

February 7, 1994

Mr. Jim Barber
North Carolina Department of Environment,
Health, and Natural Resources
Division of Solid Waste Management
225 Green Street, Suite 601
Fayetteville, NC 28301



Re: Response of DEHNR Comments
Halifax County Ash Monofill
Construction Record Documentation Report
H&S No. 3716

Dear Mr. Barber:

The following are the Hazen and Sawyer responses to DEHNR's comments prepared by Mr. Barber in a February 3, 1994 letter. Revised pages, where indicated, are attached.

A. Hazen and Sawyer Field Reports

1. 11/19/93 Field Report

The referenced subgrade was rerolled and approved by the Certifying Engineer on 11/21, as indicated on the Subgrade Approval Form for that date. The Daily Field Report for 11/21 has been revised to clarify this, and is attached.

2. 11/24/93 Field Report

The deer punctured the geomembrane. The entire area was inspected closely by both Hazen and Sawyer and the installer. Damaged areas (Panel 111) were repaired and tested in accordance with the Specifications. This is indicated on the Panel Inspection Form for P111 submitted previously.

Mr. Jim Barber
February 7, 1994
Page 2

3. 11/23/93 and 11/25/93 Field Reports

All affected seams were closely inspected by the Certifying Engineer and the Resident Engineer and representative areas were selected for testing (DS#42 and #44). All seam areas were nondestructively tested by the installer and inspected by the Engineer and complied with the Specifications.

4. 12/01/93 Field Report

The areas that were incorrectly repaired by the Installer were marked on the liner by Hazen and Sawyer. The patches were cut out and replaced with larger patches, tested and approved. Since only the approved patch is shown on the Panel Inspection Forms, a separate list of repair locations is impossible to assemble at this time. As stated in the report and on the CQA documentation, all such areas were repaired in accordance with the Specifications.

B. Geotechnologies Field Reports

Clarification of the daily field reports has been provided by Geotechnologies and is submitted as Attachment No. 1 of this response.

In regards to the pipe outfall (9/30/93), the entire pipe subgrade was inspected and approved prior to backfilling by the H&S Resident Engineer. The soft area identified was local in nature, and removed and repaired in accordance with the Specifications.

C. Density Tests

1. See Geotechnologies, Inc. letter provided as Attachment No. 1/
2. Landfill Subgrade

Excavation of the cell was conducted using scrapers. Hazen and Sawyer and Geotechnologies personnel observed the subgrade during trafficking of loaded scrapers, and no pumping, etc. was observed. The geomembrane subgrade was left slightly high and trimmed just prior to installation. We also monitored this operation and saw no evidence of soft subgrade. In addition, the base of the monofill was rolled by a SAKAI SV91-TF smooth drum vibratory

Mr. Jim Barber
February 7, 1994
Page 3

roller. A subgrade approval form was completed for each section of subgrade, approved and signed by the Resident Engineer, Project Superintendent, and the Liner Installer. Refer to Section 3.4 page 14 of the report.

3. Conformance Testing

Prior to geomembrane shipment, three conformance tests were conducted by AGP Labs, Inc., on November 15, 1993. On December 7, 1993, additional conformance tests were conducted for the extra rolls acquired from another site to finish lining of the cell. All geomembrane was in conformance with project specifications. Conformance test information is presented in Appendix 3.3 of the report, previously submitted.

D. CQA Panel Reports

1. Darker copies of reports for panels 87, 88, 92, 94, 97, 98, 100-106, 111, 126-128, 130, and 134 are attached.
2. For Panels 104-111, cross hatched areas indicate where adjacent panels subsequently overlapped the panel in question.
3. Panels 112 and 115 represent areas indicated as questionable by the technician when the panel was first deployed. Later review by the Resident Engineer indicated that no repair was necessary. The questionable areas were crossed out and noted with "OK SAS" by the Resident Engineer on the Panel forms.
4. Geomembrane seaming equipment was monitored for set and actual temperatures during prewelds and prior to seaming each seam. Major fluctuations in actual temperature were recorded during seaming if observed.

