APPENDIX J

EISB Treatability Study Reports for Shallow Groundwater

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Laboratory Biotreatability Study to Evaluate Anaerobic Remediation of Benzene and p-Cymene in Groundwater

SGW-23 Area Near Stillhouse Control Room - Brunswick, GA

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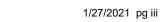




LIST OF ABBREVIATIONS

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% °C °C/min	percent degrees Celsius degrees Celsius per minute
µg/L	micrograms per liter
μL	microliter
abcA	benzene carboxylase
CO ₂	carbon dioxide
DAP	diammonium phosphate
FID	flame ionization detector
g	grams
GC	gas chromatograph
Geosyntec	Geosyntec Consultants Inc.
gene copies/L	gene copies per liter
IC	ion chromatograph
mg/L	milligrams per liter
min	minutes
mL	milliliter
mL/min	milliliters per minute
mM	millimolar
mmol/bottle	millimoles per bottle
mV	millivolts
NRBC	nitrate reducing benzene culture
ORP	oxidation-reduction potential
p-cymene	para-cymene
pepto-ben	Peptococcaceae
psi	pounds per square inch
QL	quantitation limit
RPM	revolutions per minute
SiREM	SiREM Laboratory
the Site	Brunswick site
VFA	volatile fatty acid
VOC	volatile organic compound
qPCR	quantitative polymerase chain reaction
SRB	sulfate reducing bacteria
rRNA	ribosomal ribonucleic acid



1. INTRODUCTION

Geosyntec Consultants Inc., (Geosyntec) retained SiREM Laboratory (SiREM) to perform a laboratory treatability study to evaluate the degradation of volatile organic compounds (VOCs) in the SGW-23 area near Stillhouse Control Room at the Brunswick site in Georgia (the Site). The purpose of the study was to assess the potential for anaerobic biodegradation of the target VOCs, namely benzene and para-cymene (p-cymene).

The groundwater labelled MPE Well was collected on 20 Feb 2020 by Geosyntec personnel and received by SiREM on 24 Feb 2020 at a temperature of 4 degrees Celsius (°C). The geologic material labelled Pinova MPE (2-5', 5-10', 6-8', 8-10') was collected on 18 Feb 2020 by Geosyntec personnel and received by SiREM on 21 Feb 2020 at a temperature of 3 °C. Refer to Appendix A for the chain of custody documentation received with the materials.

The remainder of this report contains a summary of key biodegradation processes (Section 1.1), the experimental materials and methods (Section 2), the results and discussion of the microcosm study (Section 3), conclusions (Section 4) and report references (Section 5).

1.1 Summary of Biodegradation Processes

Benzene compounds can be biologically degraded under a variety of aerobic and anaerobic conditions (Wiedemeier et al. 1995). Under aerobic conditions the compounds are oxidized using atmospheric oxygen and carbon dioxide (CO_2) is produced. Under anaerobic conditions, natural attenuation processes can occur in situ and are often mediated by indigenous microbial populations present at sites containing benzene. Benzene can act as an electron donor for nitrate-reducing, iron-reducing, sulfate reducing, or methanogenic bacteria. In the process benzene is oxidized via anaerobic pathways to carbon dioxide (Ulrich et al., 2005). Enhanced biological remediation can in certain cases be achieved by stimulating the indigenous microbial populations through the addition of electron acceptors, such as nitrate.

Named in honor of anaerobic hydrocarbon degradation pioneer Dunja Grbić-Galić, DGG-B[™] is an anaerobic mixed microbial consortium capable of degrading benzene. This mixed culture originated as an enrichment from a diverse natural microbial community chronically exposed to hydrocarbons (Nales et al., 1998), and has been maintained by the University of Toronto and SiREM for over 20 years (Burland and Edwards, 1999; Ulrich and Edwards, 2003; Mancini et al., 2008; Luo et al., 2016). Benzene is added as the sole carbon source and can couple hydrocarbon degradation to sulfate reduction, or fermentative (methanogenic) metabolism.

The DGG-B[™] culture, grown fermentatively on benzene, has consistently been dominated by four microorganisms for more than 15 years (Ulrich and Edwards, 2003; Mancini et al., 2008; Luo et al., 2016). Benzene fermentation is first catalyzed by a *Deltaproteobacteria* designated ORM2 (Luo et al., 2016), which typically comprises 14-32 percent (%) of the total microbial community composition at a concentration of 10⁷-10⁸ gene copies per liter (gene copies/L). The other organisms in the cultures are predominantly methanogens.



A research culture from the University of Toronto referred to as the nitrate reducing benzene culture (NRBC) was also tested in this study. This culture has similarly been maintained on benzene under nitrate reducing conditions for over 15 years at the University of Toronto (Burland and Edwards, 1999).

2. MATERIALS AND METHODS

The following sections describe the materials and methods used for microcosm construction and incubation (Section 2.1), and microcosm sampling and analysis (Section 2.2).

2.1 Microcosm Construction and Incubation

2.1.1 Microcosm Construction

Treatability microcosms were constructed in a disposable anaerobic glove bag containing the Site groundwater and geologic materials and all the materials required to construct the treatment and control microcosms. The glove bag was purged with nitrogen gas in order to create an anaerobic environment and to protect any microorganisms present in the site materials from oxygen exposure. Prior to microcosm construction, all of the Site geologic materials were thoroughly homogenized by hand.

Microcosms were constructed on 27 February 2020 (Day -11) by filling sterile 250 millilitre (mL) (nominal volume) screw cap Boston round clear glass bottles (Systems Plus, New Hamburg, ON) with 200 mL of Site groundwater and 60 grams (g) of geologic material. The DGG Bioaugmented treatment was added to the scope of the study after the initial set up, so those microcosms were constructed using the same procedure on 25 June 2020 (Day -21) and have a different Time 0 date than the rest of the study. The bottles were capped with Mininert[™] closures to allow repetitive sampling with minimal VOC loss. All treatment and control microcosms were constructed in triplicate. Table 1 summarizes the details of microcosm construction and the amendments used for the control and treatment microcosms.

Anaerobic sterile control microcosms were constructed to quantify potential abiotic and experimental volatile losses from the microcosms. The sterile controls were constructed by autoclaving the Site geologic materials at 121 °C and 15 pounds per square inch (psi) pressure for 45 to 60 minutes (min). After autoclaving, the sterile control microcosms were returned to the anaerobic chamber, filled with 200 mL of Site groundwater and amended with mercuric chloride and sodium azide as described in Table 1.

2.1.2 Microcosm Amendments and Incubation

All microcosms were sampled and incubated in an anaerobic chamber (Coy Laboratory Products, Grass Lake, MI) filled with an atmosphere of approximately 80% nitrogen, 10% CO₂ and 10% hydrogen (Linde Gases, Guelph, ON). Hydrogen in the anaerobic chamber functions to scavenge trace oxygen via a palladium catalyst. Anaerobic conditions in the anaerobic chamber were verified using an indicator containing resazurin (Sigma, St. Louis, MO) in a mineral medium, which turns pink in the presence of oxygen. During quiescent incubation, all microcosms were covered



to minimize photodegradation, and stored horizontally to minimize volatile losses via the (submerged) Mininert[™] closure. Microcosms were incubated for a period of up to 225 days at approximately 22°C (room temperature).

The initial benzene and p-cymene concentrations in the microcosms were 5.2 milligrams per litre (mg/L) and 4.8 mg/L respectively. Geosyntec confirmed that these concentrations were representative of the Site conditions, so it was not necessary to spike the microcosms. However, the DGG Bioaugmented microcosms that were constructed at later date had a lower concentration of benzene and were spiked with 61 μ L of a saturated benzene solution on 16 July 20 (Day 0) to target a concentration of 5 mg/L.

In this study, nitrate was selected as the electron acceptor to be evaluated and was provided in the form of sodium nitrate (BioShop Canada Inc., Burlington, ON). In one treatment nitrate amendment was tested in combination with NRBC bioaugmentation. In another treatment nitrate amendment was tested in combination with nutrient amendment using diammonium phosphate (DAP) (BioShop Canada Inc., Burlington, ON) to potentially stimulate intrinsic nitrate reducing bacteria.

On 16 March 2020 (Day 0), Nitrate Amended microcosms were amended with sodium nitrate and Nitrate and Nutrient Amended microcosms were amended with sodium nitrate and diammonium phosphate. In consultation with Geosyntec, it was decided to target a nitrate concentration of 100 mg/L (as nitrogen) and a DAP concentration of 20 mg/L. On 16 July 2020 (Day 0), DGG Bioaugmented microcosms were amended with 100 microliters (μ L) of an iron sulfide suspension to accelerate the establishment of reducing conditions.

The first microcosm of each treatment and control was amended with resazurin (Sigma, St. Louis, MO) to monitor redox conditions. Resazurin turns from pink to clear in the absence of oxygen and can be used to indicate the on-set of reducing conditions. Details of amendments are provided in Table 1 and Table 2.

2.2 Microcosm Sampling and Analysis

2.2.1 Microcosm Sampling Schedules

The sampling frequency for all parameters was determined in consultation with Geosyntec based on anticipated microbial activity. The microcosms were sampled using gas-tight 250 μ L Hamilton glass syringes. Syringes were cleaned with acidified water (pH ~2) and rinsed 10 times with deionized water between samples to ensure that the VOCs and microorganisms were not transferred between different samples or treatments.

VOC, pH, ORP, and anion samples were collected from ongoing microcosms. Samples for ammonia and p-cymene analysis were taken from designated sacrificial microcosms. The DGG Bioaugmented microcosms were not sampled for anion, p-cymene, or ammonia analysis. At Time 0, the active control microcosms were sampled for p-Cymene analysis and ammonia samples were collected from the first replicate of treatments that were amended with nitrate. These results were used to represent the initial p-cymene and ammonia concentrations.





2.2.2 Analysis of VOC Compounds

This section describes the methods used by SiREM to quantify the VOCs and DHGs. The quantitation limits (QL) for these compounds were typically 20 micrograms per liter (μ g/L) in the microcosms based on the lowest concentration standards that were included in the linear calibration trend.

Aqueous VOC concentrations in the microcosms were measured using a Hewlett-Packard (Hewlett Packard 7890) gas chromatograph (GC) equipped with an auto sampler (Hewlett Packard G1888) programmed to heat each sample vial to 75°C for 45 min. prior to headspace injection into a GSQ Plot column (0.53 millimeters x 30 meters, J&W) and a flame ionization detector (FID). Sample vials were heated to ensure that all VOCs in the aqueous sample would partition into the headspace. The injector temperature was 200°C, and the detector temperature was 250°C. The oven temperature was programmed as follows: 35°C for 2 min, increased to 100°C at 50 degrees Celsius per minute (°C/min), then increased to 185°C at 25°C/min and held at 185°C for 6.80 min. The carrier gas was helium at a flow rate of 11 milliliters per minute (mL/min).

After withdrawing a 0.1 milliliter (mL) sample (as described in section 2.2.1), the sample was injected into a 10 mL auto sampler vial containing 5.9 mL of acidified de-ionized water (pH ~2). The water was acidified to inhibit microbial activity between microcosm sampling and GC analysis. The vial was sealed with an inert Teflon[®]-coated septum and aluminium crimp cap for automated injection of 3 mL of headspace onto the GC. One standard was analysed with each set of samples to verify the instrument five-point calibration curve. Calibration was performed using external standard solutions (Sigma, St Louis, MO), where known volumes of standard solutions were added to acidified water in auto sampler vials and analysed as described above for microcosm samples. Data were integrated using Chemstation Software (Agilent Technologies, Santa Clara, CA).

2.2.3 Analysis of Anions

Anion and total VFA analysis were performed by SIREM on a Thermo-Fisher ICS-2100 ion chromatograph (IC) equipped with a Thermo-Fisher AS-DV autosampler and an AS18 column, the sample loop volume was 25 µL. An isocratic separation was performed using 33 millimolar (mM) reagent grade sodium hydroxide eluent generator cartridge (Thermo Scientific, Burlington, ON) eluent for 13 min. One standard was analysed with each set of samples tested in order to verify the seven-point calibration using external standards of known concentrations. External standards were prepared gravimetrically using chemicals of the highest purity available (Sigma St Louis, MO or Bioshop, Burlington, ON). Data were integrated using Chromeleon 7[®] Chromatography software (Thermo-Fisher, Burlington, ON). The QLs were as follows: 0.07 mg/L total volatile fatty acid (VFA), 0.07 mg/L chloride, 0.09 mg/L nitrite, 0.09 mg/L nitrate, 0.07 mg/L sulfate, 0.07 mg/L phosphate and 0.08 mg/L bromide. The total VFA value includes lactate, formate, acetate, propionate, pyruvate and butyrate (valerate has not been confirmed).





A 0.5 mL sample was withdrawn (as described in section 2.2.1), after which the sample was placed in a 1.5 mL micro-centrifuge tube. Samples were centrifuged for five minutes at 13,000 revolutions per minute (RPM) to remove solids. The supernatant was removed, diluted 50-fold in deionized water and placed in a Thermo-Fisher autosampler vial with a cap that filters the sample during automated injection onto the IC.

2.2.4 Analysis of ORP

Oxidation-reduction potential (ORP) measurements were performed using an Omega PHH-127 Multi-Parameter Water Quality Monitor with ORP Probe (Omega, Laval, QC). A 1.5 mL sample was taken (as described in section 2.2.1) and placed in a 5 mL Thermo-Fisher vial. The ORP was measured on the lab bench immediately after sampling. A single point calibration of the meter was performed at each sampling event with Zobell ORP calibration solution (YSI Incorporated, Yellow Springs, OH).

2.2.5 Analysis of pH

The pH measurements were performed by SIREM using an Oakton pH spear with a combination pH electrode (Oakton, Vernon Hills, IL). A 0.5 mL sample was taken (as described in section 2.2.1), the vial was removed from the glove box and the pH was measured on the lab bench. The pH spear was calibrated at each sampling event according to the manufacturer's instructions using pH 4.0, 7.0 and 10 standards.

2.2.6 Gene-Trac[®] Testing

Gene-Trac[®] quantitative polymerase chain reaction (qPCR) testing was performed in this study to quantify and characterize sulfate reducing bacteria (SRB), ORM2, and *Peptococcaceae* (peptoben) microorganisms as well as the functional gene benzene carboxylase (abcA). SRB facilitate the reduction of sulfate to sulfide and are well known to promote the degradation of various petroleum hydrocarbons. The Gene-Trac[®] SRB test targets the drsA gene. ORM2 are benzene specialists and facilitate the oxidation of benzene to carbon dioxide. The Gene-Trac[®] ORM2 tests quantify the total ORM2 by targeting the 16S ribosomal ribonucleic acid (rRNA) gene. Pepto-ben can co-metabolically degrade benzene in the presence of nitrate. The functional gene benzene carboxylase is involved in the cleavage of the aromatic benzene ring.

Samples for Gene-Trac[®] analysis were collected from the bulk groundwater at the beginning of the study.

2.2.7 Analysis of p-Cymene and Ammonia

Analysis of p-cymene was conducted by Pace Analytical in Indianapolis, IN. Samples were collected in 40 mL glass vials and preserved with hydrochloric acid. Analysis of ammonia was conducted by ALS Environmental in Waterloo, ON. Samples were collected in 40 mL glass vials and preserved with sulfuric acid.



3. RESULTS AND DISCUSSION

The following sections present and discuss the results of the biotreatability study:

- Gene-Trac[®] Results (Section 3.1),
- Redox processes (Section 3.2),
- VOC Biodegradation Results (Section 3.3)

Tables 2, 3, 4, 5, and 6 provide VOC, DHG, anion, pH, ORP, Gene-Trac[®], and half-life data. All VOC and DHG concentrations are presented in units of mg/L and millimoles per microcosm bottle (mmol/bottle) to demonstrate mass balances on a molar basis. Concentrations were converted from mg/L to mmol/bottle using Henry's Law as demonstrated in Appendix B. Anion concentrations are reported in mg/L. ORP is reported in millivolts (mV). Gene-Trac[®] data is reported in gene copies/L. VOC half-life data is reported in days. Figures 1-5 present trends in the concentrations of VOCs in the control and treatment microcosms over the incubation period. Gene-Trac[®], ALS, and Pace reports are provided in Appendix C, D, and E, respectively.

3.1 Gene-Trac[®] Results

The Gene-Trac[®] results from the bulk groundwater are presented in Table 5. ORM2 and SRB were detected at 10⁴ gene copies/L. abcA and pepto-ben were not detected. These results suggest that indigenous nitrate reducing benzene degrading organisms may not be present, while low concentrations of sulfate reducing and potentially benzene degrading organisms may be present.

3.2 Redox Processes

The presence of electron donors, including benzene and other organic compounds, and electron acceptors (i.e., nitrate), typically stimulates microbial activity that promotes increasingly reduced conditions in groundwater.

The sequence of redox reactions in groundwater is well known (Appelo and Postma, 1994). Oxygen is first consumed, followed by nitrate (denitrification), iron, manganese, and sulfate reduction producing sulfides. The final step is CO_2 reduction producing methane (methanogenesis). The consumption of each species in sequence indicates that conditions are becoming increasingly reducing. Benzene degrades readily under aerobic conditions and can also be degraded anaerobically in the range of nitrate reducing to methanogenic conditions.

Nitrate and sulfate concentrations in the Nitrate Amended and Nitrate and Nutrient Amended treatments remained relatively stable during the incubation period (Table 3) indicating that the reducing conditions necessary for anaerobic benzene degradation to occur were not established. This is further supported by the Day 225 ORP results in the range of 67 to 78 mV for these treatments (Table 4).





For the DGG Bioaugmented treatment, Day 1 ORP results (-49 mV) indicate that reducing conditions were established after the addition iron sulfide. However, the Day 104 results (52 mV) suggest that reducing conditions may not have persisted throughout the incubation period (Table 4). Anion analysis was not conducted for this treatment.

These results suggest that the reducing conditions required for anaerobic benzene degradation to occur may not be able to be achieved intrinsically, by amendment with nitrate, or by amendment with nitrate and nutrients in the form of DAP. Microbial populations capable of creating increasingly reducing conditions with these amendments may not have been present or were only present at low concentrations.

3.3 VOC Biodegradation Results

3.3.1 Half Lives

Laboratory half-lives were calculated based on the average dechlorination observed in the treatment microcosms. First order reaction kinetics was assumed for all calculations as described in Newell et al, 2002. The half-lives were calculated using the following relationship:

$$Half - life = \frac{\ln(2)}{\left[\frac{\ln\left(\frac{C_2}{C_1}\right)}{t_2 - t_1}\right]}$$

where,

 C_1 is the concentration at first time (t₁ days)

 C_2 is the concentration at second time (t₂ days)

Half-lives were not calculated if net degradation of the compound was not detected during the study period.

3.3.2 VOC Biodegradation Results

All VOC results discussed in this section are presented in Table 2 and Figures 1-5. Half-life data is presented in Table 6. Aside from the cases discussed below, net degradation of benzene and p-cymene was not observed during the incubation period and half-lives were not calculated.

A half-life of 242 days was calculated for p-cymene in the Sterile Control. The decrease in the concentration of p-cymene in the Sterile Control occurred between Day 0 and Day 28 (the subsequent data point), whereas the concentration remained relatively stable after Day 28. The Time 0 Active Control p-cymene data was used to represent Time 0 conditions for all controls and treatments. It's possible that the Time 0 Active Control p-cymene data may not be representative of the concentration of p-cymene that would have been reported for the Sterile Control. For example, the autoclaving of geologic material for the Sterile Control may have resulted in losses



that led to a lower equilibrium concentration in the microcosm groundwater after construction. No p-cymene degradation was observed in the Active Control suggesting that no intrinsic degradation of p-cymene occurred.

Small benzene losses were observed in the DGG Bioaugmented treatment resulting in a calculated half-life of 1436 days. Endpoint sampling for this treatment occurred 103 days post bioaugmentation and the onset benzene degradation may not have occurred yet in these microcosms.

These results suggest that nitrate and nutrient amendments did not stimulate intrinsic degradation of benzene or p-cymene. DGG-B[™] bioaugmentation did not increase degradation rates in the time period that was studied.

4. CONCLUSIONS

The study was conducted with a primary objective to assess the potential for anaerobic degradation of benzene and p-cymene using nitrate amendment and nutrient amendment. Bioaugmentation was added to the scope midway through the study. The laboratory biotreatability study results suggest the following conclusions:

- 1. Benzene degrading ORM2 organisms were detected in the Site groundwater at low concentrations suggesting that anaerobic biodegradation of benzene may be possible under sulfate reducing or methanogenic conditions. No nitrate reducing microbial populations were detected at the onset of the study.
- 2. Nitrate reducing conditions were not established in the treatment microcosms with or without the addition of nutrients.
- 3. Degradation of benzene and p-cymene was not achieved over the incubation period. Potential degradation may have been inhibited by suboptimal conditions, such as insufficiently reducing conditions. For the DGG Bioaugmented treatment, the incubation period may not have been long enough to allow benzene degradation activity to get established.

The results indicate that nitrate and nutrient amendment may not be capable of stimulating degradation of benzene via nitrate reduction. Further testing or longer incubation period may be required to determine the suitability of bioaugmentation using DGG consortium as a remedy for this area of the Site.

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TABLES



TABLE 1: SUMMARY OF MICROCOSM CONTROLS, TREATMENTS AND AMENDMENTS SGW-23 Area Near Stillhouse Control Room - Brunswick, GA

Treatment/Control	Assigned Microcosm Number	Number of Microcosms	Number of Sacrificial Microcosms	Geological Material (g)	Groundwater (mL)	Headspace (mL)	Sodium Azide	Mercuric Chloride	Iron Sulfide	VOCs	Rezasurin	Nitrate	DAP	Bioaugmentation
Sterile Control	1 to 3	3	12	60	200	20		Amended with 2.8 mL of a 2.7% solution on Day -18.	-	-		-	-	-
Active Control	4 to 6	3	12	60	200	20	-	-	-	-		-	-	-
Nitrate Amended/NRBC Bioaugmented	7 to 9	3	12	60	200	20	-	-	-	-	Amended first replicate with 100 µL of a 1,000 mg/L solution on Day - 18.	Amended with 0.5 mL of a 267 g/L sodium nitrate solution to a target a nitrate-N concentration of 100 mg/L.	-	Bioaugmented with 8 mL of NRBC on Day 73
Nitrate and Nutrient Amended	10 to 12	3	12	60	200	20	-	-	-				Amended with 267 µL of a 15 g/L DAP solution to a target a concentration of 20 mg/L.	-
DGG Bioaugmented	13 to 15	3	12	60	200	20	-		Amended with 100 µL of an iron sulfide suspension.	Spiked with 61 µL of a saturated benzene solution to target a concentration of 5		-	-	Bioaugmented with 5 mL of DGG-B [™] on Day 0.

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Table 1

Treatment	Date	Day	Replicate	Bottle	Ethene	Acetylene	Ethane	Methane	Benzene	p-Cymene	
			Replicate	Bottle	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Sterile Control	27-Feb-20	-18									Poisoned with mercuric chloride and sodium azide
											Amended the first replicate with resazurin.
	16-Mar-20	0	ANSC-1 ANSC-2	1 2	<0.010 <0.010	<0.0010 <0.0010	<0.010 <0.010	0.68	4.6 4.8	-	
			ANSC-2 ANSC-3	3	<0.010	<0.0010	<0.010	0.76	4.0 5.4		
			Average Concentration (mg/L)	- °	ND ND	ND	ND	0.76	4.9		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	1.8E-03	1.1E-03		
			Average Total mmoles		ND	ND	ND	0.033	0.013		
	30-Mar-20	14	ANSC-1	1	<0.020	< 0.0020	<0.020	0.89	6.1		
			ANSC-2	2	< 0.020	< 0.0020	< 0.020	0.93	6.5		
			ANSC-3	3	<0.020	<0.0020	< 0.020	0.94	7.2		
			Average Concentration (mg/L)	1	ND	ND	ND	0.92	6.6		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	1.2E-03	1.4E-03		
			Average Total mmoles		ND	ND	ND	0.043	0.017	-	
	13-Apr-20	28	ANSC-1	1	<0.020	<0.0020	<0.020	0.69	5.9	1.07	
			ANSC-2 ANSC-3	2	< 0.020	<0.0020 <0.0020	<0.020 <0.020	0.75	6.2 6.7	1.50	
				3	<0.020						
	1		Average Concentration (mg/L) Standard Deviation (mmoles)	1	ND 0.0E+00	ND 0.0E+00	ND 0.0E+00	0.73 1.8E-03	6.3 1.0E-03	1.32 2.3E-01	1
	1		Average Total mmoles	1	0.0E+00 ND	0.0E+00 ND	0.0E+00 ND	0.034	0.016	0.0022	1
	04-May-20	49	Average Total minoles ANSC-1	1	<0.020	<0.0020	<0.020	0.68	6.1	0.0022	1
	1	1	ANSC-2	2	<0.020	<0.0020	<0.020	0.00	6.3		1
	1		ANSC-3	3	<0.020	<0.0020	<0.020	0.86	6.9	-	1
	1		Average Concentration (mg/L)	1	ND	ND	ND	0.76	6.4		1
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	4.4E-03	1.1E-03		
			Average Total mmoles		ND	ND	ND	0.035	0.017		
	26-May-20	71	ANSC-1	1	<0.020	<0.0020	<0.020	0.76	6.1		
			ANSC-2	2	< 0.020	<0.0020	<0.020	1.0	6.3		
			ANSC-3	3	<0.020	<0.0020	<0.020	0.91	7.1		
			Average Concentration (mg/L)		ND	ND	ND	0.89	6.5		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	5.8E-03	1.3E-03		
	10.1.00		Average Total mmoles		ND	ND	ND	0.041	0.017	-	
	19-Jun-20	95	ANSC-1 ANSC-2	1	< 0.020	< 0.0020	< 0.020	0.70	5.5		
			ANSC-2 ANSC-3	2	<0.020 <0.020	<0.0020 <0.0020	<0.020 <0.020	0.71 0.74	5.6 6.3	-	
			Average Concentration (mg/L)	1°	ND	ND	ND	0.74	5.8		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	9.2E-04	1.1E-03		
			Average Total mmoles		ND	ND	ND	0.033	0.015		
	25-Aug-20	162	ANSC-1	1	<0.020	< 0.0020	< 0.020	0.70	6.2		
	-		ANSC-2	2	<0.020	< 0.0020	< 0.020	0.77	6.5		
			ANSC-3	3	< 0.020	< 0.0020	< 0.020	0.52	7.2		
			Average Concentration (mg/L)	1	ND	ND	ND	0.66	6.6		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	6.0E-03	1.3E-03		
			Average Total mmoles		ND	ND	ND	0.031	0.017		
	27-Oct-20	225	ANSC-1	1	<0.020	<0.0020	<0.020	0.64	6.2	2.48	
	1		ANSC-2	2	<0.020	<0.0020	<0.020	0.76	6.3	1.23	1
	1		ANSC-3	3	<0.020	<0.0020	< 0.020	0.56	7.1	1.04	1
	1		Average Concentration (mg/L)	1	ND	ND	ND	0.65	6.5	1.58	1
	1		Standard Deviation (mmoles)	1	0.0E+00 ND	0.0E+00 ND	0.0E+00 ND	4.8E-03 0.03	1.3E-03 0.017	7.8E-01 0.0026	1
Active Control	27-Feb-20	-18	Average Total mmoles		ND	ND	ND	0.03	0.017	0.0026	Amended the first replicate with resazurin.
Active Control	16-Mar-20		ANAC-1	4	<0.010	<0.0010	<0.010	0.78	4.9	4.97	
	10*mai+20	ľ	ANAC-1 ANAC-2	5	<0.010	<0.0010	<0.010	0.78	4.9	4.97	1
			ANAC-3	6	<0.010	<0.0010	<0.010	0.78	4.8	4.30	
	1		Average Concentration (mg/L)	1	ND	ND	ND	0.79	4.8	4.34	1
	1		Standard Deviation (mmoles)	1	0.0E+00	0.0E+00	0.0E+00	9.7E-04	1.3E-04	6.0E-01	1
	1		Average Total mmoles	1	ND	ND	ND	0.037	0.013	0.0071	1
	30-Mar-20	14	ANAC-1	4	<0.020	< 0.0020	< 0.020	1	6.7		1
	1		ANAC-2	5	<0.020	<0.0020	< 0.020	1.1	6.7		1
	1		ANAC-3	6	<0.020	<0.0020	<0.020	1.1	6.7		1
	1		Average Concentration (mg/L)	1	ND	ND	ND	1.1	6.7		1
	1		Standard Deviation (mmoles)	1	0.0E+00	0.0E+00	0.0E+00	1.7E-03	3.2E-05		1
			Average Total mmoles		ND	ND	ND	0.049	0.017		

Table 2

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				-	Ethene	Acetylene	Ethane	Methane	Benzene	p-Cymene	
Treatment	Date	Day	Replicate	Bottle	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Active Control	13-Apr-20	28	ANAC-1	4	<0.020	<0.0020	<0.020	0.84	6.1	4.15	
Continued			ANAC-2	5	<0.020	<0.0020	<0.020	0.85	6.0	4.01	
			ANAC-3	6	< 0.020	<0.0020	< 0.020	0.86	6.2	5.07	
			Average Concentration (mg/L)		ND	ND	ND	0.85	6.1	4.41	
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	5.4E-04	2.3E-04	5.8E-01	
			Average Total mmoles		ND	ND	ND	0.039	0.016	0.0072	
	04-May-20	49	ANAC-1	4	<0.020	<0.0020	<0.020	0.78	6.2		
			ANAC-2	5	<0.020	<0.0020	< 0.020	0.83	6.0		
			ANAC-3	6	<0.020	<0.0020	< 0.020	0.85	6.4		
			Average Concentration (mg/L) Standard Deviation (mmoles)		ND 0.0E+00	ND 0.0E+00	ND 0.0E+00	0.82 1.7E-03	6.2 6.2E-04		
			Average Total mmoles		ND	0.0E+00	0.0E+00	0.038	0.016	-	
	26-May-20	74	Average Total Innoies ANAC-1	4	<0.020	<0.0020	<0.020	0.93	6.5		
	20*iway*20		ANAC-2	5	<0.020	<0.0020	<0.020	0.86	5.5	-	
			ANAC-3	6	<0.020	<0.0020	< 0.020	1	6.6		
			Average Concentration (mg/L)	Ŭ	ND	ND	ND	0.94	6.2		
	1	1	Standard Deviation (mmoles)	1	0.0E+00	0.0E+00	0.0E+00	4.0E-03	1.6E-03	-	i l
	1	1	Average Total mmoles	1	ND	ND	ND	0.044	0.016	-	i l
	19-Jun-20	95	ANAC-1	4	<0.020	<0.0020	< 0.020	0.83	5.7		i l
	1		ANAC-2	5	<0.020	< 0.0020	< 0.020	0.82	5.7	-	i l
	1		ANAC-3	6	<0.020	<0.0020	< 0.020	0.85	5.7	-	i l
	1		Average Concentration (mg/L)	1	ND	ND	ND	0.83	5.7		i l
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	7.4E-04	9.5E-05		1
			Average Total mmoles		ND	ND	ND	0.039	0.015		
	25-Aug-20	162	ANAC-1	4	<0.020	<0.0020	<0.020	0.87	6.6		
			ANAC-2	5	<0.020	<0.0020	<0.020	0.89	6.5		
			ANAC-3	6	<0.020	<0.0020	<0.020	0.87	6.6		
			Average Concentration (mg/L)		ND	ND	ND	0.88	6.6		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	6.3E-04	1.9E-04		
			Average Total mmoles		ND	ND	ND	0.041	0.017	-	
	27-Oct-20	225	ANAC-1	4	<0.020	<0.0020	<0.020	0.81	6.5	3.80	
			ANAC-2	5	<0.020	<0.0020	< 0.020	0.88	6.4	5.06	
			ANAC-3	6	<0.020	<0.0020	< 0.020	1	6.3	4.50	
			Average Concentration (mg/L) Standard Deviation (mmoles)		ND 0.0E+00	ND 0.0E+00	ND 0.0E+00	0.9 4.4E-03	6.4 2.5E-04	4.45 6.3E-01	
					0.0E+00 ND	0.0E+00 ND	0.0E+00 ND	4.4E-03 0.042	2.5E-04 0.017	0.0073	
Nitrate Amended/NRBC Bioaugmented	27-Feb-20	-18	Average Total mmoles		ND	ND	ND	0.042	0.017	0.0073	Amended the first replicate with resazurin.
Nitrate Amended/NKBC Bloadgmented	16-Mar-20										Amended with 0.5 mL of a 267 g/L sodium nitrate solution to target a concentration of 100 mg/L.
		1	NIT-1	7	<0.010	<0.0010	< 0.010	0.58	5.0		g Johner to taget a concentration of too high.
			NIT-2	8	<0.010	<0.0010	< 0.010	0.32	4.0		
	1		NIT-3	9	<0.010	<0.0010	< 0.010	0.38	4.3		i l
			Average Concentration (mg/L)	1	ND	ND	ND	0.43	4.4		
	1		Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	6.3E-03	1.3E-03		i l
			Average Total mmoles		ND	ND	ND	0.02	0.012		
	30-Mar-20	14	NIT-1	7	< 0.020	< 0.0020	< 0.020	0.61	6.7		
	1		NIT-2	8	<0.020	<0.0020	< 0.020	0.19	5.2		i l
			NIT-3	9	<0.020	<0.0020	<0.020	0.39	5.7		
	1		Average Concentration (mg/L)	1	ND	ND	ND	0.40	5.9		i l
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	9.6E-03	1.9E-03		
			Average Total mmoles		ND	ND	ND	0.018	0.015		
	13-Apr-20	28	NIT-1	7	<0.020	<0.0020	<0.020	0.48	6.2	4.51	
			NIT-2	8	<0.020	<0.0020	<0.020	0.15	4.9	4.64	
			NIT-3	9	< 0.020	<0.0020	< 0.020	0.32	5.3	4.04	
	1		Average Concentration (mg/L)		ND	ND	ND	0.32	5.5	4.40	
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	7.6E-03	1.7E-03	3.2E-01	
			Average Total mmoles	-	ND	ND	ND	0.015	0.014	0.0072	
	04-May-20	49	NIT-1	7	< 0.020	< 0.0020	< 0.020	0.48	6.4		1
	1		NIT-2	8	< 0.020	< 0.0020	< 0.020	0.15	5.2	-	
	1	1	NIT-3	9	<0.020	<0.0020	< 0.020	0.31	5.6		4
			Average Concentration (mg/L)		ND 0.05.000	ND 0.05.000	ND 0.05.00	0.32	5.7		
			Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles		0.0E+00	0.0E+00	0.0E+00	7.6E-03 0.015	5.7 1.6E-03 0.015	-	

Table 2

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Note A concertable: Discopenda Part of the Part of	Treatment	Date	Day	Replicate	Bottle	Ethene	Acetylene	Ethane	Methane	Benzene	p-Cymene	
Control Image: Problem in the state of the			-			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Read Fund Second		20+May-20	/1								-	
Marge Construction (mg) image Transmit No.e	oonandoo											
Image Image <th< td=""><td></td><td></td><td></td><td>Average Concentration (mg/L)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>				Average Concentration (mg/L)								
Bit No P Control Contr				Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	1.8E-02	3.8E-03		
Ham Pi				Average Total mmoles		ND	ND	ND	0.029	0.013		
Mate Part Part <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>r</td><td></td><td></td><td></td><td></td><td>Bioaugmented with 8 mL of NRBC.</td></th<>							r					Bioaugmented with 8 mL of NRBC.
Notes and Nacional Annuald 12-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0		19-Jun-20	95									
Interse and Nucleon Assended Answerge Constraint (engly) Subsidied United interview) Answerge Total mathem No. No. <												
Nitrain and Nucleed Amended Outcome Out					1 °							
Image: Section of the sectin of the section of the section												
Nerter and Natives Amended NT-2 (Nerter and Natives Amen												
Near Normal Normal <td></td> <td>25-Aug-20</td> <td>162</td> <td>NIT-1</td> <td>7</td> <td>< 0.020</td> <td><0.0020</td> <td>< 0.020</td> <td>0.48</td> <td>6.3</td> <td></td> <td></td>		25-Aug-20	162	NIT-1	7	< 0.020	<0.0020	< 0.020	0.48	6.3		
Nitrate and Noticit Amended 12/-02-20 25/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 10/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-07 1/-												
Image: state in the state in the state intervent in the state intervent i					9							
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Protect and Nutrient Amended 2Ps NIT-1 Instance Understanding (mgL) Sectore Understanding (mgL) Instance												
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Nitrate and Nutrient Amended 21/Fe-20 Parage 100 Parage 100 Parage </td <td></td> <td>21-001-20</td> <td>225</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		21-001-20	225									
Nitrate and Nucleist Anended ZF-fac.20 Average Total mundles No. Dia		1										
Nirste and Nucleoit Amended Standard Deviation (model) Nirste		1			1							
Nitrate and Nuclient Amended 27-F8-20 18												
16-Mar-20 4												
Image: construction (mgL) construction (mgL) <thc< td=""><td>Nitrate and Nutrient Amended</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thc<>	Nitrate and Nutrient Amended											
NITAUT-1 ID -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 <td></td> <td>16-Mar-20</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		16-Mar-20	0									
NITAUT-2 NITAUT-2 11 -0.010 -0.010 -0.010 -0.010 NITAUT-2 14 NITAUT-2 14 -0.010 -0.010 -0.010 -0.010 -0.010 30-Mar-20 14 NITAUT-1 10 NO NO NO 0.020 0.020 -0.020 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010 -0.010				A 1070 (A 10 1070 - 4	1.0				0.75	1.0		Amended with 267 µL of a 15 g/L DAP solution to target a concentration of 20 mg/L.
Number Number<												
Number Average Concentration (migL) ND												
Number Standard Deviation (rmoles) Viceop 7 c14 mmoles					12							
Image: Problem index Average Croat minoles ND ND 0.033 0.013 0.013 0.013 0.013 30-Min-20 14 NITMUT-3 10 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>												
30-Min-20 14 NIT/NUT-1 10 <0.020												
Number Numbr Numbr Numbr <td></td> <td>30-Mar-20</td> <td>14</td> <td></td> <td>10</td> <td></td> <td></td> <td>< 0.020</td> <td></td> <td></td> <td></td> <td></td>		30-Mar-20	14		10			< 0.020				
Average Concentration (mgL) NO NO NO 0.83 5.8 13.Apr.20 28 NT/NUT-1 10 0.67-00 0.67-00 0.023 8.82-04 13.Apr.20 28 NT/NUT-1 10 -0.020 0.0200 0.81 5.9 4.31 NT/NUT-3 11 -0.020 -0.0200 -0.020 0.84 5.9 4.84 Average Concentration (mgL) NT/NUT-3 12						<0.020				6.0		
Image: Standard Deviation (mmoles) VD					12							
Image: Normal system Average Creat minoles ND ND 0.038 0.013												
13-Apr-20 28 NITAULT-1 10 <0.020												
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Nerror NTR/UT-3 (Nerror 10 ND ND 0.0100 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0200 -0.0210 -0.0140 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.0210 -0.020		1.3-74p1-20	20									
Average Concentration (mg/L) ND ND ND 0.72 5.5 4.52 04-May-20 49 NIT/MUT-1 0.0E+00 0.0E+00 0.0200 0.702 5.5 4.52 04-May-20 49 NIT/MUT-1 10 -0.020 -0.0200 -0.020 0.0200 -0.020 0.0201 0.021 5.5 4.52 NIT/MUT-1 10 -0.020 -0.020 -0.020 -0.020 0.020 0.78 5.1 NIT/MUT-3 12 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020		1										
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04-May-20 49 NITAUT-1 10 <0.020												
Parage Concentration (mgL) NIT/NUT-2 11 <0.020											0.0074	
NTR/UT-3 Y Column Constraints Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column Column		04-May-20	49									
Average Concentration (mg/L) ND ND ND 0.7 5.7 26-May-20 7 NIT/MUT-1 0.0E+00 0.0E+00 0.023 1.9E+03 26-May-20 1 NIT/MUT-1 10 -0.020 -0.020 -0.020 0.023 0.015 10 NIT/MUT-3 12 110-Untr3 12 10-Juntr3 12 10-Juntr3 12 10-Juntr3 12 10-Juntr3 12 10-Juntr3 12 10-Juntr3 12 </td <td></td> <td>1</td> <td></td>		1										
Standard Deviation (mmoles) 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.08-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.09-00 0.0					12							
Average Total mmoles ND ND A00 0.033 0.015 26-May-20 NIT/NUT-1 10 <0.020		1										
26-May-20 71 NIT/NUT-1 10 <0.020		1										
NIT/NUT-2 11 <0.020		26-May-20	71		10							
NTI/TUT-3 Parage Concentration (mg/L) 2 Standard Deviation (mmoles) 20 Pole 20020 Pole 0.02000 Pole 0.02000 Pole 0.01200 Pole 0.012000 Pole 0.01200 Pole 0.012000 Pole 0.01200 Pole 0.012000 Pole 0.012000 Pole 0.012000 Pole 0.012000 Pole 0.012000 Pole 0.012000Pole 0.012000Pole 0.012000Pole 0.012000Pole 0.012000Pole 0.012000Pole 0.01200Pole 0.012000Pole 0.		,										
Average Concentration (mgL) ND ND ND ND 0.83 5.9 Mondard Deviation (moles) 0.0E+00 0.0E+00 0.0E0 7.4E-03 19-Jun-20 95 NIT/NUT-1 10 -0202 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020<		1										
Average Total mmodes ND ND ND 0.038 0.015 19-Jun-20 95 NIT/NUT-1 10 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020 -0.020		1			1	ND	ND	ND	0.83	5.9		
19-Jun-20 95 NT/NUT-1 10 <0.020		1										
NIT/NUT-2 11 <0.020 <0.020 0.020 0.024 5.4 NIT/NUT-3 12 <0.020		L										
NIT/NUT-3 12 <0.020 <0.020 <0.82 5.7 Average Concentration (mgL) ND ND ND 0.70 5.2 Standard Devision (mmoles) 0.0E+00 0.0E+00 6.650 3.14E-03		19-Jun-20	95									
Average Concentration (mg/L) ND ND ND ND 5.2 Standard Deviation (mmoles) 0.0E+00 0.0E+00 0.0E+00 6.6E+03 1.4E+03		1										
Standard Deviation (mmoles) 0.0E+00 0.0E+00 6.6E+03 1.4E+03		1			12							
		1									-	
											-	

