APPENDIX H

MPE/Injection Pilot Test Memorandum

Geosyntec consultants

1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144
PH 678.202.9500
FAX 678.202.9501
www.geosyntec.com

Technical Memorandum

Date: January 28, 2021

To: Tim Hassett; Hercules LLC

From: Ali Ciblak, P.E., Ph.D., Rich Murray, P.E., Shanna Thompson, P.E., Geosyntec Consultants, Inc.

Subject: Shallow Groundwater Pilot Test Results
Hercules/Pinova, Glynn County, Brunswick, GA

Geosyntec Consultants, Inc. (Geosyntec) performed field studies on behalf of Hercules, LLC between December 2019 and November 2020 to evaluate the feasibility of remedial technologies and to support selection of an interim corrective measure (ICM) to address volatile organic compounds (VOCs) or/and possible non-aqueous phase liquid (NAPL) in shallow groundwater near the location of temporary shallow groundwater (SGW) sample location, SGW-23, and monitoring wells MW-21, MW-22, MW-23, and MW-24 (i.e. the SGW-23 Area, also known as the Stillhouse Control Room area) at the Hercules/Pinova facility in Brunswick, Georgia (Site) as shown in **Figure 1**. A desktop study evaluated the feasibility of remedial technologies including excavation, air sparging/soil vapor extraction (AS/SVE), in-situ stabilization (ISS), multi-phase extraction (MPE), in-situ chemical oxidation (ISCO), Ozone/SVE, in-situ thermal treatment, and enhanced in-situ bioremediation (EISB). Based on the desktop study, EISB, ISCO and MPE were selected for further evaluation with field and laboratory studies. The following studies were performed to evaluate the feasibility of selected technologies:

- A pilot test to evaluate the feasibility of MPE; and,
- An injection test to evaluate the injection rate and pressure that could be achieved if implementing an EISB or ISCO remedy.

This technical memorandum summarizes the methodology, results and conclusions of the MPE pilot test and the injection rate test.

BACKGROUND

The SGW-23 Area is located north of the Stillhouse Control Room within the greater Southern Production Area, which is an identified source area at the site according to the *Refined Conceptual Site Model Hercules/Pinova Brunswick Facility, Brunswick, Georgia* (Integral, 2019). The dominant direction of groundwater flow in this area is vertical with a dominant downward hydraulic gradient, and a less significant horizontal gradient which simultaneously transports groundwater eastward (Integral, 2019). Elevated concentrations of VOCs, specifically benzene, p-isopropyltoluene (paracymene), and toluene, have been detected in the monitoring wells which define the area: MW-21, MW-22, MW-23, and MW-24 as shown on **Figure 2**. The recent benzene, paracymene, and toluene results for each of the four monitoring wells are shown in the table below.

Monitoring Well	Sampling Date	Results (µg/L)		
		Benzene	Paracymene	Toluene
MW-21	12/13/2019	33,000	8,300	5,600
MW-22	6/14/2018	36,000	9,600	9,300
MW-23	12/13/2019	5,600	8,800	910
MW-24	12/15/2016	9,400	770	140

MPE PILOT TEST

This section explains the pilot test well layout, methods and results of the MPE pilot test.

Multi-Phase Extraction (MPE) Technology

MPE is a remedial technology that extracts both subsurface liquids and soil vapors from extraction well(s) by applying varying levels of vacuum to extraction wells. For a typical MPE application, a drop tube, also known as a "stinger", is installed in the extraction well (s) to control the volume of liquid extracted. Vacuum is applied directly to the stinger, making it possible to extract free product (if available) or water directly from or just below the groundwater table. The depth of the drop tube can be adjusted to varying depths, depending on testing conditions, to depress the liquid levels in the extraction well. Vacuum is also applied to the well head assembly, causing VOCs laden coil vapor to be recovered through well head riser pipe. The combined air and liquid stream extracted from the MPE well is conveyed through a flexible vacuum hose to the MPE system where the VOCs in the extracted vapors are treated using a thermal oxidizer or vapor-phase granular activated carbon unit (s) before vapor discharge to the atmosphere, through a stack. The extracted LNAPL/water stream can be collected and disposed of offsite or a can be treated before discharge to a permitted discharge location.

Pilot Test Well Layout

A test well network consisting of one MPE test well, two observation wells, and three soil vapor probes was installed to implement the MPE pilot test and injection rate test. A private utility locator was contracted to mark locations of underground utilities in the pilot test area prior to drilling, and all locations were hand cleared to a minimum of 5 feet below ground consistent with site underground utility clearance protocols. Betts Environmental Recovery from Adel, Georgia was contracted to install the MPE test well (MPE-01), observation well (MPE-OW-01 and MPE-OW-02), and vapor probes (VP-01, VP-02, and VP-03). The MPE well and observation well were installed using hollow-stem auger drilling techniques, and the vapor points were installed via hand auger. As shown in **Figure 2**, the location of MPE-01 and the observation wells were selected so that existing well MW-24 was utilized as a third observation well. MPE-01 was placed 20-feet from MW-24, and observation wells MPE-OW-01 and MPE-OW-02 were installed approximately 5-feet and 10-feet, respectively, from MPE-01. Existing well MW-23 was also utilized as an observation well to a lesser extent. It is approximately 44-feet from MPE-01. Soil vapor probes, VP-01, VP-02, and VP-03, were installed approximately 10 feet, 12 feet and 15 feet away from MPE-01, respectively. The vapor probes were used to monitor vacuum influence during the MPE test. Boring logs for newly installed wells are provided in **Attachment A**.

The table below provides survey and well construction information for the wells utilized during the MPE pilot and injection rate tests:

Well ID	Northing[1]	Easting[1]	Top of Casing (ft. NAVD88)	Screen Interval (ft. bgs.)
MPE-01	424368.64	870457.13	9.56	2 - 10
MPE-OW-01	424368.92	870461.58	9.51	2 - 17
MPE-OW-02	424359.36	870460.70	9.50	2 - 15
VP-01	424364.22	870465.05	9.42	2 - 5
VP-02	424356.24	870456.94	9.66	2 - 5
VP-03	424380.89	870465.77	9.67	2 - 5
MW-23	424375.02	870503.65	9.91	4 - 14
MW-24	424374.63	870437.85	10.04	4.8 - 14.8

[1] Horizontal Datum is NAD1983 Georgia State Plane East

ft. bgs. - feet below ground surface

ft. NAVD88 - feet North American Vertical Datum 1988

MPE Test Methods and Results

The MPE test equipment includes well head assembly, a scrubber/knockout tank assembly, a blower, and a thermal oxidizer to treat vapor phase VOCs. The details of the test equipment are included in **Attachment B**. A 20,000 gallon frac tank was used for collection and temporary storage of water extracted during the MPE test.

Geosyntec and Fruits mobilized to the Site on April 27th, 2020 and the test was completed in two days. On April 27th, 2020 (Day 1), a plastic sheeting/tarp was installed on the ground surface in test area to minimize the potential for short circuiting of air during the MPE testing. Baseline data including depth to water (DTW), depth to product (DTP), VOC screening using a photo-ionization detector (PID), and baseline vacuum was collected at the MPE test well (MPE-01) and the observation locations including MPE-OW-01, MPE-OW2, MW-24, VP-01, VP-02 and VP-03. The baseline readings are summarized in **Attachment C**. Based on the baseline measurements on Day 1, headspace PID readings ranged between 11 parts per million (ppm) and 57.9 ppm, with the highest reading in MPE-01. There was no measurable LNAPL in the test wells. The DTW was generally around 1.5 to 1.8 ft bgs.

Operational parameters: After completion of the baseline measurements, a well head assembly was placed in MPE-01 at a depth of 7 ft bgs. The test was performed for a period of 6.5 hours on April 27th. The applied vacuum was increased slowly from 1 inch of mercury (in Hg) up to 10.5 in Hg during the test duration. The monitoring data is included in **Attachment B** and **Attachment C**. The following observations were noted during the test on April 26th:

- Maximum air flow rate from the subsurface was 38 actual cubic feet per minute (ACFM) observed at a well head vacuum of 11.5 in. Hg.
- Maximum extracted liquid flow rate was around 2.2 gallons per minute (gpm) within the range of applied vacuum.
- A vacuum influence of 0.13 inches of water was noted in VP-03, which was approximately 15 feet from the test well. No significant vacuum influence was observed in VP-01 and VP-02, which were approximately 10 and 12 feet away from the test well. It is possible that the applied vacuum was surfacing through a preferential pathway prior to reaching to VP-01 and VP-02.
- No LNAPL was observed in the extracted water and in the observation wells, and maximum FID from hydrocarbons (not including methane) was 640 ppm.

- Maximum water table drawdown in observation wells MPE-OW-01, MPE-0W-02 and MW-24 were 2.27 ft, 1.60 ft and 0.76 ft, respectively.

The test was continued on April 28th (Day 2) after collection of another round of baseline water levels. Applied wellhead vacuum ranged from 10 to 17 in. Hg. The stinger depth was slowly lowered in the well to 9.8 ft bgs on Day 2. Pressure transducers were installed in MPE-OW-01, MPE-OW-02 and MW-24. The pressure transducers collected DTW readings once per minute. Four groundwater and four vapor samples were collected on Day 2 to estimate aqueous phase and vapor phase mass removal rates and evaluate treatment options. The following observations were noted from Day 2 activities:

- Maximum air flow rate from the subsurface was approximately 120 ACFM observed at a well head vacuum of 17 in. Hg.

- Extracted flow rate ranged between 2 gpm and 3.5 gpm within the range of applied vacuum (10 to 17" Hg).

- A vacuum influence of 0.3 inches of water was noted in VP-03, which was approximately 15 feet from the test well with an applied vacuum of 15 in. Hg.

- No LNAPL was observed in the extracted water, and maximum VOCs in the vapor phase from hydrocarbons (not including methane) was 580 ppm.

- **Figure 3** shows DTW changes in the observation wells. Maximum drawdown in MPE-OW-01, MPE-OW-02 and MW-24 were 9.54 ft, 2.1 ft and 1.29 ft, respectively.

Analytical results: On Day 2, four groundwater samples were collected. Two duplicate groundwater samples (i.e., MPE-GW-042820-1, MPE-GW-042820-2) and third sample (i.e., MPE-GW-042820-3) were collected from the extracted liquid at different times of the test. A fourth groundwater sample (i.e., MPE-GW-042820-4) was collected as a grab sample directly from MPE-01 at the end of the testing. In addition, two duplicate vapor samples were collected the extracted.

Groundwater samples were sent to Test America in Savannah, Georgia (GA) for the analysis of site-specific VOCs, total iron and manganese, hardness, alkalinity, and total suspended solid (TSS). Vapor samples were sent to Test America in Knoxville, Tennessee (TN) for VOC analysis using TO-15 method. The laboratory reports are included in **Attachment D.**

A summary of the laboratory analytical data is presented in **Tables 1 and 2**. The results are summarized and discussed below.

Volatile Organic Compounds (VOCs):

- The detected VOCs in the aqueous phase include 4-Methyl-2-Pentanone (MIBK), benzene, ethylbenzene, paracymene, methyl ethyl ketone (MEK), toluene and xylenes.

- The concentration of total VOCs in the aqueous grab sample collected directly from MPE-01 was around 17,805 micrograms per liter (µg/L). Assuming an extraction rate of 3.5 gpm and continuous operation, the mass removal rate in the aqueous phase would be 0.75 lbs. per day per well.

- The concentrations of total VOCs in the aqueous samples collected after MPE equipment ranged between 1,246 µg/L and 1,561 µg/L.

- The concentration of total VOCs in the vapor phase was approximately 64,100 µg/m^3 . Assuming a vapor extraction rate of 120 ACFM per well and continuous operation, the mass removal rate in the vapor phase would be 0.69 lbs. per day per well. The following VOCs were detected in vapor samples, as shown in order from highest to lowest average concentration:

    - benzene with an average concentration of 42,750 micrograms per cubic meter (µg/m^3);
    - paracymene with an average concentration of 13,334 µg/m^3;
    - toluene with an average concentration of 6,800 µg/m^3;
    - MEK with an average concentration of 1,295 J µg/m^3;
    - xylenes (Total) with an average concentration of 645 µg/m^3.
    - m,p-xylene with an average concentration of 435 µg/m^3;
    - o-xylene with an average concentration of 210 µg/m^3; and
    - ethylbenzene with an average concentration of 153 J µg/m^3.

Metals:

The groundwater samples exhibited iron concentrations ranging between 1,100 µg/L and 4,700 µg/L and manganese concentrations ranging between 67 µg/L and 230 µg/L.

Hardness, Alkalinity, and Solids

The groundwater samples had an average hardness of 175 milligrams per liter (mg/L) as calcium carbonate ($CaCO_3$), mostly attributable to calcium and magnesium hardness. Groundwater samples had an average alkalinity of 112 mg/L as $CaCO_3$ and an average total suspended solids (TSS) concentration of 221 mg/L. Typically, waters with hardness above 150 mg/L as $CaCO_3$ are classified as very "hard" waters.

Conclusions Related to MPE Feasibility and Design Parameters

Based on the pilot test results, MPE technology would be feasible, especially addressing treatment zones with residual or mobile LNAPL. However, if the extracted water is not hauled offsite to a waste water treatment facility, then the MPE system requires a system capable of addressing water with high hardness and relatively high iron/manganese concentrations prior to a permitted discharge location. Even though LNAPL was not detected in the pilot test area, the key design parameters for fluid recovery were obtained during the test. It is observed that an air flow rate of 38 ACFM was possible at an applied vacuum of up to 11.5 in Hg, when the stinger was placed approximately 5 feet below water level (5 feet of exposed screen for vapor recovery). A remedial design basis of 2,000 to 4,000 pore volume exchange per year is recommended for the treatment of soil vapor in a reasonable timeframe. Assuming an effective porosity of 20%, an exposed screen length of 5 feet, and a design air flow rate of 38 ACFM and a radius of influence (ROI) of 20 feet would result in approximately 16,000 pore volume exchange per year and provide an effective treatment. The following design parameters are recommended for the full scale design.

- Radius of influence: 20 feet;
- Design air flow rate: 38 ACFM per well (the treatment area may require capping to prevent short circuiting of vacuum propagation);
- Well spacing: 40 feet on center;
- Design well head vacuum: up to 12 in Hg; and
- Water extraction rate: up to 3.5 gpm per well.

LIQUID INJECTION FEASABILITY TEST

The injection rate tests were conducted with the purpose of informing a potential EISB or ISCO remedy. However, data gained from the tests can inform the design of any potential liquid injection systems.

Injection Preparation

The injection rate tests for MPE-OW-01 and MPE-OW-02 were conducted on April 29th and April 30th, 2020, respectively. The injection equipment consisted of an injection trailer with a 1,100-gallon polyethene tank, generator, and electrical centrifugal injection pump. Injectate consisted of potable water from a fire hydrant onsite, and, in the case of MPE-OW-01, a tracer solution consisting of concentrated sodium bromide was added to the batch to create an injected concentration of 210 mg/L sodium bromide. A pilot injection notification was provided to the Underground Injection Control department at the Georgia Environmental Protection Division. Injectate was fed through a totalizing flowmeter and into an injection wellhead affixed with a pressure gauge to monitor injection pressure.

Baseline samples for bromide analysis were collected from MPE-OW-02, MPE-01, MW-23, and MW-24 on March 27th, 2020. Background bromide concentrations are generally low, the highest observed concentration was 0.93 mg/L at MPE-OW-02, followed by 0.80 mg/L at MPE-01 and MW-23, and a non-detect result from MW-24. Background samples were also collected for fluorescein dye which were non-detect at all locations. Fluorescein was retained as a potential back-up tracer in the event background bromide levels were too high. Bromide was used over fluorescein because it is a conservative tracer, readily available, and inexpensive. A concentrated 250 g/L sodium bromide solution was prepared by SiREM lab in Knoxville, TN and shipped to the site.

Approximately 1-liter of 250 g/L sodium bromide solution was added to the 500-gal batch for MPE-OW-01, and a sample collected from the batch tank showed a concentration of 210 mg/L in the tank. The injection rate for both wells followed generally the same procedure with three primary goals:

- evaluate sustainable injection rates at pressures which do not result in surfacing of injectate (daylighting);
- evaluate the effect of screen length on observed injection rate; and
- evaluate radius of influence (ROI) for potential full scale design.

Injection Activity

At MPE-OW-01, injection initially commenced under gravity flow conditions. Totalizer readings were recorded on 10 to 20-minute intervals and water level measurements were collected from surrounding monitoring wells on 30 minute intervals. When the water level in the injection area stabilized from gravity flow (about 6 hours), the injection pump was utilized to increase injection pressure to 0.5 psi, 1.0 psi, and finally 2.0 psi. Water levels continued to be monitored in surrounding wells during this time and injection ceased when daylighting was observed while injecting at 2 psi. The totalizer indicated a total of 497.4 gallons was injected into MPE-OW-01.

At MPE-OW-02, injection briefly commenced under gravity flow conditions, then injection pressure was increased to 0.5 psi for two hours, and then increased again to 1.0 psi for one-and-a-half hours until daylighting was observed. At that point the injection pump was shut down, and the remainder of the batch was injected via gravity flow. **Table 3** provides water level measurements collected throughout the event, and **Table 4** provides the wellhead pressure and totalizer measurements.

Injection Monitoring

Field parameters (pH, conductivity, ORP, DO, and temperature) were recorded from the five wells in the pilot test area at the start and end of each injection day. Field parameter readings are tabulated in **Table 5**. Samples for bromide analysis were collected from MPE-01, MPE-OW-02, MW-23, and MW-24 immediately after wrapping up injection on April 29, 2020 and again in the morning of April 30, 2020, before starting the injection test that day. Bromide results at surrounding wells following the injection rate test into MPE-OW-01 are presented in the table below:

Location	Approximate Distance from Injection Well	Background (mg/L)	4/29 End-of-day Concentration (mg/L)	4/30 Beginning-of-Day Concentration (mg/L)
MPE-01	5	0.8	< 0.50	0.97
MPE-OW-02	12	0.93	2.6	< 0.50
MW-24	22	< 0.50	0.52	1.2
MW-23	40	0.8	1.1	< 0.50

Bromide observations at wells placed at varied distances from the injection point were used to estimate the injection radius of influence. Bromide results from the 29th indicate transport from MPE-OW-01 to MPE-OW-02, 12 ft away, and potentially MW-24, 22 ft away. The concentration of bromide at MPE-OW-01 increased from 0.93 mg/L to 2.6 mg/L, and at MW-24 bromide

increased from non-detect to 0.52 mg/L. A rainstorm was recorded in the Brunswick, GA area in the early morning of April 30, 2020, resulting in 0.26 in of rain on the pilot test area prior to collecting the bromide samples on the 30th (www.weatherunderground.com). Infiltration from precipitation likely influenced the transport and dilution of bromide in the subsurface due to the shallow water table and well-draining sands present. Overnight transport of bromide was not able to be determined from the data due to this precipitation event. A good indicator of rainwater dilution are the results from MPE-OW-02 where bromide was 2.6 mg/L on the afternoon of the 29th, but non-detect the following morning. Similar dilution is exhibited at MW-23, from 1.1 mg/L on the 29th to non-detect on the 30th. Bromide results from the 29th indicate transport from MPE-OW-01 radially outward to MPE-OW-02, 12 ft away, and potentially MW-24, 22 ft away. The concentration of bromide at MPE-OW-01 increased from 0.93 mg/L to 2.6 mg/L, and at MW-24 bromide increased from non-detect to 0.52 mg/L.

Water level changes in response to the injection were used to evaluate the degree to which the injectate would mound in the area around the injection well versus spreading out into the aquifer. Baseline groundwater elevations within the pilot test area were less than 2-ft bgs. at the start of the injection test into MPE-OW-01. Water level monitoring during gravity flow conditions show an increase of 0.37 to 0.62-ft throughout the plot. The table below shows observed mounding under gravity flow conditions for each observation well and its distance from MPE-OW-01.

Observation Well	MPE-01	MPE-OW-02	MW-24	MW-23
Distance from Injection Well (ft)	5	10	22	40
Maximum Observed Change in Groundwater Elevation (ft)	0.62	0.37	0.5	0.33

The following day, injection commenced at MPE-OW-02 under 0.5 psi which was increased to 1-psi after two hours and held at 1-psi for two hours.

The table below displays the average observed flow rates at each injection pressure for both MPE-OW-01 and MPE-OW-02:

Injection Well	Date of Injection Test	Injection Pressure		
		0 psi	0.5 psi	1 - 2 psi
MPE-OW-01	4/29/2020	0.87 gpm	1.47 gpm	4.75* gpm
MPE-OW-02	4/30/2020	0.63 gpm	1.50 gpm	1.95** gpm

* daylighting observed and injection ceased after approximately 20-minutes at 2-psi.
** daylighting observed and injection ceased after approximately 1.5 hours at 1-psi.

Observed flow rates under gravity flow and pressure and generally similar between the two locations. The 4.75-gpm observed at ME-OW-01 under 1-psi was the result of injection fluid surfacing and is not considered a sustainable injection pressure. The addition of an additional 2-ft of injection well screen at MPE-OW-02 did not impart a noticeable increase in the specific capacity of the injection well. Furthermore, gravity flow conditions at MPE-OW-02 were tested after approximately 400-gallons of injectate, unlike the injection test in MPE-OW-01, so the decreased gravity flow rate at MPE-OW-02 compared to MPE-OW-01 may be due to the pressurized injection that occurred immediately prior. Gravity flow at MPE-OW-02 had to overcome dissipating mounding pressure in addition to natural pore water entry pressure.

Conclusions Related to Liquid Injection Feasibility and Design Parameters

Based on the pilot test results, liquid injection of amendments would be feasible under gravity feed conditions or very low pressure (e.g. 0.5 psi) conditions. Injection under gravity flow conditions resulted in relatively low groundwater mounding (0.33 – 0.67 ft) throughout the pilot, and no daylighting was observed. Under pressurized injection conditions, daylighting of injectate was observed when pressures were increased to 1 psi in one of the test wells and 2 psi in the other test well. In addition to monitoring injection pressure and mounding, ROI was evaluated by injecting bromide as a conservative tracer. The following design parameters are recommended for the full scale design.

- Observed ROI was up to 22 ft.; however, closer well spacing to provide overlapping ROIs can be used to mitigate the potential for daylighting if the design volume per well requires long-term injection.

- Design injection pressure: Gravity feed (0 psi) up to 0.5 psi. Up to 1 psi may be possible based on observations at one of the two wells used during this pilot injection.

- Design injection flowrate: gravity feed at 0.75 gpm (average of MPE-OW-01 and MPE-OW-02 flowrates) or low pressure (0.5 - 1 psi) at 1.5 gpm. These are initial injection flow rates, and injection flow rates can slow down over the course of an injection event.

- Injection well screens: injection well screens from 2 – 12 feet below ground surface were used successfully in this injection test. Future remedial designs could also provide varied well screen depths and presume deeper placement of the top of the well screen would result in the ability to apply some degree of additional injection pressure.

Groundwater level should be monitored closely during full scale injection because the superposition of multiple wells receiving injectate at once could result in unacceptable mounding or surfacing of groundwater. Injections must cease if surfacing is observed to allow the treatment area to recover to pre-injection groundwater levels. Sequencing the distribution of injectate so that adjacent injection wells are not receiving fluid at the same time will reduce mounding potential. Injection wells MPE-OW-01 and MPE-OW-02 were installed via hollow-stem auger and performed well during the test; however, the drilling team reported some difficulty during installation due to the loose, sandy conditions. The low clay and high sand content of the formation may allow for alternative, less intrusive drilling methods – such as direct push technology (DPT) - to be utilized.

Attachments:
Table 1 – Summary of Groundwater Analytical Results
Table 2 – Summary of Vapor Analytical Results
Table 3 – Injection Rate Test – Water Level Measurements
Table 4 – Injection Rate Test – Injection Pressure and Totalizer Readings
Table 5 – Injection Rate Test – Field Parameters

Figure 1 – Site Location – SGW-23 Area
Figure 2 – MPE Pilot and Injection Rate Test Well Layout
Figure 3 – Depth to Water Changes in the Observation Wells During MPE Test

Attachment A: Boring Logs and Well Construction Details
Attachment B: MPE Contractor Field Report
Attachment C: Summary of MPE Pilot Test Measurements
Attachment D: Analytical Laboratory Reports

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TABLES

Table 1
Summary of Groundwater Analytical Results
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Well ID	Units	MPE-01			
Sample Date		04/28/20			
Lab ID		680-183249-1	680-183249-2	680-183249-3	680-183249-4
Sample Name		MPE-GW-042820-1	MPE-GW-042820-2	MPE-GW-042820-3	MPE-GW-042820-4
Volatile Organic Compounds					
1,1-Dichloroethane	µg/L	0.38 U	0.38 U	0.38 U	19 U
1,1-Dichloroethene	µg/L	0.36 U	0.36 U	0.36 U	18 U
1,2,4-Trichlorobenzene	µg/L	2.5 U	2.5 U	2.5 U	130 U
1,2-Dichlorobenzene	µg/L	0.37 U	0.37 U	0.37 U	19 U
1,2-Dichloropropane	µg/L	0.67 U	0.67 U	0.67 U	34 U
1,4-Dichlorobenzene	µg/L	0.46 U	0.46 U	0.46 U	23 U
4-Methyl-2-Pentanone (MIBK)	µg/L	470	310	340	750
Acetone	µg/L	200	220	170	350 U
Benzene	µg/L	320	250	260	9,300
Carbon Disulfide	µg/L	1.0 U	1.0 U	1.0 U	50 U
Chlorobenzene	µg/L	0.26 U	0.26 U	0.26 U	13 U
Chloroform	µg/L	0.50 U	0.50 U	0.50 U	25 U
cis-1,2-Dichloroethene	µg/L	0.41 U	0.41 U	0.41 U	21 U
Ethylbenzene	µg/L	4.6	20	28	28 J
Methyl Ethyl Ketone (MEK)	µg/L	12	12	9.6 J	170 U
Methylene Chloride	µg/L	2.5 U	2.5 U	2.5 U	130 U
p-Cymene	µg/L	440	190	170	6,000
Tetrachloroethene	µg/L	0.74 U	0.74 U	0.74 U	37 U
Toluene	µg/L	87	94	140	1,700
Vinyl Chloride	µg/L	0.50 U	0.50 U	0.50 U	25 U
Xylenes (Total)	µg/L	27	150	210	55
Total VOCs	µg/L	1560.6	1246	1318	17805
Alkalinity					
Alkalinity	mg/L	110	110	130	97
Bicarbonate Alkalinity as $CaCO_3$	mg/L	110	110	130	97
Bicarbonate ion as HCO_3	mg/L	140	140	160	120
Carbon Dioxide, Free	mg/L	7.9	7.1	5.0 U	120
Carbonate Alkalinity as $CaCO_3$	mg/L	5.0 U	5.0 U	5.0 U	5.0 U
Hydroxide Alkalinity	mg/L	5.0 U	5.0 U	5.0 U	5.0 U
Phenolphthalein Alkalinity	mg/L	5.0 U	5.0 U	5.0 U	5.0 U
Total Metals					
Iron	µg/L	3,600	4,700	2,100	1,100
Manganese	µg/L	200	230	140	67
Solids, Total Suspended (TSS)					
Total Suspended Solids	mg/L	390	410	57	28
Total Hardness (as $CaCO_3$) by Calculation					
Hardness as $CaCO_3$	mg/L	190	190	160	160
Calcium Hardness as $CaCO_3$	mg/L	95	90	75	65
Magnesium Hardness as $CaCO_3$	mg/L	91	99	86	99

Notes:
µg/L - micrograms per liter; mg/L - milligrams per liter; CaCO3 - calcium carbonate; HCO_3 - bicarbonate
J - Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
U - Indicates the analyte was analyzed for but not detected.

Table 2

Geosyntec Consultants

Summary of Soil Vapor Analytical Results

Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Well ID	Units	MPE-01			
Sample Date		04/28/20			
Lab ID		140-19001-1	140-19001-2	140-19001-3	140-19001-4
Sample Name		MPE_VP01_042820	MPE_VP02_042820	MPE_VP03_042820	MPE_VP04_042820
Volatile Organic Compounds					
1,2,3-Trichloropropane	µg/m^3	320 U	240 U	350 U	250 U
Acetone	µg/m^3	2,400 U	1,800 U	2,600 U	1,900 U
Benzene	µg/m^3	37,000	40,000	43,000	51,000
Chlorobenzene	µg/m^3	52 U	39 U	58 U	41 U
Chloroform	µg/m^3	55 U	41 U	61 U	43 U
Ethylbenzene	µg/m^3	100 U	150 J	160 J	200 J
Methyl Isobutyl Ketone (MEK)	µg/m^3	880 J	1,300	1,500 J	1,500
Naphthalene	µg/m^3	700 U	520 U	780 U	550 U
p-Cymene	µg/m^3	7,400	12,000	14,000	14,000
Toluene	µg/m^3	5,500	6,300	7,200	8,200
Vinyl Chloride	µg/m^3	120 U	88 U	130 U	93 U
m,p-Xylene	µg/m^3	320 J	370 J	460 J	590 J
o-Xylene	µg/m^3	160 J	180 J	240 J	260 J
Xylene (Total)	µg/m^3	480 J	550 J	700 J	850 J

Notes:

µg/m^3 - micrograms per cubic meter

J - Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

U - Indicates the analyte was analyzed for but not detected.

