

August 10, 2016

Mr. Thomas Slusser, LG
North Carolina Department of Environmental Quality
Division of Waste Management,
Inactive Hazardous Sites Branch - Superfund Section
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Additional Landfill Gas Sampling
Jacksonville WWTP Landfill at Sturgeon City
Jacksonville, Onslow County, North Carolina
ID No. NONCD0000679
State Contract No. N13003S

Dear Mr. Slusser:

ATC Associates of North Carolina, P.C. (ATC) was contracted by the **North Carolina Department of Environmental Quality (NCDEQ), Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch, Pre-Regulatory Landfill Unit** to conduct subsurface investigation at the Jacksonville WWTP Landfill at Sturgeon City, Jacksonville, Onslow County, North Carolina (NONCD0000679), hereinafter referred to as the "Site". This task order involved the installation of up to 12 landfill gas probes and/or flux chambers at the Site, followed by additional screening events conducted for three consecutive months.

1.0 LANDFILL GAS PROBE INSTALLATION AND SCREENING

On May 26, 2016, under the supervision of ATC personnel, Regional Probing, Inc., attempted to install three landfill gas probes (GP-17, GP-18, and GP-19) at the site, by a track mounted geoprobe utilizing direct push technology. Prior to the installation of the gas probes, a private utility locating firm cleared the locations of all proposed gas probes and flux chambers. A hand auger was then used to clear the initial 5 ft of each borehole. Groundwater was encountered during the installation of GP-17 and GP-18 at depths of 6 ft and 4 ft, respectively. Due to shallow depth to groundwater, these borings were subsequently abandoned by a North Carolina licensed driller.

ATC personnel proceeded to install flux chambers at the proposed locations of GP-17 though GP-20 and GP-22 through GP-24. Each flux chamber was composed of stainless steel dome and equipped with Swagelok fittings. Prior to the installation of the flux chambers, a hand auger boring was advanced at each location, to a depth of 6-12 inches below ground surface (bgs). The flux chambers were then installed approximately 3 inches bgs using a bentonite seal to prevent short-circulating of air from the surface. GP-17, GP-18, and GP-19 were each installed within the waste

boundary. GP-20, GP-22, GP-23, and GP-24 were each installed just outside of the waste boundary. The locations of the flux chambers are shown in *Figure 1*. Due to an error in numbering, GP-21 was located in the next ring of sampling points which were not needed and, therefore; is not shown in *Figure 1* or in *Table 1*.

2.0 LANDFILL GAS SURVEY MAY 2016

Following the installation of the flux chambers, a landfill gas readings were collected. Landfill gas measurements of methane (% volume and % of lower explosive limit-LEL), hydrogen sulfide, oxygen, carbon dioxide, and total volatile organic compounds (parts per million-ppm) were recorded at each flux chamber location, using a Gem 2000+ and a photoionization detector (PID). A thermohygrometer was used to record temperature and pressure at least once per hour during the landfill gas survey activities. All meters used were field calibrated in the morning before work began, and bump tested periodically throughout the work day. Brief descriptions of the initial findings are provided below:

- Methane was detected in GP-17 at a concentration of 0.1% by volume, and 2.0% of methane's lower explosive limit (LEL).
- VOCs were detected in GP-17, GP-18, GP-19, GP-20, GP-22, GP-23, and GP-24 at concentrations ranging from 0.1 to 4.1 parts per million (ppm).
- CO₂ was detected in GP-17, GP-18, GP-19, GP-20, GP-22, GP-23, and GP-24 at concentrations ranging from 0.1% to 4.6% by volume.
- H₂S was not detected in any flux chamber..

3.0 LANDFILL GAS SURVEY JUNE 2016

On June 27, 2016, ATC personnel conducted a landfill gas survey at the site. Seven flux chambers (GP-17 through GP-20 and GP-22 through GP-24) were re-installed at the same locations and in the same manner as during the May 2016 event. Brief descriptions of the initial findings are provided below:

- Methane and H₂S were not detected in any flux chambers.
- VOCs were detected in GP-24 at a concentration of 0.7 ppm.
- CO₂ was detected in GP-17, GP-18, GP-19, GP-20, and GP-23 at concentrations ranging from 0.2% to 0.5% by volume.

4.0 LANDFILL GAS SURVEY JULY 2016

On July 27, 2016, ATC personnel conducted a landfill gas survey at the site. Seven flux chambers (GP-17 through GP-20 and GP-22 through GP-24) were re-installed at approximately the same locations and in the same manner as during previous events. Brief descriptions of the initial findings are provided below:

- Methane, VOCs, and H₂S were not detected in any of the flux chambers.
- CO₂ was detected in all flux chambers at concentrations ranging from 0.1% to 0.2% by volume.

Landfill gas measurements for all events are summarized in **Table 1**. Field notes and instrument calibration logs are included in **Attachment A**. The report certification is included in **Attachment B**.