Table 2

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Table 2

Treatment	Date	Day	Replicate	Bottle	Ethene	Acetylene	Ethane	Methane	Benzene	p-Cymene	
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Nitrate and Nutrient Amended	25-Aug-20	162	NIT/NUT-1	10	<0.020	< 0.0020	< 0.020	0.77	5.0		
Continued			NIT/NUT-2	11	<0.020	< 0.0020	< 0.020	0.52	6.0		
			NIT/NUT-3	12	<0.020	< 0.0020	< 0.020	0.76	6.3		
			Average Concentration (mg/L)		ND	ND	ND	0.68	5.8		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	6.8E-03	1.8E-03		
			Average Total mmoles		ND	ND	ND	0.032	0.015		
	27-Oct-20	225	NIT/NUT-1	10	< 0.020	< 0.0020	< 0.020	0.81	5	4.83	
			NIT/NUT-2	11	< 0.020	< 0.0020	< 0.020	0.52	6	4.04	
			NIT/NUT-3	12	< 0.020	<0.0020	< 0.020	0.76	6.3	4.62	
			Average Concentration (mg/L)	1	ND	ND	ND	0.7	5.8	4.50	
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	7.0E-03	1.7E-03	4.1E-01	
			Average Total mmoles		ND	ND	ND	0.032	0.015	0.0074	
DGG Bioaugmented	25-Jun-20	-21				•					New set of microcosms constructed.
-	16-Jul-20	0									Amended the first replicate with resazurin.
											Amended with 100 µL of an iron sulfide suspension.
											Spiked with 61 µL of a saturated benzene solution to target a concentration of 5 mg/L.
											Bioaugmented with 5 mL of DGG-B.
			DGG-1	13	< 0.020	< 0.0020	< 0.020	0.060	4.9		
			DGG-2	14	<0.020	< 0.0020	< 0.020	0.10	5.1		
			DGG-3	15	<0.020	< 0.0020	< 0.020	0.10	4.9		
			Average Concentration (mg/L)	1	ND	ND	ND	0.09	5.0		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	2.5E-02	1.4E-01		
			Average Total mmoles		ND	ND	ND	0.00013	0.013	-	
	04-Aug-20	19	DGG-1 DGG-2	13	<0.020	<0.0020	< 0.020	0.050	4.3		
			DGG-2 DGG-3	14 15	<0.020 <0.020	<0.0020 <0.0020	<0.020	0.084	4.5 4.4		
			Average Concentration (mg/L)	15	ND	ND	ND	0.086	4.4		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	2.0E-02	1.1E-01		
			Average Total mmoles		ND	ND	ND	0.00011	0.011	-	
	25-Aug-20	40	DGG-1	13	< 0.020	< 0.0020	< 0.020	0.046	4.6		
	-		DGG-2	14	<0.020	< 0.0020	< 0.020	0.079	4.9		
			DGG-3	15	<0.020	<0.0020	< 0.020	0.076	4.7		
			Average Concentration (mg/L)	1	ND	ND	ND	0.067	4.7		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	1.8E-02	1.8E-01		
	27-Oct-20	402	Average Total mmoles DGG-1		ND	ND	ND	0.00010	0.012		
	27-Oct-20	103	DGG-1 DGG-2	13	<0.020 <0.020	<0.0020 <0.0020	<0.020 <0.020	0.036	4.6		
			DGG-2 DGG-3	14 15	<0.020	<0.0020	<0.020	0.065	4.8 4.7		
			Average Concentration (mg/L)	1 15	<0.020 ND	<0.0020 ND	<0.020 ND	0.068	4.7		
			Standard Deviation (mmoles)		0.0E+00	0.0E+00	0.0E+00	1.8E-02	4.7 1.0E-01		
			Average Total mmoles		ND	ND	ND	0.00008	0.012	-	
Note											

 Bandard Deviator (mmoles)
 0.8°-C

 Notes:
 - compound not detected, the associated value is the detection limit - up of the system of the system of the system of the system DQR - detected, the associated value is the detection limit - up of the system of the system of the system DQR - detected by the system of the system DQR - detected by the system of the system mode - millionales mode - millionales mode - millionales mode - millionales mode - millionales
 0.8°-C NR - system Millionales

 N - not detected NIT - nitrate reducing banzene outure p-Cymene - para-cymene
 0.8°-C NIT - system
 0.8°-C NIT - system

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Treatment	Date	Day	Bottle	Replicate	Total VFAs	Chloride	Nitrite-N	Nitrate-N	Sulfate	Phosphate
	16-Mar-20	0	Dotte		mg/L <0.07	mg/L 171	mg/L <0.09	mg/L <0.09	mg/L 14	mg/L <0.07
Sterile Control	10-Mar-20	U	2	ANSC-1 ANSC-2	<0.07	167	<0.09	<0.09	14	<0.07
			3	ANSC-3	< 0.07	168	<0.09	<0.09	12	<0.07
				Average Concentration (mg/L)	ND	169	ND	ND	13	ND
	30-Mar-20	14	1	ANSC-1 ANSC-2	<0.07	181 176	<0.09	<0.09	14 15	<0.07
			2	ANSC-2 ANSC-3	<0.07	176	<0.09	<0.09	15	<0.07
			3	Average Concentration (mg/L)		176	~0.05 ND	ND	14	~0.07 ND
	13-Apr-20	28	1	ANSC-1	<0.07	195	<0.09	<0.09	16	<0.07
			2	ANSC-2	<0.07	190	<0.09	<0.09	15	<0.07
			3	ANSC-3	<0.07	186	<0.09	<0.09	13	<0.07
				Average Concentration (mg/L)	ND	190	ND	ND	15	ND
	4-May-20	49	2	ANSC-1 ANSC-2	<0.07 <0.07	186 195	<0.09	<0.09	15 16	<0.07 <0.07
			3	ANSC-3	<0.07	179	<0.09	<0.09	12	<0.07
				Average Concentration (mg/L)	ND	187	ND	ND	14	ND
	19-Jun-20	95	1	ANSC-1	< 0.07	196	<0.09	<0.09	13	<0.07
			2	ANSC-2	<0.07	195	<0.09	<0.09	14	<0.07
			3	ANSC-3	<0.07	184	<0.09 ND	<0.09	12	<0.07 ND
	4-Aug-20	141		Average Concentration (mg/L) ANSC-1	ND <0.07	192	ND <0.09	<0.09	13	<0.07
	4-Aug-20	141	2	ANSC-1 ANSC-2	<0.07	203	<0.09	<0.09	10	<0.07
			3	ANSC-3	<0.07	187	<0.09	<0.09	15	<0.07
				Average Concentration (mg/L)	ND	195	ND	ND	16	ND
Active Control	16-Mar-20	0	4	ANAC-1	<0.07	115	<0.09	<0.09	10	<0.07
			5	ANAC-2	<0.07	122	<0.09	<0.09	11	<0.07
			6	ANAC-3 Average Concentration (mg/L)	<0.07 ND	114	<0.09 ND	<0.09	10	<0.07
	30-Mar-20	14	4	Average Concentration (mg/L) ANAC-1	<0.07	117	<0.09	<0.09	10	<0.07
	55-midi=20		5	ANAC-1 ANAC-2	< 0.07	119	<0.09	<0.09	10	<0.07
			6	ANAC-3	<0.07	120	<0.09	<0.09	10	<0.07
				Average Concentration (mg/L)	ND	120	ND	ND	10	ND
	13-Apr-20	28	4	ANAC-1	<0.07	124	<0.09	<0.09	10	<0.07
			5	ANAC-2	<0.07 <0.07	135 117	<0.09 <0.09	<0.09 <0.09	11	<0.07 <0.07
			0	ANAC-3 Average Concentration (mg/L)	<0.07 ND	117	×0.09	×0.09 ND	11	<0.07
	4-May-20	49	4	Average concentration (ingre)	<0.07	125	<0.09	<0.09	10	<0.07
	4-11103-20		5	ANAC-2	<0.07	127	<0.09	<0.09	10	<0.07
			6	ANAC-3	<0.07	130	<0.09	<0.09	11	<0.07
				Average Concentration (mg/L)	ND	127	ND	ND	10	ND
	19-Jun-20	95	4	ANAC-1	<0.07	132	<0.09	<0.09	9.5	<0.07
			5	ANAC-2	<0.07	129	<0.09	<0.09	10	<0.07
			6	ANAC-3	<0.07 ND	135 132	<0.09	<0.09	11	<0.07
	4-Aug-20	141	4	Average Concentration (mg/L) ANAC-1	ND <0.07	132	<0.09	<0.09	10	<0.07
	4-Mug-20	141	5	ANAC-2	<0.07	136	<0.09	<0.09	11	<0.07
			6	ANAC-3	<0.07	132	<0.09	<0.09	10	<0.07
				Average Concentration (mg/L)	ND	135	ND	ND	11	ND
Nitrate Amended/NRBC Bioaugmented	16-Mar-20	0	7	NIT-1	<0.07	113	<0.09	98	10	<0.07
			8	NIT-2 NIT-3	<0.07 <0.07	115	<0.09	94 106	10	<0.07 <0.07
			а	Average Concentration (mg/L)	<0.07 ND	121	ND ND	100	10	<0.07 ND
	30-Mar-20	14	7	NIT-1	<0.07	119	<0.09	99	9.3	<0.07
			8	NIT-2	<0.07	118	<0.09	92	10	<0.07
			9	NIT-3	<0.07	117	<0.09	97	9.3	<0.07
	L			Average Concentration (mg/L)	ND	118	ND	96	9.4	ND
	13-Apr-20	28	7	NIT-1	<0.07	129 126	<0.09	101	10	<0.07
			9	NIT-2 NIT-3	<0.07	120	<0.09	99	10	<0.07
			Ŭ	Average Concentration (mg/L)	<0.07 ND	127	~0.05 ND	98	10	~0.0/ ND
	4-May-20	49	7	NIT-1	<0.07	126	<0.09	96	10	<0.07
			8	NIT-2	<0.07	126	<0.09	90	10	<0.07
			9	NIT-3	<0.07	127	<0.09	95	10	<0.07
	00.1100	74		Average Concentration (mg/L)	ND	126	ND	94	10	ND
	26-May-20	71	8	NIT-1 NIT-2	<0.07 <0.07	134 142	<0.09 <0.09	99	10 11	<0.07 <0.07
			9	NIT-2 NIT-3	<0.07	142	<0.09	100	11	<0.07
			-	Average Concentration (mg/L)	ND	139	ND	98	11	ND
	29-May-20	74	7	NIT-1	<0.07	142	<0.09	94	11	<0.07
			8	NIT-2	<0.07	144	<0.09	91	11	<0.07
			9	NIT-3	<0.07	146	<0.09	97	11	<0.07
	40.1	05	-	Average Concentration (mg/L) NIT-1	ND <0.07	144	ND <0.09	94	11	ND <0.07
	19-Jun-20	95	7	NIT-1 NIT-2	<0.07 <0.07	144	<0.09	97	10	<0.07 <0.07
			9	NIT-2 NIT-3	<0.07	136	<0.09	90	10	<0.07
			-	Average Concentration (mg/L)	ND	140	ND	91	10	ND
	4-Aug-20	141	7	NIT-1	<0.07	139	<0.09	95	10	<0.07
			8	NIT-2	<0.07	145	<0.09	90	11	<0.07
			9	NIT-3	<0.07	142	<0.09	94	12	<0.07
	1			Average Concentration (mg/L) NIT-1	ND <0.07	142 162	ND <0.09	93 111	11 13	ND <0.07
	8-Sep-20	176	8		<0.07	183		120	14	<0.07
	8-Sep-20	176	8 9	NIT-1 NIT-2 NIT-3	<0.07 <0.07 <0.07	183	<0.09	120	14	<0.07 <0.07

Table 3

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Treatment	Date	Dav	Bottle	Replicate	Total VFAs	Chloride	Nitrite-N	Nitrate-N	Sulfate	Phosphate
Treatment		Day	Bottle	Replicate	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrate and Nutrient Amended	16-Mar-20	0	10	NIT/NUT-1	<0.07	128	<0.09	109	13	<0.07
			11	NIT/NUT-2	<0.07	115	<0.09	102	10	<0.07
			12	NIT/NUT-3	<0.07	112	<0.09	99	10	<0.07
				Average Concentration (mg/L)	ND	118	ND	103	11	ND
	30-Mar-20	14	10	NIT/NUT-1	<0.07	119	<0.09	102	10	<0.07
			11	NIT/NUT-2	<0.07	122	<0.09	108	10	<0.07
			12	NIT/NUT-3	<0.07	114	<0.09	100	10	<0.07
				Average Concentration (mg/L)	ND	118	ND	103	10	ND
	13-Apr-20	28	10	NIT/NUT-1	<0.07	119	<0.09	96	10	<0.07
			11	NIT/NUT-2	<0.07	125	<0.09	104	10	<0.07
			12	NIT/NUT-3	<0.07	124	<0.09	102	11	<0.07
				Average Concentration (mg/L)	ND	123	ND	101	10	ND
	4-May-20	49	10	NIT/NUT-1	<0.07	127	<0.09	99	10	<0.07
			11	NIT/NUT-2	<0.07	129	<0.09	105	11	<0.07
			12	NIT/NUT-3	<0.07	124	<0.09	99	10	<0.07
				Average Concentration (mg/L)	ND	127	ND	101	10	ND
	19-Jun-20	95	10	NIT/NUT-1	<0.07	130	<0.09	101	10	<0.07
			11	NIT/NUT-2	<0.07	133	<0.09	109	10	<0.07
			12	NIT/NUT-3	<0.07	124	<0.09	100	11	<0.07
				Average Concentration (mg/L)	ND	129	ND	103	10	ND
	4-Aug-20	141	10	NIT/NUT-1	<0.07	132	<0.09	103	11	<0.07
			11	NIT/NUT-2	<0.07	143	<0.09	117	13	<0.07
			12	NIT/NUT-3	<0.07	131	<0.09	106	11	<0.07
				Average Concentration (mg/L)	ND	135	ND	108	12	ND
	8-Sep-20	176	10	NIT/NUT-1	<0.07	142	<0.09	114	11	<0.07
			11	NIT/NUT-2	<0.07	157	<0.09	131	13	<0.07
			12	NIT/NUT-3	<0.07	139	<0.09	114	11	<0.07
				Average Concentration (mg/L)	ND	146	ND	120	12	ND

85: <- compound not detected, the ass ANAC - anaerobic active control ANSC - anaerobic sterile control ND - not detected NIT - nitrate NIT nitrate NIT/NUT - nitrate/nutrient Nitrate-N - nitrate-nitrogen Nitrate-N - nitrite-nitrogen ed value is the detection limit

culture

ate but may include other VFAs such as formate, acetate, propionate, pyruvate and butyrate

Table 3

Treatment	Date	Day	Bottle	Replicate	рН	ORP	Ammonia
Sterile Control	16-Mar-20	0	1	ANSC-1	6.07	mV 149	mg/L
			2	ANSC-2	6.02	164	
			3	ANSC-3	5.99	202	
	30-Mar-20	14	1	Average ANSC-1	6.03 5.77	172	
	50-IVIAI-20	14	2	ANSC-2	5.61	-	
			3	ANSC-3	5.71		
				Average	5.70		
	13-Apr-20	28	1	ANSC-1	5.70		
			2 3	ANSC-2 ANSC-3	5.59 5.64		
				Average	5.64		
	4-May-20	49	1	ANSC-1	5.62		
			2	ANSC-2	5.56		
			3	ANSC-3	5.60		
	26-May-20	71	1	Average ANSC-1	5.59 6.01		
	20 May 20	<i>,</i> ,	2	ANSC-2	6.03		
			3	ANSC-3	6.00		
				Average	6.01		
	19-Jun-20	95	1	ANSC-1	5.60		
			2 3	ANSC-2 ANSC-3	5.59 5.59		
				Average	5.59		
	25-Aug-20	162	1	ANSC-1	5.93		
			2	ANSC-2	5.87		
			3	ANSC-3	5.92		
	27-Oct-20	225	1	Average ANSC-1	5.91 5.73	87	4.7
	21-00-20	225	2	ANSC-1 ANSC-2	5.68	116	4.7
			3	ANSC-3	5.74	114	4.59
				Average	5.72	106	4.6
Active Control	16-Mar-20	0	4	ANAC-1	6.13	121	
			5	ANAC-2	6.13	106	
			6	ANAC-3 Average	6.08 6.11	105 111	
	30-Mar-20	14	4	ANAC-1	5.98		
			5	ANAC-2	6.00		
			6	ANAC-3	6.00		
				Average	5.99		
	13-Apr-20	28	4	ANAC-1	5.96		
			5 6	ANAC-2 ANAC-3	5.97 5.93		
			Ĭ	Average	5.95		
	4-May-20	49	4	ANAC-1	5.91		
			5	ANAC-2	5.94		
			6	ANAC-3	5.91		
	26-May-20	71	4	Average ANAC-1	5.92 6.31		
	20-1viay-20	11	5	ANAC-1 ANAC-2	6.33		
			6	ANAC-3	6.29		
				Average	6.31		
	19-Jun-20	95	4	ANAC-1	5.96		
			5 6	ANAC-2 ANAC-3	5.95 5.96		
			· ·	Average	5.96		
	25-Aug-20	162	4	ANAC-1	6.26		
			5	ANAC-2	6.28		
			6	ANAC-3	6.26		
	27-Oct-20	225	4	Average	6.08	83	 3.64
	21-00-20	225	4 5	ANAC-1 ANAC-2	6.10	75	52
			6	ANAC-3	6.09	69	14
				Average	6.09	76	23
Nitrate Amended/NRBC Bioaugmented	16-Mar-20	0	7	NIT-1	6.09	55	3.2
			8	NIT-2	6.20	65	
			9	NIT-3 Average	6.18 6.16	86 69	3.2
	30-Mar-20	14	7	NIT-1	6.09		
			8	NIT-2	6.17		
			9	NIT-3	6.11		
	13-Apr-20	28	7	Average	6.12 5.99		3.3
	13-74p1-20	20	7 8	NIT-1 NIT-2	6.10		3.3
			9	NIT-3	6.05		3.1
				Average	6.05		3.3
	4-May-20	49	7	NIT-1	6.04		
			8 9	NIT-2	6.04		
			3	NIT-3 Average	6.02 6.03		
	26-May-20	71	7	NIT-1	6.26		
	I '		8	NIT-2	6.38		
	1 1		9	NIT-3	6.35		
				Average	6.33		
	10 hm 00	05			0.00		
	19-Jun-20	95	7	NIT-1	6.20 6.38		
	19-Jun-20	95	8	NIT-1 NIT-2	6.38		
	19-Jun-20	95		NIT-1			1
	19-Jun-20 25-Aug-20	95	8 9 7	NIT-1 NIT-2 NIT-3 Average NIT-1	6.38 6.33 6.30 6.54	 	
			8 9 7 8	NIT-1 NIT-2 NIT-3 Average NIT-1 NIT-2	6.38 6.33 6.54 6.62	 	
			8 9 7	NIT-1 NIT-2 NIT-3 Average NIT-1 NIT-2 NIT-3	6.38 6.33 6.54 6.62 6.54	 	
	25-Aug-20	162	8 9 7 8 9	NIT-1 NIT-2 NIT-3 Average NIT-1 NIT-2 NIT-3 Average	6.38 6.33 6.54 6.62 6.54 6.54 6.54 6.57	 	
			8 9 7 8	NIT-1 NIT-2 NIT-3 Average NIT-1 NIT-2 NIT-3	6.38 6.33 6.54 6.62 6.54	 	

Treatment	Date	Day	Bottle	Replicate	pH	ORP	Ammonia
Nitrate and Nutrient Amended	16-Mar-20	0	10	NIT/NUT-1	6.08	mV 86	mg/L 6.5
Nitrate and Nutrient Amended	10-Iviai-20	0		NIT/NUT-2		101	
			11		6.08		
			12	NIT/NUT-3	6.02	114 100	
	20 14 20	44	40	Average	6.06		6.5
	30-Mar-20	14	10	NIT/NUT-1	6.01		
			11	NIT/NUT-2	6.02		
			12	NIT/NUT-3	6.03		
				Average	6.02		
	13-Apr-20	28	10	NIT/NUT-1	5.93		6.4
			11	NIT/NUT-2	5.95		6.4
			12	NIT/NUT-3	5.92		6.4
				Average	5.93		6.4
	4-May-20	49	10	NIT/NUT-1	5.92		
			11	NIT/NUT-2	5.92		
			12	NIT/NUT-3	5.91		
			Γ Γ	Average	5.92		
	26-May-20	71	10	NIT/NUT-1	6.25		
			11	NIT/NUT-2	6.25		
			12	NIT/NUT-3	6.19		
			· · ·	Average	6.23		
	19-Jun-20	95	10	NIT/NUT-1	6.04		
	10 0011 20	00	10	NIT/NUT-2	6.06		
			12	NIT/NUT-3	6.00		
			12	Average	6.03		
	05 Aur 00	162	10		6.26		_
	25-Aug-20	162		NIT/NUT-1			
			11	NIT/NUT-2	6.29		
			12	NIT/NUT-3	6.23		
			10	Average	6.26		
	27-Oct-20	225	10	NIT/NUT-1	6.09	78	15
			11	NIT/NUT-2	6.14	78	13
			12	NIT/NUT-3	6.09	78	<10
				Average	6.11	78	9.3
DGG Bioaugmented	15-Jul-20	-1	13	DGG-1		18	
			14	DGG-2		22	
			15	DGG-3		22	
				Average		21	
	16-Jul-20	0			ith 100 µL of an iro	n sulfide suspen	sion.
			13	DGG-1			
			14	DGG-2		-49	
			15	DGG-3		40	
				Average		-49	
	4-Aug-20	19	13	DGG-1	6.43	-45	
	4-Aug-20	19	13	DGG-1 DGG-2	6.35		
							-
			15	DGG-3	6.32		
		10	40	Average	6.37		
	25-Aug-20	40	13	DGG-1	6.49		
			14	DGG-2	6.45		
			15	DGG-3	6.41		
				Average	6.45		
	27-Oct-20	103	13	DGG-1	6.34	54	
			14	DGG-2	6.26	50	
			15	DGG-3	6.21	52	
	I			Average	6.27	52	

--- not applicable µL - microliter ANAC - anaerobic active control ANSC - anaerobic sterile control DGG - Dunja Grbić-Galić mg/L - milligrams per liter mV - milligrams per liter mV - milligrams per liter NIT - nitrate NIT/NUT - nitrate/nutrient NRBC nitrate reducing benzene culture ORP - oxidation-reduction potential

TABLE 5: SUMMARY OF GENE-TRAC[®] RESULTS SGW-23 Area Near Stillhouse Control Room - Brunswick, GA

Treatment	Date	ORM2 Gene Copies/L	SRB Gene Copies/L	abcA Gene Copies/L	Pepto-ben Gene Copies/L	
Bulk Groundwater	26-Mar-20	3 x 10 ⁴	1 x 10 ⁴	6 x 10 ³ U	6 x 10 ³ U	

Notes:

abcA - benzene carboxylase Gene Copies/L - gene copies of functional gene per liter Pepto-ben - peptococcaceae SRB - sulfate reducing bacteria U - not detected, the associated value is the quantitation limit

Table 5

Page 1 of 1

TABLE 6: HALF-LIVES (DAYS) OF VOCs SGW-23 Area Near Stillhouse Control Room - Brunswick, GA

		Benzene		p-Cymene					
Treatment/Control	Half Life (Days)	T ₁ (Day)	T ₂ (Days)	Half Life (Days)	T ₁ (Day)	T ₂ (Days)			
Anaerobic Sterile Control	~	-		242	0	225			
Anaerobic Active Control	~			~					
Nitrate Amended/NRBC Bioaugmented	~			~					
Nitrate and Nutrient Amended	~			~					
DGG Bioaugmented	1436	0	103	~					

Notes:

: - - not applicable ~ - net degradation of compound was not detected over duration of study DGG - Dunja Crbic-Galić NRBC - nitrate reducing benzene culture p-Cymene - para-cymene VOC - volatile organic carbon

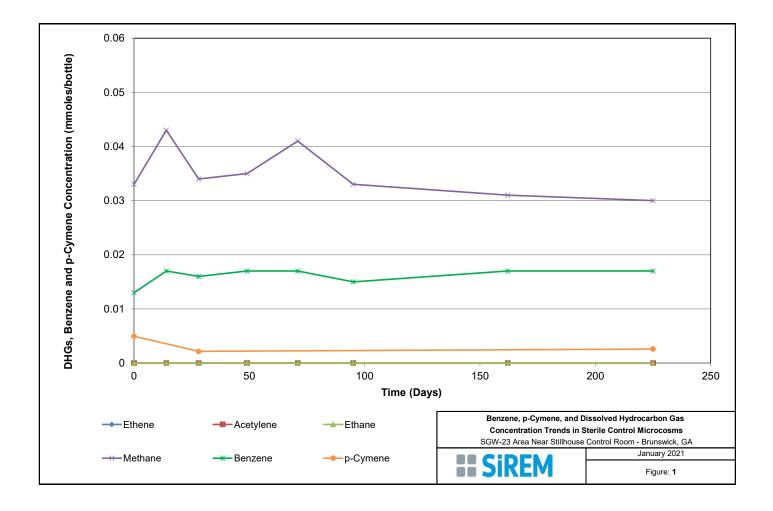
Table 6

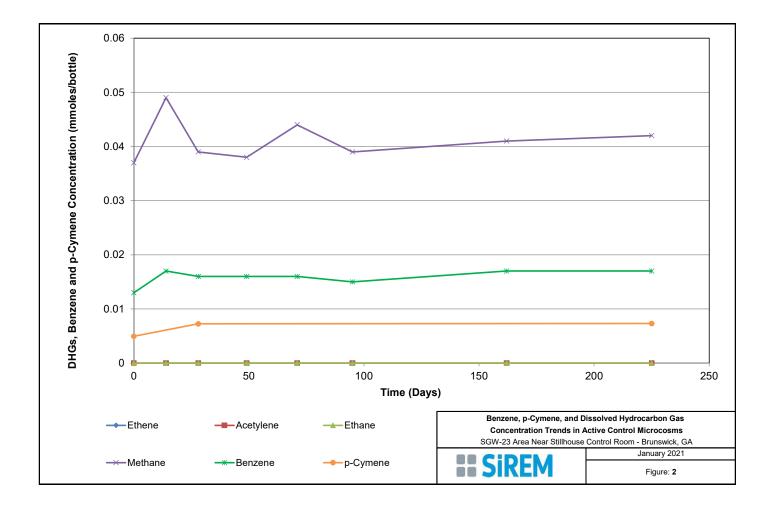
Page 1 of 3

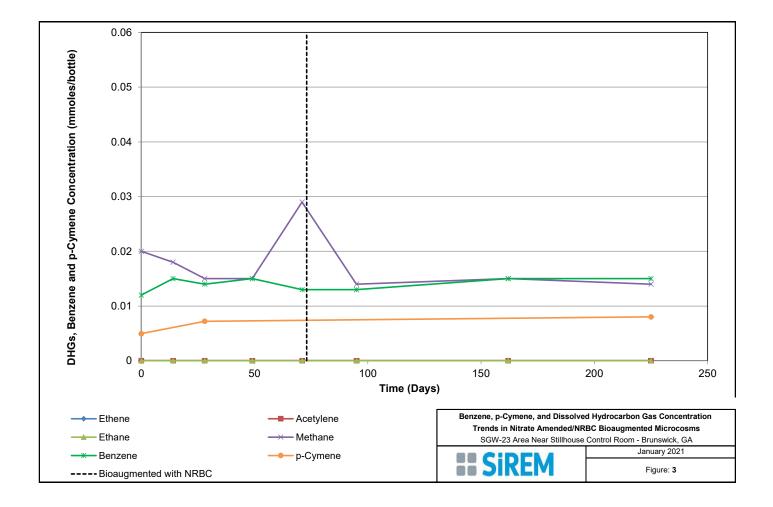


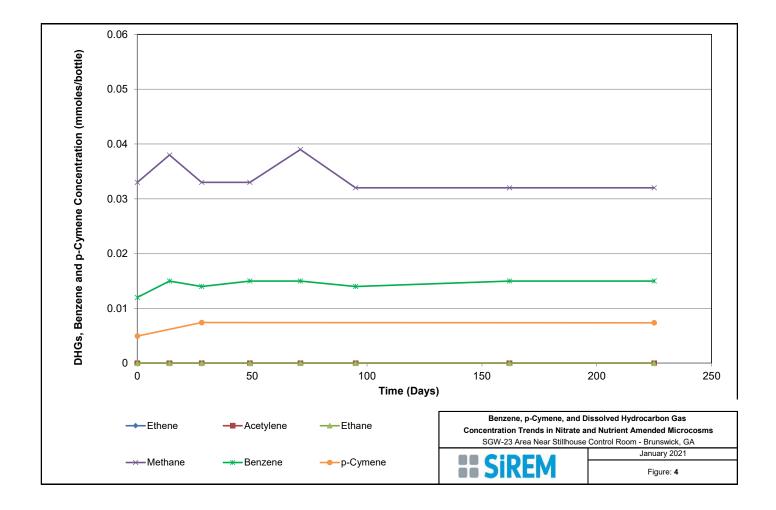
FIGURES

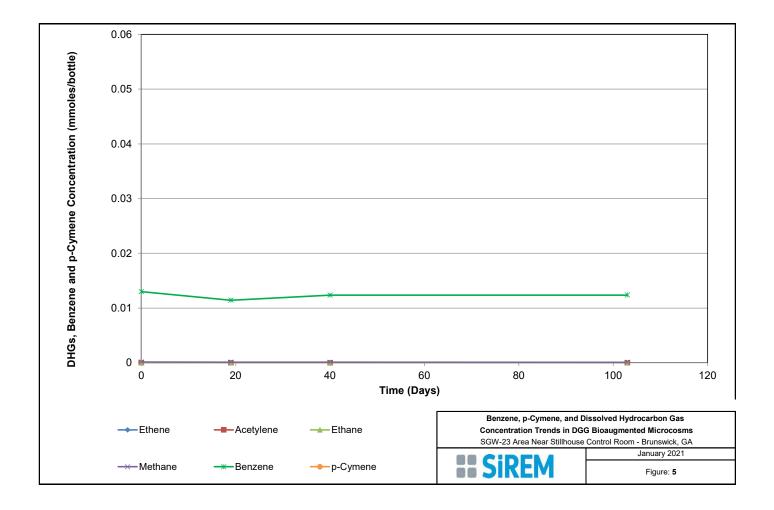














APPENDIX A: Chain of Custody Documentation



SIREM		ustody For	m		130 Stone Rd. W Guetph, ON N1G 322 (519) 822-2265
*Project Name Hercules Brunswick	*Project # GR6881C		A	nalysis	
*Email Address Adrig Reiner	*Company Geosyntec				
areiner C. geosyntec. com	/	tce A)	+-+-+-	sa l	O. None
1255 Roberts Blud		Pvc∧		្ត្រីទួនes	1. HCL
City Kennesan State/Province GA	CountryUSA	Ver V	4	Dissolved hydrocarbon Treatability Study	2. Other
*Phone # 678-202-9500	USH	Gene-Trac DHC Gene-Trac FGA (Gene-Trac DHB	Gene-Trac DHG Gene-Trac SRB Volarite Fatty Anide	Dissolved hydroce Treatability Study	3. Other
*Sampler's Signature *Sampler's F	Printed	ie-Tra	e-Trac e-Trac	blved labilit	4. Other
Name	Printed Nardos Tilahun	Gen Gen Gen	Gen Gen Vola	Treat	6. Other
Client Sample ID	Sampling Ø of Date Time Matrix Containers				Other Information
Pinous MPE (2-5')	2/18/20 1400 50 1		╆╼┟╼╶╂╼	Y	
PINEVER MPE (5-10')	2/18/20 1400 50 1		╆╌┼╌┼╾		Recovery = 12"
Pinoua MPE (2-5')	2/18/10 1410 SO I		+	+ + + + - + - +	Recarry = 18"
Pinova MRE (6-8')	418/201410 SO 1				Recovery = 2 ft.
Pinevia MPE (8-10')	3/18/20 1410 SO 1			X	Receivery=444 (Josz)
Pinaca PZ-1 (2-5')	2/18/20 1420 50 1			1 Y	Recovery = 4ft (2.f2)
P.nova PZ-1 (5-10')	418/20 1420 SO 1			+-+ <u>\$</u>	Recovery = 2ft
		21		+ + - +	Recovery = 18"
	12	AL	5 2/1	9/000	
Billing Information					
	Turnaround Time Requested Cooler Co	ndition: For I	ab Use Only 3°C	F	for Lab Use Only
*Bitt To:	Normal Cooler Te	nperature:	,3°C		
	Custody S		No		
				P	roposal #:
Received By: Received By: Signature Received By: Signature	Rollinguished By: Signature	Rece	lved By:	Relinquis Signature	
ame Rich Morray Printed Name	Printed	Printed			
"Geosputer Fim	Name Firm	Name		Printed Name	Printed Name
L/10/2010 1730 Date/Ime	Date/Time	Date/Time		Firm Date/Time	Firm
tribution: White - return to Originator: Yellow - Lab Copy: Pink - Retained by Client				Date/Time	

.

1.234567

Chain-of-Custody Form

5718

Sire	M			Chai	n-of-Cl stremla			Forn	n						Gue	130 Stone Rd, W Iph, ON NIG 322 (519) 822-2265
*Project Name		6	R.688	/c												
*Project Name Hercules	Brunswick	*Project #	78-20	52-9	5000						Anal	ysis				
Adria Ke	mer	*Company G	eosunt	eC										-		
A	1					-	(Ce A)	1					┝━─┞			Preservative Key O. None
*Email Address <u>Areimer eg</u> Address (Street) Etss 1255	Roberts Blud.						bvcA 1					on gases				1. HCL
City Kennesaw	Roberts Blud. State/Province GA	Co	ountry 301	421		U	A (vorA	0	5		Cids	ocarby	, dy			2. Other
*Phone # 678-20	2-9500			(/		ac DH	ac FG	ac DH	BC DH	ac SR	Fatty /	d hydr	lity Stu			3. Other 4. Other
*Sampler's Signature R.Q.w.	A *Sampler's Name	Printed Pa	ch Mu	Tay		Gene-Trac DHC	Gene-Trac FGA (vorA, bvcA, tceA)	Gene-Trac DHB	Gene-Trac DHG	Gene-Trac SRB	Volatile Fatty Acids	Dissolved hydrocarbon	Treatability Study			5. Other
Client Sa	ample (D		pling Time	Matrix	# of Containers											Other Information
MPE W	Well	2/20/201	1400	WG	4								5			
MPE W	ere e												\sim			4×2-6 Bottles
		-				_										
						-										
P.O. # Billing in	formation	Turnaro	und Time Re	quested				ForL	ab Use (Only			[Earla	b Lise Only	
					Cooler Cor	dition:	(So	002	2				- COLLA	0.010 0109	
BIN To:		Rus	nmat 📋		Cooler Ten	peratu	ire:	\$	200	-				1		
					Custody Se	als,	Ye	s []	No	A				1		
		-							-	Local				Propos		
Relinquished By:	Received By: Signature	2	Relignature	elinquished	l Øy:	Sigr	nature	Rece	lved By:		1	Signatur		quished B		Received By: Signature
inted Rich Morray	Printed Name	ooli Pri	inted Ime			Print	ed	1		-		Printed		-		Printed
The hozo . 1700	fim SUER	- Flr				Firm			-			Firm			-	Name Firm
2/20 hozo . 1700	Feb 24-3	01.3	1. Salar			Date/Time Date/Time							-		Date/Time	

Distribution. White - return to Originator: Yellow - Lab Copy: Pink - Retained by Client • Mandatory Fields

Chain-of-Custody Form

130 Stone Road West Guelph ON, Canada N1G 3Z2 (519) 822-2265

Lab# 5-6408

*Project Name Brunswick	*Project # G	26881	16881C						Analysis									
*Project Name Brunswick *Project Manager Adria Reimer	*Company	POSUM	tec.										Preservative Key					
Email Address aveiner a glosyntec. a	om	n											0. None 1. HCL					
toress (Street) 1255 Roberts bive Diverse State/Province Go	N Ste ZI			USA			OHC	ų	HB	DHG	Study				2. Other 3. Other 4. Other			
470-361-7557				Gene-Trac DHC	Gene-Trac VC	Gene-Trac DHB	Gene-Trac DHG	Treatability Study				4. Other 5. Other 6. Other						
Sampler's ASUS Rees Name Cilent Sample ID	Sam Date	Sampling Date Time Mar		# of							\mathbf{H}				Other Information			
MW-21 treatability	10/15/20		GW	1					\times									
0																		
						-		-										
										\square								
				-				\vdash		+	-							
0.# GR6881C/100/100J		ound Time Re	quested	Cooler Co	ondition	1:		Lab Us	2000 A.			For Lab U	lise Only					
3ill To:		Normal Cooler Te Rush			emperature: 13°C													
		Custody 5					'es 🗋		No 🗹	Pro			Proposal #:					
Relinquished By: signature Signature Signatur		ed By:	Received By: Signature Signat						Relinquished By: Rec Signature Signature									
medashly Raynsy Name Rachelt	1 aller	Printed Name		Printed Printed Name							Printed Name							
m Geosyntee Firm SiREM	unan	Firm			Firm F						-		Firm					
Im Geosyntee Firm SIREM aterTine 0 15/26 19 0.12		Date/Time			Date/Time Dat					Date/Ti	Date/Time Date/Time							

Distribution: White - return to Originator: Yellow - Lab Copy: Pink - Retained by Client



APPENDIX B: Henry's Law Calculation





The following Henry's Law calculation was used to convert aqueous concentrations (Table 2) to total mmoles of each analyte per microcosm bottle (Figures 2 to 8):

 $Total \ mmoles = \frac{C_{liq} \cdot \left(V_{liq} + H \cdot V_{gas}\right)}{Molecular \ Weight \ \left(\frac{mg}{mmol}\right)}$

Where for the 250 mL microcosms:

 $C_{liq} = liquid concentration (mg/L)$ $V_{liq} = liquid volume (0.200 L) per bottle$ V_{gas} = headspace volume (0.020 L) per bottle H = Henry's Law constant (dimensionless)

Where for the 1 L microcosms:

$$\begin{split} &C_{liq} = liquid \text{ concentration (mg/L)} \\ &V_{liq} = liquid \text{ volume (0.800 L) per bottle} \\ &V_{gas} = headspace \text{ volume (0.080 L) per bottle} \\ &H = Henry's Law \text{ constant (dimensionless)} \end{split}$$

The Henry's Law constants used are summarized in the table below.