Table 3
Injection Rate Test - Water Level Measurements
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Location	TOC Elevation (ft. AMSL)	Date	Time	Depth to Water (ft. bTOC)	GW Elevation
MPE-01	9.5646	4/29/2020	10:14	1.40	8.16
MPE-01	9.5646	4/29/2020	10:24	1.27	8.2946
MPE-01	9.5646	4/29/2020	10:34	1.20	8.3646
MPE-01	9.5646	4/29/2020	11:04	1.12	8.4446
MPE-01	9.5646	4/29/2020	11:34	1.10	8.4646
MPE-01	9.5646	4/29/2020	12:04	0.78	8.7846
MPE-01	9.5646	4/29/2020	12:34	0.78	8.7846
MPE-01	9.5646	4/29/2020	13:04	0.78	8.7846
MPE-01	9.5646	4/29/2020	13:34	0.78	8.7846
MPE-01	9.5646	4/29/2020	14:04	0.79	8.7746
MPE-01	9.5646	4/29/2020	14:34	0.79	8.7746
MPE-01	9.5646	4/29/2020	15:04	0.79	8.7746
MPE-01	9.5646	4/29/2020	15:34	0.80	8.7646
MPE-01	9.5646	4/29/2020	16:04	0.89	8.6746
MPE-01	9.5646	4/30/2020	9:00	1.45	8.1146
MPE-01	9.5646	4/30/2020	10:10	1.08	8.4846
MPE-01	9.5646	4/30/2020	10:20	0.88	8.6846
MPE-01	9.5646	4/30/2020	10:30	0.78	8.7846
MPE-01	9.5646	4/30/2020	11:00	0.68	8.8846
MPE-01	9.5646	4/30/2020	11:30	0.60	8.9646
MPE-01	9.5646	4/30/2020	12:00	0.55	9.0146
MPE-01	9.5646	4/30/2020	12:30	0.55	9.0146
MPE-01	9.5646	4/30/2020	13:00	0.55	9.0146
MPE-OW-01	9.5125	4/30/2020	9:00	1.38	8.1325
MPE-OW-01	9.5125	4/30/2020	10:10	0.70	8.8125
MPE-OW-01	9.5125	4/30/2020	10:20	0.50	9.0125
MPE-OW-01	9.5125	4/30/2020	10:30	0.50	9.0125
MPE-OW-01	9.5125	4/30/2020	11:00	0.50	9.0125
MPE-OW-01	9.5125	4/30/2020	11:30	0.45	9.0625
MPE-OW-01	9.5125	4/30/2020	12:00	0.40	9.1125
MPE-OW-01	9.5125	4/30/2020	12:30	0.40	9.1125
MPE-OW-01	9.5125	4/30/2020	13:00	0.40	9.1125
MPE-OW-02	9.5041	4/29/2020	10:14	1.15	8.3541
MPE-OW-02	9.5041	4/29/2020	10:24	1.09	8.4141

Table 3
Injection Rate Test - Water Level Measurements
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Location	TOC Elevation (ft. AMSL)	Date	Time	Depth to Water (ft. bTOC)	GW Elevation
MPE-OW-02	9.5041	4/29/2020	10:34	1.06	8.4441
MPE-OW-02	9.5041	4/29/2020	11:04	1.03	8.4741
MPE-OW-02	9.5041	4/29/2020	11:34	0.88	8.6241
MPE-OW-02	9.5041	4/29/2020	12:04	0.78	8.7241
MPE-OW-02	9.5041	4/29/2020	12:34	0.78	8.7241
MPE-OW-02	9.5041	4/29/2020	13:04	0.78	8.7241
MPE-OW-02	9.5041	4/29/2020	13:34	0.79	8.7141
MPE-OW-02	9.5041	4/29/2020	14:04	0.80	8.7041
MPE-OW-02	9.5041	4/29/2020	14:34	0.81	8.6941
MPE-OW-02	9.5041	4/29/2020	15:04	0.81	8.6941
MPE-OW-02	9.5041	4/29/2020	15:34	0.86	8.6441
MPE-OW-02	9.5041	4/29/2020	16:04	0.94	8.5641
MPE-OW-02	9.5041	4/30/2020	9:00	1.35	8.1541
MW-23	9.91	4/29/2020	10:14	1.67	8.24
MW-23	9.91	4/29/2020	10:24	1.55	8.36
MW-23	9.91	4/29/2020	10:34	1.72	8.19
MW-23	9.91	4/29/2020	11:04	1.69	8.22
MW-23	9.91	4/29/2020	11:34	1.66	8.25
MW-23	9.91	4/29/2020	12:04	1.61	8.3
MW-23	9.91	4/29/2020	12:34	1.61	8.3
MW-23	9.91	4/29/2020	13:04	1.59	8.32
MW-23	9.91	4/29/2020	13:34	1.60	8.31
MW-23	9.91	4/29/2020	14:04	1.58	8.33
MW-23	9.91	4/29/2020	14:34	1.56	8.35
MW-23	9.91	4/29/2020	15:04	1.34	8.57
MW-23	9.91	4/29/2020	15:34	1.52	8.39
MW-23	9.91	4/29/2020	16:04	1.54	8.37
MW-23	9.91	4/30/2020	9:00	1.65	8.26
MW-23	9.91	4/30/2020	10:10	1.55	8.36
MW-23	9.91	4/30/2020	10:20	1.52	8.39
MW-23	9.91	4/30/2020	10:30	1.50	8.41
MW-23	9.91	4/30/2020	11:00	1.44	8.47
MW-23	9.91	4/30/2020	11:30	1.42	8.49
MW-23	9.91	4/30/2020	12:00	1.38	8.53
MW-23	9.91	4/30/2020	12:30	1.37	8.54

Table 3
Injection Rate Test - Water Level Measurements
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Location	TOC Elevation (ft. AMSL)	Date	Time	Depth to Water (ft. bTOC)	GW Elevation
MW-23	9.91	4/30/2020	13:00	1.35	8.56
MW-23	9.91	4/30/2020	13:30	1.28	8.63
MW-23	9.91	4/30/2020	14:00	1.22	8.69
MW-24	10.04	4/29/2020	10:14	1.80	8.24
MW-24	10.04	4/29/2020	10:24	1.73	8.31
MW-24	10.04	4/29/2020	10:34	1.53	8.51
MW-24	10.04	4/29/2020	11:04	1.47	8.57
MW-24	10.04	4/29/2020	11:34	1.47	8.57
MW-24	10.04	4/29/2020	12:04	1.30	8.74
MW-24	10.04	4/29/2020	12:34	1.38	8.66
MW-24	10.04	4/29/2020	13:04	1.37	8.67
MW-24	10.04	4/29/2020	13:34	1.38	8.66
MW-24	10.04	4/29/2020	14:04	1.37	8.67
MW-24	10.04	4/29/2020	14:34	1.37	8.67
MW-24	10.04	4/29/2020	15:04	1.54	8.5
MW-24	10.04	4/29/2020	15:34	1.34	8.7
MW-24	10.04	4/29/2020	16:04	1.63	8.41
MW-24	10.04	4/30/2020	9:00	1.62	8.42
MW-24	10.04	4/30/2020	10:10	1.49	8.55
MW-24	10.04	4/30/2020	10:20	1.41	8.63
MW-24	10.04	4/30/2020	10:30	1.36	8.68
MW-24	10.04	4/30/2020	11:00	1.27	8.77
MW-24	10.04	4/30/2020	11:30	1.23	8.81
MW-24	10.04	4/30/2020	12:00	1.20	8.84
MW-24	10.04	4/30/2020	12:30	1.20	8.84
MW-24	10.04	4/30/2020	13:00	1.16	8.88
MW-24	10.04	4/30/2020	13:30	1.00	9.04
MW-24	10.04	4/30/2020	14:00	0.92	9.12

Notes:
ft. AMSL - feet above mean sea level
ft. bTOC - feet below top of casing

Table 4
Injection Rate Test - Injection Pressure and Totalizer Readings
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Injection Well	Date	Time	Wellhead Pressure (psi)	Totalizer (gallons)
MPE-OW-01	4/29/2020	10:03	0.0	4.0
	4/29/2020	10:14	0.0	12.1
	4/29/2020	10:24	0.0	20.9
	4/29/2020	10:34	0.0	29.5
	4/29/2020	10:44	0.0	38.3
	4/29/2020	10:54	0.0	46.1
	4/29/2020	11:04	0.0	54.0
	4/29/2020	11:24	0.0	79.2
	4/29/2020	11:44	0.0	88.5
	4/29/2020	12:04	0.0	113.5
	4/29/2020	12:24	0.0	136.8
	4/29/2020	12:44	0.0	159.0
	4/29/2020	13:04	0.0	179.8
	4/29/2020	13:24	0.0	199.2
	4/29/2020	13:44	0.0	217.8
	4/29/2020	14:04	0.0	235.5
	4/29/2020	14:24	0.0	252.2
	4/29/2020	14:44	0.0	268.1
	4/29/2020	15:04	0.0	282.3
	4/29/2020	15:24	0.0	296.2
	4/29/2020	15:44	0.0	309.2
	4/29/2020	16:04	0.0	320.4
	4/29/2020	16:15	0.5	332.3
	4/29/2020	16:25	0.5	347.6
	4/29/2020	16:47	0.5	384.0
	4/29/2020	17:00	0.5	403.3
	4/29/2020	17:10	0.5	420.0
	4/29/2020	17:20	0.5	433.4
	4/29/2020	17:31	0.5	450.0
	4/29/2020	17:36	1.0	460.0
	4/29/2020	17:38	1.0	475.0
	4/29/2020	17:40	2.0	497.4

Table 4
Injection Rate Test - Injection Pressure and Totalizer Readings
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Injection Well	Date	Time	Wellhead Pressure (psi)	Totalizer (gallons)
MPE-OW-02	4/30/2020	10:00	0.0	497.4
	4/30/2020	10:10	0.0	513.2
	4/30/2020	10:20	0.5	530.2
	4/30/2020	10:30	0.5	547.1
	4/30/2020	10:50	0.5	580.0
	4/30/2020	11:10	0.5	611.0
	4/30/2020	11:30	0.5	641.1
	4/30/2020	11:50	0.5	670.0
	4/30/2020	12:12	0.5	700.0
	4/30/2020	12:30	0.5	723.5
	4/30/2020	12:50	0.5	749.0
	4/30/2020	13:10	--	767.2
	4/30/2020	13:20	1.0	790.2
	4/30/2020	13:30	1.0	811.8
	4/30/2020	13:37	1.0	--
	4/30/2020	13:40	1.0	834.0
	4/30/2020	13:50	1.0	855.0
	4/30/2020	14:00	1.0	876.1
	4/30/2020	14:10	1.0	897.5
	4/30/2020	14:16	1.0	--
	4/30/2020	14:19	0.0	915.0
	4/30/2020	14:30	0.0	921.8
	4/30/2020	14:40	0.0	928.9
	4/30/2020	15:00	0.0	942.0
	4/30/2020	15:33	0.0	963.5
	4/30/2020	15:50	0.0	974.1
	4/30/2020	16:10	0.0	986.5
	4/30/2020	16:30	0.0	998.2
	4/30/2020	16:52	0.0	1010.2

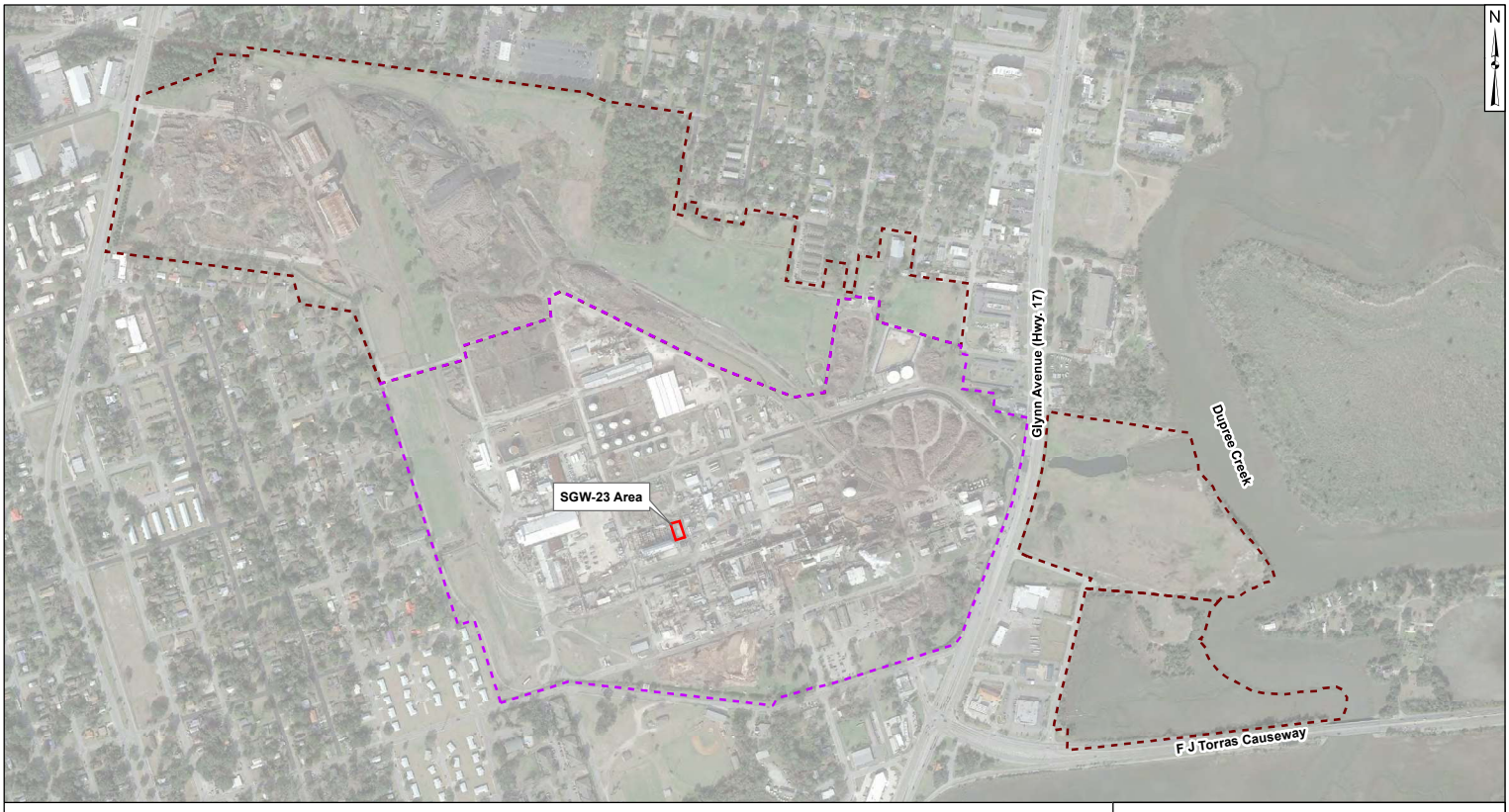
Notes:
psi - pounds per square inch

Table 5
Injection Rate Test - Field Parameters
Hercules LLC/Pinova Inc. Facility, Brunswick, GA

Location	Date	Time	pH	DO	ORP	Conductivity	Temperature	Comments (e.g., color, odor, precipitates, etc.)
			s.u.	(mg/L)	(mV)	(µS/cm)	(°C)	
MPE-01	4/29/20	9:03	5.65	0.34	-284	1,021	22.3	Pre-injection; salinity = 0.51 ppt; 8' btoc
MPE-OW-01	4/29/20	8:47	5.49	0.42	-343	1,265	22.3	Pre-injection; salinity = 0.63 ppt; 10' btoc
MPE-OW-02	4/29/20	8:55	5.42	0.43	-293	1,127	22.2	Pre-injection; salinity = 0.56 ppt; 10' btoc
MW-23	4/29/20	9:20	5.34	0.41	-271	1,120	22.7	Pre-injection
MW-24	4/29/20	8:40	6.19	0.46	-337	880	23.3	Pre-injection
MW-24	4/29/20	18:13	6.05	0.56	-236.2	1,061	23.4	Post-injection
MPE-01	4/29/20	18:24	5.73	0.42	-235.2	1,106	22.4	Post-injection
MPE-OW-02	4/29/20	18:35	5.54	0.41	-249.9	1,154	22.4	Post-injection; salinity = 0.57 ppt
MW-23	4/29/20	18:45	5.32	0.42	-236.9	1,111	22.8	Post-injection
MPE-01	4/30/20	9:45	5.57	0.44	-242.3	1,046	22.3	Pre-injection; salinity = 0.52 ppt
MPE-OW-01	4/30/20	9:50	6.90	0.40	-169.2	2,222	25.8	Pre-injection; salinity = 1.13 ppt
MPE-OW-02	4/30/20	9:40	5.41	0.46	-248.8	1,138	22.3	Pre-injection; salinity = 0.57 ppt
MW-23	4/30/20	9:55	5.36	0.44	-252.7	1,114	22.8	Pre-injection; salinity = 0.55 ppt
MW-24	4/30/20	9:35	5.91	0.51	-265.2	1,129	23.3	Pre-injection; salinity = 0.56 ppt
MW-24	4/30/20	17:00	6.10	1.19	-248.7	1,095	23.50	Post-injection
MPE-01	4/30/20	17:05	5.71	0.72	-235.8	1,143	22.40	Post-injection; salinity = 0.57 ppt
MPE-OW-01	4/30/20	17:10	6.78	0.82	-117.8	2,180	24.70	Post-injection; salinity = 1.11 ppt
MW-23	4/30/20	17:15	5.32	0.49	-231.9	1,113	22.90	Post-injection; salinity = 0.55 ppt

Notes:
** - sensor reading is out of range
DO - dissolved oxygen
ORP - oxidation-reduction potential
mV - millivolt
s.u. - standard unit
°C - degrees Celsius
µS/cm - microsiemens per centimeter

FIGURES



Legend

- Pinova Property
- Hercules Property
- SGW-23

0 275 550 1,100 Feet

Notes:
1. Aerial Photograph approximate date - January 2019. Source: Google Earth.

Site Location - SGW-23 Area
Hercules/Pinova Facility
Brunswick, Georgia

Geosyntec consultants

Kennesaw, GA | January 2021

Figure 1

Path: N:\Ashland\Brunswick Plant\GIS\MXD\SGW-23 ICM\SGW-23 Area Location Map.mxd; RMurray; 1/25/2021

Multi-Phase Extraction (MPE) Well

Pilot Test Observation Well

Vapor Monitoring Point

Existing Monitoring Well

Temporary Shallow Groundwater Sample Location

Target Treatment

0 10 20 40 60 Feet

SGW-23 Pilot Test Area
MPE Pilot and Injection Rate Test Well Layout
Hercules LLC/Pinova, Inc. Facility, Brunswick, Georgia

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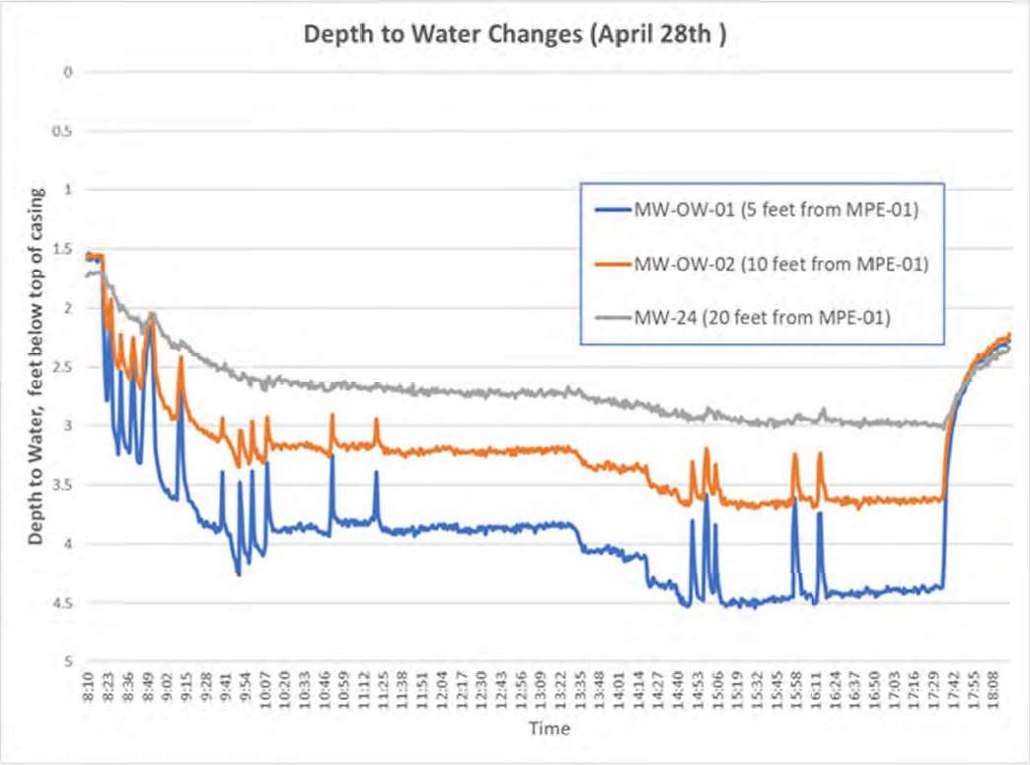
Kennesaw | July 2020

Figure **2**

Path: N:\Ashland\Brunswick Plant\GIS\MXD\SGW-23 CM\SGW-23 STG Area - Basemap_survey.mxd



Depth to Water Changes in the Observation Wells During MPE Test

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Figure **3**

Kennesaw, GA | 01-24-2021

APPENDIX A

Geosyntec consultants

Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

WELL LOG

Well No. **MPE-01**

Page: **1 of 1**

Drilling Start Date:	**2/18/2020**	Boring Depth (ft):	**10.3**	Well Depth (ft):	**10.3**
Drilling End Date:	**2/18/2020**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**4.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**Direct Push**	Screen Slot (in):	**0.020**
Drilling Method:	**DPT and Hollow Stem Auger**	DTW During Drilling (ft):	**NM**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Geoprobe 7822DT**	DTW After Drilling (ft BTOC):	**1.58**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.56**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870457.13, 424368.64**	Filter Pack:	**20/40 Silica Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	COLLECT: N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0				DP			1.00		(0') Poorly graded SAND (SP); mostly fine grained sand, trace coarse gravel, trace silt, loose, moist, light to dark grey		0
5				DP			1.50		(5') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, black, non-plastic, oil like staining		5
10									(10.3') Boring terminated		10
15											15
20											20

NOTES: Hole precleared using hand auger. 4.5 bags of sand used. 0.167 cubic feet of bentonite pellets used.

Geosyntec consultants

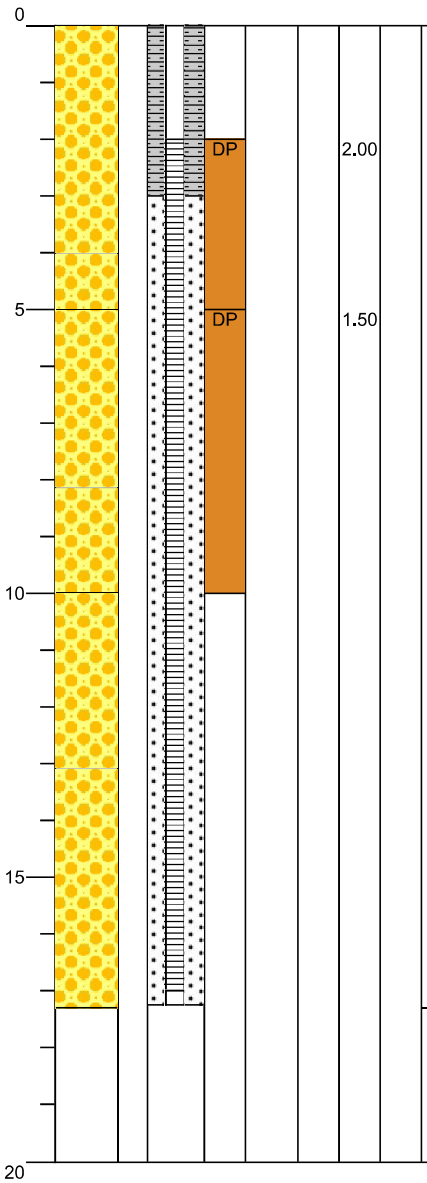
Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

WELL LOG

Well No. **MW-OW-01**

Page: **1 of 1**

Drilling Start Date:	**2/18/2020**	Boring Depth (ft):	**17.3**	Well Depth (ft):	**17.3**
Drilling End Date:	**2/18/2020**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**Direct Push**	Screen Slot (in):	**0.010**
Drilling Method:	**DPT and Hollow Stem Auger**	DTW During Drilling (ft):	**NM**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Geoprobe 7822DT**	DTW After Drilling (ft BTOC):	**1.51**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.51**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870461.58, 424368.92**	Filter Pack:	**20/40 Silica Sand**



DEPTH (ft)	Sample Type	Time	Blow Counts	Recovery (ft)	N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0						(0') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, light to dark grey, non-plastic	(0.00') Hand auger	0
	DP			2.00				
5	DP			1.50		(5') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, wet, light grey to dark grey, non-plastic, oil like staining	(5.00') Auger cuttings	5
10						(10') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, light grey to dark brown to brown, non-plastic, oil like staining		10
15						(15') As Above: light brown to dark brown, NAPL around 16 ft		15
						(17.3') Boring terminated		
20								20

NOTES: 4.5 bags of sand used, 0.33 cubic feet of bentonite pellets used

Geosyntec consultants

Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

WELL LOG

Well No. **MW-OW-02**

Page: **1 of 1**

Drilling Start Date:	**2/18/2020**	Boring Depth (ft):	**17.3**	Well Depth (ft):	**17.3**
Drilling End Date:	**2/18/2020**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**Direct Push**	Screen Slot (in):	**0.010**
Drilling Method:	**DPT Hollow Stem Auger**	DTW During Drilling (ft):	**NM**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Geoprobe 7822DT**	DTW After Drilling (ft BTOC):	**1.49**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.50**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870460.70, 424359.36**	Filter Pack:	**20/40 Silica Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	COLLECT: N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0									(0') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, light grey to dark grey, non-plastic	(0.00') Hand Auger	0
5									(5') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, dark grey to brown to dark brown, non-plastic	(5.00') DPT sample collected	5
10									(10') As Above: light brown to dark brown		10
15									(15') As Above: dark grey		15
									(17.3') Boring terminated		
20											20

NOTES: Four bags of sand used. 0.03 cubic feet of bentonite pellets

Geosyntec consultants

Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

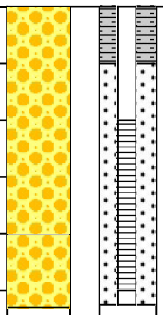
WELL LOG

Well No. VP-01

Page: 1 of 1

Drilling Start Date:	**2/19/2020**	Boring Depth (ft):	**5.3**	Well Depth (ft):	**5.3**
Drilling End Date:	**2/19/2020**	Boring Diameter (in):	**3.00**	Well Diameter (in):	**1.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**N/A**	Screen Slot (in):	**0.010**
Drilling Method:	**Auger**	DTW During Drilling (ft BTOC):	**2.5**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Hand Auger**	DTW After Drilling (ft BTOC):	**1.45**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.42**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870465.05, 424364.22**	Filter Pack:	**20/40 Silica Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	COLLECT: N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0									(0') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, grey to dark grey, non-plastic, oil like staining near bottom		0
5									(5.3') Boring terminated		5
10											10
15											15
20											20



NOTES: 1/3 bag of sand, 1/8 bag of bentonite pellets

Geosyntec consultants

Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

WELL LOG

Well No. VP-02

Page: 1 of 1

Drilling Start Date:	**2/19/2020**	Boring Depth (ft):	**5.3**	Well Depth (ft):	**5.3**
Drilling End Date:	**2/19/2020**	Boring Diameter (in):	**3.00**	Well Diameter (in):	**1.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**N/A**	Screen Slot (in):	**0.010**
Drilling Method:	**Auger**	DTW During Drilling (ft BTOC):	**1.95**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Hand Auger**	DTW After Drilling (ft BTOC):	**1.65**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.66**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870456.94, 424356.24**	Filter Pack:	**20/40 silica Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	COLLECT: N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0									(0') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, light grey to dark grey, oil like staining near bottom		0
5									(5.3') Boring terminated		5
10											10
15											15
20											20

NOTES: 1/3 bag of sand used. 1/8 bag of bentonite pellets used.

Geosyntec consultants

Client:	**HERCULES**
Project:	**MPE and Injection Pilot Test**
Address:	**Hercules/Pinova Brunswick Facility, Brunswick, GA**

WELL LOG

Well No. **VP-03**

Page: **1 of 1**

Drilling Start Date:	**2/19/2020**	Boring Depth (ft):	**5.3**	Well Depth (ft):	**5.3**
Drilling End Date:	**2/19/2020**	Boring Diameter (in):	**3.00**	Well Diameter (in):	**1.0**
Drilling Company:	**Betts Environmental**	Sampling Method(s):	**N/A**	Screen Slot (in):	**0.010**
Drilling Method:	**Auger**	DTW During Drilling (ft BTOC):	**2.15**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Hand Auger**	DTW After Drilling (ft BTOC):	**1.71**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Chris Golden**	Top of Casing Elev. (ft):	**9.67**	Seal Material(s):	**Bentonite Pellets**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**870465.77, 424380.89**	Filter Pack:	**20/40 Silica Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	COLLECT: N Value RQD%	SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
0									(0') Poorly graded SAND (SP); mostly fine grained sand, trace silt, loose, moist, light grey to dark grey, oil like staining near bottom		0
5									(5.3') Boring terminated		5
10											10
15											15
20											20

NOTES: 1/3 bag of sand used. 1/8 bag of bentonite pellets used.

APPENDIX B

FRUITS & ASSOCIATES
500 Northpoint Pkwy SE
Acworth, GA 30102
www.fruits-us.com
(866) 974-6999
(770) 974-6999

May 14, 2020

Ali Ciblak
Geosyntec Consultants, Inc
1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

Subject:
Two Day High-Vacuum Remediation Pilot Study
Hercules Pinova Facility
2801 Cook Street
Brunswick, Georgia
Fruits Project: GA20-9074

Dear Mr. Ciblak:

Fruits & Associates, Inc. is pleased to provide this summary of the High-Vacuum Remediation event that was conducted on April 27th, 2020 at the above referenced facility. Below is a summary of both the technology as well as the results of the actual event.

Technology:

High-Vacuum Remediation (HVR) involves the extraction of subsurface vapors and liquids via a monitoring well or recovery well. This is accomplished by applying high levels of vacuum pressure to the extraction point. To eliminate mounding of the water table, a drop tube (commonly known as a stinger) is inserted in the well to the static water level depth. The applied vacuum and airflow extracted from the well is pulled through this drop tube. As the water table attempts to mound due to the application of vacuum, the liquids are “slurped” through this drop tube. This slurping effectively maintains the static conditions of the water table while the elevated vacuum is applied to the well during the event. In order to minimize any change to the current smear zone associated with the site, seasonal water level data is analyzed. Once the extraction process is underway, the inlet of the stinger assembly is slowly lowered to the maximum historical water level observed for each extraction well. This draw down (one to ten feet below the static water level) depresses the water table and creates a cone of influence, which maximizes the efficiency of the high vacuum process.

Occasionally, fresh air (5 to 25 CFM) is introduced at the well surface to increase the airflow and enhance the liquid removal rate. In order to accurately record the actual removal rate from the well, an airflow gauge is mounted on the well head to measure the amount of fresh air that is introduced. This extra fresh air is subtracted from the total flow calculated for each extraction well. Additionally, two vacuum gauges are installed; one on the stinger assembly (well head vacuum), and one on the well casing (influence vacuum). If fresh air is introduced at the well head, the influence vacuum reading will be artificially lower than the actual applied vacuum because the inlet for fresh air is adjacent to this vacuum gauge port. The setup and piping configurations are shown in Figure #1.

During the extraction process, the combined air and liquids are transferred to the mobile treatment system where the liquids are separated with a liquid scrubber / knockout system and discharged into a storage tank for future disposal. The hydrocarbon vapors are transferred to the off-gas treatment system and are incinerated in a forced air Thermal Oxidation (ThOx) unit at 1500 degrees Fahrenheit. After thorough destruction of the contaminants in the air stream, the clean air is discharged into the atmosphere. A complete flow diagram of this process is shown in Figure #2.

Calculations:

During the HVR event, two measurements are taken, of both the influent and effluent flow rates, the concentrations of the vapors removed (before off-gas treatment), and the off-gas treatment system concentrations. These measurements are used to calculate the removal rates and the off-gas emission rates. The flow rates were measured using a Dwyer DS-300 Pitot tube attached to a differential pressure gauge. These flow rate measurements are reported in Actual Cubic Feet per Minute (ACFM). Before each event, these flow assemblies are calibrated to insure an accurate flow measurement. A separate flow rate is calculated for each influent well (if more than one well is connected), as well as for any additional fresh air that is introduced into the influent stream. The individual flow rates are combined to achieve the total flow and velocity derived from the extraction points. Because of the extremely high concentrations involved with a High Vacuum event, additional quench air (0 to 2,000 SCFM) is added to the vapor stream, just before entering the ThOx unit. An additional Pitot tube assembly is installed at the inlet of the ThOx unit and is used to measure the total flow. Combined with the off-gas concentration readings, this total flow rate is used to calculate the destruction efficiency of the system.

The concentration measurements are taken using a TVA-1000A FID instrument calibrated to methane. For comparison purposes, the removal rates are calculated in total carbon, as well as total hydrocarbons. This FID instrument has a dynamic range of 0-50,000 PPM as methane, 0-100,000 PPM as hydrocarbon. Our concentration samples are collected before any additional bleed or quench air is added to the extracted flow rate. These undiluted concentration measurements exceed the dynamic range of any FID instrument. In order to accurately record the high concentrations observed during a HVR event, a calibrated 10:1 dilution valve is used to cut the sample. This dilution valve, along with the FID instrument, is calibrated before the start of each event.

In order to eliminate the naturally occurring methane that is present during a typical HVR event, each concentration sample is measured twice. The first sample is collected directly from the system, and recorded as the total VOC concentration. The second sample is collected using an in-line activated carbon filter, which adsorbs the hydrocarbon compounds leaving only methane present in the sample to be measured. This methane only result is then subtracted from the total VOC concentration measurement (first sample), resulting in a Non Methane Organic Compound (NMOC) concentration. This NMOC concentration is used in the mass removal calculations. However, as with any FID instrument, the NMOC results are recorded as parts per million by volume (PPM_v) as if the concentrations were methane. A conversion from methane to a hydrocarbon and from a volume to a weight is necessary to calculate an accurate mass removal rate. Using the NMOC concentration results and the TVA-1000's factory certified response ratio for hydrocarbons, the NMOC results are converted to equivalent hydrocarbon mg/Ls. A TVA-1000 FID has an average response ratio of 600 PPM_v per mg/L of unleaded gasoline and 200 PPM_v per mg/L of diesel. Summaries of these calculations are shown in Figure #3.

Results:

Phase Separated Hydrocarbon (PSH) was not detected in any monitoring wells prior to performing the event (well locations are shown in Figure #4). Once static water levels were established, during the course of the event the system was connected to MPE-1. At each of the extraction points a stinger was located at the static fluid levels, and once the ThOx unit's normal operating temperature was reached, the inlet flow valve was opened for this well. Once the PSH was removed from the extraction well (if any), the stinger assembly was lowered into the static fluid level approximately 0 to 6 feet, creating a cone of influence.

During the first HVR event, the average ACFM was calculated at 24.49 for MPE-1, with an additional 5.00 ACFM recorded at the fresh air breather port. The fresh air breather port is used during an event to enhance the volatilization and fluid recovery rates from the monitoring wells. A summary of the recovered flow rates are shown in Figure # 5. The combined total airflow from the extraction well and breather port averaged 28.81 ACFM.

During the second HVR event, the average ACFM was calculated at 88.92 for MPE-1, with an additional 5.00 ACFM recorded at the fresh air breather port. The fresh air breather port is used during an event to enhance the volatilization and fluid recovery rates from the monitoring wells. A summary of the recovered flow rates are shown in Figure # 5. The combined total airflow from the extraction well and breather port averaged 93.92 ACFM.