Waste generated during the installation of the flux chambers were disposed of in accordance with NCDEQ guidelines. Soils recovered during the installation of the flux chambers were used as backfill material.

5.0 SOLE USE STATEMENT

This report, in accordance with the Unit's May 12, 2016 approval referencing *Task Order 679DP-13* and ATC's proposal dated May 4, 2016, is intended solely for the use of the Unit.

If you have questions or require additional information, please do not hesitate to contact our office at (919) 871-0999.

Sincerely,
ATC Associates of North Carolina, P.C.



Chris Hanley
Project Scientist



Timothy D. Grant, P.G.
Senior Project Manager

Attachments:

Table 1 – Subsurface Landfill Gas Readings

Figure 1 – Site Map

Attachment A – Field Notes and Instrument Calibration Logs

Attachment B – Certification

Table 1
Subsurface Landfill Gas Readings
Jacksonville WWTP Landfill at Sturgeon City - NONCD0000679
Jacksonville, Onslow County, North Carolina

ID#	Date	Time	VOC	CH ₄		CO ₂	O ₂	H ₂ S	
			(ppm)	%Vol	%LEL	% Vol	%Vol	ppm	µg/m ³
GP-17	5/26/2016	15:55	0.7	0.1	2.0	0.8	19.5	0	0.00
	6/27/2016	12:35	0.0	0.0	0.0	0.4	17.9	0	0.00
	7/25/2016	14:20	0.0	0.0	0.0	0.2	18.8	0	0.00
GP-18	5/26/2016	16:00	1.2	0.0	0.0	0.7	19.5	0	0.00
	6/27/2016	12:40	0.0	0.0	0.0	0.2	18.5	0	0.00
		12:42	0.0	0.0	0.0	0.2	18.5	0	0.00
7/25/2016	14:25	0.0	0.0	0.0	0.1	18.7	0	0.00	
GP-19	5/26/2016	16:04	0.2	0.0	0.0	0.4	20.0	0	0.00
	6/27/2016	12:45	0.0	0.0	0.0	0.2	18.7	0	0.00
	7/25/2016	14:30	0.0	0.0	0.0	0.2	18.6	0	0.00
GP-20	5/26/2016	11:50	0.2	0.0	0.0	3.0	17.8	0	0.00
		16:08	1.0	0.0	0.0	0.4	19.8	0	0.00
	6/27/2016	12:50	0.0	0.0	0.0	0.3	18.5	0	0.00
		13:45	0.0	0.0	0.0	0.5	19.0	0	0.00
7/25/2016	14:35	0.0	0.0	0.0	0.2	18.5	0	0.00	
GP-22	5/26/2016	11:30	0.2	0.0	0.0	0.0	21.0	0	0.00
		16:55	3.1	0.0	0.0	0.4	20.0	0	0.00
	6/27/2016	13:48	0.0	0.0	0.0	0.0	19.6	0	0.00
	7/25/2016	15:00	0.0	0.0	0.0	0.1	18.8	0	0.00
GP-23	5/26/2016	10:30	0.2	0.0	0.0	4.6	15.4	0	0.00
		17:04	1.1	0.0	0.0	0.1	20.6	0	0.00
	6/27/2016	13:50	0.0	0.0	0.0	0.2	19.6	0	0.00
	7/25/2016	14:50	0.0	0.0	0.0	0.1	19.0	0	0.00
GP-24	5/26/2016	12:05	1.8	0.0	0.0	0.1	20.6	0	0.00
	6/27/2016	13:53	0.7	0.0	0.0	0.0	19.7	0	0.00
	7/25/2016	14:40	0.0	0.0	0.0	0.1	19.0	0	0.00

CH₄ - Methane

CO₂ - Carbon dioxide

O₂ - Oxygen

H₂S - Hydrogen Sulfide

GP - Gas Probe

VOC - Volatile Organic Compounds

ppm - parts per million

% Vol - Percent by Volume

%LEL - Percent of the lower explosive limit

µg/m³ - micrograms per cubic meter of air

LEGEND:

- 
GP-17 FLUX CHAMBER
 Chamber Identification
- 
WASTE DISPOSAL AREA
- 
SLUDGE DRYING BED
- 
ELEVATED WALKWAY
- 
SWAMP/MARSH



NOTES:

TITLE FIGURE 1
 SAMPLE LOCATIONS
 REMEDIAL INVESTIGATION-DELINEATION PHASE
 JACKSONVILLE WWTP LANDFILL AT STURGEON CITY
 JACKSONVILLE, ONSLOW COUNTY, NC



ATC

ATC Associates of North Carolina, P.C.
 Raleigh, North Carolina, 27604

(919) 871-0999

CAD FILE	TASK ORDER:	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
SEE LOWER LEFT	679DP-13	AK	TG	AS SHOWN	7/2016	PRLU0679B

ATTACHMENT A
Field Notes and Instrument Calibration Documentation



①

Jacksonville 5/26/16

Chris Hanley

Comp Nobles

7:15 - load truck

Start mileage: 123693

10:00 - onsite

75° Clear sky, light breeze

Regional Rooms (Larry offer) onsite @ 10:05

TWT onsite @ 10:05 am

HASP

- locate all 12 Gas probe and

flux chambers

11:30 - Start Hand Augers, GP-18

GP-18

0' - 4' Clayey sand, light brown/light gray
asphalt debris intermixed, moist

4' - 8' Clayey sand, dark brown/dark gray,
wet @ 4' BGS

②

NOTE:

Hand Auger to 5 ft BGS

direct push to 8' BGS

water recharged to 6' BGS

after a 30 min.

