

# Buxton Environmental, Inc.

1101 South Blvd., Suite 101 ~ Charlotte, North Carolina 28203  
Phone (704) 344-1450 ~ Fax (704) 344-1451 ~ e-mail: [buxtonenv@bellsouth.net](mailto:buxtonenv@bellsouth.net)

March 14, 2013

Ms. Marcie Smith  
Gaston County Public Works  
P.O. Box 1578  
Gastonia, North Carolina 28053



**Subject:           Installation of Landfill Gas Monitor Wells at:  
                      Closed Cramerton Landfill (Permit No.: 36-01),  
                      Closed Biggerstaff Landfill (Permit No.: 36-02), and  
                      Closed Auten Landfill (Permit No.: 36-03)  
                      Gaston County, North Carolina**

Dear Ms. Smith,

Buxton Environmental, Inc. respectfully submits this report documenting the installation of landfill gas monitor wells at the closed Cramerton Landfill (Permit No.: 36-01), closed Biggerstaff Landfill (Permit No.: 36-02), and the closed Auten Landfill (Permit No.: 36-03) located in Gaston County, North Carolina. The well installation activities were conducted in general accordance with current North Carolina Department of Environment and Natural Resources, Division of Waste Management, Solid Waste Section (NCSWS) rules; the NCSWS *Landfill Gas Monitoring Guidance* dated November 2010; North Carolina Well Construction Standards (15A NCAC 02C .0100); and the *Landfill Gas Monitoring Plan Update* prepared for each landfill by CHA on November 2012, which were approved by the NCSWS. Landfill gas monitor well location maps are attached.

## **1.0    Landfill Gas Monitor Well Installation**

On February 14, 2013, Mr. Ross Klingman, P.G. (North Carolina Geologist License No.: 1266) with Buxton Environmental, Inc. conducted the oversight of the installation of a total of eight (8) shallow probe landfill gas monitor wells. Four (4) landfill gas monitor wells (SP-1, SP-2, SP-3 and SP-6) were installed at the closed Cramerton Landfill; two (2) landfill gas monitor wells (SP-1 and SP-5) were installed at the closed Biggerstaff Landfill; and two (2) landfill gas monitor wells (SP-1 and SP-3) were installed at the closed Auten Landfill. The drilling activities were conducted by Mr. John Allen (North Carolina Driller Certification No.: 4196-B) with Probe Technology, Inc. located in Concord, North Carolina. The well borings were advanced with Geoprobe® direct-push technology utilizing a continuous macro-core soil sampler (5-foot long and 3-inch outer diameter). The soil samples were logged in the field. The landfill gas monitor wells were installed to depths ranging from 14 to 15 feet below grade and were equipped with 10 foot sections of 1-inch diameter, Schedule 40, 0.01-foot mill slotted PVC well screen; an appropriate length of 1-inch diameter, Schedule 40 PVC riser pipe; with a sand pack around the screen to 1 foot above the screen; 2 feet of hydrated bentonite above the sand pack; and grout (cement and sodium bentonite) above the bentonite seal to the ground surface. The wells were completed at grade with a lockable steel stand-up cover; concrete well pad; and a permanently affixed well tag indicating the well contractor name, driller certification number, date of well completion, total depth of well, screen length and well identification number. A PVC slip-cap equipped with a Landtec GEM quick-connect valve was installed at each well head for sampling. Boring logs and Well Construction Records (Form GW-1b) are attached in Appendix A.

Ms. Smith  
March 14, 2013  
Page 2

A copy of this report should be submitted to the NCSWS within 30-days from the installation date of the wells. The top-of-casing and ground surface elevations, and the horizontal location of each well should be determined by a North Carolina Registered Land Surveyor.

The remaining dual purpose groundwater/landfill gas monitoring wells located at the closed Cramerton, Biggerstaff and Auten landfills were also equipped with PVC slip-caps and Landtec GEM quick-connect valves for sampling purposes.

If you have any further questions concerning these matters, please give me a call at (704) 344-1450.

