	ug/m3	4.1	1.55		05/11/19 20:05	100-44-7	
Bromodichloromethane	ND	ug/m3	2.1	1.55		05/11/19 20:05	75-27-4	
Bromoform	ND	ug/m3	8.1	1.55		05/11/19 20:05	75-25-2	
Bromomethane	ND	ug/m3	1.2	1.55		05/11/19 20:05	74-83-9	
1,3-Butadiene	ND	ug/m3	0.70	1.55		05/11/19 20:05	106-99-0	
2-Butanone (MEK)	ND	ug/m3	4.6	1.55		05/11/19 20:05	78-93-3	
Carbon disulfide	ND	ug/m3	0.98	1.55		05/11/19 20:05	75-15-0	
Carbon tetrachloride	ND	ug/m3	2.0	1.55		05/11/19 20:05	56-23-5	
Chlorobenzene	ND	ug/m3	1.5	1.55		05/11/19 20:05	108-90-7	
Chloroethane	ND	ug/m3	0.83	1.55		05/11/19 20:05	75-00-3	
Chloroform	ND	ug/m3	0.77	1.55		05/11/19 20:05	67-66-3	
Chloromethane	ND	ug/m3	0.65	1.55		05/11/19 20:05	74-87-3	
Cyclohexane	ND	ug/m3	2.7	1.55		05/11/19 20:05	110-82-7	
Dibromochloromethane	ND	ug/m3	2.7	1.55		05/11/19 20:05	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/m3	1.2	1.55		05/11/19 20:05	106-93-4	
1,2-Dichlorobenzene	ND	ug/m3	1.9	1.55		05/11/19 20:05	95-50-1	
1,3-Dichlorobenzene	ND	ug/m3	1.9	1.55		05/11/19 20:05	541-73-1	
1,4-Dichlorobenzene	ND	ug/m3	4.7	1.55		05/11/19 20:05	106-46-7	
Dichlorodifluoromethane	**2.1**	ug/m3	1.6	1.55		05/11/19 20:05	75-71-8	
1,1-Dichloroethane	ND	ug/m3	1.3	1.55		05/11/19 20:05	75-34-3	
1,2-Dichloroethane	ND	ug/m3	0.64	1.55		05/11/19 20:05	107-06-2	
1,1-Dichloroethene	ND	ug/m3	1.2	1.55		05/11/19 20:05	75-35-4	
cis-1,2-Dichloroethene	ND	ug/m3	1.2	1.55		05/11/19 20:05	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.2	1.55		05/11/19 20:05	156-60-5	
1,2-Dichloropropane	ND	ug/m3	1.5	1.55		05/11/19 20:05	78-87-5	
cis-1,3-Dichloropropene	ND	ug/m3	1.4	1.55		05/11/19 20:05	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/m3	1.4	1.55		05/11/19 20:05	10061-02-6	
Dichlorotetrafluoroethane	ND	ug/m3	2.2	1.55		05/11/19 20:05	76-14-2	
Ethanol	**31.7**	ug/m3	3.0	1.55		05/11/19 20:05	64-17-5	
Ethyl acetate	ND	ug/m3	1.1	1.55		05/11/19 20:05	141-78-6	
Ethylbenzene	ND	ug/m3	1.4	1.55		05/11/19 20:05	100-41-4	
4-Ethyltoluene	ND	ug/m3	3.9	1.55		05/11/19 20:05	622-96-8	
n-Heptane	ND	ug/m3	1.3	1.55		05/11/19 20:05	142-82-5	
Hexachloro-1,3-butadiene	ND	ug/m3	8.4	1.55		05/11/19 20:05	87-68-3	
n-Hexane	**21.7**	ug/m3	2.8	1.55		05/11/19 20:05	110-54-3	
2-Hexanone	ND	ug/m3	6.4	1.55		05/11/19 20:05	591-78-6	
Methylene Chloride	**12.8**	ug/m3	5.5	1.55		05/11/19 20:05	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/m3	6.4	1.55		05/11/19 20:05	108-10-1	
Methyl-tert-butyl ether	ND	ug/m3	5.7	1.55		05/11/19 20:05	1634-04-4	
Naphthalene	ND	ug/m3	4.1	1.55		05/11/19 20:05	91-20-3	
2-Propanol	ND	ug/m3	9.7	1.55		05/11/19 20:05	67-63-0	
Propylene	ND	ug/m3	1.4	1.55		05/11/19 20:05	115-07-1	
Styrene	ND	ug/m3	1.3	1.55		05/11/19 20:05	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.1	1.55		05/11/19 20:05	79-34-5	
Tetrachloroethene	ND	ug/m3	1.1	1.55		05/11/19 20:05	127-18-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SSV-1 **Lab ID: 10473907001** Collected: 05/07/19 11:50 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Tetrahydrofuran	**7.8**	ug/m3	0.93	1.55		05/11/19 20:05	109-99-9	
Toluene	ND	ug/m3	1.2	1.55		05/11/19 20:05	108-88-3	
1,2,4-Trichlorobenzene	ND	ug/m3	11.7	1.55		05/11/19 20:05	120-82-1	
1,1,1-Trichloroethane	ND	ug/m3	1.7	1.55		05/11/19 20:05	71-55-6	
1,1,2-Trichloroethane	ND	ug/m3	0.86	1.55		05/11/19 20:05	79-00-5	
Trichloroethene	ND	ug/m3	0.85	1.55		05/11/19 20:05	79-01-6	
Trichlorofluoromethane	ND	ug/m3	1.8	1.55		05/11/19 20:05	75-69-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/m3	2.4	1.55		05/11/19 20:05	76-13-1	
1,2,4-Trimethylbenzene	**2.8**	ug/m3	1.5	1.55		05/11/19 20:05	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.5	1.55		05/11/19 20:05	108-67-8	
Vinyl acetate	ND	ug/m3	1.1	1.55		05/11/19 20:05	108-05-4	
Vinyl chloride	ND	ug/m3	0.40	1.55		05/11/19 20:05	75-01-4	
m&p-Xylene	ND	ug/m3	2.7	1.55		05/11/19 20:05	179601-23-1	
o-Xylene	ND	ug/m3	1.4	1.55		05/11/19 20:05	95-47-6	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SV-2 **Lab ID: 10473907002** Collected: 05/07/19 15:26 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Acetone	**30.3**	ug/m3	9.0	1.49		05/11/19 20:34	67-64-1	
Benzene	**2.8**	ug/m3	0.48	1.49		05/11/19 20:34	71-43-2	
Benzyl chloride	ND	ug/m3	3.9	1.49		05/11/19 20:34	100-44-7	
Bromodichloromethane	ND	ug/m3	2.0	1.49		05/11/19 20:34	75-27-4	
Bromoform	ND	ug/m3	7.8	1.49		05/11/19 20:34	75-25-2	
Bromomethane	ND	ug/m3	1.2	1.49		05/11/19 20:34	74-83-9	
1,3-Butadiene	ND	ug/m3	0.67	1.49		05/11/19 20:34	106-99-0	
2-Butanone (MEK)	**5.7**	ug/m3	4.5	1.49		05/11/19 20:34	78-93-3	
Carbon disulfide	ND	ug/m3	0.94	1.49		05/11/19 20:34	75-15-0	
Carbon tetrachloride	ND	ug/m3	1.9	1.49		05/11/19 20:34	56-23-5	
Chlorobenzene	ND	ug/m3	1.4	1.49		05/11/19 20:34	108-90-7	
Chloroethane	ND	ug/m3	0.80	1.49		05/11/19 20:34	75-00-3	
Chloroform	ND	ug/m3	0.74	1.49		05/11/19 20:34	67-66-3	
Chloromethane	**1.0**	ug/m3	0.63	1.49		05/11/19 20:34	74-87-3	
Cyclohexane	ND	ug/m3	2.6	1.49		05/11/19 20:34	110-82-7	
Dibromochloromethane	ND	ug/m3	2.6	1.49		05/11/19 20:34	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/m3	1.2	1.49		05/11/19 20:34	106-93-4	
1,2-Dichlorobenzene	ND	ug/m3	1.8	1.49		05/11/19 20:34	95-50-1	
1,3-Dichlorobenzene	**28.0**	ug/m3	1.8	1.49		05/11/19 20:34	541-73-1	
1,4-Dichlorobenzene	ND	ug/m3	4.6	1.49		05/11/19 20:34	106-46-7	
Dichlorodifluoromethane	**2.2**	ug/m3	1.5	1.49		05/11/19 20:34	75-71-8	
1,1-Dichloroethane	ND	ug/m3	1.2	1.49		05/11/19 20:34	75-34-3	
1,2-Dichloroethane	ND	ug/m3	0.61	1.49		05/11/19 20:34	107-06-2	
1,1-Dichloroethene	ND	ug/m3	1.2	1.49		05/11/19 20:34	75-35-4	
cis-1,2-Dichloroethene	ND	ug/m3	1.2	1.49		05/11/19 20:34	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.2	1.49		05/11/19 20:34	156-60-5	
1,2-Dichloropropane	ND	ug/m3	1.4	1.49		05/11/19 20:34	78-87-5	
cis-1,3-Dichloropropene	ND	ug/m3	1.4	1.49		05/11/19 20:34	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/m3	1.4	1.49		05/11/19 20:34	10061-02-6	
Dichlorotetrafluoroethane	ND	ug/m3	2.1	1.49		05/11/19 20:34	76-14-2	
Ethanol	**43.4**	ug/m3	2.9	1.49		05/11/19 20:34	64-17-5	
Ethyl acetate	**3.1**	ug/m3	1.1	1.49		05/11/19 20:34	141-78-6	
Ethylbenzene	**1.6**	ug/m3	1.3	1.49		05/11/19 20:34	100-41-4	
4-Ethyltoluene	ND	ug/m3	3.7	1.49		05/11/19 20:34	622-96-8	
n-Heptane	**4.0**	ug/m3	1.2	1.49		05/11/19 20:34	142-82-5	
Hexachloro-1,3-butadiene	ND	ug/m3	8.1	1.49		05/11/19 20:34	87-68-3	
n-Hexane	**3.1**	ug/m3	2.7	1.49		05/11/19 20:34	110-54-3	
2-Hexanone	ND	ug/m3	6.2	1.49		05/11/19 20:34	591-78-6	
Methylene Chloride	ND	ug/m3	5.3	1.49		05/11/19 20:34	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/m3	6.2	1.49		05/11/19 20:34	108-10-1	
Methyl-tert-butyl ether	ND	ug/m3	5.5	1.49		05/11/19 20:34	1634-04-4	
Naphthalene	ND	ug/m3	4.0	1.49		05/11/19 20:34	91-20-3	
2-Propanol	**69.5**	ug/m3	9.3	1.49		05/11/19 20:34	67-63-0	
Propylene	**89.2**	ug/m3	1.3	1.49		05/11/19 20:34	115-07-1	E
Styrene	ND	ug/m3	1.3	1.49		05/11/19 20:34	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.0	1.49		05/11/19 20:34	79-34-5	
Tetrachloroethene	ND	ug/m3	1.0	1.49		05/11/19 20:34	127-18-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SV-2 **Lab ID: 10473907002** Collected: 05/07/19 15:26 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Tetrahydrofuran	ND	ug/m3	0.89	1.49		05/11/19 20:34	109-99-9	
Toluene	**5.8**	ug/m3	1.1	1.49		05/11/19 20:34	108-88-3	
1,2,4-Trichlorobenzene	ND	ug/m3	11.2	1.49		05/11/19 20:34	120-82-1	
1,1,1-Trichloroethane	ND	ug/m3	1.7	1.49		05/11/19 20:34	71-55-6	
1,1,2-Trichloroethane	ND	ug/m3	0.83	1.49		05/11/19 20:34	79-00-5	
Trichloroethene	ND	ug/m3	0.81	1.49		05/11/19 20:34	79-01-6	
Trichlorofluoromethane	ND	ug/m3	1.7	1.49		05/11/19 20:34	75-69-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/m3	2.3	1.49		05/11/19 20:34	76-13-1	
1,2,4-Trimethylbenzene	**2.2**	ug/m3	1.5	1.49		05/11/19 20:34	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.5	1.49		05/11/19 20:34	108-67-8	
Vinyl acetate	ND	ug/m3	1.1	1.49		05/11/19 20:34	108-05-4	
Vinyl chloride	ND	ug/m3	0.39	1.49		05/11/19 20:34	75-01-4	
m&p-Xylene	**4.2**	ug/m3	2.6	1.49		05/11/19 20:34	179601-23-1	
o-Xylene	**2.0**	ug/m3	1.3	1.49		05/11/19 20:34	95-47-6	
Tentatively Identified Compounds								
1-Propene, 2-methyl-	**16.7J**	ppbv		1.49		05/11/19 20:34	115-11-7	N
Cyclohexene, 1-methyl-4	**13.0J**	ppbv		1.49		05/11/19 20:34	5989-54-8	N

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SV-1 **Lab ID: 10473907003** Collected: 05/07/19 16:52 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Acetone	**48.6**	ug/m3	9.5	1.58		05/11/19 21:03	67-64-1	
Benzene	**31.4**	ug/m3	0.51	1.58		05/11/19 21:03	71-43-2	
Benzyl chloride	ND	ug/m3	4.2	1.58		05/11/19 21:03	100-44-7	
Bromodichloromethane	ND	ug/m3	2.1	1.58		05/11/19 21:03	75-27-4	
Bromoform	ND	ug/m3	8.3	1.58		05/11/19 21:03	75-25-2	
Bromomethane	ND	ug/m3	1.2	1.58		05/11/19 21:03	74-83-9	
1,3-Butadiene	ND	ug/m3	0.71	1.58		05/11/19 21:03	106-99-0	
2-Butanone (MEK)	**13.0**	ug/m3	4.7	1.58		05/11/19 21:03	78-93-3	
Carbon disulfide	**3.7**	ug/m3	1.0	1.58		05/11/19 21:03	75-15-0	
Carbon tetrachloride	ND	ug/m3	2.0	1.58		05/11/19 21:03	56-23-5	
Chlorobenzene	ND	ug/m3	1.5	1.58		05/11/19 21:03	108-90-7	
Chloroethane	ND	ug/m3	0.85	1.58		05/11/19 21:03	75-00-3	
Chloroform	ND	ug/m3	0.78	1.58		05/11/19 21:03	67-66-3	
Chloromethane	ND	ug/m3	0.66	1.58		05/11/19 21:03	74-87-3	
Cyclohexane	**7.1**	ug/m3	2.8	1.58		05/11/19 21:03	110-82-7	
Dibromochloromethane	ND	ug/m3	2.7	1.58		05/11/19 21:03	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/m3	1.2	1.58		05/11/19 21:03	106-93-4	
1,2-Dichlorobenzene	ND	ug/m3	1.9	1.58		05/11/19 21:03	95-50-1	
1,3-Dichlorobenzene	**99.8**	ug/m3	1.9	1.58		05/11/19 21:03	541-73-1	
1,4-Dichlorobenzene	ND	ug/m3	4.8	1.58		05/11/19 21:03	106-46-7	
Dichlorodifluoromethane	**5.7**	ug/m3	1.6	1.58		05/11/19 21:03	75-71-8	
1,1-Dichloroethane	ND	ug/m3	1.3	1.58		05/11/19 21:03	75-34-3	
1,2-Dichloroethane	ND	ug/m3	0.65	1.58		05/11/19 21:03	107-06-2	
1,1-Dichloroethene	ND	ug/m3	1.3	1.58		05/11/19 21:03	75-35-4	
cis-1,2-Dichloroethene	ND	ug/m3	1.3	1.58		05/11/19 21:03	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.3	1.58		05/11/19 21:03	156-60-5	
1,2-Dichloropropane	ND	ug/m3	1.5	1.58		05/11/19 21:03	78-87-5	
cis-1,3-Dichloropropene	ND	ug/m3	1.5	1.58		05/11/19 21:03	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/m3	1.5	1.58		05/11/19 21:03	10061-02-6	
Dichlorotetrafluoroethane	ND	ug/m3	2.2	1.58		05/11/19 21:03	76-14-2	
Ethanol	**86.7**	ug/m3	3.0	1.58		05/11/19 21:03	64-17-5	
Ethyl acetate	**7.3**	ug/m3	1.2	1.58		05/11/19 21:03	141-78-6	
Ethylbenzene	**3.0**	ug/m3	1.4	1.58		05/11/19 21:03	100-41-4	
4-Ethyltoluene	ND	ug/m3	4.0	1.58		05/11/19 21:03	622-96-8	
n-Heptane	**15.3**	ug/m3	1.3	1.58		05/11/19 21:03	142-82-5	
Hexachloro-1,3-butadiene	ND	ug/m3	8.6	1.58		05/11/19 21:03	87-68-3	
n-Hexane	**44.6**	ug/m3	2.8	1.58		05/11/19 21:03	110-54-3	
2-Hexanone	ND	ug/m3	6.6	1.58		05/11/19 21:03	591-78-6	
Methylene Chloride	ND	ug/m3	5.6	1.58		05/11/19 21:03	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/m3	6.6	1.58		05/11/19 21:03	108-10-1	
Methyl-tert-butyl ether	ND	ug/m3	5.8	1.58		05/11/19 21:03	1634-04-4	
Naphthalene	ND	ug/m3	4.2	1.58		05/11/19 21:03	91-20-3	
2-Propanol	**165**	ug/m3	9.9	1.58		05/11/19 21:03	67-63-0	
Propylene	**639**	ug/m3	1.4	1.58		05/11/19 21:03	115-07-1	E
Styrene	ND	ug/m3	1.4	1.58		05/11/19 21:03	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.1	1.58		05/11/19 21:03	79-34-5	
Tetrachloroethene	ND	ug/m3	1.1	1.58		05/11/19 21:03	127-18-4	

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ANALYTICAL RESULTS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Sample: SV-1 **Lab ID: 10473907003** Collected: 05/07/19 16:52 Received: 05/08/19 08:30 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR (TICS)	Analytical Method: TO-15							
Tetrahydrofuran	ND	ug/m3	0.95	1.58		05/11/19 21:03	109-99-9	
Toluene	**18.8**	ug/m3	1.2	1.58		05/11/19 21:03	108-88-3	
1,2,4-Trichlorobenzene	ND	ug/m3	11.9	1.58		05/11/19 21:03	120-82-1	
1,1,1-Trichloroethane	ND	ug/m3	1.8	1.58		05/11/19 21:03	71-55-6	
1,1,2-Trichloroethane	ND	ug/m3	0.88	1.58		05/11/19 21:03	79-00-5	
Trichloroethene	ND	ug/m3	0.86	1.58		05/11/19 21:03	79-01-6	
Trichlorofluoromethane	ND	ug/m3	1.8	1.58		05/11/19 21:03	75-69-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/m3	2.5	1.58		05/11/19 21:03	76-13-1	
1,2,4-Trimethylbenzene	**3.4**	ug/m3	1.6	1.58		05/11/19 21:03	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.6	1.58		05/11/19 21:03	108-67-8	
Vinyl acetate	ND	ug/m3	1.1	1.58		05/11/19 21:03	108-05-4	
Vinyl chloride	ND	ug/m3	0.41	1.58		05/11/19 21:03	75-01-4	
m&p-Xylene	**6.8**	ug/m3	2.8	1.58		05/11/19 21:03	179601-23-1	
o-Xylene	**3.0**	ug/m3	1.4	1.58		05/11/19 21:03	95-47-6	
Tentatively Identified Compounds								
1-Propene, 2-methyl-	**141J**	ppbv		1.58		05/11/19 21:03	115-11-7	N
2-Pentyne	**26.0J**	ppbv		1.58		05/11/19 21:03	627-21-4	N
Pentane, 2-methyl-	**24.3J**	ppbv		1.58		05/11/19 21:03	107-83-5	N
Unknown	**9.1J**	ppbv		1.58		05/11/19 21:03		
1-Hexene	**14.9J**	ppbv		1.58		05/11/19 21:03	592-41-6	N
Unknown	**8.0J**	ppbv		1.58		05/11/19 21:03		
1,3,5-Hexatriene, (Z)-	**17.7J**	ppbv		1.58		05/11/19 21:03	2612-46-6	N
Cyclohexene, 1-methyl-4	**16.4J**	ppbv		1.58		05/11/19 21:03	5989-54-8	N

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

QC Batch: 605273 Analysis Method: TO-15
QC Batch Method: TO-15 Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 10473907001, 10473907002, 10473907003

METHOD BLANK: 3272438 Matrix: Air
Associated Lab Samples: 10473907001, 10473907002, 10473907003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1-Trichloroethane	ug/m3	ND	0.56	05/11/19 15:42	
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.35	05/11/19 15:42	
1,1,2-Trichloroethane	ug/m3	ND	0.28	05/11/19 15:42	
1,1,2-Trichlorotrifluoroethane	ug/m3	ND	0.78	05/11/19 15:42	
1,1-Dichloroethane	ug/m3	ND	0.41	05/11/19 15:42	
1,1-Dichloroethene	ug/m3	ND	0.40	05/11/19 15:42	
1,2,4-Trichlorobenzene	ug/m3	ND	3.8	05/11/19 15:42	
1,2,4-Trimethylbenzene	ug/m3	ND	0.50	05/11/19 15:42	
1,2-Dibromoethane (EDB)	ug/m3	ND	0.39	05/11/19 15:42	
1,2-Dichlorobenzene	ug/m3	ND	0.61	05/11/19 15:42	
1,2-Dichloroethane	ug/m3	ND	0.21	05/11/19 15:42	
1,2-Dichloropropane	ug/m3	ND	0.47	05/11/19 15:42	
1,3,5-Trimethylbenzene	ug/m3	ND	0.50	05/11/19 15:42	
1,3-Butadiene	ug/m3	ND	0.22	05/11/19 15:42	
1,3-Dichlorobenzene	ug/m3	ND	0.61	05/11/19 15:42	
1,4-Dichlorobenzene	ug/m3	ND	1.5	05/11/19 15:42	
2-Butanone (MEK)	ug/m3	ND	1.5	05/11/19 15:42	
2-Hexanone	ug/m3	ND	2.1	05/11/19 15:42	
2-Propanol	ug/m3	ND	3.1	05/11/19 15:42	MN
4-Ethyltoluene	ug/m3	ND	1.2	05/11/19 15:42	
4-Methyl-2-pentanone (MIBK)	ug/m3	ND	2.1	05/11/19 15:42	
Acetone	ug/m3	ND	3.0	05/11/19 15:42	MN
Benzene	ug/m3	ND	0.16	05/11/19 15:42	
Benzyl chloride	ug/m3	ND	1.3	05/11/19 15:42	
Bromodichloromethane	ug/m3	ND	0.68	05/11/19 15:42	
Bromoform	ug/m3	ND	2.6	05/11/19 15:42	
Bromomethane	ug/m3	ND	0.39	05/11/19 15:42	
Carbon disulfide	ug/m3	ND	0.32	05/11/19 15:42	
Carbon tetrachloride	ug/m3	ND	0.64	05/11/19 15:42	
Chlorobenzene	ug/m3	ND	0.47	05/11/19 15:42	
Chloroethane	ug/m3	ND	0.27	05/11/19 15:42	
Chloroform	ug/m3	ND	0.25	05/11/19 15:42	
Chloromethane	ug/m3	ND	0.21	05/11/19 15:42	
cis-1,2-Dichloroethene	ug/m3	ND	0.40	05/11/19 15:42	
cis-1,3-Dichloropropene	ug/m3	ND	0.46	05/11/19 15:42	
Cyclohexane	ug/m3	ND	0.88	05/11/19 15:42	
Dibromochloromethane	ug/m3	ND	0.86	05/11/19 15:42	
Dichlorodifluoromethane	ug/m3	ND	0.50	05/11/19 15:42	
Dichlorotetrafluoroethane	ug/m3	ND	0.71	05/11/19 15:42	
Ethanol	ug/m3	ND	0.96	05/11/19 15:42	
Ethyl acetate	ug/m3	ND	0.37	05/11/19 15:42	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

