

File #	Date	Doc ID#
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August 19, 1999



HDR

Mr. Bobby Lutfy, Hydrogeologist
North Carolina Department of Environment
and Natural Resources
Division of Solid Waste Management
Solid Waste Section
P. O. Box 27687
Raleigh, North Carolina 27611-7687

Re: Supplemental Revisions to Revised Ground-Water Monitoring Plan
Winston-Salem Construction and Demolition Landfill (#34-12)
Forsyth County, North Carolina
HDR Project No. 00162-090-018

Dear Mr. Lutfy:

HDR Engineering, Inc. of the Carolinas (HDR) is hereby submitting, on behalf of the City of Winston-Salem Utilities Division, the enclosed attachments to be incorporated into the existing Revised Ground-Water Monitoring Plan, dated January 1996.

In response to the permitting of Phases II and III at the landfill, two previously sampled ground-water monitoring wells (MW-3 and MW-6) were abandoned as a result of being inside the proposed areas being permitted (North Carolina abandonment records are attached). Two replacement ground-water monitoring wells (MW-3R and MW-6R) were installed in accordance with the locations approved by the Solid Waste Section. An additional ground-water monitoring well (MW-8) was also installed downgradient of the proposed Phase III area of the landfill. However, this monitoring well will not be monitored and sampled on a semiannual basis until this portion of the landfill begins to receive waste. The geologists logs and monitoring well construction record drawings for each of the newly installed monitoring wells are attached to this submittal. The enclosed site plan (Drawing C-5) shows the location of all abandoned, existing, and proposed ground-water monitoring wells at the Old Salisbury Road C&D Landfill. Future semiannual, detection monitoring of the landfill will include monitoring wells MW-1R (background), MW-2R, MW-3R, MW-4R, MW-5R, MW-6R, and MW-7 for Appendix I volatile organic compounds (VOCs) and the eight RCRA metals.

HDR Engineering, Inc.
of the Carolinas

Employee-owned

Suite 1400
128 S. Tryon Street
Charlotte, North Carolina
28202-5001

Telephone
704 338-6700
Fax
704 338-6760

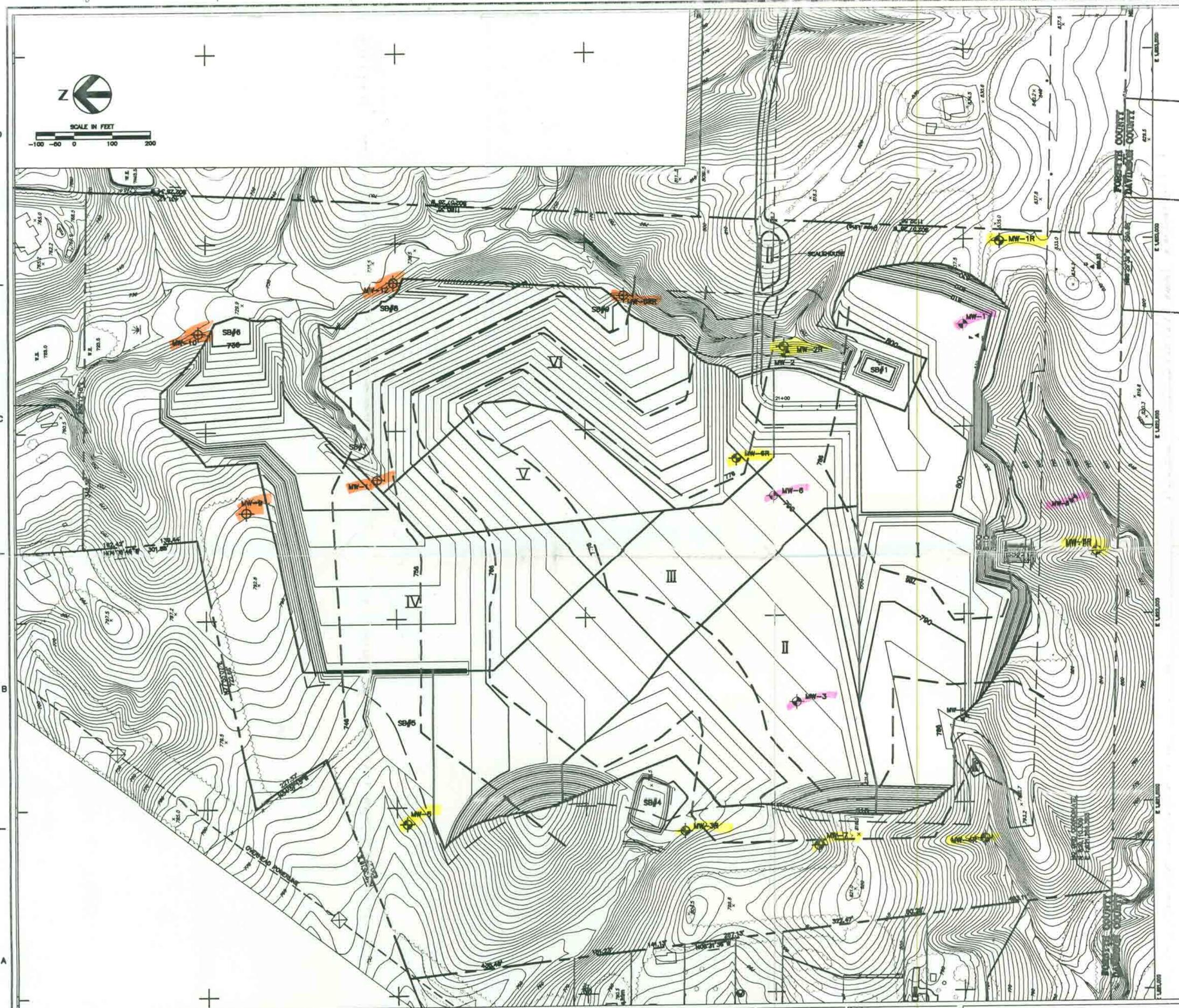


LEGEND

- 780 PROPOSED CONTOURS
- 810 EXISTING CONTOURS
- PROPERTY BOUNDARY
- COUNTY LINE
- STREAM
- POTENTIAL EXTENT OF WASTE
- PROPOSED PHASING BOUNDARY
- SEASONAL HIGH GROUND-WATER CONTOURS
- EXISTING GROUND-WATER MONITORING WELL
- PROPOSED GROUND-WATER MONITORING WELL ('R' DENOTES REPLACEMENT WELL)
- ABANDONED MONITORING WELLS
- PRIVATE WATER SUPPLY WELL
- SB#2 SEDIMENTATION BASIN

NOTES

1. TOPOGRAPHIC INFORMATION PROVIDED BY CARTOGRAPHIC AERIAL MAPPING DATED NOVEMBER 12, 1993.
2. PROPERTY SURVEY TAKEN FROM DATA SUPPLIED BY BRADY SURVEYING, INC. DATED MARCH 15, 1994.
3. THIS DRAWING SHOWS ABANDONED, EXISTING AND PROPOSED MONITORING WELLS.



HDR
 HDR Engineering, Inc.
 of the Carolinas
 Suite 1400
 128 S. Tryon Street
 Charlotte, NC 28202-8001
 (704) 336-1800

Project Manager	J.C. READING, P.E.	ISC/Project	
Designer	E.A. WRIGHT, P.E.	Designer	
Checker	J. GALL	Checker	
Date	4/18/99	GRH	
Drawn			
Checked			
Scale			
Proj. No.			

OLD SALISBURY ROAD
 CONSTRUCTION AND DEMOLITION LANDFILL
 PHASE II AND III
 CONSTRUCTION PLAN APPLICATION
 WINSTON-SALEM NORTH CAROLINA

Date	APRIL 1999	Project No.	0162-026-018	Sheet No.	C-5	Scale	1"=100'
							B

P:\MS\GIS\02-2001\1999

Project No: 00162-090-018

Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Location: Old Salisbury Road

Geologist Log B-3R (MW-3R)

Ground Elevation: 772.9' MSL

Geologist: John R. Isham, PG.



SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery			
0		Ground Surface	0							
0		RESIDUUM	773							
1		Dark to medium brown, micaceous silty clayey sand, slightly plastic, slightly moist, organics mixed, rooted.	772							
2										
3		CLAYEY SAND (SC)								
4		Orange-brown to tan, micaceous clayey sand, fine to medium-grained, some quartz granules, slightly plastic, moist.								
5				1		8	40%			Portland Type I Cement with 3% Bentonite
6										
7			7							
8			766							
9										
10										
11		SANDY CLAY (CL)		2		5	40%			3/8-inch Bentonite Chips
12		Gray, soft, plastic, micaceous, mottled with orange-brown iron oxide staining, medium to coarse-grained quartz grains, very moist.								Old Creek Deposits
13										
14										
15										
16				3		8	40%			
17			17.5							
18			755							
19										
20										Granitic Saprolite

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 7, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 776.6' MSL

Sheet: 1 of 2

Project No: 00162-090-018

Geologist Log B-3R (MW-3R)

HDR

Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Ground Elevation: 772.9' MSL

Location: Old Salisbury Road

Geologist: John R. Isham, PG.

SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery			
21		SILTY SAND (SM) Gray, white, and black, micaceous, medium-dense, fine to medium-grained, mottled with iron oxide staining, weak mineral alignment, very moist.		4		9	50%			2-inch Diameter SCH 40 PVC 0.010-inch Slots
22										
23										
24										
25										
26				5		18	50%			
27		End of Borehole	27 746							
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 7, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 776.6' MSL

Sheet: 2 of 2

Project No: 00162-090-018

Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Location: Old Salisbury Road

Geologist Log B-6R (MW-6R)

Ground Elevation: 817.8' MSL

Geologist: John R. Isham, PG.



SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery			
0		Ground Surface	0							
0		RESIDUUM	818							
1		Tan to light brown sandy loam.								
2		SANDY SILT (ML)								
3		Orange-brown, micaceous, fine-grained quartz grains, dry.	3.5							
4			814							
5										
6				1		8	60%			
7										
8										
9										
10										
11				2		7	75%			
12		SILTY SAND (SM)								
13		Tan to yellow-brown, micaceous, fine to coarse-grained quartz grains, weak mineral alignment (horizontal), iron oxide staining, mottled, dry.								
14										
15										
16				3		8	75%			
17										
18										
19										
20										

Portland Type I Cement with 3% Bentonite

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 8, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 820.4' MSL

Sheet: 1 of 3

Project No: 00162-090-018

Geologist Log B-6R (MW-6R)



Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Ground Elevation: 817.8' MSL

Location: Old Salisbury Road

Geologist: John R. Isham, PG.

SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery			
21		SILTY SAND (SM) Tan to yellow-brown, micaceous, fine to coarse-grained quartz grains, weak mineral alignment (horizontal), iron oxide staining, mottled, dry.	23 795	4		12	80%			Granitic Sapolite
22										
23										
24										
25										
26										
27										
28		SILTY SAND (SM) Same as above, becoming mixed with partially weathered rock lenses, dry.	34 784	5		15	75%		Portland Type I Cement with 3% Bentonite	
29										
30										
31										
32										
33										
34										
35		SILTY SAND w/ GRAVEL White, to light gray and tan, micaceous, mottled with iron oxide staining, fine to coarse-grained quartz, feldspar, mica, weak foliation as mineral alignment, dry.	34 784	6		27	75%			
36										
37										
38										
39										
40										

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 8, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 820.4' MSL

Sheet: 2 of 3

Project No: 00162-090-018

Geologist Log B-6R (MW-6R)



Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Ground Elevation: 817.8' MSL

Location: Old Salisbury Road

Geologist: John R. Isham, PG.

SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks	
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery				
41	[Symbol: Silty Sand w/ Gravel]	SILTY SAND w/ GRAVEL White, to light gray and tan, micaceous, mottled with iron oxide staining, fine to coarse-grained quartz, feldspar, mica, weak foliation as mineral alignment, dry.		8	[Symbol: Sand]	84	75%	[Graph: Shear strength vs depth]	[Diagram: Well casing and pack]	3/8-inch Bentonite Chips #2 Silica Sand Pack	
42											
43											
44											
45				9		90	10%				
46											
47											
48			48							Partially Weathered Rock @ 48'	
49		PWR Gray, white and tan, micaceous granite saprolite with partially weathered rock lenses, fine to coarse-grained.	770								
50											
51			51	10		90	1%			Auger Refusal @ 51'	
52			767								
53											
54											
55		PWR As above, visual identification based on cuttings from air hammer drilling from 51 to 60'.		11	G					2-inch Diameter SCH 40 PVC 0.010-inch Slots	
56					G						
57					G						
58					G						
59					G						
60			60		G						
			758								

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 8, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 820.4' MSL

Sheet: 3 of 3

Project No: 00162-090-018

Geologist Log B-8 (MW-8)



Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Ground Elevation: 759.8' MSL

Location: Old Salisbury Road

Geologist: John R. Isham, PG.

SUBSURFACE PROFILE				SAMPLE				Shear Strength				Well Data	Remarks	
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery	blows/ft						
								20	40	60	80			
0		Ground Surface	0											
0		TOPSOIL Brown silty sandy loam, rooted, organic-rich.	760											
1			1											
1			759											
2		SANDY SILT (ML) Tan to yellow-brown.												
3														
4		CLAYEY SAND (SC) Yellow-brown to tan, micaceous, fine to coarse-grained quartz grains, mottled with iron oxide staining, very moist.												
5				1	SC	24	80%							Portland Type I Cement with 3% Bentonite
6														
7														
8			8											
8			752											3/8-inch Bentonite Chips
9														
10		SANDY CLAY (CL) Gray and tan, fine to very coarse-grained quartz grains, iron oxide staining, no mica, plastic, sticky, very moist.												
11				2	CL	12	75%							Old Creek Deposits 8-23.5'
12														
13														
14			14.5											
14			745											
15														
15				3	SC	9	100%							2-inch Diameter SCH 40 PVC 0.010-inch Slots
16														
17		CLAYEY SAND (SC) Tan to yellow-brown, slightly plastic, fine to coarse-grained quartz grains, no structure, very moist to wet.												
18														
19														
20														

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 7, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 762.5' MSL

Sheet: 1 of 2

Project No: 00162-090-018

Geologist Log B-8 (MW-8)



Project: Winston-Salem C&D Landfill

Client: City of Winston-Salem

Ground Elevation: 759.8' MSL

Location: Old Salisbury Road

Geologist: John R. Isham, PG.

SUBSURFACE PROFILE				SAMPLE				Shear Strength blows/ft 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery			
21		CLAYEY GRAVEL (GM) Yellow-brown to tan, poorly graded, large angular quartz gravel, limonite staining, very wet.	21 739	4		14	100%			2-inch Diameter SCH 40 PVC 0.010-inch Slots Granitic Saprolite @ 23.5'
22		SILTY SAND (SM) Brown, white and tan, micaceous, fine to very coarse-grained quartz grains, weak horizontal mineral alignment, pegmatite zone at base, wet.	23.5 736	5		14	90%			
23										
24										
25										
26										
27		End of Borehole	27 733							
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

Drilled By: Engineering Tectonics, PA.

Drill Method: 4.25-inch ID HSA

Drill Date: July 7, 1999

HDR Engineering, Inc. of the Carolinas
128 S. Tryon Street
Suite 1400
Charlotte, NC. 28202

Hole Size 8-inch Diameter

Top-of-Casing 762.5' MSL

Sheet: 2 of 2

North Carolina
 Department of Natural Resources and Community Development
 Division of Environmental Management
 Groundwater Section
 P.O. Box 27687 - Raleigh, N.C. 27611

WELL ABANDONMENT RECORDCONTRACTOR Engineering Tectonics, PA

REG. NO.

835

1. WELL LOCATION: (Show a sketch of the location on back of form.)

Nearest Town: Old Salisbury Road Landfill County ForsythOld Salisbury Road, Winston-Salem

(Road, Community, Subdivision, Lot No.)

Quadrangle No.

2. OWNER: City of Winston-Salem

3. ADDRESS: _____

4. TOPOGRAPHY : draw, slope, hilltop, valley, flat5. USE OF WELL: monitoring DATE: 7-9-996. TOTAL DEPTH: 39.0' DIAMETER: 2.0"

7. CASING REMOVED:

feet

diameter

8. SEALING MATERIAL:

Neat cement

bags of cement _____

gals. of water _____

Sand cement

bags of cement _____

yds. of sand _____

gals. of water _____

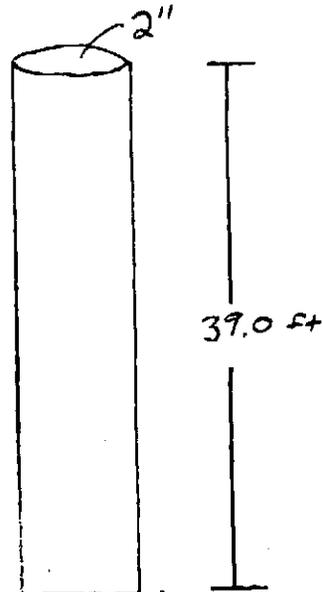
Other

Type material pumpable groutAmount 0.83 cubic feet

9. EXPLAIN METHOD EMPLACEMENT OF MATERIAL.

a grout pump

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.

