

**SECTION 6
MONITORING WELLS**

6.0 WATER QUALITY MONITORING

A total of seven monitoring wells were installed for water quality monitoring for Cell 1. Two wells, MW13 and MW14 are temporary wells which will be abandoned during construction of Cell 2. In addition to the monitoring wells, two stream locations and the Internal Stormwater System Settling Basin were sampled on January 20, 1994 by Environment One, Inc., under contract with the County in accordance with the Construction permit.

The Water Quality Monitoring Plan and the report describing well construction, including well construction diagrams, were prepared by Armstrong Geological and Engineering Services. Their report is provided in Appendix 6.1. Coordinates and ground surface elevations for each monitoring well location are provided on Drawing G5, Section 7.

Environment 1, Incorporated

P.O. BOX 7085, 114 OAKMONT DRIVE
GREENVILLE, N.C. 27835-7085

PHONE (919) 756-6208
FAX (919) 756-0633

January 20, 1994

Mr. John Bove
Hazen and Sawyer
4011 Westchase Boulevard
Suite 500
Raleigh, NC 27607

Dear Mr. Bove:

Samples were collected on the above date at the Halifax County Coal Ash Landfill. Seven (7) monitoring wells, two (2) surface water locations, one (1) basin location, and one (1) off-site drinking water well were sampled. Total Suspended Residue, total metals, and dissolved metals will be analyzed on all locations, except for the drinking water location, along with all other requested parameters. The drinking water location will be analyzed for total metals and TOX only.

If you have any questions please give me a call.

Sincerely,



Steve Jones

cc: Jerry Williams

SECTION 6.1
WELL COMPLETION RECORDS

Enviros/Armstrong Geological & Engineering Services, P.C.

January 20, 1994

Division of Solid Waste Management
Department of Environment, health, and Natural Resources
401 Oberlin Road
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Reference: Well Construction Logs / Well Completion Records
Halifax County Ash Monofill
Halifax County, North Carolina

Dear Mr. Lutfy:

Enclosed are well construction logs and well completion records for the new ground water monitoring wells constructed for the Halifax County Ash Monofill. These monitoring wells, MW-9, MW-10, MW-11, MW-12, MW-13, and MW-14, as shown on the attached Hazen and Sawyer figure, were constructed under the supervision of a North Carolina Registered Geologist. A ground water monitoring plan is being provided separately and the first sampling round is scheduled for January 20, 1994. The previously existing monitoring well MW-8, which is also part of the monitoring well system for the landfill, is also scheduled to be sampled during the first sampling round.

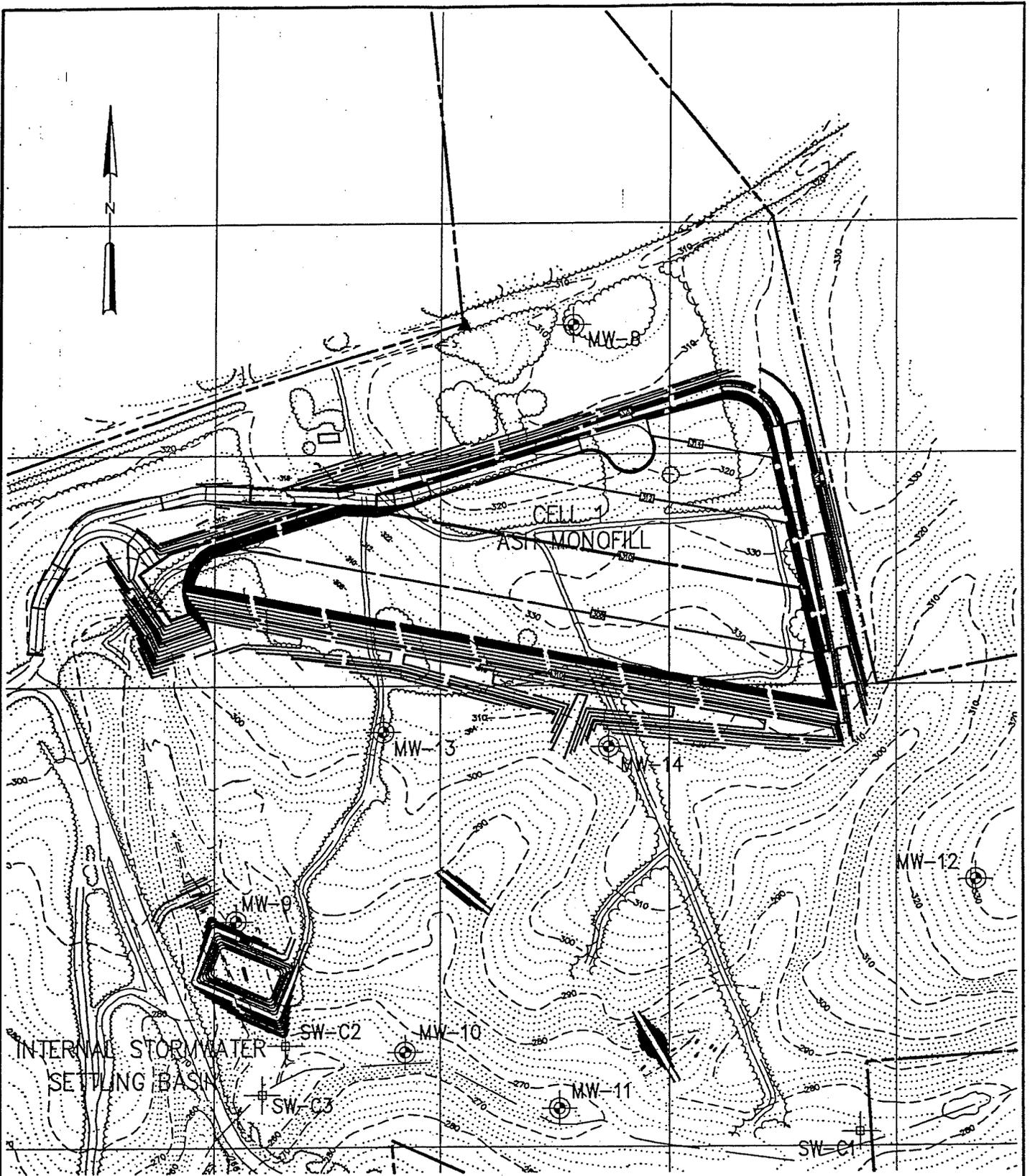
Please contact us or Hazen and Sawyer if you have any questions.

Sincerely,

Macklin M. Armstrong
Macklin M. Armstrong, P.G.
Principal Geologist



Enclosures



PLAN

1"=300'

HAZEN AND SAWYER
 Environmental Engineers & Scientists
 RALEIGH, NORTH CAROLINA

HALIFAX COUNTY
 ASH MONOFILL

FIGURE 1
MONITORING WELL
LAYOUT

TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill

WELL NO. MW-9

CLIENT Halifax County

SHEET 1 OF 2

DRILLING CONTRACTOR Parratt Wolff, Inc.