METHOD BLANK: 3272438 Matrix: Air
Associated Lab Samples: 10473907001, 10473907002, 10473907003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Ethylbenzene	ug/m3	ND	0.44	05/11/19 15:42	
Hexachloro-1,3-butadiene	ug/m3	ND	2.7	05/11/19 15:42	
m&p-Xylene	ug/m3	ND	0.88	05/11/19 15:42	
Methyl-tert-butyl ether	ug/m3	ND	1.8	05/11/19 15:42	
Methylene Chloride	ug/m3	ND	1.8	05/11/19 15:42	
n-Heptane	ug/m3	ND	0.42	05/11/19 15:42	
n-Hexane	ug/m3	ND	0.90	05/11/19 15:42	MN
Naphthalene	ug/m3	ND	1.3	05/11/19 15:42	
o-Xylene	ug/m3	ND	0.44	05/11/19 15:42	
Propylene	ug/m3	ND	0.44	05/11/19 15:42	MN
Styrene	ug/m3	ND	0.43	05/11/19 15:42	
Tetrachloroethene	ug/m3	ND	0.34	05/11/19 15:42	
Tetrahydrofuran	ug/m3	ND	0.30	05/11/19 15:42	
Toluene	ug/m3	ND	0.38	05/11/19 15:42	
trans-1,2-Dichloroethene	ug/m3	ND	0.40	05/11/19 15:42	
trans-1,3-Dichloropropene	ug/m3	ND	0.46	05/11/19 15:42	
Trichloroethene	ug/m3	ND	0.27	05/11/19 15:42	
Trichlorofluoromethane	ug/m3	ND	0.57	05/11/19 15:42	
Vinyl acetate	ug/m3	ND	0.36	05/11/19 15:42	
Vinyl chloride	ug/m3	ND	0.13	05/11/19 15:42	

LABORATORY CONTROL SAMPLE: 3272439

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/m3	56.6	51.9	92	70-130	
1,1,2,2-Tetrachloroethane	ug/m3	69.8	58.0	83	70-132	
1,1,2-Trichloroethane	ug/m3	58.2	53.7	92	70-130	
1,1,2-Trichlorotrifluoroethane	ug/m3	84.9	69.7	82	70-130	
1,1-Dichloroethane	ug/m3	42.4	38.3	90	70-130	
1,1-Dichloroethene	ug/m3	43.5	37.1	85	70-130	
1,2,4-Trichlorobenzene	ug/m3	74.7	55.7	75	56-130	
1,2,4-Trimethylbenzene	ug/m3	53	41.3	78	70-134	
1,2-Dibromoethane (EDB)	ug/m3	83.6	72.6	87	70-130	
1,2-Dichlorobenzene	ug/m3	59.9	46.7	78	70-132	
1,2-Dichloroethane	ug/m3	42.8	37.6	88	70-130	
1,2-Dichloropropane	ug/m3	48.4	43.6	90	70-130	
1,3,5-Trimethylbenzene	ug/m3	53.5	42.1	79	70-132	
1,3-Butadiene	ug/m3	22.5	20.5	91	65-130	
1,3-Dichlorobenzene	ug/m3	65.4	47.9	73	70-137	
1,4-Dichlorobenzene	ug/m3	65.4	48.7	74	70-134	
2-Butanone (MEK)	ug/m3	32.4	24.9	77	70-130	
2-Hexanone	ug/m3	42.9	40.5	94	70-135	
2-Propanol	ug/m3	26.5	23.4	88	68-130	
4-Ethyltoluene	ug/m3	52	44.5	86	70-138	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

LABORATORY CONTROL SAMPLE: 3272439

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
4-Methyl-2-pentanone (MIBK)	ug/m3	42	41.3	98	70-131	
Acetone	ug/m3	26.6	23.2	87	67-130	
Benzene	ug/m3	34.4	29.4	86	70-130	
Benzyl chloride	ug/m3	56.3	42.9	76	70-130	
Bromodichloromethane	ug/m3	69.5	67.9	98	70-130	
Bromoform	ug/m3	97.7	127	130	70-132	
Bromomethane	ug/m3	40.6	33.6	83	69-130	
Carbon disulfide	ug/m3	32.9	30.3	92	56-137	
Carbon tetrachloride	ug/m3	65.9	70.0	106	66-131	
Chlorobenzene	ug/m3	49.6	41.5	84	70-130	
Chloroethane	ug/m3	26.8	25.1	94	70-130	
Chloroform	ug/m3	52.6	44.9	85	70-130	
Chloromethane	ug/m3	22.2	19.3	87	66-130	
cis-1,2-Dichloroethene	ug/m3	41.9	38.0	91	70-130	
cis-1,3-Dichloropropene	ug/m3	48	42.9	89	70-133	
Cyclohexane	ug/m3	35.3	32.0	90	68-132	
Dibromochloromethane	ug/m3	90	101	113	70-130	
Dichlorodifluoromethane	ug/m3	52.8	44.1	83	70-130	
Dichlorotetrafluoroethane	ug/m3	74.6	64.9	87	70-130	
Ethanol	ug/m3	21.1	14.9	71	68-133	
Ethyl acetate	ug/m3	38.8	33.9	87	69-130	
Ethylbenzene	ug/m3	45.5	41.1	90	67-131	
Hexachloro-1,3-butadiene	ug/m3	108	89.9	83	66-137	
m&p-Xylene	ug/m3	45.9	43.1	94	70-132	
Methyl-tert-butyl ether	ug/m3	37.4	33.3	89	70-130	
Methylene Chloride	ug/m3	38.1	37.7	99	65-130	
n-Heptane	ug/m3	43.7	37.7	86	65-130	
n-Hexane	ug/m3	37.6	38.3	102	66-130	
Naphthalene	ug/m3	52.7	35.1	67	56-130	
o-Xylene	ug/m3	44.1	38.5	87	70-130	
Propylene	ug/m3	19.2	17.7	92	67-130	
Styrene	ug/m3	44.2	40.8	92	69-136	
Tetrachloroethene	ug/m3	70.3	58.0	83	70-130	
Tetrahydrofuran	ug/m3	30.3	28.6	95	68-131	
Toluene	ug/m3	39.4	33.9	86	70-130	
trans-1,2-Dichloroethene	ug/m3	41.5	37.9	91	70-130	
trans-1,3-Dichloropropene	ug/m3	44.8	46.4	104	70-134	
Trichloroethene	ug/m3	56.3	52.5	93	70-130	
Trichlorofluoromethane	ug/m3	58.8	52.0	88	65-130	
Vinyl acetate	ug/m3	35.1	29.2	83	61-133	
Vinyl chloride	ug/m3	28.1	24.1	86	70-130	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

SAMPLE DUPLICATE: 3272638

Parameter	Units	10474300001 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1-Trichloroethane	ug/m3	ND	ND		25	
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
1,1,2-Trichloroethane	ug/m3	ND	ND		25	
1,1,2-Trichlorotrifluoroethane	ug/m3	ND	ND		25	
1,1-Dichloroethane	ug/m3	ND	ND		25	
1,1-Dichloroethene	ug/m3	ND	ND		25	
1,2,4-Trichlorobenzene	ug/m3	ND	ND		25	
1,2,4-Trimethylbenzene	ug/m3	ND	ND		25	
1,2-Dibromoethane (EDB)	ug/m3	ND	ND		25	
1,2-Dichlorobenzene	ug/m3	ND	ND		25	
1,2-Dichloroethane	ug/m3	ND	ND		25	
1,2-Dichloropropane	ug/m3	ND	ND		25	
1,3,5-Trimethylbenzene	ug/m3	ND	ND		25	
1,3-Butadiene	ug/m3	ND	ND		25	
1,3-Dichlorobenzene	ug/m3	ND	ND		25	
1,4-Dichlorobenzene	ug/m3	ND	ND		25	
2-Butanone (MEK)	ug/m3	ND	2.5J		25	
2-Hexanone	ug/m3	ND	ND		25	
2-Propanol	ug/m3	ND	3.7J		25	
4-Ethyltoluene	ug/m3	ND	ND		25	
4-Methyl-2-pentanone (MIBK)	ug/m3	ND	1.1J		25	
Acetone	ug/m3	ND	6.5J		25	
Benzene	ug/m3	ND	ND		25	
Benzyl chloride	ug/m3	ND	ND		25	
Bromodichloromethane	ug/m3	ND	ND		25	
Bromoform	ug/m3	ND	ND		25	
Bromomethane	ug/m3	ND	ND		25	
Carbon disulfide	ug/m3	ND	ND		25	
Carbon tetrachloride	ug/m3	ND	ND		25	
Chlorobenzene	ug/m3	ND	ND		25	
Chloroethane	ug/m3	ND	ND		25	
Chloroform	ug/m3	ND	ND		25	
Chloromethane	ug/m3	0.79	0.89	12	25	
cis-1,2-Dichloroethene	ug/m3	ND	ND		25	
cis-1,3-Dichloropropene	ug/m3	ND	ND		25	
Cyclohexane	ug/m3	ND	ND		25	
Dibromochloromethane	ug/m3	ND	ND		25	
Dichlorodifluoromethane	ug/m3	2.1	2.2	4	25	
Dichlorotetrafluoroethane	ug/m3	ND	ND		25	
Ethanol	ug/m3	6.8	6.8	0	25	
Ethyl acetate	ug/m3	ND	ND		25	
Ethylbenzene	ug/m3	ND	ND		25	
Hexachloro-1,3-butadiene	ug/m3	ND	ND		25	
m&p-Xylene	ug/m3	ND	ND		25	
Methyl-tert-butyl ether	ug/m3	ND	ND		25	
Methylene Chloride	ug/m3	ND	1.6J		25	
n-Heptane	ug/m3	ND	ND		25	

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

SAMPLE DUPLICATE: 3272638

Parameter	Units	10474300001 Result	Dup Result	RPD	Max RPD	Qualifiers
n-Hexane	ug/m3	ND	ND		25	
Naphthalene	ug/m3	ND	ND		25	
o-Xylene	ug/m3	ND	ND		25	
Propylene	ug/m3	ND	ND		25	
Styrene	ug/m3	ND	ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
Tetrahydrofuran	ug/m3	ND	ND		25	
Toluene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3	93.0	91.9	1	25	
trans-1,3-Dichloropropene	ug/m3	ND	ND		25	
Trichloroethene	ug/m3	ND	ND		25	
Trichlorofluoromethane	ug/m3	ND	1.1J		25	
Vinyl acetate	ug/m3	ND	ND		25	
Vinyl chloride	ug/m3	ND	ND		25	

SAMPLE DUPLICATE: 3272639

Parameter	Units	10474300003 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1-Trichloroethane	ug/m3	ND	ND		25	
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
1,1,2-Trichloroethane	ug/m3	ND	ND		25	
1,1,2-Trichlorotrifluoroethane	ug/m3	ND	ND		25	
1,1-Dichloroethane	ug/m3	ND	ND		25	
1,1-Dichloroethene	ug/m3	ND	ND		25	
1,2,4-Trichlorobenzene	ug/m3	ND	ND		25	
1,2,4-Trimethylbenzene	ug/m3	ND	ND		25	
1,2-Dibromoethane (EDB)	ug/m3	ND	ND		25	
1,2-Dichlorobenzene	ug/m3	ND	ND		25	
1,2-Dichloroethane	ug/m3	ND	ND		25	
1,2-Dichloropropane	ug/m3	ND	ND		25	
1,3,5-Trimethylbenzene	ug/m3	ND	ND		25	
1,3-Butadiene	ug/m3	ND	ND		25	
1,3-Dichlorobenzene	ug/m3	ND	ND		25	
1,4-Dichlorobenzene	ug/m3	ND	ND		25	
2-Butanone (MEK)	ug/m3	ND	.92J		25	
2-Hexanone	ug/m3	ND	ND		25	
2-Propanol	ug/m3	ND	ND		25	
4-Ethyltoluene	ug/m3	ND	ND		25	
4-Methyl-2-pentanone (MIBK)	ug/m3	ND	ND		25	
Acetone	ug/m3	ND	2.3J		25	
Benzene	ug/m3	ND	ND		25	
Benzyl chloride	ug/m3	ND	ND		25	
Bromodichloromethane	ug/m3	ND	ND		25	
Bromoform	ug/m3	ND	ND		25	
Bromomethane	ug/m3	ND	ND		25	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

SAMPLE DUPLICATE: 3272639

Parameter	Units	10474300003 Result	Dup Result	RPD	Max RPD	Qualifiers
Carbon disulfide	ug/m3	ND	ND		25	
Carbon tetrachloride	ug/m3	ND	ND		25	
Chlorobenzene	ug/m3	ND	ND		25	
Chloroethane	ug/m3	ND	ND		25	
Chloroform	ug/m3	ND	ND		25	
Chloromethane	ug/m3	0.86	0.81	6	25	
cis-1,2-Dichloroethene	ug/m3	ND	ND		25	
cis-1,3-Dichloropropene	ug/m3	ND	ND		25	
Cyclohexane	ug/m3	ND	ND		25	
Dibromochloromethane	ug/m3	ND	ND		25	
Dichlorodifluoromethane	ug/m3	2.3	2.3	1	25	
Dichlorotetrafluoroethane	ug/m3	ND	ND		25	
Ethanol	ug/m3	ND	2.4J		25	
Ethyl acetate	ug/m3	ND	ND		25	
Ethylbenzene	ug/m3	ND	ND		25	
Hexachloro-1,3-butadiene	ug/m3	ND	ND		25	
m&p-Xylene	ug/m3	ND	ND		25	
Methyl-tert-butyl ether	ug/m3	ND	ND		25	
Methylene Chloride	ug/m3	ND	1.8J		25	
n-Heptane	ug/m3	ND	ND		25	
n-Hexane	ug/m3	ND	ND		25	
Naphthalene	ug/m3	ND	ND		25	
o-Xylene	ug/m3	ND	ND		25	
Propylene	ug/m3	ND	ND		25	
Styrene	ug/m3	ND	ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
Tetrahydrofuran	ug/m3	ND	ND		25	
Toluene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3	ND	ND		25	
trans-1,3-Dichloropropene	ug/m3	ND	ND		25	
Trichloroethene	ug/m3	ND	ND		25	
Trichlorofluoromethane	ug/m3	ND	1.2J		25	
Vinyl acetate	ug/m3	ND	ND		25	
Vinyl chloride	ug/m3	ND	ND		25	

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QUALIFIERS

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
MN	The reporting limit has been raised in accordance with Minnesota Statutes 4740.2100 Subpart 8. C, D. Reporting Limit Evaluation Rule.
N	The reported TIC has an 85% or higher match on a mass spectral library search.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: B1903316 Former Hillcrest Golf
Pace Project No.: 10473907

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10473907001	**SSV-1**	TO-15	605273		
10473907002	**SV-2**	TO-15	605273		
10473907003	**SV-1**	TO-15	605273		

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WO# : 10473907

10473907

34950

Page: of

Section A
Required Client Information:

Company:	Braun Intertec
Address:	11001 Hampshire Ave Mpls, MN
Email To:	
Phone:	Fax:
Requested Due Date/TAT:	

Section B
Required Project Information:

Report To:	Mark Keefer
Copy To:	
Purchase Order No.:	
Project Name:	Hillcrest GC
Project Number:	B1903316

Section C
Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager/Sales Rep.	
Pace Profile #:	34125

Program

☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act
☐ Voluntary Clean Up ☐ Dry Clean ☐ RCRA ☐ Other___

Location of Sampling by State ______

Reporting Units: ug/m³___ mg/m³___ PPBV___ PPMV___ Other___

Report Level II.___ III.___ IV.___ Other___

Section D Required Client Information

AIR SAMPLE ID
Sample IDs MUST BE UNIQUE

Valid Media Codes

MEDIA	CODE
Tedlar Bag	TB
1 Liter Summa Can	1LC
6 Liter Summa Can	6LC
Low Volume Puff	LVP
High Volume Puff	HVP
Other	PM10

Method: PM10; 3C - Fixed Gas (%); TO-3 BTEX; TO-3M (Methane); TO-14; TO-15 Full List VOCs; TO-15 Short List BTEX; TO-15 Short List Chlorinated; TO-15 Short List (other)

ITEM #	AIR SAMPLE ID	MEDIA CODE	PID Reading (Client only)	Composite Start DATE	Composite Start TIME	Composite - End/Grab DATE	Composite - End/Grab TIME	Canister Pressure (Initial Field - in Hg)	Canister Pressure (Final Field - in Hg)	Summa Can Number	Flow Control Number	PM10	3C - Fixed Gas (%)	TO-3 BTEX	TO-3M (Methane)	TO-14	TO-15 Full List VOCs	TO-15 Short List BTEX	TO-15 Short List Chlorinated	TO-15 Short List (other)	Pace Lab ID
1	SSV-1		0			5/7	1150	-28	-3	0666	1636						X				001
2	SV-2		0.4			5/7	1526	-30	-3	1195	0725						X				002
3	SV-1		0.6			5/7	1652	-29	-4	0540	1758						X				003
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Comments :

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
[signature]	5/8	8:30	[signature] Pace	5/8/19	8:30
			[signature] Pace	05/08/19	1230

SAMPLE CONDITIONS

Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
—	Y/N	Y/N	Y/N
—	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jay Moldenhauer

SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY) 5/7/19

ORIGINAL

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414 Air Technical Phone: 612.607.6386

FC046Rev.01, 03Feb2010

WO#: 10473907

PM: BM2 Due Date: 05/15/19

CLIENT: Braun-BLM

Air Sample Condition Upon Receipt

Client Name: Braun

Project #:

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Pace ☐ SpeeDee ☐ Commercial **See Exception** ☐

Tracking Number:

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Tin Can ☐ Other: **Temp Blank rec:** ☐ Yes ☑ No

Temp. (TO17 and TO13 samples only) (°C): – **Corrected Temp (°C):** –

Temp should be above freezing to 6°C **Correction Factor:** –

Thermometer Used: ☐ G87A9170600254 ☐ G87A9155100842

Date & Initials of Person Examining Contents: 05/08/19 CS

Type of ice Received ☐ Blue ☐ Wet ☑ None

			Comments:
Chain of Custody Present?	☑ Yes	☐ No	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No ☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	7.
Sufficient Volume?	☑ Yes	☐ No	8.
Correct Containers Used?	☑ Yes	☐ No	9.
-Pace Containers Used?	☑ Yes	☐ No	
~~Containers Intact?~~	☑ Yes	☐ No	10.
Media: Air Can Airbag Filter TDT Passive			11. Individually Certified Cans Y N (list which samples)
Is sufficient information available to reconcile samples to the COC?	☑ Yes	☐ No	12.
Do cans need to be pressurized (3C and ASTM 1946 DO NOT PRESSURIZE)?	☑ Yes	☐ No	13.

Samples Received: Pressure Gauge # ☐ 10AIR34 ☑ 10AIR35

Sample Number	Can ID	Flow Controller	Initial Pressure	Final Pressure	Sample Number	Can ID	Flow Controller	Initial Pressure	Final Pressure
SV-1	0566	1636	-4.0	+5.0					
SV-2	1195	0725	-3.0	"					
" 1	0540	1758	-4.5	"					

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: BN **Date:** 5/8/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical®	Document Name: Cooler Transfer Check List	Revised Date: 12Feb2 Page 1 of 1
	Document Number: F-MN-C-205-Rev.01	Issuing Authority: Pace Minnesota Quality

Bloomington Service Center Cooler Transfer Check Lis

Client: Braun

Project Manager: BMZ

Received with Custody Seal: Yes No

Custody Seal Intact: Yes No NA

Temperature C:	Temp Read	Corrected Temp	Correction Factor
IR Gun # B88A0143310092	—	—	0.1

☐ Samples on ice, cooling process has begun

Rush/Short Hold: N

Containers Intact: Yes No

Re-packed and Re-Iced: N

Temp Blank Included: Yes No

Shipped By/Date: [illegible] 5/8/19

Notes:

Appendix E

Standard Operating Procedures

A. Purpose

The objective of this Standard Operating Procedure (SOP) is to establish a consistent method and format for the use and control of documentation generated during field activities. Field notes, records, and photographs are intended to provide sufficient information that can be used to recreate the field activities and collection of environmental data. The information placed in these documents and/or records should be factual, detailed, and free of personal opinions.

A.1. Scope and Applicability

This SOP is applicable to Phase I Environmental Site Assessments (ESAs), Phase II ESAs, remedial investigations, and Response Action Plan (RAP) implementation. Documentation includes Field Report Form, additional field forms that are part of method SOPs, and photographs.

A.2. Personnel Responsibilities

The project manager (or designee) is responsible for properly preparing field personnel to perform the field work and to oversee that field documentation is collected in accordance with this SOP, site-specific or project-specific planning documents, and other applicable SOPs.

Field personnel are responsible for understanding and implementing this SOP during field activities, as well as completing appropriate Field Report Form to properly document the field activities. Field observations should be discussed with the project manager on a daily basis. If conditions change from initial expectations, a call should also be made to the project manager. Field personnel should document field activities and record field measurements as they occur and complete documentation prior to leaving the site. Field personnel are responsible for tracking the location of field documentation. Field personnel are responsible for preserving original documentation until it is provided to the project manager and placed into the permanent file or archived. Field personnel are responsible for distributing copies (or electronically preserving copies) of the documentation in a timely manner.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP), if applicable.

C. Referenced SOPs

- None

D. Equipment and Supplies

- Field Report Form (see Attachment A) or field logbook
- Waterproof and/or indelible ink pens
- Cell phone camera or digital camera

E. Procedure

This SOP primarily addresses documentation using the Field Report Form (see Attachment A) or field logbook. However, procedures discussed in this SOP are applicable to other types of field documentation collected. Other field records and forms (e.g., soil boring logs, Chain-of-Custody records, water sample collection records, soil vapor monitoring forms) are discussed in the specific SOP associated with that particular activity and are not described in this SOP.

E.1. Field Report Form

Field personnel will keep accurate written records of their daily activities in chronological order on a Field Report Form that will be sufficient to recreate the project field activities without reliance on memory. Entries should be legible and written in black, waterproof or indelible ink. Each page should be numbered sequentially, dated, and signed by the field author. There should be no blank lines on a page. If only part of a page is used, the remainder of the page should have an "X" drawn over it. The completion of each day's work and the end of the field project should be clearly indicated with "END DAY" or "END FIELD INVESTIGATION."

If pre-printed adhesive labels or other added information are glued or taped onto a Field Report Form, the note taker should sign the addition. The signature should begin on the addition and extend onto the Field Report Form page so that the addition cannot be removed without detection.

At a minimum the following information should be recorded for <u>each project</u>:

- Site/project name
- Site location
- Site project number
- Name of project manager
- Full name of Field Report Form author
- Names of other Braun Intertec personnel on site and their role (full name and initials)
- Name of subcontractors performing work for Braun Intertec (or whose work Braun Intertec is monitoring) and the full name and phone number of their site superintendent

At a minimum, the following information should be recorded <u>each day</u>:

- Date
- Purpose of the day's activities
- Pertinent weather conditions (temperature, precipitation events, wind direction and speed, general air quality, particularly any ambient odors). Significant weather changes during the day should be noted
- Full name and initials of Field Report Form author, if different from previous day
- Full name and initials of other Braun Intertec personnel on site and their role, if different from previous day
- Documentation of exclusion zone setup and decontamination procedures, if applicable
- Record safety related monitoring information, including the time and location of the measurements or observations
- If not Level D, record the Personal Protective Equipment (PPE) level in which work is conducted and change in levels and the reason for the change

- Names, phone numbers, and affiliation of all site visitors and their reason for visiting, as well as their time of arrival(s) and departure(s). The project manager should be notified immediately if regulators (e.g., Minnesota Pollution Control Agency [MPCA], Environmental Protection Agency [EPA], Occupational Safety & Health Administration [OSHA]) visit the site. [Note: "all site visitors" means those who are inspecting or observing our work or the work we are overseeing. It is not intended to include unrelated site activities or personnel.]
- Persons contacted, name, and reason for contact, and decisions made. If the person contacted is not Braun Intertec personnel, also record the phone number.