Sincerely,  
**Buxton Environmental, Inc.**



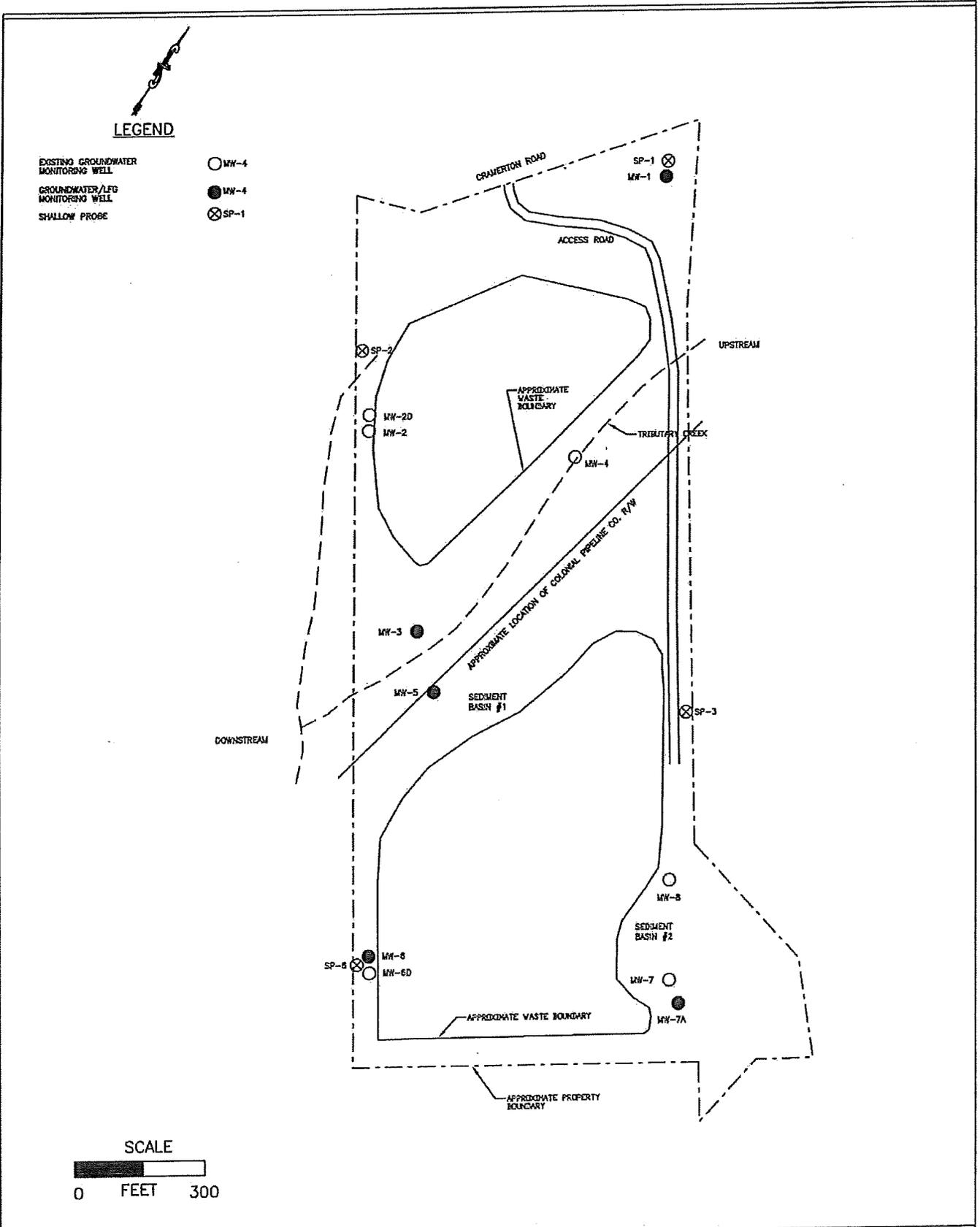
Ross Klingman, P.G.  
President



cc: Mr. Brian Wootton - NCSWS

***FIGURES***





Drawing Copyright © 2012

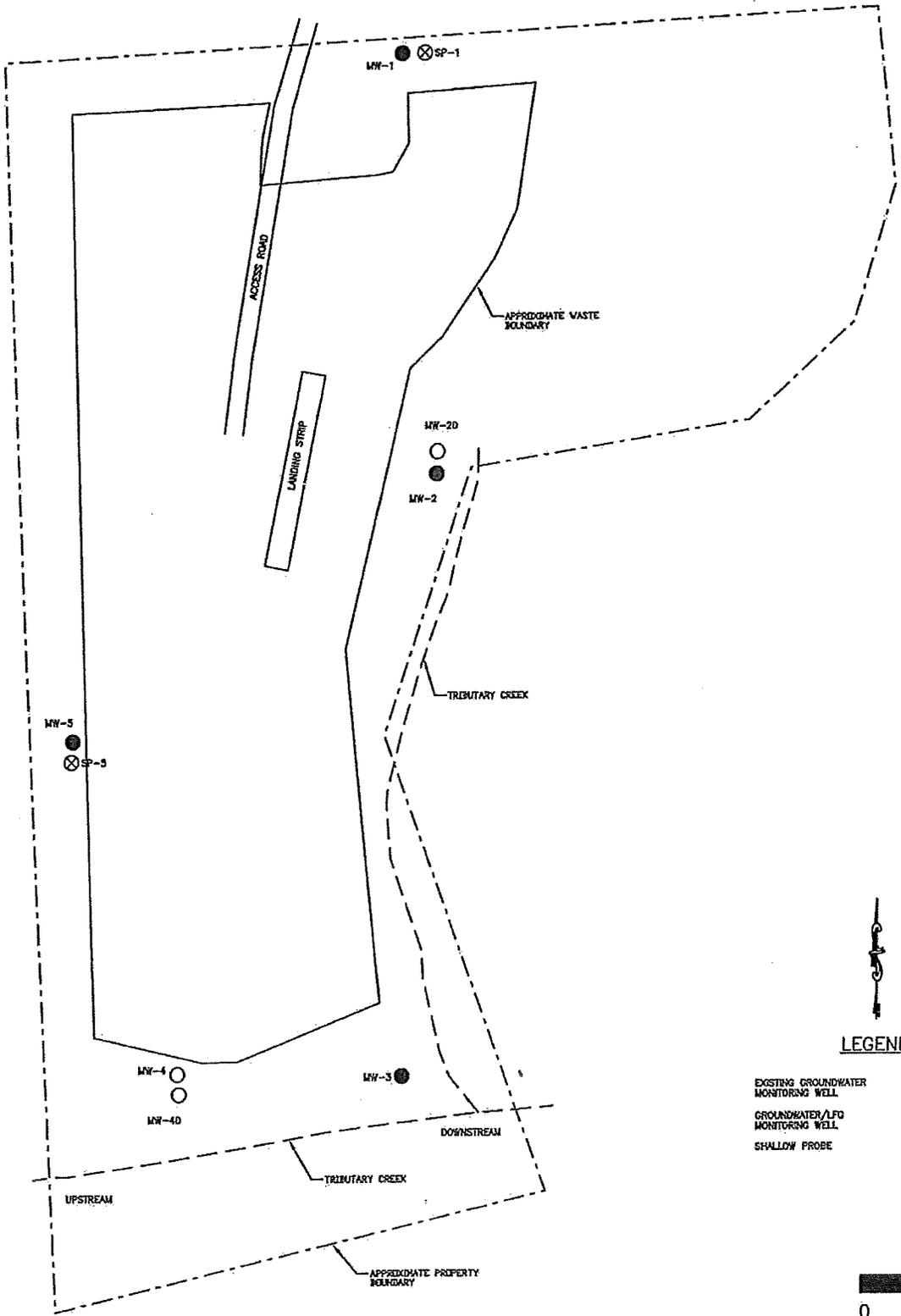
**CHIA**

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**CRAMERTON LANDFILL  
 GASTON COUNTY, NORTH CAROLINA**

**LANDFILL GAS MONITORING PLAN UPDATE**

PROJECT NO. 21420
DATE: AUGUST 2012
FIGURE 3



**LEGEND**

EXISTING GROUNDWATER MONITORING WELL	○ MW-4
GROUNDWATER/LFG MONITORING WELL	● MW-4
SHALLOW PROBE	⊗ SP-1

**SCALE**

0 FEET 300

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BIGGERSTAFF LANDFILL  
 GASTON COUNTY, NORTH CAROLINA

LANDFILL GAS MONITORING PLAN UPDATE

PROJECT NO. 21420