12:00 - make GP-17

Hand Auger to 5 ft.

0 - 3' Clayey sand, black/dark brown
dry, Asphalt intermixed.

3 - 7 SAND, dark gray, fine grains,
wet

7 - 8 $\frac{1}{2}$ Clayey sand, dark gray,
saturated

water recharged to 6' BGS

1:00 - abandoned GP-18 & GP-17 locations
- used cuttings as backfill above
water table.

1:00 TWT offsite

1:15 - Hand Augers all GP locations to 1 ft BGS.
NO water in any GP location

(3)

Jacksonville

5/26/15
Chris Hawley
Cory Nobles

11:30 - Regional Probing

1:30 - AIC personnel

2:45 - start installing
w/ flux chambers

offsite
offsite for lunch
GP-17, GP-18, GP-19
and GP-20

3:30 - finished installing flux chambers

- Calibrate meters

- PID (miniMete 2000)

- GC 2000+

5:15 - finish LFG Readings

- NO methane in perimeter Gas probes

5:20 - start remaining probes

- measure all locations

- ~~GPS all locations~~ ~~CAP~~

- draw map with white markers

~~GPS Site Name: Jacksonville LFG~~

(4)

~~Gas Probe~~ ~~Time~~

Gas Probe	Time	VOCS (ppm)	CH ₄ (ppm)	CH ₄ %LEL	CO ₂ (ppm)	O ₂ %	H ₂ S (ppm)	Temp (°F)	Humidity (RH)	Pressure (inHg)
GP-17	3:55	0.7	00.1	00.4	00.8	19.5	0000	81.12	66.51	30.12
GP-18	4:00	1.2	00.0	00.0	00.7	19.8	0000			
GP-19	4:04	0.2	00.0	00.0	00.4	20.0	0000			
GP-20	4:08	1.0	00.0	00.0	00.4	19.8	0000			
GP-17 avg	4:11	0.6	00.1	00.3	00.9	19.5	0000			

5

Jacksonville

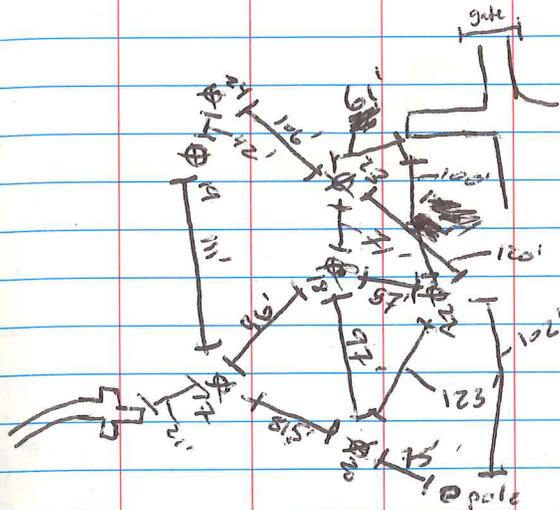
5/26/16

Gas Probe	Time	(ppm)	CH ₄ (ppm)	CH ₄ (ppm)	CO ₂ (ppm)	CO ₂ (ppm)	H ₂ S (ppm)	Temp (°F)	Humidity (RH)	Pressure (inHg)
GP-22	4:55	3.1	00.0	00.0	00.4	20.0	00.0	86.72	52.98	30.11
GP-23	5:04	1.1	00.0	00.0	00.2	20.6	00.0	-	-	-
GP-24	5:00	1.6	00.0	00.0	00.1	20.6	00.0	-	-	-
GP-22	5:05	1.8	00.0	00.0	00.5	20.0	00.0	-	-	-