E. Seam Inspection Forms

1. Seams 7-8, 9-8, 15-14, 18-19, 48-49, 51-52, 64-63, 142-143, 151-152 represents questionable areas marked by the technician when the seam was being welded. Later review by the Resident Engineer indicated that a repair was not needed. This has been clarified on revised Seam Inspection Forms, which are attached.

Mr. Jim Barber
February 7, 1994
Page 4

2. Seams 87-89, 89-88, 178-179 were vacuum tested according to project specifications but this information was not transferred to seam inspection sheets. During final walkthrough each patch was checked for "V.T. OK" written on patch to confirm testing was completed. Revised Seam Inspection Forms are attached.
3. Seams 68-67, 76-77, 79-78, 134-132, 133 were seams where "burn-thru's" occurred at the T-joints and were later covered by patches at the T-seams. No additional repair was necessary. The T-seams were completed in accordance with manufacturer's specifications.
4. Seam 119-120A, 119-120 was a seam that was simultaneously completed by two welding crews. Two forms were completed, one for each welder. The seam was completed at sundown (~ 5:30 pm). The next morning, the seam was re-inspected by the Hazen and Sawyer technician and a destructive sample (DS#25) was taken to confirm seam integrity.
5. Seam 106-105 was a disqualified seam that was entirely cap-stripped and vacuum tested. Refer to 12/9/93 Hazen and Sawyer field report, previously submitted.
6. Seam 27 A-27 B was a six foot long seam located at the southeast corner of the cell. The seam was fusion welded but not tested due to length of seam and location. Most of the seam was placed in the anchor trench.
7. Seam 32-33 was questioned regarding overlap. The base sheet overlapped the destructive sample at the time of note. The overlaps were later cut where the tie-in seam occurs at typically 10' from toe of slope. The repair for DS#3 was vacuum tested.
8. Seam Inspection Form 71-70 was not labeled for orientation. This form has been corrected to show orientation and is attached.

F. Operational Cover

The geomembrane was patched and tested in accordance with the Specifications and documented on the 1/11/94 Hazen and Sawyer Daily Field Report previously submitted.

Mr. Jim Barber
February 7, 1994
Page 5

G. Cell Sump Elevation

Mr. Barber has also requested clarification of the elevations along the toe of the southern (Intermediate) berm. The design intends for this grade to be essentially flat in order to allow the maximum amount of sediment to settle out in the cell. The sump was not intended to completely drain the cell when no ash is in the cell.

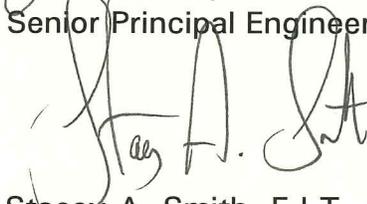
We trust that the information provided addresses your comments. If you have any questions or require any additional information, please contact us.

Very truly yours,

HAZEN AND SAWYER, P.C.



John A. Bove, P.E.
Senior Principal Engineer



Stacey A. Smith, E.I.T.
Assistant Engineer

JSB/SAS/wp
Attachments

cc: Jim Coffey (w/o attachments)
Sherry Hoyt
Hazen Blodgett, Halifax Co. (w/o attachments)

Hazen and Sawyer, P.C.
 4011 WestChase Boulevard
 Suite 500
 Raleigh, North Carolina 27607
 (919) 833-7152
 Fax (919) 833-1828

DATE	11-21-93	PROJECT NO.	3716
PROJECT	HALIFAX COUNTY ASH MONOFILL		
LOCATION	HALIFAX COUNTY, NC		
CONTRACTOR	BARNHILL	SUBCONTRACTORS	GEOTECHNOLOGIES
WEATHER	SUNNY ; 68°		
PRESENT AT SITE	H.S. BARNHILL, ENVIRONMENTAL DESIGN, GEOTECHNOLOGIES		

TO _____

THE FOLLOWING WAS NOTED:

ARRIVED ON SITE @ 7:45 AM
 BARNHILL
 - DRESSING UP SLOPES FOR ENVIRONMENTAL DESIGN
 ENVIRONMENTAL DESIGN
 - LINED 1/2 OF S. BERM & E. BERM ONLY
 - CAUGHT AIR TESTING GUY NOT WRITING CORRECT AIR PRESSURES
 - DISCUSSED WITH CHARLIE (ENV. DES.) & CORRECTED PROBLEM
 LEFT SITE @ 6:00 PM