JOB NO. 931210

PURPOSE Monitoring Well for Ash Landfill

ELEV. MP GR

GROUND WATER

CASING

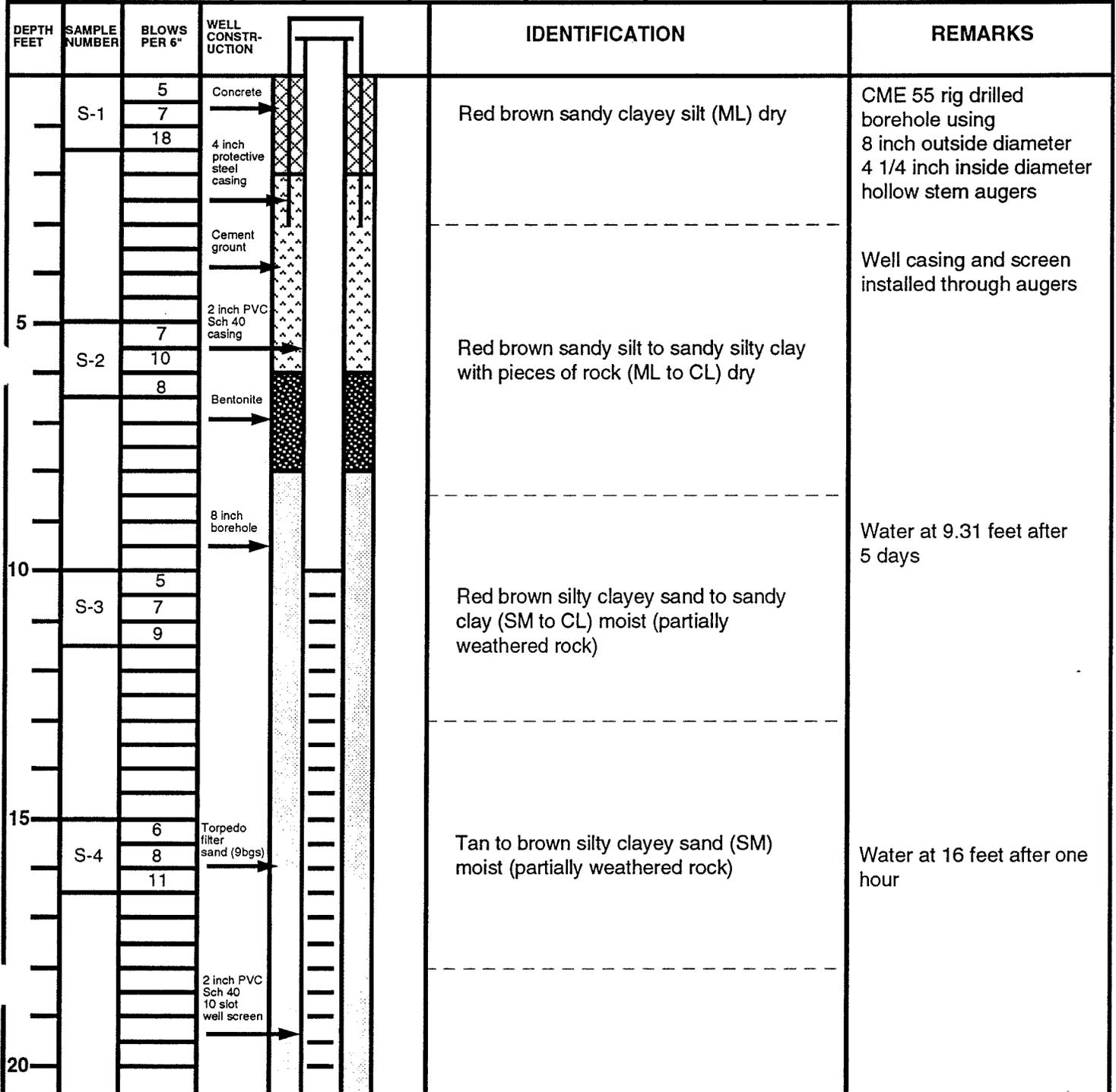
SAMPLE

CORE

WELL

DATUM

DATE	TIME	DEPTH	CASING	TYPE					STARTED	1/5/94
1-10-94	1015	9.31'		DIAMETER					COMPLETED	1/6/94
				WEIGHT					DRILLER	Dave Stratton
				FALL					GEOLOGIST	Mac Armstrong



TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill						WELL NO. MW-11	
CLIENT Halifax County						SHEET 1 OF 1	
DRILLING CONTRACTOR Parratt Wolff, Inc.						JOB NO. 931210	
PURPOSE Monitoring Well for Ash Landfill						ELEV. MP	GR
GROUND WATER				CASING	SAMPLE	CORE	WELL
DATE	TIME	DEPTH	CASING	TYPE			DATUM
1-10-94	1545	2.16'		DIAMETER			STARTED 1/7/94
				WEIGHT			COMPLETED 1/7/94
				FALL			DRILLER Dave Stratton
							GEOLOGIST Mac Armstrong

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS		
5	S-1	1	Concrete	Tan to light brown silty sand (SM) dry	CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers		
		2	4 inch protective steel casing				
		3					
5	S-2	20	Bentonite	Tan to brown clayey sandy silt (ML) moist	Water at 2.16 feet after 3 days		
		15	2 inch PVC Sch 40 casing				
		22				8 inch borehole	
							Tan to brown clayey sand (SC) moist
10	S-3	5	2 inch PVC Sch 40 10 slot well screen	Yellow brown clayey silt (ML) moist	Well casing and screen installed through augers		
		9					
		12					
15	S-4	9	Torpedo filter sand (7.5bgs)	Yellow brown clayey silt (ML) wet	Water at 6 feet immediately after drilling		
		13					
		16					
20			2 inch well cap	Total depth at 20 feet			

TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill						WELL NO. MW-12	
CLIENT Halifax County						SHEET 1 OF 3	
DRILLING CONTRACTOR Parratt Wolff, Inc.						JOB NO. 931210	
PURPOSE Monitoring Well for Ash Landfill						ELEV.	MP GR
GROUND WATER				CASING	SAMPLE	CORE	WELL
DATE	TIME	DEPTH	CASING	TYPE			DATUM
1-7-94	0700	40.0'		DIAMETER			STARTED 1/6/94
1-10-94	1430	39.31'		WEIGHT			COMPLETED 1/7/94
				FALL			DRILLER Dave Stratton
							GEOLOGIST Mac Armstrong

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
	S-1	1	Concrete	Red brown clayey silt (ML) dry	CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers
		1	→ 4 inch protective steel casing		
		3	→ 2 inch PVC Sch 40 casing		
5	S-2	5	8 inch borehole	Yellow brown clayey silt (ML) dry	Well casing and screen installed through augers
		8			
		10			
			Cement grout		
10	S-3	6	Cement grout	Yellow brown clayey silt (ML) dry	
		6			
		8			
15	S-4	6	Cement grout	Yellow brown clayey silt (ML) dry	
		6			
		8			
20				Yellow brown clayey silt (ML) dry	

TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill

WELL NO. MW-12

CLIENT Halifax County

JOB NO. 931210

SHEET 2 OF 3

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
	S-5	6 6 8	Cement grout	Yellow brown clayey silt (ML) moist	
25	S-6	3 4 9	8 inch borehole	Light brown clayey silt to silty clay (ML to CL) moist	
30	S-7	4 4 6	2 inch PVC Sch 40 casing	Yellow brown clayey micaceous silt (ML) moist	
35	S-8	4 4 5	Benonite	Brown micaceous silt (ML) moist	
40	S-9	9 12 15	2 inch PVC Sch 40 10 slot well screen	Brown to yellow brown micaceous silt (ML) moist	Water at 39.31 feet after 3 days Water at 40 feet after 14 hours
45			Torpedo filter sand (9bgs)		

TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill						WELL NO. MW-13	
CLIENT Halifax County						SHEET 1 OF 2	
DRILLING CONTRACTOR Parratt Wolff, Inc.						JOB NO. 931210	
PURPOSE Monitoring Well for Ash Landfill						ELEV.	MP
GROUND WATER						CASING	SAMPLE
DATE	TIME	DEPTH	CASING	TYPE		WELL	DATUM
1-6-94	0700	35.0'		DIAMETER			STARTED 1/5/94
1-10-94	1300	27.39'		WEIGHT			COMPLETED 1/6/94
				FALL		DRILLER Dave Stratton	
						GEOLOGIST Mac Armstrong	

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTR- UCTION	IDENTIFICATION	REMARKS		
			Concrete	Red brown clayey silt (ML) dry	CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers		
			4 inch protective steel casing				
			2 inch PVC Sch 40 casing				
5	S-1	4	8 inch borehole				
		6					
		10					
10	S-2	4	Cement grout			Brown to orange clayey silt (ML) moist	Well casing and screen installed through augers
		4					
		8					
15	S-3	5		Brown to red brown clayey silt to silty clay (ML to CL) moist			
		5					
		9					
20							

TEST BORING - WELL CONSTRUCTION LOG

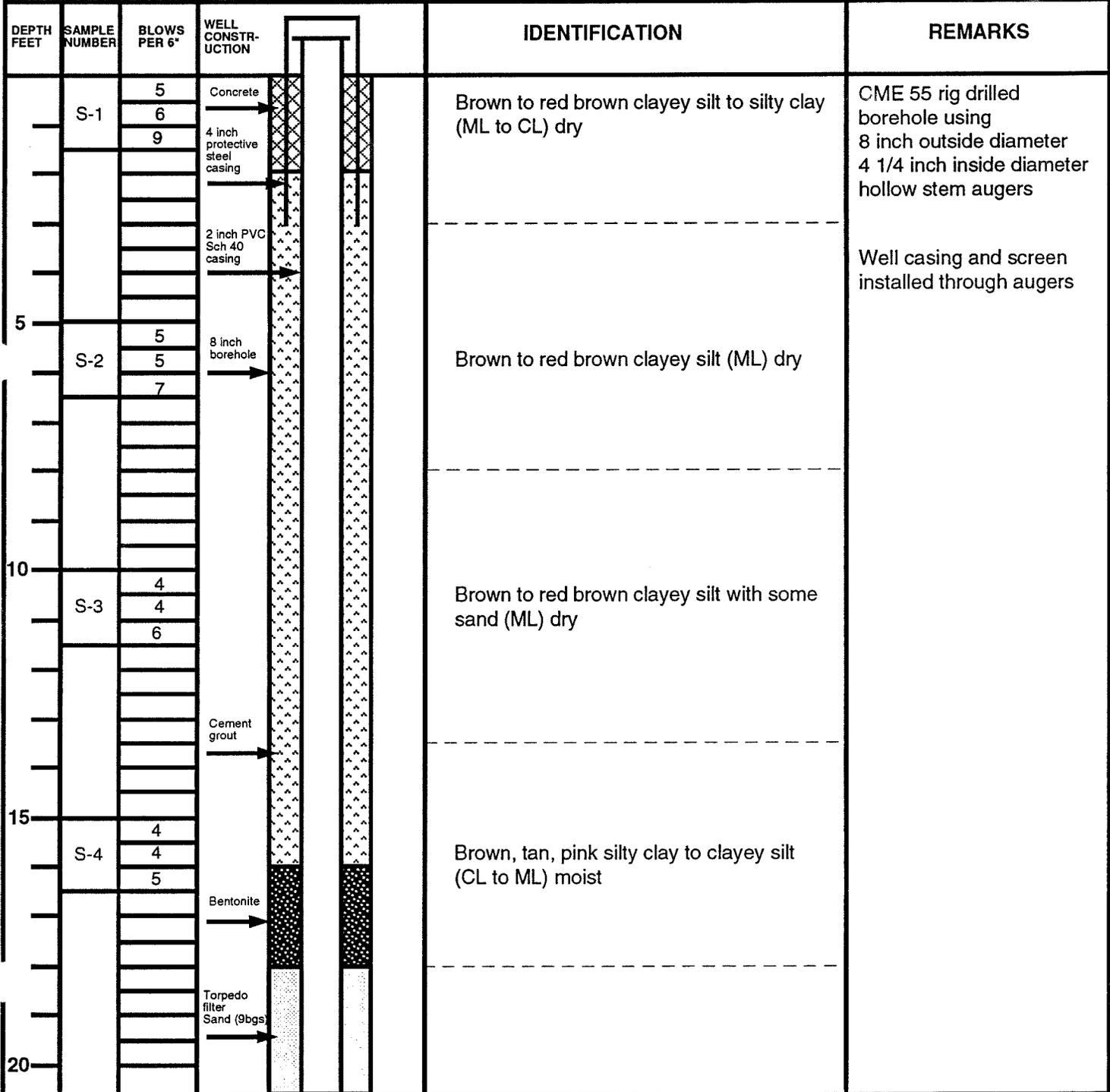
PROJECT	Halifax County Ash Landfill	WELL NO.	MW-13
CLIENT	Halifax County	JOB NO.	931210
		SHEET	2 OF 2

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
	S-4	4 5 7	Cement grout Benonite 2 inch PVC Sch 40 casing	Brown to yellow brown clayey silt (ML) moist	
25	S-5	4 3 7	8 inch borehole	Tan, white, brown clay to clayey silt (CL to ML) moist	Water at 27.39 feet after 5 days
30	S-6	4 5 10	2 inch PVC Sch 40 10 slot well screen	Tan to brown silty clay to clayey silt (CL to ML) moist	
35	S-7	4 6 9	Torpedo filter sand (9bgs)	Tan, brown, white silty clay (CL) moist	Water at 35 feet after 14 hours
40	S-8	8 12 13	2 inch well cap	Tan, brown, white silty clay (CL) moist to wet	
45				Total depth at 41.5 feet	

TEST BORING - WELL CONSTRUCTION LOG

PROJECT	Halifax County Ash Landfill	WELL NO.	MW-14
CLIENT	Halifax County	SHEET 1 OF 2	
DRILLING CONTRACTOR	Parratt Wolff, Inc.	JOB NO.	931210
PURPOSE	Monitoring Well for Ash Landfill	ELEV.	MP GR

GROUND WATER				CASING	SAMPLE	CORE	WELL	DATUM
DATE	TIME	DEPTH	CASING	TYPE				STARTED 1/10/94
1-11-94	1300	23.21		DIAMETER				COMPLETED 1/11/94
				WEIGHT				DRILLER Dave Stratton
				FALL				GEOLOGIST Mac Armstrong