DATE: AUGUST 2012
FIGURE 3

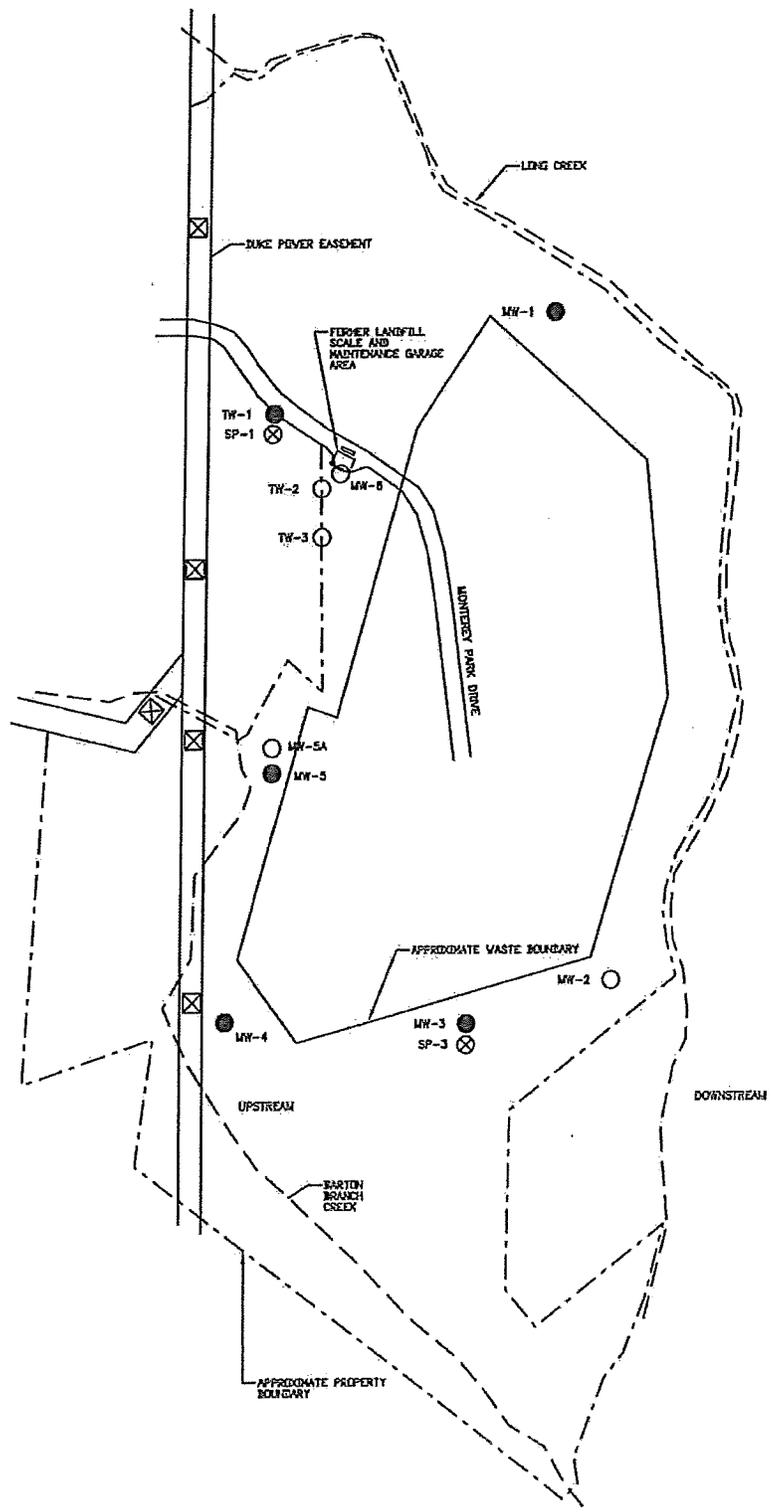
File: j:\BRAGGS\OCA\21420\LFG MONITORING PLAN UPDATES\BIGGERSTAFF LANDFILL.DWG Saved: 10/22/2012 11:16:26 AM Plotted: 10/22/2012 12:01:33 PM User: Bivins, Nathan LastSavedBy: 3763

**LEGEND**

EXISTING GROUNDWATER MONITORING WELL ○ MW-4

GROUNDWATER/LFG MONITORING WELL ● MW-4

SHALLOW FROG ☒ SP-1



**SCALE**

0 FEET 600

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AUTEN ROAD LANDFILL  
GASTON COUNTY, NORTH CAROLINA

LANDFILL GAS MONITORING PLAN UPDATE

PROJECT NO.  
21420

DATE: AUGUST 2012

FIGURE 3

***APPENDIX A***  
***BORING LOGS AND WELL CONSTRUCTION RECORDS***



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 Consulting Services  