WEAK AREA WAS SHOWN TO JOHN BOVE AND WAS RE-ROLLED
 AND APPROVED

COPIES TO _____

RESIDENT ENGINEER

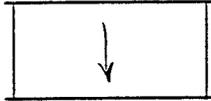
FIELD REPORT

SIGNED

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX COUNTY ASH MONOFILL PANEL NO. 87
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 68°
 DEPLOYMENT METHOD PULLED WITH 4-WHEELER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 87

~~#1~~
 1

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	CREASE	11-29-93 PS	PATCH	SAS

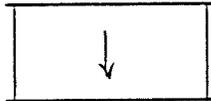
PANEL LENGTH 389'
 PANEL WIDTH 22.5'
 PANEL AREA 8753 FT²
 ROLL NUMBER 1550

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX COUNTY ASH MONOFILL PANEL NO. 88
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 60°
 DEPLOYMENT METHOD PULLED WITH

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 88

~~#1~~

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	CREASE	11-29-93 PJ	PATCH	SAS

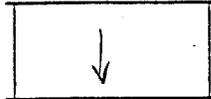
PANEL LENGTH 395'
 PANEL WIDTH 22.5'
 PANEL AREA 8888 FT²
 OLL NUMBER 1597

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX COUNTY ASH MONOFILL PANEL NO. 92
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 62°
 DEPLOYMENT METHOD PULLED WITH 4-WHEELERS (ATV'S)

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 92

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	CREASE	11-29-93 (PJ)	PATCH	SAS
11-22-93	#2	CREASE	11-29-93 (PJ)	PATCH	SAS
11-22-93	#3	CREASE	11-29-93 (PJ)	PATCH	SAS

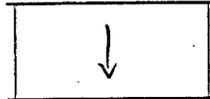
PANEL LENGTH 392'
 PANEL WIDTH 22.5'
 PANEL AREA 8820 Ft²
 ILL NUMBER 167

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX COUNTY ASH MONOFILL PANEL NO. 94
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY & 68°
 DEPLOYMENT METHOD PULLED WITH 4-WHEELERS (ATV)

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 94

OK 11/22/93 NOT A DEFECT

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	# 1	crease		OK	SAS

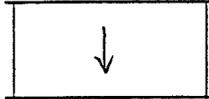
PANEL LENGTH 396'
 PANEL WIDTH 22.5'
 PANEL AREA 8910 FT²
 OLL NUMBER 1603

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALFAX COUNTY ASH MONOFILL PANEL NO. 97
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 5 68°
 DEPLOYMENT METHOD PULLED WITH 4-WHEELERS (ATV)

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 97

#1

#2

#3

#4

#5

#6

#7

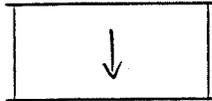
DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	CREASE	11-29-93 (PT)	PATCH	SAS
11-22-93	#2	CREASE	11-29-93 (PT)	PATCH	SAS
11-22-93	#3	CREASE	11-29-93 (PT)	PATCH	SAS
11-22-93	#4	CREASE	11-30-93 (PT)	PATCH	SAS
11-22-93	#5	CREASE	11-30-93 (PT)	PATCH	SAS
11-22-93	#6	CREASE	11-30-93 (PT)	PATCH	SAS
11-26-93	#7	CREASE	11-30-93 (PT)	PATCH	SAS

PANEL LENGTH 390 TECHNICIAN COMMENTS SAS
 PANEL WIDTH 22.5'
 PANEL AREA 375 FT²
 OLL NUMBER 1600

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX COUNTY ASH MOUND FILL PANEL NO. 98
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BAEWHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY & 60°
 DEPLOYMENT METHOD PULLED WITH 4-WHEELERS (ATV)

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 98

~~#1~~

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	CREASE	11-30-93 (RT)	PATCH	SAS