E.2. Environmental Media Sampling Data

The information below should be recorded on specific forms if they are required by the data collection method SOP, but use of the form should be documented on the Field Report Form. The following information should be recorded:

- A chronological description of field observations and sampling events (i.e., date and time)
- Sampling locations (referenced/scaled drawings or global positioning system [GPS] coordinates, if not logged) should be identified. The project manager should provide the sample nomenclature system to the field personnel for consistency and continuity on sites with multiple rounds of data collection.
- Specific data associated with sample acquisition (e.g., field parameter measurements, field screening data, and HASP monitoring data)
- Source of samples, matrix, sample identification, sample container types and preservatives (including ice), field quality assurance/quality control sample collection, preparation, and origin
- Conditions that could adversely impact samples, such as smoke, wind, rain, or dust
- Make, model, and serial number of field instruments should be recorded in the Field Report Form or in a separate calibration log along with calibration data
- Deviations from the work plan and/or SOPs
- Sketches or scaled diagrams
- Process diagrams
- Waste generated and management methods (i.e., investigation derived waste [IDW]).

E.3. Sketches and Scaled Diagrams

Draw a site map using accurate measurements or make notes on a photocopy of an existing site map. The site map should include:

- Site boundaries (or features such as street curbs, fence lines, etc., that can later be related to site boundaries)
- Street names or other references that can be related to a site location map
- Investigation and well locations with dimensions to site landmarks
- Major structures with dimensions
- North arrow
- Scale
- Date
- Initials of field personnel

E.4. Photographs

Subject

Photographs should be taken to document existing conditions pertinent to the subject evaluation or remediation at a project site. Except when specifically required, it is unnecessary to photograph processes that are described by SOPs, but rather photograph the results of the process. **Note: Some restrictions may apply regarding Site photographic documentation.**

Composition

The three most common mistakes to avoid in providing photographic documentation are (1) too few photographs, (2) poor quality photographs, and (3) lack of subject identification in photographs. Photographic documentation should tell the story with as little need for narrative as possible.

When photographing several similar subjects or details that are not necessarily well identified in an establishing shot, such as a test excavations or test excavation spoil piles, it is recommended that you place a clip board with an identifying description in at least the first in the sequence of photographs of that subject or detail.

Scale

Where there are insufficient objects of widely known scale in a photograph, one should be placed in the photograph to provide scale. Some examples include a coin, ruler, clipboard, or cell phone.

Photographic Log

The following information should be recorded in the Field Report Form or field logbook:

- Site name, location, and field task
- Name of photographer
- Date and time the photograph was taken (verify the date/time stamp is correct if using a digital camera)
- Sequential number of the photograph
- Brief description of the subject of the photograph
- Site plan or site sketch showing the location from which the photograph was taken and the direction the photographer was facing.

E.5. Additional Field Forms/Records

Additional field records may be required for some field events. As an example, these may include soil boring logs during drilling, well construction and development records, groundwater purge and sample collection records, water level measurement records, instrument calibration records, sample container labels, sample container security tags and seals, Chain-of-Custody forms, field equipment calibration and maintenance logs and commercial shipping manifests. Use of these records described in the SOPs associated with the particular activity.

Prior to beginning field activities, field personnel will coordinate with the project manager, or designee, to determine which SOPs will be used and identify additional field forms that are required. These additional records will be maintained in a field file throughout the duration of the field activities. Copies of the records will be forwarded to the project manager (or designee) on a daily basis, if practical to do so.

E.6. Corrections

If an error is made in an entry in the field records, corrections will be made by drawing a SINGLE straight line through the error, entering the correct information, initialing, and dating the change. Materials that obliterate the original information, such as correction fluids, tapes or markers are prohibited. If the reason for the change is not obvious, provide a brief explanation.

E.7. Data and Records Management

Field records should be forwarded to the project manager or designated staff on a daily basis, if practical. The project manager should review progress and results in detail on a daily basis and evaluate the quality of the documentation. The field personnel should scan the field records and place them in the project folder in OnBase. This preserves documentation in the event that the Field Report Form is lost, stolen, or damaged. Copies of the field notes should be maintained in accordance with the Braun Intertec Records Retention Policy and Procedures. Photographs should be uploaded to the EnCon DRAFTS project folder as soon as possible.

Individual logbooks may be assigned to large projects. These logbooks will be returned to the project manager at the completion of field work and archived with the project file. Logbooks assigned to individual personnel for recording multiple project information from multiple projects should be provided to the designated EnCon project assistant for archiving when the logbooks are filled. Each logbook should have a table of contents (TOC) and be kept up to date by the personnel to which the book is assigned.

The TOC for each logbook should list the project names and locations, project numbers, inclusive dates and logbook page numbers.

E.8. Quality Assurance/Quality Control

All personnel that perform field work will be trained in the use of this SOP. Project managers or project staff who use the field notes for interpreting data and preparing reports should provide immediate feedback to those recording field information to reinforce conformance with the SOP and correct deficiencies. Periodic random audits of all field personnel documentation will be performed by the quality assurance (QA) manager or designees.

F. References

U.S. Environmental Protection Agency, Region 4, Science and Ecosystem Support Division, Athens, Georgia, Operating Procedure: Logbooks, SESDPROC-010-R3, October 31, 2007.

BRAUN INTERTEC

Field Report Form

Project No.:

Date:

Project Name:

Personnel:

Location:

Time On Site:

Time Off Site:

☐ Photos taken and documented.

Project Manager:

Other Braun Intertec Staff:

Weather (temperature, wind speed and direction, etc.):

Other Personnel (subcontractors, site superintendent, etc.; include time on site and time off site):

PPE and Field Equipment Used (e.g., PID; include ID numbers, calibration information, etc.):

Work Completed (include field scope, unexpected issues, action items, log of communication, and site sketch):

Signature:

BRAUN INTERTEC

Field Report Form

Project No.:		Date:	
Project Name:		Personnel:	
Location:		Project Manager:	

Work Completed (include field scope, unexpected issues, action items, log of communication, and site sketch):

Signature:

A. Purpose

The objective of this Standard Operating Procedure (SOP) is to establish a consistent method and format for visual identification and description of soil samples collected in the field. This SOP is applicable to soil samples collected during completion of soil borings (see SOP 203 – Soil Boring Observation and Sampling) and test trench excavations (see SOP 211 – Test Pit and Test Trench Observation and Sampling).

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 203 – Soil Boring Observation and Sampling
- SOP 208 – Soil Grab Sample Collection
- SOP 209 – Soil Composite Sample Collection
- SOP 210 – Soil Stockpile Sampling
- SOP 211 – Test Pit and Test Trench Observation and Sampling

D. Equipment and Supplies

- Soil boring or test trench log forms (see SOP 203 – Soil Boring Observation and Sampling or SOP 211 – Test Pit and Test Trench Observation and Sampling)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens

E. Procedure

As soil samples are collected in the field, a visual identification and description will be completed as described below. The *Standard Practice for Description and Identification of Soils* (American Society for Testing and Materials [ASTM] D2488-00) was used to prepare this SOP, and soil descriptions should follow that document as applicable.

When visually describing soils in the field, the following information should be provided at a minimum; however, more detailed descriptions are encouraged.

Prepare the soil description **in the order shown**. All field personnel should have a laminated copy of the Field Guide for Soil and Stratigraphic Analysis and use this field guide for classification of soil.

E.1. Main Soil

A description of the main soil group name using the United Soil Classification System (USCS) nomenclature (e.g., gravel, sand, silt, clay, silty sand, clayey sand, organic soil, etc.).

E.2. Group Symbol

List the Group Symbol in parenthesis after the main soil group name. Group symbols include the following:

- CL = Lean Clay; Lean Clay with Sand
- ML = Silt; Silt with Sand
- CH = Fat Clay
- OL/OH = Organic Soils
- GW/GP = Well Graded Gravel/Poorly Graded Gravel
- GP-SM = Poorly Graded Gravel with Silt
- GP-SC = Poorly Graded Gravel with Clay
- GM= Silty Gravel
- GC = Clayey Gravel
- SW/SP = Well Graded Sand/Poorly Graded Sand
- SP-SM = Poorly Graded Sand with Silt
- SP-SC = Poorly Graded Sand with Clay
- SM = Silty Sand
- SC = Clayey Sand

E.3. Color

Describe the color of the main soil group (e.g., brown, gray, etc.). Preferably, the color should be identified using a Munsell® Soil Color Chart. The Munsell® Soil Color Chart is a good resource for characterization of color at sites with complicated geology. The soil color should be described for moist samples. If the soil sample contains layers or patches of varying colors (e.g., mottled), this should be noted and representative colors shall be described. If the color described is for dry soils, this must be noted on the log.

E.4. Moisture

Describe the overall moisture of the soil sample using the terms dry, moist, or wet (do not use the term "saturated"):

- Dry = absence of moisture, dusty, dry
- Moist = damp, but no visible water
- Wet = visible water; usually soil is below the water table or perched water

E.5. Percentage by Weight

Describe the percentage by weight of the soil type(s) present in the sample using ASTM adjectives based on the percentages present within the sample:

- Trace = < 5%
- Few = 5 to 10%
- Little = 10 to 25%
- Some = 30 to 45%
- Mostly = 50 to 100%

E.6. Grain Size

Coarse-grained Soil

If the soil is coarse-grained (i.e., sand or gravel), include a brief description of the predominant particle grain size(s) (e.g., fine, medium, coarse) (see field guide).

Fine-grained Soil

If the soil is fine-grained (i.e., clay or silt), describe the consistency based on finger pressure:

- Very soft = thumb will penetrate soil more than 1 inch
- Soft = thumb will penetrate soil about 1 inch
- Firm = thumb will penetrate soil about 1/4 inch
- Hard = thumb will not indent soil, but thumbnail will easily make a mark
- Very hard = thumbnail will not indent soil

E.7. Plasticity

Describe the plasticity of the soil sample as follows:

- Nonplastic = A 1/8-inch (3-mm) thread cannot be rolled at any water content.
- Low = The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
- Medium = The thread is easily rolled and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
- High = It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

E.8. Structure

Describe any structures present in the soil sample as follows:

- Stratified = alternating layer of varying materials or color layers at least 1/4 inch or greater, note thickness.
- Laminated = alternating layer of varying materials or color layers less than 1/4 inch thick, note thickness.
- Fissured = Breaks along definite planes of fracture with little resistant to fracturing.
- Slickensided = Fracture planes appear polished or glossy.
- Blocky = cohesive soil that can be broken down into angular lumps which resist further breakdown.
- Lensed = Inclusions of small pockets of different soils such as small lenses of sand scattered in a mass of clay, note thickness.
- Homogeneous = same color and appearance throughout.

E.9. Mottling

Mottling is a patchwork of different colors in mineral soil (usually orange or rust against a background of grey or blue) which indicates periods of anaerobic (wet) conditions. If mottling is present, note the fraction of the sample that is mottled (e.g., 1/2 mottled and the color of the mottle).

E.10. Cementation

Note if any cementation is present.

E.11. Unusual Materials or Debris

Note the presence of any unusual materials or debris (e.g., bricks, glass, wood). Include the specific depth interval of the occurrence of unique material in the description or in the Remarks. See SOP 203 – Soil Boring Observation and Sampling, SOP 210 – Soil Stockpile Sampling, and SOP 211 – Test Pit and Test Trench Observation and Sampling for additional information.

E.12. Odor

Indicate any odors that are present such as organic or unusual odors. Soils that have a significant amount of organic content usually have a distinct color and odor. If the odor is of decaying vegetation, state that there is an "organic odor" present. If the odor is unusual (petroleum, herbicides, chemicals) describe the odor intensity (strong, moderate, mild, no odor) and a general descriptor. However, do not use specific chemical names to describe the odor. For example stating that "a strong chemical odor is present from 2 to 3 feet below ground surface (bgs)" is correct; however, stating that the soil "has a gasoline odor" is NOT correct.

Note: When smelling soil, do not inhale deeply or repeatedly; the chemicals present may represent a health risk.

E.13. Fill

If the soil is fill or probable fill, note in brackets (e.g., [fill], [probable fill]).

Waste/debris terminology should be as specific and descriptive as possible (e.g., concrete and glass vs. demolition debris). Category names of waste/debris should not be used. Imprecise or incorrect terminology may cause undue concern among regulators. Several important distinctions should be drawn:

- **Wood:** The term wood should not be used alone. Differentiate between tree/brush waste and lumber. To the extent feasible, lumber should be further qualified as unadulterated or treated and the type of treatment described (e.g., painted, green treated, brown treated, creosote, etc.).
- **Debris:** The term debris should not be used alone. Most often, the term is used to refer to demolition debris; however, the distinction should be drawn between demolition debris consisting of road/paving demolition debris and building demolition debris.
  - Note and carefully describe the presence of concrete pieces or blocks, bricks, bituminous, recycled gravel, pipe, or tubing.
  - Asbestos is more frequently associated with building demolition debris; although, it can also be present with road/paving materials, particularly in cementitious utility conduits.
  - Household waste or garbage should be noted as such if present.
- **Sizes/Amounts:** Qualitative terms like small, medium, large, etc., should be avoided in favor of dimensions (i.e., inches, feet, etc.), unless they are defined by ASTM or other commonly understood conventions. When reasonable, descriptions of sizes and percentages should be quantitative (e.g., "3 to 4 feet" or "less than 1 percent [%]") rather than qualitative (e.g., "large") or semi-quantitative (e.g., "several," or "a few").

E.14. Example

The following are examples of correct visual soil classifications:

- Silty sand (SM), dark brown (10YR 3/3), moist, mostly sand with some low plasticity fines and trace gravel, sand grains are fine to medium grained, firm, homogeneous.
- Clay (CL), gray (7.5YR 5/1), wet, mostly fines with trace sand, medium to high plasticity, soft, laminated, moderate chemical odor(s) [fill].
- Poorly Graded Sand (SP), dark brown (10YR 3/3), moist, mostly coarse-grained sand, trace fine sand, non-plastic, homogenous, debris present [debris fill]. Debris present from 4 to 5 feet bgs. Debris content is 25-30% of the material and consists mostly of concrete (4 to 6 inches in diameter), and some broken glass (< 1 inch in diameter).

E.15. Groundwater

If and when groundwater is encountered, note the depth to water in the log.

E.16. Collecting Soil Samples

If soil samples are collected for laboratory analysis, refer to the appropriate SOPs including SOP 203 – Soil Boring Observation and Sampling, SOP 208 – Soil Grab Sample Collection, SOP 209 – Soil Composite Sample Collection, SOP 210 – Soil Stockpile Sampling, and SOP 211 – Test Pit and Test Trench Observation and Sampling.

E.17. Geotechnical Logs

To ensure consistent logs across Braun Intertec disciplines, soil samples will be collected and classified by a Braun Intertec Geotechnical Engineer. The Geotechnical Engineer's log is a supplement to the field log and is not meant to be a replacement for the field log.

Place one or more representative portions of each two-foot interval into sealable moisture-proof containers (jars or quart-sized polyethylene sealable bags) without ramming or distorting any apparent stratification. Seal the containers to prevent evaporation of soil moisture.

Affix labels to the containers indicating job designation, boring number, and sample depth. If there is a soil change within the interval, collect a soil sample for each stratum and note its depth.

Deliver the samples to a Braun Intertec soil classification lab. Include a copy of the soil boring log form.

E.18. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.19. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

This Standard Operating Procedure (SOP) describes procedure for screening soil potentially contaminated with volatile organic chemicals, such as petroleum, and/or hazardous substances that can be ionized within the energy range of the photoionization detector (PID) lamp being used. The purpose of the bag headspace procedure is to assist with site soil characterization of organic chemical contamination, soil sample selection for laboratory analysis, and soil management during excavation.

A.1. Scope and Applicability

This procedure should be used during field activities where bag headspace procedures are required by regulatory guidance or site-specific work plans. This procedure is used for soil characterization and not for health and safety monitoring.

A.2. Summary of Method

A quart-size polyethylene bag with a tight sealing closure is filled with soil (approximately 1 cup) and immediately closed leaving air in the top portion of the bag (headspace). Organic vapors are allowed to accumulate in the headspace for approximately 10 minutes at room temperature. The bag is opened slightly and the tip of the PID probe is inserted to the middle of the headspace. The highest PID response observed is recorded in the field notes.

A.3. Definitions

Background Readings: The PID measurement of ambient air and bag headspace reading without soil in the bag.

Ionization energy (IE): The energy required to displace an electron and "ionize" a compound. Used more commonly than the old, but equivalent, term Ionization Potential (IP).

Photoionization Detector (PID): The PID is a portable, nonspecific, vapor/gas detector employing the principle of photoionization to detect and measure real-time concentrations of a variety of chemical compounds, both organic and inorganic, in air.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 201 – Classification of Soil
- SOP 205 – Calibration of MiniRAE PID

D. Equipment and Supplies

- Quart-size polyethylene sealable bags
- PID with appropriate lamp (10.6 or 11.7 electron volts [eV])
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Personal Protective Equipment (PPE)

E. Procedure

E.1. Preparation

PID lamps with two different light energy (in electron volts or eV) are available for use. The 11.7-eV lamp measures the broadest range of compounds at lower sensitivity; while the 10.6-eV lamp is responsive to most commonly-studied VOCs and has higher sensitivity. The standard lamp used is 10.6 eV unless otherwise specified by the technical project manager.

Calibrate the PID onsite at least daily to yield total organic vapors in parts per million (ppm) using an isobutylene standard. If field personnel are at multiple project locations in one day, calibrate the PID upon arrival to each project location. See SOP 205 – Calibration and Operation of MiniRAE PID for calibration procedures. Record the date and results of the daily calibration.

E.2. Collection

- Visually examine the soil for staining or sheens. Note observations in field logbook. Describe the type and general amount of debris, if present, in the field logbook (see SOP 201 – Classification of Soil).
- Do not intentionally smell the soil for odors, but note unintentional olfactory indication of contamination in the field logbook.
- Collect soil samples in increments according to instructions established by the project manager or the site-specific work plan.
- **Soil samples for laboratory analysis should not be collected from the sealable bag used for headspace analysis.**
- While wearing proper PPE (Nitrile gloves at a minimum), field personnel should fill approximately one-quarter of a quart-size polyethylene sealable bag with a tight sealing closure (about 1 cup of soil), leaving air in the upper portion of the sealable bag (the volume ratio of soil: headspace should be 1:3). Close the quart-size polyethylene sealable bag immediately, making sure all soil is clear from the path of the bag's seal. Break apart the soil while vigorously shaking the bag for 15 seconds, avoiding puncturing a hole in the bag or tearing apart the zipper.
- Allow the headspace to develop in the sealable bag at room temperature (e.g., approximately 50 °F or greater) for 10 to 20 minutes. If the temperature is below approximately 50 °F, allow the headspace to develop within a heated vehicle or building. Record the ambient temperature during headspace screening.
- Vigorously shake the sealable bag again for 15 seconds. Open the sealable bag slightly, enough for the end of the PID probe tip to enter the bag and insert the tip to the middle of the headspace, avoiding contact with the soil and/or potential moisture from condensation in the sealable bag. Watch the PID screen for the highest reading (ppm). The maximum reading should appear in less than 5 seconds. Record the maximum PID reading reached in the field notes. Record the actual PID reading, do not round the number.
- In addition to screening a soil sample, a background PID headspace reading should be established in the field. Under the same conditions as the screened soil sample (heated vehicle or building, etc.), take an empty quart-size polyethylene sealable bag, puff it up with air, and insert the probe of the PID in the same way as the soil sample. Watch the screen of the PID for the highest PID reading (ppm). Record the maximum PID reading reached in the field notes. Record the actual PID reading, do not round the number.

E.3. Cautions

PIDs provide non-specific measurement of the presence of organic compounds including the following: aromatics, ketones and aldehydes, amines and amides, chlorinated hydrocarbons, sulfur compounds, saturated and unsaturated hydrocarbons, and alcohols. The light energy in eV emitted by the PID lamp must be greater than the IE of the compound(s) of interest. However, 11.7-eV lamps should only be used when compounds with IEs over 10.6 eV are expected and are the primary contaminants. Examples include carbon tetrachloride, methylene chloride, chloroform, and 1,1,1-trichloroethane.

Consult the NIOSH Guide to Chemical Hazards for ionization energies for most common contaminants. The PID will not measure the following: radiation, air (N_2, O_2, CO_2, H_2O), natural gas (methane, ethane, propane), acid gases (HCl, HF, HNO_3), common toxics (CO, HCN, SO_2), freons, ozone, hydrogen peroxide, polychlorinated biphenyls (PCBs), or greases.

E.4. Interferences

Excessive moisture in the air or dust on the PID lamp and sensor housing can cause a false positive response on the PID. This problem can be demonstrated by a “drift” upward of the measurement or could be a sharp response to inserting the probe either into an empty sealable bag or into a sealable bag filled by blowing air into it. See SOP 205 – Calibration and Operation of MiniRAE PID for steps to take to resolve this.

E.5. Data and Records Management

Field data should be recorded and managed in accordance with SOP 101 – Field Notes and Documentation. Documentation should include the following:

- Calibration: date and result
- Maintenance performed, if any
- Background readings: ambient air and quart-size sealable bag
- Ambient air temperature at which headspace screened
- Sample identification information per sample method SOP
- General observations: condensed moisture in the bag, unusual odors associated with the soil sample and/or ambient air

E.6. Quality Assurance/Quality Control

Field personnel should check the PID maintenance log before beginning each new job to make sure that scheduled maintenance is current. Erratic PID responses in the field should be evaluated, and field maintenance performed or the PID should be replaced. The PID should be calibrated daily in the field.

Ambient air quality at the work site should be checked and recorded, as should a headspace sample of an empty sealable bag. All quality assurance (QA) checks should be documented in the field logbook.

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

F. References

Minnesota Pollution Control Agency, Soil Sample Collection and Analysis Procedures, Field Screening Procedures. Guidance Document 4-04, c-prp4-04. Petroleum Remediation Program, Minnesota Pollution Control Agency; St. Paul, MN, September 2008.

NIOSH, Pocket Guide to Chemical Hazards, NIOSH Publications; Cincinnati, OH, September 2007.

A. Purpose

The purpose of this Standard Operating Procedure (SOP) is to describe procedures to be used to conduct and document soil boring observations and sampling either from a direct-push probe or drill rig.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

In addition to potential exposure to hazardous materials, observing drilling of soil borings presents safety risks due to working near drilling equipment.

One of the biggest risks during probe sampling is the use of utility knives to cut open the plastic sleeves that hold soil collected by the probe. Instruct the probe operator to cut the sleeves open. Do not cut the sleeves open yourself.

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 201 – Classification of Soil
- SOP 202 – Organic Vapor Screening
- SOP 208 – Soil Grab Sample Collection
- SOP 209 – Soil Composite Sample Collection
- SOP 311 – Groundwater Sample Collection
- SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe
- SOP 702 – Management of Investigation Derived Waste

D. Equipment and Supplies

- Soil Boring Log form (see Attachment A)
- Global Positioning System (GPS) unit or measuring tape
- Photoionization detector (PID) with appropriate lamp (see SOP 202 – Organic Vapor Soil Screening)
- Soil sampling equipment (see SOP 208 – Soil Grab Sample Collection and SOP 209 – Soil Composite Sample Collection)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Groundwater sampling equipment (see SOP 311 – Groundwater Sample Collection)
- Soil vapor sampling equipment (see SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe)
- Waterproof and/or indelible ink pens
- Cell phone camera or digital camera
- Personal Protective Equipment (PPE)
- 55-gallon drum, if necessary

E. Procedure

E.1. Disposition of Drill Cuttings, Excess Probe Soil and Removed Groundwater

Before the drilling begins, review the proper procedures for disposition of soil and groundwater in accordance with the Sampling Plan and SOP 702 – Management of Investigation Derived Waste. If necessary, ensure that steel drums are provided to collect either the soil cuttings or excess removed groundwater.

E.2. Underground Utility Locates

Perform underground utility clearance in accordance with the Braun Intertec Corporate Utility Clearance Process.

Ensure that utilities are marked and the soil borings are located a safe distance from any buried utility.