Analyte	Henry's Law Constant ª (dimensionless)
Benzene	0.222
Chlorobenzene	0.161
Methane	27.3
1,2-dichlorobenezen	0.064
1,3-diclorobenzene	0.117
1,4-dichlorobenzene	0.130

^a Source: Montgomery, J.H. 2000. *Groundwater Chemicals Desk Reference, Third Edition.* CRC Press LLC, Boca Raton, FL.



APPENDIX C: Gene-Trac® Laboratory Reports





Certificate of Analysis: Gene-Trac[®] ORM-2, Assay

Customer: Duane Graves, Geosyntec Consultants Project: Brunswick Plant Customer Reference: GR6881 SiREM Reference: S-5771 Report Date: 22-Apr-20 Data Files: iQ5C-ORM-2-QPCR-0134 iQ5C-DB-ORM-2-QPCR-0134

Table 1a: Test Results

Sample ID	Deltaproteobacterium ORM-2					
	Percent ORM-2 ⁽¹⁾	ORM-2 16S rRNA Gene Copies/Liter				
Si-4401-BULK	0.008 - 0.02 %	3 x 10 ⁴				

See final page for notes.

Taylor A

Analyst:

Taylor Aris, B.Sc. Laboratory Technician

Jimena Druar Approved:

Ximena Druar, B.Sc. Genetic Testing Supervisor



Certificate of Analysis: Gene-Trac[®] SRB, Sulfate Reducing Bacteria (*dsrA*) Assay

Customer: Duane Graves, Geosyntec Consultants Project: Brunswick Plant Customer Reference: GR6881 SiREM Reference: S-5771 Report Date: 22-Apr-20 Data Files: iQ5B-SRB-QPCR-0057 iQ5B-DB-SRB-QPCR-0057

Table 1b: Test Results

Sample ID	Sulfate Reducing Bacteria (<i>dsrA</i>)					
	Percent <i>dsrA</i> ⁽¹⁾	dsrA Gene Copies/Liter				
Si-4401-BULK	0.003 - 0.01 %	1 x 10 ⁴				

See final page for notes.

Taylor of

Analyst:

Taylor Aris, B.Sc. Laboratory Technician

Jemena Druar

Approved:

Ximena Druar, B.Sc. Genetic Testing Supervisor



Certificate of Analysis: Gene-Trac[®] abcA Benzene Carboxylase Assay

Customer: Duane Graves, Geosyntec Consultants Project: Brunswick Plant Customer Reference: GR6881 SiREM Reference: S-5771 Report Date: 22-Apr-20 Data Files: iQ5A-abcA-QPCR-0113 iQ5A-DB-abcA-QPCR-0113

Table 1c: Test Results

Sample ID	Benzene Carboxylase (abcA)					
	Percent <i>abcA</i> ⁽¹⁾	abcA Gene Copies/Liter				
Si-4401-BULK	NA	6 x 10 ³ U				

See final page for notes.

Taylor A

Analyst:

Taylor Aris, B.Sc. Laboratory Technician

Jemena Druar Approved:

Ximena Druar, B.Sc. Genetic Testing Supervisor



Certificate of Analysis: Gene-Trac[®] Pepto-ben Peptococcaceae Assay

Customer: Duane Graves, Geosyntec Consultants Project: Brunswick Plant Customer Reference: GR6881 SiREM Reference: S-5771 Report Date: 22-Apr-20 Data Files: iQ5B-Pepto-QPCR-0112 iQ5B-DB-Pepto-QPCR-0112

Table 1d: Test Results

Sample ID	Peptococcaceae					
	Percent <i>Peptococcaceae</i> ⁽¹⁾	Peptococcaceae 16S rRNA Gene Copies/Liter				
Si-4401-BULK	NA	6 x 10 ³ U				

See final page for notes.

Taylor A

Analyst:

Taylor Aris, B.Sc. Laboratory Technician

Jimena Druar

Ximena Druar, B.Sc. Genetic Testing Coordinator

Approved:

Table 2: Detailed Test Parameters, Test Reference S-5771

Customer Sample ID	Si-4401-BULK
SiREM ORM-2 Test ID	ORM-0187
SiREM SRB Test ID	SRB-0329
SiREM abcA Test ID	ABC-0155
SiREM Pepto Test ID	PEP-0138
Date Sampled ⁽²⁾	26-Mar-20
Matrix	Groundwater
Date Received ⁽²⁾	26-Mar-20
Sample Temperature	NA
Filtration Date ⁽²⁾	27-Mar-20
Volume Used for DNA Extraction	200 mL
DNA Extraction Date	27-Mar-20
DNA Concentration in Sample (extractable)	686 ng/L (J)
PCR Amplifiable DNA	Detected
ORM-2 qPCR Date Analyzed	2-Apr-20
SRB qPCR Date Analyzed	2-Apr-20
abcA qPCR Date Analyzed	3-Apr-20
Pepto qPCR Date Analyzed	3-Apr-20
Laboratory Controls (see Tables 3 -6)	Passed
Comments	

See final page for notes.

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Table 3: Control Results, Test Reference S-5771

			OR	M-2		
Laboratory Control	Analysis Date	Control Description	Spiked Gene Copies per Liter	Recovered Gene Copies per Liter	Comments	
Positive Control Low Concentration	2-Apr-20	Genomic DNA (CSLO-0134)	5.2 x 10 ⁸	3.9 x 10 ⁸	Passed	
Positive Control High Concentration	2-Apr-20	Genomic DNA (CSHO-0134)	9.1 x 10 ⁹	7.9 x 10 ⁹	Passed	
DNA Extraction Blank	2-Apr-20	Sterile Water (FB-3518)	0	2.6 x 10 ³ U	Passed	
Negative Control	2-Apr-20	Test Reagent Blank (TBO-0134)	0	2.6 x 10 ³ U	Passed	

See final page for notes.

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Table 4: Control Results, Test Reference S-5771

			ds	rA	
Laboratory Control	Analysis Date	Control Description	Spiked Gene Copies per Liter	Recovered Gene Copies per Liter	Comments
Positive Control Low Concentration	2-Apr-20	Genomic DNA (CSLSR-0057)	8.6 x 10 ⁵	1.1 x 10 ⁶	Passed
Positive Control High Concentration	2-Apr-20	Genomic DNA (CSHSR-0057)	4.8 x 10 ⁷	4.2 x 10 ⁷	Passed
DNA Extraction Blank	2-Apr-20	Sterile Water (FB-3518)	0	2.6 x 10 ³ U	Passed
Negative Control	2-Apr-20	Test Reagent Blank (TBSR-0057)	0	2.6 x 10 ³ U	Passed

See final page for notes.

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Table 5: Gene-Trac abcA Control Results, Test Reference S-5771

			ab	cA		
Laboratory Control	Analysis Date	Control Description	Spiked Gene Copies per Reaction	Recovered Gene Copies per Reaction	Comments	
Positive Control Low Concentration	3-Apr-20	Plasmid DNA (CSLAB-0113)	3.5 x 10 ⁴	2.5 x 10 ⁴	Passed	
Positive Control High Concentration	3-Apr-20	PlasmidGenomic DNA (CSHAB-0113)	3.5 x 10 ⁶	3.3 x 10 ⁶	Passed	
DNA Extraction Blank	3-Apr-20	Sterile Water (FB-3518)	0	2.6 x 10 ³ U	Passed	
Negative Control	3-Apr-20	Test Reagent Blank (TBAB-0113)	0	2.6 x 10 ³ U	Passed	

See final page for notes.

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Table 6: Gene-Trac Pepto-ben Control Results, Test Reference S-5771

			Pepto	o-ben		
Laboratory Control	Analysis Date	Control Description	Spiked Gene Copies per Reaction	Recovered Gene Copies per Reaction	Comments	
Positive Control Low Concentration	3-Apr-20	Genomic DNA (CSLPE-0112)	3.2 x 10 ⁴	1.5 x 10 ^{4 (3)}	See note 3	
Positive Control High Concentration	3-Apr-20	Genomic DNA (CSHPE-0112)	3.2 x 10 ⁶	1.7 x 10 ⁶	Passed	
DNA Extraction Blank	3-Apr-20	Sterile Water (FB-3518)	0	2.0 x 10 ¹ U	Passed	
Negative Control	3-Apr-20	Test Reagent Blank (TBPE-0112)	0	2.0 x 10 ¹ U	Passed	

See final page for notes.

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Notes:

ORM-2 = Deltaproteobacterium ORM-2 dsrA = dissimilatory sulfate reductase A *abcA* = Benzene Carboxylase Pepto = Peptococcaceae J The associated value is an estimated quantity between the method detection limit and quantitation limit. U Not detected, associated value is the quantitation limit. B Analyte was detected in the method blank within an order of magnitude of the test sample. E Extracted genomic DNA was not detected in the sample. I Sample inhibited the test reaction based on inability to PCR amplify extracted DNA with universal primers. ng/L = nanograms per liter mL = milliliter NA = not applicable ND = not detected DNA = deoxyribonucleic acid 16S rRNA = 16S ribosomal ribonucleic acid PCR = polymerase chain reaction qPCR = quantitative PCR °C = degrees Celsius

¹Percent ORM-2 *Deltaproteobacterium* (ORM-2), *Peptococcaceae, dsrA,* or *abcA* in microbial population. This value is calculated by dividing the number of specific gene copies by the total number of bacteria as estimated by the mass of DNA extracted from the sample. Range represents normal variation in enumeration.

²Samples are stabilized by freezing at -80 °C upon sample reception (field filters) or in-lab filtration (groundwater). Hold time not exceeded if sampling date is within 14 days of date received or filtration date.

³Control was outside recovery limit guidelines (+/- 50%), however, test results are deemed acceptable if one of two positive controls falls within the recovery limit.

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* Mandatory Fields



APPENDIX D: ALS Laboratory Reports





SIREM **ATTN: STEVE SANDE** 130 Stone Road West Guelph ON N1G 3Z2 Date Received: 19-MAR-20 Report Date: 24-MAR-20 14:03 (MT) Version: FINAL

Client Phone: 519-822-2265

Certificate of Analysis

Lab Work Order #: L2429950 Project P.O. #: Job Reference: C of C Numbers:

Legal Site Desc:

NOT SUBMITTED SI-4401

Gayle Braun Senior Account Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group An ALS Limited Company

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Detail	s/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2429950-1 Sampled By: Matrix:	SI-4401-7A R. SCHOFIELD on 19-MAR-20 WATER							
Anions and	l Nutrients							
	Total (as N)	3.18	RRR	0.10	mg/L		20-MAR-20	R503407
Report Rer	marks : DLHC Detection Limit Raised: Dilu ceived in container not provided by ALS.	tion required due to I	high conce	ntration of tes	t analyte(s). U	SC Unknown s erify its cleanli	sample Contai	her.
_2429950-2 Sampled By: Matrix:	SI-4401-10A R. SCHOFIELD on 19-MAR-20 WATER							
Anions and								
Ammonia,	Total (as N)	6.54	RRR	0.20	mg/L		20-MAR-20	R503407
Report Rer	marks : DLHC Detection Limit Raised: Dilu ceived in container not provided by ALS.	tion required due to I	nigh conce rs to be ap	ntration of tes	t analyte(s). U	SC Unknown s erify its cleanli	sample Contai	ner.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description								
RRR	Refer to Report Remarks for issues regarding this analysis								
Test Method R	eferences:								
ALS Test Code	Matrix	Test Description	Method Reference**						
NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC						

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

				-	•	•			
			Workorder:	L2429950		Report Date:	24-MAR-20		Page 1 of 2
Client:		e Road West DN N1G 3Z2							
Contact:	STEVE S	ANDE							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-WT		Water							
Batch WG3295730 Ammonia, T			L2429817-4 <0.010	<0.010	RPD-NA	mg/L	N/A	20	20-MAR-20
WG3295730 Ammonia, T				110.1		%		85-115	20-MAR-20
WG3295730 Ammonia, T				<0.010		mg/L		0.01	20-MAR-20
WG3295730 Ammonia, T			L2429817-4	111.7		%		75-125	20-MAR-20

Client:	SIREM
	130 Stone Road West
	Guelph ON N1G 3Z2
Contact:	STEVE SANDE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



C Number: 17 -

Page <u>1</u> of <u>1</u>

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Chain of Custody (COC) / Analyl Request Form

Canada Toll Free: 1 800 668 9878

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Company:	SIREM		Seiect Report F			DD (DIGITAL)	R I Regular (Standard TAT if received by 3 pm - business days)												
Contact:	Steve Sande			(QC) Report with F		· _ ·	Р	Prior	ity (2-4	bus.dar	ys if rea	sived by	/ 3pm)	50% s	urcharge	e - conta	tALS to	confirm	TAT
Address:	130 Stone Road West			rt - provide details below	if box checked														firm _. TAT
	Guelph, ON N1G 3Z2		Select Distribut											(ALS b	to confirm	n TAT ar	d surcha	rge	
Phone:	(519) 822-2265		Email 1 or Fax Email 2	SSande@Siremla mhealey@Siremla			Spec	ify Dat	e Req	uired f	for E2,			is Re	quest				
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ACTER TO BROK PAGE FOR ALS EXCANDED SAMPLING INFORMATION WHILE - LABORATORY COPY YELLOW - CLIENT COPY Fairly to complete all portions of this form may delay analysis. These fill in this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1. If any water samples are taken from a Registant Drinking Water (DW) System, please submit using an Authorized DW COC form.



SIREM **ATTN: STEVE SANDE** 130 Stone Road West Guelph ON N1G 3Z2 Date Received: 14-APR-20 Report Date: 17-APR-20 13:42 (MT) Version: FINAL

Client Phone: 519-822-2265

Certificate of Analysis

Lab Work Order #: L2436571 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

NOT SUBMITTED SI-4401

Gayle Braun Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details	s/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2436571-1 Sampled By: Matrix:	SI-4401-7B RS on 13-APR-20 WATER							
Anions and								
Ammonia, 1		3.29	RRR	0.50	mg/L		16-APR-20	R5057374
Report Ren	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C	ion required due to h		ntration of tes	t analyte(s). U		Sample Contai	ner.
L2436571-2 Sampled By: Matrix:	SI-4401-8B RS on 13-APR-20 WATER							
Anions and	Nutrients							
Ammonia, 1	Γotal (as N)	3.38	RRR	0.50	mg/L		16-APR-20	R5057374
	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C							
L2436571-3 Sampled By: Matrix:	SI-4401-9B RS on 13-APR-20 WATER							
Anions and	Nutrients							
Ammonia, 1	· · · ·	3.13	RRR	0.50	mg/L		16-APR-20	
Report Ren Sample rec for this test.	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C	on required due to h ontainer type appear	iigh conce rs to be ap	ntration of tes propriate, but	t analyte(s). U ALS cannot v	SC Unknown erify its cleanli	Sample Contai ness or overall	ner. suitability
L2436571-4 Sampled By: Matrix:	SI-4401-10B RS on 13-APR-20 WATER							
Anions and	Nutrients							
Ammonia, 1	Γotal (as N)	6.38	RRR	0.50	mg/L		16-APR-20	R5057374
	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C							
L2436571-5 Sampled By: Matrix:	SI-4401-11B RS on 13-APR-20 WATER							
Anions and	Nutrients							
Ammonia, T	Γotal (as N)	6.36	RRR	0.50	mg/L		16-APR-20	R5057374
	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C							
L2436571-6 Sampled By: Matrix:	SI-4401-12B RS on 13-APR-20 WATER							
Anions and								
Ammonia, T	Fotal (as N)	6.38	RRR	0.50	mg/L		16-APR-20	R5057374
Report Ren	narks : DLHC Detection Limit Raised: Dilut eived in container not provided by ALS. C	ion required due to h		ntration of tes	t analyte(s). U		Sample Contai	ner.

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Ammonia, Total (as N)	MS-B	L2436571-1, -2, -3, -4, -5, -6

Sample Parameter Qualifier key listed: Qualifier Description

Quanner	besonption
MS-B Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.	
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory

objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million. < - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

				-		•			
			Workorder:	L2436571		Report Date:	17-APR-20		Page 1 of 2
Client:		e Road West DN N1G 3Z2							
Contact:	STEVE S	ANDE							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-WT		Water							
Batch WG3308534 Ammonia, T			WG3308534-5 3.29	3.34		mg/L	1.6	20	16-APR-20
WG3308534 Ammonia, T				93.9		%		85-115	16-APR-20
WG3308534 Ammonia, T				<0.010		mg/L		0.01	16-APR-20
WG3308534 Ammonia, T			WG3308534-5	N/A	MS-B	%		-	16-APR-20

Client:	SIREM
	130 Stone Road West
	Guelph ON N1G 3Z2
Contact:	STEVE SANDE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Chain of Custody (COC) / Analy Request Form



OC Number: 17 -

Page ______ of _____

Canada Toll Free: 1 800 668 9878

Denerat To	www.alsglobal.com Steve Sande		<u> </u>		Peport Form	at / Distribution								-	around	Time (1	TAT) im 1	not evail	oble for a	ol tests	
Report To	SiREM			Select Re	port Format: Ø PDF		EDD (DIGITAL)	(umaround Time (TAT) is not available for all tests; .) R ☑ Regular (Standard TAT if received by 3 pm - business days)													
Company:	Steve Sande				ontrol (QC) Report with		• •	·						rm TAT							
Contact: Address:	130 Stone Road West				Report - provide details bek														tALS to		
r luur 000.	Guelph, ON N1G 3Z2			Select Dis			D FAX	I -								to confir					
Phone:	(519) 822-2265			Email 1 o	Fax SSande@SiremI	ab.com		_		te Req					Т						
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Company:	SiREM - A Division of C	I Yes Geosyntec Consul		Email 1 or	Fax AccountsPayable	Can@Siremlab.	com														
Contact:	Accounts Payable Can	ada		Email 2																	
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ALS Quote #:				Approver	ID:	Cost Center:															tainers
Job #:	Si-4401			GL Accou	nt:	Routing Code:	:														of Con
PO / AFE:				Activity C	ode;																Number of Containers
LSD:				Location:																	'nN
ALS Lab Wo	rie Octor # (Jalo uno ori	" L21	1365		act: Gayle Braun	Sampler:	Rita Schofield														
ALS Sample # (lab use only)		nple identificatio			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Ammonia													
	·				13-Apr-20		10/04-0	R		 _			-	+	+		_			-	1
	Si-4401-7B						Water	+	<u> </u>			ļ		–				-			
	Si-4401-8B				13-Apr-20		Water	R	ļ						-	$\left \right $		\rightarrow			1
	Si-4401-9B				13-Apr-20		Water	R		-		ļ		<u> </u>	ļ			_	_	_	1
	Si-4401-10B				13-Apr-20		Water	R							1						1
	Si-4401-11B				13-Apr-20		Water	R					1								1
	Si-4401-12B				13-Apr-20		Water	R													1
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										-				1			-				
Drinking	g Water (DW) Samples ¹	(client use)		Special Instructions	/ Specify Criteria to add	on report (client L	lse)	Froz	en			A 18 1	i shî li k	SIF	Obse	rvatio		0.75	14 3 2	3.51	
Are samples tak	ten from a Regulated DW S ∕es IZ No	System?	To ALS Water	rloo				lce p	acks.	Yes		2 No	۵	Cus	itody	seat in	tact 🕺	Yes	ā	lie.	D
	-	.2								OOLER	TEMPE	RATUR	66 °C	nase h Refe	er ser Retter	FRIAL	coou				and the second
Are samples for	rhunman drinking wateruse ∕es a⊽No									1		1		17	(1946) 1940)	2		819. A	er e p	12 Q.	Ange -
																				0.347.0389	
	SHIPMENT RELEA	SE (client use)		The second s	IAL SHIPMENT RECE	PTION (lab use	only)			<u> </u>	FU	IAL SI	IPME	MTR	latela	PTION	(ieb)		West.	24 A.	

WHITE - LABORATORY COPY YELLOW - CLIENT COPY REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

The Los To and Finds For Hos Southons and commence and entrol and one finds at commence and an and an and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1, if any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



SIREM **ATTN: Steve Sande** 130 Stone Road West Guelph ON N1G 3Z2

Date Received: 28-OCT-20 Report Date: 04-NOV-20 13:47 (MT) Version: FINAL

Client Phone: 519-822-2265

Certificate of Analysis

Lab Work Order #: L2522624 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

NOT SUBMITTED SI-4401

Gayle Braun Senior Account Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Environmental 🔊

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2522624-1 SI-4401-1C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	4.7	DLHC	1.0	mg/L		30-OCT-20	R5270967
L2522624-2 SI-4401-2C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	4.6	DLHC	1.0	mg/L		02-NOV-20	R5270967
L2522624-3SI-4401-3CSampled By:S.SANDE on 27-OCT-20Matrix:WATER							
Anions and Nutrients							
Ammonia, Total (as N)	4.59	DLHC	0.50	mg/L		02-NOV-20	R5270967
L2522624-4SI-4401-4CSampled By:S.SANDE on 27-OCT-20Matrix:WATER							
Anions and Nutrients							
Ammonia, Total (as N)	3.64	DLHC	0.50	mg/L		02-NOV-20	R5270967
L2522624-5SI-4401-5CSampled By:S.SANDE on 27-OCT-20Matrix:WATER							
Anions and Nutrients							
Ammonia, Total (as N)	52	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-6 SI-4401-6C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	14	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-7 SI-4401-7C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	15	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-8SI-4401-8CSampled By:S.SANDE on 27-OCT-20Matrix:WATER							
Anions and Nutrients							
Ammonia, Total (as N)	11	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-9 SI-4401-9C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	12	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-10SI-4401-10CSampled By:S.SANDE on 27-OCT-20Matrix:WATER							
Anions and Nutrients							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2522624-10 SI-4401-10C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	15	DLHC	10	mg/L		29-OCT-20	R5270967
L2522624-11 SI-4401-11C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	13	DLHC	10	mg/L		29-OCT-20	R527096
L2522624-12 SI-4401-12C Sampled By: S.SANDE on 27-OCT-20 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<10	DLHC	10	mg/L		29-OCT-20	R527096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Ammonia, Total (as N)	MS-B	L2522624-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Sample Para	Sample Parameter Qualifier key listed:								
Qualifier	Description								
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).								
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.								

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory

objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million. < - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

				-		-			
			Workorder:	L2522624		Report Date:	04-NOV-20		Page 1 of 2
Client:		e Road West DN_N1G 3Z2							
Contact:	Steve Sar	nde							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-WT		Water							
Batch	R5270967								
WG3434251 Ammonia, T			L2522502-1 4.08	3.77		mg/L	7.8	20	02-NOV-20
WG3434251 Ammonia, T				110.8		%		85-115	29-OCT-20
WG3434251 Ammonia, T				<0.010		mg/L		0.01	29-OCT-20
WG3434251 Ammonia, T			L2522502-1	N/A	MS-B	%		-	02-NOV-20

Client:	SIREM
	130 Stone Road West
	Guelph ON N1G 3Z2
Contact:	Steve Sande

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.





0 Number: 17 -

Page _____ of ____

Chain of Custody (COC) / Analytic **Request Form**

Environmental

Canada Toli Free: 1 800 668 9878

	www.aisglobai.com		 	T Depart Format (Distribution						Se	lect Ser	lce Lev	el Belo	(Rust	Turna	round	Time (TA	AT) is no	ot avaik	able for	all tests	s)
Report To	Steve Sande		Report Format / Distribution						Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests) R Z Regular (Standard TAT if received by 3 pm - business days)													
Company:	SIREM		Select Report Format: PDF PEXCEL DEDD (DIGITAL)						Regular (Scandard TAT in received by 3 pm - business days) P Prionty (2-4 bus, days if received by 3pm) 50% surcharge - contact ALS to confirm TAT													
Contact:	Steve Sande			Quality Control (QC) Report with Report						E Emergency (1-2 bus, days in received by 3pm) 100% surcharge - contact ALS to confirm TAT												
Address	130 Stone Road West			Criteria on Report - provide details below if box checked Select Distribution: EMAIL AAIL FAX					E Same day or weekend emergency - contact ALS to confirm TAT and surcharge													
										te Req		_		_								
Phone:															s Re	quest						
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Company:	SIREM - A Division of G			Email 1	Email 1 or Fax AccountsPavableCan@Siremlab.com																	
Contact: Accounts Payable Canada					Email 2																	
	Project la	nformation			Oil and Gas Required Fields (client use)																	yn
ALS Quote #:				Approve	Approver ID: Cost Center:																	Number of Containers
Job #:	Si-4401			GL Acc	ount:		Routing Code:															of Co
PO / AFE:				Activity	Code:																	Imber
LSD:			A	Location	n:																	ź
ALS Lab Work Order # (lab use only) 1 25 22624					ontact:	Gayle Braun	Sampler:	Steve Sande														
ALS Sample # (lab use only)	Sam	ple Identification	n and/or Coordina	ates		Date	Time	Sample Type	Ammonia													
(ran rate cruy)		s description will	appear on the rep	ort)		(dd-mmm-yy)	(hh:mm)		Ч R	ļ	ļ					<u> </u>				-+	_	1
	Si-4401-1C			<u></u>		27-Oct-20		Water			-				+				-+	-		1
	Si-4401-2C					27-Oct-20		Water	-		<u> </u>				\vdash			- +-				
	Si-4401-3C					27-Oct-20		Water	R						L		\vdash				-+	1
	Si-4401-4C					27-Oct-20		Water	R													1
	Si-4401-5C		· · · ·			27-Oct-20		Water	R													1
	Si-4401-6C	· · · ·			- +	27-Oct-20		Water	R													1
	Si-4401-7C					27-Oct-20	+	Water	R	-					1							1
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	Si-4401-8C	··· _					·					-					+	+				1
	Si-4401-9C					27-Oct-20		Water	R								+ +					
	Si-4401-10C					27-Oct-20	L	Water	R						ļ							1
	Si-4401-11C					27-Oct-20		Water	R													1
	Si-4401-12C		_			27-Oct-20		Water	R													1
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Drinking Water (DW) Samples ¹ (client use) Special Instru				pecial Instruction	tructions / Specify Criteria to add on report (client Use)				Froz	en		D			SIF	Obse	CEIVE	15	Yes		No	
Are samples tak	ren from a Regulated DW S res 🔽 No	system?	To ALS Waterlo	0							Yes itiated	B	No		Cust	tody :	seal inf				No	
	human drinking water use	?							ITIAL C	OOLER	TEMPE	RATURI	E8 °C		.,	FINAL C	COOLE	R TEM	PERAT	URES	ic	
TYes 🔽 No															15	<u>.</u> .8						
	SHIPMENT RELEAS	SE (client use)		IN IN	INITIAL SHIPMENT RECEPTION (lab use only)					FINAL SHIPMENT RECEPTION (lab use only)												
Steve Sande		10/27/2020		Received by:	ed by: Date: Time:					eived	by:		Я	K			128	1	Time:	þ	40	6
L				(48)				CLIEN	T COP						NA EN LT	10.000	ontitue Lany	any 2014				

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APPENDIX E: Pace Laboratory Reports





Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

March 06, 2020

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Si-4401 Pace Project No.: 50250884

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on March 03, 2020. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Kelly M gmes

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab



REPORT OF LABORATORY ANALYSIS



CERTIFICATIONS

Project: Si-4401 Pace Project No.: 50250884

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Certification #: 200074 Indiana Certification #: C-49-06 Kansas/NELAP Certification #: E-10177 Kentucky UST Certification #: 80226 Kentucky WW Certification #: 98019 Michigan Department of Environmental Quality, Laboratory #9050 Ohio VAP Certification #: CL0065 Oklahoma Certification #: 9204 Texas Certification #: T104704355 West Virginia Certification #: 330 Wisconsin Certification #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Si-4401 Pace Project No.: 50250884

Lab ID	Sample ID	Matrix	Date Collected	Date Received		
50250884001	Si-4401-BASE-1	Water	03/02/20 13:30	03/03/20 09:00		
50250884002	Si-4401-BASE-2	Water	03/02/20 13:30	03/03/20 09:00		



SAMPLE ANALYTE COUNT

	Sample ID	Mothod	Analysts	Analytes	Laboratory
Pace Project No.:	50250884				
Project:	Si-4401				

Lab ID	Sample ID	Method	Analysts	Reported	Laboratory	_
50250884001	Si-4401-BASE-1	EPA 8260	ZAH	5	PASI-I	
50250884002	Si-4401-BASE-2	EPA 8260	ZAH	5	PASI-I	



SUMMARY OF DETECTION

Project: Pace Project No.:	Si-4401 50250884					
Lab Sample ID Method	Client Sample ID Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50250884001	Si-4401-BASE-1					
EPA 8260 EPA 8260	Benzene p-Isopropyltoluene	4790 4490	ug/L ug/L	500 500	03/04/20 23:08 03/04/20 23:08	
50250884002	Si-4401-BASE-2					
EPA 8260 EPA 8260	Benzene p-Isopropyltoluene	5590 5170	ug/L ug/L	500 500	03/04/20 22:52 03/04/20 22:52	



Project: Si-4401

Pace Project No.: 50250884

Sample: Si-4401-BASE-1	Lab ID: 50	250884001	Collected: 03/02/2	20 13:30	Received: 03	3/03/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical Me	thod: EPA 82	260					
Benzene	4790	ug/L	500	100		03/04/20 23:08	71-43-2	
p-lsopropyltoluene <i>Surrogates</i>	4490	ug/L	500	100		03/04/20 23:08	99-87-6	
Dibromofluoromethane (S)	98	%.	75-120	100		03/04/20 23:08	1868-53-7	HS
4-Bromofluorobenzene (S)	93	%.	85-116	100		03/04/20 23:08	460-00-4	
Toluene-d8 (S)	99	%.	83-111	100		03/04/20 23:08	2037-26-5	



Project: Si-4401

Pace Project No.: 50250884

Sample: Si-4401-BASE-2	Lab ID: 5	0250884002	Collected: 03/02/2	20 13:30	Received: 03	3/03/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical M	ethod: EPA 82	260					
Benzene	5590	ug/L	500	100		03/04/20 22:52	71-43-2	
p-lsopropyltoluene <i>Surrogates</i>	5170	ug/L	500	100		03/04/20 22:52	99-87-6	
Dibromofluoromethane (S)	101	%.	75-120	100		03/04/20 22:52	1868-53-7	D4,HS
4-Bromofluorobenzene (S)	96	%.	85-116	100		03/04/20 22:52	460-00-4	
Toluene-d8 (S)	98	%.	83-111	100		03/04/20 22:52	2037-26-5	



QUALITY CONTROL DATA

Project: S	Si-4401												
Pace Project No.: 5	0250884												
QC Batch:	550293			Anal	ysis Meth	od: E	EPA 8260						
QC Batch Method:	EPA 826	0		Anal	ysis Desc	ription: 8	260 MSV						
Associated Lab Samp	les: 50)2508840	02										
METHOD BLANK: 2	537337				Matrix: V	Vater							
Associated Lab Samp	les: 50	2508840	02										
				Bla	nk	Reporting							
Parame	ter		Units	Res	ult	Limit	Anal	yzed	Qualifiers	6			
Benzene			ug/L		ND	5.0	03/04/2	0 13:18					
p-Isopropyltoluene			ug/L		ND	5.0	03/04/2	0 13:18					
4-Bromofluorobenzen	e (S)		%.		94	85-116	6 03/04/2	0 13:18					
Dibromofluoromethan	e (S)		%.		101	75-120	0 03/04/2	0 13:18					
Toluene-d8 (S)			%.		99	83-111	1 03/04/2	0 13:18					
LABORATORY CONT	ROL SAM		2537338										
				Spike	L	CS	LCS	% R	ec				
Parame	ter		Units	Conc.		esult	% Rec	Lim		Qualifiers			
Benzene			ug/L		50	42.4	8	5	75-118		_		
p-Isopropyltoluene			ug/L	5	50	43.7	8	7	82-119				
4-Bromofluorobenzen	e (S)		%.				9	4	85-116				
Dibromofluoromethan			%.				9	6	75-120				
Toluene-d8 (S)			%.				10	1	83-111				
MATRIX SPIKE & MA		KE DUPL	ICATE: 2537	339		2537340							
				MS	MSD								
			50250794002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter		Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qual
Benzene		ug/L	ND	50	50	44.5	44.1	88	87	49-135	1	20	
p-Isopropyltoluene		ug/L	ND	50	50		41.1	81	82	15-155	1		
4-Bromofluorobenzen	e (S)	%.						94	95	85-116			
Dibromofluoromethan	· · /	%.						96	98	75-120			
Toluopo dQ (C)	. /	0/						100	100	02 111			

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

100

100 83-111

REPORT OF LABORATORY ANALYSIS

Toluene-d8 (S)

%.

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QUALITY CONTROL DATA

Project: Si	-4401											
Pace Project No.: 50	250884											
QC Batch:	550294		Analy	/sis Metho	d: E	PA 8260						
QC Batch Method:	EPA 8260		Analy	/sis Descri	ption: 82	260 MSV						
Associated Lab Sample	es: 50250884	001										
METHOD BLANK: 25	37343			Matrix: W	/ater							
Associated Lab Sample	es: 50250884	001										
			Blar	۱k	Reporting							
Paramete	er	Units	Res	ult	Limit	Anal	yzed	Qualifiers	3			
Benzene		ug/L		ND	5.0	03/04/2	0 13:34					
p-Isopropyltoluene		ug/L		ND	5.0	03/04/2	0 13:34					
4-Bromofluorobenzene		%.		95	85-116							
Dibromofluoromethane	(S)	%.		102	75-120							
Toluene-d8 (S)		%.		99	83-111	03/04/2	0 13:34					
LABORATORY CONTR		2537344 Units	Spike Conc.	LC Re:		LCS % Rec	% Re Limi		Qualifiers			
Benzene		ug/L	5	50	44.8	9	0 7	75-118				
p-Isopropyltoluene		ug/L	5	50	47.5	9		32-119				
4-Bromofluorobenzene		%.				9		35-116				
Dibromofluoromethane	(S)	%.				9		75-120				
Toluene-d8 (S)		%.				10	3 0	83-111				
MATRIX SPIKE & MAT	RIX SPIKE DUF	PLICATE: 2537	'345		2537346							
			MS	MSD								
		50250774001	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qual
Benzene	ug/L	. ND	50	50	45.7	44.5	91	89	49-135	2	20	
p-Isopropyltoluene	ug/L	. ND	50	50	46.5	47.0	93	94	15-155	1	20	
4-Bromofluorobenzene	. ,						96	95	85-116			
Dibromofluoromethane	· /						99	102	75-120			
Toluene-d8 (S)	%.						102	102	83-111			

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

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full, without the written consent of Pace Analytical Services, LLC.



QUALIFIERS

Project:	Si-4401
Pace Project No.:	50250884

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

LABORATORIES

PASI-I Pace Analytical Services - Indianapolis

ANALYTE QUALIFIERS

D4 Sample was diluted due to the presence of high levels of target analytes.

HS Results are from sample aliquot taken from VOA vial with headspace (air bubble greater than 6 mm diameter).



QUALITY CONTROL DATA CROSS REFERENCE TABLE

 Project:
 Si-4401

 Pace Project No.:
 50250884

Analytical

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Batch
50250884001	Si-4401-BASE-1	EPA 8260	550294		
50250884002	Si-4401-BASE-2	EPA 8260	550293		

Pace Analytical Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields Billing Information:											-						iber Here	
SiREM					ablecar	Msire	mlah	00	1			the Office of		(USD)			a har shall be	B USE ONLY
ess: 130 Stone Rd W			m	nspay	abiceai		inab		3		-	er Preserv	220	100	1200			t Manager:
^{rt To:} Steve Sande			Email To:	ssande	@siremlab.com					thanol.	7) sodium	bisulfate,	(8) sodiu	m thio	sulfate, (hexane	ic acid, (4) so e, (A) ascorb	odium hydroxide, (5) zinc acetate, ic acid, (B) ammonium sulfate,
-		H	Site Collec	tion Info/A						monium	hydroxid	e, (D) TSP, Analys	(U) Unpr	eserve	d, (O) Otl	ner	Lab Profile	/Line:
mhealey@siremlal omer Project Name/Number: 4401	5.0011		State:	County/Cli anada/G	ty: Tin Guelph [ne Zone Col PT [] MT	lected: []CT	√] ET				Analys			En la		Lab Sat	mple Receipt Checklist: E SCL y Seals Present/Intact Y N NA
	Site/Facility ID	#:			[] Yes	e Monitorii	ng?										Collect Bottle	Y Signatures Present Y N NA tor Signature Present Y N NA s Intact Y N NA t Bottles Y N NA
ected By (print): eve Sande	Purchase Orde Quote #:	er #:		DW PWS ID #: DW Location Code: Immediately Packed on Ice:							ante						Suffic Sample	ient Volume Y N NA s Received on Ice Y N NA Headspace Acceptable Y N NA
ected By (signature):	Rush: Field Fill [] Same Day [] Next Day [] 2 Day [] 3 Day [] 2 Day [] 4 Day				1	ly Packed of [] No	on Ice:							Vin			USDA R Sample	egulated Soils Y N NA s in Holding Time Y N NA
ple Disposal: bispose as appropriate [] Return krchive: lold:					Field Filtered (if applicable): [] Yes [] No Analysis:												Cl Str Sample pH Str Sulfid	pH Acceptable Y N NA
atrix Codes (Insert in Matrix bo oduct (P), Soil/Solid (SL), Oil (O	x below): Drink L), Wipe (WP),	king Water Air (AR), Ti	(DW), Grou ssue (TS), E	und Water Bioassay (B)	(GW), Wast , Vapor (V),	ewater (W Other (OT)		1.	ene (8260)				-		13		LAB US	E ONLY:
tomer Sample ID	Matrix *	Comp / Grab	Compo	site Start)		site End	Res Cl	# of Ctns	P-Cymene									50250884
4401-BASE-1	GW	Grab	Date Mar 2	Time 3:30	Date	Time		3	X						nw:			001
4401-BASE-2	GW	Grab	Mar 2	3:30				3	X								-	002
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	-		-															
stomer Remarks / Special Cond		e Hazards:		Ice Used: Material Us		Blue D	ry t	lone		-	T HOLDS	PRESENT	r (<72 h	ours):	YN	I N/A		Lab Sample Temperature Info: Temp Blank Received: Y W NA Therm ID#: 2 Cooler 1 Temp Upon Receipt: 5.9 of
		Radcher	n sample(s)	screened (<500 cpm):	Y	N N	4		les recei EDEX		Client	Со	urier	Pace C		Cooler 1 Therm Corr. Factor: 03 0 Cooler 1 Corrected Temp: 5-6 0	
linquished by/Compan(: (Signature) Date/Time:		520	Received	by/Compar	iy: (Sign	ature)		1	Date/Tim	e:		Table		AB USE	ONLY	Comments:		
linquished by/Company: (Signa	ture) Fade		ate/Time:			by/company	iy (Sign	ature)			Date/Tim		D	Temp	olate:			Trip Blank Received: Y N NA HCL MeOH Tsp Page 12 of 16
inquished by/Company: (Signa			ate/Time:		Pacaivad	by/Compar	w /Sign	ature)	-		Date/Tim			PM:	1000			Non Conformance(s): Page:

Toxic Substance Control Act (TSCA) Certification Page 13 of 16

Date: March 02 2020

Waybill or reference number: 7779 0500 4620

Check only one

Positive Certification

I certify that all chemical substances in this shipment comply with all applicable rules or orders under TSCA and that I am not offering a chemical substance for entry in violation of TSCA or any applicable rule or order thereunder.

or

Negative Certification

I certify that all chemicals in this shipment are not subject to TSCA.