TEST BORING - WELL CONSTRUCTION LOG

PROJECT Halifax County Ash Landfill

BORING NO. MW-14

CLIENT Halifax County

JOB NO. 931210

SHEET 2 OF 2

DEPTH FEET	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
	S-5	4 5 9	<p>Torpedo filter sand (9bgs)</p> <p>8 inch borehole</p> <p>2 inch PVC Sch 40 10 slot well screen</p> <p>2 inch well cap</p>	Red brown to brown clayey silt (ML) moist	<p>Water at 23.21 feet after 20.5 hours</p>
25	S-6	5 6 12		Brown, pink, black clayey sandy silt (ML) moist	
30	S-7	5 5 9		Pink, tan, white, brown clayey sandy silt (ML) wet	
35	S-8	8 12 13		Pink, tan, white clayey sandy silt to silty clayey sand (ML to SM) wet	
40				Total depth at 36.5 feet	
45					

WELL COMPLETION RECORD

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

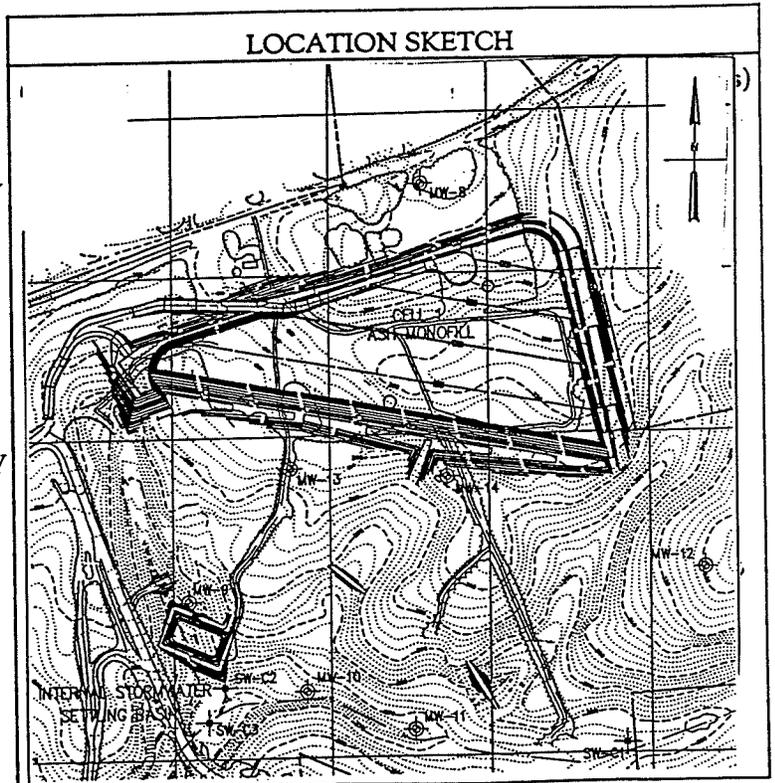
Monitoring Well MW-9

NAME OF SITE: Halifax County Ash Landfill		PERMIT NO.:
ADDRESS: State Road 1417(P.O. Box 327) Halifax, NC 27839		OWNER (print): Halifax County
DRILLING CONTRACTOR: Parratt Wolff, Inc.		REGISTRATION NO.: 1446

Casing Type: Sch 40 PVC dia. 2 in. Grout Depth: from Sur to 6 ft. - dia. 8 in.
 Casing Depth: from +1.83 to 10 ft. - dia. in. Bentonite Seal: from 6 to 8 ft. - dia. 8 in.
 Screen Type: Sch 40 PVC 0.010" dia. 2 in. Sand/Gravel PK: from 8 to 25 ft. - dia. 8 in.
 Screen Depth: from 10 to 25 ft. - dia. in. Total Well Depth: from Sur to 25 ft. - dia. 8 in.

Static Water Level: 9.31 feet from top of casing Date Measured 1 / 10 / 94
 Yield (gpm): NA Method of Testing: NA Casing is 1.83 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
Surface	3.0'	Red brown sandy clayey silt(ML)dry
3.0'	8.5'	Red brown sandy silt to sandy silty clay (ML to CL)dry
8.5'	13.0'	Red brown silty clayey sand to sandy clay (SM to CL)moist
13.0'	18.0'	Tan to brown silty clayey sand(SM)moist partially weathered rock (con't on back)



REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch side diameter hollow stem augers. Well casing and screen installed through augers.

DATE: 1-20-94 SIGNATURE: Waclaw M. Armstrong

WELL COMPLETION RECORD

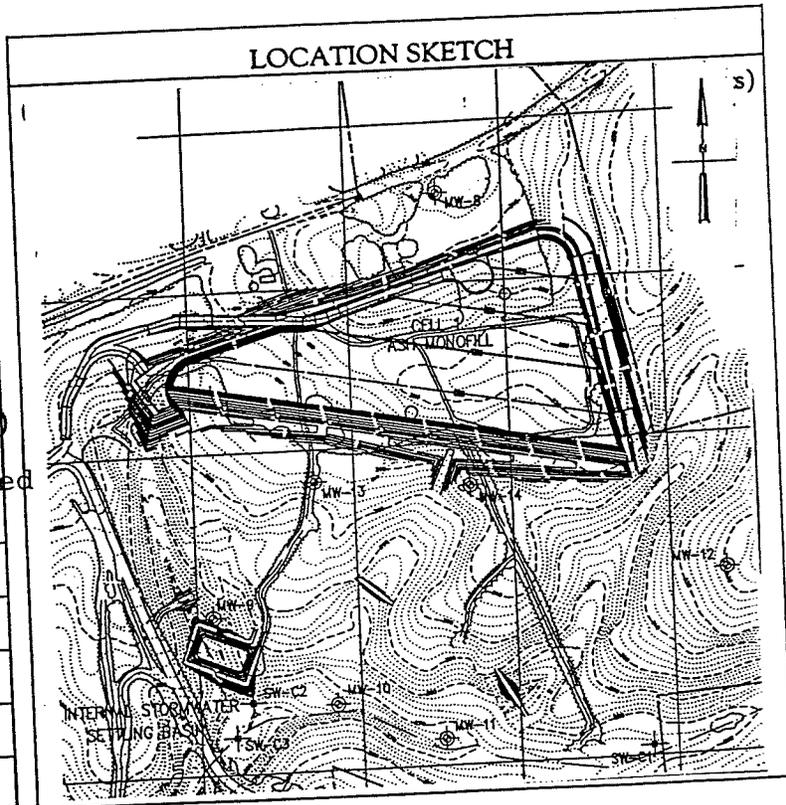
COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

Monitoring Well MW-10		PERMIT NO.:
NAME OF SITE: Halifax County Ash Landfill		OWNER (print): Halifax County
ADDRESS: State Road 1417 (P.O. Box 327) Halifax, NC 27839		REGISTRATION NO.:
DRILLING CONTRACTOR: Parratt Wolff, Inc.		1446

Casing Type: Sch 40 PVC _____ dia. 2 in. Grout Depth: from Sur to 2 ft. - dia. 8 in.
 Casing Depth: from +2.15 to 5 ft. - dia. _____ in. Bentonite Seal: from 2 to 4 ft. - dia. 8 in.
 Screen Type: Sch 40 PVC 0.010 dia. 2 in. Sand/Gravel PK: from 4 to 16.5 ft. - dia. 8 in.
 Screen Depth: from 5 to 15 ft. - dia. _____ in. Total Well Depth: from Sur to 15 ft. - dia. 8 in.