E.3. Boring Location and Numbering

A day or two before the field work, review the written scope of work with the project manager. The scope should define the boring numbering scheme, boring locations, depths, sample intervals, and types of samples to be collected. Make sure that all required field equipment is prepared and in good working condition. If required, determine the appropriate place to dispose of cuttings or provide an appropriate container per SOP 702 – Management of Investigation Derived Waste.

During many projects, boring locations will be marked by Braun Intertec personnel, such as the CADD Staker, before the field event begins. In other cases, the responsibility to identify boring locations is left to field personnel on the day of the event. In either case once on site, identify the boring locations with the driller (or drilling subcontractor). Ensure that utilities are marked and that all proposed soil borings are located a safe distance from any buried utility. Review planned sampling procedures to ensure they meet the scope of work. In particular, review sample intervals and water sampling depths, if appropriate.

If the marked boring location must be changed, it is critical that the new location is clear of underground utilities. In some cases, utility marking does not apply to new locations and the work cannot proceed until new locations have been cleared. Use a measuring tape or GPS unit to document soil boring locations relative to the original marked location. This also may be necessary if a boring location must be modified due to refusal or if additional borings are advanced based on field observations (i.e., step out borings). If boring locations were not previously located with a GPS unit, make arrangements for proper location either on the day of the event or later.

E.4. Drilling

The driller or probe operator will collect soil samples from the sample intervals and provide the samples to the field personnel. It is the responsibility of the driller or probe operator to decontaminate the sampler and reusable sampling equipment to minimize cross-contamination using a brush in a detergent and water wash, followed by a clean water rinse between intervals.

Field personnel are responsible for making field observations of the soil, screening soil samples for volatile organic vapors, and collecting soil or water samples both for laboratory analysis and geotechnical classification by a Braun Intertec Geotechnical Engineer.

E.5. Soil Description

Note the surface composition (e.g., concrete, asphalt, grass, etc.). Indicate the material at the surface of the borehole (e.g., 4-inch concrete, asphalt, grass, gravel, etc.) in the top section of the log form.

The driller will bring the sampler to the surface and open it at the request of field personnel. Record the percent recovery and the length of sample recovered in feet. Describe the soil type, color, stratification, and conditions of the soil samples recovered (see SOP 201 – Classification of Soil).

E.6. Soil Screening

Don new disposable gloves. Collect a small sample of the soil from each two-foot interval (or less) for organic vapor screening in the field using a photoionization detector (PID) (SOP 202 – Organic Vapor Soil Screening). Record the results of the vapor screening on the boring log form.

E.7. Soil Sampling

Collect soil samples for chemical analysis in the field as soon as possible after retrieval. To collect soil samples for chemical analyses as specified in the project-specific work plan or Sampling and Analysis Plan, refer to SOP 208 – Soil Grab Sample Collection and SOP 209 – Soil Composite Sample Collection.

As samples are collected for laboratory analysis, note the sample name, including depth, time collected, and analytical test in the Remarks section of the Boring Log. For example:

- GP-1(8-10') @ 10:15 – DRO, GRO and VOCs
- ST-3 (2-4') @ 10:45 – RCRA Metals

E.8. Groundwater Sampling

Groundwater Sampling from a Borehole Advanced by a Drill Rig

The drilling operator will advance the auger to the specified depth and prepare for groundwater collection. The operator may use one of the two following methods:

- In the case of shallow groundwater and a fairly competent soil formation, the operator advances the auger to the desired depth for groundwater sampling. All drilling equipment is removed from the borehole. Groundwater samples are collected from inside the open borehole.
- In the case of a less competent soil formation, the operator advances the auger to the desired depth for groundwater sampling. A length of 2-inch diameter PVC pipe with a five or ten foot screened portion on the bottom is extended down the open hole. All drilling equipment is removed from the borehole. After an appropriate period of time, groundwater samples are collected from inside the screened portion of the PVC pipe.

Groundwater Sampling from a Probe Borehole

The sampling probe operator will advance the probe to the depth you specify and prepare the sampler for groundwater collection. The operator may use one of the two following methods:

- In the case of shallow groundwater and a fairly competent soil formation, the sampling probe is advanced to the desired depth for groundwater sampling. All sampling probe equipment is removed from the probe hole. A length of 3/4-inch diameter PVC pipe with a five or ten foot screened portion on the bottom is extended down the open hole. Groundwater samples are collected from the screened portion of the PVC pipe.
- In many cases the operator advances a special sampling probe to the desired depth for groundwater sampling. The tip of the probe will be an “expendable point” which is snugly attached to the probe. Inside the probe is a stainless steel screen section. The sampling probe is pulled up, releasing the expendable point and exposing the screen. Groundwater samples are collected from the screened portion of the stainless steel screen.

Groundwater Sample Collection

Refer to SOP 311 – Groundwater Sample Collection for procedures for collecting groundwater samples.

As samples are collected for laboratory analysis, note the boring identifier, time collected, and analytical test in the Remarks section of the Boring Log.

E.9. Soil Vapor Sampling

Refer to SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe for details on collecting the soil vapor sample.

As samples are collected for laboratory analysis, note the boring identifier, time collected, and analytical test in the Remarks section of the Soil Boring Log.

E.10. Geotechnical Logs

To ensure consistent logs across Braun Intertec disciplines, samples of soil cores will be collected and classified by a Braun Intertec Geotechnical Engineer. The Geotechnical Engineer’s log is a supplement to the field log and is not meant to be a replacement for the field log.

Place one or more representative portions of each two-foot interval into sealable moisture-proof containers (resealable bags) without ramming or distorting any apparent stratification. Seal the bag to prevent evaporation of soil moisture.

Label the containers indicating job designation, boring number, and sample depth. If there is a soil change within the interval, collect a soil sample for each stratum and note its depth.

Deliver the samples to a Braun Intertec soil classification lab. Include a copy of the soil boring log form.

E.11. Documentation

Logs of borings are required in investigation reports. Use the Soil Boring Log form (Attachment A). Descriptions of soil samples collected in the field are described in SOP 201 – Classification of Soil.

Photographs will be taken of the boring location in accordance with SOP 101 – Field Notes and Documentation.
A photographic log should be included with the field notes. If there is something specific field personnel would like the viewer to note, be sure it is specified in the description.

E.12. Backfilling/Restoration

The boring will be backfilled with bentonite grout or reused soil cuttings, if appropriate, as allowed or required by the well code.

E.13. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.14. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

Project Name/Project Number:		Log of Boring No.	
Boring Location Notes:		Surface Elevation:	Total Depth:
Drilling Contractor/Drilling Method:		Date/Time Started:	Date/Time finished:
Sampling Equipment (i.e., Macro-Core, split spoon):		Depth to Water:	Measuring Point:
Field Personnel:	Responsible Prof./Reg. No.:	Surface Cover (asphalt, concrete etc.)	

Depth (Feet)	Sample Recovery	PID (ppm)	DESCRIPTION Name (USCS Symbol), color, moisture, grain size, amount of gravel, sand, or fines, plasticity, consistency, structure, inclusions or debris present, geologic interpretation (fill, native, till, lacustrine etc.)	Analytical Sample Interval	Remarks (odors, blow counts, debris, analytical sample IDs, temp well details etc.)

BRAUN INTERTEC

Project Name/Project Number:	Log of Boring No. (Cont.)

Depth (Feet)	Sample Recovery	PID (ppm)	DESCRIPTION Name (USCS Symbol), color, moisture, grain size, amount of gravel, sand, or fines, plasticity, consistency, structure, inclusions or debris present, geologic interpretation (fill, native, till, lacustrine etc.)	Analytical Sample Interval	Remarks (odors, blow counts, debris, analytical sample IDs, temp well details etc.)

BRAUN INTERTEC

A. Purpose

The purpose of this Standard Operating Procedure (SOP) is to provide the procedure to calibrate a MiniRAE 3000 or MiniRAE Lite Photoionization Detector (PID). Proper calibration of the PID will help produce consistent and defensible field measurements. In addition, this SOP describes procedures to identify and address simple issues related to dust accumulation on the lamp and internal housing.

B. Health and Safety

The use of the MiniRAE 3000 or MiniRAE Lite PID should be in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 202 – Organic Vapor Soil Screening

D. Equipment and Supplies

- MiniRAE 3000 or MiniRAE Lite PID with appropriate lamp
- Clean moisture filter
- Isobutylene span gas (100 parts per million [ppm])
- Regulator
- Polyethylene tubing with T-connection
- Bound Calibration Record (in PID case)
- Isopropanol cleaner and Q-tips
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens

E. Procedure

E.1. Prior to Leaving Office

Prior to leaving the office, ensure that the PID has power and the span gas canister is full.

Attach the regulator to the 100 ppm isobutylene span gas. The regulator has a gauge on it to show how much span gas remains in the canister. The gauge should show more than 100 pounds per square inch (PSI) of gas. If not, replace the canister with a new one.

E.2. To Turn On

Check the probe tip for dirt or other obstructions. Clean as necessary.

Check the moisture filter for visible dirt. Replace as necessary.

Screw the probe tip and filter assembly onto the PID.

There are three buttons on the screen face of the PID:

- MODE (Φ)
- **Y/+**
- **N/-**

There is one button on the body of the instrument:

- LIGHT

Press and hold the center MODE button for a few seconds, then release. The screen will flash through a series of screens. Screens will display:

RAE
SYSTEMS

PGM-7320
VOL 01.01

MINIRAE 3000
SN 952-001736

Self test….

Test Passed!

Ready…Start Sampling?

Press the **Y/+** key.

An audible whirring sound will begin, which is the air pump inside the PID.

Note: If the screen displays "Lamp" alarm, the internal lamp has failed to light. Wait for several minutes until it lights. If the "Lamp" display remains, turn off the PID, and retry turning on the instrument.

E.3. To Calibrate

Press and hold the MODE (Φ) and **N/-** buttons at the same time for approximately two (2) seconds. The screen will display:

ENTER PASSWORD ________

Do not enter a password. Press MODE (Φ), or enter, again. The screen will give the options of:

CALIBRATION
ZERO CALIB (highlighted)
SPAN CALIB

Press the **Y/+** key to select Zero Calibration. Be sure the PID is in "zero" (i.e., fresh) air.

Press the **Y/+** key again to start the zero air calibration. Zeroing starts a 30 second countdown. When complete the screen says:

Zeroing Is Done!
Reading = 0.0 PPM

Then the screen will give the options of:

Calibration
Zero Calib
Span Calib (highlighted)

Press **Y/+** to select Span Calibration. The screen will display:

C. Gas = Isobutylene
Span = 100 ppm
Please apply Gas 1

Attach the regulator to the 100 ppm isobutylene span gas. The regulator has gauge on it to show how much span gas remains in the canister. The gauge should show more than 50 PSI gas. If not, do not use it because the calibration may not work, replace the canister with a new one. Attach one end of the polyethylene tubing to the top of the regulator. Tubing should have a T-joint on it to provide span gas at atmospheric pressure during calibration. Attach the other end of the tubing to the PID probe. Push in and twist the control button on the regulator until the gas can be heard escaping the canister.

As soon as the tubing is in place, the PID may begin a 30 second countdown. Press "start" if the countdown does not begin automatically. After 30 seconds the screen will display:

Span 1 is done
Reading ___.___ppm.

Turn off the span gas by pressing and twisting the control button on the regulator until the gas does not escape from the canister any longer.

Wait for the reading to drop as fresh air enters the tubing. If the reading does not drop below 1.0 ppm, repeat the calibration. If it does drop below 1.0 ppm, record the lowest number displayed as the Ambient Air Reading in the Calibration Log. Turn the span gas back on and wait for the reading to stabilize. If the reading is not within ±5 ppm of 100 ppm, repeat the calibration. If the reading is within ±5 ppm of 100 ppm, turn off the gas and record the number displayed as the Span Gas Reading on the Calibration Log.

Release the tubing from the PID probe and regulator. Unscrew the regulator from span gas canister.

Complete the calibration information in the bound Calibration Record. Also note in field notes that the calibration was completed.

If the calibration does not complete normally, or if the instrument will not produce the expected readings during the calibration verification, note the failure and attempted remedy on the Calibration Record. After attempting a remedy, repeat the calibration. If the calibration does not produce the expected result contact the office to obtain instructions for other potential remedies or to obtain a replacement PID. <u>Do not use a PID that does not calibrate properly.</u>

E.4. To Turn Off

Press and hold the MODE (Φ) button. The instrument will count down for 5 seconds. The lights and/or alarm may flash and sound during the countdown. Release the MODE (Φ) button when the screen displays:

UNIT OFF!

E.5. Interference and Cleaning

Excessive moisture in the air can cause dust on the PID lamp and sensor housing to produce a false positive response on the PID due to current leakage across the electrodes. This problem can be demonstrated either by a “drift” upward of the measurement or a sharp response to inserting the probe either into an empty sealable bag or into a sealable bag filled by blowing air into it. Dust on the lamp and sensor is the primary reason for these responses. The sensor has two electrodes. With clean dry air and sensor components, no current can leak across the air space between the two electrodes. However, even microscopic dirt accumulations on the electrodes and Teflon parts can promote leakage. A sensor may appear to be clean, but may be dirty enough to cause current leakage.

If field personnel are observing false positive responses with the PID, they must perform a humidity response test. The humidity response test includes exhaling gently into an empty sealable bag and then inserting the probe tip into the bag. The PID should show little to no response from this test. If the PID reads more than 5 ppm, the lamp and sensor may need cleaning. Record the results of the humidity response test in the field logbook.

Take the following steps to attempt to resolve the high ambient PID readings. After each step, repeat the humidity response test. If the humidity response test passes (i.e., < 5 ppm reading), record the action in the field notes and proceed with using the PID. If the humidity response test does not pass, proceed to the next step:

- Replace or temporarily remove the moisture filter – The case should have a spare moisture filter. Discard the used filter and connect the new filter to the probe tip.
- Clean the PID lamp and sensor.

  1. Unscrew the large silver sensor cover from the front of the PID. Be careful, in some cases, the white-plastic sensor detector or lamp inside the cover may be loose. Take care not to drop them.
  2. Carefully remove the white plastic sensor detector from the PID housing. It may be necessary to hold the edges of the sensor detector and use a gentle rocking motion to remove it.

  Note: Never touch the lamp surface or the gold-colored sensors with your fingers.

  3. Dip a clean cotton swab into the isopropanol cleaner. Gently swab the flat surface of the lamp and the gold-colored electrodes on the back of the sensor detector.
  4. Let the cleaner evaporate from the components in the air for about five minutes.

5. Replace the sensor detector and screw the cover back onto the PID. Re-connect the probe.

6. Allow the PID to run several minutes until the ambient reading returns to 0.

- Stop using the PID and obtain a different PID to complete the work. The PID must be professionally serviced.

E.6. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.7. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

F. References

Addressing PID Instruments Moisture Sensitivity: Humidity Effect on PID Instruments, Technical Note TN-163, RAE Systems by Honeywell; San Jose, CA, February 2014.

A. Purpose

The following Standard Operating Procedure (SOP) for the collection of grab soil samples is intended to be used by Braun Intertec field personnel for the purposes of soil sample collection. Grab sampling techniques should always be used to collect samples for volatile organic compounds (VOC), gasoline range organics (GRO), diesel range organics (DRO) or other analyses that require collection of a generally undisturbed portion of soil. Grab sampling techniques may also be used to collect other analytes such as semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals. Grab samples should be collected prior to collection of other sample aliquots as soon as possible after the sampling interval is retrieved. Soil samples collected in the field during investigations for characterization and/or documentation of site conditions are integral to the services provided to clients and regulatory agencies.

This SOP is applicable for soil samples collected from soil borings (SOP 203 – Soil Boring Observation and Sampling), test pits and test trenches (SOP 211 – Test Pit and Test Trench Observation and Sampling), stockpiles (SOP 210 – Soil Stockpile Sampling), and/or excavations.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP), if applicable.

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 203 – Soil Boring Observation and Sampling
- SOP 210 – Soil Stockpile Sampling
- SOP 211 – Test Pit and Test Trench Observation and Sampling
- SOP 308 – Trip Blanks
- SOP 602 – Chain-of-Custody Procedures
- SOP 603 – Sample Shipping

D. Equipment and Supplies

- Coring device (one for each soil sample collected)
- Portable digital scale, if necessary
- Appropriate laboratory-supplied container and preservative (when applicable)
- Sample labels
- Sample coolers
- Ice
- Temperature blanks (one per sample cooler)
- Trip blanks, if necessary (see SOP 308 – Trip Blanks)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedure)
- Custody seals
- Cell phone camera or digital camera
- Personal Protective Equipment (PPE)

The following table provides details regarding analytical parameters and the type of laboratory-supplied containers and applicable preservative.

Analytical Parameter (holding time)	Bottle Type and Preservation Type
DRO (10 days)*	4-oz. glass jar, pre-weighed and unpreserved
8 RCRA Metals or 13 Priority Pollutant Metals (6 Months, except mercury 28 days)	4-oz. glass jar, unpreserved
GRO (14 days)**	40-milliliter (mL) glass vial, with 10 mL methanol pre-weighed
PCBs (14 days)***	4-oz. glass jar unpreserved
SVOCs (14 days)****	4-oz. glass jar unpreserved
VOCs (14 days)**	40-mL glass vial, with 10 mL methanol, pre-weighed

*DRO soil samples collected in 60-mL pre-weighed containers must be filled with 25 to 35 grams or soil.
**VOC and GRO soil samples collected in 40-mL pre-weighed containers should contain between 8 to 11 grams of soil.
***PCBs – Polychlorinated Biphenyls
****SVOCs – Semi-volatile Organic Compounds

All soil samples must have a single unpreserved sample collected (5-10 gram minimum) for dry weight analysis (i.e., moisture sample).

E. Procedure

E.1. Bottle Order

Several days before field work is scheduled to begin contact the laboratory to order sample containers and soil coring devices by phone or email. It may be a good idea to order extra bottles to allow for breakage, extra samples, etc. If you are unsure of the required sample volumes or proper laboratory sample containers for specific analytical parameters, ask that a written description be included with the bottle order which clarifies sample requirements.

Upon receipt of the sample coolers and before you leave for the field, check the contents of the cooler to be sure that you have the appropriate sample containers and that extra containers are included, if requested. Be sure you are aware of sample volume and container requirements.

E.2. Cooler Preparation

Place ice or a frozen cold pack into each sample cooler before collecting any samples. Double-bag the ice in sealable gallon bags or sealed garbage bags to avoid potential contact of water in the cooler with sample containers.

Place a temperature blank into each cooler and under the sealed bags of ice. If the cooler will contain VOCs samples ensure that a trip blank is placed into the cooler with the samples.

E.3. Labeling Sample Containers

Prior to collecting soil grab samples, complete the sample label for the laboratory-supplied containers. The sample label must have the following information:

- Project Number (listed under "Client")
- Sample Name (listed under "Sample ID")
- Date Sample Collected (listed under "Collection Date")
- Sampler's Initials (listed under "Collected by")
- Time Sample Collected (listed under "Time")

Additionally, some laboratory-supplied sample containers (e.g., DRO, GRO, and VOCs) have been pre-weighed by the laboratory. It is important to make sure that the pre-weighed sample containers have their weight listed on the sample label and that the weight is visible.

E.4. Soil Sampling

Select sample location/interval per the Work/Sampling Plan. Don new disposable gloves and expose a fresh surface of soil, if necessary. Follow procedures listed below for each specific parameter. If VOCs and GRO samples are to be collected as part of the Work/Sampling Plan, these parameters are to be collected first from undisturbed soil or freshly exposed soil surfaces to minimize volatilization.

E.5. VOCs and GRO Soil Grab Sample Collection

- Place an electronic scale, which has been verified that day prior to use, on a flat surface and turn it on. A weighted standard shall be used to determine acceptable precision.
- Before filling the first jar, verify the accuracy of the scale. Place a pre-weighed sample container on the scale. Compare the reading to the weight on the container. If within 5 grams, the scale can be used for the rest of the day. If not within 5 grams, remove the container, turn the scale off, then on, and repeat the test. If still not within 5 grams, use a different scale.
- Remove cap from pre-weighed, pre-preserved 40-milliliter (mL) sample vial.
- Place 40-mL vial on electronic scale and press "tare" button to zero electronic scale.
- Electronic scale should read 0.0g – leave sample vial on electronic scale.
- Use the lab provided Terra Core® sampler (5- or 10-gram) or 10-mL syringe with the top cut off (approximately 10 grams when full) for collecting a sample. The laboratory may provide a different sampling device than described above; whichever device is provided, the goal is to have **8-11 grams** of soil in the sample jar for VOC/GRO analysis.
- Scrape off upper layer of soil to expose underlying soil. Remove the syringe cap and push the syringe into the freshly exposed soil until the soil column entering the syringe has forced the top of the plunger to the stopping point against the top of the syringe cradle.
- Wipe all debris from the outside of the syringe and remove any soil that extends outside the mouth of the syringe, so the soil sample is flush with the mouth of the syringe.
- Carefully place the mouth of the syringe against the top of the open 40-mL vial and gently extrude the sample into the vial. (Note: to prevent the methanol preservative from splashing out of the bottle, hold the syringe against the top of the vial until the sample has fallen into the preservative.) Try to avoid getting soil on the threads of the vial. Clean the threads if necessary and cap the vial immediately.

- Weigh the sample bottle. Tolerances and field actions required are presented in the table below:

Actual Sample Weight	Volume of Methanol	Field Action
< 8 grams	10 mL	Add soil to reach 10 grams
8-11 grams	10 mL	None required
> 11 to < 20 grams	10 mL	None required. Laboratory will add methanol to reach 1:1 ratio
20 or > grams	10 mL	Discard bottle and resample

- Cap the sample container. Gently swirl, do not shake, sample vial to fully immerse soil into methanol.
- Fill out the label on the vial completely, including project number, sample I.D., date, time and sampler's initials. Record the information on the Chain-of-Custody form and in the field notebook.
- Collect at least two vials of soil sample for each analysis (VOCs or GRO). Therefore, if the work plan requires only VOCs then you will fill two vials; if the work plan calls for VOCs and GRO you will fill four vials (two vials for each analyte).
- Manually fill a plastic snap-top tube (or similar unpreserved bottle) with soil from the same sampling interval/matrix as each sample. Remove soil particles from the rim of the snap tube so the cap will close securely and close the cap. This jar is for moisture calculation to be submitted with VOCs/GRO soil sample containers and should be labeled the same as the VOC/GRO sample jars. All soil samples for VOCs or GRO analysis require an accompanying moisture calculation jar. Only one moisture jar is required per soil sample (i.e., one moisture jar is sufficient for both VOCs and GRO analysis).
- Place a trip blank into the cooler with the VOCs/GRO samples; see SOP 308 – Trip Blanks.
- Store, transport, and maintain sample custody per SOP 602 – Chain-of-Custody Procedures.

E.6. DRO Soil Grab Sample Collection

- Place an electronic scale, which has been verified that day prior to use, on a flat surface and turn it on. A weighted standard shall be used to determine acceptable precision.
- Before filling the first jar, verify the accuracy of the scale. Place a pre-weighed sample container on the scale. Compare the reading to the weight on the container. If within 5 grams, the scale can be used for the rest of the day. If not within 5 grams, remove the container, turn the scale off, then on, and repeat the test. If still not within 5 grams, use a different scale.
- Remove cap from pre-weighed, unpreserved sample container.
- Place empty DRO bottle on electronic scale and press "tare" button to zero electronic scale.
- Electronic scale should read 0.0g – leave DRO bottle on electronic scale.
- Use the laboratory provided coring device such as a Terra Core® sampler (5- or 10-gram) or 10-mL syringe with the top cut off (approximately 10 grams when full) for collecting a sample. The laboratory may provide a different coring device than described above; whichever coring device is provided, the goal is to have **25 to 35 grams** of soil in a 4-oz. sample jar for the Wisconsin DRO method and Environmental Protection Agency (EPA) Method 8015, Total Petroleum Hydrocarbon (50 to 70 grams in an 8-oz. jar).
- Scrape off upper layer of soil to expose underlying soil. Push the coring device into the freshly exposed soil until the soil column entering the coring device has filled to the top of the plunger (Terra Core) or the 10-mL line (cut off Syringe).
- Wipe all debris from the outside of the coring device and remove any soil that extends outside the mouth of the coring device, so the soil sample is flush with the mouth of the coring device.
- Extrude soil sample from the coring device into the DRO bottle. Collected soil sample should have a cumulative weight between **25 and 35 grams (4-oz. jar)**. Repeat the steps above as necessary to achieve necessary soil sample weight. If more than 35 grams of soil are collected, discard all the soil

in sample jar and recollect the sample. Try to avoid getting soil on the threads of the sample jar. Clean the threads if necessary and cap the sample jar immediately after sample collection.