Company name: Geosyntec Consultants DBA SiREM

Company address: 130 Stone Rd W

Certifier name: Samantha Gallant

Certifier title: Administrative Secretary

Certifier phone number: 519-822-2230

Certifier email address: (sgallant@geosyntec.com fund

Sun Its Certifier signature:

Product description

1.	N/A
2.	N/A
3.	Ground Water Samples For Destructive Analysis
4.	
5.	
6.	
7.	
8.	
9.	
10.	

If the certifier is unsure if their chemical substance is subject to TSCA compliance, contact the Environmental Protection Agency, TSCA Assistance Office at 1.202.554.1404 between 8:30 a.m. and 5:00 p.m.

This invoice must be completed in English

COMMERCIAL INVOICE

XPORTER										
ax ID# : Contact Name :	Sammie Gall	ant		Ship Date : 02 Mar, 2020 Air Waybill No. / Tracking No. / Bill of Lading : 777905004620						
elephone No. :										
E-Mail : JSchimn	nel@siremlat									
Company Name/	Address			Invoice No.: 01 Purchase Order No.: 02						
SIREM										
130 Stone Rd W										
GUELPH ON N1 Country/Territor Parties to Trans	y Canada									
Related		lated								
Payment Terms										
Purpose of Ship		mmercial								
CONSIGNEE				rent from Consigne	e)					
Tax ID# :			Same as CON	SIGNEE						
Contact Name	Joshua Ricl	hards								
Telephone No.	: 317-502-95	594		Tax ID# : Company Name/Address :						
E-Mail : Company Name/Address : Pace Analytical Services			Company Name/	Address						
7726 Moller Roa										
112010000000000										
INDIANAPOLIS										
Country/Territo	ory United S	States								
				Country/Territor	<u>y :</u>					
If there is a de Name of Broke	signated bro	oker for this sh Contact	ipment, please provide contact information Name							
Duties and Tax				specify		la la company				
No. of	No. of	Unit of	Description of Goods		Harmonized Tariff Number	Country/Territory of Origin		Total Value		
Packages	Units 1.00	Measure LBS	Commercial - groundwater samples for destruct	ive analyses		CA	10.000000	10.00		
Total No. of P		LDO	Total Weight (Indicate LBS or KGS) :	3.00 kg			Terms of Sale :	10.00		
Special Instru							Subtotal	0.00		
opecial instru	GUONA						Insurance	0.00		
							Freight	0.00		
							Packing : Handling	0.00		
Declaration S	tatement(s)						Other	0.00		
					100 C		Invoice Total	10.00		
I declare that	all the inform	mation contain	ned in this involce to be true and correct	1.10.0	a la dividual -		Currency Code :	CAL		
Originator or	Name of Co	mpany Repres	entative if the invoice is being completed on b	ehalt of a company (orindividual		Conteney code .			
		5		Suy			02 Mar, 2020			
Signature / Ti	tle / Date	19	marto /E	1 1						

Project #: 502508			UPON RECEIPT FORM Date/Time and Initials of person examining contents:ທົພ 3/	15/20 11	کا	
Durier: Fed Ex UPS USPS Client						
acking #: 7779 2500						
ustody Seal on Cooler/Box Present:	No No		Seals Intact: Ves No			
cking Material: 🗌 Bubble Wrap 🖉 Bubble	Bags	None	Other			
nermometer: 120456ABCDEF	ce Type	□ Wet	Blue None Samples collected today and on ice:	🗌 Yes	No No	N//
and and	loc Type.		Ice Visible in Sample Containers?		No	
boler Temperature: <u>5.9/s.C</u> hitial/Corrected) Temp should be above freezing to 6°C			If temp, is Over 6°C or under 0°C, was the PM Notified?:	Yes	🗌 No	1 N/A
All discreted	nancies w	ill he writt	ten out in the comments section below.			
Airdiscie	Yes	No		Yes	No	N/A
e samples from West Virginia?	100	-	All containers needing acid/base pres. Have been checked?: exceptions: VOA, coliform, LLHg, O&G, and any			
SDA Regulated Soils? (ID, NY, WA, OR, CA, NM, TX, <, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto co)		1	container with a septum cap or preserved with HCI. All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.			1
nain of Custody Present	1		Circle: HNO3 H2SO4 NaOH NaOH/ZnAc			
nain of Custody Filled Out:	/		Dissolved Metals field filtered?:			-
nort Hold Time Analysis (<72hr)?: nalysis:		1	Headspace Wisconsin Sulfide			1
me 5035A TC placed in Freezer or Short Holds To La	b:	2	Residual Chlorine Check (SVOC 625 Pest/PCB 608) Residual Chlorine Check (Total/Amenable/Free Cyanide)	Present	Absent	N/A
ush TAT Requested: 504		X	Headspace in VOA Vials (>6mm):		/	
ontainers Intact?:	-		Trip Blank Present?:		1	
ample Labels (IDs/Dates/Times) Match COC?: cept TCs, which only require sample ID	~		Trip Blank Custody Seals?:		-	
xtra labels on Terracore Vials (soils only)?		/				
omments:						

-IN-Q-290-rev.18,22Apr2019

Page 15 of 16

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Sample Container Count

12	11	10	6	8	7	6	თ	4	ω	2	-	Sample Line Item			
												WGFU			
-												ਸ	AT BR	₫	SBS
										C	2	DG9H			
										3/3	3/3	VOA VIALS (>6mm)	•		
-												VG9U	•		
	-											DG9U			
												DG9T			
												AGOU			
												AG1H			
												AG1U			
												AG3S			
												BP1U	_		
												BP1N			
												BP2U	_		
										-	-	BP3U	_		
												BP3N			
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		-										pH <2 pH >9 pH>12	Pa	ne 1	6 of

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Contraction of the local division of the loc		Glass	ŝ			Pla	0
	DG9B	DG9B 40mL Na Bisulfate amber vial	AGOU	AGOU 100mL unpres amber glass	BP1A	BP1A 1L NaOH, Asc Acid plastic	
	DG9H	DG9H 40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1N	1L HNO3 plastic	
	DG9M	DG9M 40mL MeOH clear vial	AG1S	AG1S 1L H2SO4 amber glass	BP1S	1L H2SO4 plastic	
and the second party of th	DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1U	BP1U 1L unpreserved plastic	
_	DG9S	40mL H2SO4 amber vial	AG1U	AG1U 1liter unpres amber glass	BP1Z	BP1Z 1L NaOH, Zn, Ac	
-	DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP2A	BP2A 500mL NaOH, Asc Acid plastic	
	DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2N	BP2N 500mL HNO3 plastic	
-	VG9H	40mL HCl clear vial	AG2U	500mL unpres amber glass	BP20	BP20 500mL NaOH plastic	
	VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2S	BP2S 500mL H2SO4 plastic	
	N69 A	VG9U 40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2U	500mL unpreserved plastic	
	VGFX	VGFX 40mL w/hexane wipe vial	BG1H	BG1H 1L HCI clear glass	BP2Z	500mL NaCH, Zn Ac	
-	VSG	Headspace septa vial & HCI	BG1S	BG1S 1L H2SO4 clear glass	BP3B	250mL NaOH plastic	
	WGKU	8oz unpreserved clear jar	BG1T	1L Na Thiosulfate clear glass	BP3N	BP3N 250mL HNO3 plastic	
	WGFU	4oz clear soil jar	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	
-	JGFU	4oz unpreserved amber wide	BG3H	250mL HCI Clear Glass		filtered)	
-	CG3H	CG3H 250mL clear glass HCi	BG3U	250mL Unpres Clear Glass			

astic /	Misc.	
BP3U	250mL unpreserved plastic	
BP3S	250mL H2SO4 plastic	
BP3Z	250mL NaOH, Zn Ac plastic	

P5T 120mL Coliform Na Thiosulfat	R Terra core kit SP5T 120mL Coliform Na Thiosulfate U Summa Can
120mL Coliform Na Thiosulfate	120mL Coliform Na Thiosulfate Summa Can
T 120mL Coliform Na Thiosulfate	T 120mL Coliform Na Thiosulfate Summa Can
	Summa Can

WP	NAL	SL	WT
Wipe	Non-aqueous liquid	Solid	Water



Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

May 04, 2020

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Si-4401 Pace Project No.: 50252145

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on March 17, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network: • Pace Analytical Services - Indianapolis

Revised Report - This revision replaces the original dated, 032320. Revised to include re-analysis of all samples, reported as samples 004/005/006. / 050120kj

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

Sincerely,

Kelly M gmer

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab





CERTIFICATIONS

Project: Si-4401 Pace Project No.: 50252145

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Accreditation #: 200074 Indiana Drinking Water Laboratory #: C-49-06 Kansas/TNI Certification #: E-10177 Kentucky UST Agency Interest #: 80226 Kentucky WW Laboratory ID #: 98019 Michigan Drinking Water Laboratory #9050 Ohio VAP Certified Laboratory #: CL0065 Oklahoma Laboratory #: 9204 Texas Certification #: T104704355 West Virginia Certification #: 330 Wisconsin Laboratory #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Si-4401 Pace Project No.: 50252145

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50252145001	Si-4401-4A	Water	03/16/20 08:00	03/17/20 09:30
50252145002	Si-4401-5A	Water	03/16/20 08:00	03/17/20 09:30
50252145003	Si-4401-6A	Water	03/16/20 08:00	03/17/20 09:30
50252145004	Si-4401-4A re-analysis	Water	03/16/20 08:00	03/17/20 09:30
50252145005	Si-4401-5A re-analysis	Water	03/16/20 08:00	03/17/20 09:30
50252145006	Si-4401-6A re-analysis	Water	03/16/20 08:00	03/17/20 09:30



Project:

SAMPLE ANALYTE COUNT

Pace Project No	o.: 50252145				
Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50252145001	Si-4401-4A	EPA 8260	TMW	5	PASI-I
50252145002	Si-4401-5A	EPA 8260	TMW	5	PASI-I
50252145003	Si-4401-6A	EPA 8260	TMW	5	PASI-I
50252145004	Si-4401-4A re-analysis	EPA 8260	TMW	5	PASI-I
50252145005	Si-4401-5A re-analysis	EPA 8260	TMW	5	PASI-I
50252145006	Si-4401-6A re-analysis	EPA 8260	TMW	5	PASI-I

PASI-I = Pace Analytical Services - Indianapolis

Si-4401



SUMMARY OF DETECTION

Project: Si-4401

Pace Project No.: 50252145

Lab Sample ID	Client Sample ID					
Method	Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50252145001	Si-4401-4A					
EPA 8260	Benzene	3050	ug/L	250	03/18/20 14:42	
EPA 8260	p-Isopropyltoluene	2130	ug/L	250	03/18/20 14:42	
50252145002	Si-4401-5A					
EPA 8260	Benzene	3730	ug/L	250	03/18/20 16:26	
EPA 8260	p-Isopropyltoluene	2800	ug/L	250	03/18/20 16:26	
50252145003	Si-4401-6A					
EPA 8260	Benzene	4570	ug/L	250	03/18/20 17:00	
EPA 8260	p-Isopropyltoluene	4120	ug/L	250	03/18/20 17:00	
50252145004	Si-4401-4A re-analysis					
EPA 8260	Benzene	5900	ug/L	250	04/21/20 19:26	H1
EPA 8260	p-Isopropyltoluene	4970	ug/L	250	04/21/20 19:26	H1
50252145005	Si-4401-5A re-analysis					
EPA 8260	Benzene	5230	ug/L	250	04/21/20 20:00	H1
EPA 8260	p-Isopropyltoluene	3770	ug/L	250	04/21/20 20:00	H1
50252145006	Si-4401-6A re-analysis					
EPA 8260	Benzene	4650	ug/L	250	04/21/20 20:35	H1
EPA 8260	p-Isopropyltoluene	4300	ug/L	250	04/21/20 20:35	H1



Project: Si-4401

Pace Project No.: 50252145

Sample: Si-4401-4A	Lab ID: 5	0252145001	Collected: 03/16/2	20 08:00	Received: 03	3/17/20 09:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical N	lethod: EPA 82	260					
	Pace Analyt	tical Services -	Indianapolis					
Benzene	3050	ug/L	250	50		03/18/20 14:42	71-43-2	
p-Isopropyltoluene	2130	ug/L	250	50		03/18/20 14:42	99-87-6	
Surrogates								
Dibromofluoromethane (S)	105	%.	75-120	50		03/18/20 14:42	1868-53-7	
4-Bromofluorobenzene (S)	98	%.	85-116	50		03/18/20 14:42	460-00-4	
Toluene-d8 (S)	95	%.	83-111	50		03/18/20 14:42	2037-26-5	



Project: Si-4401

Pace Project No.: 50252145

Sample: Si-4401-5A	Lab ID:	50252145002	Collected: 03/16/2	20 08:00	Received: 03	3/17/20 09:30 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	3730	0 ug/L	250	50		03/18/20 16:26	71-43-2	
p-Isopropyltoluene	280	0 ug/L	250	50		03/18/20 16:26	99-87-6	
Surrogates								
Dibromofluoromethane (S)	103	3%.	75-120	50		03/18/20 16:26	1868-53-7	
4-Bromofluorobenzene (S)	98	8 %.	85-116	50		03/18/20 16:26	460-00-4	
Toluene-d8 (S)	95	5%.	83-111	50		03/18/20 16:26	2037-26-5	



Project: Si-4401

Pace Project No.: 50252145

Sample: Si-4401-6A	Lab ID:	50252145003	Collected: 03/16/2	20 08:00	Received: 03	3/17/20 09:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	457	0 ug/L	250	50		03/18/20 17:00	71-43-2	
p-Isopropyltoluene	4120	0 ug/L	250	50		03/18/20 17:00	99-87-6	
Surrogates								
Dibromofluoromethane (S)	102	2%.	75-120	50		03/18/20 17:00	1868-53-7	
4-Bromofluorobenzene (S)	97	7%.	85-116	50		03/18/20 17:00	460-00-4	
Toluene-d8 (S)	95	5%.	83-111	50		03/18/20 17:00	2037-26-5	



Qual

ANALYTICAL RESULTS

Project: Si-4401

Pace Project No.: 50252145 Sample: Si-4401-4A re-analysis Lab ID: 50252145004 Collected: 03/16/20 08:00 Received: 03/17/20 09:30 Matrix: Water DF Parameters Results Units Report Limit Prepared Analyzed CAS No. 8260/5030 MSV Analytical Method: EPA 8260 Pace Analytical Services - Indianapolis 5900 ug/L 250 50 04/21/20 19:26 71-43-2 H1 Benzene 4970 04/21/20 19:26 99-87-6 H1 p-Isopropyltoluene ug/L 250 50 Surrogates 89 Dibromofluoromethane (S) %. 75-120 50 04/21/20 19:26 1868-53-7 4-Bromofluorobenzene (S) 93 %. 85-116 50 04/21/20 19:26 460-00-4 Toluene-d8 (S) 100 %. 83-111 50 04/21/20 19:26 2037-26-5



Project: Si-4401

Pace Project No.: 50252145

Sample: Si-4401-5A re-analysis	Lab ID: 502	52145005	Collected: 03/16/2	20 08:00	Received: 03	3/17/20 09:30 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical Meth	nod: EPA 82	260					
	Pace Analytica	l Services -	Indianapolis					
Benzene	5230	ug/L	250	50		04/21/20 20:00	71-43-2	H1
p-Isopropyltoluene	3770	ug/L	250	50		04/21/20 20:00	99-87-6	H1
Surrogates								
Dibromofluoromethane (S)	111	%.	75-120	50		04/21/20 20:00	1868-53-7	
4-Bromofluorobenzene (S)	98	%.	85-116	50		04/21/20 20:00	460-00-4	
Toluene-d8 (S)	96	%.	83-111	50		04/21/20 20:00	2037-26-5	



Project: Si-4401 Pace Project No.: 50252145

Sample: Si-4401-6A re-analysis	Lab ID: 502	52145006	Collected: 03/16/2	0 08:00	Received: 03	3/17/20 09:30 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical Met	nod: EPA 82	260					
	Pace Analytica	I Services -	Indianapolis					
Benzene	4650	ug/L	250	50		04/21/20 20:35	71-43-2	H1
p-Isopropyltoluene	4300	ug/L	250	50		04/21/20 20:35	99-87-6	H1
Surrogates		-						
Dibromofluoromethane (S)	111	%.	75-120	50		04/21/20 20:35	1868-53-7	
4-Bromofluorobenzene (S)	96	%.	85-116	50		04/21/20 20:35	460-00-4	
Toluene-d8 (S)	94	%.	83-111	50		04/21/20 20:35	2037-26-5	



QUALITY CONTROL DATA

Project:	Si-4401						
Pace Project No.:	50252145						
QC Batch:	552633		Analysis Meth	nod: Ef	PA 8260		
QC Batch Method:	EPA 8260		Analysis Des	cription: 82	260 MSV		
			Laboratory:	Pa	ace Analytical Servi	ces - Indianapolis	
Associated Lab Sar	mples: 502521450	001, 50252145002,	50252145003				
METHOD BLANK:	2548499		Matrix:	Water			
Associated Lab Sar	mples: 502521450	01, 50252145002,	50252145003				
			Blank	Reporting			
Parar	neter	Units	Result	Limit	Analyzed	Qualifiers	
Benzene		ug/L	ND	5.0	03/18/20 12:22		
p-Isopropyltoluene		ug/L	ND	5.0	03/18/20 12:22		
4-Bromofluorobenze	ene (S)	%.	99	85-116	03/18/20 12:22		
Dibromofluorometha	ane (S)	%.	105	75-120	03/18/20 12:22		
Toluene-d8 (S)		%.	96	83-111	03/18/20 12:22		

LABORATORY CONTROL SAMPLE: 2548500

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L		43.9	88	75-118	
p-Isopropyltoluene	ug/L	50	45.4	91	82-119	
4-Bromofluorobenzene (S)	%.			98	85-116	
Dibromofluoromethane (S)	%.			96	75-120	
Toluene-d8 (S)	%.			96	83-111	

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



QUALITY CONTROL DATA

Project:	Si-4401						
Pace Project No.:	50252145						
QC Batch:	560071		Analysis Meth	nod: El	PA 8260		
QC Batch Method:	EPA 8260		Analysis Des	cription: 82	260 MSV		
			Laboratory:	Pa	ace Analytical Servio	ces - Indianapolis	
Associated Lab San	nples: 502521450	04, 50252145005,	50252145006				
METHOD BLANK:	2582641		Matrix:	Water			
Associated Lab San	nples: 502521450	04, 50252145005,	50252145006				
			Blank	Reporting			
Paran	neter	Units	Result	Limit	Analyzed	Qualifiers	
Benzene		ug/L	ND	5.0	04/21/20 12:32		
p-Isopropyltoluene		ug/L	ND	5.0	04/21/20 12:32		
4-Bromofluorobenze	ene (S)	%.	101	85-116	04/21/20 12:32		
Dibromofluorometha	ane (S)	%.	111	75-120	04/21/20 12:32		
Toluene-d8 (S)		%.	97	83-111	04/21/20 12:32		

LABORATORY CONTROL SAMPLE: 2582642

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Benzene	ug/L		51.1	102	75-118	
p-Isopropyltoluene	ug/L	50	49.9	100	82-119	
4-Bromofluorobenzene (S)	%.			98	85-116	
Dibromofluoromethane (S)	%.			101	75-120	
Toluene-d8 (S)	%.			99	83-111	

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



QUALIFIERS

Project: Si-4401 Pace Project No.: 50252145

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H1 Analysis conducted outside the recognized method holding time.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Si-4401 Pace Project No.: 50252145

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50252145001	Si-4401-4A	EPA 8260	552633		
50252145002	Si-4401-5A	EPA 8260	552633		
50252145003	Si-4401-6A	EPA 8260	552633		
50252145004	Si-4401-4A re-analysis	EPA 8260	560071		
50252145005	Si-4401-5A re-analysis	EPA 8260	560071		
50252145006	Si-4401-6A re-analysis	EPA 8260	560071		

Prace Analytical*		Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields Billing Information:							MTJL Log-in					M	TJL Log-		HOW COLOLITO			
SiREM						- Osia	mlak					ALL	SHAD	DED A	REA	s				
^{Idress:} 130 Stone Rd W			m accour	ntspay	ableca	an@sire	miac	0.00		-	Containe	r Preser	vative T	/pe **	1	F	50252:	145		
port To: Steve Sande			Email To:		Online	lab asm		-										sodium hydroxide, (5) zinc acetate,		
NOV TO:	200.00	-	Site Collect			lab.com		-	 (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) here (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other 							xane, (A) ascorbic acid, (B) ammonium sulfate,				
istomer Project Name/Number:	b.com	H		County/Ci	100 C. 10	me Zone Co	llected			_	-	Analy	ses		1	-	Lab Profil	e/Line: ample Receipt Checklist:		
Si-4401		-			Guelph]PT[]MT	[]СТ	V ET	1								Custo	dy Seals Present/Intact Y N NA		
ione: nail:	Site/Facility II	D #:			Complian [] Yes	Ice Monitori	ng?						-				Colle	dy Signatures Present Y N NA ctor Signature Present Y N NA es Intact Y N NA		
illected By (print):	Purchase Ord Quote #:	ler #:			DW PWS DW Loca	ID #: tion Code:											Suffi	ct Bottles Y N NA cient Volume Y N NA es Received on Ice Y N NA		
illected By (signature):	Turnaround D	Date Requir	ed:		Immediat	tely Packed	on Ice:					1					VOA - USDA	Headspace Acceptable Y N NA Regulated Soils Y N NA es in Holding Time Y N NA		
mple Disposal:] Dispose as appropriate [] Return] Archive: Hold:	[] 2 Day		[] Next Day [] 4 Day arges Apply)			ered (if appli	cable):		30)					1			Resid Cl St Sample pH St	ual Chlorine Present Y N NA rips: e pH Acceptable Y N NA		
Matrix Codes (Insert in Matrix bo Product (P), Soil/Solid (SL), Oil (O								1	ne (8260)			-		1			Lead	Acetate Strips:		
ustomer Sample ID	Matrix *	Comp / Grab	Collect Composi Date		Comp	osite End	Res Cl	# of Ctns	P-Cymene								Lab S	ample # / comments: See Scur		
i-4401-4A	GW	Grab	Mar 16	Time	Date	Inne		3	X						1			001		
i-4401-5A	GW	Grab	Mar 16			1.000		3	X	131					1			002		
I-4401-6A	GW	Grab	Mar 16	-				3	X								(203		
													1							
stomer Remarks / Special Condi	tions / Possible	Hazards	Type of Ice	Used:	Wet	Blue D	TV N	lone		SHO	RT HOLDS F	PRESENT	r (<72 ho	ours):	YN	N/A		Lab Sample Temperature Info:		
istonici kemarks / Special condi			Packing Ma	aterial Us	ed:		1			Lab	Tracking #:			-				Temp Blank Received: Y N NA Therm ID#:oC Cooler 1 Temp Upon Receipt:oC		
			Radchem s	ample(s)	screened (<500 cpm):	Y I	N NA	e -		ples receive FEDEX		Client	Couri	ier I	Pace Co	ourier	Cooler 1 Therm Corr. Factor:oC Cooler 1 Corrected Temp:oC		
			Time: Mar 20 FE						Date/Time:			M Table # Acctnur	:	B USE C	USE ONLY Comments: See Sev					
Hinquished by/Company: (Signat			e/Time:		1	by/Compan	ing	/			Date/Time: 3-17-2	0 0		Templat	te:			Trip Blank Received: age 16 of 20 NA HCL MeOH TSP Other		
linquished by/Company: (Signat	ure)	Dat	e/Time:		Received	by/Compan	y: (Signa	ture)			Date/Time:	:		DAA.			No. C. Company (a) Bago:			

This invoice must be completed in English

COMMERCIAL INVOICE

EXPORTER : Tax ID# : Contact Name Telephone No. E-Mail : JSchir Company Nam SiREM 130 Stone Rd V	: 51982222 mmel@sirem ne/Address	230 1lab.com		Ship Date : 16 Mar, 2020 Air Waybill No. / Tracking No. / Bill of Lading : 770028609274 Invoice No. Purchase Order No. :								
GUELPH ON N Country/Territo Parties to Tran	ory : Canad Isaction:											
Payment Term												
Purpose of Sh		Commercial		1								
CONSIGNEE : Tax ID# : Contact Name Telephone No. E-Mail : Company Nam Pace Analytical 7726 Molter Ro INDIANAPOLIS Country/Territ	Joshua R 317-502- Services ad N 46268 ory : United	9594 States	hipment, piezse provide contact information	Sold To (Indine	Address /	nee)						
If there is a de Name of Broke	signated br	oker for this s	Name									
Duties and Ta		by SExpo	rter Consignee Other If Other, please s									
No. of Packages	No. of Units	Unit of Measure	Description of Goods	poury	Harmonized Tartff Number	Country/Territory of Origin	Unit Value	Total Value				
	1.00	LBS	Commercial - groundwater samples for destructiv			CA	10.000000	10.00				
Total No. of Pa			Total Weight (Indicate LBS or KGS)	3.00 kg		_	Terms of Sale :	FCA 10.00				
Special Instruc	ctions						Subtotal : Insurance :	0.00				
							Freight:	0.00				
							Packing	0.00				
Declaration St	atomont/a						Handling	0.00				
Declaration St	aromoni(s)	·					Other:	0.00				
I declare that	all the inform	mation contain	ed in this invoice to be true and correct				Involce Total	10.00				
			entative if the involce is being completed on beh	alf of a company o	r individual		Currency Code :	CAD				
Signature / Tit	610	K	1 42	6 Mar 2	20		16 Mar, 2020					

TOXIC SUBSTANCE CONTROL ACT (TSCA) CERTIFICATION

Date: March 16, 2020 (CHECK ONE SECTION ONLY)

POSITIVE CERTIFICATION

"I certify that all chemical substances in this shipment comply with all applicable rules or orders under TSCA and that I am not offering a chemical substance for entry in violation of TSCA or any applicable rules order thereunder."

OR (

NEGATIVE CERTIFICATION

Х

"I certify that all chemical substances in this shipment are not subject to TSCA."

Company Name: Geos	yntec Consultants
Company Address: 130	Stone Rd W
City/State: Guelph ON	
Country/Zip: N1G 3Z2	
Authorized Name: Stev	en Sande
Authorized Signature: _	Se p
Title: Laboratory Tech	nician
Federal Express AWB#:	7700 2860 9274

If the certifier is unsure if their chemical substance is subject to TSCA compliance, contact the Environmental Protection Agency, TSCA Assistance Office, Washington, D.C. (202) 554-1404 between 8:30 am and 5:00 pm EST.

Revised 04-2009

Pace Analytical SAMPI Project #: <u>50257145</u>			UPON RECEIPT FORM Date/Time and Initials of person examining contents: <u><u><u></u></u><u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u>	7-20 10	10	
Client Courier:					10	
Sustody Seal on Cooler/Box Present:	No No		Seals Intact: Yes No			
Packing Material: D Bubble Wrap D Bubbl	e Bags	None	Other			
			Blue Done Samples collected today and on ice:	T Yes	□ No	D N/A
Cooler Temperature: 5.6/ 4.7	ice type.	Ja wei		-	1.1	-
Initial/Corrected) Temp should be above freezing to 6°C			Ice Visible in Sample Containers?	L Yes	K No	
		1 m 1	If temp. is Over 6°C or under 0°C, was the PM Notified?: en out in the comments section below.	L Yes	No	N/A
All disc	Yes	No	en out in the comments section below.	Ver	No	
Are samples from West Virginia?	res	NO		Yes	No	N/A
Document any containers out of temp.		+	All containers needing acid/base pres. Have been checked? exceptions: VOA, coliform, LLHg, O&G, and any			
USDA Regulated Soils? (ID, NY, WA, OR,CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		+	container with a septum cap or preserved with HCI. All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.			+
Chain of Custody Present:	t	1. The state	Circle: HNO3 H2SO4 NaOH NaOH/ZnAc			
Chain of Custody Filled Out	+24	~	Dissolved Metals field filtered?		-	+
Short Hold Time Analysis (<72hr)?: Analysis:	3/14/2	t	Headspace Wisconsin Sulfide			P
Time 5035A TC placed in Freezer or Short Holds To L	ab:		Residual Chlorine Check (SVOC 625 Pest/PCB 608) Residual Chlorine Check (Total/Amenable/Free Cyanide)	Present	<u>Absent</u>	N/A + +
Rush TAT Requested:	1	P	Headspace in VOA Vials (>6mm): All vig(s	+		×
Containers Intact?:	+		Trip Blank Present?		t	E Bad
Sample Labels (IDs/Dates/Times) Match COC? Except TCs, which only require sample ID	e		Trip Blank Custody Seals?		x	
Extra labels on Terracore Vials (soils only)?	11	x				
Comments: No Time on COC or	Samples	22 31	17/20 			
F-IN-Q-290-rev.18,22Apr2019					Page	e 19 of 20

Sample Line Item	WGFU	SBS DI BK Kit R	H69H	VOA VIALS (>6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H	1			Matrix	pH <2	pH >9 r	H>12
1			3	313					11					1											WT			
2			1	313																					1			
3			V	3/3						-	-													12-1	L			
4				111																								
5			_																									_
6																												
7																1.			-							_		
8																												
9	_							- 1				-					1						_			_		
10																				-								
11		-																										
12								-			-			1.1								-						-

COC PAGE of

Sample Container Count

Container Codes

	Glas	SS		Plastic / Misc.									
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BP1A	1L NaOH, Asc Acid plastic	BP3U	J 250mL unpreserved plastic						
DG9H	40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1N	1L HNO3 plastic	BP3S	250mL H2SO4 plastic						
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1S	1L H2SO4 plastic	BP3Z	250mL NaOH, Zn Ac plastic						
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1U	1L unpreserved plastic								
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1Z	1L NaOH, Zn, Ac	12							
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	AF	Air Filter						
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2N	500mL HNO3 plastic	С	Air Cassettes						
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2O	500mL NaOH plastic	R	Terra core kit						
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2S	500mL H2SO4 plastic	SP5T	120mL Coliform Na Thiosulfate						
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2U	500mL unpreserved plastic	U	Summa Can						
VGFX	40mL w/hexane wipe vial	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac	ZPLC	Ziploc Bag						
VSG	Headspace septa vial & HCI	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic								
NGKU	8oz unpreserved clear jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	WT	Water						
NGFU	4oz clear soil jar	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	SL	Solid						
JGFU	4oz unpreserved amber wide	BG3H	250mL HCI Clear Glass		filtered)	NAL	Non-aqueous liquid						
CG3H	250mL clear glass HCi	BG3U	250mL Unpres Clear Glass			WP	Wipe Page 20						

F-IN-Q-270-rev.11,26Sep2019



Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

April 19, 2020

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Si-4401 Pace Project No.: 50254679

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on April 15, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network: • Pace Analytical Services - Indianapolis

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

Sincerely,

Kelly M gmer

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab





CERTIFICATIONS

Project: Si-4401 Pace Project No.: 50254679

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Accreditation #: 200074 Indiana Drinking Water Laboratory #: C-49-06 Kansas/TNI Certification #: E-10177 Kentucky UST Agency Interest #: 80226 Kentucky WW Laboratory ID #: 98019 Michigan Drinking Water Laboratory #9050 Ohio VAP Certified Laboratory #: CL0065 Oklahoma Laboratory #: 9204 Texas Certification #: T104704355 West Virginia Certification #: 330 Wisconsin Laboratory #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Si-4401 Pace Project No.: 50254679

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50254679001	Si-4401-1B	Water	04/13/20 08:00	04/15/20 09:00
50254679002	Si-4401-2B	Water	04/13/20 08:00	04/15/20 09:00
50254679003	Si-4401-3B	Water	04/13/20 08:00	04/15/20 09:00
50254679004	Si-4401-4B	Water	04/13/20 08:00	04/15/20 09:00
50254679005	Si-4401-5B	Water	04/13/20 08:00	04/15/20 09:00
50254679006	Si-4401-6B	Water	04/13/20 08:00	04/15/20 09:00
50254679007	Si-4401-7B	Water	04/13/20 08:00	04/15/20 09:00
50254679008	Si-4401-8B	Water	04/13/20 08:00	04/15/20 09:00
50254679009	Si-4401-9B	Water	04/13/20 08:00	04/15/20 09:00
50254679010	Si-4401-10B	Water	04/13/20 08:00	04/15/20 09:00
50254679011	Si-4401-11B	Water	04/13/20 08:00	04/15/20 09:00
50254679012	Si-4401-12B	Water	04/13/20 08:00	04/15/20 09:00



SAMPLE ANALYTE COUNT

 Project:
 Si-4401

 Pace Project No.:
 50254679

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50254679001	Si-4401-1B	EPA 8260	CAP	4	PASI-I
50254679002	Si-4401-2B	EPA 8260	CAP	4	PASI-I
50254679003	Si-4401-3B	EPA 8260	CAP	4	PASI-I
50254679004	Si-4401-4B	EPA 8260	CAP	4	PASI-I
50254679005	Si-4401-5B	EPA 8260	CAP	4	PASI-I
50254679006	Si-4401-6B	EPA 8260	CAP	4	PASI-I
50254679007	Si-4401-7B	EPA 8260	CAP	4	PASI-I
50254679008	Si-4401-8B	EPA 8260	CAP	4	PASI-I
50254679009	Si-4401-9B	EPA 8260	CAP	4	PASI-I
50254679010	Si-4401-10B	EPA 8260	CAP	4	PASI-I
50254679011	Si-4401-11B	EPA 8260	CAP	4	PASI-I
50254679012	Si-4401-12B	EPA 8260	CAP	4	PASI-I

PASI-I = Pace Analytical Services - Indianapolis



SUMMARY OF DETECTION

Project: Si-4401 Pace Project No.: 50254679

Lab Sample ID	Client Sample ID					
Method	Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50254679001	Si-4401-1B					
EPA 8260	p-Isopropyltoluene	1070	ug/L	125	04/16/20 16:31	
50254679002	Si-4401-2B					
EPA 8260	p-Isopropyltoluene	1500	ug/L	125	04/16/20 17:04	
50254679003	Si-4401-3B					
EPA 8260	p-Isopropyltoluene	1400	ug/L	125	04/16/20 17:37	
50254679004	Si-4401-4B					
EPA 8260	p-Isopropyltoluene	4150	ug/L	125	04/16/20 18:09	
50254679005	Si-4401-5B					
EPA 8260	p-Isopropyltoluene	4010	ug/L	125	04/16/20 18:42	
50254679006	Si-4401-6B					
EPA 8260	p-Isopropyltoluene	5070	ug/L	125	04/16/20 19:15	
50254679007	Si-4401-7B					
EPA 8260	p-Isopropyltoluene	4510	ug/L	125	04/16/20 19:48	
50254679008	Si-4401-8B					
EPA 8260	p-Isopropyltoluene	4640	ug/L	125	04/16/20 20:21	
50254679009	Si-4401-9B					
EPA 8260	p-Isopropyltoluene	4040	ug/L	125	04/16/20 20:53	
50254679010	Si-4401-10B					
EPA 8260	p-Isopropyltoluene	4310	ug/L	125	04/16/20 21:26	
50254679011	Si-4401-11B					
EPA 8260	p-lsopropyltoluene	4410	ug/L	125	04/16/20 21:59	
50254679012	Si-4401-12B					
EPA 8260	p-lsopropyltoluene	4840	ug/L	125	04/17/20 03:11	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-1B	Lab ID: 5	50254679001	Collected: 04/13/2	20 08:00	Received: 04	15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical N	lethod: EPA 82	260					
	Pace Analy	tical Services -	Indianapolis					
p-Isopropyltoluene	1070	ug/L	125	25		04/16/20 16:31	99-87-6	
Surrogates								
Dibromofluoromethane (S)	98	%.	75-120	25		04/16/20 16:31	1868-53-7	D4
4-Bromofluorobenzene (S)	96	%.	85-116	25		04/16/20 16:31	460-00-4	
Toluene-d8 (S)	99	%.	83-111	25		04/16/20 16:31	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-2B	Lab ID:	50254679002	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	Method: EPA 82						
	Pace Analy	/tical Services -	Indianapolis					
p-Isopropyltoluene	1500) ug/L	125	25		04/16/20 17:04	99-87-6	
Surrogates		-						
Dibromofluoromethane (S)	97	%.	75-120	25		04/16/20 17:04	1868-53-7	D4
4-Bromofluorobenzene (S)	94	· %.	85-116	25		04/16/20 17:04	460-00-4	
Toluene-d8 (S)	98	8 %.	83-111	25		04/16/20 17:04	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Lab ID:	50254679003	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	latrix: Water	
Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Analytical I	Method: EPA 82	260					
Pace Analy	tical Services -	Indianapolis					
1400) ug/L	125	25		04/16/20 17:37	99-87-6	
96	6 %.	75-120	25		04/16/20 17:37	1868-53-7	D4
97	7 %.	85-116	25		04/16/20 17:37	460-00-4	
99	9%.	83-111	25		04/16/20 17:37	2037-26-5	
	Results Analytical Pace Analy 1400 96	Analytical Method: EPA 82 Pace Analytical Services - 1400 ug/L 96 %. 97 %.	ResultsUnitsReport LimitAnalytical Method: EPA 8260Pace Analytical Services - Indianapolis1400ug/L96%.97%.85-116	ResultsUnitsReport LimitDFAnalytical Method: EPA 8260 Pace Analytical Services - Indianapolis1400ug/L1252596%.75-1202597%.85-11625	ResultsUnitsReport LimitDFPreparedAnalytical Method: EPA 8260 Pace Analytical Services - Indianapolis1400ug/L125251400ug/L1252596%.75-1202596%.75-120252597%.85-11625	Results Units Report Limit DF Prepared Analyzed Analytical Method: EPA 8260 Pace Analytical Services - Indianapolis 400 ug/L 125 25 04/16/20 17:37 96 %. 75-120 25 04/16/20 17:37 97 %. 85-116 25 04/16/20 17:37	Results Units Report Limit DF Prepared Analyzed CAS No. Analytical Method: EPA 8260 Pace Analytical Services - Indianapolis 5 04/16/20 17:37 99-87-6 1400 ug/L 125 25 04/16/20 17:37 99-87-6 96 %. 75-120 25 04/16/20 17:37 1868-53-7 97 %. 85-116 25 04/16/20 17:37 460-00-4