Jacksonville

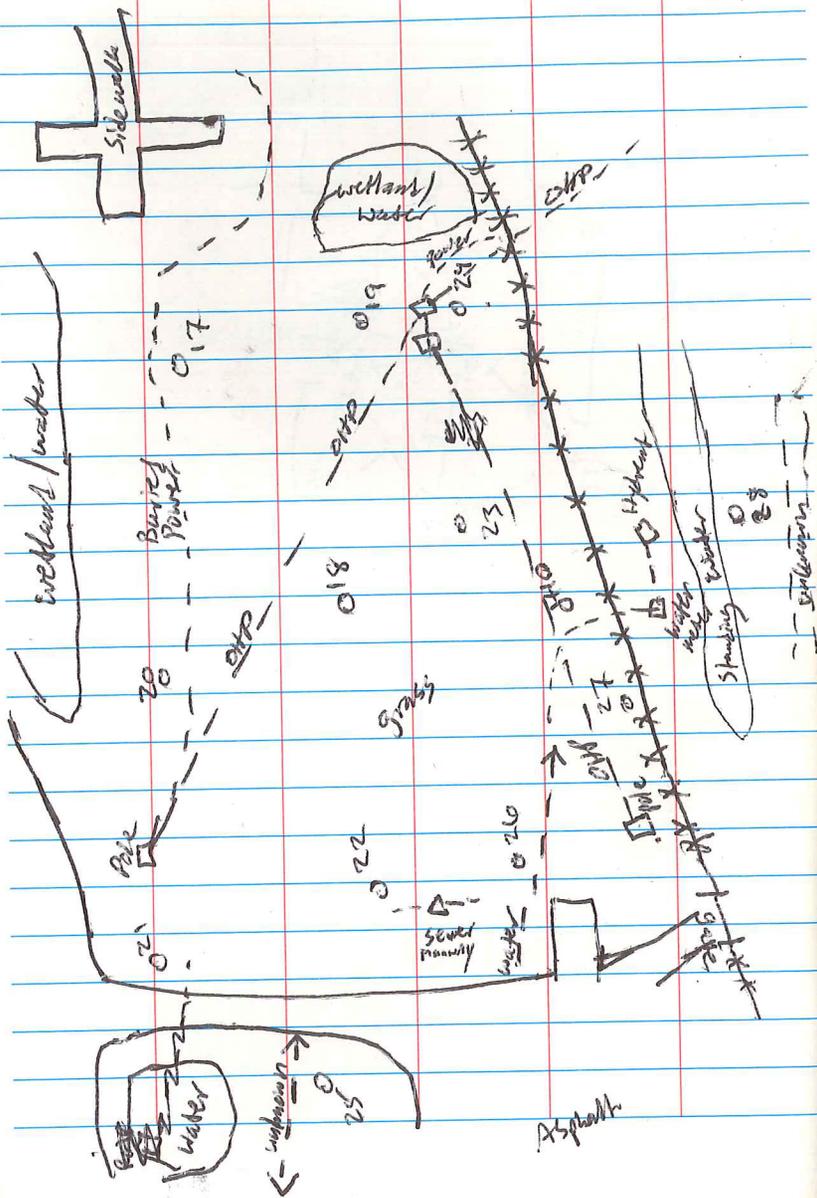
5/26/16

6



(7)

Jacksonville 5/26/16



Jacksonville

5/26/16

(8)

6:00 - offsite.

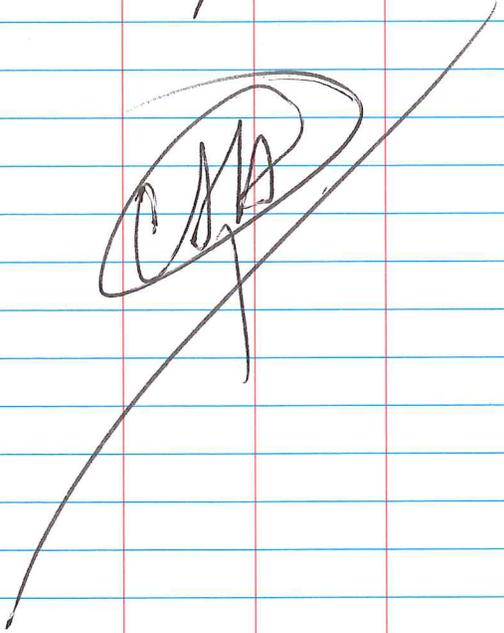
Chris Henley
Comp Notes

8:17 - at office

end mileages 173952

unload meters.

8:30 - End Day



⑨

JACKSONVILLE LF 6/27/16

BEGINNING MILEAGE 56465

OILMAST, 800F

2:00 load truck.

10:27 - onsite

CSH, RH

81°F 65% RH, Partly cloudy

- HWS

- locate points

1040' CALIBRATED GEM AND

M.W. BAR. ALL WITHIN LIMITS.

locate floor chamber locations

- W200 offsite to purchase new shovel

12:35 Start LFC readings

note - very dry soils and hard ground

13:40 finished installing second round of floor chambers

Time	(ppm) TDS	(ppm) CH ₄	(ppm) CO ₂	O ₂	H ₂ S	(°C) Temp	(RH) Humidity	(%T) Pressure
GA-1735 12:35	0.0	0.0	0.0	0.1	17.9	0000	92.0	30.2
GA-1735 12:35	0.0	0.0	0.0	0.2	18.4	0000	-	-
GA-1735 12:35	0.0	0.0	0.0	0.2	18.5	0000	-	-
GA-1735 12:35	0.0	0.0	0.0	0.2	18.7	0000	-	-
GA-1735 12:35	0.0	0.0	0.0	0.3	18.5	0000	-	-