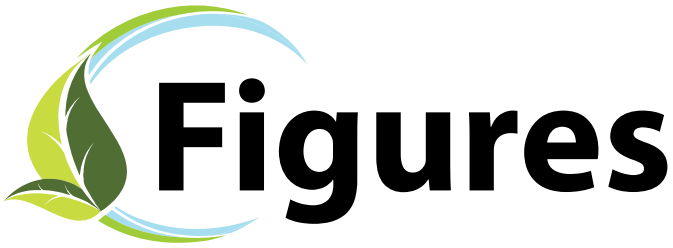
Throughout the event, air concentration measurements were recorded periodically from both the influent and effluent sample ports. The concentration results were entered into the HVR field monitoring log (Attachment A) and during the event, 0.65 pounds of carbon was removed (2.19 pounds of hydrocarbon, 0.35 equivalent gallons of gasoline). Additionally, 3.87 pounds of methane was removed and incinerated during the event. A summary of the total equivalent hydrocarbon recovery rate is shown in Figure #6. The total off-gas discharge (to the atmosphere) was 0.01948 pounds of carbon (0.06501 pounds of hydrocarbon), thus yielding a 92.34% destruction rate for the ThOx unit. Induced vacuum readings (in inches of water column) were recorded in this event (See Attachment A for results).

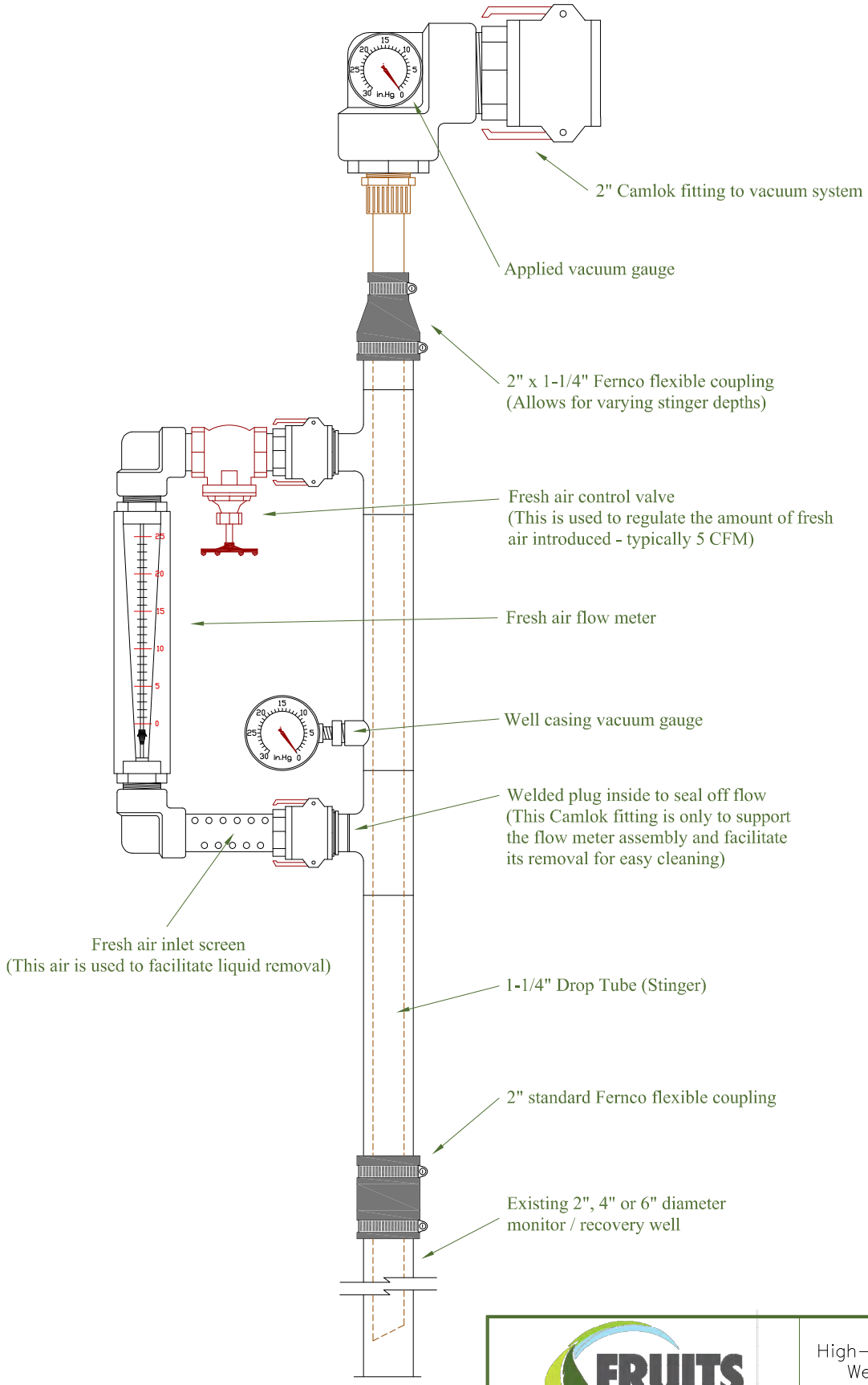
Once the HVR event was complete, a second round of water level measurements was recorded in which the results are shown in Attachment A. After the event, there were no levels of PSH recorded in any of the associated monitoring wells. During the event, 1,413 gallons of petroleum contacted water (PCW) was removed and collected in a holding tank onsite.

Sincerely,

Fruits & Associates, Inc.

John M. Fruits

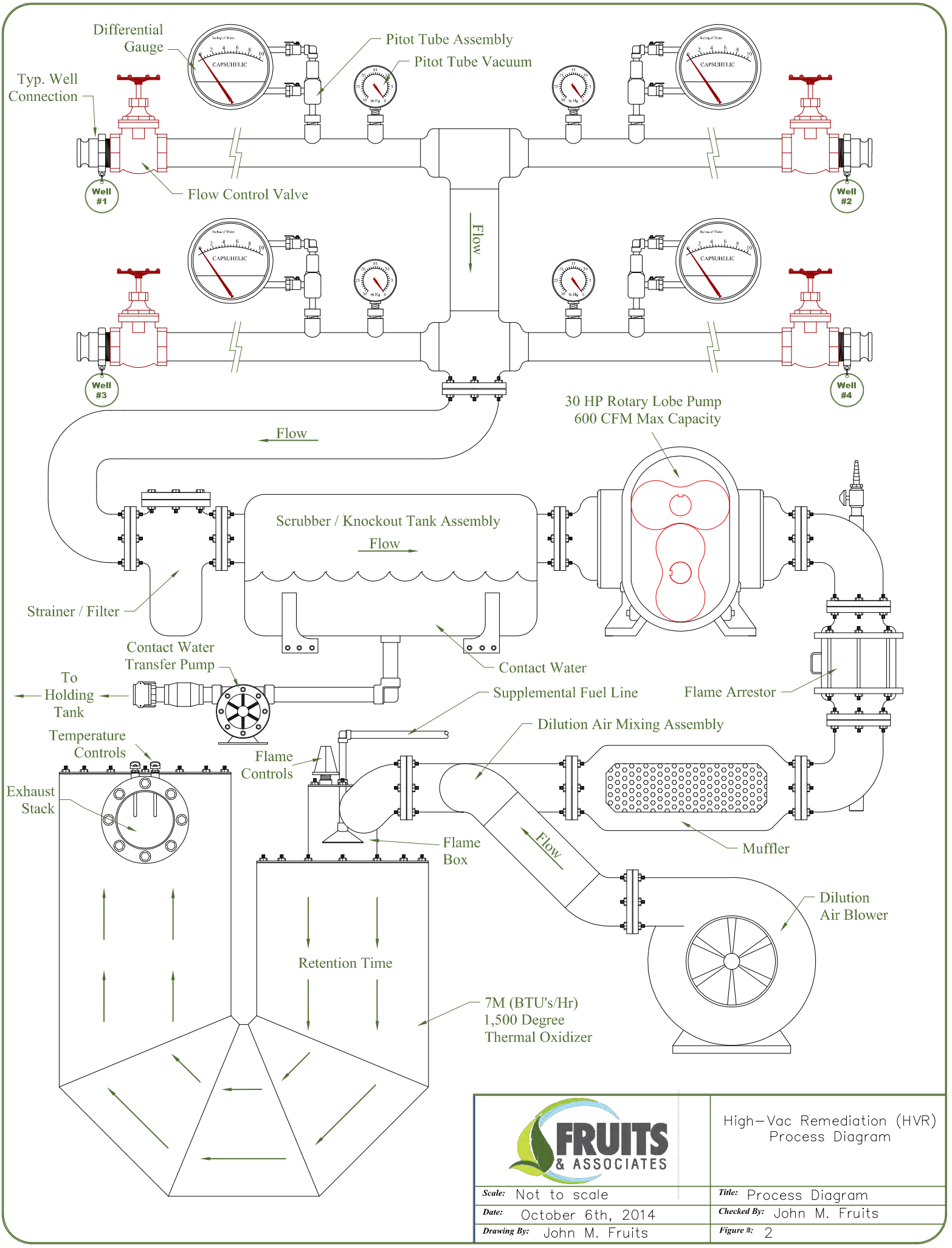

Figures



FRUITS & ASSOCIATES

High–Vac Remediation (HVR)
Well Manifold Assembly
(Stinger Assembly)

Scale: Not to scale	*Title:* Well Connection Diagram
Date: October 6th, 2014	*Checked By:* John M. Fruits
Drawing By: John M. Fruits	*Figure #:* 1



FRUITS & ASSOCIATES

High–Vac Remediation (HVR) Process Diagram

Scale: Not to scale	*Title:* Process Diagram
Date: October 6th, 2014	*Checked By:* John M. Fruits
Drawing By: John M. Fruits	*Figure #:* 2

Calculation of Hydrocarbon Loading Rate

Formula:

$$\dot{m} = Q \times C \times CF$$

Where:

$\dot{m}$ = Contaminant Loading Rate (lbs/hr)

Q = Air Flow Rate (CFM)

C = Contaminant Concentration (mg/m³)

CF = Conversion Factor = $0.000003743 = \frac{1\ m^3}{35.31\ ft^3} \times \frac{1\ lb}{454 \times 10^3\ mg} \times \frac{60\ min}{1\ hr}$

Since all field measurements are in PPM_V, the following formula is used to convert to mg/m³.

$$C = \frac{PPM_V}{R} \times \frac{1{,}000\ L}{1 m^3}$$

Where:

R = TVA Response Ratio*

*According to the manufacture's documentation, *The Foxboro Monitor, Volume 3, Issue 1A, Page 5, Response Ratio of Fuel Samples,* the Foxboro TVA-1000 has a response ratio of approximately $\frac{600\ PPM_V}{1\ mg/L}$ for Gasoline, $\frac{200\ PPM_V}{1\ mg/L}$ for Diesel Fuel.

Example:

Q = Air Flow Rate = 200 CFM

C = TVA-1000 Reading = 20,400 PPM_V

R = Response Ratio for Gasoline = 600

Results:

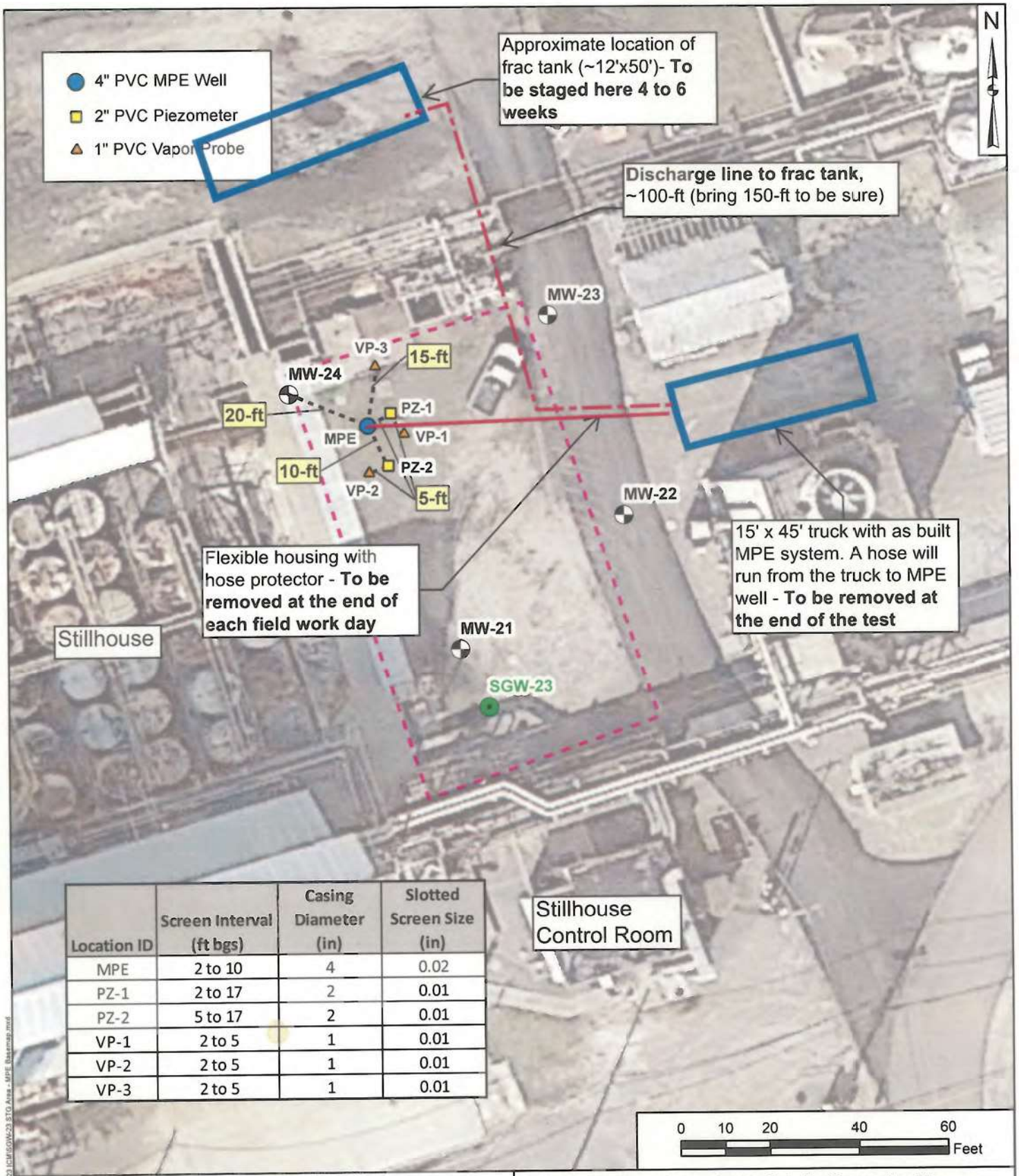
$$25.45\ lbs/hr = 200 \times \left(\frac{20{,}400}{600} \times 1{,}000\right) \times 0.000003743$$

($\dot{m}$ = 25.45 lbs/hr; Q = 200; C = 20,400; R = 600; CF = 0.000003743)

Note:

To convert *lbs* to equivalent gallons, the following formula is used:
Specific Gravity (Gasoline =0.74, Diesel = 0.84) x Conversion Factor (8.333) = *lbs/gal.*
(Gasoline = 6.16 *lbs/gal.* Diesel = 6.99 *lbs/gal.)*

FRUITS & ASSOCIATES	High–Vac Remediation (HVR) Process Diagram
Scale: Not to scale	Title: Concentration Calculations
Date: October 6th, 2014	Checked By: John M. Fruits
Drawing By: John M. Fruits	Figure #: 3



Location ID	Screen Interval (ft bgs)	Casing Diameter (in)	Slotted Screen Size (in)
MPE	2 to 10	4	0.02
PZ-1	2 to 17	2	0.01
PZ-2	5 to 17	2	0.01
VP-1	2 to 5	1	0.01
VP-2	2 to 5	1	0.01
VP-3	2 to 5	1	0.01

Monitoring Well

Temporary Shallow Groundwater Sample Location

Target Treatment

Notes:
MPE: multi-phase extraction
NAPL: non-aqueous phase liquid
ROI: radius of influence

NAPL/Shallow Groundwater Interim Corrective Measures
As-Built MPE Pilot Test Well Layout
Hercules LLC/Pinova, Inc. Facility, Brunswick, Georgia

Geosyntec consultants

Kennesaw | March 2020

Figure 1

Path: N:\Ashland\Brunswick Plant\GIS\MXD\SGW-23 ICM\SGW-23 STG Area - MPE Basemap.mxd

Attachment A

HVR FIELD MONITORING LOG

FRUITS & ASSOCIATES

Date:	April 27, 2020	Facility Name:	Hercules Pinova Facility	Facility ID#:		Personnel:	Billy Graham
Event #:	1	Facility Address:	2801 Cook Street, Brunswick, GA	Consultant:	Geosyntec Consultants		

Extraction Point(s) Data:

Time	Interval Time (in Minutes)	Rotary Lobe Vacuum (in/Hg)	MPE-1 Stinger Depth (ft)	MPE-1 Well Vacuum (in/Hg)	MPE-1 Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Addl. Bleed Air (ACFM)
11:00 AM	0 min.	3.0"	7.00	1.0"	14.0													
11:10 AM	10 min.	5.0"	7.00	3.0"	17.4													
11:20 AM	10 min.	6.0"	7.00	4.0"	25.0													
11:30 AM	10 min.	6.0"	2.00	4.0"	20.0													5.0
11:50 AM	20 min.	6.0"	4.00	4.0"	20.0													5.0
12:10 PM	20 min.	6.0"	5.00	4.0"	20.0													5.0
12:30 PM	20 min.	6.0"	6.00	4.0"	20.0													5.0
12:50 PM	20 min.	6.0"	7.00	4.0"	20.0													5.0
01:10 PM	20 min.	6.0"	7.00	4.0"	20.0													5.0
01:30 PM	20 min.	6.0"	7.00	4.0"	20.0													5.0
01:50 PM	20 min.	6.0"	7.00	4.0"	20.0													5.0
02:10 PM	20 min.	6.0"	7.00	4.0"	20.0													5.0
02:30 PM	20 min.	10.0"	7.00	8.0"	25.6													5.0
02:50 PM	20 min.	10.0"	7.00	8.0"	25.6													5.0
03:10 PM	20 min.	10.0"	7.00	8.0"	25.6													5.0
03:30 PM	20 min.	14.0"	7.00	11.5"	38.0													5.0
03:50 PM	20 min.	13.0"	7.00	10.5"	34.1													5.0
04:10 PM	20 min.	13.0"	7.00	10.5"	34.1													5.0
04:30 PM	20 min.	11.0"	7.00	9.0"	29.8													5.0
04:50 PM	20 min.	11.0"	7.00	9.0"	29.8													5.0
05:10 PM	20 min.	11.0"	7.00	9.0"	29.8													5.0
05:30 PM	20 min.	11.0"	7.00	9.0"	29.8													5.0
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	30 min.																	
	30 min.																	
	30 min.																	
				Average Rate:	24.49		Average Rate:			Average Rate:			Average Rate:			Average Rate:		

Time	Total Velocity (Ft/sec.)	Total Flow as (ACFM)	Total Flow as (DSCFM)	Influent Flow Temp. (F°)	Total Influent FID Results (PPMv)	Filtered (CH_4) FID Results (PPMv)	Non-Methane Compounds (Hydrocarbon) (PPMv)	Non-Methane Compounds (Hydrocarbon) (mg/m3)
11:00 AM	10.7	14.0	14.0	63.0	640		640	1,067
11:10 AM	13.3	17.4	17.3	64.0	710	530	180	300
11:20 AM	19.1	25.0	24.6	69.0	430	250	180	300
11:30 AM	19.1	25.0	24.6	70.0	260	130	130	217
11:50 AM	19.1	25.0	24.5	71.0	210	130	80	133
12:10 PM	19.1	25.0	24.5	71.0	290	150	140	233
12:30 PM	19.1	25.0	24.5	71.0	370	160	210	350
12:50 PM	19.1	25.0	24.5	72.0	330	140	190	317
01:10 PM	19.1	25.0	24.5	72.0	350	190	160	267
01:30 PM	19.1	25.0	24.5	72.0	470	250	220	367
01:50 PM	19.1	25.0	24.5	72.0	480	230	250	417
02:10 PM	19.1	25.0	24.5	72.0	510	240	270	450
02:30 PM	23.4	30.6	29.9	72.0	770	560	210	350
02:50 PM	23.4	30.6	29.9	72.0	760	510	250	417
03:10 PM	23.4	30.6	29.9	72.0	720	490	230	383
03:30 PM	32.9	43.0	42.0	72.0	1,310	960	350	583
03:50 PM	29.9	39.1	38.2	72.0	1,290	870	420	700
04:10 PM	29.9	39.1	38.2	72.0	1,150	890	260	433
04:30 PM	26.6	34.8	34.0	72.0	980	790	190	317
04:50 PM	26.6	34.8	34.0	72.0	1,030	850	180	300
05:10 PM	26.6	34.8	34.0	72.0	920	800	120	200
05:30 PM	26.6	34.8	34.0	72.0	780	560	220	367
							Total Removed:	

Time	Before off-gas treatment: Total Methane Removed (lbs.)	Total Carbon Removed (lbs.)	Total Hydrocarbon Removed Lbs	Total Hydrocarbon Removed Gal	Temp. of Stack Gas (F°)	Total Effluent FID Results (PPMv)	ThOx Unit Total Flow Rate (SCFM)	Liquid Level in Tank (Gallons)	After off-gas treatment: Carbon Emission Rate (lbs.)	Equiv. Hydrocarbon Rate (lbs.)	Destruction Efficiency Rating %
11:00 AM		0.00	0.00	0.000	1210.0	2.00	329.11		0.0000	0.0000	92.63%
11:10 AM	0.004	0.00	0.00	0.001	1205.0	2.00	329.11		0.0002	0.0007	78.83%
11:20 AM	0.003	0.00	0.00	0.001	1206.0	2.00	329.11		0.0002	0.0007	85.14%
11:30 AM	0.001	0.00	0.00	0.001	1205.0	2.00	329.11		0.0002	0.0007	79.39%
11:50 AM	0.003	0.00	0.00	0.001	1204.0	2.00	329.11		0.0004	0.0014	66.45%
12:10 PM	0.003	0.00	0.01	0.001	1203.0	2.00	329.11		0.0004	0.0014	80.83%
12:30 PM	0.003	0.00	0.01	0.002	1205.0	2.00	329.11		0.0004	0.0014	87.22%
12:50 PM	0.003	0.00	0.01	0.002	1204.0	2.00	329.11		0.0004	0.0014	85.85%
01:10 PM	0.004	0.00	0.01	0.001	1202.0	2.00	329.11		0.0004	0.0014	83.19%
01:30 PM	0.005	0.00	0.01	0.002	1200.0	2.00	329.11		0.0004	0.0014	87.78%
01:50 PM	0.005	0.00	0.01	0.002	1200.0	2.00	329.11		0.0004	0.0014	89.24%
02:10 PM	0.005	0.00	0.01	0.002	1201.0	2.00	329.11		0.0004	0.0014	90.04%
02:30 PM	0.014	0.00	0.01	0.002	1205.0	2.00	329.11		0.0004	0.0014	89.51%
02:50 PM	0.012	0.00	0.02	0.003	1200.0	2.00	329.11		0.0004	0.0014	91.19%
03:10 PM	0.012	0.00	0.01	0.002	1200.0	2.00	329.11		0.0004	0.0014	90.42%
03:30 PM	0.033	0.01	0.03	0.005	1211.0	2.00	329.11		0.0004	0.0014	95.53%
03:50 PM	0.027	0.01	0.03	0.005	1209.0	2.00	329.11		0.0004	0.0014	95.90%
04:10 PM	0.028	0.01	0.02	0.003	1205.0	2.00	329.11		0.0004	0.0014	93.37%
04:30 PM	0.022	0.00	0.01	0.002	1200.0	2.00	329.11		0.0004	0.0014	89.80%
04:50 PM	0.024	0.00	0.01	0.002	1207.0	2.00	329.11		0.0004	0.0014	89.23%
05:10 PM	0.022	0.00	0.01	0.001	1208.0	2.00	329.11		0.0004	0.0014	83.85%
05:30 PM	0.016	0.00	0.02	0.003	1203.0	2.00	329.11	180	0.0004	0.0014	91.19%
Total Removed:	0.247	0.08	0.27	0.043	Average / Totals:		329.11	180	0.00800	0.02669	87.12%

Monitoring Well Gauging Data

Well Number	Before DTP	Before DTW	Before Prod.(ft)	Vacuum Readings at: 3:10 PM			DTP	DTW	Prod.(ft)	After DTP	After DTW	After Prod.(ft)	Drawdown Results (ft)
MPE-1	1.58	1.58		7" Hg						5.80	5.80		-4.22

Comments:

notes
Dan & Ali taking all DTW, Vac and PID readings at the monitoring wells
Per Ali we do not have to log these.
Influent readings and water production is all we have to take. Due to flowmeter malfunctions no hourly readings on Monday.
Per Ali remove flowmeter and measure frat tank hourly on Tuesday.

Calibration Information

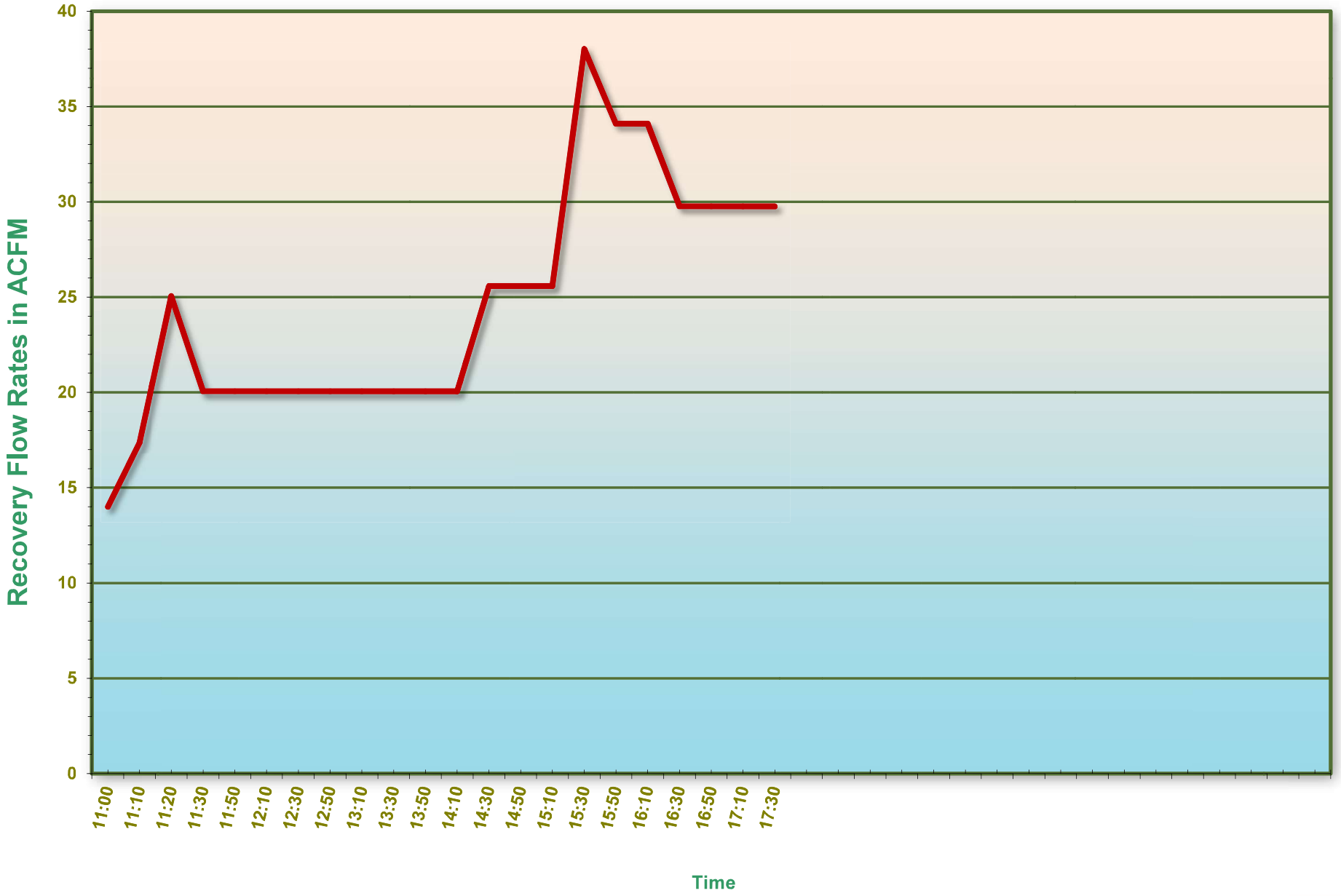
Calibration Gas	Methane
Calibration Gas Concentration (PPMv)	10,000
Response Factor (TVA-1000)	600
Number of Carbons	1
Influent Pipe Dia.	2
Effluent Stack Dia.	8

This Event's Totals

Total Lbs of Carbon	0.08
Total Lbs of Methane	0.25
Total Lbs of Hydrocarbon	0.27
Equiv. Gal. of Hydrocarbons	0.043
Total Gallons of Liquid (Groundwater)	180.00
Total Operating Time (Hours)	6.5

Cumulative (To Date) Totals

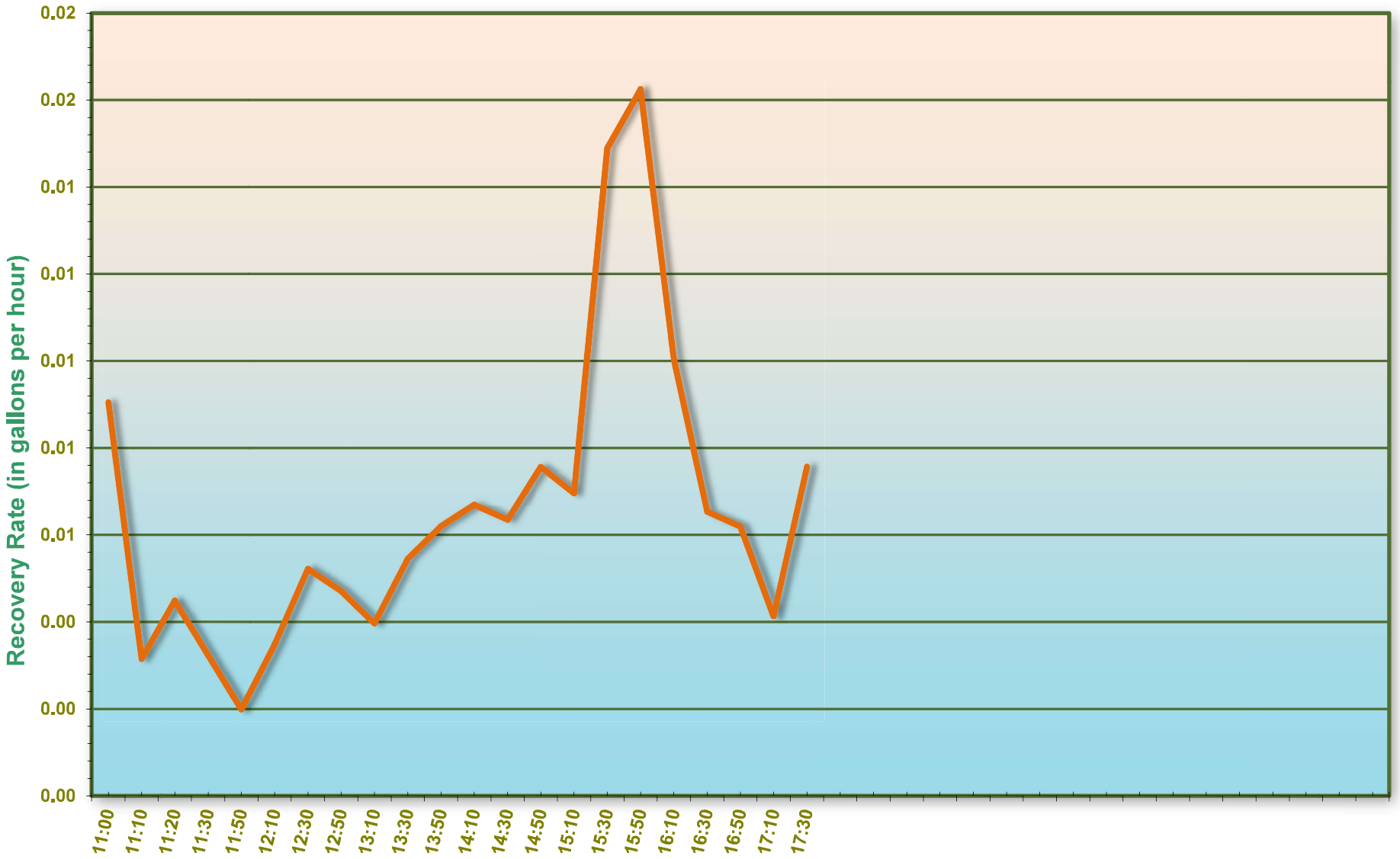
Total Lbs of Carbon	0.08
Total Lbs of Methane	0.25
Total Lbs of Hydrocarbon	0.27
Equiv. Gal. of Hydrocarbons	0.043
Total Gallons of Liquid	180.00