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 Charlotte, North Carolina 28203  
 Ph (704) 344-1450 Fax (704) 344-1451  
 buxtonenv@bellsouth.net

# Boring Log, SP-1

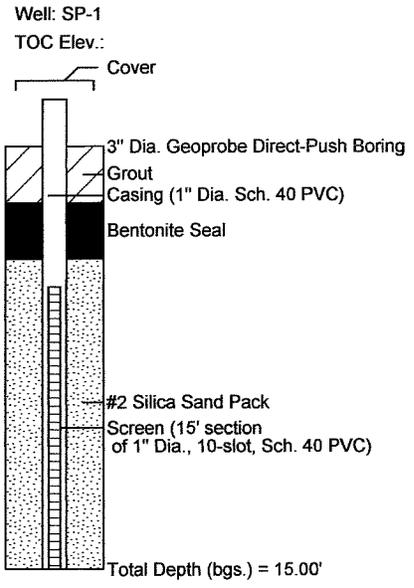
(Page 1 of 1)

Closed Cramerton Landfill  
 Cramerton Road  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type GP = continuous Geoprobe direct-push	Lithologic Description
0	GP	4		moist; red orange; fine sandy clayey silt; Soil Horizon
5	GP	1		moist; yellow orange and orange speckled; very slightly clayey fine sandy silt; Saprolite
10	GP	1		moist; yellow orange and orange speckled; very slightly clayey fine sandy silt; Saprolite
15	GP	1		moist; white and light tan speckled; silty fine to medium quartz, feldspar and mica sand; Saprolite