MW-3

I do hereby certify that this well abandonment record is true and exact.

Signature of Contractor or Agent Mason Taylor

Date

8-3-99

WELL LOCATION:

Draw a location sketch on the reverse of this sheet, showing the direction and distance of the well to at least two (2) nearby reference points such as roads, intersections and streams. Identify roads with State Highway road identification numbers.

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the owner.

North Carolina
 Department of Natural Resources and Community Development
 Division of Environmental Management
 Groundwater Section
 P.O. Box 27687 - Raleigh, N.C. 27611

WELL ABANDONMENT RECORDCONTRACTOR Engineering Tectonics, PAREG. NO. 835

1. WELL LOCATION: (Show a sketch of the location on back of form.)

Nearest Town: Old Salisbury Road Landfill County Forsyth
Old Salisbury Road, Winston-Salem

(Road, Community, Subdivision, Lot No.)

Quadrangle No.

2. OWNER: City of Winston-Salem

3. ADDRESS: _____

4. TOPOGRAPHY: draw slope, hilltop, valley, flat5. USE OF WELL: monitoring DATE: 7-9-996. TOTAL DEPTH: 59.0' DIAMETER: 2.0"

7. CASING REMOVED:

feet

diameter

8. SEALING MATERIAL:

Neat cement
bags of cement _____Sand cement
bags of cement _____

gals. of water _____

yds. of sand _____

gals. of water _____

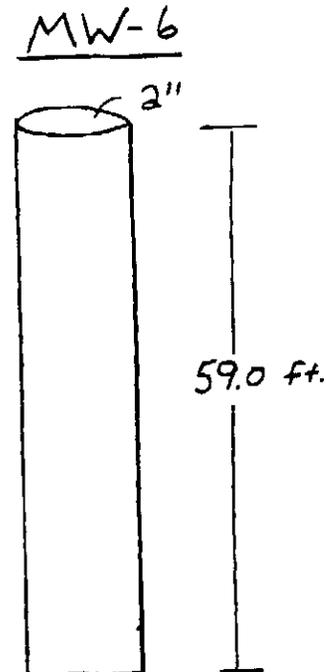
Other

Type material pumpable groutAmount 1.26 cubic feet

9. EXPLAIN METHOD EMPLACEMENT OF MATERIAL.

a grout pump

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.



I do hereby certify that this well abandonment record is true and exact.

Signature of Contractor or Agent Mark Taylor Date 8-3-99

WELL LOCATION: Draw a location sketch on the reverse of this sheet, showing the direction and distance of the well to at least two (2) nearby reference points such as roads, intersections and streams. Identify roads with State Highway road identification numbers.

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the owner.

December 16, 1994

Mr. Bobby Lutfy
Hydrogeologist
Solid Waste Section
NC, Dept. of Environment, Health & Natural Resources
512 North Salisbury Street
Raleigh, North Carolina 27604

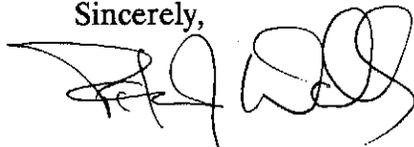
Subject: Installation of Monitoring Wells MW-10, MW-11&11D, and MW-12&12D
Piedmont Landfill and Recycling Center
Kernersville, North Carolina
RUST Job 32066.200

Dear Mr. Lutfy:

Please find three copies of the installation report for monitoring wells MW-10, MW-11&11D and MW-12&12D at the landfill. This document completes the construction of the ground water monitoring system at the site for the present permitted landfill.

If you have any questions, you can contact me at the following number (803)234-2261.

Sincerely,



Peter J. Walls, P.E., P.G.
Project Manager

cc: Ed Gibson - PLRC



MONITORING WELL INSTALLATION REPORT
PIEDMONT LANDFILL & RECYCLING CENTER
KERNERSVILLE, NORTH CAROLINA

DECEMBER 1994


LARRY A. RASBERRY
Engineer


PETER J. WALLS, P.E., P.G.
Project Manager

PREPARED BY:

RUST ENVIRONMENT & INFRASTRUCTURE INC.
GREENVILLE, SOUTH CAROLINA

December 16, 1994

Mr. Edward Gibson
Piedmont Landfill and Recycling Center
9900 Freeman Road
Kernersville, North Carolina 27284

Subject: Monitoring Well Installation Report for System Upgrade
Piedmont Landfill and Recycling Center
Kernersville, North Carolina
RUST Project No. 32066.200

Dear Mr. Gibson:

The following report describes the additional well installation for the ground-water monitoring system upgrade at the landfill. We appreciate this opportunity to work with you, and if you should have any questions please do not hesitate to call me at (803) 234-2261.

Sincerely,



Peter J. Walls, P.G., P.E.
Senior Geological Engineer

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FIGURES

1	GROUND WATER MONITORING WELL LOCATION MAP
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TABLES

1	MONITORING WELL CONSTRUCTION DETAILS
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APPENDICES

A	SOIL BORING LOGS
B	MONITORING WELL CONSTRUCTION SUMMARIES
C	MONITORING WELL COMPLETION RECORDS

1.0 INTRODUCTION

Waste Management of Carolinas, Inc. (WMCI) operates the Piedmont Landfill and Recycling Center (PLRC). PLRC is located approximately ten miles north of Kernersville, North Carolina, in the northeast corner of Forsyth County. Access to the site is by Goodwill Church - Freeman Road. The current operating landfill occupies a footprint of approximately 38 acres. This report presents the results of the installation of five additional ground-water monitoring wells for the monitoring system upgrade as per the Water Quality Monitoring Plan for the Unconstructed Portion.

2.0 OBJECTIVES AND SCOPE

The Water Quality Monitoring Plan for the Unconstructed Portion required the installation of five additional new ground-water monitoring wells, MW-10, MW-11, MW-11D, MW-12; and MW-12D. Three of the five wells were installed within 100 feet from the waste boundary, between the waste boundary and the property boundary. However, wells MW-12 and MW-12D were installed about 170 feet from the proposed waste boundary because a major roadway (Freeman Road) and drainage ditch were located within 100 feet of the waste boundary.

Three 15-foot monitoring well screens were placed at vertical locations for MW-10, MW-11 and MW-12 that would ensure that future drought conditions, which may lower the water table, would not render the monitoring system ineffective.

During October and November 1994, these the shallow monitoring wells (MW-10, MW-11, and MW-12) were installed such that screens were set 1-foot above the seasonal high water table as established in the Water Quality Monitoring Plan. The two deep wells were installed in the saprolite just above bedrock. These wells were set in the residuum/saprolite where first contamination is anticipated to be encountered.

3.0 INSTALLATION

3.1 Soil Test Boring

Standard soil test borings were drilled at the three designated monitoring locations. The soil test borings were advanced into the residuum/saprolite with a 6-1/4 and 4-1/4 inch I.D. hollow-stem augers and sampled using a split spoon sampler at 5-foot intervals. Borings MW-11 and MW-12 encountered auger refusal at 93.5-feet and 43.3 feet respectively. Drilling was stopped there and the well was set. The soil samples were logged for classification purposes. The two shallow wells were set in saprolite in adjacent borings.

3.2 Monitoring Wells

The three boring locations had five ground-water monitoring wells installed at them. The following paragraph describes the installation methods used. A summary of monitoring well construction data is presented in the table. Detailed monitoring well construction logs are included in Appendix B and state well completion records in Appendix C.

Monitoring wells were installed in accordance with the following procedures. All well screens and risers were steam cleaned and the length of each section was measured to the nearest 0.01 foot immediately prior to installation. Personnel handling well materials were required to wear new disposable latex gloves. Well screens and risers for each well consisted of 2.0-inch I.D., flush threaded, Schedule 40 polyvinyl chloride (PVC). Screens were 15 feet in length for the three shallow wells and 10 feet for the two deep wells with 0.010-inch machined slots. Filter pack material, consisting of a washed medium/fine silica sand, was installed to approximately 1-foot above the top of each well screen. Another foot of washed fine silica sand was placed above the coarser sand pack to act as a filter. Then at least a 3-foot thick bentonite pellet seal was placed above the sands and allowed to hydrate for approximately 3/4 hour. Another 6-inch layer of washed fine silica sand was placed above this bentonite seal. Because the top of screen was so shallow in MW-12, some of the minimum thicknesses had to be further reduced to construct a properly functioning monitoring well. Cement-bentonite grout was pumped via tremie pipe from the top of this upper sand layer to the ground surface. The wells were completed with 4-inch lockable

anodized-aluminum protective casings set into a 3 ft. x 3 ft. x 3 in. concrete pads with 4 protective posts.