FRUITS & ASSOCIATES

HIGH-VAC REMEDIATION (HVR)
RECOVERY FLOW RATES

Scale: NOT APPLICABLE	Title: RECOVERY FLOW RATES
Date:	Checked By: JOHN M. FRUITS
Drawing By: JOHN M. FRUITS	Figure #:



FRUITS & ASSOCIATES

HIGH-VAC REMEDIATION (HVR)
RECOVERY RATE (IN GPH)

Scale: NOT APPLICABLE	Title: RECOVERY RATES (IN GPH)
Date:	Checked By: JOHN M. FRUITS
Drawing By: JOHN M. FRUITS	Figure #:

HVR FIELD MONITORING LOG

Date:	April 28, 2020	**Facility Name:**	Hercules Pinova Facility	**Facility ID#:**		**Personnel:**	Billy Graham
Event #:	2	**Facility Address:**	2801 Cook Street, Brunswick, GA	**Consultant:**	Geosyntec		

Extraction Point(s) Data:

Time	Interval Time (in Minutes)	Rotary Lobe Vacuum (in/Hg)	MPE-1															Addl. Bleed Air (ACFM)
			Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	Stinger Depth (ft)	Well Vacuum (in/Hg)	Flow Rate (ACFM)	
08:15 AM	0 min.	16.0"	2.00	12.0"	80.7													5.0
08:25 AM	10 min.	15.0"	3.00	11.0"	74.9													5.0
08:35 AM	10 min.	14.0"	4.00	10.0"	69.5													5.0
08:55 AM	20 min.	14.0"	5.00	10.0"	69.5													5.0
09:15 AM	20 min.	14.0"	6.00	10.0"	69.5													5.0
09:35 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
09:55 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
10:15 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
10:35 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
10:55 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
11:15 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
11:35 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
11:55 AM	20 min.	14.0"	7.00	10.0"	69.5													5.0
12:15 PM	20 min.	14.0"	8.00	10.0"	69.5													5.0
12:35 PM	20 min.	14.0"	8.00	10.0"	69.5													5.0
12:55 PM	20 min.	14.0"	8.00	10.0"	69.5													5.0
01:15 PM	20 min.	14.0"	8.00	10.0"	69.5													5.0
01:35 PM	20 min.	16.0"	8.00	12.0"	80.7													5.0
01:55 PM	20 min.	16.0"	8.00	12.0"	80.7													5.0
02:15 PM	20 min.	19.0"	8.00	15.0"	100.7													5.0
02:35 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
02:55 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
03:15 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
03:35 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
03:55 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
04:15 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
04:35 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
04:55 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
05:15 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
05:35 PM	20 min.	21.0"	8.00	17.0"	120.7													5.0
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
	30 min.																	
				Average Rate:	**88.92**		**Average Rate:**			**Average Rate:**			**Average Rate:**			**Average Rate:**		

Time	Total Velocity Ft/sec.	Total Flow as (ACFM)	Total Flow as (DSCFM)	Influent Flow Temp. (F^U)	Total Influent FID Results (PPMv)	Filtered (CH_4) FID Results (PPMv)	Non-Methane Compounds (Hydrocarbon)		Before off-gas treatment				Temp. of Stack Gas (F^U)	Total Effluent FID Results (PPMv)	ThOx Unit Total Flow Rate (SCFM)	Liquid Level in Tank (Gallons)	After off-gas treatment		
									Total Methane Removed (lbs.)	Total Carbon Removed (lbs.)	Total Hydrocarbon Removed						Carbon Emission Rate (lbs.)	Equiv. Hydrocarbon Rate (lbs.)	Destruction Efficiency Rating %
							(PPMv)	(mg/m3)			Lbs	Gal							
08:15 AM	65.5	85.7	84.8	66.0	960		960	1,600		0.00	0.00	0.000	1233.0	2.00	329.11		0.0000	0.0000	99.19%
08:25 AM	61.1	79.9	78.9	67.0	850	630	220	367	0.020	0.01	0.02	0.003	1217.0	2.00	329.11		0.0002	0.0007	96.21%
08:35 AM	56.9	74.5	73.4	68.0	820	600	220	367	0.018	0.01	0.02	0.003	1202.0	2.00	329.11		0.0002	0.0007	95.92%
08:55 AM	56.9	74.5	73.4	68.0	840	610	230	383	0.037	0.01	0.04	0.006	1204.0	2.00	329.11		0.0004	0.0014	96.10%
09:15 AM	56.9	74.5	73.4	68.0	850	600	250	417	0.036	0.01	0.04	0.006	1201.0	2.00	329.11	36	0.0004	0.0014	96.41%
09:35 AM	56.9	74.5	73.4	68.0	960	620	340	567	0.037	0.02	0.05	0.008	1209.0	2.00	329.11		0.0004	0.0014	97.36%
09:55 AM	56.9	74.5	73.4	68.0	940	700	240	400	0.042	0.01	0.04	0.006	1205.0	2.00	329.11		0.0004	0.0014	96.26%
10:15 AM	56.9	74.5	73.4	68.0	1,070	780	290	483	0.047	0.01	0.04	0.007	1200.0	2.00	329.11	164	0.0004	0.0014	96.91%
10:35 AM	56.9	74.5	73.4	68.0	1,280	810	470	783	0.049	0.02	0.07	0.012	1209.0	2.00	329.11		0.0004	0.0014	98.09%
10:55 AM	56.9	74.5	73.2	69.0	870	600	270	450	0.036	0.01	0.04	0.007	1209.0	2.00	329.11		0.0004	0.0014	96.67%
11:15 AM	56.9	74.5	73.1	70.0	1,050	730	320	533	0.044	0.01	0.05	0.008	1208.0	2.00	329.11	200	0.0004	0.0014	97.19%
11:35 AM	56.9	74.5	73.1	70.0	1,170	750	420	700	0.045	0.02	0.06	0.010	1209.0	2.00	329.11		0.0004	0.0014	97.86%
11:55 AM	56.9	74.5	73.1	70.0	890	510	380	633	0.030	0.02	0.06	0.009	1200.0	2.00	329.11		0.0004	0.0014	97.63%
12:15 PM	56.9	74.5	73.1	70.0	970	530	440	733	0.032	0.02	0.07	0.011	1204.0	2.00	329.11	442	0.0004	0.0014	97.95%
12:35 PM	56.9	74.5	73.1	70.0	840	600	240	400	0.036	0.01	0.04	0.006	1201.0	2.00	329.11		0.0004	0.0014	96.25%
12:55 PM	56.9	74.5	73.1	70.0	850	590	260	433	0.035	0.01	0.04	0.006	1205.0	2.00	329.11		0.0004	0.0014	96.54%
01:15 PM	56.9	74.5	72.9	71.0	830	600	230	383	0.036	0.01	0.03	0.006	1207.0	2.00	329.11	535	0.0004	0.0014	96.08%
01:35 PM	65.5	85.7	83.9	71.0	1,130	780	350	583	0.053	0.02	0.06	0.010	1209.0	2.00	329.11		0.0004	0.0014	97.76%
01:55 PM	65.5	85.7	83.9	71.0	990	770	220	367	0.053	0.01	0.04	0.006	1206.0	2.00	329.11		0.0004	0.0014	96.43%
02:15 PM	80.8	105.7	103.5	71.0	1,310	970	340	567	0.082	0.02	0.07	0.012	1205.0	2.00	329.11	721	0.0004	0.0014	98.13%
02:35 PM	96.1	125.7	123.3	70.0	3,730	3,480	250	417	0.351	0.02	0.06	0.010	1207.0	2.00	329.11		0.0004	0.0014	97.87%
02:55 PM	96.1	125.7	123.3	70.0	4,180	3,970	210	350	0.400	0.02	0.05	0.009	1201.0	2.00	329.11		0.0004	0.0014	97.46%
03:15 PM	96.1	125.7	123.3	70.0	5,170	4,660	510	850	0.470	0.04	0.13	0.021	1209.0	2.00	329.11	907	0.0004	0.0014	98.95%
03:35 PM	96.1	125.7	123.3	70.0	2,630	2,290	340	567	0.231	0.03	0.09	0.014	1200.0	2.00	329.11		0.0004	0.0014	98.43%
03:55 PM	96.1	125.7	123.3	70.0	2,830	2,370	460	767	0.239	0.04	0.12	0.019	1204.0	2.00	329.11		0.0004	0.0014	98.84%
04:15 PM	96.1	125.7	123.3	70.0	2,890	2,310	580	967	0.233	0.04	0.15	0.024	1206.0	2.00	329.11	1,000	0.0004	0.0014	99.08%
04:35 PM	96.1	125.7	123.3	70.0	3,090	2,550	540	900	0.257	0.04	0.14	0.022	1203.0	2.00	329.11		0.0004	0.0014	99.01%
04:55 PM	96.1	125.7	123.3	70.0	2,830	2,410	420	700	0.243	0.03	0.11	0.017	1200.0	2.00	329.11		0.0004	0.0014	98.73%
05:15 PM	96.1	125.7	123.3	70.0	2,520	2,170	350	583	0.219	0.03	0.09	0.015	1200.0	2.00	329.11	1,186	0.0004	0.0014	98.48%
05:35 PM	96.1	125.7	123.3	70.0	2,490	2,090	400	667	0.211	0.03	0.10	0.017	1203.0	2.00	329.11	1,233	0.0004	0.0014	98.67%
							Total Removed:		**3.619**	**0.57**	**1.92**	**0.311**	**Average / Totals:**		**329.11**	**1,233**	**0.01148**	**0.03832**	**97.55%**

Monitoring Well Gauging Data

Well Number	Before			Vacuum Readings at:						After			Drawdown Results (ft)
	DTP	DTW	Prod.(ft)	2:15 PM			DTP	DTW	Prod.(ft)	DTP	DTW	Prod.(ft)	
MPE-1	1.58	1.58		12" Hg						8.36	8.36		-6.78

Comments:
notes

Calibration Information

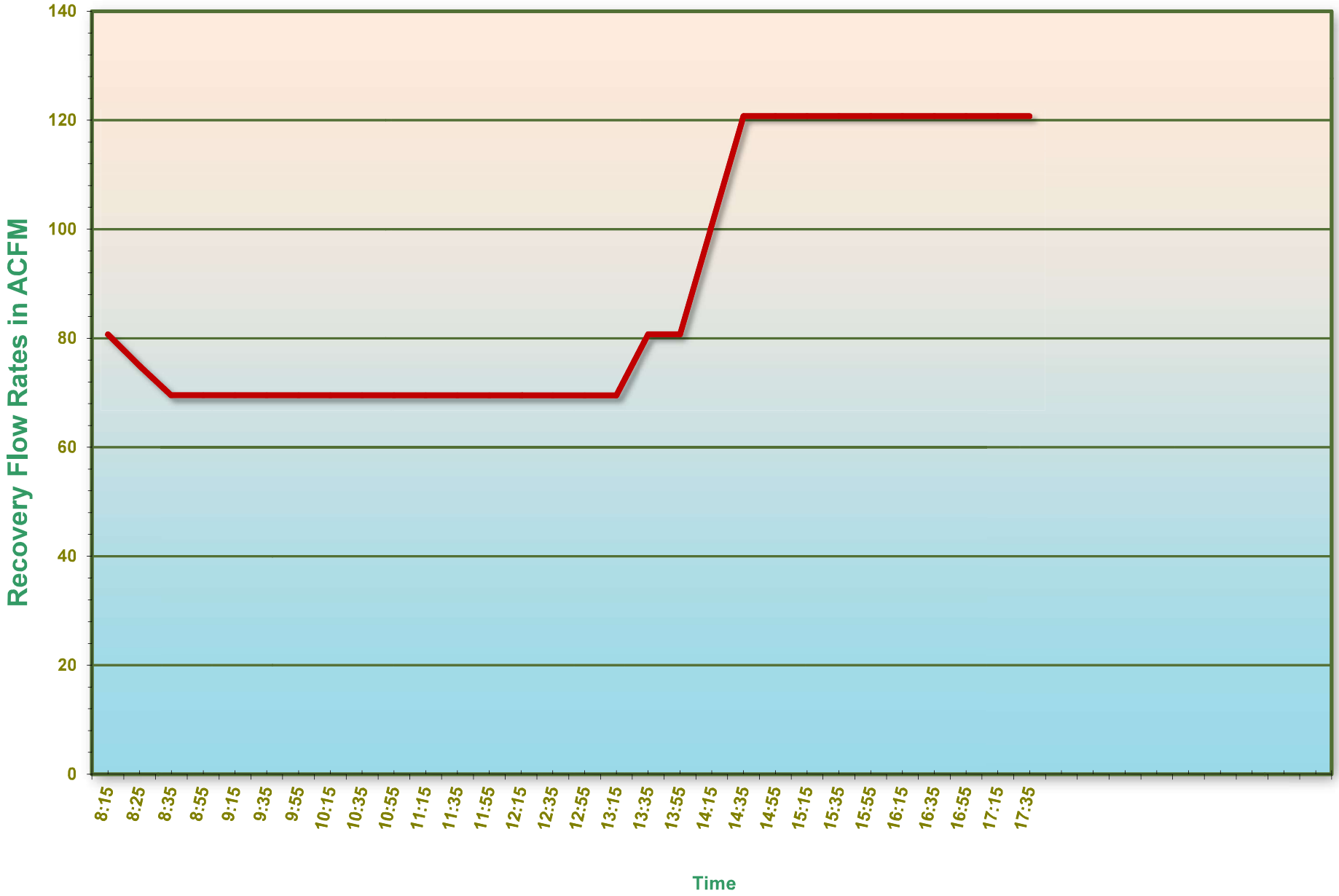
Calibration Gas	Methane
Calibration Gas Concentration (PPMv)	10,000
Response Factor (TVA-1000)	600
Number of Carbons	1
Influent Pipe Dia.	2
Effluent Stack Dia.	8

This Event's Totals

Total Lbs of Carbon	0.57
Total Lbs of Methane	3.62
Total Lbs of Hydrocarbon	1.92
Equiv. Gal. of Hydrocarbons	0.311
Total Gallons of Liquid (Groundwater)	1233.00
Total Operating Time (Hours)	9.3

Cumulative (To Date) Totals

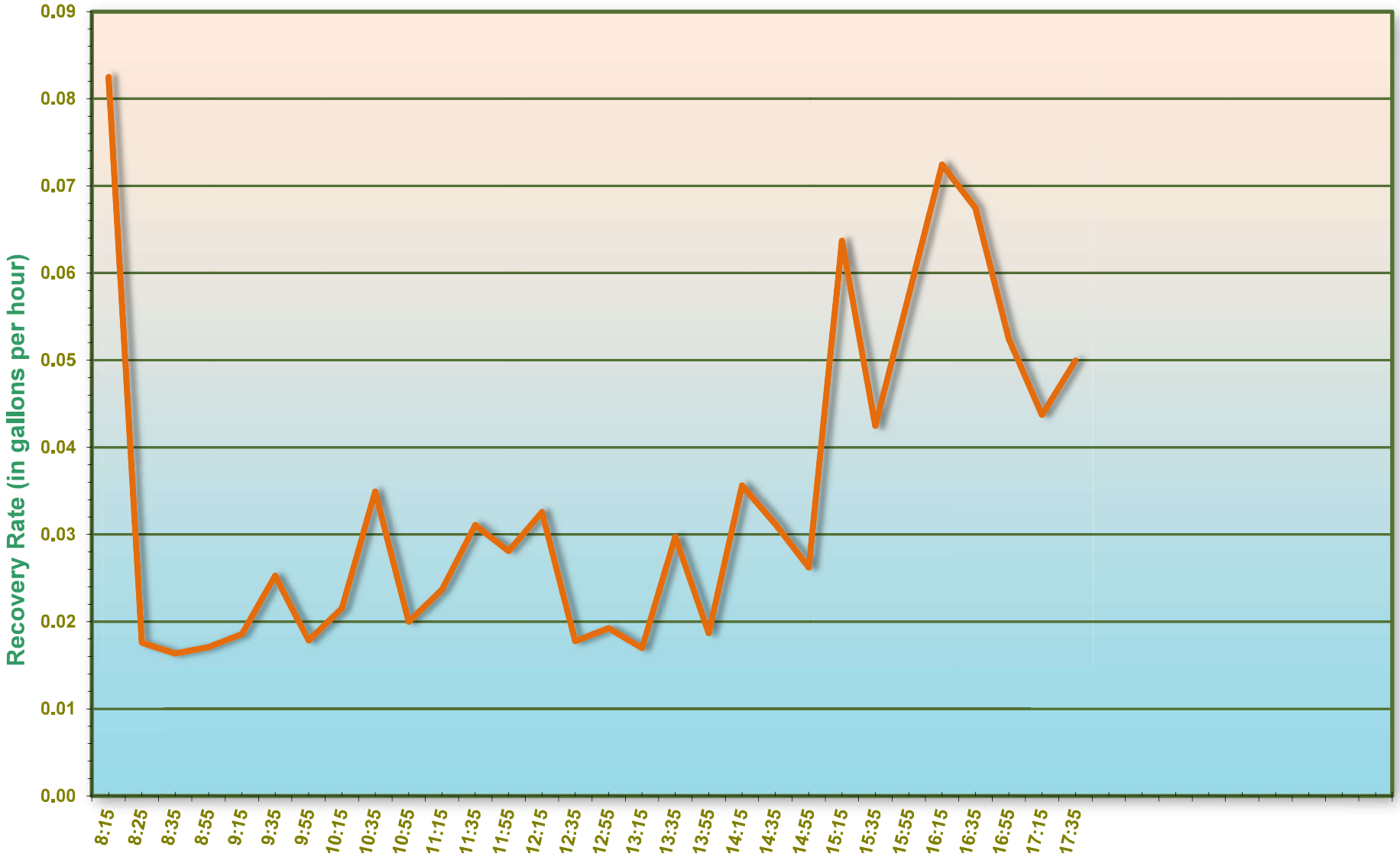
Total Lbs of Carbon	0.65
Total Lbs of Methane	3.87
Total Lbs of Hydrocarbon	2.19
Equiv. Gal. of Hydrocarbons	0.354
Total Gallons of Liquid	1413.00



FRUITS & ASSOCIATES

HIGH-VAC REMEDIATION (HVR)
RECOVERY FLOW RATES

Scale: NOT APPLICABLE	Title: RECOVERY FLOW RATES
Date:	Checked By: JOHN M. FRUITS
Drawing By: JOHN M. FRUITS	Figure #:



FRUITS & ASSOCIATES

HIGH-VAC REMEDIATION (HVR) RECOVERY RATE (IN GPH)

Scale: NOT APPLICABLE	Title: RECOVERY RATES (IN GPH)
Date:	Checked By: JOHN M. FRUITS
Drawing By: JOHN M. FRUITS	Figure #:

APPENDIX C

Table 1A - Baseline Data Collection
MPE Pilot Test
Hercules/Pinova Brunswick Plant
Brunswick, GA

Geosyntec Consultants

Date: 4/27/2020
Baseline for Test

Weather: Sunny, 70°F
Geosyntec Crew: AC, DG
Other Crew: Billy Graham (Fruits)

Time	Well ID	Depth to water	Depth to product	VOCs	Vacuum	Atmospheric Pressure	Notes
hh:mm	-	ft btoc.	ft btoc.	ppm	IWC	in. of Hg	
9:33	MPE-01	1.58	None	57.9			
9:30	MPE-OW-01	1.51	None	34.8			
9:29	MPE-OW-02	1.49	None	38.1			
9:37	MW-24	1.84	None	49.9			
9:25	VP-01	1.45	None	34.8	-0.001	30.127	
9:30	VP-02	1.65	None	11.0	-0.004	30.127	
9:32	VP-03	1.71	None	25.6	-0.005	30.127	

Notes:
MPE - Multi Phase Extraction
IWC - Inches of water
VP - vapor probe
ft btoc - ft below top of casing
in. of Hg - inches of mercury

Table 2A - MPE Pilot Test Monitoring
MPE Pilot Test
Hercules/Pinova Brunswick Plant
Brunswick, GA

Geosyntec Consultants

Date: 4/27/2020 **Start Time: 11:04**

Weather: Sunny, 70°F

Test Well ID: MPE-01

Time	Wellhead Vacuum	Vapor Flow Rate	VOCs, FID	Temp.	O_2 content	Cumulative Extracted Water or	VP- 01		VP - 02		VP - 03		MPE-OW-01		MPE-OW-02		MW-24		Notes (Dilutions, barometric pressure)
							Vacuum	VOCs	Vacuum	VOCs	Vacuum	VOCs	DTW	DTP	DTW	DTP	DTW	DTP	
hh:mm	" Hg	(scfm)	(ppm)	(°F)	(%)	(gal or)	(IWC)	(ppm)	(IWC)	(ppm)	(IWC)	(ppm)	(ft bgs)		(ft bgs)		(ft bgs)		
11:19	4"	See Fruits Report	475	69	20.9	3.4 gpm	-0.007	51.1	-0.005	4.6	-0.021	12.2		--		--	1.81	--	
10:40	4"		179	71	20.9	--	-0.04		-0.12		-0.016		1.78	--	1.75	--	1.81	--	
Drop tobe 2' below static														--		--		--	
12:35	4"	See Fruits Report	313	71	20.9		-0.001	58.1	0	7.6	0.003	8.9	2.38	--	2.09	--	1.96	--	
13:09	4"		350			27.7 gal	-0.001	60.2	0	11.4	-0.051	17.6	2.52	--	2.18	--	2.04	--	
13:16	Drop tube at 5' below static water level													--		--		--	
13:35	4.5-5"	From Fruits Report	430	71	20.9	54.7 gal	0	61.6	0	12.9	0	24	2.85	--	2.41	--	2.13	--	
14:00	5"		485	7	20.9	92.7 gal	0	53.4	0	9.3	0	24.7	2.91	--	2.47	--	2.20	--	
14:07	Increase vacuum to 8" Hg					108.9 gal								--		--		--	
14:25	8"	From Fruits Report	717	71	20.9	141.3 gal	0	41.4	0	8.3	-0.05	22.8	3.36	--	2.76	--	2.36	--	
14:45	7.5"		760	71	20.9	183 gal	0	23.6	0	7.8	-0.13	24.6	3.39	--	2.8	--	2.42	--	
15:05	8"		767	71	20.9	223.4 gal	0	27.5	0	7.9	-0.13	26.5	3.4	--	2.81	--	2.47	--	
15:25	8"		709	71	20.9	262.6 gal	0	24.9	0	9.1	-0.12	25.9	3.41	--	2.83	--	2.46	--	
15:35						278.6 gal								--		--		--	
16:00	9.5"		1080	71	20.9	2.2 gpm	-0.01	25.1	0	10		25.4	3.78	--	3.09	--	2.57	--	
16:30	8.5"			71	20.9	2.1 gpm	-0.01	11.8	0	8.5	-0.12	25.9	3.6	--	3.00	--	2.56	--	
17:15	8"		910	71	20.9	2.1 gpm	-0.02	9.9	0	2.7	-0.15	21.1	3.58	--	3.00	--	2.60	--	
17:25	stop the test																		

Notes:

IWC - inches of water column
% - percent
DTW - Depth to water
ppm - parts per million
scfm - standard cubic feet per minute
gal - gallon
DTP - Depth to product
°F - degree fahrenheit
" Hg - inches of mercury
VOCs - volatile organic compounds

Table 1B - Baseline Data Collection
MPE Pilot Test
Hercules/Pinova Brunswick Plant
Brunswick, GA

Geosyntec Consultants

Date: 4/28/2020
Baseline for Test

Weather: Sunny, 70°F
Geosyntec Crew: AC, DG
Other Crew: Billy Graham (Fruits)

Time	Well ID	Depth to water	Depth to product	VOCs	Vacuum	Notes
hh:mm	-	ft btoc.	ft btoc.	ppm	IWC	
8:00	MPE-01	--	None			
8:10	MPE-OW-01	1.59	None			
8:09	MPE-OW-02	4.58	None			
8:08	MW-24	1.74	None			
8:10	VP-01			44.9	0	
8:11	VP-02			9.7	0	
8:11	VP-03			12.1	-0.005	

Notes:
MPE - Multi Phase Extraction
IWC - Inches of water
VP - vapor probe
ft bgs - ft below ground surface
in. of Hg - inches of mercury

Table 2B - MPE Pilot Test Monitoring
MPE Pilot Test
Hercules/Pinova Brunswick Plant
Brunswick, GA

Geosyntec Consultants

Date: 4/28/2020 **Start Time:** 8:20
Weather: Sunny, 70°F **Test Well ID:** MPE-01

Time	Wellhead Vacuum	Vapor Flow Rate	Vapor , FID	Temp.	O_2 content	Cumulative Extracted Water or extraction rate	VP- 01		VP - 02		VP - 03		MPE-OW-01		MPE-OW-02		MW-24		Notes (Dilutions, barometric pressure)
							Vacuum	VOCs	Vacuum	VOCs	Vacuum	VOCs	DTW	DTP	DTW	DTP	DTW	DTP	
hh:mm	" Hg	(scfm)	(ppm)	(°F)	(%)	(gal or gpm)	(IWC)	(ppm)	(IWC)	(ppm)	(IWC)	(ppm)	(ft bgs)		(ft bgs)		(ft bgs)		
			Drop tube at 4' bgs																
9:15	12"		840	68	20.3	--	0	45.3	0	5.6	0	13.2	3.83	--	3.06	--	2.42	--	
9:35	12"		540	68	20.9	2.8 gpm	0	38.1	0	4.7	0	23	3.88	--	3.12	--	2.53	--	
			Drop tube at 7' bgs																
9:55	12"		1480	69	20.9	--								--		--		--	
10:10	10"		1110	69	20.9	3 gpm	-0.003	39.6	0	2.4	-0.07	18.8	3.89	--	3.2	--	2.64	--	
10:40	10"		870	69	20.9	3.5 gpm	0	29.9	0	1.3	-0.08	20.9	3.88	--	3.2	--	2.66	--	
11:04	10"		1030	69	20.9	2.5 gpm	0	22.1	0	0.9	-0.03	18.3	3.85	--	3.2	--	2.7	--	
11:25			Drop tube at 9' bgs																
11:40	10"		910	69	20.9	2.5 gpm	0	20.3	0	2.8	-0.13	19.8	3.91	--	3.25	--	2.72	--	
12:00	10"		940	69	20.9	3 gpm	0	15.3	0	0.7	-0.05	21.6	3.9	--	3.24	--	2.72	--	
12:10		see Fruits Report	Drop tube at 9.8' bgs																
12:30	10"		851	70	20.9	2.5 gpm	0	14.5	0	2.1	-0.07	21	3.9	--	3.26	--	2.75	--	
13:00	10"		840	70	20.9	2.6 gpm	0	10.7	0	0.5	-0.09	18.8	3.89	--	3.25	--	2.75	--	
13:45	12"												4.1	--	3.4	--	2.8	--	
14:00	12"		970	70	20.9	2.0 gpm	0	13.2	0	4.4	-0.09	17.1	4.1	--	3.4	--	2.83	--	
14:30	15"		1160	70	20.9	3.25 gpm	0	10.5	0	0.9	-0.304	17.9	4.39	--	3.58	--	2.91	--	
15:20	15"		310											--		--		--	
15:45	15"		7010	70	20.9	2.5 gpm	0	NM	0	NM	-0.12	--	4.5	--	3.7	--	3.04	--	
16:30	14"		3670	70	20.9	2.5 gpm							4.45	--	3.68	--	3	--	
17:10	14"		2310	70	20.9	3.25 gpm	0	4.4	0	18.4	-0.2	22	4.5	--	3.65	--	3.03	--	

Notes:
IWC - inches of water column
scfm - standard cubic feet per minute
°F - degree fahrenheit
% - percent
gal - gallon
" Hg - inches of mercury
DTW - Depth to water
DTP - Depth to product
VOCs - volatile organic compounds
ppm - parts per million

APPENDIX D

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

Laboratory Job ID: 140-19001-1
Client Project/Site: MPE Pilot Test/Brunswick, GA

For:
Geosyntec Consultants, Inc.
1255 Roberts Blvd, NW
Suite 200
Kennesaw, Georgia 30144

Attn: Laura Kinsman

Authorized for release by:
5/13/2020 5:32:49 PM

Jerry Lanier, Project Manager I
(912)250-0281
jerry.lanier@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

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

Job ID: 140-19001-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

CASE NARRATIVE

Client: Geosyntec Consultants, Inc.

Project: MPE Pilot Test/Brunswick, GA

Report Number: 140-19001-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Receipt
The samples were received on 5/4/2020 2:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice.

VOLATILE ORGANIC COMPOUNDS IN AMBIENT AIR
Samples MPE_VP01_042820 (140-19001-1), MPE_VP02_042820 (140-19001-2), MPE_VP03_042820 (140-19001-3) and MPE_VP04_042820 (140-19001-4) were analyzed for Volatile Organic Compounds in Ambient Air in accordance with EPA Method TO-15. The samples were analyzed on 05/06/2020.

TO-15: EPA methods TO-14A and TO-15 specify the use of humidified "zero air" as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by TestAmerica Knoxville.

The continuing calibration verification (CCV) associated with batch 140-39410 exhibited % difference of > 30% for the following analyte(s) Acetone, Chloromethane and Isopropyl alcohol ; however, the results were within the LCS acceptance limits. The EPA method requires that all target analytes in the continuing calibration verification standard be within 30% difference from the initial calibration. According to the laboratory standard operating procedure, the continuing calibration is acceptable if it meets the laboratory control sample acceptance criteria.