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-4B	Lab ID: 5	50254679004	Collected: 04/13/2	20 08:00	Received: 04	k/15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	1ethod: EPA 82						
	Pace Analyt	tical Services -	Indianapolis					
p-Isopropyltoluene	4150	ug/L	125	25		04/16/20 18:09	99-87-6	
Surrogates								
Dibromofluoromethane (S)	97	%.	75-120	25		04/16/20 18:09	1868-53-7	D4
4-Bromofluorobenzene (S)	95	%.	85-116	25		04/16/20 18:09	460-00-4	
Toluene-d8 (S)	97	%.	83-111	25		04/16/20 18:09	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-5B	Lab ID:	50254679005	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Analy	ytical Services -	Indianapolis					
p-Isopropyltoluene	4010) ug/L	125	25		04/16/20 18:42	99-87-6	
Surrogates								
Dibromofluoromethane (S)	98	3 %.	75-120	25		04/16/20 18:42	1868-53-7	
4-Bromofluorobenzene (S)	94	4%.	85-116	25		04/16/20 18:42	460-00-4	D4
Toluene-d8 (S)	97	7 %.	83-111	25		04/16/20 18:42	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-6B	Lab ID:	50254679006	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	Method: EPA 82						
	Pace Analy	tical Services -	- Indianapolis					
p-Isopropyltoluene	5070) ug/L	125	25		04/16/20 19:15	99-87-6	
Surrogates								
Dibromofluoromethane (S)	98	3 %.	75-120	25		04/16/20 19:15	1868-53-7	D4
4-Bromofluorobenzene (S)	94	4 %.	85-116	25		04/16/20 19:15	460-00-4	
Toluene-d8 (S)	99	%.	83-111	25		04/16/20 19:15	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-7B	Lab ID:	50254679007	Collected: 04/13/2	20 08:00	Received: 04	15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	Method: EPA 82						
	Pace Analy	tical Services -	· Indianapolis					
p-Isopropyltoluene	4510	ug/L	125	25		04/16/20 19:48	99-87-6	
Surrogates								
Dibromofluoromethane (S)	97	%.	75-120	25		04/16/20 19:48	1868-53-7	D4
4-Bromofluorobenzene (S)	96	% .	85-116	25		04/16/20 19:48	460-00-4	
Toluene-d8 (S)	98	8 %.	83-111	25		04/16/20 19:48	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-8B	Lab ID:	50254679008	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	Method: EPA 82						
	Pace Analy	/tical Services -	Indianapolis					
p-Isopropyltoluene	4640	ug/L	125	25		04/16/20 20:21	99-87-6	
Surrogates								
Dibromofluoromethane (S)	97	%.	75-120	25		04/16/20 20:21	1868-53-7	D4
4-Bromofluorobenzene (S)	95	5 %.	85-116	25		04/16/20 20:21	460-00-4	
Toluene-d8 (S)	98	8 %.	83-111	25		04/16/20 20:21	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-9B	Lab ID:	50254679009	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical I	Method: EPA 82	260					
	Pace Analy	tical Services -	- Indianapolis					
p-Isopropyltoluene	4040) ug/L	125	25		04/16/20 20:53	99-87-6	
Surrogates								
Dibromofluoromethane (S)	98	3 %.	75-120	25		04/16/20 20:53	1868-53-7	
4-Bromofluorobenzene (S)	94	4 %.	85-116	25		04/16/20 20:53	460-00-4	D4
Toluene-d8 (S)	99	%.	83-111	25		04/16/20 20:53	2037-26-5	



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-10B	Lab ID: 5	50254679010	Collected: 04/13/2	20 08:00	Received: 04	l/15/20 09:00 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical M	/lethod: EPA 82	260					
	Pace Analy	tical Services -	Indianapolis					
p-Isopropyltoluene	4310	ug/L	125	25		04/16/20 21:26	99-87-6	
Surrogates								
Dibromofluoromethane (S)	97	%.	75-120	25		04/16/20 21:26	1868-53-7	
4-Bromofluorobenzene (S)	94	%.	85-116	25		04/16/20 21:26	460-00-4	D4
Toluene-d8 (S)	99	%.	83-111	25		04/16/20 21:26	2037-26-5	



Project: Si-4401 Pace Project No.: 50254679

Sample: Si-4401-11B Lab ID: 50254679011 Collected: 04/13/20 08:00 Received: 04/15/20 09:00 Matrix: Water DF Parameters Results Units Report Limit Prepared Analyzed CAS No. Qual 8260/5030 MSV Analytical Method: EPA 8260 Pace Analytical Services - Indianapolis p-Isopropyltoluene 4410 ug/L 125 25 04/16/20 21:59 99-87-6 Surrogates Dibromofluoromethane (S) 96 %. 75-120 25 04/16/20 21:59 1868-53-7 D4 4-Bromofluorobenzene (S) 94 %. 85-116 25 04/16/20 21:59 460-00-4 Toluene-d8 (S) 98 %. 83-111 25 04/16/20 21:59 2037-26-5



Project: Si-4401

Pace Project No.: 50254679

Sample: Si-4401-12B	Lab ID:	50254679012	Collected: 04/13/2	20 08:00	Received: 04	4/15/20 09:00 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	,	Method: EPA 82						
	Pace Anal	ytical Services -	Indianapolis					
p-Isopropyltoluene	4840	0 ug/L	125	25		04/17/20 03:11	99-87-6	
Surrogates								
Dibromofluoromethane (S)	11(o %.	75-120	25		04/17/20 03:11	1868-53-7	D4
4-Bromofluorobenzene (S)	103	3 %.	85-116	25		04/17/20 03:11	460-00-4	
Toluene-d8 (S)	96	6%.	83-111	25		04/17/20 03:11	2037-26-5	



p-Isopropyltoluene

Toluene-d8 (S)

4-Bromofluorobenzene (S)

Dibromofluoromethane (S)

QUALITY CONTROL DATA

Project:	Si-4401							
Pace Project No.:	50254679							
QC Batch:	557519		Analysis Met	nod: E	PA 8260			
QC Batch Method:	EPA 8260		Analysis Des	cription: 8	260 MSV			
			Laboratory:	Р	ace Analytical S	Services - India	napolis	
Associated Lab Sa		001, 50254679002 008, 50254679009	, ,	,	0254679005, 5	0254679006, 5	50254679007,	
METHOD BLANK:	2571321		Matrix:	Water				
Associated Lab Sa		001, 50254679002 008, 50254679009	, ,	,	0254679005, 5	0254679006, 5	50254679007,	
			Blank	Reporting				
			Diank	reporting				
Para	meter	Units	Result	Limit	Analyzed	Qualifi	ers	
Para p-lsopropyltoluene	meter	Units ug/L					ers	
			Result	Limit	04/16/20 14:	53	ers	
p-Isopropyltoluene	ene (S)	ug/L %. %.	Result	Limit 5.0	04/16/20 14: 04/16/20 14:	53 53	ers	
p-lsopropyltoluene 4-Bromofluorobenz	ene (S)	ug/L %.	Result ND 96	Limit 5.0 85-116	04/16/20 14: 04/16/20 14: 04/16/20 14:	53 53 53	ers	
p-lsopropyltoluene 4-Bromofluorobenz Dibromofluorometh	ene (S) ane (S)	ug/L %. %.	Result ND 96 99	Limit 5.0 85-116 75-120	04/16/20 14: 04/16/20 14: 04/16/20 14:	53 53 53	ers	
p-lsopropyltoluene 4-Bromofluorobenz Dibromofluorometh Toluene-d8 (S)	ene (S) ane (S)	ug/L %. %. %.	Result ND 96 99 98 Spike	Limit 5.0 85-116 75-120	04/16/20 14: 04/16/20 14: 04/16/20 14:	53 53 53	ers	

45.1

90

98

87

107

82-119

85-116

75-120

83-111

50

ug/L

%.

%.

%.

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



QUALITY CONTROL DATA

QC Batch: 557522		Analysis Meth	iod: El	PA 8260	
QC Batch Method: EPA 8260		Analysis Desc	ription: 82	260 MSV	
		Laboratory:	Pa	ace Analytical Servi	ces - Indianapolis
Associated Lab Samples: 5025467901	2				
METHOD BLANK: 2571358		Matrix:	Water		
Associated Lab Samples: 5025467901	2				
		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
p-lsopropyltoluene	ug/L		5.0	04/17/20 02:38	
4-Bromofluorobenzene (S)	%.	103	85-116	04/17/20 02:38	
Dibromofluoromethane (S)	%.	111	75-120	04/17/20 02:38	
Toluene-d8 (S)	%.	97	83-111	04/17/20 02:38	

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
p-Isopropyltoluene	ug/L		49.7	99	82-119	
4-Bromofluorobenzene (S)	%.			111	85-116	
Dibromofluoromethane (S)	%.			103	75-120	
Toluene-d8 (S)	%.			88	83-111	

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



QUALIFIERS

Project: Si-4401 Pace Project No.: 50254679

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D4 Sample was diluted due to the presence of high levels of target analytes.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project:	Si-4401
Pace Project No.:	50254679

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50254679001	Si-4401-1B	EPA 8260	557519		
50254679002	Si-4401-2B	EPA 8260	557519		
50254679003	Si-4401-3B	EPA 8260	557519		
50254679004	Si-4401-4B	EPA 8260	557519		
50254679005	Si-4401-5B	EPA 8260	557519		
50254679006	Si-4401-6B	EPA 8260	557519		
50254679007	Si-4401-7B	EPA 8260	557519		
50254679008	Si-4401-8B	EPA 8260	557519		
50254679009	Si-4401-9B	EPA 8260	557519		
50254679010	Si-4401-10B	EPA 8260	557519		
50254679011	Si-4401-11B	EPA 8260	557519		
50254679012	Si-4401-12B	EPA 8260	557522		

Prace Analytical*			ISTODY A	OCUMEN							LAB USE (ONLY- Affix Y				254679
SiREM			Billing Infor		ablaa	- Oning	mlak					ALL SH				
ddress: 130 Stone Rd W			m	itspay	ableca	an@sire	mat	0.00	3		Container	Preservatio	502	254679		Ten International Providence
port To: Steve Sande			Email To:	acanda	Quiron	alah com		-	** Pr							(4) sodium hydroxide, (5) zinc acetate,
DOV TO:			Site Collect			nlab.com						bisulfate, (8) soo , (D) TSP, (U) Un				scorbic acid, (B) ammonium sulfate,
mhealey@siremia	b.com	-	3	County/Ci		ime Zone Co	lloctod:				_	Analyses	_			rofile/Line:
ustomer Project Name/Number: Si-4401]PT[]MT									1 200	Sample Receipt Checklist:
n-440 1	Site/Facility ID)#:	1			nce Mogitori		-							Cus	tody Seals Present/Intact Y N NA tody Signatures Present Y N NA
nail:					[] Yes	V] No	-	-								lector Signature Present Y N NA tles Intact Y N NA
llected By (print): teve Sande	Purchase Orde Quote #:	er #:				tion Code:									Suf	rect Bottles Y N NA ficient Volume Y N NA sples Received on Ice Y N NA
ellected By (signature):	Turnaround D	ate Requi	red:		Immedia	tely Packed o	on Ice:								VOF	A - Headspace Acceptable Y N NA DA Regulated Soils Y N NA sples in Holding Time Y N NA
ample Disposal: Dispose as appropriate []Return Archive: Hold:	[] 2 Day	[] 3 Day	[] Next Day [] 4 Day arges Apply)		Field Filt [] Yes Analysis:	ered (if appli		_	30)						Res Cl San pH	idual Chlorine Present Y N NA Strips: ple pH Acceptable Y N NA Strips: fide Present Y N NA
Matrix Codes (Insert in Matrix bo Product (P), Soil/Solid (SL), Oil (O									ne (8260)						Lea	d Acetate Strips:
Customer Sample ID	Matrix *	Comp / Grab	Collect Composi Date	te Start)		oosite End	Res Cl	# of Ctns	P-Cymene						0.000	SEE SCIR
Si-4401-1B	GW	Grab	Apr 13	Time	Date	Time	-	3	X						a	
i-4401-2B	GW	Grab	Apr 13		-	1	-	3	\Diamond						10000	02
i-4401-3B	GW	Grab	Apr 13	1	1		-	3	\mathbf{X}						-	03
i-4401-4B	GW	Grab	Apr 13		1		-	3	X						Contraction of the	04
i-4401-5B	GW	Grab	Apr 13	1			-	3	X		-				1.00-0	55
i-4401-6B	GW	Grab	Apr 13	-				3	X						10.000	86
6i-4401-7B	GW	Grab	Apr 13	0.00		1		3	X						CO. State	07
i-4401-8B	GW	Grab	Apr 13					3	X		-				0	08
i-4401-9B	GW	Grab	Apr 13			1		3	X						0	07
i-4401-10B	GW	Grab	Apr 13					3	X						0	10
ustomer Remarks / Special Condi	tions / Possible	Hazards:	Type of Ice Packing Ma		Wet ed:	Blue Dr	ry N	lone		1.1.2.2.2.2	T HOLDS P racking #:	RESENT (<72	nours):	YN	N/A	Lab Sample Temperature Info: Temp Blank Received: Y N NA Therm ID#:
			Radchem s	ample(s)	screened (<500 cpm):	Y	N NA		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	es received	d via: IPS Client	Cou	rier Pa	ace Courier	Cooler 1 Temp Upon Receipt: 4.9, Cooler 1 Therm Corr. Factor: -0.9 Cooler 1 Corrected Temp: 4.0
elinquished by/Company: (Signatu	178)	Da	te/Time: 13ADI	20	Received	by/Company	y: (Signa	ature)		D	ate/Time:		Table		JSE ONLY	Comments:
Relingbisbed by/Company: (Signati	ure)		te/Time: • 13•20	0900	-1	by/Company	1 1	eller	-		ate/Time: 4-15-2	0 0900	Acctnu Templ Prelog	ate:		Trip Blank Received: Y N NA HCL MeOH TSP Other Page 22 of
Relinquished by/Company: (Signate	ure)	Da	te/Time:		Received	by/Company	y: (Signa	ature)		D	ate/Time:		PM: PB:			Non Conformance(s): Page: 1 YES / NO of:

Prace Analytical*			STODY A					nt			LAB U	SE ONLY-	Affix V				Here or List Pace umber Here	Workorder Numb	er or
Company: SIREM			Billing Info			0.						AL	L SH	ADED	ARE	AS ai	e for LAB U	SE ONLY	
Address: 130 Stone Rd W			accoui m	ntspay	ableca	n@sire	emiab	.co	3	-	Conta	iner Pres	ervative	e Type *	•	1	Lab Project Man	nager:	
Report To: Steve Sande			Email To:	ssande	Øsirem	lab.com			** P									hydroxide, (5) zinc ac I, (B) ammonium sulfa	
Copy To: mhealey@siremla	b.com		Site Collect	tion Info/A	Address:						ium hydrox	dde, (D) TS					Lab Profile/Line:		
Customer Project Name/Number: Si-4401				County/Ci anada/C		me Zone Co] PT [] M1		V ET			-						Lab Sample	Receipt Checkl	
Phone: Email:	Site/Facility ID)#:			[] Yes	ce Monitori	ng?								5		Custody Sig	gnatures Presen Signature Prese	t YN NA
Collected By (print): Steve Sande	Purchase Orde Quote #:	er #:		11	DW PWS DW Locat										10		Correct Bot Sufficient		Y N NA Y N NA Y N NA
Collected By (signature):	Turnaround D	ate Requir	ed:		Immediat	ely Packed	on Ice:		1						1		VOA - Heads USDA Regula	space Acceptable ated Soils	e YNNA YNNA
Sample Disposal: [] Dispose as appropriate [] Return [] Archive: [] Hold:	[] 2 Day ([] 3 Day Expedite Cha	rges Apply)	√ 5 Day	Field Filte [] Yes Analysis:	red (if appli [] No			(8260)								Residual Ch Cl Strips: Sample pH A pH Strips: Sulfide Pre	esent	Y N NA Y N NA Y N NA Y N NA
* Matrix Codes (Insert in Matrix bo Product (P), Soil/Solid (SL), Oil (O															8		LAB USE ONL		
Customer Sample ID	Matrix *	Comp / Grab	Collect Composi	ite Start)	Compo	osite End	Res Cl	# of Ctns	P-Cymene									# / Comments: SCIR	
Si-4401-11B	GW	Grab	Date Apr 13	Time	Date	Time		3	X						1		oll	1000	
Si-4401-12B	GW	Grab	Apr 13					3	X							-	012		
				-	-			-	1	-									
					10						-								
		-			-			-		-		-			-				
												1							
		-					_	-	0	-						-			
Customer Remarks / Special Condi	tions / Possible	Hazards:	Type of Ice Packing M	1912 2.6.1		Blue D	ry N	one		-	ORT HOLD		NT (<72	hours):	YN	N/A	Lab Si	ample Temperature	
			Packing in	aterial US	eu.	-											Th	oler 1 Temp Upon	Receipt: 1.9 oC
1 1	2		Radchem	sample(s)	screened («	:500 cpm):	YN	N/	4		FEDEX	UPS			urier	Pace C	Courier Co	ooler 1 Therm Corr. ooler 1 Corrected Te	
Relinquished by/Company: (Signati	ure)		e/Time: 3AA	120	F	ell	×				Date/Tin			Table		BUSE		omments:	
Relinquished by/Company: (Signat	ure)	Dat	e/Time: 15-20		Received	wish	y: (Signat	l			Date/Tin 4 - 15 -	20 0	900	Temp	late:			p Blank Received: CL MeOH TS	P Other
Relinquished by/Company: (Signat	ure)	Dat	e/Time:		Received	by/Compan	y: (Signal	ture)			Date/Tin	ne:		PM: PB:	1		Non	Conformance(s): YES / NO	Page 23 of 26 Page: of:

<pre>Project #: 5025467</pre>	9	_	person examining contents: MN	1.15.2	0 16	105
Courier: Fed Ex UPS USPS Client		Commercia	al 🗌 Pace 🔲 Other			
Tracking #:			11:15:20			
Custody Seal on Cooler/Box Present:	MNO		Seals Intact:			
Packing Material: Bubble Wrap Bubble			e 🗌 Other			
Thermometer: $23456ABCDEF$	-	U We		1 Yes		1 Aug
	ice Type:			_	/	
Cooler Temperature: 4.9/4.0°C			Ice Visible in Sample Containers?	Yes	_	
(Initial/Corrected) Temp should be above freezing to 6°C			If temp. is Over 6°C or under 0°C, was the PM Notified?	Yes	No	UN/A
All discre	-	T	tten out in the comments section below.		-	
	Yes	No		Yes	No	N/A
Are samples from West Virginia? Document any containers out of temp		1	All containers needing acid/base pres. Have been			
USDA Regulated Soils? (ID, NY, WA, OR, CA, NM, TX,		,	checked?: exceptions: VOA, coliform, LLHg, O&G, and any container with a septum cap or preserved with HCI.			
OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto			All containers needing preservation are found to be in compliance			-
Rico)	/		with EPA recommendation (<2, >9, >12) unless otherwise noted.	1.1.1		
Chain of Custody Present:	V	/	Circle: HNO3 H2SO4 NaOH NaOH/ZnAc		-	1
Chain of Custody Filled Out: Short Hold Time Analysis (<72hr)?:		-	Dissolved Metals field filtered?			
Analysis:		1	Headspace Wisconsin Sulfide			10
Time 5035A TC placed in Freezer or Short Holds To La	b:		Residual Chlorine Check (SVOC 625 Pest/PCB 608) Besidual Chlorine Check (Total/Amenable/Free Cyanide)	Present	Absent MB 9 15/20	N/A
Rush TAT Requested:			Headspace in VOA Vials (>6mm):	\checkmark	1	
Containers Intact?	/		Trip Blank Present?:		-	
Sample Labels (IDs/Dates/Times) Match COC? Except TCs, which only require sample ID	/		Trip Blank Custody Seals?		-	
Extra labels on Terracore Vials (soils only)?		/			-	
	contra	and N	W 4.15.20			
Comments: No sample times on Collor	contain	ners N	N 4.15.20			_
						-

Sample Line Item	WGFU	SBS DI BK Kit R	Hebd	VOA VIALS (*6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H	Ĩ	11	Г	Matrix	рН <2 рН >	9 pH>12
1	1		3	33															1						UT	12.00	
2			1	23																					1		
3				013																							
4	I.			23																							
5			1	213										-				-									
6				3/3																							
7				33																							
8				213																						_	
9				3/3																							
10	-		J	33																-					5		
11																											
12										1.0								-					1. 1. 1.				

COC PAGE _____ of ____

Sample Container Count

Container Codes

	Glas	SS		11	Pla	stic	/ Misc.	
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BP1A	1L NaOH, Asc Acid plastic	BP3L	J 250mL unpreserved plastic	-
DG9H	40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1N	1L HNO3 plastic	BP35	250mL H2SO4 plastic	
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1S	1L H2SO4 plastic	BP3Z	250mL NaOH, Zn Ac plastic	
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1U	1L unpreserved plastic		and the second	
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1Z	1L NaOH, Zn, Ac			
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	AF	Air Filter	
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2N	500mL HNO3 plastic	С	Air Cassettes	
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2O	500mL NaOH plastic	R	Terra core kit	
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2S	500mL H2SO4 plastic	SP5T	120mL Coliform Na Thiosulfate	
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2U	500mL unpreserved plastic	U	Summa Can	
VGFX	40mL w/hexane wipe vial	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac	ZPLC	Ziploc Bag	
VSG	Headspace septa vial & HCI	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic			
WGKU	8oz unpreserved clear jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	WT	Water	
WGFU	4oz clear soil jar	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	SL	Solid	
JGFU	4oz unpreserved amber wide	BG3H	250mL HCI Clear Glass		filtered)	NAL	Non-aqueous liquid	
CG3H	250mL clear glass HCi	BG3U	250mL Unpres Clear Glass			WP	Wipe	Page 25 c

E IN 0.270 rov 11 26Sep2019

Sample Line Item	WGFU	SBS DI BK Kit R	CG9H	VOA VIALS (~6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H	n		1		Matrix	nH <2	2 pH >9	0H>12
1	>	IN	3	33	1			4	4	4	4										0		1			WT	pri -z	pires	p11-12
2		1	3															1				-				1			
3								1																					
4																					-		-			-			
5																													
6				_							_											_			1				
7																1													
8					-	-						-								-									
9																													
10								_																			-		
11						-					_							_	_			-		-					
12	-		-	-		-					_		-	-		1	1		_	-				<u></u>	-				1

Sample Container Count

	Glas	SS			Plastic / Misc.							
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BP1A	1L NaOH, Asc Acid plastic	BP3L	J 250mL unpreserved plastic	1				
DG9H	40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1N	1L HNO3 plastic	BP38	S 250mL H2SO4 plastic	1				
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1S	1L H2SO4 plastic	BP32	250mL NaOH, Zn Ac plastic	1				
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1U	1L unpreserved plastic							
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1Z	1L NaOH, Zn, Ac	-						
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	AF	Air Filter	1				
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2N	500mL HNO3 plastic	С	Air Cassettes	1				
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP20	500mL NaOH plastic	R	Terra core kit	1				
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2S	500mL H2SO4 plastic	SP5T	120mL Coliform Na Thiosulfate	1				
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2U	500mL unpreserved plastic	U	Summa Can	1				
VGFX	40mL w/hexane wipe vial	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac	ZPLC	Ziploc Bag	1				
VSG	Headspace septa vial & HCI	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic	-						
WGKU	8oz unpreserved clear jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	WT	Water					
WGFU	4oz clear soil jar	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	SL	Solid					
JGFU	4oz unpreserved amber wide	BG3H	250mL HCI Clear Glass		filtered)	NAL	Non-aqueous liquid					
CG3H	250mL clear glass HCi	BG3U	250mL Unpres Clear Glass	1		WP	Wipe	age 26 d				

COC PAGE 2012



Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

November 04, 2020

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Si-4401 Pace Project No.: 50271521

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on October 28, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network: • Pace Analytical Services - Indianapolis

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

Sincerely,

Kelly M gmes

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab





CERTIFICATIONS

Project: Si-4401 Pace Project No.: 50271521

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Accreditation #: 200074 Indiana Drinking Water Laboratory #: C-49-06 Kansas/TNI Certification #: E-10177 Kentucky UST Agency Interest #: 80226 Kentucky WW Laboratory ID #: 98019 Michigan Drinking Water Laboratory #9050 Ohio VAP Certified Laboratory #: CL0065 Oklahoma Laboratory #: 9204 Texas Certification #: T104704355 West Virginia Certification #: 330 Wisconsin Laboratory #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Si-4401 Pace Project No.: 50271521

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50271521001	Si-4401-1C	Water	10/27/20 08:00	10/28/20 08:30
50271521002	Si-4401-2C	Water	10/27/20 08:00	10/28/20 08:30
50271521003	Si-4401-3C	Water	10/27/20 08:00	10/28/20 08:30
50271521004	Si-4401-4C	Water	10/27/20 08:00	10/28/20 08:30
50271521005	Si-4401-5C	Water	10/27/20 08:00	10/28/20 08:30
50271521006	Si-4401-6C	Water	10/27/20 08:00	10/28/20 08:30
50271521007	Si-4401-7C	Water	10/27/20 08:00	10/28/20 08:30
50271521008	Si-4401-8C	Water	10/27/20 08:00	10/28/20 08:30
50271521009	Si-4401-9C	Water	10/27/20 08:00	10/28/20 08:30
50271521010	Si-4401-10C	Water	10/27/20 08:00	10/28/20 08:30
50271521011	Si-4401-11C	Water	10/27/20 08:00	10/28/20 08:30
50271521012	Si-4401-12C	Water	10/27/20 08:00	10/28/20 08:30



SAMPLE ANALYTE COUNT

Project:Si-4401Pace Project No.:50271521

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50271521001	Si-4401-1C	EPA 8260	RSW	5	PASI-I
50271521002	Si-4401-2C	EPA 8260	RSW	5	PASI-I
50271521003	Si-4401-3C	EPA 8260	RSW	5	PASI-I
50271521004	Si-4401-4C	EPA 8260	RSW	5	PASI-I
50271521005	Si-4401-5C	EPA 8260	RSW	5	PASI-I
50271521006	Si-4401-6C	EPA 8260	RSW	5	PASI-I
50271521007	Si-4401-7C	EPA 8260	RSW	5	PASI-I
50271521008	Si-4401-8C	EPA 8260	RSW	5	PASI-I
50271521009	Si-4401-9C	EPA 8260	RSW	5	PASI-I
50271521010	Si-4401-10C	EPA 8260	RSW	5	PASI-I
50271521011	Si-4401-11C	EPA 8260	RSW	5	PASI-I
50271521012	Si-4401-12C	EPA 8260	RSW	5	PASI-I

PASI-I = Pace Analytical Services - Indianapolis



SUMMARY OF DETECTION

Project: Si-4401

Pace Project No.: 50271521

Lab Sample ID	Client Sample ID					
Method	Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50271521001	Si-4401-1C				· ·	
EPA 8260	Benzene	5460	ug/L	125	11/03/20 13:03	
EPA 8260	p-Isopropyltoluene	2480	ug/L	125	11/03/20 13:03	
50271521002	Si-4401-2C					
EPA 8260	Benzene	5340	ug/L	125	11/03/20 13:37	
EPA 8260	p-Isopropyltoluene	1230	ug/L	25.0	10/31/20 03:03	
50271521003	Si-4401-3C					
EPA 8260	Benzene	5610	ug/L	125	11/03/20 14:10	
EPA 8260	p-Isopropyltoluene	1040	ug/L	25.0	10/31/20 03:37	
50271521004	Si-4401-4C					
EPA 8260	Benzene	4310	ug/L	125	11/03/20 14:43	
EPA 8260	p-lsopropyltoluene	3800	ug/L	125	11/03/20 14:43	
50271521005	Si-4401-5C					
EPA 8260	Benzene	4710	ug/L	125	11/03/20 15:17	
EPA 8260	p-Isopropyltoluene	5060	ug/L	125	11/03/20 15:17	
50271521006	Si-4401-6C					
EPA 8260	Benzene	4580	ug/L	125	11/03/20 15:50	
EPA 8260	p-Isopropyltoluene	4500	ug/L	125	11/03/20 15:50	
50271521007	Si-4401-7C					
EPA 8260	Benzene	4570	ug/L	125	11/03/20 16:24	
EPA 8260	p-Isopropyltoluene	4350	ug/L	125	11/03/20 16:24	
50271521008	Si-4401-8C					
EPA 8260	Benzene	3300	ug/L	125	11/03/20 13:53	
EPA 8260	p-Isopropyltoluene	5150	ug/L	125	11/03/20 13:53	
50271521009	Si-4401-9C					
EPA 8260	Benzene	4760	ug/L	125	11/03/20 14:26	
EPA 8260	p-Isopropyltoluene	5170	ug/L	125	11/03/20 14:26	
50271521010	Si-4401-10C					
EPA 8260	Benzene	4590	ug/L	125	11/03/20 15:00	
EPA 8260	p-Isopropyltoluene	4830	ug/L	125	11/03/20 15:00	
50271521011	Si-4401-11C					
EPA 8260	Benzene	3950 4040	ug/L	125	11/03/20 15:33 11/03/20 15:33	
EPA 8260	p-Isopropyltoluene	4040	ug/L	125	11/03/20 15.33	
50271521012	Si-4401-12C					
EPA 8260 EPA 8260	Benzene	5550 4620	ug/L	125 125	11/03/20 16:07 11/03/20 16:07	
	p-Isopropyltoluene	4020	ug/L	125	11/03/20 10.07	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-1C	Lab ID:	50271521001	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services ·	- Indianapolis					
Benzene	546	0 ug/L	125	25		11/03/20 13:03	71-43-2	
p-Isopropyltoluene	248	0 ug/L	125	25		11/03/20 13:03	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	6%.	75-120	25		11/03/20 13:03	1868-53-7	
4-Bromofluorobenzene (S)	9	6 %.	85-116	25		11/03/20 13:03	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 13:03	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-2C	Lab ID:	50271521002	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	- Indianapolis					
Benzene	534	0 ug/L	125	25		11/03/20 13:37	71-43-2	
p-Isopropyltoluene	123	0 ug/L	25.0	5		10/31/20 03:03	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	1 %.	75-120	5		10/31/20 03:03	1868-53-7	
4-Bromofluorobenzene (S)	9	7 %.	85-116	5		10/31/20 03:03	460-00-4	
Toluene-d8 (S)	10	5%.	83-111	5		10/31/20 03:03	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-3C	Lab ID:	50271521003	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services ·	- Indianapolis					
Benzene	561	0 ug/L	125	25		11/03/20 14:10	71-43-2	
p-Isopropyltoluene	104	0 ug/L	25.0	5		10/31/20 03:37	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	2 %.	75-120	5		10/31/20 03:37	1868-53-7	
4-Bromofluorobenzene (S)	9	5%.	85-116	5		10/31/20 03:37	460-00-4	
Toluene-d8 (S)	10	3 %.	83-111	5		10/31/20 03:37	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-4C	Lab ID:	50271521004	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	431	0 ug/L	125	25		11/03/20 14:43	71-43-2	
p-Isopropyltoluene	380	0 ug/L	125	25		11/03/20 14:43	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	9%.	75-120	25		11/03/20 14:43	1868-53-7	
4-Bromofluorobenzene (S)	9	8 %.	85-116	25		11/03/20 14:43	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 14:43	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-5C	Lab ID:	50271521005	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Ana	lytical Services -	- Indianapolis					
Benzene	471	0 ug/L	125	25		11/03/20 15:17	71-43-2	
p-Isopropyltoluene	506	0 ug/L	125	25		11/03/20 15:17	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	6 %.	75-120	25		11/03/20 15:17	1868-53-7	
4-Bromofluorobenzene (S)	9	9 %.	85-116	25		11/03/20 15:17	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 15:17	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-6C	Lab ID:	50271521006	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	458	0 ug/L	125	25		11/03/20 15:50	71-43-2	
p-Isopropyltoluene	450	0 ug/L	125	25		11/03/20 15:50	99-87-6	
Surrogates								
Dibromofluoromethane (S)	11	0%.	75-120	25		11/03/20 15:50	1868-53-7	
4-Bromofluorobenzene (S)	9	7%.	85-116	25		11/03/20 15:50	460-00-4	
Toluene-d8 (S)	9	9%.	83-111	25		11/03/20 15:50	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-7C	Lab ID:	50271521007	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Ana	lytical Services -	Indianapolis					
Benzene	457	0 ug/L	125	25		11/03/20 16:24	71-43-2	
p-Isopropyltoluene	435	0 ug/L	125	25		11/03/20 16:24	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	7 %.	75-120	25		11/03/20 16:24	1868-53-7	
4-Bromofluorobenzene (S)	9	6 %.	85-116	25		11/03/20 16:24	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 16:24	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-8C	Lab ID:	50271521008	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Aatrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	330	0 ug/L	125	25		11/03/20 13:53	71-43-2	
p-Isopropyltoluene	515	0 ug/L	125	25		11/03/20 13:53	99-87-6	
Surrogates								
Dibromofluoromethane (S)	11	0%.	75-120	25		11/03/20 13:53	1868-53-7	
4-Bromofluorobenzene (S)	9	6 %.	85-116	25		11/03/20 13:53	460-00-4	
Toluene-d8 (S)	10	3 %.	83-111	25		11/03/20 13:53	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-9C	Lab ID:	50271521009	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	476	0 ug/L	125	25		11/03/20 14:26	71-43-2	
p-Isopropyltoluene	517	0 ug/L	125	25		11/03/20 14:26	99-87-6	
Surrogates								
Dibromofluoromethane (S)	10	7%.	75-120	25		11/03/20 14:26	1868-53-7	
4-Bromofluorobenzene (S)	9	5%.	85-116	25		11/03/20 14:26	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 14:26	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-10C	Lab ID:	50271521010	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	459	0 ug/L	125	25		11/03/20 15:00	71-43-2	
p-Isopropyltoluene	483	0 ug/L	125	25		11/03/20 15:00	99-87-6	
Surrogates								
Dibromofluoromethane (S)	11	0%.	75-120	25		11/03/20 15:00	1868-53-7	
4-Bromofluorobenzene (S)	9	6 %.	85-116	25		11/03/20 15:00	460-00-4	
Toluene-d8 (S)	10	2 %.	83-111	25		11/03/20 15:00	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-11C	Lab ID:	50271521011	Collected: 10/27/2	20 08:00	Received: 1	0/28/20 08:30 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical I	Method: EPA 82	260					
	Pace Analy	/tical Services -	Indianapolis					
Benzene	3950	ug/L	125	25		11/03/20 15:33	71-43-2	
p-Isopropyltoluene	4040) ug/L	125	25		11/03/20 15:33	99-87-6	
Surrogates								
Dibromofluoromethane (S)	109) %.	75-120	25		11/03/20 15:33	1868-53-7	
4-Bromofluorobenzene (S)	95	5 %.	85-116	25		11/03/20 15:33	460-00-4	
Toluene-d8 (S)	100) %.	83-111	25		11/03/20 15:33	2037-26-5	



Project: Si-4401

Pace Project No.: 50271521

Sample: Si-4401-12C	Lab ID: 5	50271521012	Collected: 10/27/2	20 08:00	Received: 10	0/28/20 08:30 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical M	lethod: EPA 82	260					
	Pace Analy	tical Services -	Indianapolis					
Benzene	5550	ug/L	125	25		11/03/20 16:07	71-43-2	
p-Isopropyltoluene	4620	ug/L	125	25		11/03/20 16:07	99-87-6	
Surrogates								
Dibromofluoromethane (S)	106	%.	75-120	25		11/03/20 16:07	1868-53-7	
4-Bromofluorobenzene (S)	95	%.	85-116	25		11/03/20 16:07	460-00-4	
Toluene-d8 (S)	98	%.	83-111	25		11/03/20 16:07	2037-26-5	



QUALITY CONTROL DATA

QC Batch: 590357	7	Analysis Meth	nod: E	PA 8260	
QC Batch Method: EPA 82	260	Analysis Des	cription: 8	260 MSV	
		Laboratory:	F	ace Analytical Servi	ces - Indianapoli
Associated Lab Samples:	50271521002, 50271521003				
METHOD BLANK: 2723507	7	Matrix:	Water		
Associated Lab Samples:	50271521002, 50271521003				
		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
Benzene	ug/L	ND	5.0	10/31/20 01:22	
p-Isopropyltoluene	ug/L	ND	5.0	10/31/20 01:22	
4-Bromofluorobenzene (S)	%.	99	85-116	10/31/20 01:22	
Dibromofluoromethane (S)	%.	106	75-120	10/31/20 01:22	
Toluene-d8 (S)	%.	102	83-111	10/31/20 01:22	

LABORATORY CONTROL SAMPLE: 2723508

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Benzene	ug/L	50	51.0	102	75-118	
p-Isopropyltoluene	ug/L	50	46.6	93	82-119	
4-Bromofluorobenzene (S)	%.			98	85-116	
Dibromofluoromethane (S)	%.			100	75-120	
Toluene-d8 (S)	%.			102	83-111	

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



QUALITY CONTROL DATA

Project:	Si-4401								
Pace Project No.:	50271521								
QC Batch:	590846		Analysis Meth	iod: E	PA 8260				
QC Batch Method:	EPA 8260		Analysis Desc	cription: 8	260 MSV				
			Laboratory:	F	ace Analytical Servi	ces - Indianapolis			
Associated Lab Sam	ples: 50271521001,	50271521004,	50271521005, 50	271521006, 5	0271521007				
METHOD BLANK:	2725412		Matrix:	Water					
Associated Lab Sam		50271521004	50271521005, 50		0071501007				
Associated Lab Sam	pies. 50271521001 ,	50271521004,	Blank	-	0271521007				
Parame	eter	Units	Result	Reporting Limit	Analyzed	Qualifiers			
Benzene		ug/L	ND	5.0	11/03/20 11:22				
p-Isopropyltoluene		ug/L	ND	5.0	11/03/20 11:22				
4-Bromofluorobenzer	ne (S)	%.	100	85-116	11/03/20 11:22				
Dibromofluoromethane (S) %. 94 75-120 11/03/20 11:22									
Toluene-d8 (S)		%.	102	83-111	11/03/20 11:22				

LABORATORY CONTROL SAMPLE: 2725413

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Benzene	ug/L		58.5	117	75-118	
p-Isopropyltoluene	ug/L	50	56.2	112	82-119	
4-Bromofluorobenzene (S)	%.			97	85-116	
Dibromofluoromethane (S)	%.			99	75-120	
Toluene-d8 (S)	%.			102	83-111	

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



QUALITY CONTROL DATA

Project:	Si-4401						
Pace Project No.:	50271521						
QC Batch:	590853		Analysis Meth	iod: E	EPA 8260		
QC Batch Method:	EPA 8260		Analysis Desc	ription: 8	260 MSV		
			Laboratory:	F	Pace Analytical Servi	ces - Indianapolis	
Associated Lab Sam	ples: 50271521008	8, 50271521009	, 50271521010, 50	271521011, 5	0271521012		
METHOD BLANK:	2725432		Matrix:	Water			
Associated Lab Sam	ples: 50271521008	8, 50271521009	, 50271521010, 50	271521011, 5	0271521012		
			Blank	Reporting			
Param	neter	Units	Result	Limit	Analyzed	Qualifiers	
Benzene		ug/L	ND	5.0	0 11/03/20 11:39		
p-Isopropyltoluene		ug/L	ND	5.0) 11/03/20 11:39		
4-Bromofluorobenze	ne (S)	%.	95	85-116	5 11/03/20 11:39		
Dibromofluorometha	ne (S)	%.	110	75-120) 11/03/20 11:39		
Toluene-d8 (S)		%.	102	83-11 ⁻	1 11/03/20 11:39		