3.3 Well Development

Each well was developed using both surging with a hand pump and a grundfos submersible pump. Development proceeded over 4 days and the total amount of water removed is recorded on the well construction logs in Appendix B. Water samples were tested periodically until the parameters stabilized within acceptable limits.

3.4 Survey

All proposed locations were staked prior to drilling and then each well was surveyed for their state grid coordinates and the top of PVC casing elevation determined using NGVD. All surveying was performed by a crew from Hugh Creed Associates.

4.0 **CONCLUSION**

These five ground-water monitoring wells were installed with three at the water table and two at the top of rock. All were set in residuum/saprolite as per the Water Quality Monitoring Plan for the Unconstructed Portion. The wells were installed in general accordance with both Waste Management and the North Carolina Well Construction Standards (15A NCAC 2C.0108).

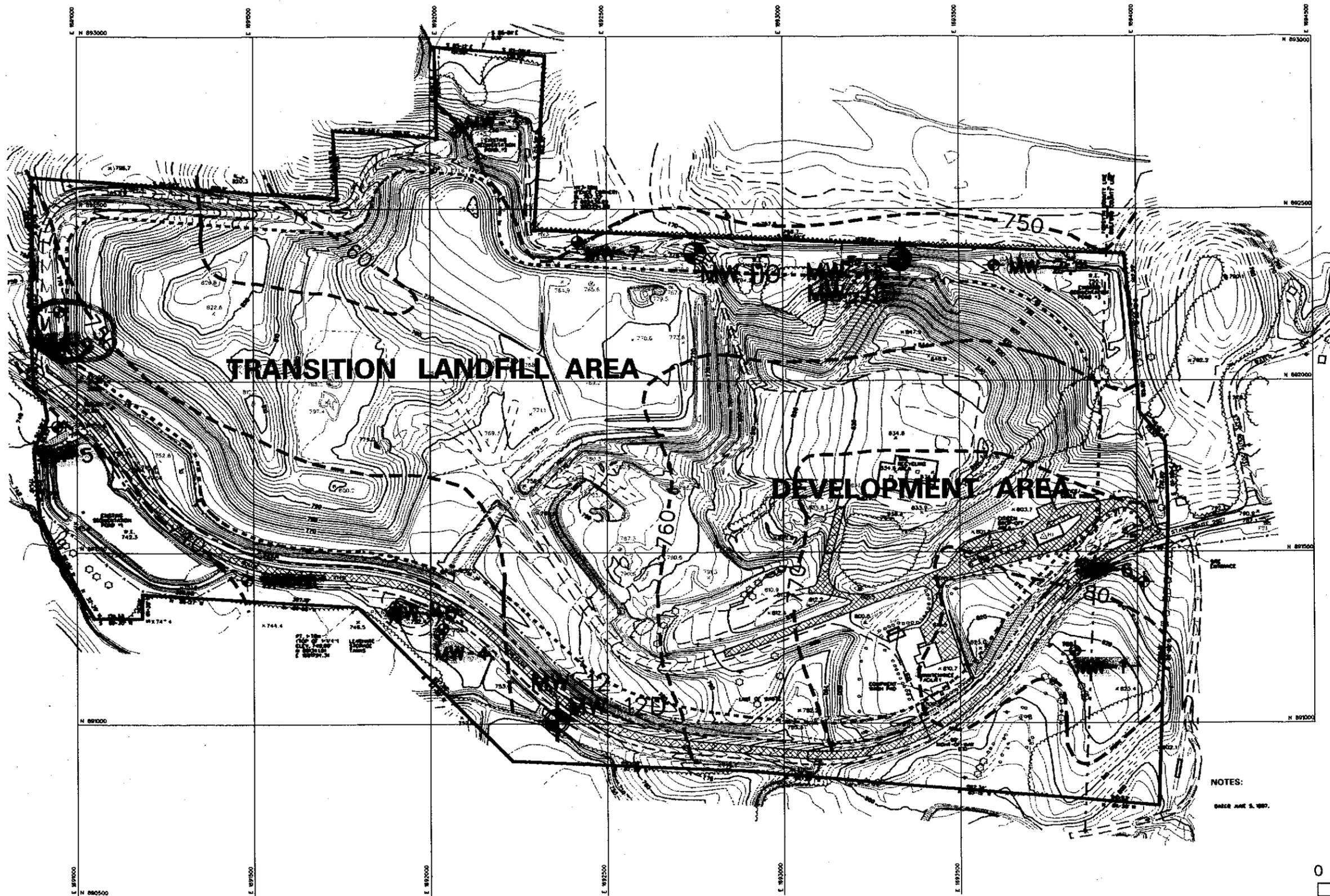
The summary of hydrogeologic characteristics at each well are described as follows. At MW-10, the soils have a porosity of 47 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 8.6 feet/year in a northerly direction. At MW-11, the soils have a porosity of 55 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 8.6 feet/year in a northerly direction. At MW-11D, the soils have a porosity of 37 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 25 percent. The ground-water flow is then estimated to be 10 feet/year in a northerly direction. At MW-12 the soils have a porosity of 49 percent and an hydraulic conductivity of 10^{-4} cm/sec. The

effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 7.2 feet/year in a west-southwesterly direction. At MW-12D the soils have a porosity of 39 percent and an hydraulic conductivity of 10^{-6} cm/sec. The effective porosity is estimated to be 20 percent. The ground water flow is then estimated to be 0.1 feet/year, in a west-southwesterly direction.

TABLE 1

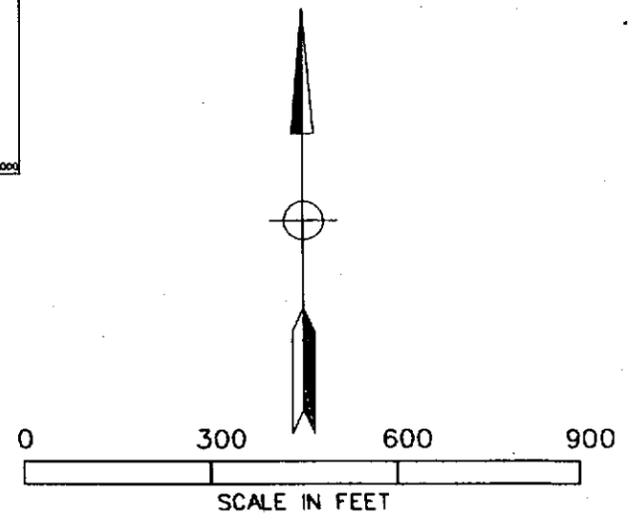
MONITORING WELL CONSTRUCTION DETAILS
 PIEDMONT LANDFILL & RECYCLING CENTER
 KERNERSVILLE, NORTH CAROLINA

Monitoring Well	State Coordinates	Ground Elevation	T.O.C. Elevation	Screen Elevation (Depth)	Sand Pack Elevation (Depth)	Top of Bentonite Seal
MW-10	N 892,371.2 E 1,692,751.8	774.20	777.20	752.20-737.21 (22.00-36.99)	754.90-736.2 (19.3-38.00)	758.60 (15.60)
MW-11	N 892,349.7 E 1,693,332.9	774.30	776.80	755.29-740.30 (19.01-34.00)	757.20-739.3 (17.1-35.00)	761.60 (12.7)
MW-11D	N 892,356.00 E 1,693,334.00	773.86	776.36	692.04-682.07 (81.82-91.79)	693.86-680.36 (80.0-93.5)	698.86 (75.0)
MW-12	N 891,010.98 E 1,692,354.73	748.58	751.48	745.25-731.55 (3.33-17.03)	746.83-730.58 (1.75-18.00)	748.08 (0.50)
MW-12D	N 891,007.53 E 1,692,360.86	748.73	751.53	716.75-706.73 (31.98-42.00)	724.23-705.43 (24.5-43.3)	735.23 (13.5)



- LEGEND:**
- 750 — POTENTIOMETRIC CONTOUR SEASONAL HIGH (10 FT. INTERVAL)
 - GROUND WATER MONITORING WELL INSTALLED OCTOBER/NOVEMBER 1994
 - ⊗ EXISTING GROUND WATER MONITORING WELL
 - ▨ VOC's detected