Samples MPE_VP01_042820 (140-19001-1)[38.79X], MPE_VP02_042820 (140-19001-2)[39.22X], MPE_VP03_042820 (140-19001-3) [39.05X] and MPE_VP04_042820 (140-19001-4)[41.35X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-19001-1	MPE_VP01_042820	Air	04/28/20 15:20	05/04/20 14:00	Air Canister (1-Liter) #8325
140-19001-2	MPE_VP02_042820	Air	04/28/20 15:25	05/04/20 14:00	Air Canister (1-Liter) #5880
140-19001-3	MPE_VP03_042820	Air	04/28/20 17:10	05/04/20 14:00	Air Canister (1-Liter) #34001383
140-19001-4	MPE_VP04_042820	Air	04/28/20 17:10	05/04/20 14:00	Air Canister (1-Liter) #4857

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Client Sample ID: MPE_VP01_042820 — Lab Sample ID: 140-19001-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	37000		450	43	ug/m3	38.79		TO-15	Total/NA
Methyl isobutyl ketone	880	J	1400	390	ug/m3	38.79		TO-15	Total/NA
m,p-Xylene	320	J	2500	220	ug/m3	38.79		TO-15	Total/NA
p-Cymene	7400		770	220	ug/m3	38.79		TO-15	Total/NA
Toluene	5500		530	520	ug/m3	38.79		TO-15	Total/NA
Xylene, o-	160	J	610	120	ug/m3	38.79		TO-15	Total/NA
Xylene (total)	480	J	1200	190	ug/m3	38.79		TO-15	Total/NA

Client Sample ID: MPE_VP02_042820 — Lab Sample ID: 140-19001-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	40000		330	32	ug/m3	39.22		TO-15	Total/NA
Ethylbenzene	150	J	450	75	ug/m3	39.22		TO-15	Total/NA
Methyl isobutyl ketone	1300		1100	290	ug/m3	39.22		TO-15	Total/NA
m,p-Xylene	370	J	1800	170	ug/m3	39.22		TO-15	Total/NA
p-Cymene	12000		570	160	ug/m3	39.22		TO-15	Total/NA
Toluene	6300		390	390	ug/m3	39.22		TO-15	Total/NA
Xylene, o-	180	J	450	86	ug/m3	39.22		TO-15	Total/NA
Xylene (total)	550	J	910	140	ug/m3	39.22		TO-15	Total/NA

Client Sample ID: MPE_VP03_042820 — Lab Sample ID: 140-19001-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	43000		500	47	ug/m3	39.05		TO-15	Total/NA
Ethylbenzene	160	J	680	110	ug/m3	39.05		TO-15	Total/NA
Methyl isobutyl ketone	1500	J	1600	430	ug/m3	39.05		TO-15	Total/NA
m,p-Xylene	460	J	2700	250	ug/m3	39.05		TO-15	Total/NA
p-Cymene	14000		860	240	ug/m3	39.05		TO-15	Total/NA
Toluene	7200		590	580	ug/m3	39.05		TO-15	Total/NA
Xylene, o-	240	J	680	130	ug/m3	39.05		TO-15	Total/NA
Xylene (total)	700	J	1400	210	ug/m3	39.05		TO-15	Total/NA

Client Sample ID: MPE_VP04_042820 — Lab Sample ID: 140-19001-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	51000		350	33	ug/m3	41.35		TO-15	Total/NA
Ethylbenzene	200	J	480	79	ug/m3	41.35		TO-15	Total/NA
Methyl isobutyl ketone	1500		1100	300	ug/m3	41.35		TO-15	Total/NA
m,p-Xylene	590	J	1900	170	ug/m3	41.35		TO-15	Total/NA
p-Cymene	14000		610	170	ug/m3	41.35		TO-15	Total/NA
Toluene	8200		420	410	ug/m3	41.35		TO-15	Total/NA
Xylene, o-	260	J	480	91	ug/m3	41.35		TO-15	Total/NA
Xylene (total)	850	J	960	150	ug/m3	41.35		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MPE_VP01_042820

Lab Sample ID: 140-19001-1
Matrix: Air
Date Collected: 04/28/20 15:20
Date Received: 05/04/20 14:00
Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	2400	U	8400	2400	ug/m3			05/06/20 19:54	38.79
Benzene	**37000**		450	43	ug/m3			05/06/20 19:54	38.79
Chlorobenzene	52	U	650	52	ug/m3			05/06/20 19:54	38.79
Chloroform	55	U	690	55	ug/m3			05/06/20 19:54	38.79
Ethylbenzene	100	U	610	100	ug/m3			05/06/20 19:54	38.79
Methyl isobutyl ketone	**880**	**J**	1400	390	ug/m3			05/06/20 19:54	38.79
m,p-Xylene	**320**	**J**	2500	220	ug/m3			05/06/20 19:54	38.79
Naphthalene	700	U	1800	700	ug/m3			05/06/20 19:54	38.79
p-Cymene	**7400**		770	220	ug/m3			05/06/20 19:54	38.79
Toluene	**5500**		530	520	ug/m3			05/06/20 19:54	38.79
1,2,3-Trichloropropane	320	U	2100	320	ug/m3			05/06/20 19:54	38.79
Vinyl chloride	120	U	360	120	ug/m3			05/06/20 19:54	38.79
Xylene, o-	**160**	**J**	610	120	ug/m3			05/06/20 19:54	38.79
Xylene (total)	**480**	**J**	1200	190	ug/m3			05/06/20 19:54	38.79

Client Sample ID: MPE_VP02_042820

Lab Sample ID: 140-19001-2
Matrix: Air
Date Collected: 04/28/20 15:25
Date Received: 05/04/20 14:00
Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1800	U	6200	1800	ug/m3			05/06/20 20:42	39.22
Benzene	**40000**		330	32	ug/m3			05/06/20 20:42	39.22
Chlorobenzene	39	U	480	39	ug/m3			05/06/20 20:42	39.22
Chloroform	41	U	510	41	ug/m3			05/06/20 20:42	39.22
Ethylbenzene	**150**	**J**	450	75	ug/m3			05/06/20 20:42	39.22
Methyl isobutyl ketone	**1300**		1100	290	ug/m3			05/06/20 20:42	39.22
m,p-Xylene	**370**	**J**	1800	170	ug/m3			05/06/20 20:42	39.22
Naphthalene	520	U	1400	520	ug/m3			05/06/20 20:42	39.22
p-Cymene	**12000**		570	160	ug/m3			05/06/20 20:42	39.22
Toluene	**6300**		390	390	ug/m3			05/06/20 20:42	39.22
1,2,3-Trichloropropane	240	U	1600	240	ug/m3			05/06/20 20:42	39.22
Vinyl chloride	88	U	270	88	ug/m3			05/06/20 20:42	39.22
Xylene, o-	**180**	**J**	450	86	ug/m3			05/06/20 20:42	39.22
Xylene (total)	**550**	**J**	910	140	ug/m3			05/06/20 20:42	39.22

Client Sample ID: MPE_VP03_042820

Lab Sample ID: 140-19001-3
Matrix: Air
Date Collected: 04/28/20 17:10
Date Received: 05/04/20 14:00
Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	2600	U	9300	2600	ug/m3			05/06/20 21:28	39.05
Benzene	**43000**		500	47	ug/m3			05/06/20 21:28	39.05
Chlorobenzene	58	U	720	58	ug/m3			05/06/20 21:28	39.05
Chloroform	61	U	760	61	ug/m3			05/06/20 21:28	39.05
Ethylbenzene	**160**	**J**	680	110	ug/m3			05/06/20 21:28	39.05

Client Sample ID: MPE_VP03_042820 — Lab Sample ID: 140-19001-3

Date Collected: 04/28/20 17:10 — **Matrix: Air**
Date Received: 05/04/20 14:00
Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl isobutyl ketone	**1500**	**J**	1600	430	ug/m3			05/06/20 21:28	39.05
m,p-Xylene	**460**	**J**	2700	250	ug/m3			05/06/20 21:28	39.05
Naphthalene	780	U	2000	780	ug/m3			05/06/20 21:28	39.05
p-Cymene	**14000**		860	240	ug/m3			05/06/20 21:28	39.05
Toluene	**7200**		590	580	ug/m3			05/06/20 21:28	39.05
1,2,3-Trichloropropane	350	U	2400	350	ug/m3			05/06/20 21:28	39.05
Vinyl chloride	130	U	400	130	ug/m3			05/06/20 21:28	39.05
Xylene, o-	**240**	**J**	680	130	ug/m3			05/06/20 21:28	39.05
Xylene (total)	**700**	**J**	1400	210	ug/m3			05/06/20 21:28	39.05

Client Sample ID: MPE_VP04_042820 — Lab Sample ID: 140-19001-4

Date Collected: 04/28/20 17:10 — **Matrix: Air**
Date Received: 05/04/20 14:00
Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1900	U	6500	1900	ug/m3			05/06/20 22:16	41.35
Benzene	**51000**		350	33	ug/m3			05/06/20 22:16	41.35
Chlorobenzene	41	U	510	41	ug/m3			05/06/20 22:16	41.35
Chloroform	43	U	540	43	ug/m3			05/06/20 22:16	41.35
Ethylbenzene	**200**	**J**	480	79	ug/m3			05/06/20 22:16	41.35
Methyl isobutyl ketone	**1500**		1100	300	ug/m3			05/06/20 22:16	41.35
m,p-Xylene	**590**	**J**	1900	170	ug/m3			05/06/20 22:16	41.35
Naphthalene	550	U	1400	550	ug/m3			05/06/20 22:16	41.35
p-Cymene	**14000**		610	170	ug/m3			05/06/20 22:16	41.35
Toluene	**8200**		420	410	ug/m3			05/06/20 22:16	41.35
1,2,3-Trichloropropane	250	U	1700	250	ug/m3			05/06/20 22:16	41.35
Vinyl chloride	93	U	280	93	ug/m3			05/06/20 22:16	41.35
Xylene, o-	**260**	**J**	480	91	ug/m3			05/06/20 22:16	41.35
Xylene (total)	**850**	**J**	960	150	ug/m3			05/06/20 22:16	41.35

Default Detection Limits

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	RL	MDL	Units
1,2,3-Trichloropropane	3.0	0.45	ug/m3
Acetone	12	3.4	ug/m3
Benzene	0.64	0.061	ug/m3
Chlorobenzene	0.92	0.074	ug/m3
Chloroform	0.98	0.078	ug/m3
Ethylbenzene	0.87	0.14	ug/m3
m,p-Xylene	3.5	0.32	ug/m3
Methyl isobutyl ketone	2.0	0.55	ug/m3
Naphthalene	2.6	1.0	ug/m3
p-Cymene	1.1	0.31	ug/m3
Toluene	0.75	0.74	ug/m3
Vinyl chloride	0.51	0.17	ug/m3
Xylene (total)	1.7	0.26	ug/m3
Xylene, o-	0.87	0.17	ug/m3

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 140-39410/5
Matrix: Air
Analysis Batch: 39410

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	3.4	U	12	3.4	ug/m3			05/06/20 11:20	1
Benzene	0.061	U	0.64	0.061	ug/m3			05/06/20 11:20	1
Chlorobenzene	0.074	U	0.92	0.074	ug/m3			05/06/20 11:20	1
Chloroform	0.078	U	0.98	0.078	ug/m3			05/06/20 11:20	1
Ethylbenzene	0.14	U	0.87	0.14	ug/m3			05/06/20 11:20	1
Methyl isobutyl ketone	0.55	U	2.0	0.55	ug/m3			05/06/20 11:20	1
m,p-Xylene	0.32	U	3.5	0.32	ug/m3			05/06/20 11:20	1
Naphthalene	1.0	U	2.6	1.0	ug/m3			05/06/20 11:20	1
p-Cymene	0.31	U	1.1	0.31	ug/m3			05/06/20 11:20	1
Toluene	0.74	U	0.75	0.74	ug/m3			05/06/20 11:20	1
1,2,3-Trichloropropane	0.45	U	3.0	0.45	ug/m3			05/06/20 11:20	1
Vinyl chloride	0.17	U	0.51	0.17	ug/m3			05/06/20 11:20	1
Xylene, o-	0.17	U	0.87	0.17	ug/m3			05/06/20 11:20	1
Xylene (total)	0.26	U	1.7	0.26	ug/m3			05/06/20 11:20	1

Lab Sample ID: LCS 140-39410/1002
Matrix: Air
Analysis Batch: 39410

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	7.13	4.70	J	ug/m3		66	60 - 140
Benzene	3.19	3.03		ug/m3		95	70 - 130
Chlorobenzene	4.60	4.35		ug/m3		95	70 - 130
Chloroform	4.88	5.13		ug/m3		105	70 - 130
Ethylbenzene	4.34	4.21		ug/m3		97	70 - 130
Methyl isobutyl ketone	4.10	3.25		ug/m3		79	60 - 140
m,p-Xylene	8.68	8.10		ug/m3		93	70 - 130
Naphthalene	5.24	5.98		ug/m3		114	60 - 140
p-Cymene	5.49	5.83		ug/m3		106	70 - 130
Toluene	3.77	3.55		ug/m3		94	70 - 130
1,2,3-Trichloropropane	6.03	5.82		ug/m3		97	60 - 140
Vinyl chloride	2.56	1.90		ug/m3		74	70 - 130
Xylene, o-	4.34	4.16		ug/m3		96	70 - 130

QC Association Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Air - GC/MS VOA

Analysis Batch: 39410

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19001-1	MPE_VP01_042820	Total/NA	Air	TO-15	
140-19001-2	MPE_VP02_042820	Total/NA	Air	TO-15	
140-19001-3	MPE_VP03_042820	Total/NA	Air	TO-15	
140-19001-4	MPE_VP04_042820	Total/NA	Air	TO-15	
MB 140-39410/5	Method Blank	Total/NA	Air	TO-15	
LCS 140-39410/1002	Lab Control Sample	Total/NA	Air	TO-15	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job ID: 140-19001-1

Client Sample ID: MPE_VP01_042820
Date Collected: 04/28/20 15:20
Date Received: 05/04/20 14:00

Lab Sample ID: 140-19001-1
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		38.79	11 mL	500 mL	39410	05/06/20 19:54	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: MPE_VP02_042820
Date Collected: 04/28/20 15:25
Date Received: 05/04/20 14:00

Lab Sample ID: 140-19001-2
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		39.22	15 mL	500 mL	39410	05/06/20 20:42	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: MPE_VP03_042820
Date Collected: 04/28/20 17:10
Date Received: 05/04/20 14:00

Lab Sample ID: 140-19001-3
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		39.05	10 mL	500 mL	39410	05/06/20 21:28	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: MPE_VP04_042820
Date Collected: 04/28/20 17:10
Date Received: 05/04/20 14:00

Lab Sample ID: 140-19001-4
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		41.35	15 mL	500 mL	39410	05/06/20 22:16	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: Method Blank
Date Collected: N/A
Date Received: N/A

Lab Sample ID: MB 140-39410/5
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	200 mL	500 mL	39410	05/06/20 11:20	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: Lab Control Sample
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCS 140-39410/1002
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	500 mL	500 mL	39410	05/06/20 09:02	S1K	TAL KNX
	Instrument ID: MR									

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: Geosyntec Consultants, Inc. Job ID: 140-19001-1
Project/Site: MPE Pilot Test/Brunswick, GA

Laboratory: Eurofins TestAmerica, Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-16-20
California	State	2423	06-30-20
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	06-30-20
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	83979	07-02-20
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-20
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	06-30-20
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-20
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	08-28-20
Oklahoma	State	9415	09-01-20
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-20
Virginia	NELAP	460176	09-15-20
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-20

Laboratory: Eurofins TestAmerica, Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Florida	NELAP	E87052	06-30-20
Georgia	State	E87052	06-30-20

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

140-19001 Chain of Custody

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact Information	Client Project Manager: Greg Roush	Samples Collected By: Dan Gibbs	COC No:
Company Name: Geosyntec Consultants	Phone: 678-~~306~~-9527		of COCs
Address: 1255 Roberts Blvd, Suite 200	Email: GRoush@geosyntec.com		TALS Project #:
City/State/Zip: Kennesaw, GA, 30144	Site Contact:		For Lab Use Only:
Phone: 857-241-7216	Tel/Fax		Walk-in Client:
FAX: -	Analysis Turnaround Time		Lab Sampling:
Project Name: ~~Bar~~ MPE Pilot Test	Standard (Specific): ✓		Job / SDG No.:
Site/Location: Brunswick, GA	Rush (Specify):		(See below for Add'l Items)
P O #			

Sample Identification	Sample Start Date	Time Start	Sample End Date	Time Stop	Canister Vacuum in Field, "Hg (Start)	Canister Vacuum in Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-14/15 (Standard / Low Level)	TO-15 ~~SIM~~ (p-cymene)	EPA 3C	EPA 25C	ASTM D-1946	EPA 15/16	Other (Please specify in notes section)	Sample Type	Indoor Air/Ambient Air	Sub-Slab	Soil Gas	Soil Vapor Extraction (SVE)	Landfill Gas	Other (Please specify in notes section)	Sample Specific Notes:
MPE_VP01_042820	4/28/20	15:20	4/28/20	~~15:~~	-29.8	-8	6163	8325		✓										✓			
MPE_VP02_042820	4/28/20	15:25	4/28/20	-	-29.8	-8	6163	5880		✓										✓			
MPE_VP03_042820	4/28/20	17:10	4/28/20	-	-29.4	-8	6163	34001383		✓										✓			
MPE_VP04_042820	4/28/20	17:10	4/28/20	-	-30.4	-8	6163	4857		✓										✓			

Temperature (Fahrenheit)	Interior	Ambient
Start		
Stop		

Pressure (inches of Hg)	Interior	Ambient
Start		
Stop		

Special Instructions/QC Requirements & Comments: Analyze p-cymene ~~and~~ TO-15

Samples Shipped by:	Date / Time:	Samples Received by: ETA 5/4/20 1400	4 coms, 4 KR
Samples Relinquished by:	Date / Time:	Received by:	
Relinquished by:	Date / Time:	Received by:	
Lab Use Only: Shipper Name:	Opened by:	Condition:	

Form No. CA-C-WI-003, Rev. 2.21, dated 3/5/2020

Loc: 140
19001

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	/			☐ **Containers, Broken**
2. Were ambient air containers received intact?			/	☑ Checked in lab
3. The coolers/containers custody seal if present, is it intact?	/			☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID :_____ Correction factor: _____			/	☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	/			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	/			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	/			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	/			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	/			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?	/			☐ **Sample Not Listed on COC**
11. Is the client and project name/# identified?	/			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	/			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	/			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)		/		☑ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	/			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			/	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			/	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			/	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			/	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			/	☐ Project missing info

Comments/Actions Taken

Received @ ambient, 1 box
Fedex G/custody seal intact
trk# 3425 6573 2775
KW 5/4/20

14.

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: 68022943 PM Instructions: _____

Sample Receiving Associate: KW Date: 5/4/20

QA026R32.doc, 062719

TestAmerica Knoxville - Air Canister Initial Pressure Check

Gauge ID: G5
Date: 5/5/2020

Analyst	Sample ID	Asset #	Cleaning Job	Cert	Size (L)	Pressure @ Receipt (-in Hg or +psig)	Time	Comments
BRS	140-19001-a-1	8325	3592-40677	B	1	-7.5	9:55	
BRS	140-19001-a-2	5880	3592-40677	B	1	-6.6	9:56	
BRS	140-19001-a-3	34001383	5855-40687	B	1	-6.9	9:57	
BRS	140-19001-a-4	4857	34001028-40427	B	1	-7.8	9:58	

□ Receiving –Air Can –Calve Open (NCM #_____)
□ Air - Can P -24 to -25 " - Flow Contr. Works (NCM#_____)
□ Air - Can P -24 to -25 " - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Works (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Low -24 to -25 " - Grab Sample (NCM#_____)
□ Air - Can P Low -26 "- Grab Sample (NCM#_____)

Pre-Shipment Clean Canister Certification Report

Canister Cleaning & Pre-Shipment Leak Test

System ID	Max DF#	# Cycles	Cleaning Start Date/Time		System Start Temp(s):		Technician	Can Size	Certification Type:
Oven 3/4	10	32	3/9/2020	1121	23	23	SML	1 liter	batch

Port	Can ID	Initial[1] (psia)	Final (psia)	Diff.[3]	Final ("Hg)	Initial Reading Gauge:	Date:	Time:	Tech:	Temp:	Final Reading Gauge:	Date:	Time:	Tech:	Temp:
1	6319	102	102	0	30.4	G26	3/10/20	1357	S	22.0	G26	3/22/20	1305	S	22.0
2	4864		102	0	30.4	G26					G26				
3	4857		102	0	30.4	G26					G26				
4	4968		102	0	30.4	G26					G26				
5	5973		105	103	30.4	G26					G26				
6	5926		102	0	30.4	G26					G26				
7	6286		116	114	30.4	G26					G26				
8	6442		102	0	30.4	G26					G26				
9	5949		108	106	30.4	G26					G26				
10	3690		102	0	30.4	G26					G26				
11	34001028	102	102	0	30.4	G26	3/21/20	1142	S	22.0	G26				
12	6464	102	102	0	30.4	G26	3/10/20	1357	S	22.0	G26				

[1] Batch Certification: The reading is taken on the "batch" canister and this value is used as the initial pressure for all canisters in the batch.

[3] Difference = Final Pressure - Initial Pressure . Acceptance Criteria: (1) The difference must be less than or equal to + 0.25psi. (2) Pressure readings must be at least 24 hours apart.

If time frame was not met, the PM must authorize shipment of canister **PM Authorization** **Date:**

Clean Canister Certification Analysis & Authorization of Release to Inventory

Test Method: ☒ TO15 Routine ☐ TO15 LL

Can ID	Date	Sequence	Analyst	Inventory Level 1	2	3	4	Secondary Review Limited	Review Date	Reviewer
34001028	3/17/20	40427	TPB			XXXXXXX			3/17/20	TPB

Inventory Level 1: Individual Canister Certification (TO15LL 0.01).

Inventory Level 2: Individual or Batch Certification (TO15 0.04 ppbv).

Inventory Level 3: Individual or Batch Certification (TO15 0.2 ppbv).

Inventory Level Limited: Canisters may only be used for certain projects.

Dup Tees/Vac gauges (enter IDs if included):

Comments:

Pre-Shipment Clean Canister Certification Report

Canister Cleaning & Pre-Shipment Leak Test

System ID	Max DF#	# Cycles	Cleaning Start Date/Time		System Start Temp(s):		Technician	Can Size	Certification Type:
Oven 3/4	10	32	3/26/2020	1500	21	21	SML	1 liter	batch

Port	Can ID	Initial[1] (psia)	Final (psia)	Diff.[3]	Final ("Hg)	Initial Reading Gauge:	Date:	Time:	Tech:	Temp:	Final Reading Gauge:	Date:	Time:	Tech:	Temp:
1	34000315	10.2	10.2	0	29.4	G26	3/27/20	1520	S	22.0	G26	4/11/20	1434	S	22.0
2	34001633	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
3	5855	10.2	10.2	0	29.4	G26	4/10/20	1248	A	22.0	G26	"	"	"	"
4	34000999	10.2	10.2	0	29.4	G26	3/27/20	1520	S	22.0	G26	"	"	"	"
5	34001951	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
6	34001383	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
7	5934	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
8	3647	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
9	4956	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
10	4664	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"
11	34001100	"	10.4	10.2	29.4	G26	"	"	"	"	G26	"	"	"	"
12	5892	"	10.2	0	29.4	G26	"	"	"	"	G26	"	"	"	"

[1] Batch Certification: The reading is taken on the "batch" canister and this value is used as the initial pressure for all canisters in the batch.

[3] Difference = Final Pressure - Initial Pressure . Acceptance Criteria: (1) The difference must be less than or equal to + 0.25psi. (2) Pressure readings must be at least 24 hours apart.

If time frame was not met, the PM must authorize shipment of canister **PM Authorization** **Date:**

Clean Canister Certification Analysis & Authorization of Release to Inventory

Test Method: ☐TO15 Routine ☐ TO15 LL

Can ID	Date	Sequence	Analyst	Inventory Level 1	2	3	4	Secondary Review Limited	Review Date	Revie
5855	4/2/20	40687	KP1			XXXXXXX			4/2/20	D

Inventory Level 1: Individual Canister Certification (TO15LL 0.01).

Inventory Level 2: Individual or Batch Certification (TO15 0.04 ppbv).

Inventory Level 3: Individual or Batch Certification (TO15 0.2 ppbv).

Inventory Level Limited: Canisters may only be used for certain projects.

Dup Tees/Vac gauges (enter IDs if included):

Comments:

Page 19 of 21

5/13/2020

Form ID: FAI023:12
Revision Date: 12/18/2018

TestAmerica Burlington

200-53209-A-3
5855
Location: Air-Storage
Bottle: Summa Canister 1L
Sampled: 3/26/2020 12:00 AM 200-1374640

Loc: 200
53209
#3
A

Pre-Shipment Clean Canister Certification Report

Canister Cleaning & Pre-Shipment Leak Test

System ID	Max DF#	# Cycles	Cleaning Start Date/Time		System Start Temp(s):		Technician	Can Size	Certification Type:
Oven 1/2	330	100	3/28/2020	1503	22	22	SML	1 liter	batch

Port	Can ID	Initial[1] (psia)	Final (psia)	Diff.[3]	Final ("Hg)	Initial Reading Gauge:	Date:	Time:	Tech:	Temp:	Final Reading Gauge:	Date:	Time:	Tech:	Temp:
1	3592	102	102	0	29.8	G26	4/16/20	1043	S	21.0	G26	4/17/20	1118	S	21.0
2	6486	102				G26	3/29/20	1226	S	22.0	G26				
3	3579					G26					G26				
4	5925		113	111	29.8	G26					G26				
5	4959					G26					G26				
6	4485					G26					G26				
7	8443					G26					G26				
~~8~~	~~4649~~					G26					G26			S	3/29/20
9	5880					G26					G26				21.0
10	5931		105	103	29.8	G26					G26				
11	8325					G26					G26				
12	6445		113	111	29.8	G26					G26				

[1] Batch Certification: The reading is taken on the "batch" canister and this value is used as the initial pressure for all canisters in the batch.

[3] Difference = Final Pressure - Initial Pressure . Acceptance Criteria: (1) The difference must be less than or equal to + 0.25psi. (2) Pressure readings must be at least 24 hours apart.

If time frame was not met, the PM must authorize shipment of canister **PM Authorization** **Date:**

Clean Canister Certification Analysis & Authorization of Release to Inventory

Test Method: ☑ TO15 Routine ☐ TO15 LL

Can ID	Date	Sequence	Analyst	Inventory Level 1	2	3	4	Secondary Review Limited	Review Date	Review
3592	4/2/20	40677	KPI			XXXXXX			4/2/20	PMB

Inventory Level 1: Individual Canister Certification (TO15LL 0.01).

Inventory Level 2: Individual or Batch Certification (TO15 0.04 ppbv).

Inventory Level 3: Individual or Batch Certification (TO15 0.2 ppbv).

Inventory Level Limited: Canisters may only be used for certain projects.

Dup Tees/Vac gauges (enter IDs if included):

Comments:

Form ID: FAI023:12
Revision Date: 12/18/2018

200-53238-A-1
3592
Location: Air-Storage
Bottle: Summa Canister 1L
Sampled: 3/28/2020 12:00 AM 200-137514O

Loc: 200
53238
#1
A

Summa Canister Dilution Worksheet

Client: Geosyntec Consultants, Inc.
Project/Site: MPE Pilot Test/Brunswick, GA

Job No.: 140-19001-1

Lab Sample ID	Canister Volume (L)	Preadjusted Pressure ("Hg)	Preadjusted Pressure (atm)	Preadjusted Volume (L)	Adjusted Pressure (psig)	Adjusted Pressure (atm)	Adjusted Volume (L)	Initial Volume (mL)	Dilution Factor	Final Dilution Factor	Pressure Gauge ID	Date	Analyst Initals
140-19001-1	1	-7.5	0.75	0.75	30.6	3.08	3.08		4.11	4.11	G5	05/05/20 12:43	BRS
140-19001-1	1	0.0	1.00	1.00	30.2	3.05	3.05		3.05	12.56	G5	05/05/20 14:20	BRS
140-19001-1	1	0.0	1.00	1.00	30.7	3.09	3.09		3.09	38.79	G5	05/05/20 14:39	BRS
140-19001-2	1	-6.6	0.78	0.78	31.8	3.16	3.16		4.06	4.06	G5	05/05/20 12:45	BRS
140-19001-2	1	0.0	1.00	1.00	31.1	3.12	3.12		3.12	12.64	G5	05/05/20 14:21	BRS
140-19001-2	1	0.0	1.00	1.00	30.9	3.10	3.10		3.10	39.22	G5	05/05/20 14:40	BRS
140-19001-3	1	-6.9	0.77	0.77	31.4	3.14	3.14		4.08	4.08	G5	05/05/20 12:46	BRS
140-19001-3	1	0.0	1.00	1.00	31.0	3.11	3.11		3.11	12.67	G5	05/05/20 14:22	BRS
140-19001-3	1	0.0	1.00	1.00	30.6	3.08	3.08		3.08	39.05	G5	05/05/20 14:41	BRS
140-19001-4	1	-7.8	0.74	0.74	31.5	3.14	3.14		4.25	4.25	G5	05/05/20 12:47	BRS
140-19001-4	1	0.0	1.00	1.00	31.5	3.14	3.14		3.14	13.36	G5	05/05/20 14:26	BRS
140-19001-4	1	0.0	1.00	1.00	30.8	3.10	3.10		3.10	41.35	G5	05/05/20 14:42	BRS

Formulae:

Preadjusted Volume (L) = (Preadjusted Pressure ("Hg) + 29.92 "Hg * Vol L) / 29.92 "Hg
Adjusted Volume (L) = (Adjusted Pressure (psig) + 14.7 psig * Vol L) / 14.7 psig
Dilution Factor = Adjusted Volume (L) / Preadjusted Volume (L)

Where:

29.92 "Hg = Standard atmospheric pressure in inches of Mercury (“Hg)
14.7 psig = Standard atmospheric pressure in pounds per square inch gauge (psig)

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

Laboratory Job ID: 680-183249-1
Client Project/Site: Hercules/Pinova Brunswick Facility

For:
Geosyntec Consultants, Inc.
1255 Roberts Blvd, NW
Suite 200
Kennesaw, Georgia 30144

Attn: Laura Kinsman

Authorized for release by:
5/7/2020 6:13:52 PM

Jerry Lanier, Project Manager I
(912)250-0281
jerry.lanier@testamericainc.com

Table of Contents

Job ID: 680-183249-1

Laboratory: Eurofins TestAmerica, Savannah

Narrative

CASE NARRATIVE

Client: Geosyntec Consultants, Inc.

Project: Hercules/Pinova Brunswick Facility

Report Number: 680-183249-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

RECEIPT
The samples were received on 04/30/2020; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 2.8 C.

VOLATILE ORGANIC COMPOUNDS (GC-MS)
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for Volatile Organic Compounds (GC-MS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 05/03/2020, 05/04/2020 and 05/05/2020.

Surrogate recovery for the following sample was outside control limits: MPE-GW-042820-1 (680-183249-1). Evidence of matrix interference due to high target analytes is present; therefore, re-extraction and/or re-analysis was not performed

Surrogate recovery for the following sample was outside control limits: MPE-GW-042820-2 (680-183249-2). Evidence of matrix interference due to high target analytes is present; therefore, re-extraction and/or re-analysis was not performed

1,2-Dichlorobenzene and 1,4-Dichlorobenzene were detected in method blank MB 680-617331/8 at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged.

Methylene Chloride was detected in method blank MB 680-617375/10 at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged.

The method blank for analytical batch 680-617527 contained Methylene chloride above the method detection limit (MDL). Associated samples were not re-analyzed because results were less than the reporting limit (RL

Samples MPE-GW-042820-1 (680-183249-1)[5X], MPE-GW-042820-2 (680-183249-2)[2X], MPE-GW-042820-3 (680-183249-3)[5X] and MPE-GW-042820-4 (680-183249-4)[50X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batches 680-617331,680-617337, 680-617375, and 680-617527.

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

METALS (ICPMS)
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for metals (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were

Job ID: 680-183249-1 (Continued)

Laboratory: Eurofins TestAmerica, Savannah (Continued)

prepared on 05/04/2020 and analyzed on 05/05/2020.

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

ALKALINITY
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for alkalinity in accordance with SM 2320B. The samples were analyzed on 05/04/2020.

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

TOTAL SUSPENDED SOLIDS
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for total suspended solids in accordance with SM 2540D. The samples were analyzed on 05/01/2020.

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

PH
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for pH in accordance with EPA SW-846 Method 9040C. The samples were analyzed on 05/01/2020.

This analysis is considered a field test and is to be performed within 15 minutes of collection. This sample(s) was performed in the laboratory outside the 15 minute timeframe.

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

TOTAL HARDNESS (AS CACO3) BY CALCULATION
Samples MPE-GW-042820-1 (680-183249-1), MPE-GW-042820-2 (680-183249-2), MPE-GW-042820-3 (680-183249-3) and MPE-GW-042820-4 (680-183249-4) were analyzed for total hardness (as CaCO3) by calculation in accordance with SM 2340B. The samples were analyzed on 05/06/2020.

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

Sample Summary

Client: Geosyntec Consultants, Inc.
Job ID: 680-183249-1
Project/Site: Hercules/Pinova Brunswick Facility

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
680-183249-1	MPE-GW-042820-1	Water	04/28/20 15:45	04/30/20 09:30	
680-183249-2	MPE-GW-042820-2	Water	04/28/20 15:45	04/30/20 09:30	
680-183249-3	MPE-GW-042820-3	Water	04/28/20 17:30	04/30/20 09:30	
680-183249-4	MPE-GW-042820-4	Water	04/28/20 18:20	04/30/20 09:30	

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL SAV
6020A	Metals (ICP/MS)	SW846	TAL SAV
SM 2340B	Total Hardness (as CaCO3) by calculation	SM	TAL SAV
2320B-2011	Alkalinity, Total	SM	TAL SAV
2540 D-2011	Total Suspended Solids (Dried at 103-105°C)	SM	TAL SAV
9040C	pH	SW846	TAL SAV
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL SAV
5030B	Purge and Trap	SW846	TAL SAV

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

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

Laboratory References:

TAL SAV = Eurofins TestAmerica, Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.
X	Surrogate recovery exceeds control limits

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
U	Indicates the analyte was analyzed for but not detected.