(12)

Flux Chamber	Time (good)	True CH ₄ (good)	CH ₄ (good)	CO ₂	O ₂	H ₂ S	Temp	Humidity	pressure	PID
MS-70	1:46	00.0	00.0	0.5	19.0	0000	93.1	40.1	30.09	0.0
MS-72	1:48	00.0	00.0	0.0	19.6	0000	-	-	-	0.0
MS-73	1:50	00.0	00.0	0.2	19.6	0000	-	-	-	0.0
MS-74	1:53	00.0	00.0	0.0	19.7	000	-	-	-	0.7

Taylorville Landfill 6/27/16

(12)

1406 - Finished Flux Chamber readings.
NO methane hits.

Created GPS file: "PRM0679 Flux Chamber locations".

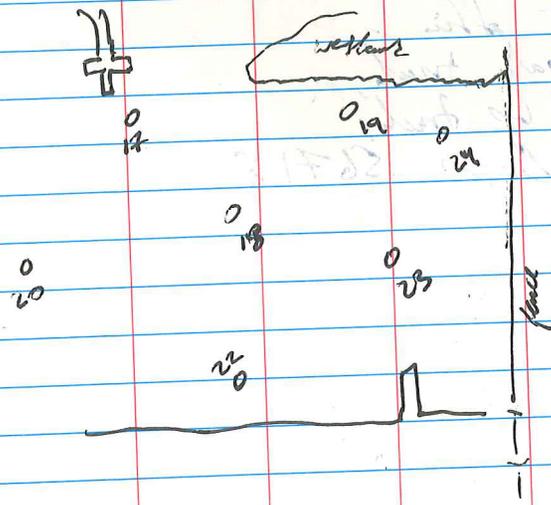
14:45 offsite

16:45 at site -
- unload truck,
- hook up truck,
GPS mileage: 56718

(13) Jackson 7/25/16
 7:00
~~7:05~~ - load Jeep
 Start mileage: 128525

- 10:50 onsite

- HWSO
- Calibrate meters
- Install 4 flux chambers



13:30 - 93°F, 53% humidity

7/25/16 (14)

Flux Chamber	Time	(So vol) Ck ₁	(So vol) Ck ₂	CO ₂	CO ₂	H ₂ S	Temp	Humid ₂	Pressure	PIS
GP-17	14:20	00.0	00.0	0.3	18.8	0	93.2	69.1	3007	0.0
GP-17 Duf	14:22	00.0	00.0	0.2	18.8	0	-	-	-	0.0
GP-18	14:26	00.0	00.0	0.1	18.7	0	-	-	-	0.0
GP-19	14:30	00.0	00.0	0.2	18.6	0	-	-	-	0.0
GP-19 Duf	14:33	00.0	00.0	0.1	18.6	0	-	-	-	0.0

Jacksonville 7/25/16

(15)

Flux Chamber	Time	% Vol CH ₄	% Vol C ₂ H ₆	CO ₂	O ₂	H ₂ S	Temp	Humidity	Pressure	(P _{atm}) PSD
GA-20	14:35	00.0	00.0	0.2	14.6	0	-	-	-	0.0
GA-204	14:40	00.0	00.0	0.1	19.0	0	91.6	770	30.24	0.0
GA-23	14:50	00.0	00.0	0.1	19.0	0	-	-	-	0.0
GA-22	15:00	00.0	00.0	0.1	18.8	0	-	-	-	0.0

Jacksonville 7/25/16

(16)

1505 - removed flux chambers
and filtration bottles

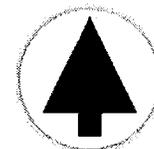
- took pics

15:30 - offsite

17:30 at office, end mileage: 128792
unload jeep
18:00 - end day

~~GA-20~~

Jacksonville
5/25/16



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 31584
Description Hanna HI 98703
Calibrated 5/20/2016 11:54:29AM

Manufacturer Hanna	State Certified
Model Number 98703	Status Pass
Serial Number/ Lot Number E0016428	Temp °C 23
Location North Carolina	Humidity % 50
Department	

Calibration Specifications

Group # 1
Group Name Turbidimeter
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
0.10 / 0.10	NTU	0.10	NTU	0.10	0.10	0.00%	Pass
15.00 / 15.00	NTU	15.00	NTU	15.00	15.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	100.00	100.00	0.00%	Pass
750.00 / 750.00	NTU	750.00	NTU	750.00	750.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date / Expiration Date</u> <u>Opened Date</u>
NC HANNA .10 NTU 5-16	NC Hanna 0.1 ntu	Hanna		sc0032/14	5/31/2016
NC HANNA 100 NTU 5/16	nc hanna 100 ntu	Hanna		SC0032/14	5/31/2016
NC HANNA 15 NTU 5/16	nc hanna 15 ntu	Hanna		SC0032/14	5/31/2016
NC HANNA 750 NTU 5/16	nc hanna 750 ntu	Hanna		SC0032/14	5/31/2016