NOTES:
DATE: APR 5, 1997.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE
GROUND WATER MONITORING
WELL LOCATIONS

PIEDMONT LANDFILL AND RECYCLING CENTER
FORSYTH COUNTY, NORTH CAROLINA
PROJECT NO. 32066.200

APPENDIX A
SOIL BORING LOGS

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC		DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER			BORING NO. MW-10						
		SAMPLING METHOD: SPLIT SPOON			SHEET 1 OF 2						
		WATER LEVEL			DRILLING						
		TIME			START TIME 09:20 FINISH TIME 14:45						
DATUM		ELEVATION 774.0			DATE 10-24-94						
DRILL RIG CME-850 Track Mount		SURFACE CONDITIONS SOIL/BOULDERS									
ANGLE Vertical		BEARING -----									
SAMPLE HAMMER TORQUE		FT.-LBS									
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER % (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
0.0 5 10 15 20 25 30 35.0	3 4 5 6 55% 1 3 3 3 38% 3 3 3 3 75% 4 5 5 4 83% 3 4 5 6 100% ST 5 7 13 15 100%		SILT (ML) Stiff, brownish orange, dry, mostly silt. SILT (ML) Similar to above, some yellow. - FILL - SILT (ML) Similar to above, none mottled, 11 - 11 1/2 ft. light brown, white saprolite. CLAYEY SILT (ML/CH) Stiff, brownish orange, little yellow and black mottling, moist, mostly silt, little clay, may have graded into severely weathered saprolite. CLAYEY SILT (ML/CH) Similar to above. SILT (ML) Very stiff, dark brown, orange brown, some black mottling, wet, mostly silt, few clay and fine sand, weathered gneiss/schist. - SAPROLITE -								

DRILLING CONTR **GRAHAM & CURRIE**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

Continued Next Page

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC		DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER		BORING NO. MW-10	
		SAMPLING METHOD: SPLIT SPOON		SHEET 2 OF 2	
DATUM		ELEVATION 774.0		DRILLING	
DRILL RIG CME-850 Track Mount		SURFACE CONDITIONS SOIL/BOULDERS		START	FINISH
ANGLE Vertical	BEARING -----			TIME 09:20	TIME 14:45
SAMPLE HAMMER TORQUE		FT.-LBS		DATE 10-24-94	DATE 10-24-94

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER	TESTS: K cm/sec
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35.0	12		GRAVELY SILT (MG) Dense, white, medium brown, mottled, wet, mostly silt, some fine to medium gravel (quartz/plagioclase grains).									
	24											
	51											
	5											
	63%		Boring Terminated at 38.0 ft.									
40												
45												
50												
55												
60												
65												
70.0												

DRILLING CONTR **GRAHAM & CURRIE**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC		DRILLING METHOD: 8.5" O.D. (4.25" I.D.)		BORING NO. MW-11								
		HOLLOW STEM AUGER		SHEET 1 OF 3								
DATUM ELEVATION 774.0		SAMPLING METHOD: SPLIT SPOON		DRILLING								
		WATER LEVEL		START	FINISH							
		TIME		13:06	11:28							
		DATE			DATE	DATE						
CASING DEPTH			11-14-94	11-15-94								
DRILL RIG CME-450		SURFACE CONDITIONS FILL (BERM OR PHASE 3, CELL 1)										
ANGLE Vertical		BEARING -----										
SAMPLE HAMMER TORQUE		FT.-LBS										
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (%RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER	TESTS: K cm/sec
0.0												
5	4 7 10 11 100%		GRAVELY SANDY SILT (ML) Very stiff, grayish brown, dry, mostly silt, little gravel and sand.									
10	1 4 6 6 83%		SILTY SAND (SM) Loose, olive brown, dry, mostly sand, some silt, few clay. - FILL -									
15	4 2 2 3 100%		SILT (ML) Soft, reddish orange, black, mottled, dry, all silt, weathered fine grained granitic gneiss.									
20	3 3 4 4 75%		SILT (ML) Medium stiff, white, black and orange, mottled, dry, mostly silt, few sand, weathered fine grained granitic gneiss.									
25	1 2 5 5 100%		SANDY SILT (ML) Medium stiff, orange brown, black and white, mottled, wet, mostly silt, little sand, weathered fine grained granitic gneiss.									
30	2 1 3 3 100%		SANDY SILT (ML) Similar to above. - SAPROLITE -									
35.0												

DRILLING CONTR **ECS**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC		DRILLING METHOD: 8.5" O.D. (4.25" I.D.) HOLLOW STEM AUGER			BORING NO. MW-11							
		SAMPLING METHOD: SPLIT SPOON			SHEET 2 OF 3							
DATUM ELEVATION 774.0		SURFACE CONDITIONS FILL (BERM OR PHASE 3, CELL 1)			DRILLING							
					START		FINISH					
					TIME		TIME					
					DATE		DATE					
DRILL RIG CME-450		WATER LEVEL		DATE 11-14-94 11-15-94								
ANGLE Vertical		BEARING -----		CASING DEPTH								
SAMPLE HAMMER TORQUE		FT.-LBS										
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (%RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER	TESTS: K cm/sec
	6 8 13 12 67% 40 7 7 12 10 80% 45 11 15 13 15 100% 50 ST 55 10 13 14 17 60 . 65 70.0		<p>SANDY SILT (ML) Very stiff, light tan-brown, wet, mostly silt, some fine sand, few clay, abundant mica in fine to medium laminations.</p> <p>SANDY SILT (ML) Very stiff, top 6" and bottom 4" white and black, mottled, middle 9" orangish brown, dark gray, green, white, relict deformation, abundant mica, wet, mostly silt, little fine sand, weathered granitic gneiss, middle portion nearly schistose.</p> <p>SANDY CLAY (ML) Very stiff, grayish brown, very mottled and deformed, wet, mostly clay, some fine sand, few silt.</p> <p>SANDY SILT (ML) Stiff, black and white, horizontal laminations, wet, mostly silt, some medium sand.</p> <p>SANDY SILT (ML) Very stiff, white, black brown, wet/moist, mostly silt, some fine sand, weathered dioritic gneiss with banding of quartz on plagioclase veins, gneiss is fine grained, iron oxidation at boundaries of quartz/plagioclase vein.</p> <p>SANDY SILT (ML) Similar to above. * No blows due to rods falling.</p> <p>- SAPROLITE -</p>									

DRILLING CONTR **ECS**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC		DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER			BORING NO. MW-12								
		SAMPLING METHOD: SPLIT SPOON			SHEET 2 OF 2								
		WATER LEVEL			DRILLING START FINISH								
		TIME			TIME 09:04 16:40								
DATUM		ELEVATION 749.0			DATE								
DRILL RIG CME 850 Track Mount		SURFACE CONDITIONS GRASS/FOREST				DATE 10-21-94 10-21-94							
ANGLE Vertical		BEARING -----											
SAMPLE HAMMER TORQUE		FT.-LBS											
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS			SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
35.0 40 45 50 55 60 65 70.0			SILTY GRAVEL (GM) Very dense, brown, black mottled white, moist, mostly fine gravel, some silt, little sand, with few mica. - SAPROLITE - Boring terminated at 43.3 ft.										

DRILLING CONTR **GRAHAM & CURRIE**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

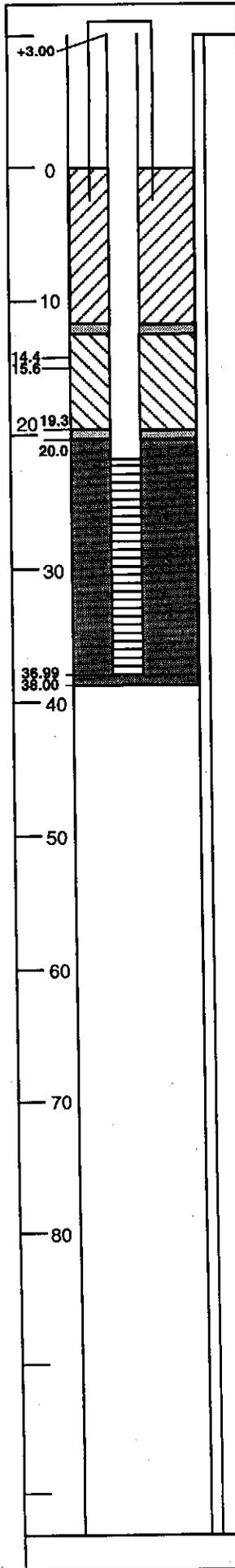
CHK'D BY

APPENDIX B
MONITORING WELL CONSTRUCTION SUMMARY

Well No.: MW-10
 Boring No. X-Ref: MW-10

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N892.371.2 Elevation Ground Level: 774.20
E1.692.751.8 Top of Casing: 777.20



Drilling Summary:

Total Depth: 38.0 ft.
 Borehole Diameter: 11 in.
 Casing Stick-up Height: 3.00 ft.
 Driller: Graham & Currie
 Rig: CMF-850
 Bit(s): 6.25" I.D. HSA
 Drilling Fluid: N/A
 Protective Casing: 5.0' x 4.0" x 4.0"
Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log: Geophysical Log:
 Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C ₁	-
22.00 - +3.00	C ₂	752.20 - 777.20
36.99 - 22.00	S ₁	737.21 - 752.20
37.19 - 36.99	P ₁	737.01 - 737.21

Casing: C1 5' x 4" x 4" Anodized Aluminum
 C2 2" I.D. Flush Threaded Sch. 40 PVC
 Screen: S1 2.0" I.D. 0.010" Slot Sch. 40 PVC
 P1 2.0" I.D. PVC Plug

Filter Pack: 38 - 20.8 Med. Sand
20.8 ft. 19.3 Fine Sand
15.6 - 14.4 Fine Sand

Grout Seal: 14.4 to 0.0 ft. Bentonite/ cement grout
 Bentonite Seal: 19.3 ft. to 15.6 ft. Bentonite pellets

Comments:

Water cleaned up after surging well during development.