Glossary

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

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-1 — Lab Sample ID: 680-183249-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	200		10	7.0	ug/L	1		8260B	Total/NA
Ethylbenzene	4.6		1.0	0.33	ug/L	1		8260B	Total/NA
Methyl ethyl ketone (MEK)	12		10	3.4	ug/L	1		8260B	Total/NA
4-Methyl-2-pentanone (MIBK)	470		10	2.1	ug/L	1		8260B	Total/NA
Toluene	87		1.0	0.48	ug/L	1		8260B	Total/NA
Xylenes, Total	27		1.0	0.23	ug/L	1		8260B	Total/NA
Benzene - DL	320		5.0	2.2	ug/L	5		8260B	Total/NA
p-Cymene - DL	440		5.0	2.4	ug/L	5		8260B	Total/NA
Iron	3600		100	25	ug/L	1		6020A	Total Recoverable
Manganese	200		5.0	1.8	ug/L	1		6020A	Total Recoverable
Hardness as calcium carbonate	190		3.3	3.3	mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	95		1.2	1.2	mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	91		2.1	2.1	mg/L	1		SM 2340B	Total/NA
Alkalinity	110		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate Alkalinity as CaCO3	110		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Carbon Dioxide, Free	7.9		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate ion as HCO3	140		6.1	6.1	mg/L	1		2320B-2011	Total/NA
Total Suspended Solids	390		17	17	mg/L	1		2540 D-2011	Total/NA
pH	7.5	HF			SU	1		9040C	Total/NA
Temperature	23.5	HF			Degrees C	1		9040C	Total/NA

Client Sample ID: MPE-GW-042820-2 — Lab Sample ID: 680-183249-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	220		10	7.0	ug/L	1		8260B	Total/NA
Ethylbenzene	20		1.0	0.33	ug/L	1		8260B	Total/NA
Methyl ethyl ketone (MEK)	12		10	3.4	ug/L	1		8260B	Total/NA
4-Methyl-2-pentanone (MIBK)	310		10	2.1	ug/L	1		8260B	Total/NA
p-Cymene	190		1.0	0.48	ug/L	1		8260B	Total/NA
Toluene	94		1.0	0.48	ug/L	1		8260B	Total/NA
Xylenes, Total	150		1.0	0.23	ug/L	1		8260B	Total/NA
Benzene - DL	250		2.0	0.86	ug/L	2		8260B	Total/NA
Iron	4700		100	25	ug/L	1		6020A	Total Recoverable
Manganese	230		5.0	1.8	ug/L	1		6020A	Total Recoverable
Hardness as calcium carbonate	190		3.3	3.3	mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	90		1.2	1.2	mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	99		2.1	2.1	mg/L	1		SM 2340B	Total/NA
Alkalinity	110		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate Alkalinity as CaCO3	110		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Carbon Dioxide, Free	7.1		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate ion as HCO3	140		6.1	6.1	mg/L	1		2320B-2011	Total/NA
Total Suspended Solids	410		24	24	mg/L	1		2540 D-2011	Total/NA
pH	7.5	HF			SU	1		9040C	Total/NA
Temperature	23.5	HF			Degrees C	1		9040C	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-3 — Lab Sample ID: 680-183249-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	170		10	7.0	ug/L	1		8260B	Total/NA
Ethylbenzene	28		1.0	0.33	ug/L	1		8260B	Total/NA
Methyl ethyl ketone (MEK)	9.6	J	10	3.4	ug/L	1		8260B	Total/NA
4-Methyl-2-pentanone (MIBK)	340		10	2.1	ug/L	1		8260B	Total/NA
Toluene	140		1.0	0.48	ug/L	1		8260B	Total/NA
Xylenes, Total	210		1.0	0.23	ug/L	1		8260B	Total/NA
Benzene - DL	260		5.0	2.2	ug/L	5		8260B	Total/NA
p-Cymene - DL	170		5.0	2.4	ug/L	5		8260B	Total/NA
Iron	2100		100	25	ug/L	1		6020A	Total Recoverable
Manganese	140		5.0	1.8	ug/L	1		6020A	Total Recoverable
Hardness as calcium carbonate	160		3.3	3.3	mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	75		1.2	1.2	mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	86		2.1	2.1	mg/L	1		SM 2340B	Total/NA
Alkalinity	130		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate Alkalinity as CaCO3	130		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate ion as HCO3	160		6.1	6.1	mg/L	1		2320B-2011	Total/NA
Total Suspended Solids	57		7.4	7.4	mg/L	1		2540 D-2011	Total/NA
pH	7.9	HF			SU	1		9040C	Total/NA
Temperature	23.4	HF			Degrees C	1		9040C	Total/NA

Client Sample ID: MPE-GW-042820-4 — Lab Sample ID: 680-183249-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	9300		50	22	ug/L	50		8260B	Total/NA
Ethylbenzene	28	J	50	17	ug/L	50		8260B	Total/NA
4-Methyl-2-pentanone (MIBK)	750		500	110	ug/L	50		8260B	Total/NA
p-Cymene	6000		50	24	ug/L	50		8260B	Total/NA
Toluene	1700		50	24	ug/L	50		8260B	Total/NA
Xylenes, Total	55		50	12	ug/L	50		8260B	Total/NA
Iron	1100		100	25	ug/L	1		6020A	Total Recoverable
Manganese	67		5.0	1.8	ug/L	1		6020A	Total Recoverable
Hardness as calcium carbonate	160		3.3	3.3	mg/L	1		SM 2340B	Total/NA
Calcium hardness as calcium carbonate	65		1.2	1.2	mg/L	1		SM 2340B	Total/NA
Magnesium hardness as calcium carbonate	99		2.1	2.1	mg/L	1		SM 2340B	Total/NA
Alkalinity	97		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate Alkalinity as CaCO3	97		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Carbon Dioxide, Free	120		5.0	5.0	mg/L	1		2320B-2011	Total/NA
Bicarbonate ion as HCO3	120		6.1	6.1	mg/L	1		2320B-2011	Total/NA
Total Suspended Solids	28		2.0	2.0	mg/L	1		2540 D-2011	Total/NA
pH	6.4	HF			SU	1		9040C	Total/NA
Temperature	23.4	HF			Degrees C	1		9040C	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-1

Date Collected: 04/28/20 15:45
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**200**		10	7.0	ug/L			05/03/20 18:52	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/03/20 18:52	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/03/20 18:52	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/03/20 18:52	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/03/20 18:52	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/03/20 18:52	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/03/20 18:52	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/03/20 18:52	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/03/20 18:52	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/03/20 18:52	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/03/20 18:52	1
Ethylbenzene	**4.6**		1.0	0.33	ug/L			05/03/20 18:52	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			05/03/20 18:52	1
Methyl ethyl ketone (MEK)	**12**		10	3.4	ug/L			05/03/20 18:52	1
4-Methyl-2-pentanone (MIBK)	**470**		10	2.1	ug/L			05/03/20 18:52	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/03/20 18:52	1
Toluene	**87**		1.0	0.48	ug/L			05/03/20 18:52	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/03/20 18:52	1
Xylenes, Total	**27**		1.0	0.23	ug/L			05/03/20 18:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*146*	*X*	*80 - 120*		*05/03/20 18:52*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 122*		*05/03/20 18:52*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*73 - 131*		*05/03/20 18:52*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*		*05/03/20 18:52*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**320**		5.0	2.2	ug/L			05/04/20 16:38	5
p-Cymene	**440**		5.0	2.4	ug/L			05/04/20 16:38	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*80 - 120*		*05/04/20 16:38*	*5*
Dibromofluoromethane (Surr)	*96*		*80 - 122*		*05/04/20 16:38*	*5*
1,2-Dichloroethane-d4 (Surr)	*90*		*73 - 131*		*05/04/20 16:38*	*5*
Toluene-d8 (Surr)	*106*		*80 - 120*		*05/04/20 16:38*	*5*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**3600**		100	25	ug/L		05/04/20 17:24	05/05/20 17:46	1
Manganese	**200**		5.0	1.8	ug/L		05/04/20 17:24	05/05/20 17:46	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**190**		3.3	3.3	mg/L			05/06/20 17:47	1
Calcium hardness as calcium carbonate	**95**		1.2	1.2	mg/L			05/06/20 17:47	1
Magnesium hardness as calcium carbonate	**91**		2.1	2.1	mg/L			05/06/20 17:47	1

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-1
Date Collected: 04/28/20 15:45
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-1
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.5**	**HF**			SU			05/01/20 16:23	1
Temperature	**23.5**	**HF**			Degrees C			05/01/20 16:23	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	**110**		5.0	5.0	mg/L			05/04/20 21:27	1
Bicarbonate Alkalinity as CaCO3	**110**		5.0	5.0	mg/L			05/04/20 21:27	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 21:27	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:27	1
Carbon Dioxide, Free	**7.9**		5.0	5.0	mg/L			05/04/20 21:27	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:27	1
Bicarbonate ion as HCO3	**140**		6.1	6.1	mg/L			05/04/20 21:27	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	**390**		17	17	mg/L			05/01/20 07:53	1

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-2

Date Collected: 04/28/20 15:45
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**220**		10	7.0	ug/L			05/04/20 16:15	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/04/20 16:15	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/04/20 16:15	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/04/20 16:15	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/04/20 16:15	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/04/20 16:15	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/04/20 16:15	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/04/20 16:15	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/04/20 16:15	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/04/20 16:15	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/04/20 16:15	1
Ethylbenzene	**20**		1.0	0.33	ug/L			05/04/20 16:15	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			05/04/20 16:15	1
Methyl ethyl ketone (MEK)	**12**		10	3.4	ug/L			05/04/20 16:15	1
4-Methyl-2-pentanone (MIBK)	**310**		10	2.1	ug/L			05/04/20 16:15	1
p-Cymene	**190**		1.0	0.48	ug/L			05/04/20 16:15	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/04/20 16:15	1
Toluene	**94**		1.0	0.48	ug/L			05/04/20 16:15	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/04/20 16:15	1
Xylenes, Total	**150**		1.0	0.23	ug/L			05/04/20 16:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*126*	*X*	*80 - 120*		*05/04/20 16:15*	*1*
Dibromofluoromethane (Surr)	*96*		*80 - 122*		*05/04/20 16:15*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*73 - 131*		*05/04/20 16:15*	*1*
Toluene-d8 (Surr)	*104*		*80 - 120*		*05/04/20 16:15*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**250**		2.0	0.86	ug/L			05/05/20 16:46	2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*122*	*X*	*80 - 120*		*05/05/20 16:46*	*2*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*05/05/20 16:46*	*2*
1,2-Dichloroethane-d4 (Surr)	*86*		*73 - 131*		*05/05/20 16:46*	*2*
Toluene-d8 (Surr)	*106*		*80 - 120*		*05/05/20 16:46*	*2*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**4700**		100	25	ug/L		05/04/20 17:24	05/05/20 17:49	1
Manganese	**230**		5.0	1.8	ug/L		05/04/20 17:24	05/05/20 17:49	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**190**		3.3	3.3	mg/L			05/06/20 17:47	1
Calcium hardness as calcium carbonate	**90**		1.2	1.2	mg/L			05/06/20 17:47	1
Magnesium hardness as calcium carbonate	**99**		2.1	2.1	mg/L			05/06/20 17:47	1

Client: Geosyntec Consultants, Inc.
Job ID: 680-183249-1
Project/Site: Hercules/Pinova Brunswick Facility

Client Sample ID: MPE-GW-042820-2
Lab Sample ID: 680-183249-2
Date Collected: 04/28/20 15:45
Matrix: Water
Date Received: 04/30/20 09:30

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.5	HF			SU			05/01/20 16:27	1
Temperature	23.5	HF			Degrees C			05/01/20 16:27	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	110		5.0	5.0	mg/L			05/04/20 21:34	1
Bicarbonate Alkalinity as CaCO3	110		5.0	5.0	mg/L			05/04/20 21:34	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 21:34	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:34	1
Carbon Dioxide, Free	7.1		5.0	5.0	mg/L			05/04/20 21:34	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:34	1
Bicarbonate ion as HCO3	140		6.1	6.1	mg/L			05/04/20 21:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	410		24	24	mg/L			05/01/20 07:53	1

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-3

Date Collected: 04/28/20 17:30
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**170**		10	7.0	ug/L			05/03/20 17:55	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/03/20 17:55	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/03/20 17:55	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/03/20 17:55	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/03/20 17:55	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/03/20 17:55	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/03/20 17:55	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/03/20 17:55	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/03/20 17:55	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/03/20 17:55	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/03/20 17:55	1
Ethylbenzene	**28**		1.0	0.33	ug/L			05/03/20 17:55	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			05/03/20 17:55	1
Methyl ethyl ketone (MEK)	**9.6**	**J**	10	3.4	ug/L			05/03/20 17:55	1
4-Methyl-2-pentanone (MIBK)	**340**		10	2.1	ug/L			05/03/20 17:55	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/03/20 17:55	1
Toluene	**140**		1.0	0.48	ug/L			05/03/20 17:55	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/03/20 17:55	1
Xylenes, Total	**210**		1.0	0.23	ug/L			05/03/20 17:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*80 - 120*		*05/03/20 17:55*	*1*
Dibromofluoromethane (Surr)	*101*		*80 - 122*		*05/03/20 17:55*	*1*
1,2-Dichloroethane-d4 (Surr)	*102*		*73 - 131*		*05/03/20 17:55*	*1*
Toluene-d8 (Surr)	*101*		*80 - 120*		*05/03/20 17:55*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**260**		5.0	2.2	ug/L			05/04/20 17:24	5
p-Cymene	**170**		5.0	2.4	ug/L			05/04/20 17:24	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*80 - 120*		*05/04/20 17:24*	*5*
Dibromofluoromethane (Surr)	*95*		*80 - 122*		*05/04/20 17:24*	*5*
1,2-Dichloroethane-d4 (Surr)	*85*		*73 - 131*		*05/04/20 17:24*	*5*
Toluene-d8 (Surr)	*108*		*80 - 120*		*05/04/20 17:24*	*5*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**2100**		100	25	ug/L		05/04/20 17:24	05/05/20 17:53	1
Manganese	**140**		5.0	1.8	ug/L		05/04/20 17:24	05/05/20 17:53	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**160**		3.3	3.3	mg/L			05/06/20 17:47	1
Calcium hardness as calcium carbonate	**75**		1.2	1.2	mg/L			05/06/20 17:47	1
Magnesium hardness as calcium carbonate	**86**		2.1	2.1	mg/L			05/06/20 17:47	1

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-3
Date Collected: 04/28/20 17:30
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-3
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.9	HF			SU			05/01/20 16:31	1
Temperature	23.4	HF			Degrees C			05/01/20 16:31	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	130		5.0	5.0	mg/L			05/04/20 21:42	1
Bicarbonate Alkalinity as CaCO3	130		5.0	5.0	mg/L			05/04/20 21:42	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 21:42	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:42	1
Carbon Dioxide, Free	5.0	U	5.0	5.0	mg/L			05/04/20 21:42	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:42	1
Bicarbonate ion as HCO3	160		6.1	6.1	mg/L			05/04/20 21:42	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	57		7.4	7.4	mg/L			05/01/20 07:53	1

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-4

Date Collected: 04/28/20 18:20
Date Received: 04/30/20 09:30

Lab Sample ID: 680-183249-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	350	U	500	350	ug/L			05/05/20 17:33	50
Benzene	**9300**		50	22	ug/L			05/05/20 17:33	50
Carbon disulfide	50	U	100	50	ug/L			05/05/20 17:33	50
Chlorobenzene	13	U	50	13	ug/L			05/05/20 17:33	50
Vinyl chloride	25	U	50	25	ug/L			05/05/20 17:33	50
Chloroform	25	U	50	25	ug/L			05/05/20 17:33	50
cis-1,2-Dichloroethene	21	U	50	21	ug/L			05/05/20 17:33	50
1,2-Dichlorobenzene	19	U	50	19	ug/L			05/05/20 17:33	50
1,4-Dichlorobenzene	23	U	50	23	ug/L			05/05/20 17:33	50
1,1-Dichloroethane	19	U	50	19	ug/L			05/05/20 17:33	50
1,1-Dichloroethene	18	U	50	18	ug/L			05/05/20 17:33	50
1,2-Dichloropropane	34	U	50	34	ug/L			05/05/20 17:33	50
Ethylbenzene	**28**	**J**	50	17	ug/L			05/05/20 17:33	50
Methylene Chloride	130	U	250	130	ug/L			05/05/20 17:33	50
Methyl ethyl ketone (MEK)	170	U	500	170	ug/L			05/05/20 17:33	50
4-Methyl-2-pentanone (MIBK)	**750**		500	110	ug/L			05/05/20 17:33	50
p-Cymene	**6000**		50	24	ug/L			05/05/20 17:33	50
Tetrachloroethene	37	U	50	37	ug/L			05/05/20 17:33	50
Toluene	**1700**		50	24	ug/L			05/05/20 17:33	50
1,2,4-Trichlorobenzene	130	U	250	130	ug/L			05/05/20 17:33	50
Xylenes, Total	**55**		50	12	ug/L			05/05/20 17:33	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*		*05/05/20 17:33*	*50*
Dibromofluoromethane (Surr)	*98*		*80 - 122*		*05/05/20 17:33*	*50*
1,2-Dichloroethane-d4 (Surr)	*90*		*73 - 131*		*05/05/20 17:33*	*50*
Toluene-d8 (Surr)	*105*		*80 - 120*		*05/05/20 17:33*	*50*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**1100**		100	25	ug/L		05/04/20 17:24	05/05/20 17:56	1
Manganese	**67**		5.0	1.8	ug/L		05/04/20 17:24	05/05/20 17:56	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	**160**		3.3	3.3	mg/L			05/06/20 17:47	1
Calcium hardness as calcium carbonate	**65**		1.2	1.2	mg/L			05/06/20 17:47	1
Magnesium hardness as calcium carbonate	**99**		2.1	2.1	mg/L			05/06/20 17:47	1

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
pH	**6.4**	**HF**			SU			05/01/20 16:35	1
Temperature	**23.4**	**HF**			Degrees C			05/01/20 16:35	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	**97**		5.0	5.0	mg/L			05/04/20 21:48	1
Bicarbonate Alkalinity as CaCO3	**97**		5.0	5.0	mg/L			05/04/20 21:48	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 21:48	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:48	1
Carbon Dioxide, Free	**120**		5.0	5.0	mg/L			05/04/20 21:48	1

Client: Geosyntec Consultants, Inc.
Job ID: 680-183249-1
Project/Site: Hercules/Pinova Brunswick Facility

Client Sample ID: MPE-GW-042820-4
Lab Sample ID: 680-183249-4
Date Collected: 04/28/20 18:20
Matrix: Water
Date Received: 04/30/20 09:30

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 21:48	1
Bicarbonate ion as HCO3	**120**		6.1	6.1	mg/L			05/04/20 21:48	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	**28**		2.0	2.0	mg/L			05/01/20 07:53	1

Surrogate Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	DCA	TOL
Lab Sample ID	Client Sample ID	(80-120)	(80-122)	(73-131)	(80-120)
680-183249-1	MPE-GW-042820-1	146 X	98	87	108
680-183249-1 - DL	MPE-GW-042820-1	105	96	90	106
680-183249-2	MPE-GW-042820-2	126 X	96	89	104
680-183249-2 - DL	MPE-GW-042820-2	122 X	97	86	106
680-183249-3	MPE-GW-042820-3	95	101	102	101
680-183249-3 - DL	MPE-GW-042820-3	103	95	85	108
680-183249-4	MPE-GW-042820-4	102	98	90	105
LCS 680-617331/4	Lab Control Sample	96	107	101	106
LCS 680-617337/4	Lab Control Sample	100	111	109	108
LCS 680-617375/4	Lab Control Sample	91	97	91	97
LCS 680-617527/4	Lab Control Sample	94	101	91	105
LCSD 680-617331/5	Lab Control Sample Dup	100	110	103	107
LCSD 680-617337/5	Lab Control Sample Dup	99	107	104	104
LCSD 680-617375/5	Lab Control Sample Dup	100	103	93	107
LCSD 680-617527/5	Lab Control Sample Dup	94	99	89	105
MB 680-617331/8	Method Blank	100	98	88	108
MB 680-617337/9	Method Blank	92	104	105	99
MB 680-617375/10	Method Blank	99	97	87	110
MB 680-617527/10	Method Blank	100	97	89	109

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 680-617331/8
Matrix: Water
Analysis Batch: 617331

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	7.0	U	10	7.0	ug/L			05/03/20 11:36	1
Benzene	0.43	U	1.0	0.43	ug/L			05/03/20 11:36	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/03/20 11:36	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/03/20 11:36	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/03/20 11:36	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/03/20 11:36	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/03/20 11:36	1
1,2-Dichlorobenzene	0.387	J	1.0	0.37	ug/L			05/03/20 11:36	1
1,4-Dichlorobenzene	0.545	J	1.0	0.46	ug/L			05/03/20 11:36	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/03/20 11:36	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/03/20 11:36	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/03/20 11:36	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			05/03/20 11:36	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			05/03/20 11:36	1
Methyl ethyl ketone (MEK)	3.4	U	10	3.4	ug/L			05/03/20 11:36	1
4-Methyl-2-pentanone (MIBK)	2.1	U	10	2.1	ug/L			05/03/20 11:36	1
p-Cymene	0.48	U	1.0	0.48	ug/L			05/03/20 11:36	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/03/20 11:36	1
Toluene	0.48	U	1.0	0.48	ug/L			05/03/20 11:36	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/03/20 11:36	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			05/03/20 11:36	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*		*05/03/20 11:36*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 122*		*05/03/20 11:36*	*1*
1,2-Dichloroethane-d4 (Surr)	*88*		*73 - 131*		*05/03/20 11:36*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*		*05/03/20 11:36*	*1*

Lab Sample ID: LCS 680-617331/4
Matrix: Water
Analysis Batch: 617331

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	250	278		ug/L		111	70 - 135
Benzene	50.0	52.9		ug/L		106	80 - 120
Carbon disulfide	50.0	49.1		ug/L		98	80 - 120
Chlorobenzene	50.0	50.5		ug/L		101	80 - 120
Vinyl chloride	50.0	50.3		ug/L		101	71 - 128
Chloroform	50.0	51.1		ug/L		102	80 - 120
cis-1,2-Dichloroethene	50.0	53.1		ug/L		106	80 - 120
1,2-Dichlorobenzene	50.0	49.4		ug/L		99	80 - 120
1,4-Dichlorobenzene	50.0	47.9		ug/L		96	80 - 120
1,1-Dichloroethane	50.0	50.0		ug/L		100	80 - 120
1,1-Dichloroethene	50.0	48.9		ug/L		98	76 - 120
1,2-Dichloropropane	50.0	53.7		ug/L		107	80 - 120
Ethylbenzene	50.0	50.6		ug/L		101	80 - 120
Methylene Chloride	50.0	51.0		ug/L		102	80 - 120
Methyl ethyl ketone (MEK)	250	260		ug/L		104	80 - 131

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-617331/4
Matrix: Water
Analysis Batch: 617331

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
4-Methyl-2-pentanone (MIBK)			250	251		ug/L		100	76 - 124		
p-Cymene			50.0	47.0		ug/L		94	80 - 120		
Tetrachloroethene			50.0	48.2		ug/L		96	80 - 121		
Toluene			50.0	50.9		ug/L		102	80 - 113		
1,2,4-Trichlorobenzene			50.0	52.0		ug/L		104	68 - 128		
Xylenes, Total			100	101		ug/L		101	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*
Dibromofluoromethane (Surr)	*107*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*101*		*73 - 131*
Toluene-d8 (Surr)	*106*		*80 - 120*

Lab Sample ID: LCSD 680-617331/5
Matrix: Water
Analysis Batch: 617331

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone			250	270		ug/L		108	70 - 135	3	30
Benzene			50.0	53.9		ug/L		108	80 - 120	2	20
Carbon disulfide			50.0	50.6		ug/L		101	80 - 120	3	20
Chlorobenzene			50.0	51.4		ug/L		103	80 - 120	2	20
Vinyl chloride			50.0	52.5		ug/L		105	71 - 128	4	20
Chloroform			50.0	52.4		ug/L		105	80 - 120	2	20
cis-1,2-Dichloroethene			50.0	55.2		ug/L		110	80 - 120	4	20
1,2-Dichlorobenzene			50.0	51.5		ug/L		103	80 - 120	4	20
1,4-Dichlorobenzene			50.0	48.6		ug/L		97	80 - 120	1	20
1,1-Dichloroethane			50.0	51.8		ug/L		104	80 - 120	4	20
1,1-Dichloroethene			50.0	50.4		ug/L		101	76 - 120	3	20
1,2-Dichloropropane			50.0	55.1		ug/L		110	80 - 120	2	20
Ethylbenzene			50.0	50.9		ug/L		102	80 - 120	1	20
Methylene Chloride			50.0	50.8		ug/L		102	80 - 120	0	20
Methyl ethyl ketone (MEK)			250	254		ug/L		102	80 - 131	2	20
4-Methyl-2-pentanone (MIBK)			250	253		ug/L		101	76 - 124	1	20
p-Cymene			50.0	49.5		ug/L		99	80 - 120	5	20
Tetrachloroethene			50.0	49.2		ug/L		98	80 - 121	2	20
Toluene			50.0	52.3		ug/L		105	80 - 113	3	20
1,2,4-Trichlorobenzene			50.0	53.8		ug/L		108	68 - 128	4	20
Xylenes, Total			100	103		ug/L		103	80 - 120	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*
Dibromofluoromethane (Surr)	*110*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*103*		*73 - 131*
Toluene-d8 (Surr)	*107*		*80 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-617337/9
Matrix: Water
Analysis Batch: 617337

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	7.0	U	10	7.0	ug/L			05/03/20 12:04	1
Benzene	0.43	U	1.0	0.43	ug/L			05/03/20 12:04	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/03/20 12:04	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/03/20 12:04	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/03/20 12:04	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/03/20 12:04	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/03/20 12:04	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/03/20 12:04	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/03/20 12:04	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/03/20 12:04	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/03/20 12:04	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/03/20 12:04	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			05/03/20 12:04	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			05/03/20 12:04	1
Methyl ethyl ketone (MEK)	3.4	U	10	3.4	ug/L			05/03/20 12:04	1
4-Methyl-2-pentanone (MIBK)	2.1	U	10	2.1	ug/L			05/03/20 12:04	1
p-Cymene	0.48	U	1.0	0.48	ug/L			05/03/20 12:04	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/03/20 12:04	1
Toluene	0.48	U	1.0	0.48	ug/L			05/03/20 12:04	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/03/20 12:04	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			05/03/20 12:04	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*80 - 120*		*05/03/20 12:04*	*1*
Dibromofluoromethane (Surr)	*104*		*80 - 122*		*05/03/20 12:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*105*		*73 - 131*		*05/03/20 12:04*	*1*
Toluene-d8 (Surr)	*99*		*80 - 120*		*05/03/20 12:04*	*1*

Lab Sample ID: LCS 680-617337/4
Matrix: Water
Analysis Batch: 617337

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	250	227		ug/L		91	70 - 135
Benzene	50.0	54.2		ug/L		108	80 - 120
Carbon disulfide	50.0	52.1		ug/L		104	80 - 120
Chlorobenzene	50.0	54.2		ug/L		108	80 - 120
Vinyl chloride	50.0	48.1		ug/L		96	71 - 128
Chloroform	50.0	54.2		ug/L		108	80 - 120
cis-1,2-Dichloroethene	50.0	54.9		ug/L		110	80 - 120
1,2-Dichlorobenzene	50.0	51.1		ug/L		102	80 - 120
1,4-Dichlorobenzene	50.0	49.8		ug/L		100	80 - 120
1,1-Dichloroethane	50.0	54.2		ug/L		108	80 - 120
1,1-Dichloroethene	50.0	51.2		ug/L		102	76 - 120
1,2-Dichloropropane	50.0	55.2		ug/L		110	80 - 120
Ethylbenzene	50.0	53.5		ug/L		107	80 - 120
Methylene Chloride	50.0	54.0		ug/L		108	80 - 120
Methyl ethyl ketone (MEK)	250	239		ug/L		96	80 - 131

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-617337/4
Matrix: Water
Analysis Batch: 617337

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
4-Methyl-2-pentanone (MIBK)			250	239		ug/L		96	76 - 124		
p-Cymene			50.0	51.7		ug/L		103	80 - 120		
Tetrachloroethene			50.0	51.5		ug/L		103	80 - 121		
Toluene			50.0	53.7		ug/L		107	80 - 113		
1,2,4-Trichlorobenzene			50.0	55.1		ug/L		110	68 - 128		
Xylenes, Total			100	108		ug/L		108	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*
Dibromofluoromethane (Surr)	*111*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*109*		*73 - 131*
Toluene-d8 (Surr)	*108*		*80 - 120*

Lab Sample ID: LCSD 680-617337/5
Matrix: Water
Analysis Batch: 617337

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone			250	214		ug/L		86	70 - 135	6	30
Benzene			50.0	52.4		ug/L		105	80 - 120	3	20
Carbon disulfide			50.0	50.5		ug/L		101	80 - 120	3	20
Chlorobenzene			50.0	52.8		ug/L		106	80 - 120	3	20
Vinyl chloride			50.0	46.8		ug/L		94	71 - 128	3	20
Chloroform			50.0	52.1		ug/L		104	80 - 120	4	20
cis-1,2-Dichloroethene			50.0	52.4		ug/L		105	80 - 120	5	20
1,2-Dichlorobenzene			50.0	50.5		ug/L		101	80 - 120	1	20
1,4-Dichlorobenzene			50.0	49.0		ug/L		98	80 - 120	2	20
1,1-Dichloroethane			50.0	52.4		ug/L		105	80 - 120	3	20
1,1-Dichloroethene			50.0	50.1		ug/L		100	76 - 120	2	20
1,2-Dichloropropane			50.0	52.7		ug/L		105	80 - 120	5	20
Ethylbenzene			50.0	52.2		ug/L		104	80 - 120	2	20
Methylene Chloride			50.0	52.1		ug/L		104	80 - 120	4	20
Methyl ethyl ketone (MEK)			250	226		ug/L		90	80 - 131	6	20
4-Methyl-2-pentanone (MIBK)			250	223		ug/L		89	76 - 124	7	20
p-Cymene			50.0	51.5		ug/L		103	80 - 120	0	20
Tetrachloroethene			50.0	50.1		ug/L		100	80 - 121	3	20
Toluene			50.0	51.7		ug/L		103	80 - 113	4	20
1,2,4-Trichlorobenzene			50.0	55.4		ug/L		111	68 - 128	0	20
Xylenes, Total			100	106		ug/L		106	80 - 120	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*
Dibromofluoromethane (Surr)	*107*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*104*		*73 - 131*
Toluene-d8 (Surr)	*104*		*80 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-617375/10
Matrix: Water
Analysis Batch: 617375

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	7.0	U	10	7.0	ug/L			05/04/20 13:05	1
Benzene	0.43	U	1.0	0.43	ug/L			05/04/20 13:05	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/04/20 13:05	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/04/20 13:05	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/04/20 13:05	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/04/20 13:05	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/04/20 13:05	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/04/20 13:05	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/04/20 13:05	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/04/20 13:05	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/04/20 13:05	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/04/20 13:05	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			05/04/20 13:05	1
Methylene Chloride	3.29	J	5.0	2.5	ug/L			05/04/20 13:05	1
Methyl ethyl ketone (MEK)	3.4	U	10	3.4	ug/L			05/04/20 13:05	1
4-Methyl-2-pentanone (MIBK)	2.1	U	10	2.1	ug/L			05/04/20 13:05	1
p-Cymene	0.48	U	1.0	0.48	ug/L			05/04/20 13:05	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/04/20 13:05	1
Toluene	0.48	U	1.0	0.48	ug/L			05/04/20 13:05	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/04/20 13:05	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			05/04/20 13:05	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*		*05/04/20 13:05*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*05/04/20 13:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*73 - 131*		*05/04/20 13:05*	*1*
Toluene-d8 (Surr)	*110*		*80 - 120*		*05/04/20 13:05*	*1*

Lab Sample ID: LCS 680-617375/4
Matrix: Water
Analysis Batch: 617375

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	250	253		ug/L		101	70 - 135
Benzene	50.0	48.8		ug/L		98	80 - 120
Carbon disulfide	50.0	48.5		ug/L		97	80 - 120
Chlorobenzene	50.0	47.1		ug/L		94	80 - 120
Vinyl chloride	50.0	52.0		ug/L		104	71 - 128
Chloroform	50.0	47.6		ug/L		95	80 - 120
cis-1,2-Dichloroethene	50.0	50.7		ug/L		101	80 - 120
1,2-Dichlorobenzene	50.0	45.7		ug/L		91	80 - 120
1,4-Dichlorobenzene	50.0	45.0		ug/L		90	80 - 120
1,1-Dichloroethane	50.0	46.9		ug/L		94	80 - 120
1,1-Dichloroethene	50.0	50.6		ug/L		101	76 - 120
1,2-Dichloropropane	50.0	50.8		ug/L		102	80 - 120
Ethylbenzene	50.0	47.7		ug/L		95	80 - 120
Methylene Chloride	50.0	45.9		ug/L		92	80 - 120
Methyl ethyl ketone (MEK)	250	252		ug/L		101	80 - 131

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-617375/4
Matrix: Water
Analysis Batch: 617375

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
4-Methyl-2-pentanone (MIBK)			250	234		ug/L		94	76 - 124		
p-Cymene			50.0	47.0		ug/L		94	80 - 120		
Tetrachloroethene			50.0	47.5		ug/L		95	80 - 121		
Toluene			50.0	48.6		ug/L		97	80 - 113		
1,2,4-Trichlorobenzene			50.0	49.5		ug/L		99	68 - 128		
Xylenes, Total			100	95.7		ug/L		96	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*91*		*80 - 120*
Dibromofluoromethane (Surr)	*97*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*91*		*73 - 131*
Toluene-d8 (Surr)	*97*		*80 - 120*