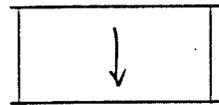
PANEL LENGTH 390'
 PANEL WIDTH 22.5'
 PANEL AREA 8775 FT²
 ROLL NUMBER 1604

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 100
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY ; 68°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH
 SHOW ALL DIMENSIONS



PANEL THICKNESS 60 (mils)

Panel No: 100

~~100~~

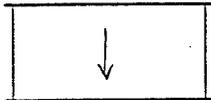
DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-26-93	1	SCRATCH	11-30-93 (AS)	PATCH	SAS

PANEL LENGTH 393' TECHNICIAN COMMENTS SAS
 PANEL WIDTH 22.5'
 PANEL AREA 8843 FT²
 TOLL NUMBER 1609

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 101
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY ; 68°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH
 SHOW ALL DIMENSIONS



PANEL THICKNESS 60 (mils)

Panel No: 101

#1

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	#1	SCRATCH	11-30-93 (PT)	PATCH	SAS

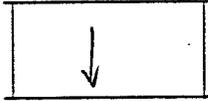
PANEL LENGTH 394'
 PANEL WIDTH 22.5'
 PANEL AREA 8865 sq ft
 ROLL NUMBER 1593

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 102
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-22-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 68°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 102

#3

#2

#1

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-22-93	# 1	CREASE	11-30-93 (PJ)	PATCH	SAS
11-22-93	# 2	CREASE	11-30-93 (PJ)	PATCH	SAS
11-26-93	# 3	CREASE	11-30-93 (PJ)	PATCH	SAS

PANEL LENGTH 391'
 PANEL WIDTH 22.5'
 PANEL AREA 8793 ft²
 ROLL NUMBER 1558

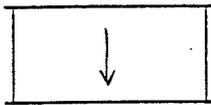
TECHNICIAN COMMENTS SAS

Base

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 103
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-23-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY & 70°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 103

Q#1

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
<u>11-24-93</u>	<u>1</u>	<u>Hole</u>	<u>11-30-93 (PT)</u>	<u>PATCH</u>	<u>SAS</u>

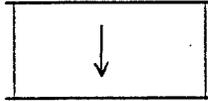
PANEL LENGTH 400
 PANEL WIDTH 22.5'
 PANEL AREA 9000 FT²
 OLL NUMBER 1584

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

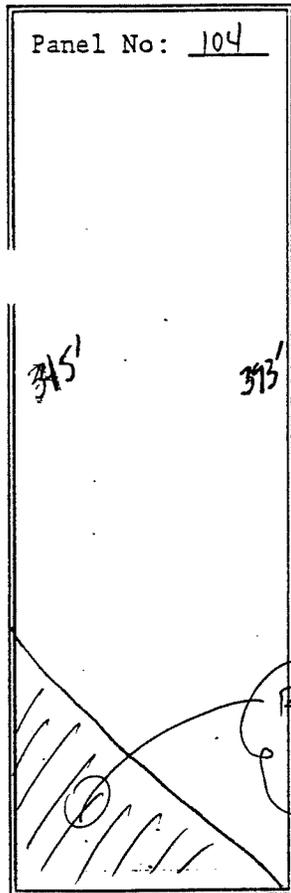
PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 104
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-23-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY ; 70°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS



DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY

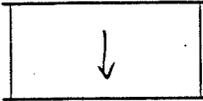
PANEL LENGTH 345, 393
 PANEL WIDTH 22.5'
 PANEL AREA 8302.5 ft²
 ROLL NUMBER 1607

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

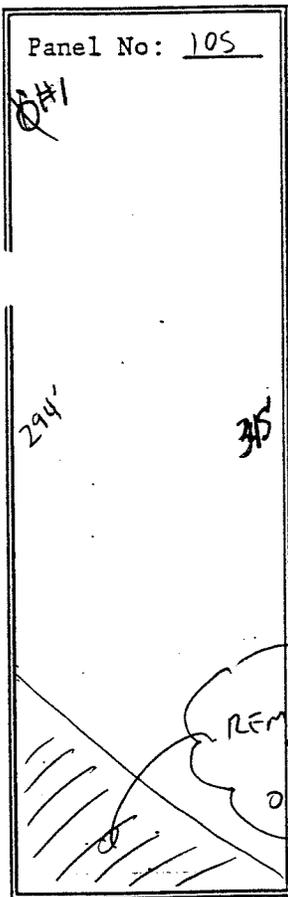
PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 105
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-23-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 70°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS



DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-24-93	1	CREASE	11-30-93 (P)	PATCH	SAS

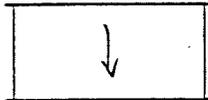
PANEL LENGTH 294', 345'
 PANEL WIDTH 22.5'
 PANEL AREA 7189 ft²
 ROLL NUMBER 1579

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

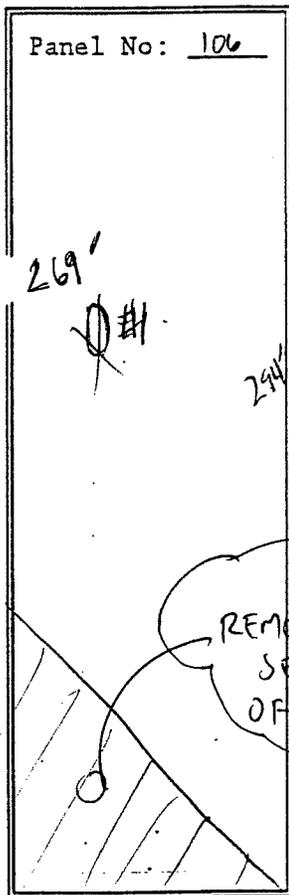
PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 106
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-23-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY ; 70°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS



DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-23-93	# 1	CREASE	11-30-93 (PS)	PATCH	SAS

PANEL LENGTH 269, 294
 PANEL WIDTH 22.5'
 PANEL AREA 6334 ft²
 ROLL NUMBER 1536

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 111
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-23-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY AND 70°
 DEPLOYMENT METHOD PULLED WITH FRONT LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 111

~~#2~~

~~#1~~

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-23-93	#1	CREASE	11-29-93 (PJ)	PATCH	SAS
11-23-93	#2	PUNCTURE	11-29-93 (PJ)	PATCH	SAS

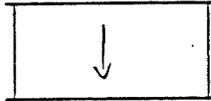
PANEL LENGTH 400'
 PANEL WIDTH 22.5'
 PANEL AREA 9000
 ROLL NUMBER 1575

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 126
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-24-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY & 65°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 126

~~Q#1~~

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-26-93	I	CREASE	11-29-93 (AG)	PATCH	SAS

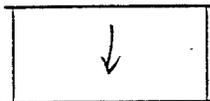
PANEL LENGTH 400'
 PANEL WIDTH 22.5'
 PANEL AREA 9000 FT²
 ROLL NUMBER 1981

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 127
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-24-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY = 65°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 127

X #1

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
<u>11-24-93</u>	<u>#1</u>	<u>CREASE</u>	<u>11-29-93 (AG)</u>	<u>PATCH</u>	<u>SAS</u>

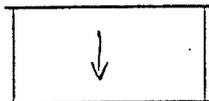
PANEL LENGTH 400'
 PANEL WIDTH 22.5'
 PANEL AREA 9000 FT²
 ROLL NUMBER 1570

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 123
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-24-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY & 65°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 128

[Handwritten marks and scribbles]

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-26-93	1	CREASE	11-29-93 (AG)	PATCH	SAS
11-26-93	2	CREASE	11-29-93 (AG)	PATCH	SAS

PANEL LENGTH 400'

TECHNICIAN COMMENTS SAS

PANEL WIDTH 22.5'

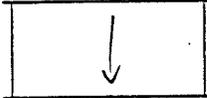
PANEL AREA 9000 sq'

OLL NUMBER 1570

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 130
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-24-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 65°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH



PANEL THICKNESS 60 (mils)

SHOW ALL DIMENSIONS

Panel No: 130

#1
#2

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-26-93	1	CREASE	11-29-93 (AG)	PATCH	SAS
11-26-93	2	CREASE	11-29-93 (AG)	PATCH	SAS