03-13-2013 C:\Users\Ross\Desktop\Boring\_Logs\CramSP-1.bor





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 buxtonenv@bellsouth.net

# Boring Log, SP-2

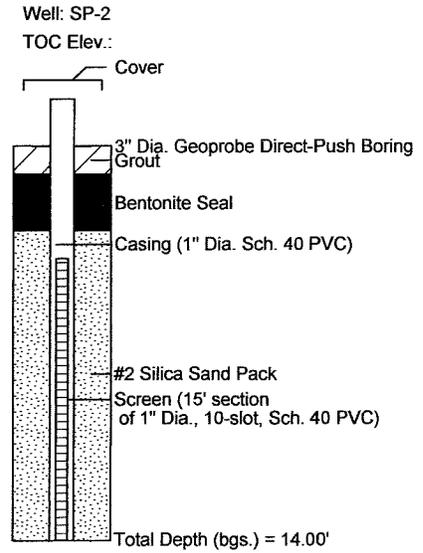
(Page 1 of 1)

Closed Cramerton Landfill  
 Cramerton Road  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type
			Lithologic Description
			GP = continuous Geoprobe direct-push
0	GP	3	moist; orange and tan mottled; silty clay; Fill
5	GP	1	wet; dark gray and black mottled; silty; fine to coarse sand; Fill
10	GP	1	moist; light gray and tan orange mottled; clayey fine to coarse quartz sand; Fluvial
15	GP	1	wet; light gray and tan orange mottled; clayey fine to coarse quartz sand; Fluvial
20			
25			
30			
35			
40			
45			





# Non Residential WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

## WELL CONTRACTOR CERTIFICATION # 4196-B

### 1. WELL CONTRACTOR:

John Allen  
Well Contractor (Individual) Name

Probe Technology, Inc.  
Well Contractor Company Name

4537 Orphanage Rd  
Street Address

Concord NC 28027  
City or Town State Zip Code

(704) 933-5538  
Area code Phone number

### 2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT# \_\_\_\_\_

OTHER ASSOCIATED PERMIT#(if applicable) \_\_\_\_\_

SITE WELL ID #(if applicable) SP-2

### 3. WELL USE (Check One Box) Monitoring Municipal/Public

Industrial/Commercial  Agricultural  Recovery  Injection

Irrigation  Other  (list use) \_\_\_\_\_

DATE DRILLED 02-14-13

### 4. WELL LOCATION:

Cramerton Landfill  
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Cramerton COUNTY Gaston

TOPOGRAPHIC / LAND SETTING: (check appropriate box)

Slope  Valley  Flat  Ridge  Other \_\_\_\_\_

LATITUDE 35 ° 14 ' 44.0000 " DMS OR 3x.xxxxxxxx DD

LONGITUDE 81 ° 5 ' 14.7000 " DMS OR 7x.xxxxxxxx DD

Latitude/longitude source:  GPS  Topographic map  
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

### 5. FACILITY (Name of the business where the well is located.)

Cramerton Landfill  
Facility Name Facility ID# (if applicable) \_\_\_\_\_

Street Address \_\_\_\_\_

NC  
City or Town State Zip Code

Ross Klinoman - Buxton Environmental  
Contact Name

PO Box 11550  
Mailing Address

Charlotte NC 28220  
City or Town State Zip Code

(704) 906-4994  
Area code Phone number

### 6. WELL DETAILS:

- a. TOTAL DEPTH: 14 ft
- b. DOES WELL REPLACE EXISTING WELL? YES  NO
- c. WATER LEVEL Below Top of Casing: \_\_\_\_\_ FT.  
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2 FT. Above Land Surface\*  
\*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): NA METHOD OF TEST none

f. DISINFECTION: Type none Amount NA

g. WATER ZONES (depth):

Top _____	Bottom _____	Top _____	Bottom _____
Top _____	Bottom _____	Top _____	Bottom _____
Top _____	Bottom _____	Top _____	Bottom _____

7. CASING: Depth	Diameter	Thickness/ Weight	Material
Top <u>+2.5</u> Bottom <u>4</u> Ft. <u>1"</u>		<u>Sch40</u>	<u>PVC</u>
Top _____ Bottom _____ Ft. _____			
Top _____ Bottom _____ Ft. _____			

8. GROUT: Depth	Material	Method
Top <u>0</u> Bottom <u>1</u> Ft. <u>concrete</u>		<u>gravity</u>
Top <u>1</u> Bottom <u>3</u> Ft. <u>bentonite</u>		<u>gravity</u>
Top _____ Bottom _____ Ft. _____		

9. SCREEN: Depth	Diameter	Slot Size	Material
Top <u>4</u> Bottom <u>14</u> Ft. <u>1"</u> in. <u>0.010</u> in. <u>PVC</u>			
Top _____ Bottom _____ Ft. _____ in. _____ in. _____			
Top _____ Bottom _____ Ft. _____ in. _____ in. _____			

10. SAND/GRAVEL PACK: Depth	Size	Material
Top <u>3</u> Bottom <u>14</u> Ft. <u>#2</u>		<u>silica sand</u>
Top _____ Bottom _____ Ft. _____		
Top _____ Bottom _____ Ft. _____		

11. DRILLING LOG	Formation Description
Top _____ Bottom _____	<u>See Geologist's log</u>
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____

12. REMARKS:

\_\_\_\_\_

\_\_\_\_\_

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO Probe Technology, Inc.