LABORATORY CONTROL SAMPLE: 2725433

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Benzene	ug/L		54.8	110	75-118	
p-Isopropyltoluene	ug/L	50	52.1	104	82-119	
4-Bromofluorobenzene (S)	%.			95	85-116	
Dibromofluoromethane (S)	%.			95	75-120	
Toluene-d8 (S)	%.			102	83-111	

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



QUALIFIERS

Project: Si-4401 Pace Project No.: 50271521

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project:Si-4401Pace Project No.:50271521

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytica Batch
50271521001	Si-4401-1C	EPA 8260	590846		
50271521002	Si-4401-2C	EPA 8260	590357		
50271521003	Si-4401-3C	EPA 8260	590357		
50271521004	Si-4401-4C	EPA 8260	590846		
50271521005	Si-4401-5C	EPA 8260	590846		
50271521006	Si-4401-6C	EPA 8260	590846		
50271521007	Si-4401-7C	EPA 8260	590846		
50271521008	Si-4401-8C	EPA 8260	590853		
50271521009	Si-4401-9C	EPA 8260	590853		
50271521010	Si-4401-10C	EPA 8260	590853		
50271521011	Si-4401-11C	EPA 8260	590853		
50271521012	Si-4401-12C	EPA 8260	590853		

mpany: CIDENA	Chain-	or-custouy	is a LEGAL D Billing Info		ar - complet	e an reieve	art neius							USE ONLY
SIREM		_	accour	ntspay	ableca	n@sire	emlab	.co		5027	1521			anager:
dress: 130 Stone Rd W			m						3	1 1	1	1 1 1 1	1	anaget.
port To: Steve Sande		-	Email To:	ssande	@sirem	lab.com) sodium hydroxide, (5) zinc acetate, orbic acid, (B) ammonium sulfate,
py To: mhealey@siremla	h com		Site Collect	tion Info//	Address:						roxide, (D) TSP, (U)	Unpreserved, (O) Other		
stomer Project Name/Number:	0.0011			County/C		me Zone Co					Analyses		Lab Profi	Me/Line: Sample Receipt Checklist:
i-4401			ON /Ca	anada/(Guelph] PT [] M1	т[]ст	V ET					Custo	dy Seals Present/Intact Y N NA
one:	Site/Facility IC	D #:				e Monitori							Custo	dy Signatures Present Y N NA actor Signature Present Y N NA
ail:					[] Yes	√] No	_	_					Bottl	les Intact Y N NA act Bottles Y N NA
lected By (print): eve Sande	Purchase Ord Quote #:	er #:			DW PWS I DW Locati								Suffi	cient Volume Y N NA
lected By (signature):	Turnaround D	ate Requir	ed:		Immediate	ely Packed	on Ice:						VOA -	Headspace Acceptable Y N NA
				_	[Yes	[] No							Sampl	Regulated Soils Y N NA Les in Holding Time Y N NA
nple Disposal: Dispose as appropriate [] Return Archive: Hold:	[] 2 Day	[] 3 Day	[] Next Da [] 4 Day arges Apply)		[]Yes	red (if appli [] No			(0				Cl St Sampl pH St	Mual Chlorine Present Y N NA rrips: .e pH Acceptable Y N NA rrips:
Aatrix Codes (Insert in Matrix box roduct (P), Soil/Solid (SL), Oil (OL	(below): Drink	king Water	(DW), Groui						P-Cymene (8260)				Lead	Acetate Strips:NA
stomer Sample ID	Comp /	Collect		Composite End Res # of CI Ctns								Lab S	Sample # Comments:	
stomer sample to	Matrix *	Grab	Composi Date	Time	Date	Time	u	cuis	P-O					Sample & Comments: Shure 001
-4401-1C	GW	Grab	Oct 27		1		1	3	X					001
-4401-2C	GW	Grab	Oct 27					3	X					DOR
-4401-3C	GW	Grab	Oct 27		1			3	X					003
-4401-4C	GW	Grab	Oct 27					3	X					004
-4401-5C	GW	Grab	Oct 27				1	3	X					005
-4401-6C	GW	Grab	Oct 27		1			3	X					006
-4401-7C	GW	Grab	Oct 27	·				3	X					007
-4401-8C	GW	Grab	Oct 27					3	X					008
-4401-9C	GW	Grab	Oct 27		1	·		3	X					009
-4401-10C	GW	Grab	Oct 27					3	X					010
stomer Remarks / Special Conditi	ons / Possible	Hazards:	Type of Ice	Used:	Wet I	Blue Di	ry N	one		SHORT HO	LDS PRESENT (<7)	2 hours): Y N N/	A	Lab Sample Temperature Info:
			Packing Ma	aterial Use	ed:					Lab Trackii	ng #:			Temp Blank Received: Y (N)N. Therm ID#: Cooler 1 Temp Upon Receipt: 5-4
			Radchem s	ample(s)	screened (<	500 cpm):	Y P	N NA			ceived via: UPS Clien	t Courier Pace	Courier	Cooler 1 Therm Corr. Factor: -0.4 Cooler 1 Corrected Temp: 5.0
inquished by/Company: (Signatu	uished by/Company: (Signature)				Received b	y/Company	y: (Signa	ture)		Date/1	lime:	MTJL LAB USE	ONLY	Comments:
An Dr	An Br			20	Fe	de	×					Table #:		
inquished by/Company: (Signatu					Received b	y/Company	y: (Signa	fure/	1	Date/	Time:	Acctnum: Template:		Trip Blank Received: Y N N
T.a			12820	J	n	ha,	11	le	R	10-	11me: 25-20531	Prelogin:		HCL MeOH TSP Other
100-1		Dat			Received by/Company: (Signature)					Date/	Time:	PM:		Page 23 of 27 Non Conformance(s): Page:

Pace Analytical"			is a LEGAL D	OCUMEN										M	TJL Log-i	in Number He	re
siREM			Billing Info		ableca	Meir	mlah					AL	L SHA	DED /	REAS	are for l	AB USE ONLY
dress [:] 130 Stone Rd W			m	nispay	apieca		iniau	1.00	3	- 1	Contai	ner Prese	ervative	Type **	1	Lab Pro	ject Manager:
port To: Steve Sande		-	Fara H Tay	ssande	@sireml	ab.com			** Pr								4) sodium hydroxide, (5) zinc acetate, corbic acid, (8) ammonium sulfate,
^{oy To:} mhealey@siremla	h com		Site Collect									ide, (D) TS	P, (U) Un	preserved		er	
stomer Project Name/Number: j-4401	5.00m		State:	County/C anada/(ity: Tin Guelph[ne Zone Co] PT [] M		√ ET			1	Ana	lyses			Lab	file/line: Sample Receipt Checklist: ody Seals Present/Intact Y N NA
one: ail:	Site/Facility II	D #:			Compliance [] Yes	e Monitor	ing?									Cust Coll	ody Signatures Present Y N NA ector Signature Present Y N NA les Intact Y N NA
lected By (print): eve Sande	Purchase Ord Quote #:	er #:			DW PWS I DW Locati											Corr Suff	ect Bottles Y N NA icient Volume Y N NA iles Received on Ice Y N NA
lected By (signature):	Turnaround D	ate Requir	ed:		Immediate	ely Packed	on Ice:									VOA USDA	- Headspace Acceptable Y N NA Regulated Soils Y N NA les in Holding Time Y N NA
nple Disposal: Dispose as appropriate [] Return Archive: Hold:	e as appropriate []Return []Same e: []2 Day [] (Expo Codes (Insert in Matrix box below): Drinking				Field Filtered (if applicable): [] Yes [/] No Y Analysis:				(0)							Resi C1 S Samp pH S	dual Chlorine Present Y N NA trips: le pH Acceptable Y N NA trips: Jde Present Y N NA
Aatrix Codes (Insert in Matrix bo roduct (P), Soil/Solid (SL), Oil (Ol		Air (AR), T	issue (TS), Bi	oassay (B))	1	P-Cymene (8260)							Lead	cetatostrips:
stomer Sample ID	Comp / Grab	Collect Composi Date		Compo: Date	site End	Res Cl	# of Ctns	-Cym							Jub	Skur	
-4401-11C	GW	Grab	Oct 27	mile	Dute	inic		3	X								011
-4401-12C	GW	Grab	Oct 27					3	X								012
								-									
		1															
							-	-		-		_					
																	Let Grante Target and the Let
stomer Remarks / Special Condit	ions / Possible	Hazards:	Type of Ice Packing Ma			Blue D	ry N	one	-	Inner	racking #	addition and the second street	11 (21</td <td>nours):</td> <td>YN</td> <td>N/A</td> <td>Lab Sample Temperature Info: Temp Blank Received: N NA Therm ID#: Z</td>	nours):	YN	N/A	Lab Sample Temperature Info: Temp Blank Received: N NA Therm ID#: Z
						-00			Samples received via:								Cooler 1 Temp Upon Receipt: 5-9 c Cooler 1 Therm Corr. Factor: -0.9 c
quished by/Company: (Signature)			e/Time:		screened (<					-	EDEX ate/Tim	UPS e:	Client	Couri M Table #:	TJL LAB	ace Courier USE ONLY	Cooler 1 Corrected Temp: <u><u><u></u></u><u><u></u><u><u></u><u><u></u><u><u></u><u></u><u><u></u><u></u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u></u></u></u></u>
inquished by/Company: (Signatu	quished by/Company: (Signature)			Date/Time: 10.28-20 Received by/Company: (Signature) 10.28-20 Mar Mark						D	ate/Tim	e: "Lo O	820	Acctnum Templat	e:		Trip Blank Received: Y N NA HCL MeOH TSP Other
			Date/Time: Received by/Company: (Signature)					Prelogin:						Page 24 of 27			

arier: Fedex UPS Client Pace stody Seal on Cooler/Box Present:	USPS	Othe				
king Material: Bubble Wrap Bubbl	No le Bags	(If yes)Se		sent)		
promoter: $1(2)3456$ A B C D E(2) Defer Temperature: $5.4/5.0$ 'C mp should be above freezing to 6'C (Initial/Corrected)	1 MW 10.28.30		: (Viet) Blue None s over 6°C or under 0°C, was the PM notified?: Yes No			
Al	II discrepar	ncies will b	e written out in the comments section below.			
	Yes	No		Yes	No	N/A
samples from West Virginia? ument any containers out of temp.		_	All containers needing acid/base pres. Have been CHECKED?: exceptions: VOA, coliform, LLHg, O&G, and any			
DA Regulated Soils? (HI, ID, NY, WA, OR,CA, NM, TX, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		-	container with a septum cap or preserved with HCI. Circle: HN03 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form			-
rt Hold Time Analysis (48 hours or less)? lysis:		-	Residual Chlorine Check (SVOC 625 Pest/PCB 608)	Present	<u>Absent</u>	<u>N//</u>
e 5035A TC placed in Freezer or Short Holds To Lab	Time:		Residual Chlorine Check (Total/Amenable/Free Cyanide)			-
h TAT Requested (4 days or less):		-	Headspace Wisconsin Sulfide?			-
tody Signatures Present?	-		Headspace in VOA Vials (>6mm):	-		
tainers Intact?:	-		Trip Blank Present?		-	
nple Label (IDs/Dates/Times) Match COC?: pt TCs, which only require sample ID	-		Trip Blank Custody Seals?:		-	
a labels on Terracore Vials? (soils only)		-			1.000	

Page 25 of 27

COC PAG	GE	of	-								5	Samp	ole C	ont	aine	er Co	ount	:									
		SBS DI BK								_																	
Sample Line Item	WGFU	Kit R	DG9H		VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	AG3C	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H	1	Matrix	pH <2	pH >9	pH>10
1			3	3/3	31	MN10.	28.0	o				1									- 1			M			
2		1	1	3/3																				1			
3				2/3								1									1.						
4				1/3																					1.		
5				1/3																							
6				2/3																							
7				2/3							-									1-1-1							
8				3/3																							
9				1/3																							
10			V	23																				V			
11												-						-	1								
12				1.											1				1.1						-		

Container Codes

	Glas	SS			Pla	Plastic / Misc.					
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BG3U	250mL Unpres Clear Glass	BP3L	250mL unpreserved plastic				
DG9H	40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1A	1L NaOH, Asc Acid plastic	BP35	250mL H2SO4 plastic				
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1N	1L HNO3 plastic	BP3Z	250mL NaOH, Zn Ac plastic				
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1S	1L H2SO4 plastic			-			
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1U	1L unpreserved plastic			_			
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP1Z	1L NaOH, Zn, Ac	AF	Air Filter				
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2A	500mL NaOH, Asc Acid plastic	С	Air Cassettes				
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2N	500mL HNO3 plastic	R	Terra core kit				
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2O	500mL NaOH plastic	SP5T	120mL Coliform Na Thiosulfate				
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2S	500mL H2SO4 plastic	U	Summa Can	-			
VGFX	40mL w/hexane wipe vial	AG3C	250mL NaOH amber glass	BP2U	500mL unpreserved plastic	ZPLC	Ziploc Bag				
VSG	Headspace septa vial & HCI	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac			_			
WGKU	8oz unpreserved clear jar	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic	WT	Water				
WGFU	4oz clear soil jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	SL	Solid				
JGFU	4oz unpreserved amber wide	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	NAL	Non-aqueous liquid				
CG3H	250mL clear glass HCI	BG3H	250mL HCI Clear Glass		filtered)	WP	Wipe				

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Sample Container Count

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		SBS DI																									
Sample Line Item	WGFU	BK Kit R	W VG9H	VOA VIAL HS (>6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	AG3C	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H		Matrix	pH <2	9< Hq	pH>10
1			3	2/3		100	-				-						-		1					WT			
2			L	2/3																				5			
3																-					TL						
4																						1.1			1		
5																											
6																											
7								_																			
8																											
9																						1					
10		1																					_				
11																											
12				1					_							1		1.	1.7		-	_		 1.1.1			

COC PAGE ____ of ____

Sample Container Count

Container Codes

	Glas	SS			Pla	lastic / Misc.					
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BG3U	250mL Unpres Clear Glass	BP3L	1 25	50mL unpreserved plastic			
DG9H	40mL HCI amber voa vial	AG1H	1L HCI amber glass	BP1A	1L NaOH, Asc Acid plastic	BP3S	5 25	50mL H2SO4 plastic			
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1N	1L HNO3 plastic	BP3Z	2	50mL NaOH, Zn Ac plastic			
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1S	1L H2SO4 plastic						
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1U	1L unpreserved plastic	1					
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP1Z	1L NaOH, Zn, Ac	AF	Air Filte	r			
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2A	500mL NaOH, Asc Acid plastic	С	Air Cas	settes			
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2N	500mL HNO3 plastic	R	Terra co	ore kit			
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP20	500mL NaOH plastic	SP5T	120mL	Coliform Na Thiosulfate			
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2S	500mL H2SO4 plastic	U	Summa	a Can			
VGFX	40mL w/hexane wipe vial	AG3C	250mL NaOH amber glass	BP2U	500mL unpreserved plastic	ZPLC	Ziploc B	Bag			
VSG	Headspace septa vial & HCI	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac						
WGKU	8oz unpreserved clear jar	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic	TVV	W	ater			
WGFU	4oz clear soil jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	SL	So	blid			
JGFU	4oz unpreserved amber wide	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	NAL	No	on-aqueous liquid			
CG3H	250mL clear glass HCI	BG3H	250mL HCI Clear Glass		filtered)	WP	W	ipe			

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Prepared for:

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Laboratory Treatability Study to Evaluate Aerobic Remediation of Benzene and para-Cymene in Groundwater

SGW-23 Area Near the Stillhouse Control Room Hercules/Pinova Facility, Brunswick, GA

Prepared by:



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SiREM Ref: GR6881C

27 January 2021 siremlab.com



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LIST OF ABBREVIATIONS

%	percent
°C	degrees Celsius
°C/min	degrees Celsius per minute
µg/L	micrograms per liter
СВ	chlorobenzene
CO ₂	carbon dioxide
DHG	dissolved hydrocarbon gases
DO	dissolved oxygen
EISB	enhanced in situ bioremediation
FID	flame ionization detector
g	grams
GC	gas chromatograph
Geosyntec	Geosyntec Consultants Inc.
mg/L	milligrams per liter
min	minutes
mL	milliliters
mL/min	milliliters per minute
mmol/bottle	millimoles per bottle
QL	quantitation limit
SiREM	SiREM Laboratory
VOC	volatile organic compounds



SiREM

1. INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) retained SiREM Laboratory (SiREM) to conduct a biotreatability study to assess the potential for enhanced *in situ* bioremediation (EISB) of benzene under aerobic conditions in groundwater at the Brunswick site in Georgia (the Site). Site materials were collected from the SGW-23 area near the Stillhouse Control Room. Geologic materials were collected by Geosyntec on 19 February 2020 and received by SiREM on 21 February 2020. The shallow groundwater used for the study was collected on 20 February 2020 and received by SiREM on 24 February 2020. The chain of custodies received with these samples are provided in Appendix A.

The remainder of this report is divided into four sections. Section 2 contains a summary of key degradation processes for the target compounds of concern. Section 3 presents the experimental materials and methods; Section 4 presents the results and Section 5 provides references.

2. SUMMARY OF DEGRADATION PROCESSES

Benzene can be biologically degraded under a variety of aerobic and anaerobic conditions (Wiedemeier *et al.* 1995).

Under aerobic conditions, benzene is rapidly oxidized using oxygen as an electron acceptor producing carbon dioxide (CO_2) by indigenous microbial populations. Although benzene biodegradation under anoxic and anaerobic conditions is less energetically favorable, it has been observed to occur in situ at sites containing benzene. Under appropriate conditions, benzene acts as an electron donor for nitrate-reducing, iron-reducing, sulfate-reducing, or methanogenic microbial populations. Ultimately benzene can be degraded via anaerobic pathways to CO_2 (Ulrich *et al.*, 2005). Enhanced biological remediation of benzene can, in certain cases, be achieved by stimulating the indigenous microbial populations through the addition of electron acceptors, such as oxygen and sulfate (De Silva and Alvarez, 2004).

P-cymene is an alkyl-substituted aromatic hydrocarbon which would be expected to degrade under aerobic conditions (Eaton, 1997).

In this study, degradation of benzene and p-cymene under aerobic conditions was investigated

3. MATERIALS AND METHODS

The following sections describe the materials and methods used for microcosm construction, amendments and incubation for the aerobic study.

3.1 Microcosm Construction and Incubation

The geologic material was collected during the MPE pilot test well installation (SGW-23) area near the Stillhouse Control Room at the Hercules/Pinova Facility in Brunswick, Georgia. The geologic material was homogenized on 22 February 2020. A composite test sample was prepared by combining the geologic material collected from the MPE-01 location (depths from 2-5', 5-10', 6-8' and 8-10' below ground surface) and the PZ-1 location (depths from 2-5' and 5-10' below



SiREM

ground surface). Initially the Site materials were used to prepare anaerobic microcosms (not discussed in this report). Therefore, cores were placed in a disposable anaerobic glove bag purged with nitrogen gas in order to create an anaerobic environment. Once removed from the cores, the geologic material was homogenized manually and passed through a ¹/₄ inch sieve to remove larger particles and to improve reproducibility between microcosm replicates. Unused Site materials were placed in cold storage in case there was a need for additional testing.

Geosyntec instructed SIREM to prepare aerobic microcosms based on their review of other anaerobic treatability study results and as a results two aerobic tests were set up. Test 1 investigated benzene degradation and Test 2 investigated both benzene and p-cymene degradation. Microcosms were constructed in the fume hood on 8 July 20 (Test 1) and 20 November 2020 (Test 2) by filling sterile 250 milliliter (mL) (nominal volume) screw cap Boston round clear glass bottles (Systems Plus, New Hamburg, ON) with 60 grams (g) of geologic material and 180 mL of site groundwater. Microcosms were constructed by combining MPE/PZ-1 geologic material and Pinova MPE groundwater. The microcosms were then capped with Mininert™ (VICI Valco Instruments Canada, Brockville, Ontario) closures to allow repetitive sampling with minimal volatile organic compound (VOC) loss and to allow amendments, as needed, throughout the incubation period. All controls and treatments were constructed in triplicate. In order to provide sufficient sample volumes for external laboratory analysis, additional sacrificial microcosms were constructed for each external analysis time-point throughout the study. Table 1 summarizes the details of microcosm construction.

All aerobic microcosms were incubated under ambient aerobic conditions in the laboratory. During quiescent incubation, all microcosms were covered to minimize photodegradation. Microcosms were incubated for a period of up to 80 days at approximately 22 degrees Celsius (°C) (room temperature).

3.1.1 Microcosm Amendments

The first microcosm of each treatment and control was amended with resazurin (Sigma, St. Louis, MO) to monitor redox conditions on Day 0. Resazurin remains pink in the presence of oxygen and can be used as a visual indicator for the presence or absence of oxidizing conditions. Geosyntec specified that the initial benzene concentration in the shallow zone microcosms should be 5 milligrams per liter (mg/L). The initial concentration of the microcosms in both Test 1 and Test 2 were not at the target concentrations and therefore on Day 0 (13 July 2020 and 20 November 2020 respectively), the microcosms were spiked with benzene to achieve the target concentration. P-cymene was not spiked. Details of resazurin amendment as well as benzene spiking are provided in Table 1.

Oxygen was amended into the treatment microcosms to maintain aerobic conditions. 100% Oxygen (Linde, Cambridge, Ontario) was amended into the treatment microcosms. Oxygen was monitored and amended as needed, to maintain a dissolved oxygen (DO) concentration between 5-8 mg/L in the aqueous phase. Additional oxygen was amended throughout both Tests 1 and 2, as needed, throughout the study and monitored by both the resazurin color and the measurement of DO (Tables 3-1 and 3-2). To account for potential headspace losses of volatile contaminants due to multiple oxygen amendments, the sterile control microcosms received equal



SiREM

volumes of nitrogen amendments. Details of gas addition are provided in Table 1, Tables 2-1 and 2-2.

3.2 Microcosm Sampling and Analysis

3.2.1 Microcosm Sampling

Aqueous samples were collected from the control and treatment microcosms for analysis of benzene, dissolved hydrocarbon gases (DHGs – specifically methane), pH and DO at SiREM. Microcosms were sampled for these parameters using gas-tight 1 mL Hamilton glass syringes. Syringes were cleaned with acidified water (pH ~2) and rinsed 10 times with deionized water between samples, to ensure that VOCs and microorganisms were not transferred between different samples or treatments. Baseline total organic carbon (TOC) samples were collected on the geologic materials at the beginning of the study by filling a 250 mL glass jar with geologic material. Samples were stored on ice and picked up by ALS (ALS Analytical Inc., Waterloo) personnel. P-cymene samples were preserved with hydrochloric acid and shipped on ice to an external laboratory.

The analytical methods employed by SiREM are described below.

3.2.2 Analysis of VOCs and DHGs

This section describes the methods used to quantify the VOCs and DHGs. The quantitation limits (QL) for the VOCs and DHGs were typically 10 micrograms per liter (μ g/L) in the microcosms based on the sample dilution factor used and the lowest concentration standards that were included in the linear calibration trend.

Aqueous VOC and DHG concentrations in the microcosms were measured using a Hewlett-Packard (Hewlett Packard 7890) gas chromatograph (GC) equipped with an auto sampler (Hewlett Packard G1888) programmed to heat each sample vial to 75°C for 45 minutes (min) prior to headspace injection into a GSQ Plot column (0.53 millimeters x 30 meters, J&W) and a flame ionization detector (FID). Sample vials were heated to ensure that all VOCs in the aqueous sample would partition into the headspace. The injector temperature was 200°C, and the detector temperature was 250°C. The oven temperature was programmed as follows: 35°C for 2 min, increased to 100°C at 50 degrees Celsius per minute (°C/min), then increased to 185°C at 25°C/min and held at 185°C for 6.80 min. The carrier gas was helium at a flow rate of 11 milliliters per minute (mL/min).

After withdrawing a sample (as described in Section 2.2.1) from the microcosms, the sample was injected into a 10 mL auto sampler vial containing acidified deionized water (pH ~2). The sample volume was added to the vial containing deionized water bringing the total volume up to 6 mL. The water was acidified to inhibit microbial activity between microcosm sampling and GC analysis. The vial was sealed with an inert Teflon[™]-lined septum and aluminum crimp cap for automated injection of 3 mL of headspace onto the GC. One VOC standard was analyzed with each set of samples to verify the instrument five-point calibration curve using methanolic stock solutions containing known concentrations of the target analytes. Calibration was performed using external standards purchased as standard solutions (Sigma, St Louis, Missouri), where known volumes of





standard solutions were added to acidified water in auto sampler vials and analyzed as described above for microcosm samples. Data were integrated using Chemstation Software (Agilent Technologies, Santa Clara, California).

3.2.3 Analysis of pH

The pH measurements were performed using an Oakton pH spear with a combination pH electrode (Oakton, Vernon Hills, IL). A 0.5 mL sample was collected from the microcosms (as described in section 2.2.1), and the pH was measured on the lab bench. The pH spear was calibrated at each sampling event according to the manufacturer's instructions using pH 4.0, 7.0 and 10 standards.

3.2.4 Analysis of Dissolved Oxygen

The DO analyses were performed using a Mi-730 Micro-Oxygen Electrode (Microelectrodes, Inc., Bedford, NH, USA) in conjunction with the ES350 Pod-Vu software (eDAQ, Denistone East, Australia). A 0.25 mL sample was collected (as described in Section 2.2.1) and placed in a 1.5 mL microcentrifuge tube. The DO was measured on the lab bench immediately after sampling. The DO probe was calibrated before each use according to manufacturer's instructions.

3.2.5 External Laboratory Analysis of Total Organic Carbon and P-cymene

Analysis of total organic carbon (TOC) on the geologic material was performed at ALS (ALS Environmental, Waterloo). Geologic samples were prepared by filling 250 mL amber glass jars with geologic material from the shallow zone.

Analysis of p-cymene (Test 2) samples was conducted by Pace Analytical in Indianapolis, IN. Samples were collected in 40 mL glass vials and preserved with hydrochloric acid.

4. RESULTS

Table 2-1 provides the benzene and methane data collected at SiREM from the control and treatment microcosms for Test 1. Table 2-2 provides the benzene data collected at SiREM, as well as the external benzene and p-cymene data generated by analysis at Pace. Results are presented in units of mg/L and millimoles per microcosm bottle (mmol/bottle). Concentrations were converted from mg/L to mmol/bottle using Henry's Law as demonstrated in Appendix B.

Table 3-1 provides TOC, pH and DO results from Test 1 and Table 3-2 from Test 2. The TOC values are reported as a percentage and the DO is reported in mg/L. The mass of oxygen per gram of TOC and per gram of VOC was calculated based on the amount of oxygen added. Figure 2 presents the benzene trends for Test 1 while Figure 3 present the benzene trends for Test 2. Appendix C presents external laboratory reports.



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TABLES



TABLE 1: SUMMARY OF AEROBIC MICROCOSM CONTROLS, TREATMENTS AND AMENDMENTS SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Assigned Microcosm Number Geological Material (g) Number of Groundwater (mL) Test Treatment/Control Headspace (mL) Sodium Azide Mercuric Chloride Resazurin Benzene Gas amendment Microcosms Amended with 0.45 mL of a 5 % solution on Day 0. Amended with 2.52 mL of a 2.7% solution on Day 0. Shallow Aerobic Sterile Control 1 to 3 3 40 Amend with nitrogen gas as needed. Spiked with 78 µL of saturated benzene to target a final benzene oncentration of 2.3 mg/L Amended first replicate with 100 µL of a 1,000 mg/L solution on Day 0. Amended with 60 g of MPE and PZ-1. Amended with 180 mL of MPE site groundwater. 1 Amend with oxygen gas to an initial target of 21 % of the headspace and then maintain as needed between 5-8 mg/L DO. Shallow Aerobic Treatment 4 to 6 3 40 ------Amended with 0.45 mL of a 5 % solution on Day 0. Amended with 2.52 mL of a 2.7% solution on Day 0. Shallow Aerobic Sterile Control 13 to 15 3 40 Amend with nitrogen gas as needed. Spiked with 528 µL of saturated benzene to a target concentration of 5 mg/L. Amended first replicate with 100 µL of a 1,000 mg/L solution on Day 0. Amended with 60 g of MPE and PZ-1. Amended with 180 mL of MPE site groundwater 2 Amend with oxygen gas to an initial target of 21 % of the headspace and then maintain as needed between 5-8 mg/L DO. Shallow Aerobic Treatment 16 to 18 3 40 ------Notes:

--- - not applicable % - percent μL - microliter DO - dissolved oxygen

g - grams mg/L - milligrams per liter mL - milliliters

Table 1

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TABLE 2-1: SUMMARY OF AEROBIC MICROCOSM BENZENE, CB AND METHANE RESULTS (TEST 1) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Benzene Methane Treatment Date Day Replicate Comment mg/L mg/L Shallow Aerobic Sterile Control 13-Jul-20 Poisoned with mecuric chloride and sodium azide. Amended the first replicate with resazurin. Spiked with benzene to target a final concentration of 5.0 mg/L. Amended with 16.8 mL of nitrogen gas SASC-1 SASC-2 <0.10 <0.10 <0.10 4.8 4.5 SASC-3 4.6 Average Concentration (mg/L) Standard Deviation (mmoles) 4.6 4.4E-04 ND 0.0E+00 Average Total mmoles SASC-1 SASC-2 **0.011** 4.6 4.5 ND <0.10 <0.10 15-Jul-20 2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles <0.10 <0.10 ND 0.0E+00 44 4.4 4.5 2.2E-04 0.011 ND Amended with 8.4 mL of nitrogen gas. <0.10 <0.10 <0.10 ND 0.0E+00 17-Jul-20 SASC-1 4.6 4.4 4.1 4 SASC-2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) 4.4 6.3E-04 Average Total mmoles 0.011 ND Amended with 8.4 mL of nitrogen gas. Amended with 8.4 mL of nitrogen gas. Amended with 8.4 mL of nitrogen gas. 20-Jul-20 23-Jul-20 27-Jul-20 7 10 14 SASC-1 4.4 4.2 <0.10 <0.10 <0.10 <0.10 ND 0.0E+00 SASC-2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) 4.2 4.0 4.2 5.5E-04 Average Total mmoles 0.010 ND Amended with 8.4 mL of nitrogen gas. SASC-1 4.3 4.1 4.1 <0.10 <0.10 05-Aug-20 23 SASC-1 SASC-2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) <0.10 ND 0.0E+00 ND 4.2 2.8E-04 Average Total mmoles 0.010 Amended with 8.4 mL of nitrogen gas. 14-Aug-20 32 19-Aug-20 37 Amended with 8.4 mL of nitrogen gas. <0.10 <0.10 <0.10 ND 0.0E+00 SASC-1 4.3 4.3 4.2 3.8 4.1 6.4E-04 SASC-2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles SASC-2 0.010 ND 27-Aug-20 45 Amended with 8.4 mL of nitrogen gas.

Table 2-1

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TABLE 2-1: SUMMARY OF AEROBIC MICROCOSM BENZENE, CB AND METHANE RESULTS (TEST 1) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Benzene Methane Treatment Date Day Replicate Comment **mg/L** <0.10 mg/L SASC-1 SASC-2 Shallow Aerobic Sterile Control 02-Sep-20 51 4.3 4.2 <0.10 Continued SASC-3 4.1 <0.10 Average Concentration (mg/L) Standard Deviation (mmoles) 4.2 3.3E-04 ND 0.0E+00 Average Total mmoles 0.010 ND Amended with 8.4 mL of nitrogen gas. <0.10 <0.10 <0.10 ND 0.0E+00 11-Sep-20 60 SASC-1 4.1 3.8 SASC-2 SASC-2 SASC-3 Average Concentration (mg/L) Standard Deviation (mmoles) 4.0 4.0 3.7E-04 Average Total mmoles 0.0096 ND Amended with 8.4 mL of nitrogen gas. 01-Oct-20 SASC-1 <0.10 <0.10 80 4.3 SASC-2 SASC-3 4.0 4.1 <0.10 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles ND 0.0E+00 ND 4.1 3.0E-04 0.0099 Shallow Aerobic Treatment 13-Jul-20 Amended the first replicate with resazurin. 0 Spiked with benzene to target a final concentration of 5.0 mg/L. Amended with 16.8 mL of oxygen gas. SAT-1 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) <0.10 <0.10 4.8 4.8 5.1 4.9 <0.10 ND 0.0E+00 4.3E-04 Average Total mmoles SAT-1 SAT-2 ND <0.10 <0.10 0.012 15-Jul-20 4.6 4.4 SAT-3 5.0 <0.10 Average Concentration (mg/L) Standard Deviation (mmoles) 4.7 7.0E-04 ND 0.0E+00 Average Total mmoles 0.011 ND Amended with 8.4 mL of oxygen gas. 17-Jul-20 4 SAT-1 4.4 4.5 <0.10 <0.10 SAT-2 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) <0.10 <0.10 ND 0.0E+00 4.7 4.5 3.8E-04 Average Total mmoles 0.011 ND Amended with 8.4 mL of oxygen gas. Amended with 8.4 mL of oxygen gas. Amended with 8.4 mL of oxygen gas. 20-Jul-20 7 23-Jul-20 10 27-Jul-20 14 SAT-1 3.8 3.5 <0.10 <0.10 SAT-2 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles <0.10 <0.10 ND 0.0E+00 4.2 3.8 8.1E-04 0.0092 ND Amended with 8.4 mL of oxygen gas.

Table 2-1

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TABLE 2-1: SUMMARY OF AEROBIC MICROCOSM BENZENE, CB AND METHANE RESULTS (TEST 1) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Benzene Methane Treatment Date Day Replicate Comment **mg/L** <0.10 mg/L SAT-1 SAT-2 Shallow Aerobic Treatment 05-Aug-20 23 2.8 2.5 <0.10 Continued SAT-3 3.6 <0.10 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles 3.0 1.4E-03 ND 0.0E+00 0.0072 ND Amended with 8.4 mL of oxygen gas. 14-Aug-20 32 19-Aug-20 37 Amended with 8.4 mL of oxygen gas. <0.10 <0.10 <0.10 ND 0.0E+00 **ND** SAT-1 2.1 1.3 SAT-1 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) 2.9 2.1 1.9E-03 Average Total mmoles 0.0050 27-Aug-20 45 02-Sep-20 51 Amended with 8.4 mL of oxygen gas. SAT-1 SAT-2 <0.10 <0.10 1.1 0.76 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles 2.2 1.4 1.9E-03 0.0033 <0.10 ND 0.0E+00 ND Amended with 8.4 mL of oxygen gas. 11-Sep-20 SAT-1 60 <0.10 0.84 SAT-1 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) <0.10 <0.10 <0.10 0.40 2.1 1.1 2.2E-03 ND 0.0E+00 Average Total mmoles SAT-1 SAT-2 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) Average Total mmoles 0.0027 0.47 0.37 ND <0.10 <0.10 24-Sep-20 73 <0.020 0.28 <0.10 ND 6.0E-04 0.00068 0.0E+00 ND Amended with 8.4 mL of oxygen gas. 01-Oct-20 80 SAT-1 0.30 <0.10 SAT-2 0.38 <0.10 SAT-3 Average Concentration (mg/L) Standard Deviation (mmoles) <0.10 <0.10 ND 0.0E+00 <0.020 0.22 4.8E-04 Average Total mmoles 0.00054 ND Notes

- the compound is not detected, the associated value is the detection limit CB - chirorobenzene mg/L - milligrams per liter mL - milligrams per liter mD - not detected ND - not detected SASC - shallow arobic sterile control SAT - shallow aerobic treatment

Table 2-1

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TABLE 2-2: SUMMARY OF AEROBIC MICROCOSM BENZENE AND P-CYMENE RESULTS (TEST 2) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

SIREM External Replicate Benzene Benzene p-Cymene Treatment Date Day Comment mg/L mg/L mg/L Aerobic Baseline 20-Nov-20 0 Aerobic 2-Baseline-1 1.83 0.122J 0.123J Aerobic 2-Baseline-2 1.83 Average Concentration (mg/L) 1.83 0.123 ---Standard Deviation (mmoles) ---0.0E+00 7.1E-04 Average Total mmoles 0.00018 0.0044 Shallow Aerobic Sterile Control 20-Nov-20 0 Amended with mecuric chloride and sodium azide. Amended the first replicate with resazurin. Spiked with benzene to target a final concentration of 5.0 mg/L. Amended with 16.8 mL of nitrogen SC-Shallow-1 2.18 _ SC-Shallow-2 2.09 ------SC-Shallow-3 2.13 Average Concentration (mg/L) 2.13 ----Standard Deviation (mmoles) 4.8E-02 ------Average Total mmoles 0.0042 Amended with 8.4 mL of nitrogen. 21-Nov-20 1 23-Nov-20 3 Amended with 8.4 mL of nitrogen. 24-Nov-20 4 Amended with 8.4 mL of nitrogen. Spiked with benzene to target concentrations of 5 mg/L. 25-Nov-20 5 Amended with 8.4 mL of nitrogen. SC-Shallow-1 5.18 ----SC-Shallow-2 5.07 ------SC-Shallow-3 5.03 Average Concentration (mg/L) 5.09 ------Standard Deviation (mmoles) 7.8E-02 ------Average Total mmoles 0.0101 Amended with 8.4 mL of nitrogen. 26-Nov-20 27-Nov-20 Amended with 8.4 mL of nitrogen. 6 SC-Shallow-1 4.74 7 ---SC-Shallow-2 4.60 ------SC-Shallow-3 4.74 Average Concentration (mg/L) 4.69 ---Standard Deviation (mmoles) 7.8E-02 ------Average Total mmoles 0.0093 Amended with 8.4 mL of nitrogen. Amended with 8.4 mL of nitrogen. 29-Nov-20 9 30-Nov-20 10 SC-Shallow-1 4.62 ---SC-Shallow-2 4.42 ------SC-Shallow-3 4.66 Average Concentration (mg/L) 4.57 ---Standard Deviation (mmoles) 1.3E-01 ---Average Total mmoles 0.0091

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TABLE 2-2: SUMMARY OF AEROBIC MICROCOSM BENZENE AND P-CYMENE RESULTS (TEST 2) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment	Date	Day	Replicate	Benzene	Benzene	p-Cymene	Comment
				mg/L	mg/L	mg/L	
Unamended Sterile Control	04-Dec-20	14	SC-Shallow-1	4.62			
Continued			SC-Shallow-2	4.46		-	
			SC-Shallow-3	4.64		-	
			Average Concentration (mg/L)	4.57			
			Standard Deviation (mmoles)	9.9E-02			
			Average Total mmoles	0.0091			
	08-Dec-20	18					Amended with 5.0 mL of nitrogen.
	18-Dec-20	28	SC-Shallow-1	4.27			
			SC-Shallow-2	4.25			
			SC-Shallow-3	4.34		-	
			Average Concentration (mg/L)	4.29			7
			Standard Deviation (mmoles)	4.7E-02		-	
			Average Total mmoles	0.0085			
	23-Dec-20	33					Amended with 4.2 mL of nitrogen.
	07-Jan-21	48	SC-Shallow-1	4.21			
			SC-Shallow-2	3.96			
			SC-Shallow-3	4.28		-	
		Ι Γ	Average Concentration (mg/L)	4.15			7
			Standard Deviation (mmoles)	1.7E-01		-	
			Average Total mmoles	0.0083			
							Amended with 8.4 mL of nitrogen.
	13-Jan-21	54	SC-Shallow-1		3.51	0.310	
			SC-Shallow-2		3.32	0.606	
			SC-Shallow-3		3.45	0.291	
			Average Concentration (mg/L)		3.43	0.402	7
			Standard Deviation (mmoles)	-	9.7E-02	1.8E-01	
			Average Total mmoles		0.0083	0.00058	
Shallow Aerobic Treatment	20-Nov-20	0					Amended the first replicate with resazurin.
							Spiked with benzene to target a final concentration of 5.0 mg/L.
							Amended with 16.8 mL of oxygen.
			Aerobic-Shallow-1	2.20			
			Aerobic-Shallow-2	2.25			
			Aerobic-Shallow-3	2.10			
		ΙΓ	Average Concentration (mg/L)	2.18			
			Standard Deviation (mmoles)	7.5E-02			
			Average Total mmoles	0.0044			
	21-Nov-20	1			-		Amended with 8.4 mL of oxygen.
	23-Nov-20	3					Amended with 8.4 mL of oxygen.
	24-Nov-20	4					Amended with 8.4 mL of nitrogen.
		I [Amended with 8.4 mL of oxygen.
		і Г					Spiked with benzene to target concentrations of 5 mg/L.