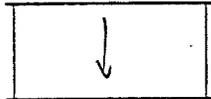
PANEL LENGTH 400 ft
 PANEL WIDTH 22.5'
 PANEL AREA 9000 FT²
 ROLL NUMBER 1603

TECHNICIAN COMMENTS SAS

CQA PANEL INSPECTION FORM

PROJECT NAME HALIFAX ASH MONOFILL PANEL NO. 134
 PROJECT NO. 3716 GEOMEMBRANE TYPE HDPE
 CONTRACTOR BARNHILL CONTRACTING INSTALLER ENVIRONMENTAL DESIGN
 DATE PLACED 11-24-93 SUBGRADE CONDITION OK
 WEATHER CONDITIONS SUNNY 65°
 DEPLOYMENT METHOD PULLED WITH LOADER

SHOW PROJECT NORTH
 SHOW ALL DIMENSIONS



PANEL THICKNESS 60 (mils)

Panel No: 134

DATE	DEFECT	DEFECT DESCRIPTION	REPAIR DATE	REPAIR TYPE	APPROVED BY
11-24-93	# 1	CREASE	11-29-93 (AG)	PATCH	SAS
11-24-93	# 2	CREASE	11-29-93 (AG)	PATCH	SAS

PANEL LENGTH 400
 PANEL WIDTH 225'
 PANEL AREA 9000 FT²
 OLL NUMBER 1587

TECHNICIAN COMMENTS SAS

CQA SEAM INSPECTION FORM

Sheet 3 of

PROJECT NAME HALFAY Co. Landfill
 PROJECT NO. 3716
 CONTRACTOR BARNHILL
 INSTALLER ENVIRON. DESIGN
 WELDING TECH FELIX (RED HAT)
 TYPE OF WELDER FUSION
 DATE WELDED 11-21-93

SEAM NO. 7-8
 SEAM LENGTH 40'
 COMMENTS OK

WELDING UNIT NO. R88 327
 TIME WELDED 11:25 (a.m./p.m.)

SEAM DETAIL
 (Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
		Date Tested
		CC Technician's Initials
		No. of Defects Found
		Date Repairs Made
		Date Retested
		Dated Inspected and Approved

2. Air Pressure Testing

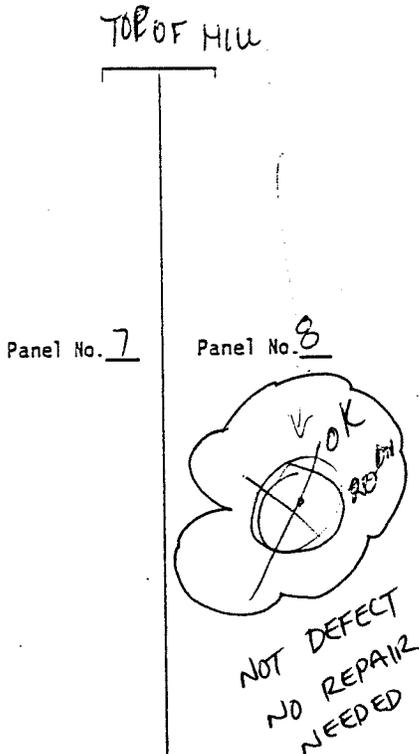
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
1:18 pm	30	1:23	30		39'	-	Y		SC

Legend

I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊙	Repair Tested
⊘	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NDT TYPE	APPROVED BY
#1	BURROW IT	OK	SAS



CQA SEAM INSPECTION FORM

Sheet 8 of

PROJECT NAME HALIFAX Co. AS- 11 MONDRIE
 PROJECT NO. 3716
 CONTRACTOR BARNHILL
 (INSTALLER ENVIRONMENTAL DESIGN)
 WELDING TECH FELIX
 TYPE OF WELDER FUSION
 DATE WELDED 11-21-93

SEAM NO. 18-19
 SEAM LENGTH 40'
 COMMENTS OK

WELDING UNIT NO. 327
 TIME WELDED 1213 a.m./p.m.