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Brian Duke

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

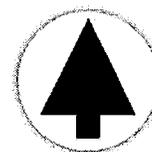
Instrument ID 31584

Description Hanna HI 98703

Calibrated 5/20/2016 11:54:29AM

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

**Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment
Please call 866-960-7463 for Technical Assistance**



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 23122
Description Myron 6P
Calibrated 5/25/2016 11:25:18AM

Manufacturer Myron	State Certified
Model Number 6P	Status Pass
Serial Number/ Lot Number 613003	Temp °C 22
Location North Carolina	Humidity % 52
Department	

Calibration Specifications

				Range Acc %			
				Reading Acc %			
				Plus/Minus			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
Group # 1				0.0000			
Group Name Conductivity				3.0000			
Stated Accy Pct of Reading				0.000			
1.413 / 1.413	ms/cm	1.413	ms/cm	1.413	1.413	0.00%	Pass
Group # 2				0.0000			
Group Name PH				3.0000			
Stated Accy Pct of Reading				0.00			
7.00 / 7.00	PH	7.00	PH	7.00	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	4.00	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.00	10.00	0.00%	Pass
Group # 3				0.0000			
Group Name Redox (ORP)				3.0000			
Stated Accy Pct of Reading				0.00			
240.00 / 240.00	mv	240.00	mv	240.00	240.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 23122
Description Myron 6P
Calibrated 5/25/2016 11:25:18AM

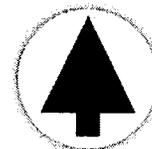
<u>Test Instruments Used During the Calibration</u>					<u>(As Of Cal Entry Date)</u>	
<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date / Opened Date</u>	<u>Next Cal Date / Expiration Date</u>
NC 1.413 COND MAR 17	NC 1.413 CONDUCTIVITY SOLUTION	AquaPhoenix Scientific	SL 20014	5AC504		3/31/2017
NC ORP LOT 4877 EXP 8/2017	NC ORP 240 mV	Hanna	SL50005-500	4877		8/30/2017
NC PH 4 5AC304 MAR 17	NC PH 4	AquaPhoenix Scientific	SL 10007	5AC304		3/31/2017
NC PH 7 5GL345 12-17	NC PH 7	GFS	SL 10004 - 32025	5GL572		12/31/2017
NC PH10 MAR 17	NC PH 10 (Lot 1007143) 12-11	AquaPhoenix Scientific	SL 10010	5AC123		3/31/2017

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Brian Duke

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment
Please call 866-960-7463 for Technical Assistance



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Pine Environmental Services, Inc.

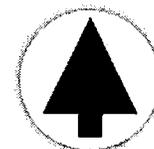
Instrument ID 13832
Description GEM 2000 +
Calibrated 5/25/2016 9:40:25AM

Manufacturer CES Landtec	State Certified
Model Number GEM2000+	Status Pass
Serial Number/ Lot Number GM11198	Temp °C 22
Location North Carolina	Humidity % 54
Department	

Calibration Specifications

				Range Acc %				
				Reading Acc %				
				Plus/Minus				
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>	
Group # 1				0.0000				
Group Name Methane				3.0000				
Stated Accy Pct of Reading				0.00				
50.00 / 50.00	%Volume	50.00	%Volume	50.00	50.00	0.00%	Pass	
Group # 2				0.0000				
Group Name Carbon Dioxide				3.0000				
Stated Accy Pct of Reading				0.00				
35.00 / 35.00	%Volume	35.00	%Volume	35.00	35.00	0.00%	Pass	
Group # 3				0.0000				
Group Name Oxygen				3.0000				
Stated Accy Pct of Reading				0.00				
20.90 / 20.90	%Volume	20.90	%Volume	20.90	20.90	0.00%	Pass	
Group # 4				0.0000				
Group Name Carbon Monoxide				3.0000				
Stated Accy Pct of Reading				0.00				
50.00 / 50.00	PPM	50.00	PPM	50.00	50.00	0.00%	Pass	
Group # 5				0.0000				
Group Name Hydrogen Sulfide				3.0000				
Stated Accy Pct of Reading				0.00				
25.00 / 25.00	PPM	25.00	PPM	25.00	25.00	0.00%	Pass	

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 13832
Description GEM 2000 +
Calibrated 5/25/2016 9:40:25AM

Test Instruments Used During the Calibration				(As Of Cal Entry Date)	
Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Expiration Date
					Last Cal Date/ Opened Date
NC 4 GAS 50-50-25-20.9 1-20-18	NC 4 GAS MIX LOT IAM-412-15	Gasco	GP 12089 -- 31523	KAP-412-13	1/20/2018
NC 50 CH4/35 CO2--MAP-399- 51-20-	NC 50 CH4/35 CO2	Gasco	GP 12115 -- 31803	MAP-399-5	1/20/2020