Lab Sample ID: LCSD 680-617375/5
Matrix: Water
Analysis Batch: 617375

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone			250	252		ug/L		101	70 - 135	1	30
Benzene			50.0	52.7		ug/L		105	80 - 120	8	20
Carbon disulfide			50.0	54.6		ug/L		109	80 - 120	12	20
Chlorobenzene			50.0	50.8		ug/L		102	80 - 120	7	20
Vinyl chloride			50.0	59.3		ug/L		119	71 - 128	13	20
Chloroform			50.0	50.0		ug/L		100	80 - 120	5	20
cis-1,2-Dichloroethene			50.0	54.3		ug/L		109	80 - 120	7	20
1,2-Dichlorobenzene			50.0	49.7		ug/L		99	80 - 120	9	20
1,4-Dichlorobenzene			50.0	49.9		ug/L		100	80 - 120	10	20
1,1-Dichloroethane			50.0	50.1		ug/L		100	80 - 120	7	20
1,1-Dichloroethene			50.0	57.7		ug/L		115	76 - 120	13	20
1,2-Dichloropropane			50.0	53.4		ug/L		107	80 - 120	5	20
Ethylbenzene			50.0	52.5		ug/L		105	80 - 120	10	20
Methylene Chloride			50.0	48.4		ug/L		97	80 - 120	5	20
Methyl ethyl ketone (MEK)			250	247		ug/L		99	80 - 131	2	20
4-Methyl-2-pentanone (MIBK)			250	240		ug/L		96	76 - 124	2	20
p-Cymene			50.0	53.0		ug/L		106	80 - 120	12	20
Tetrachloroethene			50.0	52.4		ug/L		105	80 - 121	10	20
Toluene			50.0	51.7		ug/L		103	80 - 113	6	20
1,2,4-Trichlorobenzene			50.0	53.2		ug/L		106	68 - 128	7	20
Xylenes, Total			100	104		ug/L		104	80 - 120	8	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*
Dibromofluoromethane (Surr)	*103*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*93*		*73 - 131*
Toluene-d8 (Surr)	*107*		*80 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-617527/10
Matrix: Water
Analysis Batch: 617527

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	7.0	U	10	7.0	ug/L			05/05/20 13:17	1
Benzene	0.43	U	1.0	0.43	ug/L			05/05/20 13:17	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			05/05/20 13:17	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			05/05/20 13:17	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			05/05/20 13:17	1
Chloroform	0.50	U	1.0	0.50	ug/L			05/05/20 13:17	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			05/05/20 13:17	1
1,2-Dichlorobenzene	0.37	U	1.0	0.37	ug/L			05/05/20 13:17	1
1,4-Dichlorobenzene	0.46	U	1.0	0.46	ug/L			05/05/20 13:17	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			05/05/20 13:17	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			05/05/20 13:17	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			05/05/20 13:17	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			05/05/20 13:17	1
Methylene Chloride	2.92	J	5.0	2.5	ug/L			05/05/20 13:17	1
Methyl ethyl ketone (MEK)	3.4	U	10	3.4	ug/L			05/05/20 13:17	1
4-Methyl-2-pentanone (MIBK)	2.1	U	10	2.1	ug/L			05/05/20 13:17	1
p-Cymene	0.48	U	1.0	0.48	ug/L			05/05/20 13:17	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			05/05/20 13:17	1
Toluene	0.48	U	1.0	0.48	ug/L			05/05/20 13:17	1
1,2,4-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			05/05/20 13:17	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			05/05/20 13:17	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*		*05/05/20 13:17*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*05/05/20 13:17*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*73 - 131*		*05/05/20 13:17*	*1*
Toluene-d8 (Surr)	*109*		*80 - 120*		*05/05/20 13:17*	*1*

Lab Sample ID: LCS 680-617527/4
Matrix: Water
Analysis Batch: 617527

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	250	250		ug/L		100	70 - 135
Benzene	50.0	52.3		ug/L		105	80 - 120
Carbon disulfide	50.0	54.7		ug/L		109	80 - 120
Chlorobenzene	50.0	50.1		ug/L		100	80 - 120
Vinyl chloride	50.0	57.6		ug/L		115	71 - 128
Chloroform	50.0	50.0		ug/L		100	80 - 120
cis-1,2-Dichloroethene	50.0	52.8		ug/L		106	80 - 120
1,2-Dichlorobenzene	50.0	48.8		ug/L		98	80 - 120
1,4-Dichlorobenzene	50.0	47.7		ug/L		95	80 - 120
1,1-Dichloroethane	50.0	50.3		ug/L		101	80 - 120
1,1-Dichloroethene	50.0	54.4		ug/L		109	76 - 120
1,2-Dichloropropane	50.0	53.5		ug/L		107	80 - 120
Ethylbenzene	50.0	51.7		ug/L		103	80 - 120
Methylene Chloride	50.0	51.4		ug/L		103	80 - 120
Methyl ethyl ketone (MEK)	250	249		ug/L		100	80 - 131

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-617527/4
Matrix: Water
Analysis Batch: 617527

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
4-Methyl-2-pentanone (MIBK)			250	241		ug/L		97	76 - 124		
p-Cymene			50.0	50.8		ug/L		102	80 - 120		
Tetrachloroethene			50.0	52.6		ug/L		105	80 - 121		
Toluene			50.0	51.9		ug/L		104	80 - 113		
1,2,4-Trichlorobenzene			50.0	50.3		ug/L		101	68 - 128		
Xylenes, Total			100	102		ug/L		102	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*
Dibromofluoromethane (Surr)	*101*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*91*		*73 - 131*
Toluene-d8 (Surr)	*105*		*80 - 120*

Lab Sample ID: LCSD 680-617527/5
Matrix: Water
Analysis Batch: 617527

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone			250	254		ug/L		102	70 - 135	2	30
Benzene			50.0	51.9		ug/L		104	80 - 120	1	20
Carbon disulfide			50.0	54.8		ug/L		110	80 - 120	0	20
Chlorobenzene			50.0	50.3		ug/L		101	80 - 120	0	20
Vinyl chloride			50.0	58.0		ug/L		116	71 - 128	1	20
Chloroform			50.0	49.2		ug/L		98	80 - 120	2	20
cis-1,2-Dichloroethene			50.0	51.2		ug/L		102	80 - 120	3	20
1,2-Dichlorobenzene			50.0	48.9		ug/L		98	80 - 120	0	20
1,4-Dichlorobenzene			50.0	46.6		ug/L		93	80 - 120	2	20
1,1-Dichloroethane			50.0	49.5		ug/L		99	80 - 120	2	20
1,1-Dichloroethene			50.0	54.4		ug/L		109	76 - 120	0	20
1,2-Dichloropropane			50.0	52.0		ug/L		104	80 - 120	3	20
Ethylbenzene			50.0	52.2		ug/L		104	80 - 120	1	20
Methylene Chloride			50.0	49.9		ug/L		100	80 - 120	3	20
Methyl ethyl ketone (MEK)			250	247		ug/L		99	80 - 131	1	20
4-Methyl-2-pentanone (MIBK)			250	242		ug/L		97	76 - 124	0	20
p-Cymene			50.0	51.3		ug/L		103	80 - 120	1	20
Tetrachloroethene			50.0	51.8		ug/L		104	80 - 121	2	20
Toluene			50.0	51.5		ug/L		103	80 - 113	1	20
1,2,4-Trichlorobenzene			50.0	51.4		ug/L		103	68 - 128	2	20
Xylenes, Total			100	103		ug/L		103	80 - 120	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*
Dibromofluoromethane (Surr)	*99*		*80 - 122*
1,2-Dichloroethane-d4 (Surr)	*89*		*73 - 131*
Toluene-d8 (Surr)	*105*		*80 - 120*

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 680-617517/1-A
Matrix: Water
Analysis Batch: 617660

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 617517

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	25	U	100	25	ug/L		05/04/20 17:24	05/05/20 16:50	1
Manganese	1.8	U	5.0	1.8	ug/L		05/04/20 17:24	05/05/20 16:50	1

Lab Sample ID: LCS 680-617517/2-A
Matrix: Water
Analysis Batch: 617660

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 617517

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	5010	4620		ug/L		92	80 - 120
Manganese	400	393		ug/L		98	80 - 120

Method: SM 2340B - Total Hardness (as CaCO3) by calculation

Lab Sample ID: MB 680-617810/1
Matrix: Water
Analysis Batch: 617810

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

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	3.3	U	3.3	3.3	mg/L			05/06/20 17:47	1
Calcium hardness as calcium carbonate	1.2	U	1.2	1.2	mg/L			05/06/20 17:47	1
Magnesium hardness as calcium carbonate	2.1	U	2.1	2.1	mg/L			05/06/20 17:47	1

Method: 2320B-2011 - Alkalinity, Total

Lab Sample ID: MB 680-617538/36
Matrix: Water
Analysis Batch: 617538

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Carbon Dioxide, Free	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			05/04/20 20:52	1
Bicarbonate ion as HCO3	6.1	U	6.1	6.1	mg/L			05/04/20 20:52	1

Lab Sample ID: LCS 680-617538/37
Matrix: Water
Analysis Batch: 617538

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	250	250		mg/L		100	90 - 112

Method: 2320B-2011 - Alkalinity, Total (Continued)

Lab Sample ID: LCSD 680-617538/35
Matrix: Water
Analysis Batch: 617538

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity			250	251		mg/L		100	90 - 112	1	30

Lab Sample ID: LCSD 680-617538/62
Matrix: Water
Analysis Batch: 617538

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity			250	263		mg/L		105	90 - 112	5	30

Lab Sample ID: 680-183249-4 DU
Matrix: Water
Analysis Batch: 617538

Client Sample ID: MPE-GW-042820-4
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Alkalinity	97			96.6		mg/L				0.9	30
Bicarbonate Alkalinity as CaCO3	97			96.6		mg/L				0.9	30
Carbonate Alkalinity as CaCO3	5.0	U		5.0	U	mg/L				NC	30
Hydroxide Alkalinity	5.0	U		5.0	U	mg/L				NC	30
Carbon Dioxide, Free	120			112		mg/L				6	30
Phenolphthalein Alkalinity	5.0	U		5.0	U	mg/L				NC	30
Bicarbonate ion as HCO3	120			118		mg/L				0.9	30

Method: 2540 D-2011 - Total Suspended Solids (Dried at 103-105°C)

Lab Sample ID: MB 680-617172/1
Matrix: Water
Analysis Batch: 617172

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

Analyte	MB Result	MB Qualifier	RL		RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	1.0	U	1.0		1.0	mg/L			05/01/20 07:53	1

Lab Sample ID: LCS 680-617172/2
Matrix: Water
Analysis Batch: 617172

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			951	962		mg/L		101	80 - 120		

Lab Sample ID: LCSD 680-617172/3
Matrix: Water
Analysis Batch: 617172

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Suspended Solids			951	956		mg/L		101	80 - 120	1	25

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Method: 9040C - pH

Lab Sample ID: LCS 680-617402/3
Matrix: Water
Analysis Batch: 617402

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			7.01	7.2		SU		102	63 - 158		

Lab Sample ID: LCSD 680-617402/21
Matrix: Water
Analysis Batch: 617402

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
pH			7.01	7.1		SU		102	63 - 158	0	40

QC Association Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

GC/MS VOA

Analysis Batch: 617331

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total/NA	Water	8260B	
MB 680-617331/8	Method Blank	Total/NA	Water	8260B	
LCS 680-617331/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-617331/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Analysis Batch: 617337

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-3	MPE-GW-042820-3	Total/NA	Water	8260B	
MB 680-617337/9	Method Blank	Total/NA	Water	8260B	
LCS 680-617337/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-617337/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Analysis Batch: 617375

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1 - DL	MPE-GW-042820-1	Total/NA	Water	8260B	
680-183249-2	MPE-GW-042820-2	Total/NA	Water	8260B	
680-183249-3 - DL	MPE-GW-042820-3	Total/NA	Water	8260B	
MB 680-617375/10	Method Blank	Total/NA	Water	8260B	
LCS 680-617375/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-617375/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Analysis Batch: 617527

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-2 - DL	MPE-GW-042820-2	Total/NA	Water	8260B	
680-183249-4	MPE-GW-042820-4	Total/NA	Water	8260B	
MB 680-617527/10	Method Blank	Total/NA	Water	8260B	
LCS 680-617527/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-617527/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Metals

Prep Batch: 617517

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total Recoverable	Water	3005A	
680-183249-2	MPE-GW-042820-2	Total Recoverable	Water	3005A	
680-183249-3	MPE-GW-042820-3	Total Recoverable	Water	3005A	
680-183249-4	MPE-GW-042820-4	Total Recoverable	Water	3005A	
MB 680-617517/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 680-617517/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 617660

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total Recoverable	Water	6020A	617517
680-183249-2	MPE-GW-042820-2	Total Recoverable	Water	6020A	617517
680-183249-3	MPE-GW-042820-3	Total Recoverable	Water	6020A	617517
680-183249-4	MPE-GW-042820-4	Total Recoverable	Water	6020A	617517
MB 680-617517/1-A	Method Blank	Total Recoverable	Water	6020A	617517
LCS 680-617517/2-A	Lab Control Sample	Total Recoverable	Water	6020A	617517

Client: Geosyntec Consultants, Inc.
Job ID: 680-183249-1
Project/Site: Hercules/Pinova Brunswick Facility

Metals

Analysis Batch: 617810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total/NA	Water	SM 2340B	
680-183249-2	MPE-GW-042820-2	Total/NA	Water	SM 2340B	
680-183249-3	MPE-GW-042820-3	Total/NA	Water	SM 2340B	
680-183249-4	MPE-GW-042820-4	Total/NA	Water	SM 2340B	
MB 680-617810/1	Method Blank	Total/NA	Water	SM 2340B	

General Chemistry

Analysis Batch: 617172

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total/NA	Water	2540 D-2011	
680-183249-2	MPE-GW-042820-2	Total/NA	Water	2540 D-2011	
680-183249-3	MPE-GW-042820-3	Total/NA	Water	2540 D-2011	
680-183249-4	MPE-GW-042820-4	Total/NA	Water	2540 D-2011	
MB 680-617172/1	Method Blank	Total/NA	Water	2540 D-2011	
LCS 680-617172/2	Lab Control Sample	Total/NA	Water	2540 D-2011	
LCSD 680-617172/3	Lab Control Sample Dup	Total/NA	Water	2540 D-2011	

Analysis Batch: 617402

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total/NA	Water	9040C	
680-183249-2	MPE-GW-042820-2	Total/NA	Water	9040C	
680-183249-3	MPE-GW-042820-3	Total/NA	Water	9040C	
680-183249-4	MPE-GW-042820-4	Total/NA	Water	9040C	
LCS 680-617402/3	Lab Control Sample	Total/NA	Water	9040C	
LCSD 680-617402/21	Lab Control Sample Dup	Total/NA	Water	9040C	

Analysis Batch: 617538

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183249-1	MPE-GW-042820-1	Total/NA	Water	2320B-2011	
680-183249-2	MPE-GW-042820-2	Total/NA	Water	2320B-2011	
680-183249-3	MPE-GW-042820-3	Total/NA	Water	2320B-2011	
680-183249-4	MPE-GW-042820-4	Total/NA	Water	2320B-2011	
MB 680-617538/36	Method Blank	Total/NA	Water	2320B-2011	
LCS 680-617538/37	Lab Control Sample	Total/NA	Water	2320B-2011	
LCSD 680-617538/35	Lab Control Sample Dup	Total/NA	Water	2320B-2011	
LCSD 680-617538/62	Lab Control Sample Dup	Total/NA	Water	2320B-2011	
680-183249-4 DU	MPE-GW-042820-4	Total/NA	Water	2320B-2011	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-1

Lab Sample ID: 680-183249-1

Date Collected: 04/28/20 15:45
Matrix: Water
Date Received: 04/30/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	617331	05/03/20 18:52	P1C	TAL SAV
	Instrument ID: CMSB									
Total/NA	Analysis	8260B	DL	5	5 mL	5 mL	617375	05/04/20 16:38	P1C	TAL SAV
	Instrument ID: CMSB									
Total Recoverable	Prep	3005A			50 mL	250 mL	617517	05/04/20 17:24	BCB	TAL SAV
Total Recoverable	Analysis	6020A		1			617660	05/05/20 17:46	BJB	TAL SAV
	Instrument ID: ICPMSD									
Total/NA	Analysis	SM 2340B		1			617810	05/06/20 17:47	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	2320B-2011		1			617538	05/04/20 21:27	DR	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540 D-2011		1	60 mL	1000 mL	617172	05/01/20 07:53	PG	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	9040C		1			617402	05/01/20 16:23	ALG	TAL SAV
	Instrument ID: MANTECH									

Client Sample ID: MPE-GW-042820-2

Lab Sample ID: 680-183249-2

Date Collected: 04/28/20 15:45
Matrix: Water
Date Received: 04/30/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	617375	05/04/20 16:15	P1C	TAL SAV
	Instrument ID: CMSB									
Total/NA	Analysis	8260B	DL	2	5 mL	5 mL	617527	05/05/20 16:46	P1C	TAL SAV
	Instrument ID: CMSB									
Total Recoverable	Prep	3005A			50 mL	250 mL	617517	05/04/20 17:24	BCB	TAL SAV
Total Recoverable	Analysis	6020A		1			617660	05/05/20 17:49	BJB	TAL SAV
	Instrument ID: ICPMSD									
Total/NA	Analysis	SM 2340B		1			617810	05/06/20 17:47	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	2320B-2011		1			617538	05/04/20 21:34	DR	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540 D-2011		1	42 mL	1000 mL	617172	05/01/20 07:53	PG	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	9040C		1			617402	05/01/20 16:27	ALG	TAL SAV
	Instrument ID: MANTECH									

Client Sample ID: MPE-GW-042820-3

Lab Sample ID: 680-183249-3

Date Collected: 04/28/20 17:30
Matrix: Water
Date Received: 04/30/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B	DL	5	5 mL	5 mL	617375	05/04/20 17:24	P1C	TAL SAV
	Instrument ID: CMSB									

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Hercules/Pinova Brunswick Facility

Job ID: 680-183249-1

Client Sample ID: MPE-GW-042820-3

Lab Sample ID: 680-183249-3

Date Collected: 04/28/20 17:30
Matrix: Water
Date Received: 04/30/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	617337	05/03/20 17:55	Y1S	TAL SAV
Total Recoverable	Prep	3005A			50 mL	250 mL	617517	05/04/20 17:24	BCB	TAL SAV
Total Recoverable	Analysis	6020A		1			617660	05/05/20 17:53	BJB	TAL SAV
	Instrument ID: ICPMSD									
Total/NA	Analysis	SM 2340B		1			617810	05/06/20 17:47	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	2320B-2011		1			617538	05/04/20 21:42	DR	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540 D-2011		1	135 mL	1000 mL	617172	05/01/20 07:53	PG	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	9040C		1			617402	05/01/20 16:31	ALG	TAL SAV
	Instrument ID: MANTECH									

Client Sample ID: MPE-GW-042820-4

Lab Sample ID: 680-183249-4

Date Collected: 04/28/20 18:20
Matrix: Water
Date Received: 04/30/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		50	5 mL	5 mL	617527	05/05/20 17:33	P1C	TAL SAV
	Instrument ID: CMSB									
Total Recoverable	Prep	3005A			50 mL	250 mL	617517	05/04/20 17:24	BCB	TAL SAV
Total Recoverable	Analysis	6020A		1			617660	05/05/20 17:56	BJB	TAL SAV
	Instrument ID: ICPMSD									
Total/NA	Analysis	SM 2340B		1			617810	05/06/20 17:47	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	2320B-2011		1			617538	05/04/20 21:48	DR	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540 D-2011		1	500 mL	1000 mL	617172	05/01/20 07:53	PG	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	9040C		1			617402	05/01/20 16:35	ALG	TAL SAV
	Instrument ID: MANTECH									

Laboratory References:

TAL SAV = Eurofins TestAmerica, Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Phone: 912-354-7858 Fax: 912-352-0165

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information	Sampler: Ali Ciblak	Lab PM: Lanier, Jerry A	Carrier Tracking No(s):	COC No: 680-114674-43874.2
Client Contact: Ali Ciblak	Phone: 857-241-7216	E-Mail: jerry.lanier@testamericainc.com		Page: Page 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:

Address: 1255 Roberts Blvd, NW Suite 200	Due Date Requested:	Analysis Requested
City: Kennesaw	TAT Requested (days): standard	
State, Zip: GA, 30144		
Phone: 857-241-7216	PO #: PO Pending	
Email: aciblak@geosyntec.com	WO #:	
Project Name: Ashland - BrunswickTotal/TCLP Water	Project #: 68022943	
Site: Hercules/Pinova Brunswick Facility	SSOW#:	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - Di Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - (MOD) TCL Sublist (VOCs + p-cymene)	2540D - Local Method (TSS)	2320B - Local Method (Alkalinity)	6020, SM2340B (Hardness) (Total Fe & Mn)	150.1 - pH (Electrometric)	8081B_8082A - TCLP Pest	Total Number of containers	Special Instructions/Note:
			Preservation Code:				A	N	N	D	N	N		
MPE-GW-042820-1	4/28/20	15:45	G	Water	NO		✓	✓	✓	✓	✓			VOCs include p-cymene
MPE-GW-042820-2	"	15:45	G	Water	NO		✓	✓	✓	✓	✓			"
MPE-GW-042820-3	"	17:30	G	Water	NO		✓	✓	✓	✓	✓			"
MPE-GW-042820-4	"	18:20	G	Water	NO		✓	✓	✓	✓	✓			"
				Water										
				Water										
				Water										

680-183249 Chain of Custody

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Ali Ciblak	4/29/20 14:00	Geosyntec	[signature]	04-30-20 0930	
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2.4(F) 2.8°C

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 680-183249-1

Login Number: 183249

List Source: Eurofins TestAmerica, Savannah

List Number: 1

Creator: Banda, Christy S

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

Accreditation/Certification Summary

Client: Geosyntec Consultants, Inc. Job ID: 680-183249-1
Project/Site: Hercules/Pinova Brunswick Facility

Laboratory: Eurofins TestAmerica, Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Florida	NELAP	E87052	06-30-20
Georgia	State	E87052	06-30-20

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

Laboratory Job ID: 680-183351-1
Client Project/Site: Ashland - Brunswick Plant Waters

For:
Geosyntec Consultants, Inc.
1255 Roberts Blvd, NW
Suite 200
Kennesaw, Georgia 30144

Attn: Adria Reimer

Authorized for release by:
5/18/2020 2:27:29 PM
Willie Hallmon, Project Manager I
(813)885-7427
willie.hallmon@testamericainc.com

Designee for

Jerry Lanier, Project Manager I
(912)250-0281
jerry.lanier@testamericainc.com

LINKS

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Table of Contents

Job ID: 680-183351-1

Laboratory: Eurofins TestAmerica, Savannah

Narrative

CASE NARRATIVE

Client: Geosyntec Consultants, Inc.

Project: Ashland - Brunswick Plant Waters

Report Number: 680-183351-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

RECEIPT
The samples were received on 05/01/2020; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 5.1 C.

TCLP VOLATILE ORGANIC COMPOUNDS (GC-MS)
Sample MPE_WC_043020 (680-183351-10) was analyzed for TCLP volatile organic compounds (GC-MS) in accordance with EPA SW-846 Methods 1311/8260B. The samples were leached on 05/06/2020 and analyzed on 05/06/2020.

Sample MPE_WC_043020 (680-183351-10)[20X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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

PESTICIDES (TCLP)
Sample MPE_WC_043020 (680-183351-10) was analyzed for Pesticides (TCLP) in accordance with EPA SW-846 Method 1311/8081B_8082A. The samples were leached on 05/06/2020, prepared on 05/07/2020 and analyzed on 05/11/2020.

This method incorporates 2nd column confirmation. Corrective action is not taken for surrogate/spike compounds unless results from both columns are unacceptable. Results outside criteria are qualified.

The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 680-617699 and 680-617920 and analytical batch 680-618275 recovered outside control limits for the following analyte: Methoxychlor. This analyte was biased high in the LCS and was not detected in the associated samples; therefore, the data has been reported

Refer to the QC report for details.

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

Methoxychlor failed the recovery criteria high for LCS 680-617920/11-A. Methoxychlor failed the recovery criteria high for LCSD 680-617920/12-A. Refer to the QC report for details.

IGNITABILITY
Sample MPE_WC_043020 (680-183351-10) was analyzed for ignitability in accordance with EPA SW846 Method 1010A. The samples were analyzed on 05/18/2020.

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

Job ID: 680-183351-1 (Continued)

Laboratory: Eurofins TestAmerica, Savannah (Continued)

ANIONS BY ION CHROMATOGRAPHY (28 DAY)

Samples INJ_BT_042920 (680-183351-1), INJ_MW24_042920 (680-183351-2), INJ_MPE01_042920 (680-183351-3), INJ_OW02_042920 (680-183351-4), INJ_MW23_042920 (680-183351-5), INJ_MW24_043020 (680-183351-6), INJ_MPE01_043020 (680-183351-7), INJ_OW02_043020 (680-183351-8) and INJ_MW23_043020 (680-183351-9) were analyzed for Anions by Ion Chromatography (28 Day) in accordance with EPA Method 300.0. The samples were analyzed on 05/05/2020, 05/06/2020 and 05/08/2020.

Method 300_ORGFM_28D: The following samples was diluted due to color and appearance: INJ_MPE01_042920 (680-183351-3), INJ_OW02_042920 (680-183351-4), INJ_OW02_043020 (680-183351-8), INJ_MW23_043020 (680-183351-9). Elevated reporting limits (RL) are provide

Samples INJ_BT_042920 (680-183351-1)[10X], INJ_MPE01_042920 (680-183351-3)[5X], INJ_OW02_042920 (680-183351-4)[5X], INJ_OW02_043020 (680-183351-8)[10X] and INJ_MW23_043020 (680-183351-9)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
680-183351-1	INJ_BT_042920	Water	04/29/20 09:58	05/01/20 09:40	
680-183351-2	INJ_MW24_042920	Water	04/29/20 18:00	05/01/20 09:40	
680-183351-3	INJ_MPE01_042920	Water	04/29/20 18:10	05/01/20 09:40	
680-183351-4	INJ_OW02_042920	Water	04/29/20 18:20	05/01/20 09:40	
680-183351-5	INJ_MW23_042920	Water	04/29/20 18:30	05/01/20 09:40	
680-183351-6	INJ_MW24_043020	Water	04/30/20 09:05	05/01/20 09:40	
680-183351-7	INJ_MPE01_043020	Water	04/30/20 09:10	05/01/20 09:40	
680-183351-8	INJ_OW02_043020	Water	04/30/20 09:15	05/01/20 09:40	
680-183351-9	INJ_MW23_043020	Water	04/30/20 09:20	05/01/20 09:40	
680-183351-10	MPE_WC_043020	Water	04/30/20 12:40	05/01/20 09:40	

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL SAV
8081B/8082A	Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography	SW846	TAL SAV
300.0-1993 R2.1	Anions, Ion Chromatography	MCAWW	TAL SAV
1010A	Ignitability, Pensky-Martens Closed-Cup Method	SW846	TAL CAN
1311	TCLP Extraction	SW846	TAL SAV
3520C	Liquid-Liquid Extraction (Continuous)	SW846	TAL SAV
5030B	Purge and Trap	SW846	TAL SAV

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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

Laboratory References:

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL SAV = Eurofins TestAmerica, Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Definitions/Glossary

Client: Geosyntec Consultants, Inc. Job ID: 680-183351-1
Project/Site: Ashland - Brunswick Plant Waters

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

GC Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD recovery exceeds control limits.
p	The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported.
U	Indicates the analyte was analyzed for but not detected.

HPLC/IC

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

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

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_BT_042920 — Lab Sample ID: 680-183351-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	210		5.0		mg/L	10		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_MW24_042920 — Lab Sample ID: 680-183351-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	0.52		0.50		mg/L	1		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_MPE01_042920 — Lab Sample ID: 680-183351-3

No Detections.

Client Sample ID: INJ_OW02_042920 — Lab Sample ID: 680-183351-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	2.6		2.5		mg/L	5		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_MW23_042920 — Lab Sample ID: 680-183351-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	1.1		0.50		mg/L	1		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_MW24_043020 — Lab Sample ID: 680-183351-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	1.2		0.50		mg/L	1		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_MPE01_043020 — Lab Sample ID: 680-183351-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Bromide	0.97		0.50		mg/L	1		300.0-1993 R2.1	Total/NA

Client Sample ID: INJ_OW02_043020 — Lab Sample ID: 680-183351-8

No Detections.

Client Sample ID: INJ_MW23_043020 — Lab Sample ID: 680-183351-9

No Detections.