Mike Tynan DN: cn=Mike Tynan, o,ou, email=mtynan@probe-tech.com, c=US  
Date: 2013.02.22 09:42:37 -0500

SIGNATURE OF CERTIFIED WELL CONTRACTOR 2-22-13 DATE

John Allen 4196-B  
PRINTED NAME OF PERSON CONSTRUCTING THE WELL



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 buxtonenv@bellsouth.net

# Boring Log, SP-3

(Page 1 of 1)

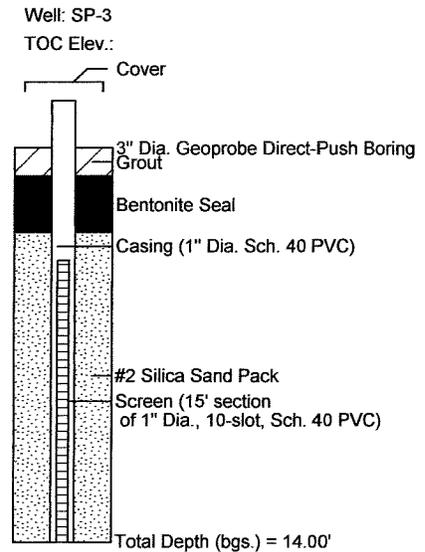
Closed Cramerton Landfill  
 Cramerton Road  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type GP = continuous Geoprobe direct-push
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Lithologic Description			
0	GP	1	moist; brown and orange mottled; silty clay; Soil Horizon
5	GP	5	moist; white, tan brown and green speckled; silty fine to medium quartz, feldspar and mica sand and sandy silt; Saprolite
10	GP	1	moist; light orange with faint 90 degree bands; silt; Saprolite
15	GP	1	moist; light orange with faint 90 degree bands; silt; refusal at 14'; Saprolite







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# Boring Log, SP-6

(Page 1 of 1)

**Closed Cramerton Landfill**  
 Cramerton Road  
 Gaston County, NC

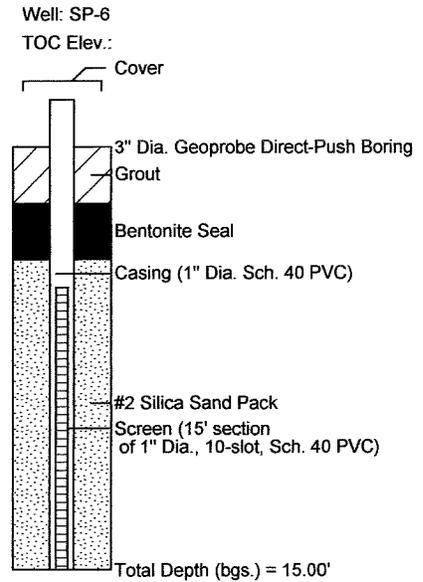
Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type GP = continuous Geoprobe direct-push
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**Lithologic Description**

0	GP	5	very moist; red orange and green gray; silty clay with gravel; Fill
5			
10	GP	1	moist; olive green and orange tan mottled with 90 degree bands; coarse silt; Saprolite
15	GP	1	moist; olive green and orange tan mottled with horizontal bands; coarse silt; Saprolite







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# Boring Log, SP-1

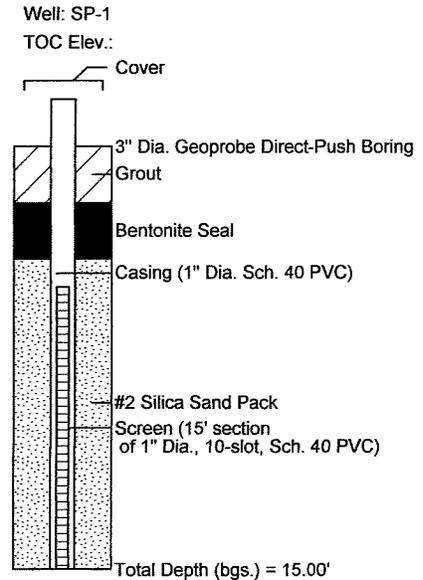
(Page 1 of 1)

Closed Biggerstaff Landfill  
 Abel Road  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type	Lithologic Description
			GP = continuous Geoprobe direct-push	
0	GP	3	moist; red orange; silty clay; Soil Horizon	
5	GP	1	moist; maroon and yellow bands at 90 degrees; silt; Saprolite	
10	GP	1	moist; maroon and yellow bands at 90 degrees; silt; Saprolite	
15	GP	1	moist; maroon and yellow bands at 90 degrees; silt; Saprolite	
20				
25				
30				
35				
40				
45				