- Repeat the above steps to fill a second DRO sample container. Two soil sample jars may be required for this analytical method.
- Fill one unpreserved sample container (typically a small plastic jar provided by the lab) with soil from the same sampling interval/matrix as each sample. This jar is for moisture calculation to be submitted with DRO soil sample containers and should be labeled the same as the DRO sample jars. All soil samples for DRO analysis require an accompanying moisture calculation jar.

E.7. Metals Soil Grab Sample Collection

- One open-top, 4- or 8-oz. unpreserved jar.
- Using a clean stainless-steel spoon, scoopula, or gloved hand, thoroughly mix or homogenize the interval to be sampled, and fill the unpreserved sample containers with the collected soil sample. Avoid filling the sample containers with gravel or rocks.
- Wipe soil from the container threads. Close the flip-top of the unpreserved sample container.
- Note: if several analyses are being performed for a single soil sample, the collection and submission of one moisture calculation jar is sufficient for all of the analyses for that one soil sample.

E.8. PCBs/SVOCs Soil Grab Sample Collection

- Open 4-oz., unpreserved sample container.
- Using a clean stainless-steel spoon, scoopula, or gloved hand, thoroughly mix or homogenize the interval to be sampled, and fill the unpreserved sample containers with the collected soil sample. Try to fill the sample containers with soil and not gravel or rocks.
- Wipe soil from the container threads. Reseal the 4-oz. sample container with the lid.
- Note: if several analyses are being performed for a single soil sample, the collection and submission of one moisture calculation jar is sufficient for all of the analyses for that one soil sample.

E.9. Sample Delivery

Arrange for pick-up/drop-off of soil samples in laboratory-provided coolers to the analytical laboratory. If shipping of soil samples to the analytical laboratory is required, follow SOP 603 – Sample Shipping.

E.10. Data and Records Management

Soil samples collected in the field should be recorded in the Field Report Form or field logbook (see SOP 101 – Field Notes and Documentation), on the field log, soil boring log, test trench log, etc., and on the COC (see SOP 602 – Chain-of-Custody Procedures). Information recorded in the Field Report Form or field logbook and on the COC should be identical to the information listed on the sample container label(s). Additionally, it is useful to note how many soil sample containers were filled for each uniquely identified soil grab sample.

Note the presence of any pieces of bituminous in the samples, no matter how small, particularly in samples to be analyzed for DRO or SVOCs.

E.11. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

The following Standard Operating Procedure (SOP) for the collection of composite soil samples is intended to be used by Braun Intertec field personnel for the purposes of composite soil sample collection. This SOP establishes a reproducible process for composite soil sample collection with the intent of maintaining integrity of the subsequent laboratory analytical procedures.

Compositing is the process of physically combining and homogenizing several individual soil aliquots of the same volume or weight.

This SOP is applicable to soil samples collected for the purposes of documenting the presence and/or concentration of regulated compounds in soil. Check the work plan or consult the project manager to determine if composite samples are required. This SOP is applicable for soil samples collected from soil borings (SOP 203 – Soil Boring Observation and Sampling), test pits and test trenches (SOP 211 – Test Pit and Test Trench Observation and Sampling), stockpiles (SOP 210 – Soil Stockpile Sampling), and/or excavations.

Specifically, this SOP is applicable for soil samples that might be analyzed for non-volatile parameters, including, but not limited to:

- Metals
- Semi-volatile organic compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Pesticides or herbicides

This SOP is not applicable to sampling volatile organic compounds (VOCs), gasoline range organics (GRO), diesel range organics (DRO), or other volatile analytes. VOCs, GRO, and DRO should be collected as grab samples, see SOP 208 – Soil Grab Sample Collection.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 203 – Soil Boring Observation and Sampling
- SOP 208 – Soil Grab Sample Collection
- SOP 210 – Soil Stockpile Sampling
- SOP 211 – Test Pit and Test Trench Observation and Sampling
- SOP 602 – Chain-of-Custody Procedures
- SOP 603 – Sample Shipping
- SOP 701 – Decontamination of Sampling Equipment

D. Equipment and Supplies

- Shovel, if necessary
- Gallon-size plastic bag or stainless-steel bowl
- Stainless-steel spoon or scoopula, if necessary
- Plastic cups or quart-sized plastic bags
- Appropriate laboratory-supplied containers
- Sample labels

- Sample coolers
- Ice
- Temperature blanks (one per sample cooler)
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedure)
- Custody seals
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Decontamination equipment (see SOP 701 – Decontamination of Sampling Equipment)
- Cell phone camera or digital camera
- Personal Protective Equipment (PPE)

The following table provides details regarding analytical parameters and the type of laboratory-supplied containers.

Analytical Parameter (holding time)	Bottle Type and Preservation Type	Number of Containers
8 RCRA Metals or 13 Priority Pollutant Metals (6 Months)	40-mL Plastic Flip cap, unpreserved	1
PCBs (14 days)	4-oz. Glass jar, unpreserved	1
SVOCs (14 days)	4-oz. Glass jar, unpreserved	1
Pesticides (14 days)	4-oz. Glass jar, unpreserved	1
Herbicides (14 days)	4-oz. Glass jar, unpreserved	1

All soil samples must have an unpreserved sample collected in a separate unpreserved container for dry weight analysis.

E. Procedure

E.1. Bottle Order

Several days before field work is scheduled to begin contact the laboratory to order sample containers by phone or email. It is a good idea to order extra bottles to allow for breakage, extra samples, etc. If you are unsure of the required sample volumes or proper laboratory sample containers for specific analytical parameters, ask that a written description be included with the bottle order which clarifies sample requirements.

Upon receipt of the sample coolers and before you leave for the field, check the contents of the cooler to be sure that you have the appropriate sample containers and that extra containers are included, if requested. Be sure you are aware of sample volume and container requirements.

E.2. Cooler Preparation

Place ice or a frozen cold pack into each sample cooler before collecting any samples. Double-bag the ice in sealable gallon bags or sealed garbage bags to avoid potential contact of water in the cooler with sample containers.

Place a temperature blank into each cooler and under the sealed bags of ice.

E.3. Labeling Sample Containers

Prior to collecting soil composite samples, complete the sample label for the laboratory-supplied containers. The sample label must have the following information:

- Project Number (listed under "Client")

- Sample Name (listed under "Sample ID")
- Date Sample Collected (listed under "Collection Date")
- Sampler's Initials (listed under "Collected by")
- Time Sample Collected (listed under "Time")

If not already present, affix the appropriate sample label to the laboratory-supplied sample container.

E.4. Soil Sampling

- Assess and approximate the size of soil from which the composite soil sample will be collected.
- Identify the number aliquots and splitting protocol using the work plan or consult the project manager.
- Prior to sampling, decontaminate the shovel, spoon or scoopula, and stainless-steel bowl or other appropriate container following SOP 701 – Decontamination of Sampling Equipment. In addition, decontaminate all sampling and compositing equipment before collecting each additional sample.
- Don new disposable gloves. Using a gloved hand or decontaminated shovel, spoon or scoopula, acquire the appropriate number of aliquots. The aliquots should be approximately the same size and weight. Place aliquots in the decontaminated stainless-steel bowl or appropriate container that will not introduce contaminants to the samples. Mix the aliquots until thoroughly homogenized, removing rocks or gravel.
- Using a gloved hand, spoon or scoopula, fill unpreserved sample containers with the collected soil sample.
- Fill one open flip-top (or similar), unpreserved jar with the remaining homogenized soil for the percent moisture calculation sample.
- Note: if several analyses are being performed for a single soil sample, the collection and submission of one moisture calculation jar is sufficient for all of the analyses for that one soil sample.
- Place the homogenized soil into the appropriate sample containers. Wipe the threads clean, close the jar, and place the sample on ice.

E.5. Sample Delivery

Arrange for pick-up/drop-off of soil samples in laboratory-provided coolers to the analytical laboratory. If shipping of soil samples to the analytical laboratory is required, follow SOP 603 – Sample Shipping.

E.6. Data and Records Management

Soil samples collected in the field should be recorded in the Field Report Form or field logbook (see SOP 101 – Field Notes and Documentation), on the field log, soil boring log, test trench log, etc., and on the COC (see SOP 602 – Chain-of-Custody Procedures). Information recorded in the Field Report Form or field logbook and on the COC should be identical to the information listed on the sample container label(s). Additionally, it is useful to note how many soil sample containers were filled for each uniquely identified soil composite sample.

Note the presence of any pieces of bituminous in the samples, no matter how small, particularly in samples to be analyzed for SVOCs.

E.7. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

The purpose of the water level measurements Standard Operating Procedure (SOP) is to provide a description of the methods used to measure water levels in piezometers, monitoring, and recovery wells.

A.1. Summary of Method

Collection of water level measurements consists of decontaminating the water level measuring equipment, testing the equipment, lowering the water level probe into the well until a response is noted, verifying results, and finally recording the results in a field logbook or field report form. See SOP 701 – Decontamination of Sampling Equipment for proper decontamination procedures.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

The collection of water level measurements can pose a hazard to human health unless appropriate precautions are taken. Potential hazards include, but are not limited to:

- Exposure to contaminants present in the fluid being measured.
- Exposure to decontamination solutions.
- Exposure to hazardous substances being removed as part of the decontamination procedure.
- Hand injuries associated with sharp edges and pinch points on wells and associated well piping and covers.

Proper personal protective equipment (PPE) should be selected based on the physical and chemical characteristic of the contaminant and decontamination solutions used.

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 302 – LNAPL Level Measurement
- SOP 701 – Decontamination of Sampling Equipment

D. Equipment and Supplies

- Hand tools (such as wrenches or sockets for at grade wells)
- Electronic water lever indicator
- Well keys, if necessary
- Water level monitoring record form (Attachment A)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Cell phone camera or digital camera
- Decontamination equipment (see SOP 701 – Decontamination of Sampling Equipment)
- PPE

E. Procedure

The following procedures are to be used, in the order listed, when collecting water level measurements:

- Prior to mobilizing to the site, turn on water level indicator and immerse the end of the water level indicator (i.e., water level probe) in a glass of tap water to check probe batteries. Note the instrument response as the probe contacts the water. If no response occurs, replace the batteries and try again or use an alternate piece of equipment if available.
- Once on-site, don appropriate PPE as prescribed by the HASP.
- Decontaminate the probe and entire cable length in accordance with SOP 701 – Decontamination of Sampling Equipment. Unless stated otherwise in the work plan, proceed from the wells least likely to be contaminated to those closest to the source area. Do not use the water level indicator in wells that are suspected to have, or have documented, free product. Use a product probe if light non-aqueous phase liquid (LNAPL) or free product is known or suspect. See SOP 302 – LNAPL Level Measurement.
- Lower the probe into the well by pulling the cable from the hand-held reel until the light comes on or the buzzer sounds.
- Move the cable up and down fractionally while looking/listening for a response from the probe. Note the exact length of cable to the 100th of a foot extended from the tip of the probe to the notch or highest point (or north side) of the well casing when the probe begins to be audible or light is visible. Record the cable length, well number, and time and date of the measurement in the field notes or water level record. The water level measurement should be repeated a second time. If the two measurements are different, repeat as necessary until results are consistent.

E.1. Cautions

Failure to follow proper water level measurement and/or decontamination procedures may result in the following:

- Cross-contamination between sampling points and/or sites. Cross-contamination would invalidate results, introduce new contaminants to an environment, or impact a previously unaffected sampling location.
- Decreased equipment performance due to foreign objects or incompatible materials on equipment surfaces or corrosion due to acidic environments.

E.2. Interferences

Factors that may interfere with water level measurement procedures include:

- The formation of ice in cold temperatures will prevent proper operation of equipment and may damage internal components of equipment when expansion occurs.
- Obstructions in the well due to down-hole equipment, defects in well piping, or other foreign objects.
- Access to the well through the well-head or access ports may limit the size of the probe that may be used.

E.3. Data and Records Management

Water level measurements should be recorded in the field form included as Attachment A in accordance with SOP 101 – Field Notes and Documentation. If water level measurements are completed in accordance with a site-specific HASP, work plan, or other related document, reference to the appropriate document should be made in the field form. Any deviations from the procedures outlined in this document or in a site-specific document should be described in detail in a field form, otherwise referencing existing procedures is sufficient. The sampler should note if there is pumping from a nearby well, dewatering, or other activity that may influence the elevation of the groundwater at the site.

E.4. Quality Assurance/Quality Control

The probe should be tested to verify proper operation of the equipment prior to its first use of the day, per the procedures outlined above. Water level measurements should be repeated as a means of verifying results, per the procedures outlined above.

BRAUN INTERTEC

Water Level Monitoring Record

Project Name: ______________________________ Project Number: ______________________________

Date: ______________ Field Personnel: ______________________ Instrument Used: ______________________________

Well No.	Time	MP Elevation (feet)	Water Level Below MP (feet)	Water Level Elevation (feet)	Previous Water Level Below MP	Remarks

Note: For your convenience, the following abbreviations may be used.

P = Pumping I = Inaccessible D = Dedicated Pump ST = Steel Tape ES = Electric Sounder MP = Measuring Point WL = Water Level

A. Purpose

The purpose of this Standard Operating Procedure is to check for contamination of gasoline range organics (GRO) and volatile organic compounds (VOCs) during handling, storage, and shipment from the laboratory to the field and back to the laboratory. If contaminants are reported in the trip blank it may indicate that the investigative samples from that sampling event have been contaminated during handling, transportation, or shipment.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 602 – Chain-of-Custody Procedures

D. Equipment and Supplies

- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Chain-of-Custody (COC) Form (see SOP 602 – Chain-of-Custody Procedure)
- For Water Sampling:
  - Two laboratory-prepared 40-milliliter (mL) glass vials with organic-free water in hydrochloric (HCl) acid preservative. Commonly provided in a small bubble-wrap bag.
- For Soil Sampling:
  - One laboratory-prepared 40-mL glass container with methanol preservative. Commonly provided in a small bubble-wrap bag.

E. Procedure

- The laboratory should prepare and provide VOC trip blanks with every bottle order. If it is necessary to prepare a trip blank in the office or in the field, note the exception in the field report form or field logbook and the investigation report. **Note: New trip blanks must be provided along with the laboratory bottle order for a specific project. Trip blanks prepared for a prior sampling event cannot be used.**
- Label sample containers using the identifier "TB," "TB-#," or a blind identifier, as necessary.
- Ensure a trip blank is located in each cooler to be used to hold the investigative samples. Preserve and handle the trip blank(s) in the same manner as investigative samples.
- Include a sample called "TB," "TB-#," or "Trip Blank" on the COC Form. Do not include a date or time for the sample. Check the appropriate column to indicate that the trip blank should be analyzed for GRO and/or VOCs per the investigation work plan (see SOP 602 – Chain-of-Custody Procedures).

E.1. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.2. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

The following Standard Operating Procedure (SOP) for field filtration of water samples will be used to collect aqueous samples for chemical analysis of dissolved metals. This SOP establishes a reproducible process for field filtration of water samples to maintain the integrity of the subsequent laboratory analytical procedures.

A.1. Summary of Method

Water samples collected for dissolved metals analyses should be filtered in the field immediately after collecting the sample using a 0.45-micron filter prior to chemical preservation. Samples can be filtered using a disposable field filtration unit and a hand vacuum pump or using an in-line filter that attaches directly to the discharge tubing of a sampling pump.

Once the sample is filtered, it is preserved and placed on ice in a laboratory-supplied cooler. A Chain-of-Custody (COC) form is completed in accordance with SOP 602 – Chain-of-Custody Procedures. Samples are then transported to the analytical laboratory under refrigerated conditions and COC procedures.

A.2. Personnel Qualifications and Responsibilities

It is the responsibility of environmental field personnel collecting and filtering the samples to maintain the integrity of the water sample collected. Maintaining the integrity of the sample includes: using the proper Personal Protective Equipment (PPE), proper documentation, proper handling, proper collection techniques, and proper storage and transport. Field personnel should be trained in performing this SOP and are responsible for understanding and implementing this SOP during field activities, as well as acquiring the appropriate laboratory-supplied containers.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

Additionally, laboratory-supplied sample containers for dissolved metals are preserved with nitric acid (HNO_3), a caustic solution. While the preservative is typically provided in small quantities, it is important to use safe handling practices when working with known chemicals as contact can be harmful to skin, clothes, eyes, and respiratory systems. Safety Data Sheets (SDSs) are available for all the preservatives used in laboratory-supplied sample containers through the analytical laboratory or through the Braun Intertec Safety Coordinator.

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 311 – Groundwater Sample Collection
- SOP 602 – Chain-of-Custody Procedures
- SOP 701 – Decontamination of Sampling Equipment
- SOP 702 – Management of Investigation Derived Waste

D. Equipment and Supplies

- Unpreserved 1-liter (L) plastic laboratory-supplied sampling container
- 500-milliliter (mL), plastic, HNO_3 preserved, laboratory-supplied sampling container
- Disposable field filtration unit method:
  - Vacuum hand pump
  - Nalgene® Disposable Filter Unit – 500-milliliter (mL) volume equipped with a 0.45-micron or micrometer (µm) diameter filter membrane (or similar). Filter membrane must be capable of filtering particles 0.45-µm or larger from the sample (do not reuse filter units or attempt to decontaminate used filter units).
  - Disposable Nalgene® 0.45-µm pre-filter disks (or similar)
- In-line field filtration method:
  - Disposable, in-line 0.45-µm filter
  - Sampling pump (e.g., peristaltic pump)
  - Silicon tubing
- COC forms (see SOP 602 – Chain-of-Custody Procedure)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Cell phone camera or digital camera
- Decontamination equipment (see SOP 701 – Decontamination of Sampling Equipment)
- PPE

E. Procedure

- Prior to filtering water samples, complete the sample label for the laboratory-supplied containers. The sample label must have the following information:
  - Project Number (listed under "Client")
  - Sample Name (listed under "Sample ID")
  - Date Sample Collected (listed under "Collection Date")
  - Sampler's Initials (listed under "Collected by")
  - Time Sample Collected (listed under "Time")
  - The sample label must indicate that the sample is field-filtered.
- If not already present, affix the appropriate sample label to the laboratory-supplied sample container.
- Collect the water sample into a 1-L <u>unpreserved</u>, plastic, laboratory-supplied sample container using SOP 311 – Groundwater Sample Collection or other applicable SOP.
- Decontaminate all equipment before proceeding to the next sample or at the end of the day in accordance with SOP 701 – Decontamination of Sampling Equipment.

E.1. Using a Disposable Field Filtration Unit

- Place a pre-filter disk in the base of the upper chamber of the filtration unit if the sample is turbid. The water sample should then be immediately decanted into the upper chamber of the filtration unit. The upper chamber should only be partially filled if the sample is turbid. Replace the lid. Attach the vacuum hand pump tubing to the adapter in the center of the filtration unit.

- Squeeze the hand pump to establish a vacuum and draw the sample through the filter into the lower chamber. Maintain the vacuum until all the water from the upper chamber has been filtered into the lower chamber.
- The following procedures should be used if sediment has clogged the filtration membrane or pre-filter disk to the point that water flow through the filtration unit is very slow before filtration of the sample is complete:
  - If the filter membrane is clogged and a pre-filter disk was not used, use a new filtration unit to filter the remainder of the sample.
  - If only a pre-filter disk is clogged, depressurize the unit and unscrew the lower chamber from the upper chamber. Swirl the remaining liquid in the upper chamber, and discard this water sample as investigation derived waste in accordance with the work plan and SOP 702 – Management of Investigation Derived Waste. Remove the used pre-filter disk without damaging it and replace with a new pre-filter disk.
- Continue using the steps described above to filter the water sample until 500 mL of water has been filtered or an adequate sample volume has been filtered based on input from the laboratory. Decant the filtered sample from the lower chamber of the filtration unit into a preserved sample container taking care not to overfill the container. Close the sample container, place the sample on ice, and properly dispose of the filtration unit.

E.2. Using an In-Line Filter

- As the metals aliquot is to be collected, attach a new 0.45-µm in-line filter to the pump discharge tubing. Direct the discharge end of the in-line filter into a preserved sample container and fill the sample container taking care not to overfill the container. Close the sample container and place the sample on ice. Remove and properly dispose of the in-filter.

E.3. Cautions and Interferences

Caution must be taken to ensure that sample devices, sample collectors, and sample containers are as clean as possible. The SOP is designed to minimize interferences from outside contaminants. However, because the water sample is being collected in the field outside contamination cannot always be mitigated.

E.4. Data and Records Management

Field-filtered water samples should be recorded in the field notes (see SOP 101 – Field Notes and Documentation) and on the COC Form (see SOP 602 – Chain-of-Custody Procedures).

E.5. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

This Standard Operating Procedure (SOP) provides guidelines for collection of groundwater samples for laboratory analytical testing. Groundwater samples can be collected from temporary wells (e.g., polyvinyl-chloride [PVC] casing pipe and screen installed in a soil boring) and from permanent monitoring wells. Groundwater samples can be analyzed for the presence of organic compounds, inorganic constituents, biological parameters, and radiological parameters.

Note: Wells with measurable levels of light non-aqueous phase liquid (LNAPL) are usually not sampled. Check with the project manager prior to proceeding with sampling.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 301 – Water Level Measurement
- SOP 308 – Trip Blanks
- SOP 309 – Field Filtering of Groundwater Samples
- SOP 312 – Well Purging and Stabilization
- SOP 316 – Calibration of Water Quality Meters
- SOP 602 – Chain-of-Custody Procedures
- SOP 603 – Sample Shipping
- SOP 701 – Decontamination of Sampling Equipment

D. Equipment and Supplies

- Pumping equipment (see applicable Sampling and Analysis Plan):
  - Low-flow submersible pump with appropriate tubing,
  - Peristaltic pump with appropriate tubing (polyethylene or silicon)
  - Inertial pump (e.g., Waterra, Solinst) with foot/check valve and appropriate tubing,
  - Tubing with bottom filling check valve (hand actuated), or
  - Bottom filling disposable bailer and rope (polypropylene or cotton)
- Appropriate laboratory-supplied containers and preservatives (see applicable Sampling and Analysis Plan)
- Sample container labels
- Trip blank, if necessary (see SOP 308 – Trip Blanks)
- Temperature blanks (one per sample cooler)
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedures)
- Sample coolers
- Ice
- Gallon-size plastic bag
- Electronic water lever indicator (see SOP 301 – Water Level Measurement)
- Water quality meters (if purging and stabilization required by Sampling and Analysis Plan) and purge bucket
- Spare batteries for pump equipment

- Hand tools (such as wrenches or sockets for at grade wells or knife for cutting tubing/rope)
- Well keys, if necessary
- Groundwater Monitoring Data Sheet (see Attachment A)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Cell phone camera or digital camera
- Decontamination products (see SOP 701 – Decontamination of Sampling Equipment)
- Personal Protective Equipment (PPE)

E. Procedures

E.1. Prior to Leaving for the Field

- Several days before field work is scheduled to begin, call or email the laboratory to order sample containers. It is a good idea to order extra bottles to allow for breakage, extra samples, etc. If you are unsure of the required sample volumes or proper laboratory sample containers for specific analytical parameters, ask that a written description be included with the bottle order clarifying sample container requirements.
- Before you leave for the field, be sure that you have the appropriate sample containers (including appropriate preservative) and that extra containers are included, if requested.
- **Be sure you are aware of sample volume and container requirements (discuss with analytical laboratory or project manager if unsure).**
- Place ice into each sample cooler before collecting any samples. Double-bag the ice in sealable gallon bags or sealed garbage bags to avoid potential contact of water in the cooler with sample containers.
- Place a temperature blank in each cooler and under the ice.
- If some samples will be analyzed for gasoline range organics (GRO), benzene, ethylbenzene, toluene and xylenes (BETX), or volatile organic compounds (VOCs), include a trip blank in each cooler.