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TABLE 2-2: SUMMARY OF AEROBIC MICROCOSM BENZENE AND P-CYMENE RESULTS (TEST 2) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Replicate Benzene Benzene p-Cymene Treatment Comment Date Day mg/L mg/L mg/L Shallow Aerobic Treatment Amended with 8.4 mL of oxygen. 25-Nov-20 5 Continued Aerobic-Shallow-1 4.57 ------Aerobic-Shallow-2 4.65 ---Aerobic-Shallow-3 4.55 Average Concentration (mg/L) 4.59 ------Standard Deviation (mmoles) 5.3E-02 Average Total mmoles 0.0091 . Amended with 8.4 mL of oxygen. Amended with 8.4 mL of oxygen. 26-Nov-20 27-Nov-20 6 Aerobic-Shallow-1 3.86 7 ----Aerobic-Shallow-2 3.93 ------Aerobic-Shallow-3 4.02 Average Concentration (mg/L) 3.94 Standard Deviation (mmoles) 8.2E-02 ------Average Total mmoles 0.0078 Amended with 8.4 mL of oxygen. 29-Nov-20 30-Nov-20 9 Amended with 8.4 mL of oxygen 10 Aerobic-Shallow-1 3.50 ------Aerobic-Shallow-2 3.45 ------Aerobic-Shallow-3 Average Concentration (mg/L) 3.76 3.57 ------Standard Deviation (mmoles) 1.7E-01 ------Average Total mmoles 0.0071 04-Dec-20 14 Aerobic-Shallow-1 3.23 ------Aerobic-Shallow-2 3.39 ------Aerobic-Shallow-3 3.54 Average Concentration (mg/L) 3.39 ------Standard Deviation (mmoles) 1.6E-01 ------Average Total mmoles 0.0067 Amended with 4.2 mL of oxygen. 08-Dec-20 18-Dec-20 18 Amended with 5.0 mL of oxygen. 28 Aerobic-Shallow-1 0.87 ----Aerobic-Shallow-2 2.36 ------Aerobic-Shallow-3 2.07 Average Concentration (mg/L) 1.77 Standard Deviation (mmoles) 7.9E-01 ------Average Total mmoles 0.0035 ---Amended with 4.2 mL of oxygen. 23-Dec-20 33

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TABLE 2-2: SUMMARY OF AEROBIC MICROCOSM BENZENE AND P-CYMENE RESULTS (TEST 2) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment	Date	Day	Replicate	Benzene	Benzene	p-Cymene	Comment
				mg/L	mg/L	mg/L	
Shallow Aerobic Treatment	07-Jan-21	48	Aerobic-Shallow-1	<0.020			
Continued			Aerobic-Shallow-2	0.86			
			Aerobic-Shallow-3	<0.020		-	
			Average Concentration (mg/L)	0.86			
			Standard Deviation (mmoles)	5.0E-01			
			Average Total mmoles	0.00057			
							Amended with 4.2 mL of oxygen.
	13-Jan-21	54	Aerobic-Shallow-1		0.0127J	0.0059J	
			Aerobic-Shallow-2	-	0.037	0.043	
			Aerobic-Shallow-3	-	<0.025	<0.025	
			Average Concentration (mg/L)	-	0.0170	0.024	
			Standard Deviation (mmoles)	-	2.6E+01	2.6E-02	
			Average Total mmoles	-	0.000041	0.000035	
Notes	37						

: BAP - base activated persulfate g/L - grams per liter mg/L - milligrams per liter mmoles - millimoles ND - not detected SC - sterile control J - estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

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TABLE 3-1: SUMMARY OF AEROBIC MICROCOSM TOC, pH, DO, AND OXYGEN PER TOTAL CARBON RESULTS (TEST 1) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment Baseline	Date	Day	Replicate S-5	pH 715 Geologic Material	DO mg/L TOC: 0.73 %	O ₂ /TOC** g O ₂ /g TOC	O ₂ /VOC*** g O ₂ /g VOC
Baseline Shallow Aerobic Sterile Control	13-Jul-20	0	SASC-1	6.16	2.74		-
			SASC-2 SASC-3	6.25 6.26	1.95 1.28		-
			Average	6.22	1.99		
	45.1.1.00		0100.4		nded with 16.8 mL of nit	rogen.	
	15-Jul-20	2	SASC-1 SASC-2	6.37 6.42	5.17 3.75		-
			SASC-3	6.48	2.40		
			Average	6.42	3.77 ended with 8.4 mL of nitr		
	17-Jul-20	4	SASC-1	6.06	2.29	ogen.	
			SASC-2	6.17	2.51		
			SASC-3 Average	6.25 6.16	2.20 2.33		
			Jitolugo		ended with 8.4 mL of nitr		
	20-Jul-20	7	SASC-1		0.00*		
			SASC-2 SASC-3		2.08*		
			Average		2.08*		
	23-Jul-20	10	SASC-1	Ame 	ended with 8.4 mL of nitr	ogen.	
	20-001-20	10	SASC-2		2.35*		
			SASC-3				
			Average	 Ame	2.35* ended with 8.4 mL of nitr		
	27-Jul-20	14	SASC-1	6.07	Inded with 0.4 me of ma	l l	
		1	SASC-2	6.17	2.35*		
			SASC-3 Average	6.20 6.15	2.35*		
		1	Average		2.35 [*] ended with 8.4 mL of nitr		
	5-Aug-20	23	SASC-1	5.97	1.42		
			SASC-2 SASC-3	6.06 6.06	3.01 2.40		
		1	Average	6.06	2.40		
		1		Ame	ended with 8.4 mL of nitr		•
	14-Aug-20	32	SASC-1 SASC-2		1.91 2.33		
			SASC-2 SASC-3		2.33		
			Average		2.24		
	19-Aug-20	37	SASC-1	6.00	ended with 8.4 mL of nitr 2.67	ogen.	
	19-Aug-20	37	SASC-1 SASC-2	6.29	2.07		
			SASC-3	6.17	2.22		
	27 Aug 20	45	Average	6.15	2.39		
	27-Aug-20	45	SASC-1 SASC-2		2.69 1.93		-
			SASC-3		1.96		
			Average		2.19		
	2-Sep-20	51	SASC-1	5.93	ended with 8.4 mL of nitr 2.65	ogen.	
			SASC-2	6.00	2.32		
			SASC-3 Average	6.01 5.98	3.20 2.72		
			Avenage		ended with 8.4 mL of nitr		
	11-Sep-20	60	SASC-1	6.31	3.23		
			SASC-2 SASC-3	6.45 6.50	2.09 2.20		
			Average	6.42	2.51		
	18-Sep-20	67	SASC-1		3.35		
			SASC-2 SASC-3		2.11 4.07		
			Average		3.18		
	1-Oct-20	80	SASC-1	6.09	3.22 3.04		-
			SASC-2 SASC-3	6.17 6.13	2.92		
		1	Average	6.13	3.06		
Shallow Aerobic Treatment	13-Jul-20	0	SAT-1	6.50	7.47		
			SAT-2 SAT-3	6.32 6.63	6.34 7.04	-	_
		1	Average	6.48	6.95		
	15-Jul-20	2	SAT-1	An 6.71	ended with 16.8 mL oxy 2.20	rgen.	
	10-041-20	<u> </u>	SAT-1 SAT-2	6.74	2.20	0.051	25
			SAT-3	6.36	2.61		
			Average	6.60 Ar	2.28 nended with 8.4 mL oxy	0.051 gen.	25
	17-Jul-20	4	SAT-1	6.29	3.08		
		1	SAT-2	6.32	2.18	0.076	38
			SAT-3 Average	6.44 6.35	3.19 2.82	0.076	38
				Ar	nended with 8.4 mL oxy	gen.	•
	20-Jul-20	7	SAT-1		5.8	0.102	51
	20-Jui-20	1	SAT-1 SAT-2		4.33*	0.102	51
		1	SAT-3				
			Average	 Ar	4.33 nended with 8.4 mL oxy	0.102	51
	23-Jul-20	10	SAT-1				
		1	SAT-2		3.97*	0.127	63
		1	SAT-3 Average		3.97	0.127	63
	L	1		Ar	nended with 8.4 mL oxy		
	27-Jul-20	14	SAT-1	6.32	4.04*	0.153	76
		1	SAT-2 SAT-3	6.29 6.32	4.04*	0.153	10
	1	1	Average	6.31	4.04	0.153	76
				A.	nended with 8.4 mL oxy	nen	
	F A O O		047.4			I	1
	5-Aug-20	23	SAT-1 SAT-2	6.14	3.58		89
	5-Aug-20	23	SAT-1 SAT-2 SAT-3 Average			0.178	89 89

TABLE 3-1: SUMMARY OF AEROBIC MICROCOSM TOC, pH, DO, AND OXYGEN PER TOTAL CARBON RESULTS (TEST 1) SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment	Date	Day	Replicate	рН	DO	O2/TOC**	O2/VOC***	
					mg/L	g O ₂ /g TOC	g O ₂ /g VOC	
Shallow Aerobic Treatment Continued	14-Aug-20	32	SAT-1		4.25			
			SAT-2		2.85	0.204	101	
			SAT-3		2.83			
			Average		3.31	0.204	101	
			Amended with 8.4 mL oxygen.					
	19-Aug-20	37	SAT-1	6.16	5.74			
			SAT-2	6.20	4.70	0.229	114	
			SAT-3	6.32	2.64			
			Average	6.23	4.36	0.229	114	
	27-Aug-20	45	SAT-1		2.94			
			SAT-2		4.13	0.229	114	
			SAT-3		5.21			
			Average		4.09	0.229	114	
			Amended with 8.4 mL oxygen.					
	2-Sep-20	51	SAT-1	6.05	2.35			
			SAT-2	6.05	2.00	0.255	127	
			SAT-3	6.18	3.37			
			Average	6.09	2.57	0.255	127	
			Amended with 8.4 mL oxygen.					
	11-Sep-20	60	SAT-1	6.52	6.02			
			SAT-2	6.57	5.21	0.280	139	
			SAT-3	6.55	6.79			
			Average	6.55	6.01	0.280	139	
	18-Sep-20	67	SAT-1	-	6.02			
			SAT-2		5.31	0.280	139	
			SAT-3		5.26			
			Average		5.53	0.280	139	
	1-Oct-20	80	SAT-1	6.12	6.25			
			SAT-2	6.28	4.18	0.280	139	
			SAT-3	6.17	6.39			
			Average	6.19	5.61	0.280	139	

Notes: * Composite sample, measured wit optical DO probe, standard measurements collected using electrode DO probe **Calculated as total grams of oxygen added per grams of total organic carbon (sum of geologic material TOC and aqueous VOCs) at the start of testing

**Calculated as total grams of oxygen added per grams of total VOCs at the start of testing

**Calculated as total grams of oxygen added per grams of total VOCs at the start of testing % - percent mg O_2/g TOC - milligrams of oxygen amended to reactor per gram of organic carbon at the start of the incubation period mg O_2/g VOC - milligrams per liter mL - milliters $O_2 - oxygen$ gas SASC - shallow arobic sterile control SAT - shallow aerobic treatment TOC - total organic carbon VOC - volatile organic compound

TABLE 3-2: SUMMARY OF AEROBIC MICROCOSM TOC, pH, DO, AND OXYGEN PER TOTAL CARBON RESULTS SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment	Date	Day	Replicate	рН	DO mg/l	O ₂ /TOC** g O ₂ /g TOC	0 ₂ /VOC***
Baseline Shallow Benzene				715 Geologic Material	mg/L FOC: 0.73 %	g02/g10C	g O ₂ /g VOC
Shallow Aerobic Sterile Control	20-Nov-20	0	SC-Shallow-1 SC-Shallow-2 SC-Shallow-3				
	21-Nov-20	1	SC-Shallow-1	6.52	Amended with 16	5.8 mL of nitrogen.	1
	21-1100-20		SC-Shallow-1 SC-Shallow-2	6.68		-	
			SC-Shallow-3	6.34			
				6.51			
	00 Nov 00	2	00.01 // 1			.4 mL of nitrogen.	
	23-Nov-20	3	SC-Shallow-1 SC-Shallow-2		4.90 3.04		
			SC-Shallow-2 SC-Shallow-3		3.50		_
					3.81		
						.4 mL of nitrogen.	
	24-Nov-20 25-Nov-20	4 5	SC-Shallow-1		Amended with 8 3.71	.4 mL of nitrogen.	
	23-1100-20	5	SC-Shallow-1 SC-Shallow-2		3.82		
			SC-Shallow-3		3.55		
					3.70		
	26-Nov-20	6	00.01 // 1	0.00		.4 mL of nitrogen.	
	27-Nov-20	7	SC-Shallow-1 SC-Shallow-2	6.20 6.18	4.85 3.75	-	
			SC-Shallow-3	6.14	4.99	-	-
				6.17	4.53		
	27-Nov-20	7				.4 mL of nitrogen.	
	29-Nov-20	9	00 0L " 1	5.01		.4 mL of nitrogen.	
	30-Nov-20	10	SC-Shallow-1 SC-Shallow-2	5.91 5.96	5.98 5.08		
			SC-Shallow-2 SC-Shallow-3	5.96	5.08	-	-
			00 0.1/21101-0	5.88	5.59		
	1-Dec-20	11	SC-Shallow-1		4.07		
			SC-Shallow-2		3.78		
			SC-Shallow-3		3.91		
	2-Dec-20	12	SC-Shallow-1		3.92 3.89		
	2 200 20		SC-Shallow-2		3.67		
			SC-Shallow-3		3.89		
	1.5				3.82		
	4-Dec-20	14	SC-Shallow-1 SC-Shallow-2	6.33 6.49	3.78 3.76		
			SC-Shallow-2 SC-Shallow-3	6.32	3.76		
			SC-Shallow-S	6.38	3.82		
	8-Dec-20	18	SC-Shallow-1		2.47		
			SC-Shallow-2		2.78		
			SC-Shallow-3		2.42		
					2.56 Amended with 5	.0 mL of nitrogen.	
	11-Dec-20	21	SC-Shallow-1		3.80		
			SC-Shallow-2		3.73		
			SC-Shallow-3		3.31		
	18-Dec-20	28	SC-Shallow-1		3.61 3.08		
	10-Dec-20	20	SC-Shallow-1		2.74		-
			SC-Shallow-3		3.15		
					2.99		
	23-Dec-20	33	SC-Shallow-1		3.71	-	
			SC-Shallow-2 SC-Shallow-3		3.15 3.87		
			00 0.14100-0		3.58		
					Amended with 4	.2 mL of nitrogen.	
	29-Dec-20	39	SC-Shallow-1	5.90	4.23		
			SC-Shallow-2	5.95 5.82	3.53 3.51		
			SC-Shallow-3	5.82	3.51		
	31-Dec-20	41	SC-Shallow-1		3.67		
			SC-Shallow-2		2.92		
			SC-Shallow-3		3.10		
	4-Jan-21	45	SC-Shallow-1		3.23 3.78		
	+-Jaii-21	40	SC-Shallow-1 SC-Shallow-2		3.85		-
			SC-Shallow-3		3.87		
					3.83		
	7-Jan-21	48	SC-Shallow-1 SC-Shallow-2	6.02	3.91		
			SC-Shallow-2 SC-Shallow-3	6.06 5.91	3.49 3.85		-
				6.00	3.75		
					Amended with 8	.4 mL of nitrogen.	
	11-Jan-21	52	SC-Shallow-1		4.32		
			SC-Shallow-2 SC-Shallow-3		4.30		
			SC-SHAllow-3		4.70 4.44		
Shallow Aerobic Treatment	20-Nov-20	0	Aerobic-Shallow-1				
			Aerobic-Shallow-2				
			Aerobic-Shallow-3				
	21 Nov 20	4	Aarabia Obellevi d	6.55	Amended with	16.8 mL oxygen.	1
	21-Nov-20	1	Aerobic-Shallow-1 Aerobic-Shallow-2	6.55		0.017	25
			Aerobic-Shallow-2 Aerobic-Shallow-3	6.70 6.75		0.017	20
			ACTORIC-STIBILOW-3	6.67		0.017	25

TABLE 3-2: SUMMARY OF AEROBIC MICROCOSM TOC, pH, DO, AND OXYGEN PER TOTAL CARBON RESULTS SGW-23 Area Near Stillhouse Control Room, Brunswick, GA

Treatment	Date	Day	Replicate	рН	DO mg/L	O ₂ /TOC** g O ₂ /g TOC	O ₂ /VOC*** g O ₂ /g VOC
	23-Nov-20	3	Aerobic-Shallow-1		4.83	a - 2 a . 00	a - 2 g . 3 0
			Aerobic-Shallow-2		3.56	0.025	38
			Aerobic-Shallow-3		3.81		
					4.07	0.025	38
						8.4 mL oxygen.	
	24-Nov-20	4			Amended with 8.4 mL	of nitrogen by accident.	
					Amended with	8.4 mL oxygen.	
	25-Nov-20	5	Aerobic-Shallow-1		4.95		
			Aerobic-Shallow-2		4.16	0.042	63
			Aerobic-Shallow-3		4.90		
					4.67	0.042	63
					Amended with	8.4 mL oxygen.	
	26-Nov-20	6				8.4 mL oxygen.	
	27-Nov-20	7	Aerobic-Shallow-1	6.41	6.95		
			Aerobic-Shallow-2	6.44	5.64	0.059	89
			Aerobic-Shallow-3	6.60	7.14		
				6.48	6.57	0.059	89
					Amended with	8.4 mL oxygen.	
	29-Nov-20	9				8.4 mL oxygen.	
	30-Nov-20	10	Aerobic-Shallow-1	6.03	11.68		
			Aerobic-Shallow-2	6.07	9.83	0.076	114
			Aerobic-Shallow-3	6.12	9.99		
				6.07	10.50	0.076	114
	1-Dec-20	11	Aerobic-Shallow-1		7.58	0.076	114
			Aerobic-Shallow-2		7.90	0.076	114
			Aerobic-Shallow-3		7.09	0.076	114
	2-Dec-20	12	Aerobic-Shallow-1		5.89	0.070	114
	2 300-20	1	Aerobic-Shallow-2		5.92	0.076	114
			Aerobic-Shallow-3		5.92		
					5.91	0.076	114
	4-Dec-20	14	Aerobic-Shallow-1	6.48	4.50		
			Aerobic-Shallow-2	6.43	4.57	0.076	114
			Aerobic-Shallow-3	6.53	4.72		
				6.48	4.60	0.076	114
	8-Dec-20	18	Acrobic Shollow 1		Amended with 3.76	4.2 mL oxygen.	
	8-Dec-20	10	Aerobic-Shallow-1 Aerobic-Shallow-2		4.29	0.081	120
			Aerobic-Shallow-2 Aerobic-Shallow-3	-	3.92	0.001	120
				-	3.99	0.081	120
					Amended with	5.0 mL oxygen.	
	11-Dec-20	21	Aerobic-Shallow-1		7.54		
			Aerobic-Shallow-2		9.14	0.086	128
			Aerobic-Shallow-3		8.35	0.000	400
	18-Dec-20	28	Aerobic-Shallow-1	-	8.34 6.38	0.086	128
	10-Dec-20	20	Aerobic-Shallow-2		6.08	0.086	128
			Aerobic-Shallow-3		5.49	0.000	120
				-	5.98	0.086	128
	23-Dec-20	33	Aerobic-Shallow-1		7.02		
		1	Aerobic-Shallow-2		5.98	0.086	128
			Aerobic-Shallow-3		5.67		
					6.22	0.086	128
	00 5 00		Aerobic-Shallow-1	E 00		4.2 mL oxygen.	
	29-Dec-20	39	Aerobic-Shallow-1 Aerobic-Shallow-2	5.68 5.64	8.15 6.50	0.090	134
			Aerobic-Shallow-2 Aerobic-Shallow-3	5.64 5.94	6.50 5.42	0.090	134
		1		5.75	6.69	0.090	134
	31-Dec-20	41	Aerobic-Shallow-1	0.10	8.78	0.000	1.54
	0.000-20		Aerobic-Shallow-2		8.01	0.090	134
					4.97		
			Aerobic-Shallow-3				
			Aerobic-Shallow-3	-		0.090	134
			Aerobic-Shallow-3	-	7.25	0.090 xygen to replicate 3 only	134
	4-Jan-21	45	Aerobic-Shallow-3				
	4-Jan-21	45			7.25 Amended with 5.0 mL o		
	4-Jan-21	45	Aerobic-Shallow-1		7.25 Amended with 5.0 mL o 7.43 6.35 5.51	xygen to replicate 3 only 0.090	134
	4-Jan-21	45	Aerobic-Shallow-1 Aerobic-Shallow-2		7.25 Amended with 5.0 mL o 7.43 6.35	xygen to replicate 3 only	<i>.</i>
	4-Jan-21 7-Jan-21	45	Aerobic-Shallow-1 Aerobic-Shallow-2		7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33	xygen to replicate 3 only 0.090 0.090	134 134
			Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1 Aerobic-Shallow-1	 6.01 5.67	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63	xygen to replicate 3 only 0.090	134
			Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1	 6.01 5.67 5.95	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63 3.73	xygen to replicate 3 only 0.090 0.090 0.090	134 134 134 134
			Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1 Aerobic-Shallow-1	 6.01 5.67	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63 3.73 4.57	xygen to replicate 3 only 0.090 0.090 0.090 0.090	134 134
	7-Jan-21	48	Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1 Aerobic-Shallow-3	 6.01 5.67 5.95	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63 3.73 4.57 Amended with	xygen to replicate 3 only 0.090 0.090 0.090	134 134 134 134
			Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3	- 6.01 5.67 5.95 5.88	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63 3.73 4.57 Amended with 5.85	xygen to replicate 3 only 0.090 0.090 0.090 4.2 mL oxygen.	134 134 134 134 134
	7-Jan-21	48	Aerobic-Shallow-1 Aerobic-Shallow-2 Aerobic-Shallow-3 Aerobic-Shallow-1 Aerobic-Shallow-3	 6.01 5.67 5.95	7.25 Amended with 5.0 mL o 7.43 6.35 5.51 6.43 5.33 4.63 3.73 4.57 Amended with	xygen to replicate 3 only 0.090 0.090 0.090 0.090	134 134 134 134

Notes:

* Composite sample, measured wit optical DO probe, standard measurements collected using electrode DO probe **Calculated as total

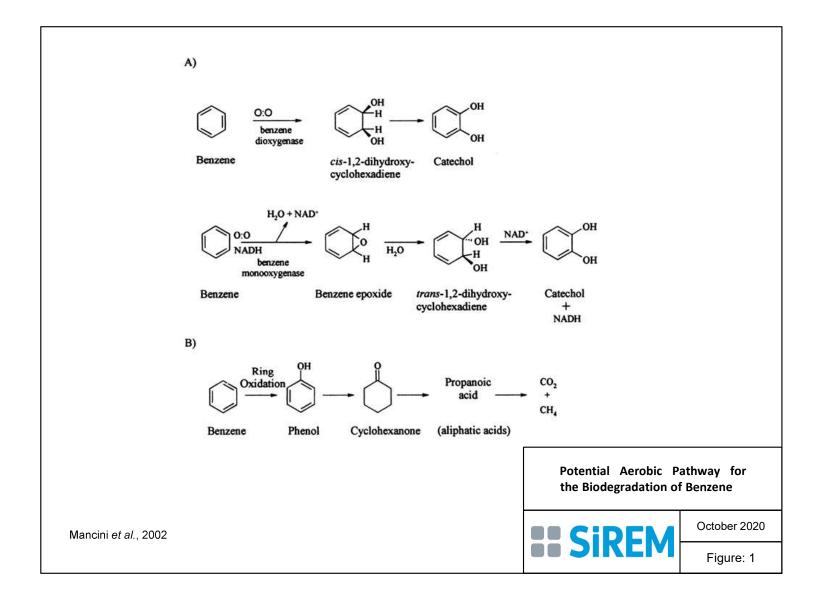
**Calculated as total grams of oxygen added per grams of total VOCs at the start of testing

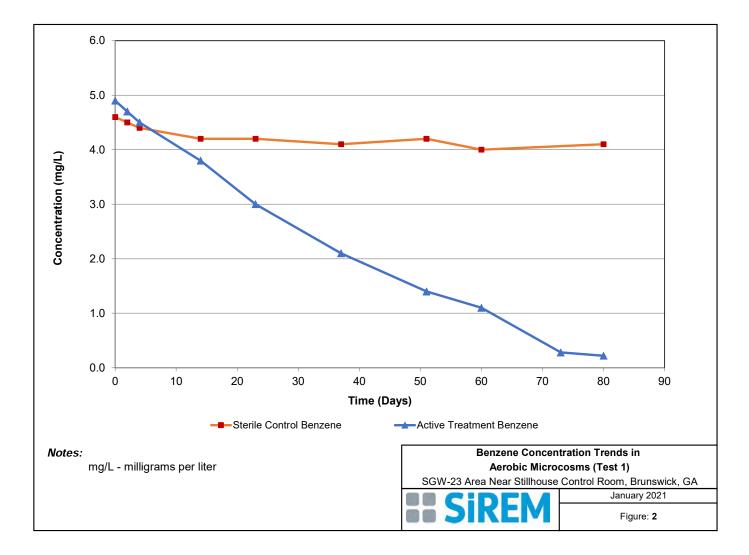
**Calculated as total grams of oxygen added per grams or total VOCs at the start of the incubation period % - percent mg O₂/g TOC - milligrams of oxygen amended to reactor per gram of organic carbon at the start of the incubation period mg O₂/g VOC - milligrams of oxygen amended to reactor per gram of total VOCs at the start of the incubation period mg/L - milliters D₂ - oxygen gas TOC - total organic carbon VOC - volatile organic compound



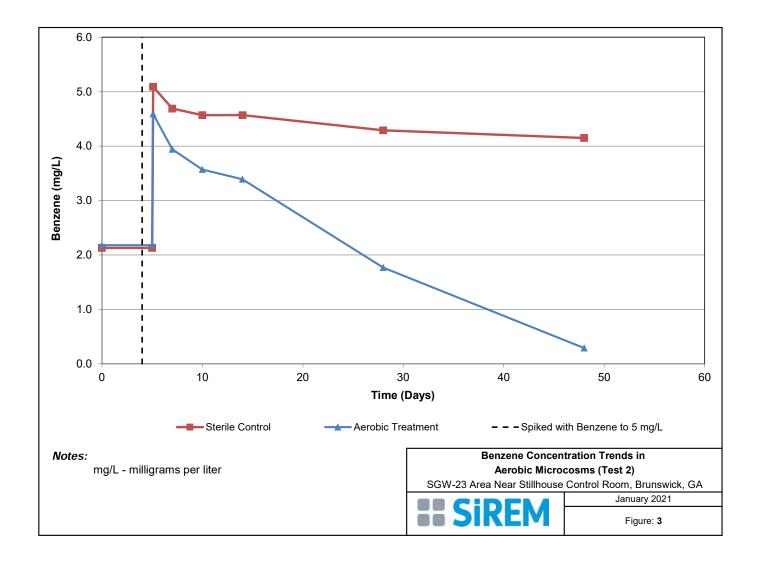
FIGURES







SiREM





APPENDIX A: Chain of Custody Documentation



SiREM

Chain-of-Custody Form

130 Stone Rd. W Guelph, ON N1G 3Z2 (519) 822-2265



Hercules brunswick	ules Brunswick "Project " GR6881C			Analysis											
*Project Manager Adria Reimer	*Company G														Preservative Key
*Emeil Address areiner @ geosyntec. Com						(ceA)					gases				0. None
Addrose (Street)						bvcA, tceA)					19 29 10				1. HCL
		water -	A			WetA				sids	carbo	2			2. Other
Kennesan GH		USU	4		DHC	FGA	DHB	DHG	SRB	tty Ac	ŋydra	y Study			3. Other
*Phone # 678-202-9500					Gene-Trac DHC	Gene-Trac FGA (vorA.	Gene-Trac DHB	Gene-Trac	Gene-Trac SRB	Volatile Fatty Acids	Dissolved hydrocarbon	Treatability			5. Other
*Sampler's *Sampler's I Signature Name	rinted Var	dos T	Jahr	1	Gene	Gene	Gene	Gene	Gene	Volat	Disso	Treat			6. Other
Client Sample ID		Time	Matrix	# of Containers											Other Information
Pinoua MPE (2-5')	2/18/20	1400	50	1								X			Recovery = 12"
PINCUCI MPE (5-10')	2/18/20	_	SO									X			Recavery = 18"
Pinova MPE (2-5')	2/18/20	1.	SO	1								X			Recaron = Z ft.
PINONG MAE (6-8')	418/20	1410	SO	1	-							X			Receivery = 4ft (10)
PINOVA MPE (8-10)	4/18/20	1410	SO	1								x			Recovery = 4ft (20
Pinaua PZ-1 (Z-5')	2/18/20	1420	50	1								X			Recovery = 2ft
Pinova PZ-1 (5-10')		1420	SO									X			Recovery = 18"
				0	2	ł									
				12	4			5		2/19	100				
							Ļ								
P.O. # Bitling information	Turnar	around Time Requested Cooler Co			Condition: For Lab Use Only								For Lab Use Only		
*Bill To:		ormal 🗍					_ (-	_						
		ush		Cooler Te	mpera	ture:		3	POC	-					
				Custody	Seals:	Y	es 🗌	P	10 0)					
		ï											Pr	oposal #: .	
Signature Received By: Signature Taylow K		F	tellnquish	ed By:	si	ignature	Rec	elved B	y:		Signat		linquish	ied By:	Received By: Signature
Printed Rich Morray Printed Name		Printed Name			Pri	inted Ime					Printed				Printed Name
Firm George has fire Firm		Firm			Fir	m					Firm				Firm
Date/Ime 2/19/2020 /730 Date/Time		Date/Time			Da	Date/Time				Date/Time				Date/Time	

.

Distribution: Write - return to Originator: Yellow - Lab Copy: Pink - Retained by Client
* Mandalory Fields

SiREM

Chain-of-Custody Form

5718

Sire	M			Cha	n-of-Cl stremla			Forn	n						Gue	130 Stone Rd, W Hph, ON NIG 322 (519) 822-2265
*Project Name		6	R.688	/c												
*Project Name Hercules	Brunswick	*Project #	78-20	52-9	5000						Anal	ysis				
Adria Ki	emer	*Company G	eosunt	eC												
A	1					-	(Ce A)	1					┝━─┞			Preservative Key 0. None
*Email Address <u>Are:mer-log</u> Address (Street) ELSS 1255	Roberts Blod.						bvcA 1					on gases				1. HCL
City Kennesaw	Roberts Blud, state/Province GA	Co	ountry 301	421		5	A [verA.	6	0		(cids	ocarby	, p			2. Other
*Phone # 678-20	2-9500			(/		ac DH	ac FG	ac DH	BC DH	ac SR	Fatty /	d hydr	lity Stu			3. Other
*Sampler's Signature R.Q. v.	A *Sampler's Name	Printed Pa	ch Mu	Tay		Gene-Trac DHC	Gene-Trac FGA (vorA, bvcA, tceA)	Gene-Trac DHB	Gene-Trac DHG	Gene-Trac SRB	Volatile Fatty Acids	Dissolved hydrocarbon	Treatability Study			5. Other
Client Sa	ample ID		pling Time	Matrix	# of Containers									_		Other Information
MPE W	Well	2/20/2020	1400	WG	4								8			4×2-L Bottles
MPE w	CC D												\sim			176 - potries
		_				_										
		-						_								
						-										
P.O. # Billing in	Iformation	Turnarou	und Time Re	quested	Cooler Cor			For L	ab Use (Dnly					b Use Only	
		No.	rmat 🗍		Cobler Cor	iaition:	(Sc	00	2					• • • • • • • • •	
Bill To:		Rus			Cooler Ten	peratu	ire:	\$	200	-				1		
					Custody Se	als.	Ye	s 🗌	Ng	A				-		
														Propos	ust di-	
Relinquished By:	Received By: Signature	2	Relignature	elinquished	l Øy:	Sigr	nature	Rece	lved By:		1	Signatur		quished B		Received By: Signature
inted Rich Morcay	Name OFF	ooli Pri	inted			Print	ed e	1	-	-		Printed				Printed
10/10 hozo . 1700	fim SUEN	Fin		-		Firm		-	-			Firm		-	-	Name Firm
2/20 hozo . 1700	Feb 24	01.3	te/Time			Date,	/Time				(Date/Tim	8			Date/Time

Distribution. White - return to Originator: Yellow - Lab Copy: Pink - Retained by Client • Mandatory Fields



APPENDIX B: Henry's Law Calculation





The following Henry's Law calculation was used to convert SiREM aqueous concentrations to total mmoles of each analyte per microcosm bottle:

$$Total \ mmoles = \frac{C_{liq} \cdot (V_{liq} + H \cdot V_{gas})}{Molecular \ Weight \ \left(\frac{mg}{mmol}\right)}$$

Where for the study:

$$\begin{split} &C_{liq} = liquid \text{ concentration (mg/L)} \\ &V_{liq} = liquid \text{ volume (0.18 L) per bottle} \\ &V_{gas} = headspace \text{ volume (0.04 L) per bottle} \\ &H = Henry's Law \text{ constant (dimensionless)} \end{split}$$

The Henry's Law constants used are summarized in the table below.

Analyte	Henry's Law Constant ^a (dimensionless)
Benzene	0.222
Chlorobenzene	0.161
Methane	27.27

^a Source: Montgomery, J.H. 2000. *Groundwater Chemicals Desk Reference, Third Edition.* CRC Press LLC, Boca Raton, FL.