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 buxtonenv@bellsouth.net

# Boring Log, SP-5

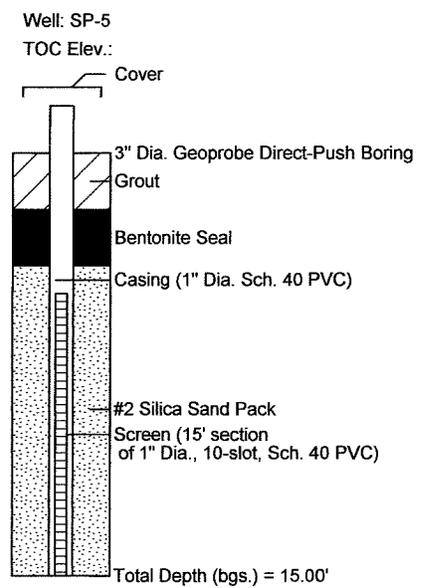
(Page 1 of 1)

**Closed Biggerstaff Landfill**  
 Abel Road  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type	Lithologic Description
			GP = continuous Geoprobe direct-push	
0	GP	5		very moist; light tan, light orange and olive mottled; fine to medium sandy clayey silt; Saprolite
5				
10	GP	1		moist; olive, white and light pink speckled with horizontal bands; silty fine to medium quartz, feldspar and mica sand; Saprolite
15	GP	1		moist; olive, white and gray speckled with horizontal bands; silty fine to medium quartz, feldspar and mica sand; Saprolite
20				
25				
30				
35				
40				
45				





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 buxtonenv@bellsouth.net

# Boring Log, SP-1

(Page 1 of 1)

Closed Auten Landfill  
 Monterey Park Drive  
 Gaston County, NC

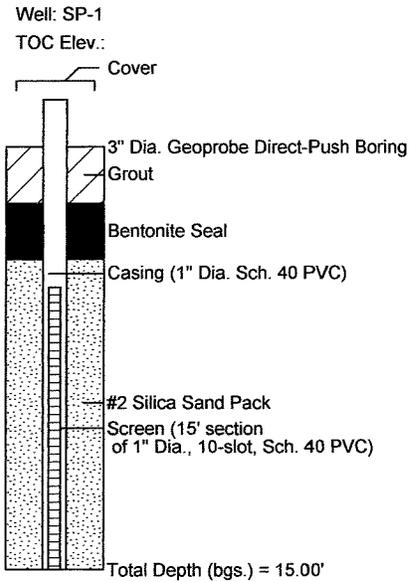
Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type GP = continuous Geoprobe direct-push
-------------------	--------------	----------------	---

### Lithologic Description

0	GP	5	moist; red orange and brown orange; fine sandy clayey silt with gravel; Fill
5			
10	GP	1	very moist; red orange with black stringers; silty clay; Fill
15	GP	1	moist; tan orange with black stringers; very fine mica sandy silt; Saprolite







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 buxtonenv@bellsouth.net

# Boring Log, SP-3

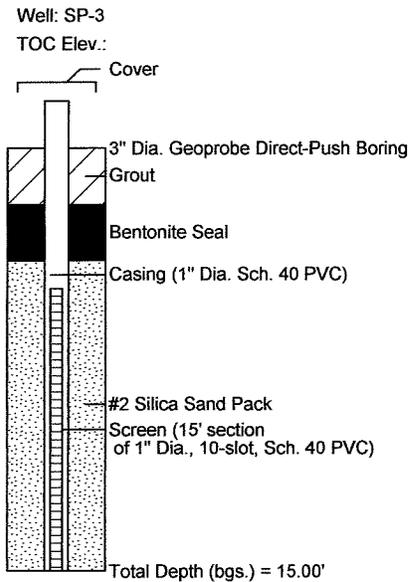
(Page 1 of 1)

Closed Auten Landfill  
 Monterey Park Drive  
 Gaston County, NC

Date Started: : 2/14/13  
 Date Completed: : 2/14/13  
 Drilling Company: : Probe Technology, Inc.  
 Drillers Name: : John Allen  
 NC Driller Certification: : 4196-B

Logged By: : Ross Klingman, P.G.  
 Drilling Method: : Geoprobe

Depth (feet bgs.)	Sampler Type	Recovery (ft.)	Sample Type	Lithologic Description
			GP = continuous Geoprobe direct-push	
0	GP	5		moist; gold brown and orange brown mottled; silty fine to coarse mica sand; Fill
5				
10	GP	1		moist; brown orange; medium to coarse feldspar and quartz sandy clayey silt; Fill
15	GP	1		moist; gray and brown mottled; fine to coarse sandy clayey silt; Fill
20				
25				
30				
35				
40				
45				