E.2. Prior to Groundwater Sample Collection

- Don appropriate PPE as prescribed by the HASP.
- Sample from the least to the most contaminated well or as specified in the Sampling and Analysis Plan.
- Measure the depth to groundwater either from the top of the well casing pipe or from the ground surface. Measure the depth to groundwater to the nearest 0.01 foot using an electronic water level indicator in accordance with SOP 301 – Water Level Measurement.
- Prior to sampling the well, purging and stabilization may be required by the Sampling and Analysis Plan (see SOP 312 – Well Purging and Stabilization).

E.3. Groundwater Sample Collection

There are several ways to bring groundwater to the surface for sample collection including pumps, bailers, check valves, etc. Follow the procedure below for the appropriate sampling device.

E.3.a. Submersible Pump for Sampling

When using a submersible pump ensure that the appropriate decontamination has been completed prior to sampling and between sampling points (see SOP 701 – Decontamination of Sampling Equipment). When sampling, direct a steady stream of water into the appropriate sample container(s) at a rate specified on the applicable Sampling and Analysis Plan.

E.3.b. Peristaltic Pump for Sampling

- Insert a length of new plastic tubing inside the well. Attach the top end of the tubing to a fitting on the peristaltic pump.
- Activate the pump to draw water into the tubing and direct the stream of water into appropriate sample container(s).
- For VOCs/GRO, the water for the sample cannot pass through the peristaltic pump body. Fill the sample vials for VOCs/GRO with water that has not passed through the pump body. Manually kink the tubing to temporarily prevent water from flowing back down the tubing, remove the tubing from the sampling point and pour the water into the sample containers after removing the kink in the tubing. Alternatively, the peristaltic pump may be reversed to push water out of the tubing into the sample containers.
- Once the sample containers are filled, remove the tubing and properly dispose (temporary well) or leave in well (permanent well) for future sampling.

E.3.c. Inertial Pump (Plastic Tubing with a Bottom Check Valve) for Sampling

- Insert a length of new or dedicated plastic tubing with a clean, bottom-mounted, stainless steel or plastic check/foot valve inside the temporary or permanent well.
- Manually or mechanically oscillate the tubing up and down. The tubing will fill with water as the ball repeatedly lifts and seats.
- Once the tubing is filled, either lift the tubing out of the well and pour the water into the sample containers or fill the sample containers from the top while the tubing is being oscillated.
- Once the sample containers are filled, remove the tubing and properly dispose (temporary well) or leave in well (permanent well) for future sampling.

E.3.d. Bailer for Sampling

- Attach an appropriate length of new polypropylene or cotton rope to a bailer.
- Lower the bailer slowly into the well, allow it to fill, and then lift it out while preventing the bailer or the rope from contacting any potentially contaminated surface, such as the ground. When using a bailer to remove the groundwater sample, take care to minimize agitation or aeration of the water as this could lead to the loss of volatiles and a non-representative sample.
- For sample collection, slowly pour the contents of the bailer into the appropriate sample container(s).

E.4. Guidelines for Filling Sample Containers:

- Containerize samples by order of the volatilization potential of the desired analytes. For example, volatile organic analysis (VOA) vials should be filled first, followed by semi-volatiles.
- For VOCs/GRO samples, fill the container to the top so that a positive meniscus is formed. Allow air bubbles to rise to the surface, carefully and quickly screw the cap onto the container and finger tighten. Invert the sample and tap it gently, looking for any air bubbles. If the sample contains air bubbles, open the container to add more water. If bubbles continue to form because the preservative is reacting with the sample matrix there are two options: 1) discard the sample with preservative, rinse the vial with sample water, discard the rinse water, and fill the container with unpreserved sample water or 2) collect the water sample in a new unpreserved sample container. The sample with preservative and the rinse water from the sample vial should be discarded with the purge water. Note that the allowable sample hold time is reduced from 14 days to 7 days for unpreserved samples. For unpreserved samples, make a note on the COC stating that the VOC sample is unpreserved and notify the technical project manager.
- For sample containers with preservative, be careful not to overfill the container, since this would dilute the preservative.
- If the sample analysis requires field filtering of the groundwater (e.g., samples for dissolved metals analysis) follow SOP 309 – Field Filtering of Groundwater Samples.
- Complete an appropriate sample container label on all containers. Include the following information: sample identification number, date and time of collection, field personnel, job site location, well number, preservation, and analysis requested. Complete the information related to sample collection and containers used on the bottom of the Groundwater Monitoring Data Sheet (Attachment A).
- Place all samples on ice in a cooler.

E.5. After Groundwater Sample Collection

- If groundwater sampling equipment is re-used between sampling points, refer to SOP 701 – Decontamination of Sampling Equipment for decontamination of groundwater sampling equipment.
- Water samples collected in the field should be recorded on the COC (see SOP 602 – Chain-of-Custody Procedures). Information recorded on the COC should be identical to the information listed on the sample container label(s).
- Arrange for pick-up/drop off of groundwater samples in laboratory-provided coolers to the analytical laboratory. If shipping of groundwater samples to the analytical laboratory is required, follow SOP 603 – Sample Shipping.

E.6. Data and Records Management

Observations should be documented on the Groundwater Monitoring Data Sheet, field report form or field logbook in accordance with SOP 101 – Field Notes and Documentation.

E.7. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

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Groundwater Monitoring Data Sheet

Client Name:	Project Name:	Well # or Sample ID:
Contact:	Project Number:	Date:
Weather Conditions:		Field Personnel:

Well Information

Chronology:	Key Number:	Casing Locked: Y N
Casing Diameter, in:	X (casing conversion), gal/ft: *2" = 0.16, 4" = 0.65, 6" = 1.5*	Well Material:
Depth to Water (DTW), ft:	Well Depth (WD), ft:	Tubing Material:
Water Column (WC), ft (WD - DTW):	Well Volume, gal: WC x X =	
Equipment Used:	Pump Intake Depth, ft:	Purge Start Time:
Well Purging Procedure(s): Volume Purge Low-Flow Micropurge		

Stabilization Information

Water Meter Used:	Calibrated Today? Y N

	Time	Depth to Water (ft)	Purge Rate* ( )	Volume Purged ( )	Temp (°C)	Spec. Cond. (µS/cm)	pH	ORP** (mV)	D.O.** (mg/L)	Turbidity** (NTU)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

* Purge Rate (GPM) = Volume (ml) * 0.0026 / Time (minutes) ** If required by sampling plan

	Temp	Spec. Cond.	pH	ORP	D.O.	Turbidity
Stabilization Criteria (difference in final three well volumes or final turbidity result)	**±0.1˚C**	**±5%**	**±0.1**	**±10 mV**	**±0.5 mg/L**	**±5% if >10 NTU**
Stabilization Criteria in units (conductivity and turbidity)						
Actual differences or turbidity in final 3 well volumes						

Stabilized: Y N	Purge Rate ( ):	**Comments/Observations:**
Purge Stop Time:	Purged Dry: Y N	
Duration, min:	Final Depth to Water (ft.):	
Total Volume Purged ( ):	No. of Well Volumes Purged = Total Volume Purged / Well Volume =	

Sample Collection

Sample Date:	Color:	Odor:
Sample Time:	Phases:	Sampling Method:
Field Filtered?: Y N	Filter Method:	Parameters Filtered:

ID	**Quantity**	**Vendor**	**Sample Parameter**	**Material**	**Type**	**Volume**	**Pres.**

Duplicate Collected Here?	Y	Duplicate ID:	

A. Purpose

This Standard Operating Procedure (SOP) provides guidelines for collection of soil vapor samples using an air sampling canister under vacuum from a soil boring for analytical testing for the presence of contaminants including organic compounds. This SOP includes collection of soil vapor samples from a direct-push sampling probe, from a temporary sampling device installed in boreholes drilled using manual or other power-driven methods, and from a hand probe.

Analytical laboratories may have specific sampling instructions for their sample canisters, and laboratory instructions should be reviewed and used in conjunction with this SOP, when available.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 202 – Organic Vapor Soil Screening
- SOP 204 – Calibration of 580B PID
- SOP 205 – Calibration of MiniRAE PID
- SOP 602 – Chain-of-Custody Procedures

D. Equipment and Supplies

Laboratory Provided

- Laboratory-cleaned, 1- or 6-liter sampling canister under a vacuum of approximately 30 inches of mercury ("Hg) such as a Summa canister or Silco canister
- Flow controller (time weighted samples)
- Flow restrictor (sub-slab samples)
- Vacuum gauge and in-line particulate filter
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedure)
- Protective shipping container (box or case)

Braun Intertec Provided

- Inert tubing in the appropriate diameter and of the appropriate length.
  - Teflon-lined polyethylene tubing of the appropriate diameter should be used to attach the sample canister to the sampling train. Ensure that the appropriate tubing is available for attaching to the sample canister assembly as well as for sampling from the borehole. More than one size of tubing may be required for sample collection (typically 1/4-inch inside diameter [ID] by 3/8-inch outside diameter [OD] tubing for probes and 3/16-inch ID by 1/4-inch OD for hand probes). Unlined polyethylene tubing should be used rarely.
  - At least 10 feet of tubing is needed for each sampling point when sampling from a borehole.

Vapor Pin® Toolbox

- Tubing cutter
- Elastrator tool
- 9/16-inch wrench to remove or tighten caps or connectors
- Pliers
- Purging device (hand pump, graduated syringe, or similar)
- 3/4-inch diameter bottle brush
- Two-pin driver for flush mount covers
- Silicone tubing connectors
- Rubber mallet
- Modeling clay and PVC coupling for leak testing

- Cell phone camera or digital camera
- Soil Vapor, Indoor Air, And Outdoor Ambient Air Sampling Log (see Attachment A, the “Sampling Log”)
- Purge Volume Tables (see Attachment B)
- Photoionization detector (PID) with appropriate lamp (see SOP 202 – Organic Vapor Soil Screening)
- New soil tip and screen (only when sampling from borehole)
- Clean sand, bentonite grout, and bentonite chips (only when sampling from borehole)

Hand Probe Sampling Only

- AMS soil gas sampling tools including 3- and 4-foot rods, threaded couplers, dedicated tip holder, driver head adapter, and driver hammer
- Dedicated sampling tip with “umbrella” and screen (if necessary)
- Two pipe wrenches
- Mechanical jack

- Global Positioning System (GPS) unit or measuring tape
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Personal Protective Equipment (PPE)

E. Procedure

E.1. Field Preparation

- Before the field work is scheduled to begin, order sample canisters equipped with flow controllers or flow restrictors (if required) and pressure gauges from the laboratory. Check the work plan or discuss with the Project Manager regarding the type of canister needed. Allow two to seven days for delivery.
- Inspect laboratory-supplied equipment upon receipt to ensure that all necessary parts are present and operable. Canisters should be under a vacuum of approximately 30"Hg.
- Obtain a blank Sampling Log (see Attachment A), which will require the following information to be recorded during sampling:

  - Canister serial/identification number
  - Flow-control serial/identification number, if present
  - Initial and final vacuum readings from canister vacuum gauge, if present
  - Sample identification
  - PID reading
  - Sample depth

    - Location of sampling point
    - Ambient temperature at time of sampling
    - Drilling method
    - Method of recording sample locations (e.g., GPS, field map)
    - Project, staff, and contractor information
    - Date

- Perform underground utility clearance in accordance with the Braun Intertec Corporate Utility Clearance Process.
- Ensure the drilling contractor is scheduled and ensure that all utilities (public and/or private) are marked prior to advancement of the sampling point.
- Before drilling, carefully observe work area for evidence of possible utilities or obstacles (e.g., water pipes, sewer cleanouts, flow drains, or electrical conduits).

E.2. Set Up for Collecting Soil Vapor from a Direct-Push Sampling Probe

- The sampling probe operator will advance the direct-push sampling probe to the required depth for collection of the soil vapor sample. Cut a length of 1/4-inch ID by 3/8-inch OD tubing from the roll that is about 3 to 4 feet longer than the anticipated sample depth. The operator will insert tubing to the base of the sampling probe and seal it off.
- Place a material such as bentonite around the probe rod and the ground surface to seal the borehole and prevent sample short-circuiting to the atmosphere. **Note: Bentonite must be hydrated and allowed time to swell to create an effective seal.**
- See Section E.5 for collection of the soil vapor sample. Record the method of drilling and depth of sample collection on the Indoor Air/Soil Vapor Sampling Log.

E.3. Set Up for Collecting Soil Vapor from a Borehole

- Advance the sampling point to the desired depth using manual or power driven method (e.g., hammer drill, power hammer, hollow stem auger, hand auger, or other device). Record the method of drilling and depth of sample collection on the Sampling Log.
- Connect a soil tip with screen to the end of the tubing and lower the tip to the bottom of the soil boring. This tubing is supplied by the field personnel, not the driller.
- Place clean sand in the soil boring to encapsulate the soil tip. Add enough sand to bring the level of the sand approximately 1 foot above the soil tip.
- Place bentonite grout (or similar) in the soil boring annulus to a level 6 inches below the ground surface. Place hydrated bentonite chips on top of the grout in the soil boring up to the ground surface.

E.4. Set Up for Collecting Soil Vapor from a Hand Probe

- The sample location must be in soil; therefore, any cover material such as concrete or asphalt must be drilled through prior to installation.
- Cut a length of 3/16-inch ID by 1/4-inch OD tubing from the roll that is about 3 or 4 feet longer than the anticipated sample depth. Thread together one drive rod with a dedicated tip holder and drive head adapter. Feed tubing through the rod from the top and attach a dedicated tip with plastic collar to the tubing (sampling point tubing). Push the dedicated tip into the tip holder.
- Place the drive assembly on the surface at the sample location and pound the assembly into the ground with the driver hammer. To increase sample depth, unthread the drive head adapter, thread an additional rod through the sampling point tubing and onto the existing rod assembly, and then rethread/screw the drive head adapter on the rod. Be sure that the drive head is threaded on completely.

- If you hit an underground obstruction or cannot drive the assembly to the required depth, use the mechanical jack to remove the drive assembly and sampling point tubing. If the tip is lost, put on a new pair of gloves to install a new dedicated tip, and re-start the installation near the first attempt.
- When the target sampling depth is reached, use the mechanical jack to pull the drive assembly out of the ground around the sampling point tubing, making sure the tubing stays in the ground. Push down on the sampling point tubing as you pull the drive assembly out to allow the expendable point to remain exposed to the soil vapor.
- Place a material such as bentonite around the probe rod and the ground surface to seal the borehole and prevent sample short-circuiting to the atmosphere. **Note: Bentonite must be hydrated and allowed time to swell to create an effective seal.**

E.5. Soil Vapor Sample Collection

- Calibrate the PID and record the calibration results (see SOP 204 – Calibration of 580B PID or SOP 205 – Calibration of MiniRAE PID).
- Connect a purging device (i.e., graduated syringe or hand pump) to the tubing that is attached to the sampling tip or sample probe (sampling point tubing).
- Purge a minimum of two volumes of air from the sampling point tubing and sampler. See Attachment B to calculate purge volume.
- Following purging, kink the sampling point tubing with a pliers or similar tool to prevent vapor loss prior to sampling and disconnect the purging device.
- Insert the tip of the PID into the sampling point tubing.
- Release the kink and ensure that the sampling point tubing is no longer obstructed.
- Measure the organic vapor readings from the sampling point tubing and record the highest measurable concentration on the Sampling Log.
- After the PID reading is recorded, re-kink the tubing with a pliers or similar tool to prevent vapor loss prior to sampling. Disconnect the PID.
- Connect the tubing on the sample canister to the tubing attached to the sampling point.
- Record the serial number of the canister and flow controller on the Sampling Log.
- Release the kink and ensure that the sampling point tubing is no longer obstructed.
- Begin sample collection by slowly opening the valve on the sample canister until the valve is fully open. Record the start time of sample collection on the Sampling Log and on the sample identification tag.
- Record the starting canister vacuum in "Hg on the Sampling Log.
- Compare the reading to the initial vacuum documented by the laboratory on the canister tag. <u>Do not use the canister if the initial reading is 4"Hg or more different than the laboratory provided reading.</u> If the laboratory did not provide a vacuum reading, <u>do not use the canister if the initial reading is less than 25"Hg</u>.
- Monitor the sampling progress.
    - Listen for a “hissing” sound as the sample is being collected.
    - If water or soil is observed within the tubing, stop the sample collection immediately and close the canister valve. Contact the Project Manager immediately. Approval may be granted to stop collection at this location if an adequate volume of soil gas has been collected for sample analysis. This is typically evaluated based on the pressure reading of the sample canister. If water or soil has entered the sampling canister, or an adequate sample volume has not been collected, the location will need to be re-sampled. This will entail drilling a new borehole or installing another sampling probe adjacent to the first attempt.
- Once the gauge reads about 5"Hg or less, sample collection is complete. If a gauge is not present, sample collection is complete when the “hissing” sound is no longer heard.
  Note: The laboratory normally needs a total of at least 20"Hg of sample for analysis.

- Close the valve on the sample canister.
- Record the sample collection stop time and final pressure on the Sampling Log.
- Complete COC Form based on information recorded on the Sampling Log in accordance with SOP 602 – Chain-of-Custody Procedures.
- Place the canisters in laboratory-provided protective shipping containers and arrange for pick-up or drop-off.

E.6. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.7. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

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Soil Vapor, Indoor Air, and Outdoor Ambient Air Sampling Log

Project No.: ____________ Date: ____________ Weather/Ambient Air Temperature (°F):

Project Name: ____________ Personnel: ____________

Location: ____________ Contractor: ____________

Sampling Method:
- ☐ Indoor Air
- ☐ Outdoor Ambient Air
- ☐ Soil Vapor/Gas
- ☐ ________________

Drilling Method:
- ☐ Push Probe
- ☐ Hollow-stem Auger
- ☐ Hand Installation
- ☐ ________________

Purged air prior to sampling with (*if applicable*):
- ☐ Pump
- ☐ Syringe
- ☐ ___________

Sample Locations Recorded with (*check all that apply and attach applicable information*):
- ☐ GPS
- ☐ Field Map
- ☐ Measurements
- ☐ Field Sketch

Sample ID	Canister ID	Flow Controller ID	Depth (feet)	PID Reading (ppm)	Canister Vacuum*			Collection Start Time	Collection End Time	Sample Location Notes
					Label ("Hg)	Initial ("Hg)	Final ("Hg)			

*Compare the Initial reading to the Label reading documented by the laboratory on the canister tag. Do not use the canister if the Initial reading is 4"Hg or more different from the Label reading. If the laboratory did not provide a Label reading, do not use the canister if the Initial reading is less than 25"Hg.

Notes:

BRAUN INTERTEC

Purge Volume Tables

Tubing/Pipe Diameter	When Using a Pump		When Using a Syringe
Inner Diameter (inches)	Volume per foot (gallons)	Volume per foot (liters)	Volume per foot (milliliters)
3/16	0.0014	0.005	5
1/4*	0.0025	0.01	10
3/8*	0.0058	0.022	22
1/2	0.0102	0.039	39
3/4	0.0229	0.087	87
1	0.0408	0.15	150
2	0.1632	0.62	620
3	0.3671	1.39	1,390
4	0.6528	2.47	2,470
5	1.02	3.86	3,860

1 liter (L) = 1,000 milliliters (mL)
1 mL = 1 cubic centimeter (cm^3)

Notes:
* The most common laboratory-provided tubing size is 1/4-inch inner diameter. Most drilling contractors use 3/8-inch diameter tubing.
If using a pump with an unknown flow rate, first fill a vessel (such as a Tedlar bag) with a known volume and calculate the flow rate.
If using a hollow-stem auger or a larger diameter tooling/auger, contact the Project Manager for purging instructions of the entire borehole.

Example:
When using 1/4-inch inner diameter tubing and the depth for soil gas sample collection is 10 feet (plus 2 more feet to get tubing to working space), the purge volume calculated is 12 feet × 10 mL/foot = 120 mL. Purge a minimum of 2 volumes of air from the sampling point tubing and sampler, which equals 240 mL.

Quick Reference for Tubing Purge Volumes (mL):

Tubing Length (feet)	Tubing Inner Diameter (in)	
	1/4	3/8
1	10	22
5	50	110
6	60	132
7	70	154
8	80	176
9	90	198
10	100	220
12	120	264
14	140	308
16	160	352
18	180	396
20	200	440

A. Purpose

This Standard Operating Procedure (SOP) provides guidelines for collection of sub-slab soil vapor samples through an air-tight fitting called a Vapor Pin®. After completion of a water dam test and dedicated tubing shut-in test, a sample of soil vapor is drawn into an air sampling canister under vacuum. The Vapor Pin® is installed either temporarily or permanently through a concrete slab to obtain the soil vapor sample. The canister is sent to a laboratory to determine the concentrations of volatile organic compounds (VOCs). Analytical laboratories often have specific sampling instructions for their sample canisters, and laboratory instructions should be reviewed and used in conjunction with this SOP, when available.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 202 – Organic Vapor Soil Screening
- SOP 205 – Calibration of MiniRAE PID
- SOP 602 – Chain-of-Custody Procedures
- SOP 701 – Decontamination of Sampling Equipment

D. Equipment and Supplies

Laboratory Provided

- Laboratory-prepared, 1- or 6-liter sampling canister, such as a Summa canister or Silco canister, under a vacuum of approximately 30 inches of mercury ("Hg)
- Flow restrictor (sub-slab samples)
- Vacuum gauge and in-line particulate filter
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedure)
- Protective shipping container (box or case)

Braun Intertec Provided

- AC- or battery-powered hammer drill with 5/8-inch diameter hammer bit and 1 1/2-inch diameter hammer bit (for permanent installations only)
- Extension cord (if needed)
- Wet/dry vacuum (optional), broom, and dust pan
- 1 Shut-in Test assembly per sample (plus one spare)- Inert tubing with fittings to conduct the shut-in test.

- Vapor Pin® Kit

    - 10 - Vapor Pins® (new or properly decontaminated)
    - 10 - Vapor Pin® silicon sleeves (see Photograph 2)
    - Vapor Pin® installation/extraction tool
    - 10 - Vapor Pin® protective Teflon caps

- Vapor Pin® Toolbox
  - Micromanometer
  - Tubing cutter
  - Elastrator tool
  - 9/16-inch wrench to remove or tighten caps or connectors
  - Pliers
  - Tape measure
  - Table of PURGE VOLUME CALCULATION
  - Purging device (hand pump, graduated syringe, or similar)
  - 3/4-inch diameter bottle brush
  - Two-pin driver for flush mount covers
  - Silicone tubing connectors
  - Rubber mallet
  - Three 4-inch long by 3-inch diameter PVC water dams
  - Modeling clay (or similar inert clay)
  - Tap water (1 liter)
  - Turkey baster
- Vapor Pin Installation and Soil Vapor Sampling Form (the “Sampling Form”; see Attachment A)
- Cell phone camera or digital camera
- MPCA *Vapor Intrusion Building Survey Form*
- Photoionization detector (PID) (see SOP 202 – Organic Vapor Soil Screening)
- Non-Volatile Organic Compound (VOC) concrete patch like hydraulic cement
- Paper towels
- Vapor Pin® flush mount cover (for permanent installations only)
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof and/or indelible ink pens
- Personal Protective Equipment (PPE)

E. Procedure

E.1. Field Preparation

- If not previously completed, download a copy of the current MPCA *Vapor Intrusion Building Survey Form* from the MPCA website.
- Before the field work is scheduled to begin, order sample canisters equipped with flow restrictors (if required) and pressure gauges from the laboratory. Check the work plan or discuss with the Project Manager regarding the type of canister needed. Allow two to seven days for delivery.
- Inspect laboratory-supplied equipment upon receipt to ensure that all necessary parts are present and operable. Canisters should be under negative vacuum.