Static Water Level: 3.75 feet from top of casing Date Measured 1/11/94
 Yield (gpm): NA Method of Testing: NA Casing is 2.15 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
Surface	3.0'	Brown sandy clayey silt (ML) wet
3.0'	8.0'	Brown silty sand with pieces of rock (SM) wet
8.0'	13.0'	Brown to pink sand (SM) wet (partially weathered rock)
13.0'	16.5'	Partially weathered rock



REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers. Well casing and screen installed through augers.

DATE: 1-20-94 SIGNATURE: Macklin M. Armstrong

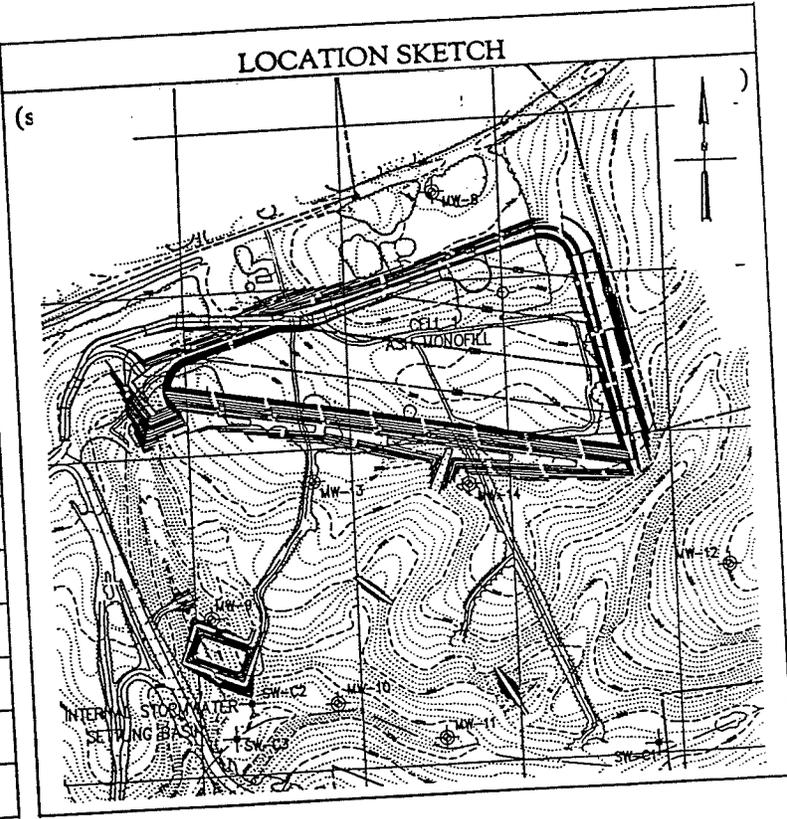
WELL COMPLETION RECORD

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

Monitoring Well MW-11		PERMIT NO.:
NAME OF SITE: Halifax County Ash Landfill		OWNER (print): Halifax County
ADDRESS: State Road 1417(P.O. Box 327) Halifax, NC 27839		REGISTRATION NO.:
DRILLING CONTRACTOR: Parratt Wolff, Inc.		1446

Casing Type: SCH 40 PVC dia. 2 in. Grout Depth: from Sur to 1.5 ft. - dia. 8 in.
 Casing Depth: from +2.78 to 4.5 ft. - dia. 2 in. Bentonite Seal: from 1.5 to 3.5 ft. - dia. 8 in.
 Screen Type: Sch 40 PVC 0.010" dia. 2 in. Sand/Gravel PK: from 3.5 to 20 ft. - dia. 8 in.
 Screen Depth: from 4.5 to 19.5 ft. - dia. 2 in. Total Well Depth: from Sur to 20 ft. - dia. 8 in.
 Date Measured 1 / 10 / 94
 Static Water Level: 2.16 feet from top of casing Casing is 2.78 feet above land surface
 Yield (gpm): NA Method of Testing: NA

DEPTH FROM	TO	FORMATION DESCRIPTION
Surface	2.0'	Tan to light brown silty sand(SM)dry
2.0'	3.5'	Yellow brown silty clay(CL)dry
3.5'	6.0'	Tan to brown clayey sandy silt(ML)moist
6.0'	8.0'	Tan to brown clayey sand(SC)moist
8.0'	13.0'	Yellow brown clayey silt(ML)moist
13.0'	16.0'	Yellow brown clayey silt(ML)wet



REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers. Well casing and screen installed through augers.

DATE: 1-20-94 SIGNATURE: Marklin M. Armstrong

WELL COMPLETION RECORD

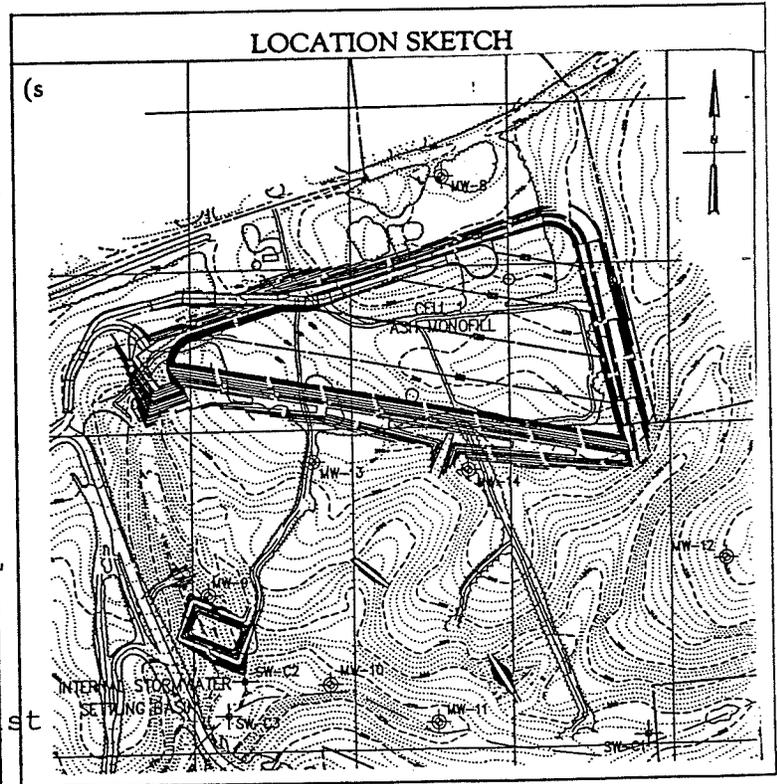
COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

Monitoring Well MW-12		PERMIT NO.:
NAME OF SITE: Halifax County Ash Landfill		OWNER (print): Halifax County
ADDRESS: State Road 1417 (P.O. Box 327) Halifax, NC 27839		REGISTRATION NO.:
DRILLING CONTRACTOR: Parratt Wolff, Inc.		1446

Casing Type: Sch 40 PVC dia. 2 in. Grout Depth: from Sur to 31 ft. - dia. 8 in.
 Casing Depth: from +1.95 to 4.5 ft. - dia. in. Bentonite Seal: from 31 to 33 ft. - dia. 8 in.
 Screen Type: Sch 40 PVC 0.010" dia. 2 in. Sand/Gravel PK: from 33 to 51.5 ft. - dia. 8 in.
 Screen Depth: from 35 to 50 ft. - dia. in. Total Well Depth: from Sur to 50 ft. - dia. 8 in.