Client Sample ID: MPE_WC_043020 — Lab Sample ID: 680-183351-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.12		0.020		mg/L	20		8260B	TCLP
Flashpoint	>200		1.00		Degrees F	1		1010A	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_BT_042920
Date Collected: 04/29/20 09:58
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-1
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	210		5.0		mg/L			05/08/20 13:10	10

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_MW24_042920
Date Collected: 04/29/20 18:00
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-2
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	0.52		0.50		mg/L			05/06/20 03:15	1

Client: Geosyntec Consultants, Inc.
Job ID: 680-183351-1
Project/Site: Ashland - Brunswick Plant Waters

Client Sample ID: INJ_MPE01_042920
Lab Sample ID: 680-183351-3
Date Collected: 04/29/20 18:10
Matrix: Water
Date Received: 05/01/20 09:40

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	2.5	U	2.5		mg/L			05/05/20 20:18	5

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_OW02_042920
Date Collected: 04/29/20 18:20
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-4
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	2.6		2.5		mg/L			05/05/20 20:31	5

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_MW23_042920
Date Collected: 04/29/20 18:30
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-5
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	1.1		0.50		mg/L			05/06/20 03:28	1

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_MW24_043020
Date Collected: 04/30/20 09:05
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-6
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	1.2		0.50		mg/L			05/06/20 03:41	1

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_MPE01_043020
Date Collected: 04/30/20 09:10
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-7
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	0.97		0.50		mg/L			05/06/20 03:53	1

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_OW02_043020
Date Collected: 04/30/20 09:15
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-8
Matrix: Water

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	5.0	U	5.0		mg/L			05/05/20 20:56	10

Client: Geosyntec Consultants, Inc.
Job ID: 680-183351-1
Project/Site: Ashland - Brunswick Plant Waters

Client Sample ID: INJ_MW23_043020
Lab Sample ID: 680-183351-9
Date Collected: 04/30/20 09:20
Matrix: Water
Date Received: 05/01/20 09:40

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	2.5	U	2.5		mg/L			05/05/20 20:43	5

Client Sample ID: MPE_WC_043020

Date Collected: 04/30/20 12:40
Date Received: 05/01/20 09:40

Lab Sample ID: 680-183351-10

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.020	U	0.020		mg/L			05/06/20 18:55	20
1,2-Dichloroethane	0.020	U	0.020		mg/L			05/06/20 18:55	20
Chlorobenzene	0.020	U	0.020		mg/L			05/06/20 18:55	20
Tetrachloroethene	0.020	U	0.020		mg/L			05/06/20 18:55	20
Carbon tetrachloride	0.020	U	0.020		mg/L			05/06/20 18:55	20
Chloroform	0.020	U	0.020		mg/L			05/06/20 18:55	20
Benzene	**0.12**		0.020		mg/L			05/06/20 18:55	20
Vinyl chloride	0.020	U	0.020		mg/L			05/06/20 18:55	20
1,1-Dichloroethene	0.020	U	0.020		mg/L			05/06/20 18:55	20
2-Butanone (MEK)	0.20	U	0.20		mg/L			05/06/20 18:55	20
Trichloroethene	0.020	U	0.020		mg/L			05/06/20 18:55	20
Hexachlorobutadiene	0.10	U	0.10		mg/L			05/06/20 18:55	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*97*		*80 - 120*		*05/06/20 18:55*	*20*
1,2-Dichloroethane-d4 (Surr)	*83*		*73 - 131*		*05/06/20 18:55*	*20*
Dibromofluoromethane (Surr)	*96*		*80 - 122*		*05/06/20 18:55*	*20*
4-Bromofluorobenzene (Surr)	*107*		*80 - 120*		*05/06/20 18:55*	*20*

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptachlor epoxide	0.0012	U F1	0.0012		mg/L		05/07/20 16:29	05/11/20 20:56	1
Chlordane (technical)	0.012	U	0.012		mg/L		05/07/20 16:29	05/11/20 20:56	1
gamma-BHC (Lindane)	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 20:56	1
Endrin	0.0012	U F1	0.0012		mg/L		05/07/20 16:29	05/11/20 20:56	1
Methoxychlor	0.0012	U F1 *	0.0012		mg/L		05/07/20 16:29	05/11/20 20:56	1
Heptachlor	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 20:56	1
Toxaphene	0.12	U	0.12		mg/L		05/07/20 16:29	05/11/20 20:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*74*		*40 - 130*	*05/07/20 16:29*	*05/11/20 20:56*	*1*
DCB Decachlorobiphenyl	*37*		*14 - 130*	*05/07/20 16:29*	*05/11/20 20:56*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	**>200**		1.00		Degrees F			05/18/20 03:36	1

Surrogate Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		TOL	DCA	DBFM	BFB
Lab Sample ID	Client Sample ID	(80-120)	(73-131)	(80-122)	(80-120)
LCS 680-617669/4	Lab Control Sample	109	91	101	84
LCSD 680-617669/5	Lab Control Sample Dup	103	91	100	94
MB 680-617669/10	Method Blank	106	84	97	94

Surrogate Legend

TOL = Toluene-d8 (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)
DBFM = Dibromofluoromethane (Surr)
BFB = 4-Bromofluorobenzene (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		TOL	DCA	DBFM	BFB
Lab Sample ID	Client Sample ID	(80-120)	(73-131)	(80-122)	(80-120)
680-183351-10	MPE_WC_043020	97	83	96	107
LB 680-617697/1-A	Method Blank	93	84	103	101

Surrogate Legend

TOL = Toluene-d8 (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)
DBFM = Dibromofluoromethane (Surr)
BFB = 4-Bromofluorobenzene (Surr)

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		TCX2	DCBP1
Lab Sample ID	Client Sample ID	(40-130)	(14-130)
LCS 680-617920/11-A	Lab Control Sample	74	84
LCSD 680-617920/12-A	Lab Control Sample Dup	58	51
MB 680-617920/10-A	Method Blank	74	63

Surrogate Legend

TCX = Tetrachloro-m-xylene
DCBP = DCB Decachlorobiphenyl

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)	
		TCX1	DCBP1
Lab Sample ID	Client Sample ID	(40-130)	(14-130)
680-183351-10	MPE_WC_043020	74	37
680-183351-10 MSD	MPE_WC_043020	69	41

Surrogate Legend

TCX = Tetrachloro-m-xylene

Surrogate Summary

Client: Geosyntec Consultants, Inc. Job ID: 680-183351-1
Project/Site: Ashland - Brunswick Plant Waters

DCBP = DCB Decachlorobiphenyl

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)									
		TCX2	DCBP2								
Lab Sample ID	Client Sample ID	(40-130)	(14-130)								
680-183351-10 MS	MPE_WC_043020	81	40								

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCBP = DCB Decachlorobiphenyl

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)									
		TCX2	DCBP1								
Lab Sample ID	Client Sample ID	(40-130)	(14-130)								
LB 680-617699/1-C	Method Blank	71	96								

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCBP = DCB Decachlorobiphenyl

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 680-617669/10
Matrix: Water
Analysis Batch: 617669

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
1,2-Dichloroethane	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Chlorobenzene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Tetrachloroethene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Carbon tetrachloride	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Chloroform	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Benzene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Vinyl chloride	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
1,1-Dichloroethene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
2-Butanone (MEK)	0.010	U	0.010		mg/L			05/06/20 13:31	1
Trichloroethene	0.0010	U	0.0010		mg/L			05/06/20 13:31	1
Hexachlorobutadiene	0.0050	U	0.0050		mg/L			05/06/20 13:31	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*106*		*80 - 120*		*05/06/20 13:31*	*1*
1,2-Dichloroethane-d4 (Surr)	*84*		*73 - 131*		*05/06/20 13:31*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*05/06/20 13:31*	*1*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*		*05/06/20 13:31*	*1*

Lab Sample ID: LCS 680-617669/4
Matrix: Water
Analysis Batch: 617669

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	0.0500	0.0469		mg/L		94	80 - 120
1,2-Dichloroethane	0.0500	0.0471		mg/L		94	72 - 128
Chlorobenzene	0.0500	0.0502		mg/L		100	80 - 120
Tetrachloroethene	0.0500	0.0469		mg/L		94	71 - 123
Carbon tetrachloride	0.0500	0.0476		mg/L		95	67 - 125
Chloroform	0.0500	0.0487		mg/L		97	80 - 120
Benzene	0.0500	0.0517		mg/L		103	80 - 120
Vinyl chloride	0.0500	0.0484		mg/L		97	80 - 129
1,1-Dichloroethene	0.0500	0.0466		mg/L		93	80 - 120
2-Butanone (MEK)	0.250	0.264		mg/L		106	79 - 125
Trichloroethene	0.0500	0.0517		mg/L		103	80 - 120
Hexachlorobutadiene	0.0500	0.0508		mg/L		102	71 - 131

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*109*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*91*		*73 - 131*
Dibromofluoromethane (Surr)	*101*		*80 - 122*
4-Bromofluorobenzene (Surr)	*84*		*80 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-617669/5
Matrix: Water
Analysis Batch: 617669

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dichlorobenzene			0.0500	0.0471		mg/L		94	80 - 120	0	20
1,2-Dichloroethane			0.0500	0.0468		mg/L		94	72 - 128	1	50
Chlorobenzene			0.0500	0.0500		mg/L		100	80 - 120	0	20
Tetrachloroethene			0.0500	0.0503		mg/L		101	71 - 123	7	20
Carbon tetrachloride			0.0500	0.0484		mg/L		97	67 - 125	2	20
Chloroform			0.0500	0.0493		mg/L		99	80 - 120	1	20
Benzene			0.0500	0.0525		mg/L		105	80 - 120	1	20
Vinyl chloride			0.0500	0.0462		mg/L		92	80 - 129	5	20
1,1-Dichloroethene			0.0500	0.0460		mg/L		92	80 - 120	1	20
2-Butanone (MEK)			0.250	0.260		mg/L		104	79 - 125	2	20
Trichloroethene			0.0500	0.0520		mg/L		104	80 - 120	1	20
Hexachlorobutadiene			0.0500	0.0502		mg/L		100	71 - 131	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*103*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*91*		*73 - 131*
Dibromofluoromethane (Surr)	*100*		*80 - 122*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*

Lab Sample ID: LB 680-617697/1-A
Matrix: Water
Analysis Batch: 617669

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.020	U	0.020		mg/L			05/06/20 17:45	20
1,2-Dichloroethane	0.020	U	0.020		mg/L			05/06/20 17:45	20
Chlorobenzene	0.020	U	0.020		mg/L			05/06/20 17:45	20
Tetrachloroethene	0.020	U	0.020		mg/L			05/06/20 17:45	20
Carbon tetrachloride	0.020	U	0.020		mg/L			05/06/20 17:45	20
Chloroform	0.020	U	0.020		mg/L			05/06/20 17:45	20
Benzene	0.020	U	0.020		mg/L			05/06/20 17:45	20
Vinyl chloride	0.020	U	0.020		mg/L			05/06/20 17:45	20
1,1-Dichloroethene	0.020	U	0.020		mg/L			05/06/20 17:45	20
2-Butanone (MEK)	0.20	U	0.20		mg/L			05/06/20 17:45	20
Trichloroethene	0.020	U	0.020		mg/L			05/06/20 17:45	20
Hexachlorobutadiene	0.10	U	0.10		mg/L			05/06/20 17:45	20

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*93*		*80 - 120*		*05/06/20 17:45*	*20*
1,2-Dichloroethane-d4 (Surr)	*84*		*73 - 131*		*05/06/20 17:45*	*20*
Dibromofluoromethane (Surr)	*103*		*80 - 122*		*05/06/20 17:45*	*20*
4-Bromofluorobenzene (Surr)	*101*		*80 - 120*		*05/06/20 17:45*	*20*

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography

Lab Sample ID: MB 680-617920/10-A
Matrix: Water
Analysis Batch: 618275

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 617920

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptachlor epoxide	0.000025	U	0.000025		mg/L		05/07/20 16:29	05/11/20 19:27	1
Chlordane (technical)	0.00025	U	0.00025		mg/L		05/07/20 16:29	05/11/20 19:27	1
gamma-BHC (Lindane)	0.000025	U	0.000025		mg/L		05/07/20 16:29	05/11/20 19:27	1
Endrin	0.000025	U	0.000025		mg/L		05/07/20 16:29	05/11/20 19:27	1
Methoxychlor	0.000025	U	0.000025		mg/L		05/07/20 16:29	05/11/20 19:27	1
Heptachlor	0.000025	U	0.000025		mg/L		05/07/20 16:29	05/11/20 19:27	1
Toxaphene	0.0025	U	0.0025		mg/L		05/07/20 16:29	05/11/20 19:27	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*74*		*40 - 130*	*05/07/20 16:29*	*05/11/20 19:27*	*1*
DCB Decachlorobiphenyl	*63*		*14 - 130*	*05/07/20 16:29*	*05/11/20 19:27*	*1*

Lab Sample ID: LCS 680-617920/11-A
Matrix: Water
Analysis Batch: 618275

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 617920

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Heptachlor epoxide	0.0000500	0.0000643		mg/L		129	52 - 130
gamma-BHC (Lindane)	0.0000500	0.0000509		mg/L		102	52 - 130
Endrin	0.0000500	0.0000648		mg/L		130	59 - 143
Methoxychlor	0.0000500	0.0000741	*	mg/L		148	52 - 136
Heptachlor	0.0000500	0.0000530		mg/L		106	35 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*74*		*40 - 130*
DCB Decachlorobiphenyl	*84*		*14 - 130*

Lab Sample ID: LCSD 680-617920/12-A
Matrix: Water
Analysis Batch: 618275

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 617920

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Heptachlor epoxide	0.0000500	0.0000560		mg/L		112	52 - 130	14	50
gamma-BHC (Lindane)	0.0000500	0.0000410		mg/L		82	52 - 130	22	50
Endrin	0.0000500	0.0000647		mg/L		129	59 - 143	0	50
Methoxychlor	0.0000500	0.0000811	*	mg/L		162	52 - 136	9	50
Heptachlor	0.0000500	0.0000432		mg/L		86	35 - 130	20	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Tetrachloro-m-xylene	*58*		*40 - 130*
DCB Decachlorobiphenyl	*51*		*14 - 130*

Method: 8081B/8082A - Organochlorine Pesticides and Polychlorinated Biphenyls by Gas Chromatography (Continued)

Lab Sample ID: LB 680-617699/1-C
Matrix: Water
Analysis Batch: 618275

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 617920

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptachlor epoxide	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 19:12	1
Chlordane (technical)	0.012	U	0.012		mg/L		05/07/20 16:29	05/11/20 19:12	1
gamma-BHC (Lindane)	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 19:12	1
Endrin	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 19:12	1
Methoxychlor	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 19:12	1
Heptachlor	0.0012	U	0.0012		mg/L		05/07/20 16:29	05/11/20 19:12	1
Toxaphene	0.12	U	0.12		mg/L		05/07/20 16:29	05/11/20 19:12	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*71*		*40 - 130*	*05/07/20 16:29*	*05/11/20 19:12*	*1*
DCB Decachlorobiphenyl	*96*		*14 - 130*	*05/07/20 16:29*	*05/11/20 19:12*	*1*

Lab Sample ID: 680-183351-10 MS
Matrix: Water
Analysis Batch: 618275

Client Sample ID: MPE_WC_043020
Prep Type: TCLP
Prep Batch: 617920

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Heptachlor epoxide	0.0012	U F1	0.00235	0.00332	F1	mg/L		141	52 - 130
gamma-BHC (Lindane)	0.0012	U	0.00235	0.00267		mg/L		114	52 - 130
Endrin	0.0012	U F1	0.00235	0.00231	p	mg/L		99	59 - 143
Methoxychlor	0.0012	U F1 *	0.00235	0.00355	F1	mg/L		151	52 - 136
Heptachlor	0.0012	U	0.00235	0.00293		mg/L		125	35 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Tetrachloro-m-xylene	*81*		*40 - 130*
DCB Decachlorobiphenyl	*40*		*14 - 130*

Lab Sample ID: 680-183351-10 MSD
Matrix: Water
Analysis Batch: 618275

Client Sample ID: MPE_WC_043020
Prep Type: TCLP
Prep Batch: 617920

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Heptachlor epoxide	0.0012	U F1	0.00246	0.00227	p	mg/L		92	52 - 130	38	50
gamma-BHC (Lindane)	0.0012	U	0.00246	0.00255		mg/L		104	52 - 130	5	50
Endrin	0.0012	U F1	0.00246	0.00238	p	mg/L		97	59 - 143	3	50
Methoxychlor	0.0012	U F1 *	0.00246	0.00379	F1	mg/L		154	52 - 136	7	50
Heptachlor	0.0012	U	0.00246	0.00275		mg/L		111	35 - 130	7	50

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Tetrachloro-m-xylene	*69*		*40 - 130*
DCB Decachlorobiphenyl	*41*		*14 - 130*

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Lab Sample ID: MB 680-617609/2
Matrix: Water
Analysis Batch: 617609

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	0.50	U	0.50		mg/L			05/05/20 14:22	1

Lab Sample ID: LCS 680-617609/3
Matrix: Water
Analysis Batch: 617609

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	10.0	10.4		mg/L		104	90 - 110

Lab Sample ID: LCSD 680-617609/4
Matrix: Water
Analysis Batch: 617609

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

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromide	10.0	10.4		mg/L		104	90 - 110	0	15

Lab Sample ID: MB 680-617654/33
Matrix: Water
Analysis Batch: 617654

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	0.50	U	0.50		mg/L			05/05/20 21:59	1

Lab Sample ID: LCS 680-617654/34
Matrix: Water
Analysis Batch: 617654

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	10.0	10.4		mg/L		104	90 - 110

Lab Sample ID: LCSD 680-617654/35
Matrix: Water
Analysis Batch: 617654

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

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromide	10.0	10.5		mg/L		105	90 - 110	0	15

Lab Sample ID: MB 680-618000/2
Matrix: Water
Analysis Batch: 618000

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	0.50	U	0.50		mg/L			05/08/20 09:56	1

Lab Sample ID: LCS 680-618000/3
Matrix: Water
Analysis Batch: 618000

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	10.0	10.6		mg/L		106	90 - 110

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Lab Sample ID: LCSD 680-618000/4
Matrix: Water
Analysis Batch: 618000

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

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromide			10.0	10.6		mg/L		106	90 - 110	0	15

Method: 1010A - Ignitability, Pensky-Martens Closed-Cup Method

Lab Sample ID: LCS 240-434651/1
Matrix: Water
Analysis Batch: 434651

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Flashpoint			81.0	81.00		Degrees F		100	97 - 103		

Lab Sample ID: 680-183351-10 DU
Matrix: Water
Analysis Batch: 434651

Client Sample ID: MPE_WC_043020
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Flashpoint	>200			>200		Degrees F				NC	20

GC/MS VOA

Analysis Batch: 617669

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	TCLP	Water	8260B	617697
LB 680-617697/1-A	Method Blank	TCLP	Water	8260B	617697
MB 680-617669/10	Method Blank	Total/NA	Water	8260B	
LCS 680-617669/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-617669/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Leach Batch: 617697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	TCLP	Water	1311	
LB 680-617697/1-A	Method Blank	TCLP	Water	1311	

GC Semi VOA

Leach Batch: 617699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	TCLP	Water	1311	
LB 680-617699/1-C	Method Blank	TCLP	Water	1311	
680-183351-10 MS	MPE_WC_043020	TCLP	Water	1311	
680-183351-10 MSD	MPE_WC_043020	TCLP	Water	1311	

Prep Batch: 617920

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	TCLP	Water	3520C	617699
LB 680-617699/1-C	Method Blank	TCLP	Water	3520C	617699
MB 680-617920/10-A	Method Blank	Total/NA	Water	3520C	
LCS 680-617920/11-A	Lab Control Sample	Total/NA	Water	3520C	
LCSD 680-617920/12-A	Lab Control Sample Dup	Total/NA	Water	3520C	
680-183351-10 MS	MPE_WC_043020	TCLP	Water	3520C	617699
680-183351-10 MSD	MPE_WC_043020	TCLP	Water	3520C	617699

Analysis Batch: 618275

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	TCLP	Water	8081B/8082A	617920
LB 680-617699/1-C	Method Blank	TCLP	Water	8081B/8082A	617920
MB 680-617920/10-A	Method Blank	Total/NA	Water	8081B/8082A	617920
LCS 680-617920/11-A	Lab Control Sample	Total/NA	Water	8081B/8082A	617920
LCSD 680-617920/12-A	Lab Control Sample Dup	Total/NA	Water	8081B/8082A	617920
680-183351-10 MS	MPE_WC_043020	TCLP	Water	8081B/8082A	617920
680-183351-10 MSD	MPE_WC_043020	TCLP	Water	8081B/8082A	617920

HPLC/IC

Analysis Batch: 617609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-3	INJ_MPE01_042920	Total/NA	Water	300.0-1993 R2.1	
680-183351-4	INJ_OW02_042920	Total/NA	Water	300.0-1993 R2.1	
680-183351-8	INJ_OW02_043020	Total/NA	Water	300.0-1993 R2.1	
680-183351-9	INJ_MW23_043020	Total/NA	Water	300.0-1993 R2.1	
MB 680-617609/2	Method Blank	Total/NA	Water	300.0-1993 R2.1	
LCS 680-617609/3	Lab Control Sample	Total/NA	Water	300.0-1993 R2.1	
LCSD 680-617609/4	Lab Control Sample Dup	Total/NA	Water	300.0-1993 R2.1	

QC Association Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

HPLC/IC

Analysis Batch: 617654

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-2	INJ_MW24_042920	Total/NA	Water	300.0-1993 R2.1	
680-183351-5	INJ_MW23_042920	Total/NA	Water	300.0-1993 R2.1	
680-183351-6	INJ_MW24_043020	Total/NA	Water	300.0-1993 R2.1	
680-183351-7	INJ_MPE01_043020	Total/NA	Water	300.0-1993 R2.1	
MB 680-617654/33	Method Blank	Total/NA	Water	300.0-1993 R2.1	
LCS 680-617654/34	Lab Control Sample	Total/NA	Water	300.0-1993 R2.1	
LCSD 680-617654/35	Lab Control Sample Dup	Total/NA	Water	300.0-1993 R2.1	

Analysis Batch: 618000

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-1	INJ_BT_042920	Total/NA	Water	300.0-1993 R2.1	
MB 680-618000/2	Method Blank	Total/NA	Water	300.0-1993 R2.1	
LCS 680-618000/3	Lab Control Sample	Total/NA	Water	300.0-1993 R2.1	
LCSD 680-618000/4	Lab Control Sample Dup	Total/NA	Water	300.0-1993 R2.1	

General Chemistry

Analysis Batch: 434651

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-183351-10	MPE_WC_043020	Total/NA	Water	1010A	
LCS 240-434651/1	Lab Control Sample	Total/NA	Water	1010A	
680-183351-10 DU	MPE_WC_043020	Total/NA	Water	1010A	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_BT_042920
Lab Sample ID: 680-183351-1
Date Collected: 04/29/20 09:58
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		10	5 mL	5 mL	618000	05/08/20 13:10	CS	TAL SAV
	Instrument ID: CICH									

Client Sample ID: INJ_MW24_042920
Lab Sample ID: 680-183351-2
Date Collected: 04/29/20 18:00
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		1	5 mL	5 mL	617654	05/06/20 03:15	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_MPE01_042920
Lab Sample ID: 680-183351-3
Date Collected: 04/29/20 18:10
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		5	5 mL	5 mL	617609	05/05/20 20:18	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_OW02_042920
Lab Sample ID: 680-183351-4
Date Collected: 04/29/20 18:20
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		5	5 mL	5 mL	617609	05/05/20 20:31	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_MW23_042920
Lab Sample ID: 680-183351-5
Date Collected: 04/29/20 18:30
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		1	5 mL	5 mL	617654	05/06/20 03:28	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_MW24_043020
Lab Sample ID: 680-183351-6
Date Collected: 04/30/20 09:05
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		1	5 mL	5 mL	617654	05/06/20 03:41	UI	TAL SAV
	Instrument ID: CICK									

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Plant Waters

Job ID: 680-183351-1

Client Sample ID: INJ_MPE01_043020

Lab Sample ID: 680-183351-7

Date Collected: 04/30/20 09:10
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		1	5 mL	5 mL	617654	05/06/20 03:53	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_OW02_043020

Lab Sample ID: 680-183351-8

Date Collected: 04/30/20 09:15
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		10	5 mL	5 mL	617609	05/05/20 20:56	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: INJ_MW23_043020

Lab Sample ID: 680-183351-9

Date Collected: 04/30/20 09:20
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0-1993 R2.1		5	5 mL	5 mL	617609	05/05/20 20:43	UI	TAL SAV
	Instrument ID: CICK									

Client Sample ID: MPE_WC_043020

Lab Sample ID: 680-183351-10

Date Collected: 04/30/20 12:40
Matrix: Water
Date Received: 05/01/20 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	100 mL	617697	05/06/20 09:40	JEB	TAL SAV
TCLP	Analysis	8260B		20	5 mL	5 mL	617669	05/06/20 18:55	Y1S	TAL SAV
	Instrument ID: CMSB									
TCLP	Leach	1311			1.0 g	1.0 mL	617699	05/06/20 09:44	JEB	TAL SAV
TCLP	Prep	3520C			20.4 mL	5 mL	617920	05/07/20 16:29	EHS	TAL SAV
TCLP	Analysis	8081B/8082A		1			618275	05/11/20 20:56	JCK	TAL SAV
	Instrument ID: CSGZ									
Total/NA	Analysis	1010A		1			434651	05/18/20 03:36	TPH	TAL CAN
	Instrument ID: WHITEY									

Laboratory References:

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL SAV = Eurofins TestAmerica, Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Phone: 912-354-7858 Fax: 912-352-0165

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information	Sampler: Ali Ciblak	Lab PM: Lanier, Jerry A	Carrier Tracking No(s):	COC No: 680-114825-43945.1
Client Contact: Rich Murray	Phone: 857-241-7216	E-Mail: jerry.lanier@testamericainc.com		Page: Page 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:
Address: 1255 Roberts Blvd, NW Suite 200	Due Date Requested:			
City: Kennesaw	TAT Requested (days): Standard			
State, Zip: GA, 30144				
Phone: 678-202-9564(Tel)	PO #: PO814385			
Email: rmurray@geosyntec.com, aciblak@geosyntec.com	WO #: Task 100			
Project Name: Ashland - Brunswick Plant Waters	Project #: 68021893			
Site: Brunswick Pinova Facility - Injection Test	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	300_ORGFM_28D - Bromide	TCLP Pesticides (8081A, 8082A)	TCLP VOCs	Ignitability/Flash Point	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N					
INJ_BT_042920	4/29/20	9:58	G	Water			✓					
INJ_MW24_042920	4/29/20	18:00	G	Water			✓					
INJ_MPE01_042920	4/29/20	18:10	G	Water			✓					
INJ_OW02_042920	4/29/20	18:20	G	Water			✓					
INJ_MW23_042920	4/29/20	18:30	G	Water			✓					
INJ_MW24_043020	4/30/20	09:05	G	Water			✓					
INJ_MPE01_043020	4/30/20	09:10	G	Water			✓					
INJ_OW02_043020	"	09:15	G	Water			✓					
INJ_MW23_043020	"	09:20	G	Water			✓					
MPE_WC_043020	4/30/20	12:40	G	Water				✓	✓	✓		

680-183351 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Ali Ciblak	04/30/20 12:10				
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Relinquished by	Date/Time	Company	Received by	Date/Time: 5/1/2020 0940	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 4.7/5.1

Ver: 01/16/2019

Eurofins TestAmerica, Pensacola
3355 McLemore Drive
Pensacola, FL 32514
Phone: 850-474-1001 Fax: 850-478-2671

3 4/4-1

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lanier, Jerry A	Carrier Tracking No(s):	COC No: 400-243343.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: jerry.lanier@testamericainc.com	State of Origin: Georgia	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Florida		Job #: 680-183351-1
Address: 4101 Shuffel Street NW, ,	Due Date Requested: 5/15/2020			
City: North Canton	TAT Requested (days):			
State, Zip: OH, 44720				
Phone: 330-497-9396(Tel) 330-497-0772(Fax)	PO #:			
Email:	WO #:			
Project Name: Ashland - Brunswick Plant Waters	Project #: 68021893			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Z - other (specify)

Other:

C61

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1010A	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MPE_WC_043020 (680-183351-10)	4/30/20	12:40 Eastern		Water			X	1	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)***
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Kathy R Auer	5.13.20 1450	ETA	[illegible]	5/14/20 1020	ETA Can
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

5/18/2020

Eurofins TestAmerica Canton Sample Receipt Form/Narrative **Login # :** _____
Canton Facility

Client ETA Pensacola Site Name _____ Cooler unpacked by: Amm

Cooler Received on 5/14/20 Opened on 5/14/20

FedEx: 1st Grd (Exp) UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

Receipt After-hours: Drop-off Date/Time _____ Storage Location _____

TestAmerica Cooler # CANTON Foam Box Client Cooler Box Other _____

Packing material used: Bubble Wrap Foam Plastic Bag (None) Other _____

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-10 (CF +0.7 °C) Observed Cooler Temp. 3.4 °C Corrected Cooler Temp. 4.1 °C
   IR GUN #IR-11 (CF +0.9°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes)	No
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes)	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	(No)
-Were tamper/custody seals intact and uncompromised?	(Yes)	No NA
3. Shippers' packing slip attached to the cooler(s)?	(Yes)	No
4. Did custody papers accompany the sample(s)?	(Yes)	No
5. Were the custody papers relinquished & signed in the appropriate place?	(Yes)	No
6. Was/were the person(s) who collected the samples clearly identified on the COC?	Yes	(No)
7. Did all bottles arrive in good condition (Unbroken)?	(Yes)	No
8. Could all bottle labels be reconciled with the COC?	(Yes)	No
9. Were correct bottle(s) used for the test(s) indicated?	(Yes)	No
10. Sufficient quantity received to perform indicated analyses?	(Yes)	No
11. Are these work share samples?	(Yes)	No
If yes, Questions 12-16 have been checked at the originating laboratory.		
12. Were all preserved sample(s) at the correct pH upon receipt?	Yes	No NA pH Strip Lot# HC902937
13. Were VOAs on the COC?	Yes	No
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this.	Yes	No NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	No
16. Was a LL Hg or Me Hg trip blank present? _____	Yes	No

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Amm 5/14/20

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: Ryan C

18. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

WI-NC-099

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Phone: 912-354-7858 Fax: 912-352-0165

Chain of Custody Record

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lanier, Jerry A	Carrier Tracking No(s):	COC No: 680-609951.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: jerry.lanier@testamericainc.com	State of Origin: Georgia	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Florida		Job #: 680-183351-1
Address: 3355 McLemore Drive, ,	Due Date Requested: 5/13/2020			
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Ashland - Brunswick Plant Waters	Project #: 68021893			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1010A	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MPE_WC_043020 (680-183351-10)	4/30/20	12:40 Eastern		Water			X	1	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

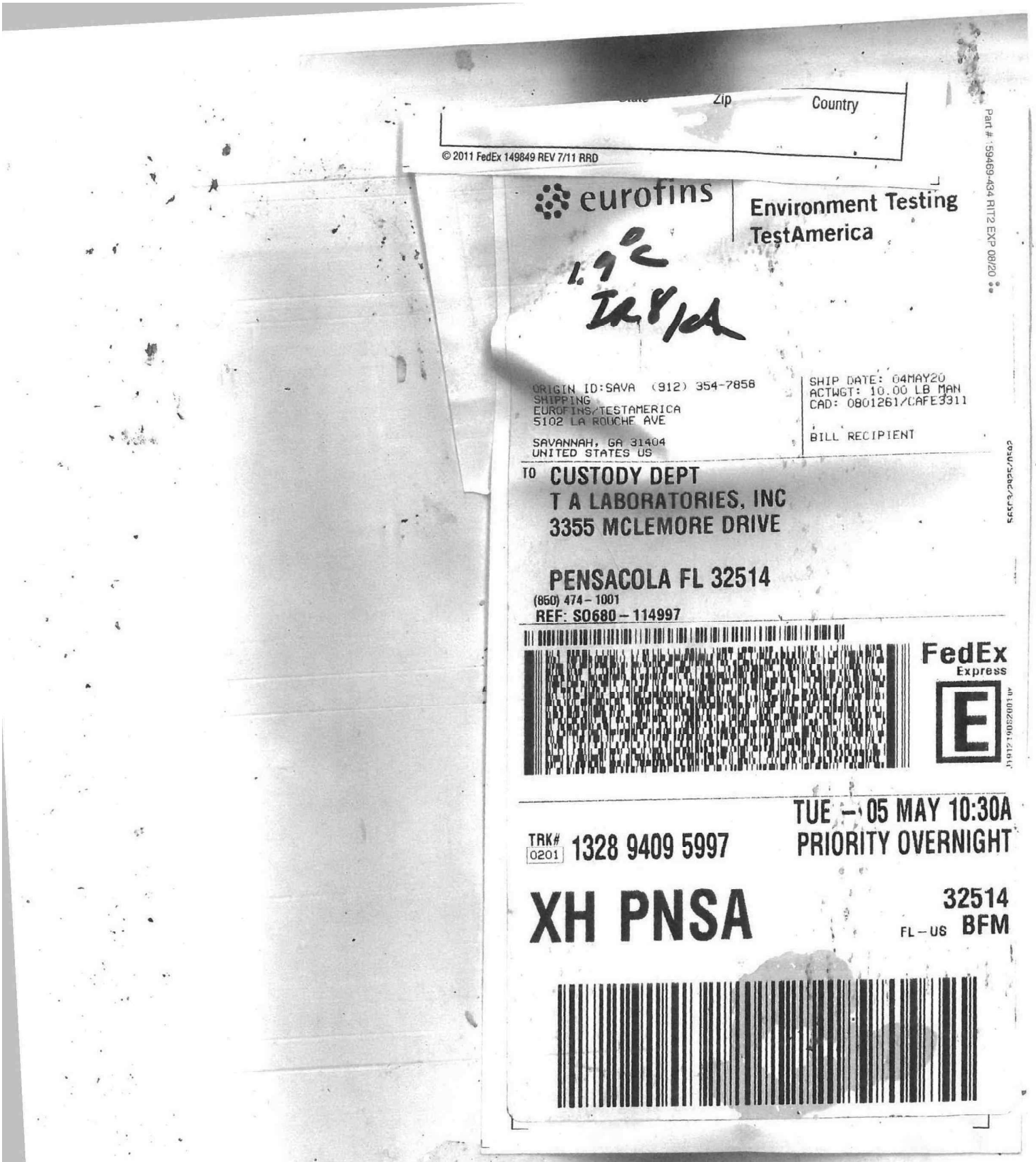
Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	05-04-2020	1214	Megan Hinnidsen	5-5-2020 936	TAMPEW
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.9°C IR8

Ver: 01/16/2019



Zip Country

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Part # 159469-434 RIT2 EXP 08/20

eurofins | Environment Testing TestAmerica

1.9°C
IR-8 ICA

ORIGIN ID:SAVA (912) 354-7858
SHIPPING
EUROFINS/TESTAMERICA
5102 LA ROUCHE AVE

SAVANNAH, GA 31404
UNITED STATES US

SHIP DATE: 04MAY20
ACTWGT: 10.00 LB MAN
CAD: 0801261/CAFE3311

BILL RECIPIENT

TO CUSTODY DEPT
T A LABORATORIES, INC
3355 MCLEMORE DRIVE

PENSACOLA FL 32514
(850) 474-1001
REF: SO680-114997

FedEx Express

TRK# 0201 1328 9409 5997

TUE - 05 MAY 10:30A
PRIORITY OVERNIGHT

XH PNSA

32514
FL-US BFM

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 680-183351-1

Login Number: 183351
List Number: 1
Creator: Laughlin, Paul D

List Source: Eurofins TestAmerica, Savannah

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

Accreditation/Certification Summary

Client: Geosyntec Consultants, Inc. Job ID: 680-183351-1
Project/Site: Ashland - Brunswick Plant Waters

Laboratory: Eurofins TestAmerica, Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Florida	NELAP	E87052	06-30-20

Laboratory: Eurofins TestAmerica, Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-23-21
Connecticut	State	PH-0590	12-31-21
Florida	NELAP	E87225	06-30-20
Georgia	State	4062	02-23-21
Illinois	NELAP	004498	07-31-20
Iowa	State	421	06-01-21
Kansas	NELAP	E-10336	04-30-21
Kentucky (UST)	State	112225	02-23-21
Kentucky (WW)	State	KY98016	12-31-20
Minnesota	NELAP	OH00048	12-31-20
Minnesota (Petrofund)	State	3506	08-01-21
New Jersey	NELAP	OH001	06-30-20
New York	NELAP	10975	03-31-21
Ohio VAP	State	CL0024	06-05-21
Oregon	NELAP	4062	02-24-21
Pennsylvania	NELAP	68-00340	08-31-20
Texas	NELAP	T104704517-18-10	08-31-20
USDA	US Federal Programs	P330-18-00281	09-17-21
Virginia	NELAP	010101	09-14-20
Washington	State	C971	01-12-21
West Virginia DEP	State	210	12-31-20