- Obtain a blank Sampling Form (Attachment A), which will require the following information to be recorded during sampling:

  - Sample identification
  - Project, staff, and contractor information
  - Date
  - Sketch of sample locations
  - Relative pressure below the floor slab
  - PID reading
  - Canister serial/identification number
  - Flow-restrictor serial/identification number, if present
  - Initial and final pressure readings from canister vacuum gauge, if present

- Complete sample identification label attached to canister.
- Perform underground utility clearance in accordance with the *Braun Intertec Corporate Utility Clearance Process*.
- Ensure that all known public and private utilities are marked and that Vapor Pins® are installed a safe distance from any buried utility.
- Before advancement of the sampling point, carefully observe the work area for evidence of possible sub-slab utilities or obstacles (e.g., water pipes, sewer cleanouts, flow drains, or electrical conduits protruding from the floor slab). Also, look for cracks in the concrete that could jeopardize the sample. If potential sub-slab utilities or cracks in concrete are present, off-set the sample location accordingly.

E.2. Complete Building Survey Form

- If not previously completed, fill out all applicable sections of the MPCA *Vapor Intrusion Building Survey Form*. In most cases, this will require assistance from the property owner or maintenance staff.

E.3. Permanent Installation of Vapor Pin®

- If AC-powered, find power source for rotary hammer drill and equip the rotary hammer drill with appropriate drill bit. Set up a wet/dry vacuum to collect drill cuttings (if necessary).
- Drill a 1 1/2-inch diameter hole at least 1 3/4 inches but not more than 2 inches into the floor slab (Photograph 3).
- Switch out drill bit on rotary hammer drill and drill a 5/8-inch hole inside of the center of the previously-drilled 1 1/2-inch diameter hole through the slab and approximately 1 inch into the underlying soil to form a void (see Photograph 3).
- Remove the drill bit, brush the hole with a bottle brush, and remove the loose cuttings with the wet/dry vacuum or broom and dust pan.
- Measure the thickness of the concrete floor and record it on the Sampling Form.
- Assemble the Vapor Pin® by using the Elastrator to push a new silicon sleeve onto the lower end of a Vapor Pin® (see Photograph 1). The lower end of the Vapor Pin® is the larger barbed fitting (see Photograph 2).
- Place the lower end of the Vapor Pin® assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool over the Vapor Pin® to protect the smaller barbed fitting (Photograph 5), and gently tap the Vapor Pin® into place using a rubber mallet (Photograph 6). Make sure the extraction/installation tool is aligned parallel to the Vapor Pin® to avoid damaging the barb fitting. In order to get the threads of the Vapor Pin® set flush with the floor slab inside the 1 1/2 inch hole, unscrew the threaded coupling from the base of the installation/extraction tool, and use the longer end of the tool to drive the pin until the bottom of the threads touch the top of the floor slab (Photograph 3).

- Place the Teflon protective cap on Vapor Pin® to prevent vapor loss prior to sampling (Photograph 7).
- Calibrate the PID and record calibration results (see SOP 204 – Calibration of 580B PID or SOP 205 – Calibration of MiniRAE PID).
- **Note: At buildings with thin slabs (less than 3 inches thick), it may not be possible to install a permanent Vapor Pin®, consult with the Project Manager on alternative sampling methods.**
- Complete a sketch of the Vapor Pin® location with accurate measurements to the building walls on the Sampling Form.

E.4. Temporary Installation of Vapor Pin®

- If AC-powered, find a power source for the rotary hammer drill and equip the rotary hammer drill with the 5/8-inch drill bit. Set up a wet/dry vacuum to collect drill cuttings (if necessary).
- Drill a 5/8-inch diameter hole through the slab and approximately 1 inch into the underlying soil to form a void (see Photograph 4).
- Remove the drill bit, brush the hole with a bottle brush, and remove the loose cuttings with the wet/dry vacuum or broom and dust pan.
- Measure the thickness of the concrete floor and record it on the Sampling Form.
- Assemble the Vapor Pin® by using the Elastrator to push a new silicon sleeve onto the lower end of a Vapor Pin® (see Photograph 1). The lower end of the Vapor Pin® is the larger barbed fitting (see Photograph 2).
- Place the lower end of the Vapor Pin® assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool handle over the Vapor Pin® to protect the barb fitting and cap (Photograph 5), and gently tap the Vapor Pin® into place using a rubber mallet (Photograph 6). Make sure the extraction/installation tool is aligned parallel to the Vapor Pin® to avoid damaging the barb fitting. Drive the Vapor Pin® downward until the bottom of the threads sit flush with the floor slab (Photograph 4).
- Place the Teflon protective cap on Vapor Pin® to prevent vapor loss prior to sampling (Photograph 7).
- Calibrate the PID and record calibration results (see SOP 204 – Calibration of 580B PID or SOP 205 – Calibration of MiniRAE PID).
- Complete a sketch of the Vapor Pin® location with accurate measurements to the building walls on the Sampling Form.

E.5. Soil Vapor Sample Collection

E.5.a. Step 1: Relative Pressure Reading

- If present, remove Teflon protective cap from the Vapor Pin®.
- Measure the relative pressure between the air below the floor slab and above the floor slab.
  - Turn on the micromanometer and make sure it is reading in pascal units (Pa).
  - If the initial reading is not 0.0 Pa, press the ZERO button and release.
  - Connect tubing from the + port to the Vapor Pin®.
  - Observe the reading for a few moments. The micromanometer is very sensitive and may drift a bit. Record a representative result as a single number, including + or –, on the Sampling Form.
  - Disconnect the micromanometer from the Vapor Pin®.

E.5.b. Step 2: Water Dam/Shut in Test

- Connect the tubing Shut-in Test assembly to the Vapor Pin® (Photograph 9).
- Place one of the PVC water dams over the Vapor Pin®. Use the modeling clay to make a water-tight seal between the bottom of the water dam and the floor surface (Photograph 10).

- Connect the tubing Shut-in Test assembly to the gauge/regulator on the canister (Photograph 11) or the alternate gauge/valve assembly (Photograph 17).
- Fill the space inside the water dam with tap water. Fill to the top of the water dam, covering the tubing and two-way valve.

  - Observe for 30 seconds. If the water level does not change, the seal is acceptable. Check the box on the Sampling Form. Proceed to the next step.
  - If the water level drops, the seal must be improved or a new sample location prepared.
  - Leave the PVC water dam and water in place until the sampling is complete.

- Connect a purging device (i.e., graduated syringe or hand pump) to the Shut-in Test assembly as shown in Photograph 14.
- Keep the valve on the canister closed and close the valve to the Vapor Pin®.
- Complete the shut-in test as follows.

  - Draw air from the purging device to produce a minimum of 25"Hg vacuum in the Shut-in Test assembly as read on the canister gauge.
  - Observe the gauge for 5 minutes. It should remain within 1"Hg from the initial reading. If not, check connection tightness on the assemblies and try again for 5 minutes. If not within 1"Hg after rechecking tightness the Shut-in Test assembly must be rejected. If OK, check the appropriate box on the Sampling Form.

E.5.c. Step 3: Purge

  - Once the shut-in test passes, keep the valve to the canister closed and open the valve above the Vapor Pin® as shown on Photograph 13. Purge 200 mL air from the sampling train (Photograph 14).

E.5.d. Step 4: Sample Collection

- Record the serial number of the canister and flow restrictor on the Sampling Form.
- Begin sample collection by slowly opening the valve on the sample canister until the valve is fully open. If the gauge/valve assembly is separate from the canister (Photograph 17) connect the assembly to the canister. Record start time of sample collection on the Sampling Form and on sample identification tag.
- Record the vacuum documented by the laboratory and the initial canister vacuum in "Hg on the Sampling Form. Compare the reading to the initial vacuum documented by the laboratory on the canister tag. **Do not use the canister if the initial reading is 4"Hg or more different than the laboratory provided reading.** If the laboratory did not provide a vacuum reading, **do not use the canister if the initial reading is less than 25"Hg**.
- Monitor the sampling progress.

  - Observe the gauge as the sample is being collected to ensure that the vacuum is decreasing steadily.
  - If water or soil is observed within the tubing, stop the sample collection immediately and close the canister valve. Contact the Project Manager immediately. Approval may be granted to stop collection at this location if an adequate volume of soil gas has been collected for the sample analysis. This is typically evaluated based on the pressure reading of the sample canister. If water or soil has entered the sampling canister, or an adequate sample volume has not been collected, the location will need to be re-sampled. This will entail drilling a new borehole or installing another sampling probe adjacent to the first attempt.

  - Once the gauge reads about 5"Hg or less, sample collection is complete. If the sample is being collected in tight soils it may take longer for the canister to fill, allow the canister to continue filling until the gauge reads 5"Hg or less.
    Note: The laboratory needs a total of at least 20"Hg of sample for analysis.

- Close the valve on the sample canister.
- Record the sample collection stop time and final pressure on the Sampling Form.

E.5.e. Step 5: Measure Organic Vapors with PID

- Shut off the valve on the tubing Shut-in Test assembly just above the Vapor Pin®. Disconnect the Shut-in Test Assembly from the canister and place the brass cap back on the canister
- Remove the water from the PVC water dam with the turkey baster.
- Turn on the PID.
- Remove the Shut-in Test assembly and PVC water dam.
  - Attach the running PID to the Vapor Pin®.
  - Observe the organic vapor readings and record the highest measurable concentration on the Indoor Air/Soil Vapor Sampling Form.
  - After the PID reading is recorded, either place the cap on the Vapor Pin® (permanent) or remove the Vapor Pin® (temporary).
- Complete COC form based on information recorded on the Sampling Form in accordance with SOP 602 – Chain-of-Custody Procedures.
- Place the canister in a laboratory provided protective shipping container and arrange for pick-up or drop-off.

E.6. Permanent Vapor Pin® Completion

If the Vapor Pin® is being left in place, remove the inert tubing, replace the Teflon protective cap and place the Vapor Pin® flush mount cover over the Vapor Pin®. Tighten using a two-tooth driver by rotating it clockwise. Rotate the cover counter clockwise to remove it for subsequent access.

E.7. Temporary Vapor Pin® Removal

- If the Vapor Pin® is being removed after sampling, extract the Vapor Pin® in the following manner:
  - Remove the Teflon protective cap, and thread the installation/extraction tool onto the barrel of the Vapor Pin® (Photograph 15).
  - Continue turning the tool to assist in extraction, and then pull the Vapor Pin® from the hole (Photograph 16).
  - Fill the hole with a non-VOC concrete patch like hydraulic cement.
- Bring the used Vapor Pin® back to the office for decontamination and reuse (see SOP 701 – Decontamination of Sampling Equipment).

E.8. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

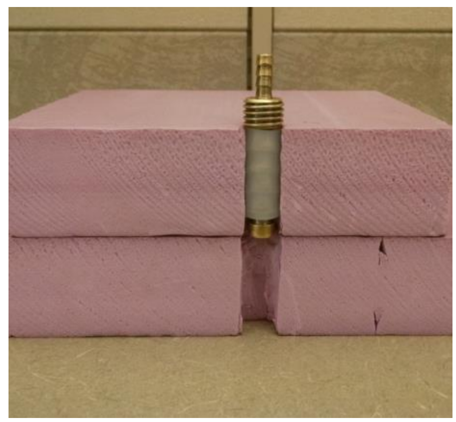
E.9. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

Photograph 1: Using Elastrator to push Vapor Pin® into silicone tubing

Photograph 2: Silicone tubing properly inserted onto Vapor Pin®

Photograph 3: Permanent Installation



Photograph 4: Temporary Installation

Photograph 5: Installation Tool

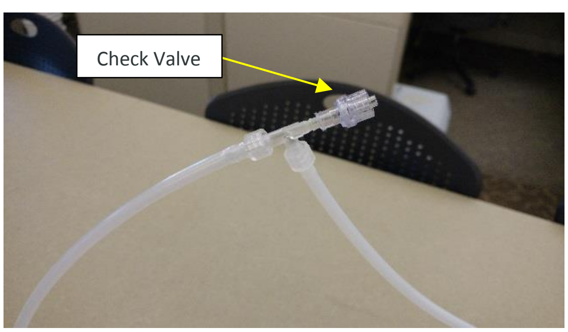
Photograph 6: Installation Tool w/ Mallet

Photograph 7: Protective Teflon Cap

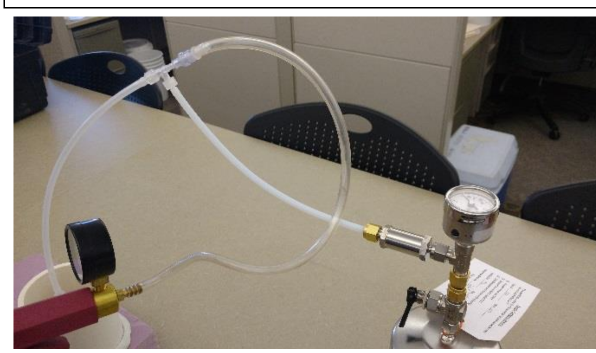
Photograph 8: Shut-In Test assembly connection to Vapor Pin®

Photograph 9: Water dam around Vapor Pin®

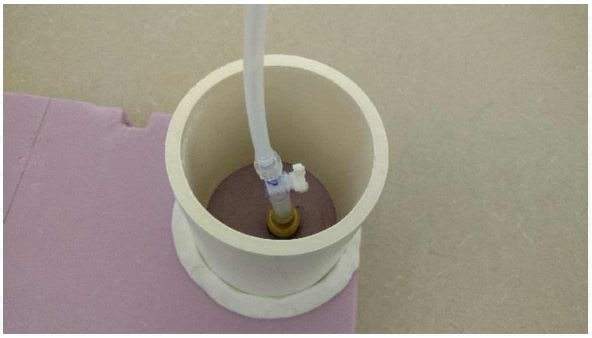
Photograph 10: Shut-In Test assembly connection to air canister



Photograph 11: Close-up of T-connection on Shut-in Test assembly



Photograph 12: Vacuum pump connected to check valve on Shut-in Test assembly



Photograph 13: Two-way valve opened to soil

Photograph 14: Use of syringe to purge air from tubing and below ground

Photograph 15: Vapor Pin® Extraction

Photograph 16: Vapor Pin® Extraction

Photograph 17: Alternate gauge and valve connection assembly (courtesy Legend Laboratory)

BRAUN INTERTEC

Vapor Pin® Installation and Soil Vapor Sampling Form

Project No.:		Sample ID:	
Project Name:		Date:	
Location:		Personnel:	

Radon or VOC mitigation system in building? ☐ Present ☐ Operating

Equipment

☐ Air canister & connectors
☐ Air Chain-of-Custody form
☐ Hammer drill and bit(s)
☐ Extension cord
☐ Shut-in Test assembly
☐ Vapor Pin® kit
☐ Vapor Pin® toolbox
☐ PID #__________
☐ Covers (permanent installation)
☐ Shop-Vac / broom & dustpan
☐ Concrete patch

Vapor Pin® Installation

Installation Date:

Installation Type:
☐ Temporary
☐ Permanent
☐ Stainless steel cover
☐ Plastic cover

Concrete Thickness (inches):

☐ Concrete patch (if temporary)

Sketch of pin location with measurements to walls:

Soil Vapor Sampling

Relative sub-slab pressure (±pascals):

☐ Water dam test passed

☐ Shut-in test passed

☐ Purged 200 mL air prior to sampling

Sampling Canister ID:
☐ 1 Liter ☐ 6 Liters

Flow Controller ID:
☐ None ☐ 200 mL/min

Canister Vacuum on Label ("Hg):

Canister Initial Vacuum ("Hg):

Do not use the canister if the difference between the label and initial vacuum is >4"Hg or if the initial is <25"Hg.

Collection Start Time:

The final vacuum must be <5"Hg or at least 20"Hg less than the initial vacuum.

Canister Final Vacuum ("Hg):

Collection End Time:

PID Reading (ppm):

Notes:

A. Purpose

The purpose of the Chain-of-Custody (COC) Standard Operating Procedure (SOP) is to control environmental samples from the time they are collected until custody of the samples is accepted by the laboratory sample custodian. COC documentation serves three main purposes:

- Communicates the analytical instructions from the sampler to the analytical laboratory.
- Provides a permanent record of samples provided to the laboratory.
- Documents that samples were handled only by authorized personnel and were not available for tampering prior to analysis.

A.1. Scope and Applicability

Although few environmental samples will ever be used in criminal or civil litigation cases, most samples are collected in support of government-regulated activities. In addition, it is possible that the results of the sample analyses will be used in future litigation even if none was contemplated at the time the samples were collected. Therefore, it is important that a record of sample possession (i.e., COC) be maintained, so that control of the samples from the time of collection to the time of sample laboratory check-in can be demonstrated.

Laboratory-related sample control is described in laboratory operating and quality-control documents and is not discussed in this standard operating procedure (SOP).

This procedure should be used for control of environmental samples that include, but are not limited to those of groundwater (see SOP 311 – Groundwater Sample Collection), surface water (see SOP 314 – Surface Water Sampling), soil (see SOP 208 – Soil Grab Sample Collection and SOP 209 – Soil Composite Sample Collection), air (see SOP 402 – Indoor Air Sampling), soil vapor (see SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe and SOP 405 – Sub-Slab Soil Vapor Sampling), and waste.

A.2. Summary of Method

Environmental samples are collected using methods specified in the work plan or other SOPs. The samples are collected in sampling containers for the desired analyses, preserved as appropriate, and a label is affixed to each container specifying the project name and number, sample identification, date and time of collection, and sample collector. The information is entered onto the COC form and the desired analyses are indicated on the form, which also serves as the analytical request. Sample custody (possession) is maintained individually until the samples are delivered to the laboratory sample check-in. Transfer of custody is documented on the COC form by printed name, signature, date and time.

A.3. Personnel Qualifications and Responsibilities

The sampler is responsible for understanding, implementing and documenting activities related to this SOP during field activities. The sampler is responsible for transmitting a copy of field notes that have not been forwarded to the project manager or designee, as well as a copy of the COC form(s) immediately after sample check-in. If there is more than one sampler, the lead field sampler assumes these responsibilities.

A.4. Definitions

Chain-of-Custody Procedure: A procedure whereby a sample or set of samples is maintained under physical possession or control.

Custody: Samples and data are considered to be in your custody when:

- They are in your physical possession,
- They are in your view, after being in your physical possession,
- They are in your physical possession and then locked in a room or vehicle so that tampering cannot occur, or
- They are kept in a secured area, with access restricted to authorized personnel only.

Chain-of-Custody Form: Form used to record sample identification information, test(s) requested, result reporting instructions, and sample custody.

Sample: A portion of an environmental or source matrix that is collected and used to characterize the matrix.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

Department of Transportation (DOT), United States Postal Service (USPS), and Federal Aviation Administration (FAA) shipping/labeling regulations must be followed for shipped samples.

C. Referenced SOPs

- SOP 208 – Soil Grab Sample Collection
- SOP 209 – Soil Composite Sample Collection
- SOP 314 – Surface Water Sampling
- SOP 402 – Indoor Air Sampling
- SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe
- SOP 405 – Sub-Slab Soil Vapor Sampling

D. Equipment and Supplies

- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Waterproof or indelible ink pens
- Sample labels
- Custody seals
- Chain-of-Custody (COC) forms (see SOP 602 – Chain-of-Custody Procedure)

E. Procedure

E.1. General Guidelines

- Keep the number of people involved in collecting and handling samples and data to a minimum.
- Only personnel associated with the project should handle samples and data.
- Always document the transfer of samples and data from one person to another on the COC form.
- Always accompany samples and data with the COC form.
- Samples should be uniquely identified, legibly, in permanent ink.
- Fill out the COC form as completely as possible. The sample identification information on the sample containers must match the COC form.
- Use a separate COC form for each cooler.

E.2. Completing COC Form

The COC form should be filled out by the sampler or designee as the samples are being collected and containerized.

E.3. Securing Samples

If you cannot maintain personal possession of the samples prior to sample check-in, they may be secured. A locked vehicle is considered controlled access (i.e., secured). A cooler sitting on the tailgate of a pickup truck or under an unlocked topper, out of direct view of the custodian is not secure. An unsecured cooler in a locked hotel room is also not within controlled access as hotel staff have access to the room. In this case, the cooler could be padlocked or custody seals could be used to secure the samples or cooler.

E.4. Data and Records Management

The original COC form is maintained by the laboratory in accordance with their file retention guidance. A copy of the record should be provided to the project manager or designee with a copy of the sampling field notes by the sampler immediately after sample check-in.

E.5. Quality Assurance Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

The project manager or designee should review the COC form as soon as possible after sample check-in to verify that the information on the COC form is correct.

A. Purpose

The purpose of this Standard Operating Procedure (SOP) is to describe the procedure used for proper packaging methods and shipment of samples by overnight carrier via Chain-of-Custody (COC) procedures (see SOP 602 – Chain-of-Custody Procedures).

A.1. Scope and Applicability

If samples cannot be delivered to the laboratory in person and must be shipped, the following procedures should be used.

This procedure should be used for shipping of environmental samples that include, but are not limited to those of groundwater (see SOP 311 – Groundwater Sample Collection), surface water (see SOP 314 – Surface Water Sampling), soil (see SOP 208 – Soil Grab Sample Collection and SOP 209 – Soil Composite Sample Collection), air (see SOP 402 – Indoor Air Sampling), soil vapor (see SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe and SOP 405 – Sub-Slab Soil Vapor Sampling), and waste.

A.2. Summary of Method

Environmental samples are collected using methods specified in the work plan or other SOPs. The samples are collected in sampling containers for the desired analyses, preserved as appropriate, and a label is affixed to each container specifying the project name and number, sample identification, date and time of collection, and sample collector. The information is entered onto the COC form and the desired analyses are indicated on the record, which also serves as the analytical request. Sample custody (possession) is maintained individually until the samples are delivered to the laboratory sample check-in. Transfer of custody is documented on the COC form by printed name, signature, date, and time.

A.3. Personnel Qualifications and Responsibilities

The sampler is responsible for understanding, implementing, and documenting activities related to this SOP during field activities. The sampler is responsible for transmitting a copy of field notes that have not been forwarded to the project manager or designee, as well as a copy of the COC form(s) immediately after samples are shipped. If there is more than one sampler, the lead sampler assumes these responsibilities.

A.4. Definitions

Chain-of-Custody Procedure: A procedure whereby a sample or set of samples is maintained under physical possession or control.

Custody: Samples and data are considered to be in your custody when:

- They are in your physical possession.
- They are in your view, after being in your physical possession.
- They are in your physical possession and then locked up so that tampering cannot occur.
- They are kept in a secured area, with access restricted to authorized personnel only.

Chain-of-Custody Form: Form used to record sample identification information, test(s) requested, result reporting instructions and sample custody.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

Department of Transportation (DOT), United States Postal Service (USPS), and Federal Aviation Administration (FAA) shipping/labeling regulations must be followed for shipped samples.

C. Referenced SOPs

- SOP 208 – Soil Grab Sample Collection
- SOP 209 – Soil Composite Sample Collection
- SOP 308 – Trip Blanks
- SOP 314 – Surface Water Sampling
- SOP 402 – Indoor Air Sampling
- SOP 403 – Soil Vapor Sampling from a Borehole and with a Hand Probe
- SOP 405 – Sub-Slab Soil Vapor Sampling
- SOP 602 – Chain-of-Custody Procedures

D. Equipment and Supplies

- Sample coolers or similar shipping containers (solid or liquid samples)
- Sturdy cardboard boxes (steel air canister)
- Protective wrapping and packaging materials
- Ice
- Appropriate laboratory-supplied containers and preservatives (when applicable)
- Sample labels
- Temperature blanks (one per sample cooler)
- Trip blanks, if necessary (see SOP 308 – Trip Blanks)
- Gallon-size plastic bags
- Waterproof and/or indelible ink pens
- COC forms (see SOP 602 – Chain-of-Custody Procedure)
- Custody seals
- Clear packing tape
- Shipping labels for the exterior of the shipping container
- Bill of lading for selected carrier

E. Procedure

E.1. General Guidelines

- Sample containers with solids or liquids should be placed inside of sealable plastic bags to reduce the potential for cross contamination, breakage, and melted ice getting into the samples.
- The drain plug on the cooler, if present, should be taped shut from the inside and outside.
- A layer of protective material such as bubble wrap should be placed in the bottom of the cooler.