Static Water Level: 39.31 feet from top of casing Date Measured 1 / 10 / 94
 Yield (gpm): NA Method of Testing: NA Casing is 1.95 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
Surface	3.0'	Red brown clayey silt (ML) dry
3.0'	18.5'	Yellow brown clayey silt (ML) dry
18.5'	23.0'	Yellow brown clayey silt (ML) moist
23.0'	28.0'	Light brown clayey silt to silty clay (ML) to CL) moist
28.0'	33.0'	Yellow brown clayey micaceous silt (ML) moist
(con't on back)		



REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers. Well casing and screen installed through augers.

DATE: 1-20-94 SIGNATURE: Macklin M. Armstrong

WELL COMPLETION RECORD

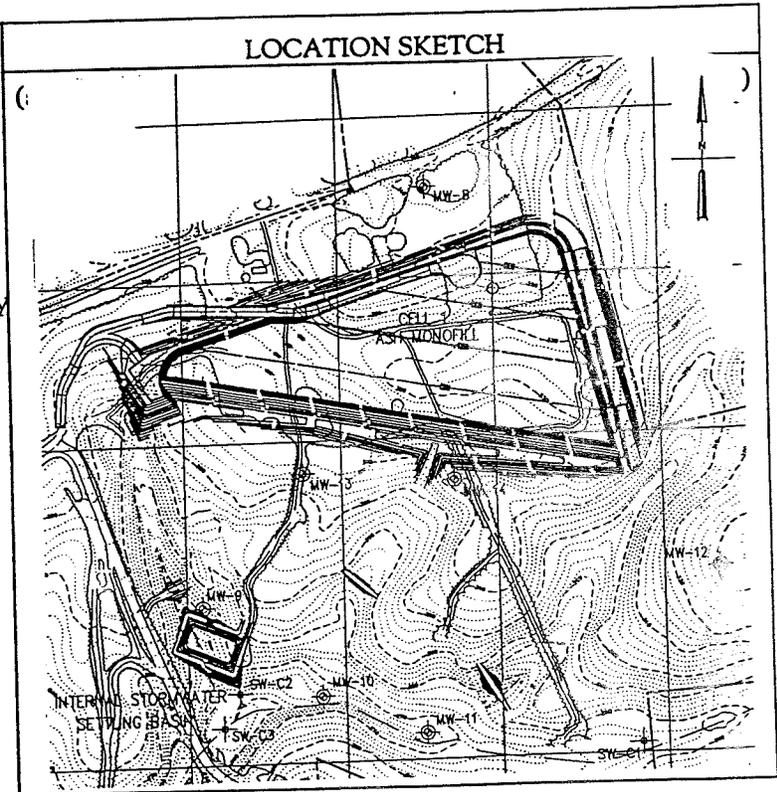
COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

Monitoring Well MW-13		PERMIT NO.:
NAME OF SITE: Halifax County Ash Landfill		OWNER (print): Halifax County
ADDRESS: State Road 1417(P.O. Box 327) Halifax, NC 27839		REGISTRATION NO.:
DRILLING CONTRACTOR: Parratt Wolff, Inc.		1446

Casing Type: Sch 40 PVC dia. 2 in. Grout Depth: from Sur to 21 ft. dia. 8 in.
 Casing Depth: from +1.78 to 25 ft. dia. in. Bentonite Seal: from 21 to 23 ft. dia. 8 in.
 Screen Type: Sch 40 PVC 0.010" dia. 2 in. Sand/Gravel PK: from 23 to 41.5 ft. dia. 8 in.
 Screen Depth: from 25 to 40 ft. dia. in. Total Well Depth: from Sur to 40 ft. dia. 8 in.

Static Water Level: 27.39 feet from top of casing Date Measured 1 / 10 / 94
 Yield (gpm): NA Method of Testing: NA Casing is 1.78 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
Surface	8.0'	Red brown clayey silt (ML)dry
8.0'	12.0'	Brown to orange clayey silt(ML)moist
12.0'	19.5'	Brown to red brown clayey silt to silty clay(ML to CL)moist
19.5'	23.0'	Brown to yellow brown clayey silt(ML)moist
23.0'	28.5'	Tan, white, brown clay to clayey silt(CL to ML)moist



REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch side diameter hollow stem augers. Well casing and screen installed through augers.

DATE: 1-20-94 SIGNATURE: Macklin M. Armstrong

WELL COMPLETION RECORD

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

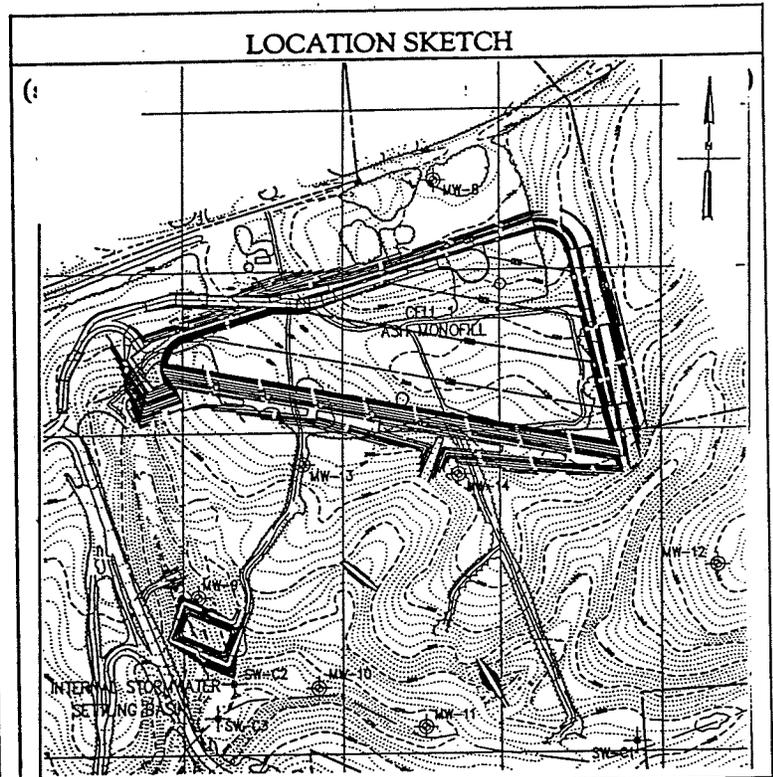
Monitoring Well MW-14

NAME OF SITE: Halifax County Ash Landfill		PERMIT NO.:
ADDRESS: State Road 1417(P.O. Box 327) Halifax, NC 27839		OWNER (print): Halifax County
DRILLING CONTRACTOR: Parratt Wolff, Inc.		REGISTRATION NO.: 1446

Casing Type: Sch 40 PVC dia. 2 in. Grout Depth: from Sur to 16 ft. - dia. 8 in.
 Casing Depth: from +1.59 to 20 ft. - dia. in. Bentonite Seal: from 16 to 18 ft. - dia. 8 in.
 Screen Type: Sch 40 PVC 0.010" dia. 2 in. Sand/Gravel PK: from 18 to 36.5 ft. - dia. 8 in.
 Screen Depth: from 20 to 35 ft. - dia. in. Total Well Depth: from Sur to 35.0 ft. - dia. 8 in.