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Brian Duke

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment
Please call 866-960-7463 for Technical Assistance



ORDER CONFIRMATION

RENTAL

Pine Environmental Services LLC
8411 Garvey Drive, Suite 113
Raleigh, NC - 27616
Main: (919) 713-0008 Toll Free: (866) 646-7463
Fax: (919) 878-1122
www.pine-environmental.com

Order Date
05/23/16
Ship Date
05/25/16
Begin Date
05/26/16

Order #
C108067
Requested Date
052516
Requested Time

Customer
ATC Group Services LLC
2725 E Millbrook Rd., Suite 121
RALEIGH, NC - 27604
United States

Ship To
ATC Group Services LLC
2725 East Millbrook Rd.
Suite 121
RALEIGH, NC - 27604
United States
Attn: Tim Grant
Phone: 919-740-0172

Prepared By
Brandi Payne

Email: TIM.GRANT@CARDNO.COM
Project #

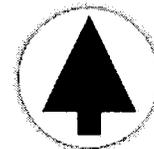
Customer #
20900016
Currency
USD US Dollar

Purchase Order #
PRLU0679B

Payment Terms
Net 30 Days
Delivery Method
Pine Driver

Ordered By
TIM GRANT
919-740-0172

Item #	Type	Description	Qty	U/M	Whse
51155	RENTAL	Landfill Meter- GEM2000 PLUS	1	EA	R41
51683	RENTAL	Myron Ultrameter II 6P (Cond/Res/TDS/pH/ORP) w/Free Chlorine	1	EA	R41
51612	RENTAL	Hanna HI 98703 Turbidity Meter	1	EA	R41



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

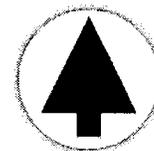
Instrument ID 13832
Description GEM 2000 +
Calibrated 6/24/2016 11:54:20AM

Manufacturer CES Landtec	State Certified
Model Number GEM2000+	Status Pass
Serial Number/ Lot Number GM11198	Temp °C 22
Location North Carolina	Humidity % 54
Department	

Calibration Specifications

				Range Acc %			
Group # 1				0.0000			
Group Name Methane				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
50.00 / 50.00	%Volume	50.00	%Volume	50.00	50.00	0.00%	Pass
Group # 2				0.0000			
Group Name Carbon Dioxide				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
35.00 / 35.00	%Volume	35.00	%Volume	35.00	35.00	0.00%	Pass
Group # 3				0.0000			
Group Name Oxygen				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
20.90 / 20.90	%Volume	20.90	%Volume	20.90	20.90	0.00%	Pass
Group # 4				0.0000			
Group Name Carbon Monoxide				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
50.00 / 50.00	PPM	50.00	PPM	50.00	50.00	0.00%	Pass
Group # 5				0.0000			
Group Name Hydrogen Sulfide				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>End As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
25.00 / 25.00	PPM	25.00	PPM	25.00	25.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 13832
Description GEM 2000 +
Calibrated 6/24/2016 11:54:20AM

<u>Test Instruments Used During the Calibration</u>					<u>(As Of Cal Entry Date)</u>	
<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date/ Opened Date</u>	<u>Next Cal Date / Expiration Date</u>
NC 4 GAS 50-50-25-20.9 1/18	NC 4 GAS MIX LOTKAP-412-13	Gasco	GP 12089 - 32211	KAP-412-13		1/20/2018
NC 50/35 KAO-399-3 EXP 10/18	NC 50 CH4/35 CO2	Calgaz	GP 12116	KA0-399-3		10/21/2018

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Joshua Ollar

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

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Please call 866-960-7463 for Technical Assistance

Mini-Rae 2000

Pine Environmental Services
8411 Garvey Drive, Suite 113
Raleigh, NC 27616

1-866-646-7463
919-713-0008

Model Number:

SERVICE

RENTAL Mini-Rae

Work Order #		Serial # / ID #	110-013775	Date Received	05-13-16
Recorded By	BD	Checked In By	BD	Return Date	05-26-16

SHIPPING ADDRESS

Company Name ATC, RALEIGH
Street Address 2725 E. MILBROOK ROAD SUITE, 121
City, State, Zip RALEIGH, NC 227604

Contact: CHRIS YOUNG
Phone: (919) 573-1192
Fax:
Cell:

CONCENTRATION RESULTS	ISO 100 PPM				
	100				

QUANTITY	PARTS LIST	ADDITIONAL INFORMATION	DATE CHECKED OUT	DATE CHECKED IN	QUANTITY CHECKED IN

Equipment Problems:

Work Performed: Cleaned & Calibrated.

Comments:

Labor @ \$70/hr	1 Hours	\$70.0
Total		\$70.0

Customer must notify PES of any defect within 24 hours of receipt of equipment
Please call 1-866-646-7463 for Technical Assistance



PINE ENVIRONMENTAL SERVICES, INC.