E.2. Cooler Guidelines

- If possible, place all contents of the cooler into a large plastic bag that is tied or taped shut to avoid melted ice from leaking out of the cooler during shipping.
- Sample containers should be placed upright in the cooler, and protective material such as bubble wrap should be placed around the sample containers. Do not stack glass containers or lay them on their side, as doing so increases the chance of them breaking.
- Fill the cooler no more than 50 percent with sample containers. Fill all the remaining void space in the cooler with protective material and ice to avoid breakage during transport. At least 1/3 of total cooler space should be taken up by ice. When in doubt, use more ice.
- Ice that is double bagged in sealable plastic bags should be distributed over the top of the samples.
- Additional protective material should then be added to the cooler.
- Ensure that a temperature blank bottle and trip blank (if needed) is in each cooler and included on the COC form.
- Total weight must be less than 30 pounds.

E.3. Air Canister Guidelines

- If possible, reuse the cardboard box provided by the laboratory. If not possible, use a sturdy cardboard box to contain the air canister and associated regulator.
- Include bubble wrap as necessary to reduce movement of the canister and regulator during shipment.
- Use clear packing tape to secure the box during shipment.

E.4. COC Guidelines

- The sampler should relinquish the samples by signing and indicating the date and time that the samples were relinquished to the shipper. The shipping company agent is not required to sign the COC form.
- Field personnel should retain a copy of the COC form and attach it to the field notes.
- The COC form should be placed in a sealable plastic bag and taped to the inside of the cooler lid or placed inside the cardboard box. At least one COC form should be placed in each cooler that is sent to the laboratory.

E.5. Custody Seal Guidelines

- Close the top of the cooler and rotate/shake the cooler to verify that the contents are packed so that they do not move. Add additional protective material if needed and reclose.
- Place one custody seal on the front and on the back of the cooler in such a way that the opening of the cooler will destroy the seal. If shipping air canisters, place the custody seal where the cardboard box flaps meet.
- Tape the cooler or the cardboard box shut with clear packing tape, wrapping all the way around each end. Be sure to tape over the custody seals.

E.6. Shipping Guidelines

- Samples sent by private carrier (UPS, FedEx, etc.) will be accompanied by a bill of lading or other shipping document. Shipping documentation should be saved as part of the permanent record. DOT, USPS, and FAA shipping/labeling regulations must be followed. The contents should be described on the shipping documents as "non-hazardous environmental samples" unless the samples are known to be hazardous such as methane gas samples. If hazardous, contact the laboratory for special shipping instructions. Fill out the correct shipping paperwork with the correct shipping address for the laboratory and tape to the top of the cooler or shipping box. Wrap packing tape around the entire cooler or shipping box. Retain copies of all shipment records as provided by the shipper.
- The cooler or shipping box should be shipped to "Laboratory Sample Receiving" marked "Deliver to addressee only," and the laboratory should be notified of its approximate delivery date and time.
- Deliver the cooler or have the cooler picked up by an overnight carrier that guarantees 24-hour delivery. Consideration should be given to the expected delivery date and the weather. The preferred carriers are shown below in order of preference.
  - Contract shipper such as Speedee (Minnesota only).
  - UPS through Braun Intertec Document Center or front desk (Minneapolis only).
  - UPS through retail outlet.
  - FedEx – may require an explanation stating the container is non-hazardous or the canister is not a cylinder, contains air, is non-flammable, and is not under pressure.
  - US mail – no special marking required.

E.7. Data and Records Management

The original request for COC form is maintained by the laboratory in accordance with their file retention guidance. A copy of the record should be provided to the project manager or designee with a copy of the sampling field notes by the field personnel immediately after sample check-in.

E.8. Quality Assurance Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

The project manager or designee should review the COC form as soon as possible after sample check-in to verify that the information on the COC form is correct.

A. Purpose

The purpose of the Standard Operating Procedure (SOP) is the procedure of decontaminating reusable equipment involved in soil, groundwater, and soil vapor activities. Reusable equipment must be properly decontaminated to provide chemical analysis results which are reflective of the actual concentrations present at sampling locations, and to minimize the potential for cross-contamination between sampling locations and the transfer of contamination off-site.

Applicable soil SOPs include SOP 203 – Soil Boring Observation and Sampling, SOP 208 – Soil Grab Sample Collection, SOP 209 – Soil Composite Sample Collection, SOP 210 – Soil Stockpile Sampling, and SOP 211 – Test Pit and Test Trench Observation and Sampling.

Applicable water SOPs include SOP 301 – Water Level Measurement, SOP 302 – LNAPL Level Measurement, SOP 303 – Monitoring Well Development, SOP 304 – Slug Testing, SOP 309 – Field Filtering of Groundwater Samples, SOP 310 – Monitoring Well and Piezometer Installation, SOP 311 – Groundwater Sample Collection, SOP 312 – Well Purging and Stabilization, SOP 314 – Surface Water Sampling, and SOP 316 – Calibration of Water Meters.

The applicable soil vapor SOP includes SOP 405 – Sub-Slab Soil Vapor Sampling.

Be sure to follow the site-specific sampling plan that may require special cleaning or rinsing methods, and/or special handling and disposal of wash and rinse water (also see SOP 702 – Management of Investigation Derived Waste). Additional rinses with solvents such as hexane, acetone, or acid may be required by the site-specific sampling plan, but are not covered in this SOP.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

Nitrile gloves should be worn during decontamination activities to reduce the incidence of skin contact with potentially contaminated soil/groundwater and to reduce the risk of cross-contamination. In certain situations, long-sleeved rubber gloves may be needed to prevent contact.

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation
- SOP 203 – Soil Boring Observation and Sampling
- SOP 208 – Soil Grab Sample Collection
- SOP 209 – Soil Composite Sample Collection
- SOP 210 – Soil Stockpile Sampling
- SOP 211 – Test Pit and Test Trench Observation and Sampling
- SOP 301 – Water Level Measurement
- SOP 302 – LNAPL Level Measurement
- SOP 303 – Monitoring Well Development
- SOP 304 – Slug Testing
- SOP 309 – Field Filtering of Groundwater Samples
- SOP 310 – Monitoring Well and Piezometer Installation
- SOP 311 – Groundwater Sample Collection
- SOP 312 – Well Purging and Stabilization
- SOP 314 – Surface Water Sampling
- SOP 316 – Calibration of Water Meters

- SOP 405 – Sub-Slab Soil Vapor Sampling
- SOP 702 – Management of Investigation Derived Waste

D. Equipment and Supplies

- Clean tap water (for washing and rinsing soil sampling equipment)
- Distilled or deionized water (for washing and rinsing groundwater sampling equipment)
- Clean container for wash water (bucket, spray bottle, etc.)
- Phosphate-free detergent (i.e., Alconox or Liquinox in bulk containers or individual packets)
- Scrub brush (soil sampling equipment decontamination)
- Paper towels
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- Personal Protective Equipment (PPE)

E. Procedures

E.1. Soil Sampling Equipment

E.1.a. Hand Tools

Hand tools used for sampling include shovels, hand trowels, hand augers, etc. Before collecting each new soil sample, clean the equipment as follows:

- Remove loose or attached soil from the tool with a gloved hand, paper towel, or brush.
- Wash and brush the tool in a solution of phosphate-free detergent in tap water.
- Rinse the tool with tap water.
- Inspect for remaining particles or surface film, and repeat cleaning and rinsing procedures if necessary.

E.1.b. Direct-Push Sampling Equipment and Split Spoon Sampler

The drilling contractor is responsible for cleaning reusable sampling equipment; however, field personnel must ensure that proper procedures are followed. Prior to collecting each sample the reusable sampling equipment should be cleaned as follows:

- Remove loose or attached soil from the sampler components.
- Wash the sampler components in a solution of phosphate-free detergent in tap water.
- Rinse the sampler components with tap water.
- Inspect for remaining particles or surface film, and repeat cleaning and rinsing procedures if necessary.

E.1.c. Drill Rig Auger Flights

The drilling contractor is responsible for providing clean auger equipment; however, field personnel must ensure that proper procedures are followed. Prior to each use the auger flights should be cleaned as follows:

- Remove loose or attached soil from the auger flight.
- Wash the auger flight with a pressure washer and clean tap water.
- Inspect for remaining particles or surface film, and repeat cleaning and rinsing procedures if necessary.

E.2. Groundwater Sampling Equipment

E.2.a. Groundwater Measuring and Sampling Equipment

This procedure applies to all reusable equipment that will be placed into a well (including water level indicators, transducers, slugs, groundwater sample equipment, and pumps). Groundwater measuring and sampling equipment should be decontaminated after use at each well or sampling point as follows:

- Wash the exterior with a solution of phosphate-free detergent in distilled or deionized water.
- Rinse with distilled or deionized water.
- Inspect for remaining particles or surface film and repeat cleaning and rinsing procedures if necessary.
- Do not wipe dry.

E.3. Product Interface Probe

The product interface probe is only used in wells that may contain light non-aqueous phase liquid (LNAPL). Prior to each use the product interface probe should be cleaned as follows:

- After fluid levels in each well are measured, wipe the probe and tape with a paper towel.
- After returning to the office, clean the probe and tape in a solution of phosphate-free detergent and tap water. Allow the probe and tape to soak in the solution up to 24 hours, if possible.

E.4. Vapor Sampling Equipment

E.4.a. Vapor Pins® – Used for Sub-Slab Soil Gas Sampling

This office-only procedure applies solely to the Vapor Pin® itself that will be used to obtain a soil gas sample. Once the Vapor Pin® has been used it will be brought back to the office and cleaned as follows:

- Remove the silicone sleeve and discard.
- Wash the Vapor Pin® in a hot water and phosphate-free detergent wash.
- Bake in an oven to a temperature of 130°C (266°F) for at least one hour.

E.5. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

E.6. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

A. Purpose

In the process of collecting environmental samples during field investigation activities, several different types of waste may be generated. These wastes are referred to as investigation derived waste (IDW). Some of these waste materials may be hazardous wastes and must be properly managed in accordance with Environmental Protection Agency (EPA) regulations. Materials which may become IDW requiring proper management include:

- Used Personal Protective Equipment (PPE) such as gloves, boots, Tyvek® clothing, spent respirator cartridges, etc.
- Disposable sampling equipment including bailers, filters, rope, sleeves from soil probes, tubing, sealable plastic bags, etc.
- Soil cuttings from drilling, probing, hand augering, or test trenching.
- Drilling mud or water used for rotary drilling.
- Groundwater obtained through well development or purging.
- Light non-aqueous phase liquid (LNAPL) combined with groundwater obtained through well development or purging.

B. Health and Safety

Field work should be performed in accordance with the *Braun Intertec Corporate Health and Safety Manual Standard Operating Procedures* and the site-specific health and safety plan (HASP).

C. Referenced SOPs

- SOP 101 – Field Notes and Documentation

D. Equipment and Supplies

Some or all of the following materials may be needed for the proper management of IDW:

- Plastic or galvanized tubs or pails
- Plastic garbage bags
- 55-gallon drums
- Drum wrench
- Roll-off dumpster
- Poly-sheeting (10 mil or thicker)
- Self-adhesive labels and permanent marker
- Field Report Form (see SOP 101 – Field Notes and Documentation) or field logbook
- PPE

E. Procedure

E.1. Characterization of IDW

IDW must be characterized in accordance with applicable state and federal hazardous waste regulations. In some cases, wastes are hazardous waste regardless of test results (i.e., listed hazardous wastes). Characterization of IDW includes activities performed before, during, and after the wastes are generated. IDW characterization may include:

- **Historical Research** – A Phase I Environmental Site Assessment (ESA), Phase II ESA, prior analytical data, and/or environmental permits can provide information regarding potential and existing contaminants of concern. In cases where prior investigations and/or analytical data are not available, additional steps should be taken to properly characterize IDW.

- **Visual and Olfactory Observations** – Some contaminants of concern can be detected using visual and/or olfactory observations such as the presence of staining and odors, respectively. However, visual and olfactory observations should only be used as a qualitative determination regarding the presence or absence of contamination.
- **Field Screening** – Field screening equipment such as a photoionization detector (PID), Draeger tubes, and/or colorimetric tubes can provide an approximation of the magnitude of contamination present. Appropriate field screening equipment should be selected based on historical research and applicable site-specific work plans.
- **Laboratory Analysis** – Analytical data provides the highest degree of accuracy regarding the magnitude of contamination present. Analytical parameters should be selected based on historical research and analytical data from site investigations. Disposal facilities may require toxicity characteristic leaching procedure (TCLP) analysis if elevated contaminants are present in IDW.

E.2. Temporary Storage of IDW

IDW may require temporary storage pending characterization. Containers should be selected based on the physical and chemical characteristics of the contaminants of concern being investigated using available characterization data. Other considerations include weather conditions, security of the storage facility, mobility of the container, and duration of storage. Commonly used waste disposal containers include 55-gallon drums, garbage bags, and roll-off dumpsters. IDW containers must be labeled with the following information:

- Date of generation
- Description of contents
- Emergency contact information

IDW may also be stockpiled on site by placing the material on polyethylene sheeting or an impermeable surface such as asphalt or concrete, covering the material with polyethylene sheeting, and anchoring polyethylene sheeting to prevent infiltration of contaminants of concern from precipitation.

When containing IDW in drums, solids and liquids must be kept in separate drums. Each drum should be labeled with:

- “Braun Intertec” and a contact phone number,
- A unique identification number,
- Date(s) material was containerized,
- Source locations (if applicable), and
- Collector’s initials.

Secure the drum cover and take precautions to ensure that the drum will not be disturbed.

Appropriate characterization must precede disposal of contained materials. The site-specific Sampling and Analysis Plan or project manager will determine the appropriate testing based on the anticipated contaminants of concern in the IDW and the anticipated disposal method.

E.3. Disposal of IDW

IDW should be managed as described in Attachments A and B or as determined by the project manager and/or the site-specific Sampling and Analysis Plan. Field personnel should consult with the project manager to assess if leaving IDW on-site has the potential to endanger human health or the environment. More conservative IDW management methods may be appropriate if the client does not own the property where field activities are performed and during winter conditions.

Information regarding IDW requiring off-site disposal should be recorded in the field logbook or on the field report form, including the drum number or stockpile identifier, a description of the waste including location generated and estimated volume, and a list of samples collected for characterization of the IDW.

If the IDW is classified as non-hazardous waste or petroleum, or as potentially hazardous, it should be disposed of promptly where permitted (see Attachment A and Attachment B).

If the IDW is classified as hazardous waste, it must be labeled, stored, handled, transported and treated/disposed according to state and federal hazardous waste regulations and the generator's classification (large, small, or very-small quantity generator).

In all cases, IDW must be properly disposed in 90 days or fewer. Braun Intertec field personnel should not sign waste profiles or shipping documents on behalf of clients or as an "agent" for clients unless a formal agreement has been executed with the client.

E.4. Data and Records Management

Observations should be documented in accordance with SOP 101 – Field Notes and Documentation.

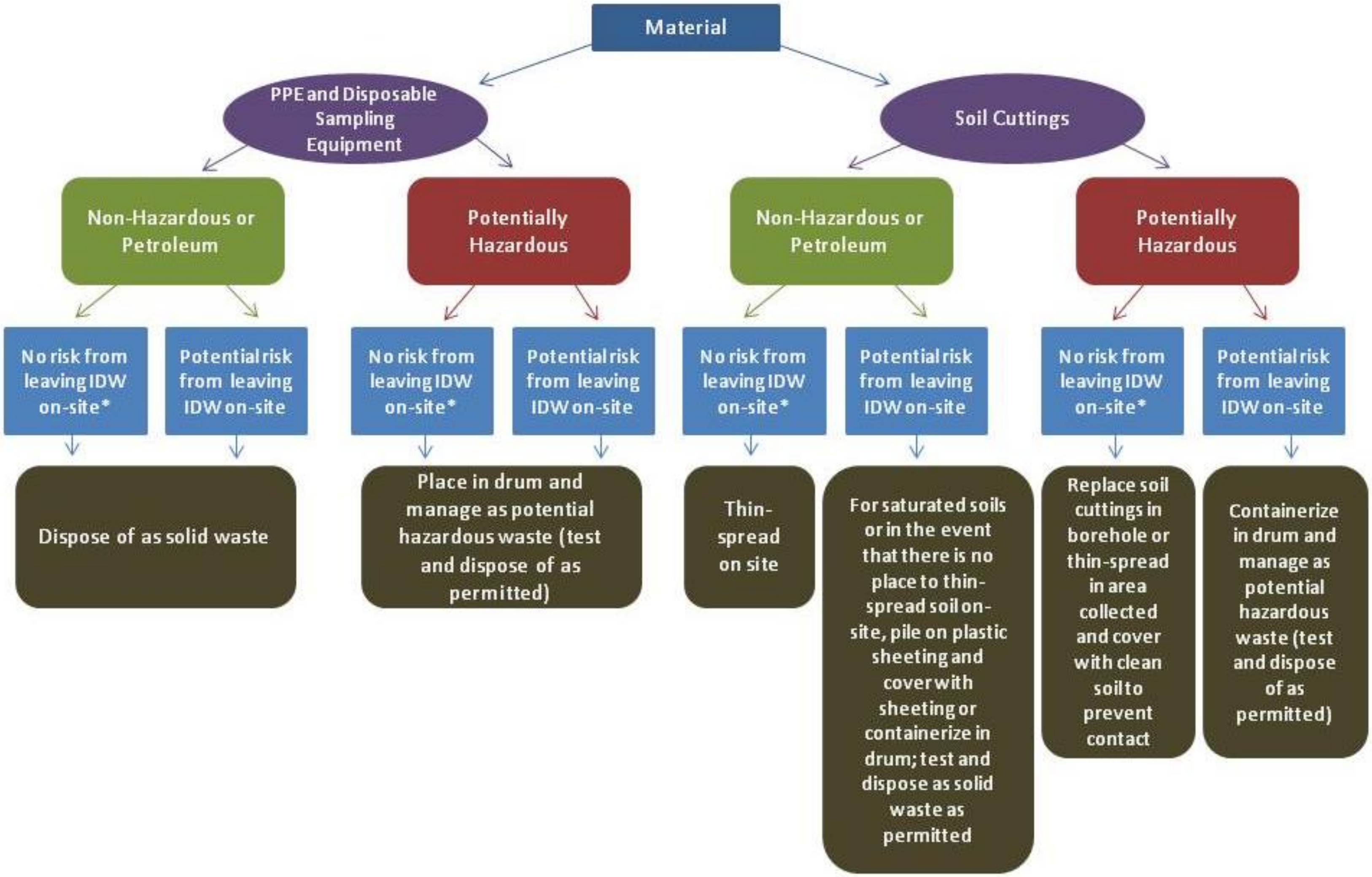
E.5. Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures described in the work plan should be followed.

F. References

United States Environmental Protection Agency, July 3, 2014, Region 4, Science and Ecosystem Support Division Operating Procedure, Management of Investigation Derived Waste, SESDPROC-202-R3, Athens, GA.

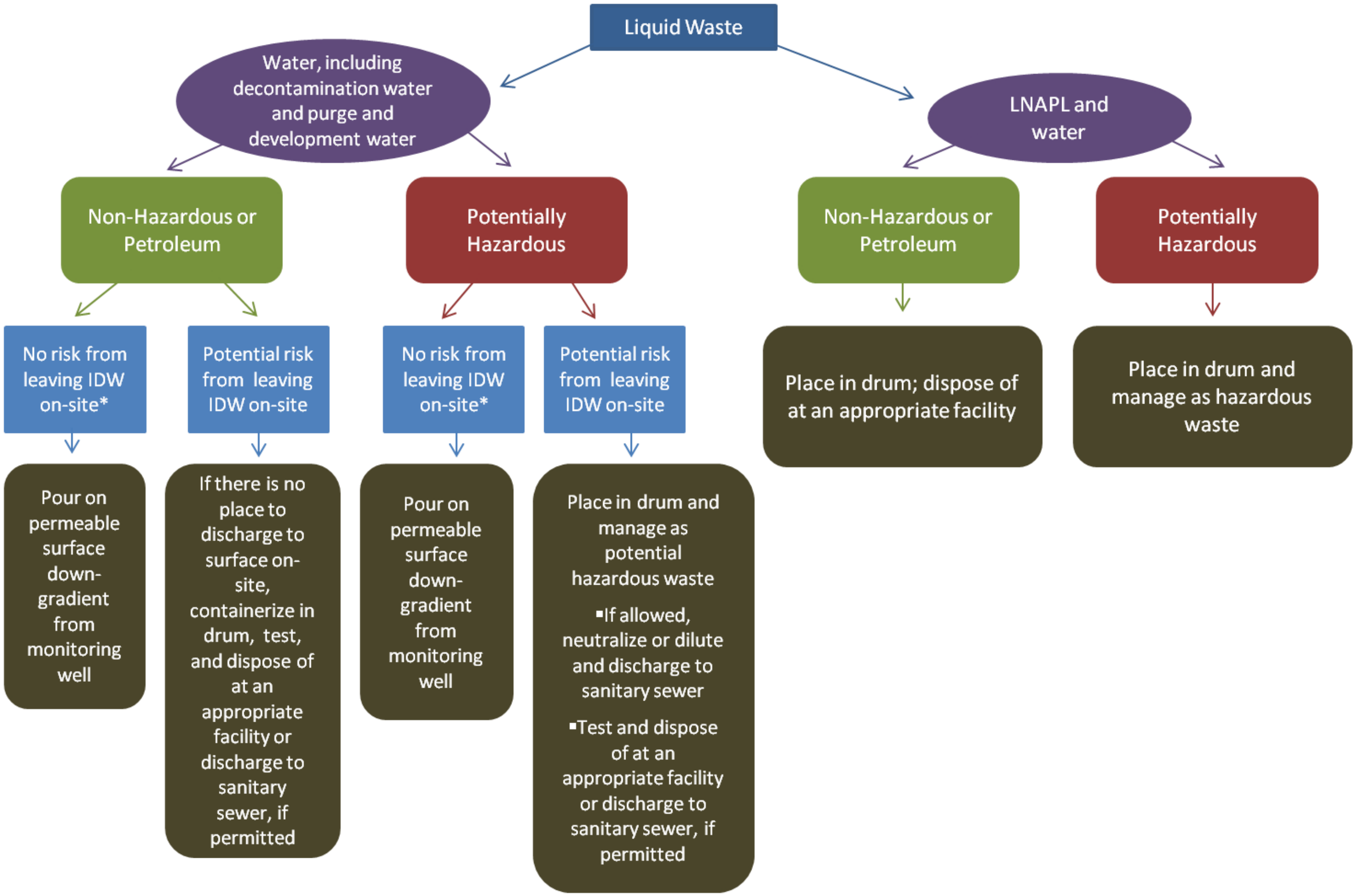
Attachment A
Management of Solid Investigation Derived Waste



* Management method for IDW at sites with no known areas of significant contamination and no known hazardous waste issues and where leaving IDW on-site will not endanger human health or the environment. Use more conservative method if the site history or regulatory status warrants. Field personnel should consult with the project manager before thin-spreading soil.

BRAUN INTERTEC

Attachment B
Management of Liquid Investigation Derived Waste



* Management method for IDW at sites with no known areas of significant contamination and no known hazardous waste issues and where leaving IDW on-site will not endanger human health or the environment. Use more conservative method if the site history or regulatory status warrants. Field personnel should consult with the project manager before pouring liquids on permeable ground surfaces.