Static Water Level: 23.21 feet from top of casing Date Measured 1/11/94
 Yield (gpm): NA Method of Testing: NA Casing is 1.59 feet above land surface

DRILLING LOG		
DEPTH		FORMATION DESCRIPTION
FROM	TO	
0.0'	3.0'	Brown to red brown clayey silt to silty clay(ML to CL)dry
3.0'	8.0'	Brown to red brown clayey silt(ML)dry
8.0'	13.5'	Brown to red brown clayey silt with some sand(ML)dry
13.5'	18.0'	Brown,tan,pink silty clay to clayey silt (CL to ML)moist
(con't on back)		



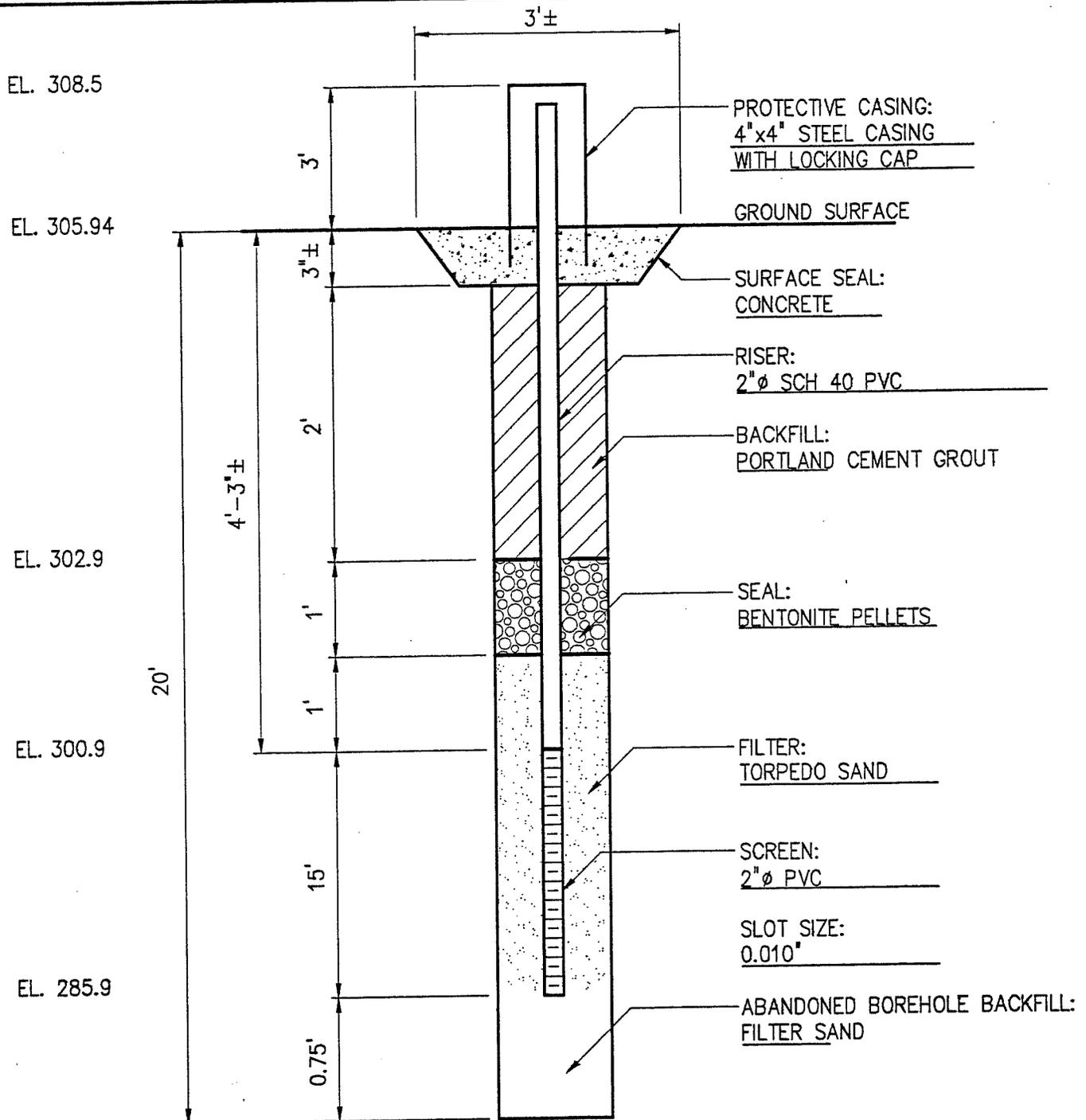
REMARKS: CME 55 rig drilled borehole using 8 inch outside diameter 4 1/4 inch inside diameter hollow stem augers. Well casing and screen installed through
gers.

DATE: 1-20-94 SIGNATURE: Marklin M. Armstrong

WELL COMPLETION RECORD

Well No: MW-8
 Project: HALIFAX CO. COAL ASH MONOFILL
 Monitoring Well No: MW-8
 Water Depth: 3.0'

Installation Date: 3/5/92
 Project No: 3716
 Ground Surface El: 305.94
 Measured: AT TERMINATION



HALIFAX COUNTY SOLID WASTE LANDFILL
 LOCATION OF MONITORING WELLS, DETERMINATION OF ELEVATION
 20 JANUARY 1994 MURPHY HOBSON SACKS, REGISTERED LAND SURVEYORS

WELL	NORTHING	EASTING	RISER	CASE OPEN	REF NAIL
MW01	959366.34	2349008.18	---.---	---.---	322.87
MW08	959780.42	2350290.39	308.57	308.49	305.94
MW09	958513.06	2349565.75	277.35	277.23	275.52
MW10	958207.25	2349910.05	258.77	258.63	256.62
MW11	958068.28	2350328.38	265.96	265.91	263.18
MW12	958581.23	2351172.80	329.52	329.43	327.57
MW13	959014.90	2349834.46	308.08	308.00	306.30
MW14	958939.24	2350334.95	306.99	306.87	305.40

General Notes:

Horizontal and vertical control adopted from Benchmark 1 and Benchmark 3 as shown on Sheet 3 of 11 by Hazen and Sawyer, Job # 3716.

Traverse closure: Angles exceed class "AA", 1/26,552 precision.

All elevations from closed loops from referenced benchmarks.

MW01 was not in original scope. Well was locked and no H&S personnel were on site when this well was surveyed.

CASE OPEN: This represents the top of the outer protective casing when the well is opened and the cover is hinged away.

RISER: Inner wells were capped and locked. These elevations are on top of protective PVC cap.