APPENDIX C: External ALS Analytics Reports





SIREM ATTN: Sandra Dworatzek 130 Stone Road West Guelph ON N1G 3Z2 Date Received:22-JUL-20Report Date:30-JUL-20 12:06 (MT)Version:FINAL

Client Phone: 519-822-2265

Certificate of Analysis

Lab Work Order #: L2478181 Project P.O. #: NOT SUBMITTED Job Reference: C of C Numbers: Legal Site Desc:

Gayle Braun Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Environmental

www.alsglobal.com

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L2478181 CONTD.... PAGE 2 of 3 Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

Fraction Organic Carbon 0.0076 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0071 0.0010 29-JUL-20 30-JUL-20 R51711 Average Fraction Organic Carbon 0.0074 0.0010 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.73 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51711 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 R51711 Matrix: SOIL SOIL 0.0030 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0032 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 </th <th>Sample Details/Parameters</th> <th>Result</th> <th>Qualifier*</th> <th>D.L.</th> <th>Units</th> <th>Extracted</th> <th>Analyzed</th> <th>Batch</th>	Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
Organic / Inorganic Carbon 0.0073 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0076 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0071 0.0010 29-JUL-20 30-JUL-20 R51711 Average Fraction Organic Carbon 0.0071 0.0010 29-JUL-20 30-JUL-20 R51711 Average Fraction Organic Carbon 0.0074 0.0010 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.0074 0.0010 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.773 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.771 0.10 % 29-JUL-20 30-JUL-20 R51711 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 Matrix: SOIL SOIL Solut-20 R51711 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon	Sampled By: J. WEBB on 21-JUL-20 @ 16:00							
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Fraction Organic Carbon 0.0076 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0071 0.0010 29-JUL-20 30-JUL-20 R51711 Average Fraction Organic Carbon 0.0074 0.0010 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.73 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51711 Total Organic Carbon 0.71 0.10 % 29-JUL-20 30-JUL-20 R51711 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 Matrix: SOIL SOIL Solution 29-JUL-20 30-JUL-20 R51711 Drganic / Inorganic Carbon 0.0030 0.0010 29-JUL-20 30-JUL-20 R51711 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51711<		0.0073		0.0010		29-JUL-20	30-JUL-20	R5171964
Average Fraction Organic Carbon 0.0074 0.0010 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.73 0.10 % 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.71 0.10 % 29-JUL-20 30-JUL-20 R51713 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 R51713 Matrix: SOIL SOIL - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	-							R5171964
Total Organic Carbon 0.73 0.10 % 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R51713 Total Organic Carbon 0.71 0.10 % 29-JUL-20 30-JUL-20 R51713 L2478181-2 S-5734 TSB-02 30-JUL-20 @ 16:00 R51713 R51713 R51713 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 R51713 Matrix: SOIL SOIL-20 R51713 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51713 Average Fraction Organic Carbon 0.0031 0.0010 29-JUL-20	Fraction Organic Carbon	0.0071		0.0010		29-JUL-20	30-JUL-20	R5171964
Total Organic Carbon 0.76 0.10 % 29-JUL-20 30-JUL-20 R5171 Total Organic Carbon 0.71 0.10 % 29-JUL-20 30-JUL-20 R5171 L2478181-2 S-5734 TSB-02 30-JUL-20 @ 16:00 % Sampled By: J. WEBB on 21-JUL-20 @ 16:00 K5171 Matrix: SOIL SOIL SOIL Solution K5171 Organic / Inorganic Carbon 0.0030 0.0010 29-JUL-20 30-JUL-20 R5171 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Average Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Average Fraction Organic Carbon 0.30 0.10 % 29-JUL-20 30-JUL-20 R5171 Total Organic Carbon 0.31 0.10 29-JUL-20	Average Fraction Organic Carbon	0.0074		0.0010		29-JUL-20	30-JUL-20	R5171964
Total Organic Carbon 0.71 0.10 % 29-JUL-20 30-JUL-20 R5171 L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 Image: Carbon of the carbo	Total Organic Carbon	0.73		0.10	%	29-JUL-20	30-JUL-20	R5171964
L2478181-2 S-5734 TSB-02 Sampled By: J. WEBB on 21-JUL-20 @ 16:00 Matrix: SOIL Organic / Inorganic Carbon 0.0030 0.0010 29-JUL-20 30-JUL-20 R51719 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51719 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51719 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51719 Average Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R51719 Total Organic Carbon 0.30 0.10 % 29-JUL-20 30-JUL-20 R51719 Total Organic Carbon 0.31 0.10 % 29-JUL-20 30-JUL-20 R51719	-	0.76		0.10		29-JUL-20		R5171964
Sampled By: Matrix: J. WEBB on 21-JUL-20 @ 16:00 Image: Matrix: Solution Solution </td <td>Total Organic Carbon</td> <td>0.71</td> <td></td> <td>0.10</td> <td>%</td> <td>29-JUL-20</td> <td>30-JUL-20</td> <td>R5171964</td>	Total Organic Carbon	0.71		0.10	%	29-JUL-20	30-JUL-20	R5171964
Fraction Organic Carbon 0.0030 0.0010 29-JUL-20 30-JUL-20 R5171 Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Fraction Organic Carbon 0.0032 0.0010 29-JUL-20 30-JUL-20 R5171 Average Fraction Organic Carbon 0.0031 0.0010 29-JUL-20 30-JUL-20 R5171 Total Organic Carbon 0.30 0.10 % 29-JUL-20 30-JUL-20 R5171 Total Organic Carbon 0.31 0.10 % 29-JUL-20 30-JUL-20 R5171	Sampled By: J. WEBB on 21-JUL-20 @ 16:00							
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Total Organic Carbon 0.31 0.10 % 29-JUL-20 30-JUL-20 R5171		0.0031		0.0010				R5171964
								R5171964
	-							R5171964
		0.02		0.10	70	20 002 20	00 002 20	110171004

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
TOC-R511-WT	Soil	TOC & FOC-O.Reg 153/04 (July 2011)	CARTER 21.3.2

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

			Workorder:	L2478181		Report Date:	30-JUL-20		Page 1 of 2
Client:		Road West N N1G 3Z2							
Contact:	Sandra Dw								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-R511-WT		Soil							
Batch WG3372585 Total Organ			WT-TOC-CRM	93.8		%		70-130	30-JUL-20
WG3372585 Total Organ				101.3		%		80-120	30-JUL-20
Total Organ	ic Carbon			101.3		%		80-120	30-JUL-20
Total Organ	iic Carbon			101.3		%		80-120	30-JUL-20
WG3372585 Total Organ				<0.10		%		0.1	30-JUL-20

Client:	SIREM
	130 Stone Road West
	Guelph ON N1G 3Z2
Contact:	Sandra Dworatzek

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

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Undict.	Jennifer Webb & Sandra Dworatzek	······		ort - provide details bei			E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT										
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	Guelph, Ontario, N1G 3Z2 519-515-0839			jwebb@siremlab.				fy Date R									
	519-822-2265			sdworatzek@sire			<u> </u>			_	_	alysis F	eques	t			
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(lab use only)		vill appear on the report)		(dd-mmm-yy)	(hh:mm)	Sample Type	TOC										
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Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

November 25, 2020

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Brunswick Aerobic2 Pace Project No.: 50274153

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on November 24, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network: • Pace Analytical Services - Indianapolis

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

Sincerely,

Kelly M gmer

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab Jen Webb, SiREM





Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

CERTIFICATIONS

Project: Brunswick Aerobic2 Pace Project No.: 50274153

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Accreditation #: 200074 Indiana Drinking Water Laboratory #: C-49-06 Kansas/TNI Certification #: E-10177 Kentucky UST Agency Interest #: 80226 Kentucky WW Laboratory ID #: 98019 Michigan Drinking Water Laboratory #9050 Ohio VAP Certified Laboratory #: CL0065 Oklahoma Laboratory #: 9204 Texas Certification #: T104704355 West Virginia Certification #: 330 Wisconsin Laboratory #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Brunswick Aerobic2

Pace Project No.: 50274153

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50274153001	Aerobic2-BASE-1	Water	11/20/20 16:00	11/24/20 09:00
50274153002	Aerobic2-BASE-2	Water	11/20/20 16:00	11/24/20 09:00



SAMPLE ANALYTE COUNT

Project: Brunswick Aerobic2 Pace Project No.: 50274153

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50274153001	Aerobic2-BASE-1	EPA 8260	ALA	5	PASI-I
50274153002	Aerobic2-BASE-2	EPA 8260	ALA	5	PASI-I

PASI-I = Pace Analytical Services - Indianapolis



SUMMARY OF DETECTION

Project: Brunswick Aerobic2

Pace Project No.: 50274153

Lab Sample ID Method	Client Sample ID Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50274153001	Aerobic2-BASE-1					
EPA 8260 EPA 8260	Benzene p-lsopropyltoluene	1830 122J	ug/L ug/L	125 125	11/24/20 19:53 11/24/20 19:53	J
50274153002	Aerobic2-BASE-2					
EPA 8260 EPA 8260	Benzene p-Isopropyltoluene	1830 123J	ug/L ug/L	125 125	11/24/20 20:22 11/24/20 20:22	J



ANALYTICAL RESULTS

Project: Brunswick Aerobic2

Pace Project No.: 50274153

Sample: Aerobic2-BASE-1	Lab ID: 502	274153001	Collected: 11/20/2	0 16:00	Received: 1	1/24/20 09:00 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical Me	thod: EPA 82	260					
	Pace Analytic	al Services -	Indianapolis					
Benzene	1830	ug/L	125	25		11/24/20 19:53	71-43-2	
p-Isopropyltoluene	122J	ug/L	125	25		11/24/20 19:53	99-87-6	J
Surrogates								
Dibromofluoromethane (S)	103	%.	75-120	25		11/24/20 19:53	1868-53-7	D4
4-Bromofluorobenzene (S)	94	%.	85-116	25		11/24/20 19:53	460-00-4	
Toluene-d8 (S)	96	%.	83-111	25		11/24/20 19:53	2037-26-5	



ANALYTICAL RESULTS

Project: Brunswick Aerobic2

Pace Project No.: 50274153

Sample: Aerobic2-BASE-2	Lab ID:	50274153002	Collected: 11/20/2	20 16:00	Received: 11	1/24/20 09:00 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Ana	ytical Services -	Indianapolis					
Benzene	183	0 ug/L	125	25		11/24/20 20:22	71-43-2	
p-Isopropyltoluene	123	J ug/L	125	25		11/24/20 20:22	99-87-6	J
Surrogates								
Dibromofluoromethane (S)	10	3 %.	75-120	25		11/24/20 20:22	1868-53-7	D4
4-Bromofluorobenzene (S)	9	4 %.	85-116	25		11/24/20 20:22	460-00-4	
Toluene-d8 (S)	9	6 %.	83-111	25		11/24/20 20:22	2037-26-5	



QUALITY CONTROL DATA

Project:	Brunswick Aerobic	2				
Pace Project No.:	50274153					
QC Batch:	595091		Analysis Meth	nod: E	PA 8260	
QC Batch Method:	EPA 8260		Analysis Dese	cription: 8	260 MSV	
			Laboratory:	P	ace Analytical Servi	ces - Indianapol
Associated Lab Sar	nples: 50274153	001, 50274153002				
METHOD BLANK:	2745444		Matrix:	Water		
Associated Lab Sar	nples: 50274153	001, 50274153002				
			Blank	Reporting		
Parar	neter	Units	Result	Limit	Analyzed	Qualifiers
Benzene		ug/L	ND	5.0	11/24/20 15:01	
p-Isopropyltoluene		ug/L	ND	5.0	11/24/20 15:01	
4-Bromofluorobenze	ene (S)	%.	95	85-116	11/24/20 15:01	
Dibromofluorometha	ane (S)	%.	105	75-120	11/24/20 15:01	
Toluene-d8 (S)		%.	96	83-111	11/24/20 15:01	

LABORATORY CONTROL SAMPLE: 2745445

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	50	43.0	86	75-118	
p-Isopropyltoluene	ug/L	50	49.3	99	82-119	
4-Bromofluorobenzene (S)	%.			99	85-116	
Dibromofluoromethane (S)	%.			110	75-120	
Toluene-d8 (S)	%.			94	83-111	

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



QUALIFIERS

Project: Brunswick Aerobic2

Pace Project No.: 50274153

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D4 Sample was diluted due to the presence of high levels of target analytes.

J Analyte detected below the reporting limit, therefore result is an estimate. This qualifier is also used for all TICs.



50274153002

Aerobic2-BASE-2

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Pace Project No.:	Brunswick Aerobic2 50274153				
Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50274153001	Aerobic2-BASE-1	EPA 8260	595091		

595091

EPA 8260

Prace Analytical*			is a LEGAL I	DOCUMEN		uest Do		nt			LAB	JSE O	NLY- Affi	ix Work	ord				0274153	3
SiREM			Billing Info		ableca	n@sire	mlab	00		-			ALL S							
ddress: 130 Stone Rd W			m	mopuy	abiood		innab	.00	3	-	Cont	ainer	Preserva	ative Typ	be 1	5027	4153			
eport To: Michael Healey			Email To:	mheale	y@sirer	nlab.con	n												sodium hydroxide, (5) zinc ac rbic acid, (B) ammonium sulfa	
iwebb@siremlab.c	com		Site Collec	tion Info/A	Address:								(D) TSP, (L Analyse	U) Unpre			·		le/Line:	
stomer Project Name/Number: Brunswick Aerobic2				County/Canada/C		me Zone Co] PT [] MT		V ET					Analyse					Lab Si	ample Receipt Checkl dy Seals Present/Int	
none: mail:	Site/Facility ID	#:			Complian [] Yes	ce Monitori	ng?											Custo	dy Signatures Presen ctor Signature Prese es Intact	t YN NA
ollected By (print): Aichael Healey	Purchase Orde Quote #:	er #:			DW PWS DW Locat	ion Code:												Suffi	ct Bottles cient Volume es Received on Ice	Y N NA Y N NA Y N NA
bilected By (signature); Multiple Actaby ample Disposal:] Dispose as appropriate [] Return		me Day)		[Ves	ely Packed o [] No red (if appli [] No			Benzene (8260)									USDA I Sample Reside Cl St.	Headspace Acceptabl Regulated Soils es in Holding Time ual Chlorine Present rips: e pH Acceptable	Y N NA Y N NA
] Archive:] Hold:	1	xpedite Cha	rges Apply)	•	Analysis:		4()	_	and Ben									pH St: Sulfi		Y N NA
Matrix Codes (Insert in Matrix bo Product (P), Soil/Solid (SL), Oil (O									ne ar										SE ONLY:	
ustomer Sample ID	Matrix *	Comp / Grab	Compos	ted (or ite Start)		osite End	Res Cl	# of Ctns	P-Cymene										ample # / Comments: See sk	4.15
Aerobic2-BASE-1	GW	Grab	Date 20Nov	Time 16:00	Date	Time		3	X	-		-		-	-		-	00		-
Aerobic2-BASE-2	GW	Grab	20Nov	16:00				3	X									000	Transfer and the second s	
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ustomer Remarks / Special Condi	tions / Possible	Hazards:	Type of Ic	e Used:	Wet	Blue Dr	ry Ne	one		SHO	ORT HOI	DS PR	ESENT (<72 hou	rs): Y	N	N/A		Lab Sample Temperatur	e Info:
			Packing N	laterial Us	ed:				1	Lab	Trackin	g #:			-		-	-	Temp Blank Received Therm ID#: Cooler 1 Temp Upon	5
			Radchem	sample(s)	screened («	:500 cpm):	Y N	N NA		San	nples red FEDEX			ient	Courie	r Pa	ace Cou	rier	Cooler 1 Temp Upon Cooler 1 Therm Corr. Cooler 1 Corrected T	Factor: -0-1 oC
elinquished by/Company: (Signati LiCheel Healey Multi	Atta CI		e/Time: Na/29	1.6:00	-	oy/Company		ture)			Date/T	ime:		1.00	able #:	JL LAB U	JSE ON	LY	Comments:	
elinquished by/Company: (Signat		Dat	e/Time: 24.20			by/Company		ture)	l		Date/T		0900	Te	emplate elogin:				Trip Blank Received: HCL MeOH TS	Y N NA P Other
Relinquished by/Company: (Signat	ure)		e/Time:		1	by/Company	y: (Signa	ture)			Date/T	ime:		P	vi:				Non Conformance(s): YES / NO	PPage 11 of 13

ate/Time and Initials of person examining conter	115.	1* (1*	11:24:20 1405			
ourier: (Fed Ex) UPS Client Pao	USPS	6 Othe	r			
ustody Seal on Cooler/Box Present: Yes	No	(If yes)Se	ais Intact: Yes No (leave blank if no seals were pre	esent)		
	le Bags	None	Other			
hermometer: 123456 ABC(D)EF		Ice Type	: Wet Blue None			
ooler Temperature: <u>4.2/4.1°C</u>	<u></u>	If temp. is	s over 6°C or under 0°C, was the PM notified?: Yes No			
Temp should be above freezing to 6°C (Initial/Corrected)	_					
A		T	e written out in the comments section below.	1		
	Yes	No	All containers needing acid/base pres. Have been	Yes	No	N/A
re samples from West Virginia? ocument any containers out of temp.		-	CHECKED?: exceptions: VOA, coliform, LLHg, O&G, and any	_		
SDA Regulated Soils? (HI, ID, NY, WA, OR,CA, NM, TX K, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)			container with a septum cap or preserved with HCI, Circle:			
K, AR, LA, IN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		-	HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the			
			container count form			-
hort Hold Time Analysis (48 hours or less)? nalysis:				Present	Absent	N/A
nalysis.		-	Residual Chlorine Check (SVOC 625 Pest/PCB 608)		_	-
me 5035A TC placed in Freezer or Short Holds To Lab	Time:		Residual Chlorine Check (Total/Amenable/Free Cyanide)			1
ush TAT Requested (4 days or less): 2 day	-		Headspace Wisconsin Sulfide?			-
ustody Signatures Present?	-		Headspace in VOA Vials (>6mm):	-	MN 11-24-2	•
ontainers Intact?	-		Trip Blank Present?			
ample Label (IDs/Dates/Times) Match COC?:	-				-	-
cept TCs, which only require sample ID		-	Trip Blank Custody Seals?:			
tra labels on Terracore Vials? (soils only)		1		1		-

-

Page 12 of 13

Sample Line Item	WGFU	SBS DI BK Kit R	DG9H (G9H	VOA VIAL HS (>6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	AG3C	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H			Matrix	рН <2	pH >9	pH>10
1			3	1/3	1					1			D.		1						-		1.5		wt			
2			3	1/3		1																			V			
3				13		1										-									1			
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COC PAGE ____ of ____

Sample Container Count

Container Codes

Glass				Plastic / Misc.				
DG9B	40mL Na Bisulfate amber vial	AGOU	100mL unpres amber glass	BG3U	250mL Unpres Clear Glass	BP3L	J 250mL unpreserved plastic	
DG9H	40ml. HCI amber voa vial	AG1H	1L HCl amber glass	BP1A	1L NaOH, Asc Acid plastic	BP38	S 250mL H2SO4 plastic	
DG9M	40mL MeOH clear vial	AG1S	1L H2SO4 amber glass	BP1N	1L HNO3 plastic	BP32	250mL NaOH, Zn Ac plastic	
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1S	1L H2SO4 plastic			
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1U	1L unpreserved plastic	1		
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP1Z	1L NaOH, Zn, Ac	AF	Air Filter	
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2A	500mL NaOH, Asc Acid plastic	С	Air Cassettes	
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2N	500mL HNO3 plastic	R	Terra core kit	
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2O	500mL NaOH plastic	SP5T	120mL Coliform Na Thiosulfate	
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2S	500mL H2SO4 plastic	U	Summa Can	
VGFX	40mL w/hexane wipe vial	AG3C	250mL NaOH amber glass	BP2U	500mL unpreserved plastic	ZPLC	Ziploc Bag	
VSG	Headspace septa vial & HCI	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac	1		
WGKU	8oz unpreserved clear jar	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic	WT	Water	
WGFU	4oz clear soil jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	SL	Solid	
JGFU	4oz unpreserved amber wide	BG1U	1L unpreserved glass	BP3F	250mL HNO3 plastic (field	NAL	Non-aqueous liquid	
CG3H	250mL clear glass HCI	BG3H	250mL HCI Clear Glass		filtered)	WP	Wipe	

F-IN-Q-270-rev.12,11Aug2020

Page 13 of 13



Pace Analytical Services, LLC 7726 Moller Road Indianapolis, IN 46268 (317)228-3100

January 19, 2021

Steve Sande SiREM Lab 130 Stone Road W Ontario, Canada,

RE: Project: Treatability Studies Pace Project No.: 50277773

Dear Steve Sande:

Enclosed are the analytical results for sample(s) received by the laboratory on January 14, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network: • Pace Analytical Services - Indianapolis

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

Sincerely,

Kelly M gmer

Kelly Jones kelly.jones@pacelabs.com (317)228-3100 Project Manager

Enclosures

cc: Michael Healey, SiREM Lab Jen Webb, SiREM





CERTIFICATIONS

Project: Treatability Studies

Pace Project No.: 50277773

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268 Illinois Accreditation #: 200074 Indiana Drinking Water Laboratory #: C-49-06 Kansas/TNI Certification #: E-10177 Kentucky UST Agency Interest #: 80226 Kentucky WW Laboratory ID #: 98019 Michigan Drinking Water Laboratory #9050 Ohio VAP Certified Laboratory #: CL0065 Oklahoma Laboratory #: 9204 Texas Certification #: T104704355 Wisconsin Laboratory #: 999788130 USDA Soil Permit #: P330-19-00257



SAMPLE SUMMARY

Project: Treatability Studies

Pace Project No.: 50277773

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50277773001	Aerobic2-13	Water	01/13/21 16:00	01/14/21 08:50
50277773002	Aerobic2-14	Water	01/13/21 16:00	01/14/21 08:50
50277773003	Aerobic2-15	Water	01/13/21 16:00	01/14/21 08:50
50277773004	Aerobic2-16	Water	01/13/21 16:00	01/14/21 08:50
50277773005	Aerobic2-17	Water	01/13/21 16:00	01/14/21 08:50
50277773006	Aerobic2-18	Water	01/13/21 16:00	01/14/21 08:50



SAMPLE ANALYTE COUNT

Project: Treatability Studies Pace Project No.: 50277773

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50277773001	Aerobic2-13	EPA 8260	JPV	5	PASI-I
50277773002	Aerobic2-14	EPA 8260	JPV	5	PASI-I
50277773003	Aerobic2-15	EPA 8260	JPV	5	PASI-I
50277773004	Aerobic2-16	EPA 8260	JPV	5	PASI-I
50277773005	Aerobic2-17	EPA 8260	JPV	5	PASI-I
50277773006	Aerobic2-18	EPA 8260	JPV	5	PASI-I

PASI-I = Pace Analytical Services - Indianapolis



SUMMARY OF DETECTION

Project: Treatability Studies

Pace Project No.: 50277773

Lab Sample ID	Client Sample ID					
Method	Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50277773001	Aerobic2-13					
EPA 8260	Benzene	3510	ug/L	125	01/18/21 13:42	
EPA 8260	p-Isopropyltoluene	310	ug/L	25.0	01/16/21 00:53	
50277773002	Aerobic2-14					
EPA 8260	Benzene	3320	ug/L	125	01/18/21 14:15	
EPA 8260	p-Isopropyltoluene	606	ug/L	25.0	01/16/21 01:26	
50277773003	Aerobic2-15					
EPA 8260	Benzene	3450	ug/L	125	01/18/21 14:48	
EPA 8260	p-Isopropyltoluene	291	ug/L	25.0	01/16/21 01:59	
50277773004	Aerobic2-16					
EPA 8260	Benzene	12.7J	ug/L	25.0	01/16/21 02:32	
EPA 8260	p-Isopropyltoluene	5.9J	ug/L	25.0	01/16/21 02:32	
50277773005	Aerobic2-17					
EPA 8260	Benzene	37.1	ug/L	25.0	01/16/21 03:06	
EPA 8260	p-lsopropyltoluene	43.0	ug/L	25.0	01/16/21 03:06	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-13	Lab ID:	50277773001	Collected: 01/13/2	21 16:00	Received: 0	1/14/21 08:50 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	351	0 ug/L	125	25		01/18/21 13:42	71-43-2	
p-Isopropyltoluene	31	0 ug/L	25.0	5		01/16/21 00:53	99-87-6	
Surrogates								
Dibromofluoromethane (S)	94	4%.	75-120	5		01/16/21 00:53	1868-53-7	
4-Bromofluorobenzene (S)	9	1 %.	85-116	5		01/16/21 00:53	460-00-4	D4,F1
Toluene-d8 (S)	10	5%.	83-111	5		01/16/21 00:53	2037-26-5	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-14	Lab ID: 🕴	50277773002	Collected: 01/13/2	21 16:00	Received: 0	1/14/21 08:50 N	/latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical N	Method: EPA 82	:60					
	Pace Analy	rtical Services -	Indianapolis					
Benzene	3320	ug/L	125	25		01/18/21 14:15	71-43-2	
p-Isopropyltoluene	606	ug/L	25.0	5		01/16/21 01:26	99-87-6	
Surrogates								
Dibromofluoromethane (S)	92	%.	75-120	5		01/16/21 01:26	1868-53-7	
4-Bromofluorobenzene (S)	89	%.	85-116	5		01/16/21 01:26	460-00-4	D4,F1
Toluene-d8 (S)	104	%.	83-111	5		01/16/21 01:26	2037-26-5	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-15	Lab ID:	50277773003	Collected: 01/13/2	21 16:00	Received: 0	1/14/21 08:50 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical I	Method: EPA 82	260					
	Pace Analy	tical Services -	Indianapolis					
Benzene	3450) ug/L	125	25		01/18/21 14:48	71-43-2	
p-Isopropyltoluene	291	l ug/L	25.0	5		01/16/21 01:59	99-87-6	
Surrogates								
Dibromofluoromethane (S)	94	4 %.	75-120	5		01/16/21 01:59	1868-53-7	
4-Bromofluorobenzene (S)	92	2 %.	85-116	5		01/16/21 01:59	460-00-4	D4,F1
Toluene-d8 (S)	103	3 %.	83-111	5		01/16/21 01:59	2037-26-5	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-16	Lab ID: 5	0277773004	Collected: 01/13/2	1 16:00	Received: 0	1/14/21 08:50 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical M	lethod: EPA 82	:60					
	Pace Analyt	ical Services -	Indianapolis					
Benzene	12.7J	ug/L	25.0	5		01/16/21 02:32	71-43-2	
p-Isopropyltoluene	5.9J	ug/L	25.0	5		01/16/21 02:32	99-87-6	
Surrogates								
Dibromofluoromethane (S)	94	%.	75-120	5		01/16/21 02:32	1868-53-7	
4-Bromofluorobenzene (S)	91	%.	85-116	5		01/16/21 02:32	460-00-4	D3,F1
Toluene-d8 (S)	107	%.	83-111	5		01/16/21 02:32	2037-26-5	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-17	Lab ID:	50277773005	Collected: 01/13/2	21 16:00	Received: 0	1/14/21 08:50 N	Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	37.	1 ug/L	25.0	5		01/16/21 03:06	71-43-2	
p-Isopropyltoluene	43.	0 ug/L	25.0	5		01/16/21 03:06	99-87-6	
Surrogates								
Dibromofluoromethane (S)	9	4 %.	75-120	5		01/16/21 03:06	1868-53-7	
4-Bromofluorobenzene (S)	8	9 %.	85-116	5		01/16/21 03:06	460-00-4	D3,F1
Toluene-d8 (S)	10	3 %.	83-111	5		01/16/21 03:06	2037-26-5	



Project: Treatability Studies

Pace Project No.: 50277773

Sample: Aerobic2-18	Lab ID:	50277773006	Collected: 01/13/2	21 16:00	Received: 0	1/14/21 08:50 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260/5030 MSV	Analytical	Method: EPA 82	260					
	Pace Anal	ytical Services -	Indianapolis					
Benzene	NE	D ug/L	25.0	5		01/16/21 03:39	71-43-2	
p-Isopropyltoluene	NE	D ug/L	25.0	5		01/16/21 03:39	99-87-6	
Surrogates								
Dibromofluoromethane (S)	94	4%.	75-120	5		01/16/21 03:39	1868-53-7	D3,F1
4-Bromofluorobenzene (S)	89	9%.	85-116	5		01/16/21 03:39	460-00-4	
Toluene-d8 (S)	104	4%.	83-111	5		01/16/21 03:39	2037-26-5	



QUALITY CONTROL DATA

Project: Trea	tability Studies				
Pace Project No.: 5027	77773				
QC Batch: 602	2547	Analysis Meth	od: EF	PA 8260	
QC Batch Method: EP	A 8260	Analysis Desc	ription: 82	60 MSV	
		Laboratory:	Pa	ace Analytical Servi	ces - Indianapolis
Associated Lab Samples:	50277773001, 50277773	002, 50277773003, 50	277773004, 50	0277773005, 50277	7773006
METHOD BLANK: 2778	3548	Matrix: \	Water		
Associated Lab Samples:	50277773001, 50277773	002, 50277773003, 50	277773004, 50)277773005, 50277	7773006
Associated Lab Samples:	50277773001, 50277773	002, 50277773003, 50 Blank	277773004, 50 Reporting	0277773005, 50277	7773006
Associated Lab Samples: Parameter	50277773001, 50277773 Units		-	0277773005, 50277 Analyzed	7773006 Qualifiers
		Blank	Reporting	-	
Parameter	Units	Blank Result	Reporting Limit	Analyzed	
Parameter Benzene	Units ug/L ug/L	Blank Result ND	Reporting Limit 5.0	Analyzed 01/16/21 00:20	
Parameter Benzene p-Isopropyltoluene	Units ug/L ug/L S) %.	Blank Result ND ND	Reporting Limit 5.0 5.0	Analyzed 01/16/21 00:20 01/16/21 00:20	

LABORATORY CONTROL SAMPLE: 2778549

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Benzene	ug/L		50.1	100	75-118	
p-Isopropyltoluene	ug/L	50	48.7	97	82-119	
4-Bromofluorobenzene (S)	%.			93	85-116	
Dibromofluoromethane (S)	%.			97	75-120	
Toluene-d8 (S)	%.			104	83-111	

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



QUALIFIERS

Project: Treatability Studies

Pace Project No.: 50277773

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

- D3 Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
- D4 Sample was diluted due to the presence of high levels of target analytes.
- F1 The sample was analyzed at a dilution due to foaming of the sample in the purge vessel.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project:	Treatability Studies
Pace Project No.:	50277773

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50277773001	Aerobic2-13	EPA 8260	602547		
50277773002	Aerobic2-14	EPA 8260	602547		
50277773003	Aerobic2-15	EPA 8260	602547		
50277773004	Aerobic2-16	EPA 8260	602547		
50277773005	Aerobic2-17	EPA 8260	602547		
50277773006	Aerobic2-18	EPA 8260	602547		

Pace Analytical*					cal Requ						LAB USE	ONLY- Aff	ix Work-			1000	277773	w or
Company: SIREM			Billing Info			0	mlak					ALL S	HAD					
Address: 130 Stone Rd W			accou m	ntspay	ableca	n@sire	emiac	0.00	3	1	Containe	er Preserva	tive Ty	5027	7773			_
Report To: Jen Webb			Email To:	iwebb@	2) siremla	b.com			** Pr								odium hydroxide, (5) zinc ac pic acid, (B) ammonium sulfa	
Copy To: mhealey@siremla	ab com		Site Collec									e, (D) TSP, (I	J) Unprese	erved, (O) Oth	ner			ie,
Customer Project Name/Number: Brunswick Aerobic2	0.0011		State: ON /C	County/C anada/C	ity: Tir Guelph [ne Zone Co] PT [] M1				1	-	Analyse	25		ΓÎ		yline: mple Receipt Checkl y Seals Present/Int	
Phone: Email:	Site/Facility ID) #:			Compliant [] Yes	e Monitori	ing?				1					Custod Collec Bottle	y Signatures Presen tor Signature Prese s Intact	E YN NA
Collected By (print): Jen Webb	Purchase Ord Quote #:	er #:			DW PWS I DW Locat	ion Code:					. (Suffic.	t Bottles ient Volume s Received on Ice	Y N NA Y N NA Y N NA
Collected By (signature):	Turnaround D 2-day TAT		ed:)		Immediate	ely Packed [] No			(8260)				1			VOA - I USDA R	Headspace Acceptabl egulated Soils s in Holding Time	
Sample Disposal: [] Dispose as appropriate [] Return [] Archive: [] Hold:	[] 2 Day	3 Day Expedite Cha	rges Apply)	[] 5 Day	[] Yes Analysis:	red (if appl [✔] No			Benzene							Residu Cl Str Sample pH Str Sulfid	al Chlorine Present ips: pH Acceptable ips: e Present	
* Matrix Codes (Insert in Matrix bo Product (P), Soil/Solid (SL), Oil (O	ox below): Drink L), Wipe (WP),	king Water Air (AR), Ti	(DW), Grou ssue (TS), B	ind Water ioassay (B	(GW), Wast), Vapor (V),	ewater (W Other (OT	W),)		ne and								cetate Strips: E ONLY:	CEE
Customer Sample ID	Matrix *	Comp / Grab	Compos	ted (or ite Start)	-	osite End	Res Cl	# of Ctns	P-Cymene							Lab Sa	mple # / Comments:	scur
Aerobic2-13	GW	Grab	Date 13Jan21	Time 16:00	Date	Time	+	3	X			1				901		
Aerobic2-14	GW	Grab	13Jan21	16:00	1		1	3	X					0.0		CUZ	- 2/-	
Aerobic2-15	GW	Grab	13Jan21	16:00				3	X			3.00	1	-		403		
Aerobic2-16	GW	Grab	13Jan21	16:00				3	X					- 100		634	des antes	
Aerobic2-17	GW	Grab	13Jan21	16:00				3	X							ws		
Aerobic2-18	GW	Grab	13Jan21	16:00				3	X							don		
		-			-			+										
			1															_
Customer Remarks / Special Condi 3 day TAT	itions / Possible	Hazards:	Type of Ic Packing N	e Used: Naterial Us		Blue D	ry N	lone		210.00	T HOLDS	and the state	<72 hour	s): Y N	N/A		Lab Sample Temperatur Temp Blank Received Therm ID#: Cooler 1 Temp Upon	A Y N NA
			Radchem	sample(s)	screened (<	:500 cpm):	Y	N N	A		les receiv EDEX		ient (Courier	Pace Cou	urier	Cooler 1 Therm Corr. Cooler 1 Corrected To	Factor: 0.3 0
Relinquished by/Company: (Signat	ure) 2 <i>5</i> 11	12	e/Time: Nanz	1		lEx					ate/Time		-	MTJL LAI ble #: tnum:	B USE ON	ILY	Comments:	
Refinquished by/Company: (Signat		1	e/Time: 143/24	0850	Received	well	eer	son	for	æ.	$\frac{1}{13}$	240	850 Pre	nplate: login:			Trip Blank Received: HCL MeOH TS	Y N NA Other Page 15 of 17
Relinquished by/Company: (Signat	ure)	Dat	e/Time:		Received	by/Compar	iy: (Signa	ature)			Date/Time		PM PB:				Non Conformance(s): YES / NO	Page:

Are samples from West Virginia? All containers needing acid/base pres. Have been Document any containers out of temp. All containers needing acid/base pres. Have been USDA Regulated Soils? (HI, ID, NY, WA, OR,CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) Image: container with a septum cap or preserved with HCI. Short Hold Time Analysis (48 hours or less)? Image: container count form Image: container count form Short Hold Time Analysis (48 hours or less)? Image: container count form Image: container count form Time 5035A TC placed in Freezer or Short Holds To Lab Time: Residual Chlorine Check (SVOC 625 Pest/PCB 608) Image: container count form Rush TAT Requested (4 days or less): Image: container Image: container Image: container Image: container Custody Signatures Present? Image: container Image: container Image: container Image: container	Date/Time and Initials of person examining contents		MP	1/14/21 1.033			
Packing Material: Pubble Wrap Pubble Bass None Other Plastic, Absolut Mederal Medera Mederal Mederal Mederal Mederal Mederal Mederal Medera	Courier: (Fed Ex) UPS Client Pace	USPS	Othe	·			
Thermometer: 1(3) 3 4 5 6 A B C D E F Ice Type: Wet Bue None Cooler Temperature:	Custody Seal on Cooler/Box Present: Yes	No	(If yes)Se		esent)		
Cooler Temperature: 1.0 / (0: 7) If temp. is over 6°C or under 0°C, was the PM notified?: Yes No No All discrepancies will be written out in the comments section below. Yes No All discrepancies will be written out in the comments section below. Yes No All discrepancies will be written out in the comments section below. Yes No All containers needing acid/base pres. Have been CHECKED?: exceptions: VOA, coliform, LLHg, 0&G, and any Containers out of temp. USDA Regulated Soils? (Hi, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) Yes HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form Short Hold Time Analysis (48 hours or less)? Analysis: Time: Residual Chlorine Check (SVOC 625 Pest/PCB 608) Time: Residual Chlorine Check (Total/Amenable/Free Cyanide) Yes No MADENTITY of the state	Packing Material: Pubble Wrap Bubble	Bags	None	Other Plastic, Absorbant Material			
Temp should be above freezing to 6°C / (Initial/Corrected) All discrepancies will be written out in the comments section below. Yes No N/A Are samples from West Virginia? All containers needing acid/base pres. Have been CHECKED?: exceptions: VOA, coliform, LLHg, 0&G, and any container with a septum cap or preserved with HCI. Circle: Yes No N/A USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) V All container with a septum cap or preserved with HCI. Circle: V All NO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form V Short Hold Time Analysis (48 hours or less)? Time: Residual Chlorine Check (SVOC 625 Pest/PCB 608) Present Absent N/A Time 5035A TC placed in Freezer or Short Holds To Lab Time: Residual Chlorine Check (Total/Amenable/Free Cyanide) V V Rush TAT Requested (4 days or less): V Headspace Wisconsin Sulfide? V V Custody Signatures Present? V Headspace in VOA Vials (>6mm): V V	Thermometer: 1(2)3456 ABCDEF		Ice Type	Wet Blue None			
Yes No Yes No Yes No N/A Are samples from West Virginia?			If temp. is	over 6°C or under 0°C, was the PM notified?: (Yes) No	1		
Are samples from West Virginia? All containers needing acid/base pres. Have been Document any containers out of temp. All containers needing acid/base pres. Have been USDA Regulated Soils? (HI, ID, NY, WA, OR,CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) Image: Character with a septum cap or preserved with HCL. Short Hold Time Analysis (48 hours or less)? Image: Character with a septum cap or preserved with HCL. Image: Character with a septum cap or preserved with HCL. Short Hold Time Analysis (48 hours or less)? Image: Character with a septum cap or preserved with form Image: Character with a septum cap or preserved with HCL. Time S035A TC placed in Freezer or Short Holds To Lab Time: Residual Chlorine Check (SVOC 625 Pest/PCB 608) Image: Wisconsin Sulfide? Rush TAT Requested (4 days or less): Image: Character wisconsin Sulfide? Image: Character wisconsin Sulfide? Image: Character wisconsin Sulfide? Custody Signatures Present? Image: Character wisconsin Sulfide? Image: Character wisconsin Sulfide? Image: Character wisconsin Sulfide?	All	discrepar	cies will b	e written out in the comments section below.		-	
Document any containers out of temp. ✓ CHECKED?: exceptions: VOA, coliform, LLHg, 0&G, and any container with a septum cap or preserved with HCI. ✓ USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) ✓ ✓ Circle: HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form ✓ Short Hold Time Analysis (48 hours or less)? ✓ ✓ Residual Chlorine Check (SVOC 625 Pest/PCB 608) V/ ✓ Time 5035A TC placed in Freezer or Short Holds To Lab Time: Residual Chlorine Check (Total/Amenable/Free Cyanide) ✓ ✓ Rush TAT Requested (4 days or less): 2 ØA ✓ Headspace Wisconsin Sulfide? ✓ Custody Signatures Present? ✓ Headspace in VOA Vials (>6mm): ✓ ✓		Yes	No		Yes	No	N/A
USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico) container with a septum cap or preserved with HCI. Circle: HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form Short Hold Time Analysis (48 hours or less)? Analysis: me: Residual Chlorine Check (SVOC 625 Pest/PCB 608) me: Residual Chlorine Check (Total/Amenable/Free Cyanide) Meadspace Wisconsin Sulfide? V Headspace in VOA Vials (>6mm): 		product.	1				1
Analysis:	USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX,		\checkmark	Circle: HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the			
Time 5035A TC placed in Freezer or Short Holds To Lab Time: Residual Chlorine Check (Total/Amenable/Free Cyanide) V Rush TAT Requested (4 days or less): 2.D A 3DA V Headspace Wisconsin Sulfide? V Custody Signatures Present? V Headspace in VOA Vials (>6mm): V			1	Residual Chlorine Check (SVOC 625 Pest/PCB 608)	Present	<u>Absent</u>	N/A V
Rush TAT Requested (4 days or less): 2 DAY/3DAY Headspace Wisconsin Sulfide? Custody Signatures Present? V Headspace in VOA Vials (>6mm):	Time 5035A TC placed in Freezer or Short Holds To Lab ;	Time:			1		1
Custody signatures Present?		1.		Headspace Wisconsin Sulfide?			- V
	Custody Signatures Present?	\checkmark	· · · · ·	Headspace in VOA Vials (>6mm):			
Containers Intact?: V , Trip Blank Present? V	Containers Intact?:	\checkmark		Trip Blank Present?		\checkmark	
Sample Label (IDs/Dates/Times) Match COC?: Except TCs, which only require sample ID				Trip Blank Custody Seals?:			\checkmark
Extra labels on Terracore Vials? (soils only) WD	Extra labels on Terracore Vials? (soils only)	-	NO		194 141		

Page 16 of 17

Sample Line Item	WGFU	SBS DI BK Kit R	DG9H	NOA	(>6mm)	VG9U	DG9U	DG9T	AGOU	AG1H	AG1U	AG3S	AG3C	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H		1	FMatrix	рН <2	рН >9	pH>10
1			3		-																-					WT			
2			1														11									1			
3							1											-				_				11			
4																													
5					-																						1	-	
6			V																1							V			
7			-																										
8		1																			-								
9																													
10																	-					-							
11																									_				
12			1			-				1	-						-							-		1			

COC PAGE ____ of ____

Sample Container Count

Container Codes

	Glas	SS		Plastic / Misc.									
DG9B	40mL Na Bisulfate amber vial	AGOU 100mL unpres amber glass		BG3U	250mL Unpres Clear Glass	BP3L	250mL unpreserved plastic						
DG9H	40mL HCI amber voa vial	AG1H 1L HCI amber glass		BP1A	1L NaOH, Asc Acid plastic	BP3S	250mL H2SO4 plastic						
DG9M	40mL MeOH clear vial	AG1S	AG1S 1L H2SO4 amber glass		1L HNO3 plastic	BP3Z	250mL NaOH, Zn Ac plastic						
DG9P	40mL TSP amber vial	AG1T	1L Na Thiosulfate amber glass	BP1S	1L H2SO4 plastic	1							
DG9S	40mL H2SO4 amber vial	AG1U	1liter unpres amber glass	BP1U	1L unpreserved plastic	1							
DG9T	40mL Na Thio amber vial	AG2N	500mL HNO3 amber glass	BP1Z	1L NaOH, Zn, Ac	AF	Air Filter						
DG9U	40mL unpreserved amber vial	AG2S	500mL H2SO4 amber glass	BP2A	500mL NaOH, Asc Acid plastic	C	Air Cassettes						
VG9H	40mL HCI clear vial	AG2U	500mL unpres amber glass	BP2N	500mL HNO3 plastic	R	Terra core kit						
VG9T	40mL Na Thio. clear vial	AG3S	250mL H2SO4 amber glass	BP2O	500mL NaOH plastic	SP5T	120mL Coliform Na Thiosulfate						
VG9U	40mL unpreserved clear vial	AG3U	250mL unpres amber glass	BP2S	500mL H2SO4 plastic	U	Summa Can						
VGFX	GFX 40mL w/hexane wipe vial		G3C 250mL NaOH amber glass		500mL unpreserved plastic	ZPLC	Ziploc Bag						
VSG	Headspace septa vial & HCI	BG1H	1L HCI clear glass	BP2Z	500mL NaOH, Zn Ac	-							
WGKU	8oz unpreserved clear jar	BG1S	1L H2SO4 clear glass	BP3B	250mL NaOH plastic	WT	Water						
WGFU	4oz clear soil jar	BG1T	1L Na Thiosulfate clear glass	BP3N	250mL HNO3 plastic	SL	Solid						
JGFU	4oz unpreserved amber wide	BG1U	BG1U 1L unpreserved glass		250mL HNO3 plastic (field	NAL	Non-aqueous liquid						
CG3H	250mL clear glass HCI	BG3H	250mL HCI Clear Glass		filtered)	WP	Wipe	Page					

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