8411 Garvey Drive Suite 113

Raleigh, NC 27616

Phone: (919) 718-0003 or (866) 646-7463

Fax: (919) 878-1122

CERTIFICATE OF CALIBRATION

For

ATC, RALEIGH

Instrument: MINIRAE

Serial #: S/N: 110-009779

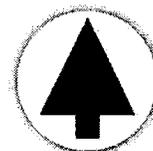
Model #: MINIRAE 2000

Date Serviced/Calibrated: 05-23-2016

Calibrated By: BRIAN DUKE

Signature: _____

All instruments are calibrated by Pine Environmental Services, Inc. according to the manufacturer's specifications. It is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

CARDNO ATC NC

Instrument ID 110-009779
Description MINIRAE 2000
Calibrated 5/23/2016

Manufacturer RAE SYSTEMS
Model Number MINIRAE 2000
Serial Number 110-009779
Location NORTH CAROLINA
Department CHRIS YOUNG

Frequency 6 Months
Status PASSED
Temp 22
Humidity 52

Calibration Specifications

Group # 1
Group Name ISOBUTYLENE
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
100.00 / 100.00	PPM	100.00	PPM	100.00	100.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

<u>Test Instrument ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date</u>	<u>Next Cal Date / Expiration Date</u>
NC ISO 100	100ppm Isobutylene	CalGaz	GP 11012 - 31721	MAP-248-100-10		1/20/2020
PPM 1-20-20						
NC ZERO AIR	NC AIR Z.G 1282374	CalGaz	GP12507 --	GAO-1-12		6/18/2018
6-18-18			31844			

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Brian Duke

Pine Environmental Services, LLC. hereby certifies that this instrument is calibrated and functions to meet the manufacturer's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

Jacksonville
7/22/16



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 33328
Description GEM 5000
Calibrated 7/22/2016 10:02:17AM

Manufacturer CES Landtec
Model Number 5000
Serial Number/ Lot Number G503201
Location North Carolina
Department

State Certified
Status Pass
Temp °C 21
Humidity % 50

Calibration Specifications

				Range Acc %	0.0000		
				Reading Acc %	3.0000		
				Plus/Minus	0.00		
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
Group # 1							
Group Name Methane							
Stated Accy Pct of Reading							
50.00 / 50.00	%Volume	50.00	%Volume	50.00	50.00	0.00%	Pass
Group # 2							
Group Name Carbon Dioxide							
Stated Accy Pct of Reading							
35.00 / 35.00	%Volume	35.00	%Volume	35.00	35.00	0.00%	Pass
Group # 3							
Group Name Oxygen							
Stated Accy Pct of Reading							
20.90 / 20.90	%Volume	20.90	%Volume	20.90	20.90	0.00%	Pass
Group # 4							
Group Name Hydrogen Sulfide							
Stated Accy Pct of Reading							
25.00 / 25.00	PPM	25.00	PPM	25.00	25.00	0.00%	Pass
Group # 5							
Group Name Carbon Monoxide							
Stated Accy Pct of Reading							
50.00 / 50.00	PPM	50.00	PPM	50.00	50.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services, LLC.

8411 Garvey Drive, Suite 113
Raleigh, NC 27614
Toll-free: (866) 646-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 33328
Description GEM 5000
Calibrated 7/22/2016 10:02:17AM

Test Instruments Used During the Calibration

<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>(As Of Cal Entry Date)</u>	
					<u>Last Cal Date/ Opened Date</u>	<u>Next Cal Date / Expiration Date</u>
NC 4 GAS KAP-412-13 EXP 1-20-18	NC 4 GAS MIX LOT CAO-412.4	Gasco	GP 12089 -- 31523	KAP-412-13		1/20/2018
NC 50/35 KAO-399-3 EXP 10/18	NC 50 CH4/35 CO2	Calgaz	GP 12116	KA0-399-3		10/21/2018

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Joshua Ollar

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ATTACHMENT B
Certification



CERTIFICATION

Document Name: Additional Landfill Gas Sampling

Site Name: Jacksonville WWTP Landfill at Sturgeon City

Site ID: NONCD0000679

Task Order: 679DP-13

I certify that, to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete.

Timothy D. Grant, P.G.
Project Manager

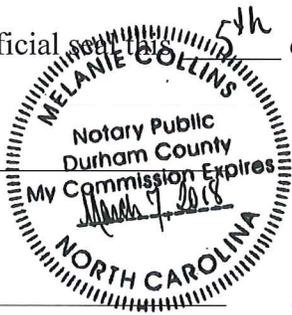
Timothy Grant
Signature

8-5-16
Date

Before me personally appeared Timothy D. Grant to me known and known to me to be the person described in and who executed the foregoing instrument, and acknowledge to and before me that Timothy D. Grant executed said instrument for the purposes therein expressed.

Witness my hand and official seal this 5th day of August, 2016.

Melanie Collins
Notary Public



March 7, 2018
My Commission Expires On

North Carolina
State Of

Durham
County Of

Official Seal