James S. Murphy
 20 JAN 1994

SECTION 6.2
GROUNDWATER MONITORING PLAN

GROUND WATER MONITORING PLAN
HALIFAX COUNTY ASH MONOFILL
HALIFAX COUNTY, NORTH CAROLINA



As part of the Coal Ash Monofill Permit Application for the Halifax County Solid Waste Department, the following ground water and surface water monitoring plan is proposed for the landfill in accordance with 15A NCAC 13B rules in order to monitor the effects of the facility on the surrounding and underlying water. The plan shall consist of semi-annual testing of ground water monitoring wells and surface water sampling in adjacent waterways.

The ground water monitoring system consists of five permanent monitoring wells, MW-8, MW-9, MW-10, MW-11, MW-12, and two temporary monitoring wells, MW-13 and MW-14. Monitoring well MW-12 will serve as the upgradient background well and the other wells will serve as downgradient wells. The locations of the monitoring wells are shown in the Hazen and Sawyer figure (Figure 1) attached to this plan. Screen depths for the wells are summarized in Table 1. All monitoring wells were constructed in accordance with 15 NCAC 2C Section .0100. The wells were constructed such that a water sample can be obtained at each monitoring well location throughout the year. All monitoring wells are protected from impact by mechanized equipment by a protective steel casing. The locations and depths of the monitoring wells are such to allow early detection of ground water contaminants within the upper most aquifer(s) in the principle down gradient directions.

The surface water monitoring system is designed to monitor any contaminants entering the stream to the south of the ash landfill. One upstream monitoring point, SW-C1, and one downstream monitoring point, SW-C3, will be established along the stream as shown on the attached figure. In addition, outfall at the internal stormwater basin, SW-C2, will be tested during the initial sampling round.

Testing methods will be in accordance with accepted industrial protocol and North Carolina Solid Waste Section (SWS) rules and policy. For baseline sampling, ground water testing shall be conducted for the parameters set forth in "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities," prescribed by NC-DSWM, and SWS rules and policies. After the first baseline sampling round, the parameters BOD, COD, TOX, TOC, iron, and manganese will not be tested. Unfiltered samples will be collected in the field for total metals analysis. Total suspended solids (TSS) will also be tested during all sampling rounds.

In accordance with 15A NCAC 13B Rule .1623 (b) (3) (c), this monitoring plan has been prepared under the responsible charge of a duly Licensed Geologist, authorized to practice under North Carolina General Statute 89E. This plan should be reasonably effective in providing early detection of a release of a hazardous constituent(s) from the ash landfill into the upper most aquifer(s), which would constitute a risk to public health and the environment.

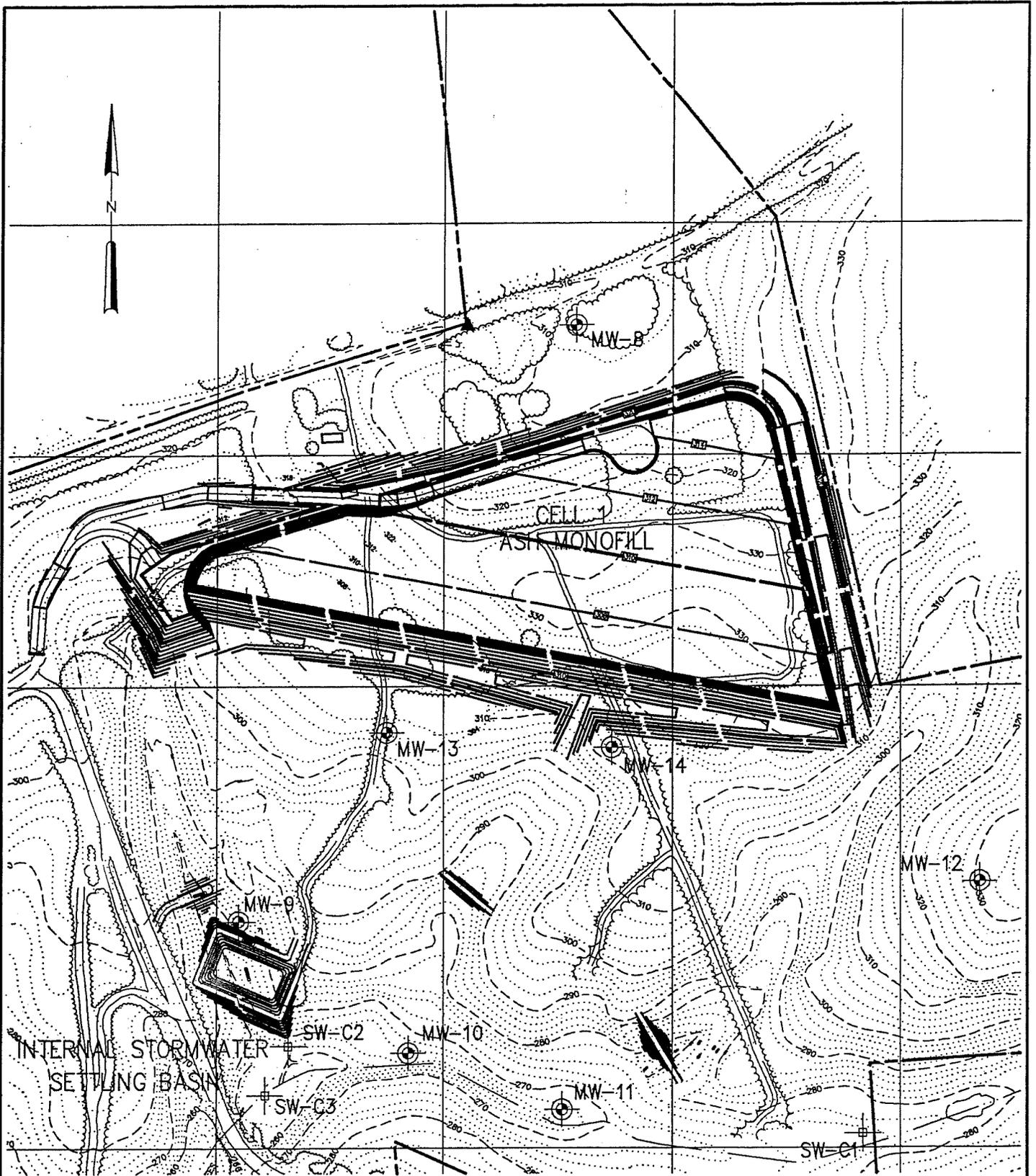
Macklin M. Armstrong
Macklin M. Armstrong, P.G.
Principal Geologist





TABLE 1
Monitoring Well Data

Monitoring Well	Ground Surface Elevation (feet)	Depth of Well (feet)	Screen Interval	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)
MW-8	305.94	20	5 to 20	308.57	288.57
MW-9	275.52	25	10 to 25	277.35	252.35
MW-10	256.62	15	5 to 15	258.77	243.77
MW-11	263.18	20	5 to 20	265.96	245.96
MW-12	327.57	50	35 to 50	329.52	279.52
MW-13	306.30	40	25 to 40	308.08	268.08
MW-14	305.40	36.5	20 to 35	306.99	271.99



PLAN

1"=300'

HAZEN AND SAWYER
 Environmental Engineers & Scientists
 RALEIGH, NORTH CAROLINA

HALIFAX COUNTY
 ASH MONOFILL

FIGURE 1
 MONITORING WELL
 LAYOUT