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA	10/24/94	09:20	10/24/94	14:45
Geophys. Logging:				
Casing:	10/24/94	14:46	10/24/94	14:48
Filter Placement:	10/24/94	14:50	10/24/94	16:04
Bentonite Seal:	10/24/94	16:06	10/24/94	16:32
Development:	11/15/94	08:03	11/17/94	15:12

Well Development:

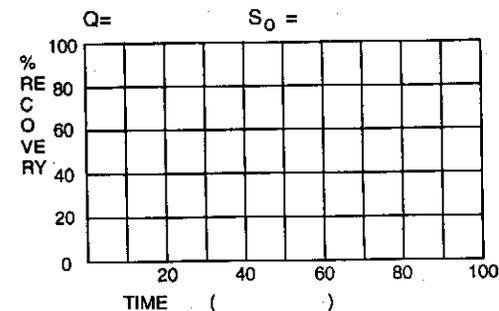
11/15/94 08:03 - 18:00. Displacement Pump (0.3)
 11/17/94 14:42 - 15:12. Grundfos Pump (0.4)

Total pumped approximately 200 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
14:45	5.64	78	14
14:50	5.64	77	15
14:55	5.53	77	15
15:00	5.52	77	15

Recovery Data: None

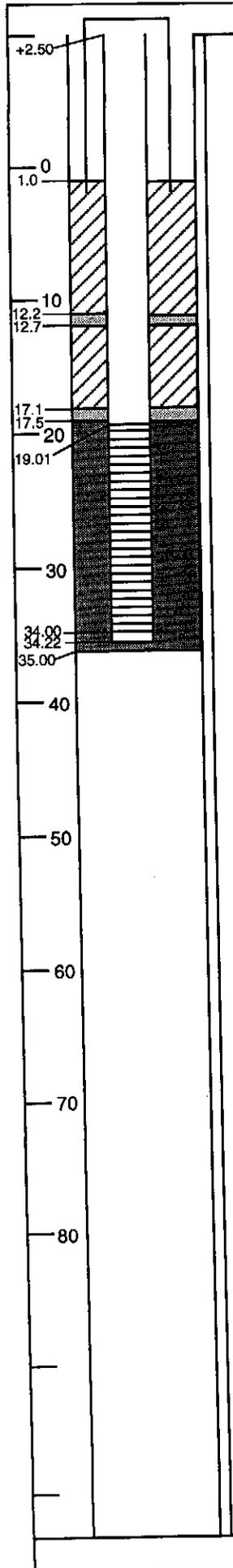


SITE NAME PIEDMONT LANDFILL LOCATION KERNERSVILLE, NC
 WC
 SUPERVISED BY: MIKE TAYLOR DATE: 10/25/94

Well No.: MW-11
 Boring No. X-Ref: MW-11

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N892.349.7 Elevation Ground Level: 774.30
E1.693.332.9 Top of Casing: 776.80



Drilling Summary:

Total Depth: 35.0 ft.
 Borehole Diameter: 8.5 in.
 Casing Stick-up Height: 2.50 ft.
 Driller: ECS
 Rig: CME-45
 Bit(s): 8.25" I.D. HSA
 Drilling Fluid: N/A
 Protective Casing: 5.0' x 4.0" x 4.0"
Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log: Geophysical Log:
 Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C1	-
19.01 - +2.50	C2	755.29 - 776.80
34.00 - 19.01	S1	740.30 - 755.29
34.22 - 34.00	P1	740.08 - 740.30

Casing: C1 5' x 4" x 4" Anodized Aluminum
 C2 2 in. I.D. Flush Threaded Sch. 40 PVC
 Screen: S1 2.0" I.D. 0.010" Slot Flush Threaded Sch. 40 PVC
 P1 2.0" I.D. Flush Threaded Sch. 40 PVC

Filter Pack: 35.0 - 17.5 Med. Sand
17.5 ft. - 17.1 Fine Sand
12.7 - 12.2 Fine Sand
 Grout Seal: 12.2 to 1.0 ft. Bentonite Quik gel/cement mix
 Bentonite Seal: 17.1 ft. to 12.7 3/8 ft. Bentonite pellets

Comments:

Water cleaned up after surging well during development.

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	11/17/94	07:55	11/17/94	09:56
Geophys. Logging:				
Casing:	11/17/94	10:05	11/17/94	10:07
Filter Placement:	11/17/94	10:12	11/17/94	11:04
Bentonite Seal:	11/17/94	11:10	11/17/94	11:20
Development:	11/18/94	14:30	11/18/94	16:32

Well Development:

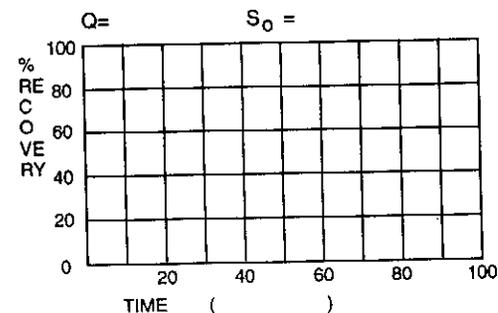
11/18/94 14:30 - 16:32. Displacement Pump (0.3)

Total pumped approximately 40 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
15:35	6.76	72	15
15:47	6.54	69	15
16:15	6.53	71	15
16:23	6.57	67	15

Recovery Data: None



SITE NAME: PIEDMONT LANDELL
 LOCATION: KERNERSVILLE, NC
 WC
 SUPERVISED BY: MIKE TAYLOR
 DATE: 11/17/94

Well No.: MW-11DBoring No. X-Ref: MW-11**MONITOR WELL CONSTRUCTION SUMMARY**Survey Coords: N892,356.00
E1,693,334.00Elevation Ground Level: 773.86Top of Casing: 776.36**Drilling Summary:**Total Depth: 93.5 ft.
Borehole Diameter: 8.5 in.
Casing Stick-up Height: 2.50 ft.
Driller: ECSRig: CMF-450
Bit(s): 8.5" I.D. HSADrilling Fluid: N/AProtective Casing: 5.0' x 4.0" x 4.0"
Anodized Aluminum**Well Design & Specifications**Basis: Geologic Log: Geophysical Log:
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C1	-
81.82 - +2.50	C2	692.04 - 776.36
91.79 - 81.82	S1	682.07 - 692.04
92.00 - 91.79	P1	681.86 - 682.07

Casing: C1 5' x 4" x 4" Anodized Aluminum
C2 2" I.D. Flush Threaded Sch. 40 PVC
Screen: S1 2.0" I.D. 0.010" Slot Flush Threaded Sch. 40 PVC
P1 2.0" I.D. Flush Threaded Sch. 40 PVCFilter Pack: 93.5 ft. - 80.5 ft. Medium Sand
80.5 ft. - 80.0 Fine Sand
75.0 - 74.4 Fine Sand
Grout Seal: 174.4 to 1.0 ft. Bentonite/cementBentonite Seal: 80.0 ft. to 75.0 ft. Bentonite pellets (3/8" hole plug)**Comments:**Water did not really clear up during development.**Construction Time Log:**

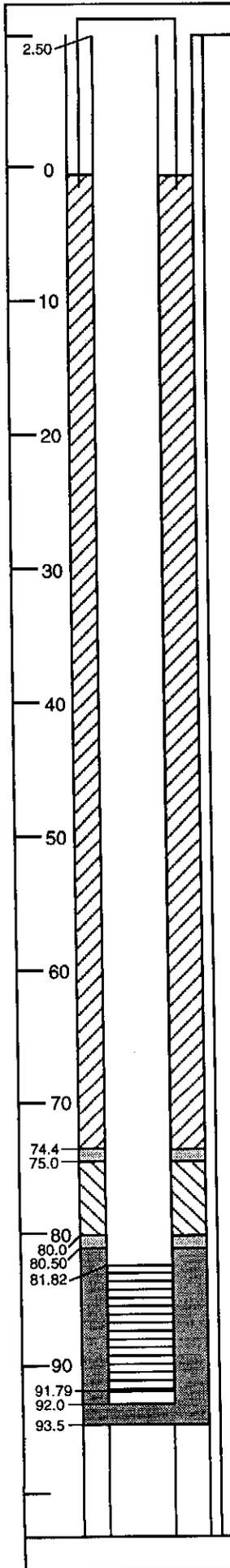
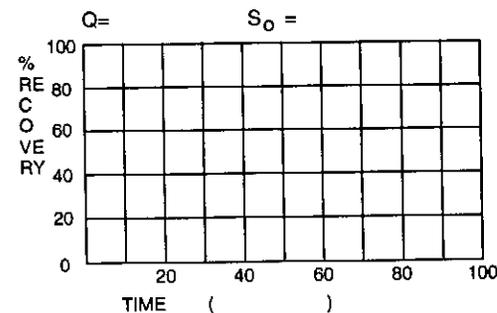
Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA	11/14/94	13:06	11/15/94	11:28
Geophys. Logging:				
Casing:	11/15/94	13:16	11/15/94	13:20
Filter Placement:	11/15/94	17:01	11/16/94	13:53
Bentonite Seal:	11/16/94	14:06	11/16/94	14:18
Development:	11/18/94	07:26	11/18/94	13:35