# Non RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

## WELL CONTRACTOR CERTIFICATION # 4196-B

### 1. WELL CONTRACTOR:

John Allen  
 Well Contractor (Individual) Name  
Probe Technology, Inc.  
 Well Contractor Company Name  
4537 Orphanage Rd  
 Street Address  
Concord NC 28027  
 City or Town State Zip Code  
 (704) 933-5538  
 Area code Phone number

### 2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT# \_\_\_\_\_  
 OTHER ASSOCIATED PERMIT#(if applicable) \_\_\_\_\_  
 SITE WELL ID #(if applicable) SP-33

3. WELL USE (Check One Box) Monitoring  Municipal/Public   
 Industrial/Commercial  Agricultural  Recovery  Injection   
 Irrigation  Other  (list use) \_\_\_\_\_  
 DATE DRILLED 02-14-13

### 4. WELL LOCATION:

Auten Landfill  
 (Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)  
 CITY: \_\_\_\_\_ COUNTY Gaston  
 TOPOGRAPHIC / LAND SETTING: (check appropriate box)  
 Slope  Valley  Flat  Ridge  Other \_\_\_\_\_  
 LATITUDE 35 ° 18 ' 16.7000 " DMS OR 3X.XXXXXXXXXX DD  
 LONGITUDE 81 ° 8 ' 21.3000 " DMS OR 7X.XXXXXXXXXX DD  
 Latitude/longitude source:  GPS  Topographic map  
 (location of well must be shown on a USGS topo map and attached to this form if not using GPS)

### 5. FACILITY (Name of the business where the well is located.)

Auten Landfill  
 Facility Name Facility ID# (if applicable) \_\_\_\_\_  
 Street Address \_\_\_\_\_  
 City or Town NC State Zip Code \_\_\_\_\_  
Ross Klingman - Buxton Environmental  
 Contact Name  
PO Box 11550  
 Mailing Address  
Charlotte NC 28220  
 City or Town State Zip Code

(704) 906-4994  
 Area code Phone number

### 6. WELL DETAILS:

- a. TOTAL DEPTH: 15 ft
- b. DOES WELL REPLACE EXISTING WELL? YES  NO
- c. WATER LEVEL Below Top of Casing: \_\_\_\_\_ FT.  
 (Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2 FT. Above Land Surface\*  
 \*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): NA METHOD OF TEST none

f. DISINFECTION: Type none Amount NA

g. WATER ZONES (depth):  
 Top \_\_\_\_\_ Bottom \_\_\_\_\_ Top \_\_\_\_\_ Bottom \_\_\_\_\_  
 Top \_\_\_\_\_ Bottom \_\_\_\_\_ Top \_\_\_\_\_ Bottom \_\_\_\_\_  
 Top \_\_\_\_\_ Bottom \_\_\_\_\_ Top \_\_\_\_\_ Bottom \_\_\_\_\_

7. CASING: Depth	Diameter	Thickness/Weight	Material
Top <u>+2.5</u> Bottom <u>5</u> Ft. <u>1"</u>		<u>Sch40</u>	<u>PVC</u>
Top _____ Bottom _____ Ft. _____			
Top _____ Bottom _____ Ft. _____			

8. GROUT: Depth	Material	Method
Top <u>0</u> Bottom <u>2</u> Ft. <u>concrete</u>		<u>gravity</u>
Top <u>2</u> Bottom <u>4</u> Ft. <u>bentonite</u>		<u>gravity</u>
Top _____ Bottom _____ Ft. _____		

9. SCREEN: Depth	Diameter	Slot Size	Material
Top <u>5</u> Bottom <u>15</u> Ft. <u>1"</u> in. <u>0.010</u> in.			<u>PVC</u>
Top _____ Bottom _____ Ft. _____ in. _____ in.			
Top _____ Bottom _____ Ft. _____ in. _____ in.			

10. SAND/GRAVEL PACK: Depth	Size	Material
Top <u>4</u> Bottom <u>15</u> Ft. <u>#2</u>		<u>silica sand</u>
Top _____ Bottom _____ Ft. _____		
Top _____ Bottom _____ Ft. _____		

11. DRILLING LOG	Formation Description
Top _____ Bottom _____	<u>See Geologist's log</u>
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____
_____ / _____	_____

12. REMARKS:  
 \_\_\_\_\_  
 \_\_\_\_\_

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.  
 Digitally signed by Mike Tynan  
 DN: cn=Mike Tynan, o=ou, email=mtynan@probe-tech.com, c=US  
 Date: 2013.02.22 08:58:45 -0500  
Mike Tynan 2-22-13  
 SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE  
John Allen 4196-B  
 PRINTED NAME OF PERSON CONSTRUCTING THE WELL