Well Development:11/18/94 07:26 - 13:35. Displacement Pump (0.1)

Total pumped approximately 40 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
08:00	7.08	109	18
08:25	6.85	84	15
08:37	7.07	83	16
10:30	6.93	70	16
10:54	6.94	70	16
12:13	6.98	64	16

Recovery Data: NoneSITE NAME PIEDMONT LANDFILLLOCATION KERNERSVILLE, NC

WC

SUPERVISED BY: MIKE TAYLORDATE: 11/15/94

Well No.: MW-12Boring No. X-Ref: MW-12**MONITOR WELL CONSTRUCTION SUMMARY**Survey Coords: N891.010.98Elevation Ground Level: 748.58E1.692.354.73Top of Casing: 751.48**Drilling Summary:**Total Depth: 18.0 ft.Borehole Diameter: 11.0 in.Casing Stick-up Height: 2.90 ft.Driller: Graham & CurrieRig: CME-850Bit(s): 6.25" I.D. HSADrilling Fluid: N/AProtective Casing: 3.8' x 4.0" x 4.0"
Anodized Aluminum**Well Design & Specifications**Basis: Geologic Log: Geophysical Log:

Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C1	-
<u>3.33</u> - <u>+2.90</u>	C2	<u>745.25</u> - <u>751.48</u>
<u>17.03</u> - <u>3.33</u>	S1	<u>731.55</u> - <u>745.25</u>
<u>17.22</u> - <u>17.03</u>	P1	<u>731.36</u> - <u>731.55</u>
-	-	-

Casing: C1 3.8' x 4" x 4" Anodized AluminumC2 2" I.D. Flush Threaded Sch. 40 PVCScreen: S1 2.0" I.D. 0.010" Sch. 40 PVCP1 2.0" I.D. PVC Plug

Filter Pack: _____

18.00 ft. - 3.33 ft. Medium Sand3.33 ft. - 1.75 Fine SandGrout Seal: 0.50 ft. to 0.00 ft. Bentonite cement/groutBentonite Seal: 1.75 ft. to 0.50 ft. Bentonite pellets**Comments:**Surface seal = 3.0 ft. x 3.0 ft. x 3 in. Concrete pad with protective post.Water did not clear up when developing well.**Construction Time Log:**

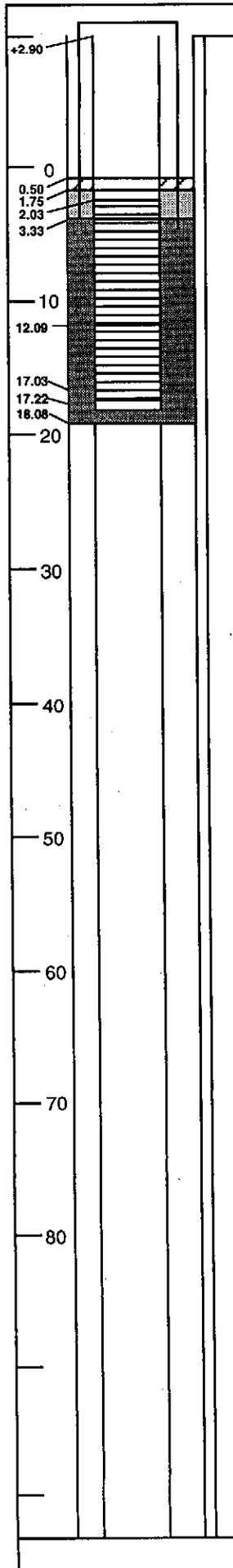
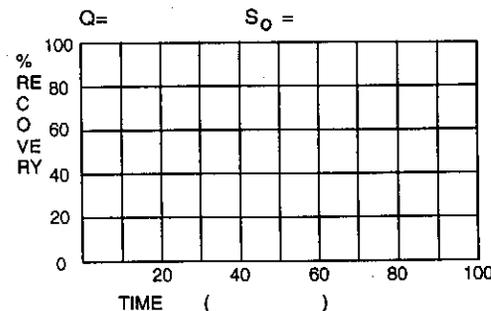
Task	Start		Finish	
	Date	Time	Date	Time
Drilling HSA	10/21/94	09:04	10/21/94	11:08
Geophys. Logging:				
Casing:				
Filter Placement:	10/21/94	11:16	10/21/94	12:19
Bentonite Seal:	10/21/94	12:23	10/21/94	12:26
Development:	11/16/94	17:41	11/17/94	18:20

Well Development:11/16/94 17:41 - 20:09. Displacement Pump (0.8)11/17/94 17:22 - 18:20. Displacement Pump (0.9)

Total pumped approximately 170 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
11/16/94 18:41	6.14	129	15
19:10	5.98	129	15
19:54	6.24	127	15
11/17/94 18:11	6.15	126	15

Recovery Data: NoneSITE NAME PIEDMONT LANDFILLLOCATION KERNERSVILLE, NC

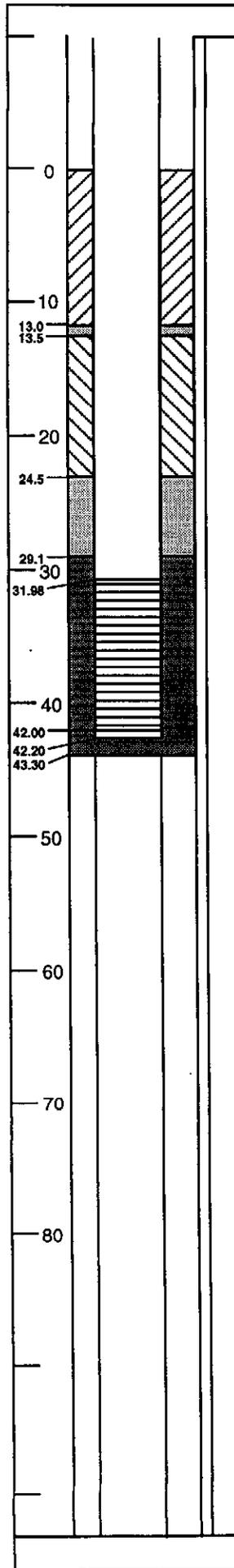
WC

SUPERVISED BY: MIKE TAYLORDATE: 10/21/94

Well No.: MW-12D
 Boring No. X-Ref: MW-12

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N891.007.53 Elevation Ground Level: 748.73
E1.692.360.86 Top of Casing: 751.53



Drilling Summary:

Total Depth: 43.3 ft.
 Borehole Diameter: 11.0 in.
 Casing Stick-up Height: 2.80 ft.
 Driller: Graham & Currie

Rig: CME-850
 Bit(s): 6.25" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 5.0' x 4.0" x 4.0"
Anodized Aluminum

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log:
 Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C1	-
31.98 - +2.80	C2	716.75 - 751.53
42.00 - 31.98	S1	706.73 - 716.75
42.20 - 42.00	P1	706.53 - 706.73

Casing: C1 5.0' x 4" x 4" Anodized Aluminum
 C2 2" I.D. Flush Threaded Sch. 40 PVC
 Screen: S1 2.0" I.D. 0.010" Sch. Slot Sch. 40 PVC
 P1 2.0" I.D. PVC Plug

Filter Pack:
43.3 ft. - 29.1 ft. Medium Sand
29.1 ft. - 24.5 ft. Fine Sand
13.5 ft. - 13.0 ft. Fine Sand
 Grout Seal: 13.0 ft. - 0.0 ft. Bentonite cement/grout
 Bentonite Seal: 24.5 ft. to 13.5 ft. Bentonite pellets

Comments:

Surface seal = 3.0 ft. x 3.0 ft. x 3 in. Concrete pad with protective posts.
Grundfos pump caused well to go dry fast at low pumping rates.

Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling 3 1/4" HSA	10/21/94	14:07	10/21/94	16:40
6 1/4" HSA	10/24/94	12:53	10/24/94	16:36
Geophys. Logging:				
Casing:	10/24/94	16:40	10/24/94	16:42
Filter Placement:	10/24/94	16:48	10/24/94	18:20
Bentonite Seal:	10/24/94	18:42	10/24/94	18:54
Development:	11/16/94	08:26	11/17/94	15:23

Well Development:

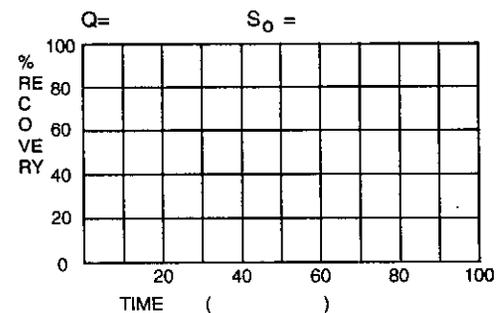
11/16/94 08:26 - 16:30, Displacement Pump (0.15)
 11/16/94 17:30 - 19:52, Grundfos Pump
 11/17/94 07:49 - 15:23, Displacement Pump

Total pumped approximately 170 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
18:27	6.03		15
18:44	6.18	194	16
19:15	6.21	192	15
19:31	6.22	191	15

Recovery Data: None



SITE NAME PIEDMONT LANDFILL
 LOCATION KERNERSVILLE, NC
 WC
 SUPERVISED BY: MIKE TAYLOR
 DATE: 10/24/94

APPENDIX C
MONITORING WELL COMPLETION RECORDS

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE
DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH
P. O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center		PERMIT NO.: 34-6
ADDRESS: 9900 Freeman Road, Kernersville, NC 27284		OWNER (print): Waste Management of Carolinas, Inc.
DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.		REGISTRATION NO.: MW-10 ✓
Casing Type: PVC Sch. 40 dia. 2 in.	Grout Depth: from 0.0 to 14.4 ft. - dia. 11"	
Casing Depth: from +3.00 to 22.00 ft. - dia. in.	Bentonite Seal: from 15.6 to 19.3 ft. - dia. 11"	
Casing Type: PVC Sch. 40 dia. 2 in.	Sand/Gravel PK: from 19.3 to 38.0 ft. - dia. 11"	
Screen Depth: from 22.00 to 36.99 ft. - dia. in.	Total Well Depth: from +3.00 to 37.1 ft. - dia. 11"	
Static Water Level: 32.42 feet from top of casing	7.57	Date Measured 11/15/94
Yield (gpm): N/A Method of Testing: N/A	Casing is +3.00 feet above land surf.	

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0'	8'	Silt (ML) stiff brownish orange FILL
0'	35'	Silt (ML) stiff to very stiff brown orange, yellow, black mostly silt little clay SAPROLITE

LOCATION SKETCH
(show distance to numbered roads, or other map reference point)
See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE
DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH
P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center	PERMIT NO.: 34-6
ADDRESS: 9900 Freeman Road, Kernersville, NC 27284	OWNER (print): Waste Management of Carolinas, Inc.
DRILLING CONTRACTOR: Environmental Construction Services Inc.	REGISTRATION NO.: MW-11 <input checked="" type="checkbox"/>

Casing Type: PVC Sch. 40 dia. 2 in. Grout Depth: from 0.0 to 12.2 ft. - dia. 8.5"
Casing Depth: from +2.50 to 19.01 ft. - dia. in. Bentonite Seal: from 12.7 to 17.1 ft. - dia. 8.5"
Screen Type: PVC Sch. 40 dia. 2 in. Sand/Gravel PK: from 17.1 to 35.0 ft. - dia. 8.5"
Screen Depth: from 19.01 to 34.00 ft. - dia. in. Total Well Depth: from +2.50 to 34.2 ft. - dia. 8.5"

Static Water Level: 27.58 feet from top of casing 8.92 + Date Measured 11 / 18 / 94
Yield (gpm): N/A Method of Testing: N/A Casing is +2.50 feet above land surf.

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0'	13'	Sandy silt and silty sand (ML/SM) stiff/loose olive brown dry soils
		FILL
13'	35'	Silt (ML) predominately stiff mottled white black, orange silt to sandy silt
		SAPROLITE

LOCATION SKETCH
(show distance to numbered roads, or other map reference point)
See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center	PERMIT NO.: 34-6
ADDRESS: 9900 Freeman Road, Kernersville, NC 27284	OWNER (print): Waste Management of Carolinas, Inc.
DRILLING CONTRACTOR: Environmental Construction Services, Inc.	REGISTRATION NO.: MW-11D <input checked="" type="checkbox"/>

Casing Type: PVC Sch. 40 dia. 2 in. Grout Depth: from 0.0 to 74.4 ft. - dia. 8.5"
 Casing Depth: from +2.50 to 81.82 ft. - dia. in. Bentonite Seal: from 75.0 to 80.0 ft. - dia. 8.5"
 Screen Type: PVC Sch. 40 dia. 2 in. Sand/Gravel PK: from 80.0 to 93.5 ft. - dia. 8.5"
 Screen Depth: from 81.82 to 91.79 ft. - dia. in. Total Well Depth: from +2.50 to 92.0 ft. - dia. 8.5"
 Static Water Level: 31.33 feet from top of casing Date Measured 11 / 18 / 94
 Yield (gpm): N/A Method of Testing: N/A Casing is +2.50 feet above land surf.

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0'	13'	Sandy silt and silty sand (ML/SM) stiff/loose olive brown dry soils
		FILL
3'	93.5'	Silt (ML) predominately stiff to hard mottled white, black, orange silt to sandy silt with few clay lenses
		SAPROLITE

LOCATION SKETCH
(show distance to numbered roads, or other map reference point)
See attached location plan

REMARKS:

DATE: 12/16/94

SIGNATURE: _____

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center		PERMIT NO.: 34-6.
ADDRESS: 9900 Freeman Road, Kernersville, NC 27284		OWNER (print): Waste Management of Carolinas, Inc.
DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.		REGISTRATION NO.: MW-12 <i>too shallow ok</i>
Casing Type: PVC Sch. 40	dia. 2 in.	Grout Depth: from 0.0 to 0.5 ft. - dia. 11"
Casing Depth: from +2.90 to 3.33 ft. - dia.	in.	Bentonite Seal: from 0.5 to 1.8 ft. - dia. 11"
Casing Type: PVC Sch. 40	dia. 2 in.	Sand/Gravel PK: X from 1.8 to 18.0 ft. - dia. 11"
Screen Depth: from 3.33 to 17.03 ft. - dia.	in.	Total Well Depth: from +2.90 to 17.2 ft. - dia. 11"
Water Level: 6.02 feet from top of casing	13.91 +	Date Measured 11 / 16 / 94
Yield (gpm): N/A	Method of Testing: N/A	Casing is +2.90 feet above land surf.

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0'	18'	Sandy silt, silty clay, silty sand (ML, CL, SM).
		Gradational between soil types and is dependent on weathering mottled brown orange white black
		SAPROLITE

LOCATION SKETCH
(show distance to numbered roads, or other map reference points)
See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE
DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH
P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center		PERMIT NO.: 34-6.	
ADDRESS: 9900 Freeman Road, Kernersville, NC 27284		OWNER (print): Waste Management of Carolinas, Inc.	
DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.		REGISTRATION NO.: MW-12D ✓	
Casing Type:	PVC Sch. 40 dia. 2 in.	Grout Depth:	from 0.0 to 13.0 ft. - dia. 11" <i>Sand</i>
Casing Depth:	from +2.80 to 31.98 ft. - dia. _____ in.	Bentonite Seal:	from 13.5 to 24.5 ft. - dia. 11" <i>Rock</i>
Casing Type:	PVC Sch. 40 dia. 2 in.	Sand/Gravel PK:	from 24.5 to 43.3 ft. - dia. 11"
Casing Depth:	from 31.98 to 42.00 ft. - dia. _____ in.	Total Well Depth:	from +2.80 to 42.2 ft. - dia. 11"
Water Level:	5.99 feet from top of casing	Date Measured:	11 / 16 / 94
Flow Rate (gpm):	N/A	Method of Testing:	N/A
		Casing is	+2.80 feet above land surf.

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0'	43.3'	Sandy silt, silty clay, silty sand silty gravel (ML, CL, SM, GM) Gradational between soil types and is dependent on weathering Mottled brown orange white black SAPROHITE

LOCATION SKETCH
(show distance to numbered roads, or other map reference point)
See attached location plan

MARKS:

DATE: 12/16/94

SIGNATURE: _____