SEAM DETAIL
(Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
		Date Tested
		QC Technician's Initials
		No. of Defects Found
		Date Repairs Made
		Date Retested
		Dated Inspected and Approved

2. Air Pressure Testing

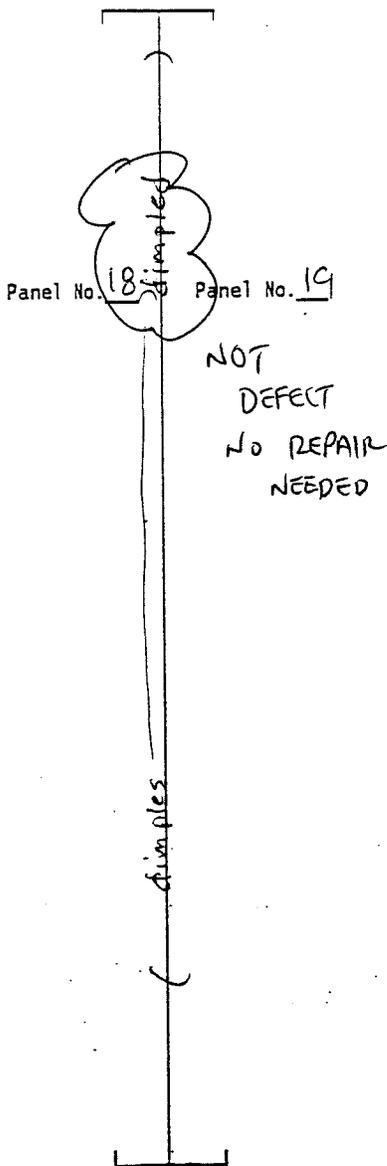
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
2:30	30	2:35	30		39'	-	Y		

Legend

I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊘	Repair Tested
●	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NOT TYPE	APPROVED BY



CQA SEAM INSPECTION FORM

Sheet 22 of

PROJECT NAME HAL FAX COLLECT ACCT MANHOLE
 PROJECT NO. 3716
 CONTRACTOR BARNETT
 INSTALLER ENVIRONMENTAL DESIGN
 WELDING TECH FEUX
 TYPE OF WELDER FUSION
 DATE WELDED 11-21-93

SEAM NO. 51-52
 SEAM LENGTH 50'
 COMMENTS Sample Top of Seam (SC)
 WELDING UNIT NO. 372
 TIME WELDED 4:21 a.m./p.m.

SEAM DETAIL
(Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
		Date Tested
		QC Technician's Initials
		No. of Defects Found
		Date Repairs Made
		Date Retested
		Dated Inspected and Approved

2. Air Pressure Testing

START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
946	30	951	30		49'	-	Y		OC

Legend

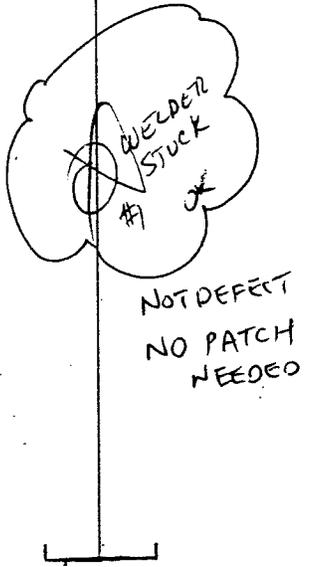
I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊙	Repair Tested
⊛	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NDT TYPE	APPROVED BY
1	WELDER STUCK		SAS

Panel No. 52
2# 1557

Panel No. 51
2# 1557



CQA SEAM INSPECTION FORM

Sheet _____ of _____

PROJECT NAME HALIFAX ASH MONOFILL
 PROJECT NO. 3710
 CONTRACTOR BARSHILL CONTRACTING
 INSTALLER ENVIRON. DESIGN
 WELDING TECH FA
 TYPE OF WELDER FUSION
 DATE WELDED 11/24/93

SEAM NO. 151-152
 SEAM LENGTH 39'
 COMMENTS BURN THRU
 WELDING UNIT NO. 327
 TIME WELDED 5:00 a.m. p.m.

SEAM DETAIL
 (Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH
Date Tested	
QC Technician's Initials	
No. of Defects Found	
Date Repairs Made	
Date Retested	
Date Inspected and Approved	

2. Air Pressure Testing

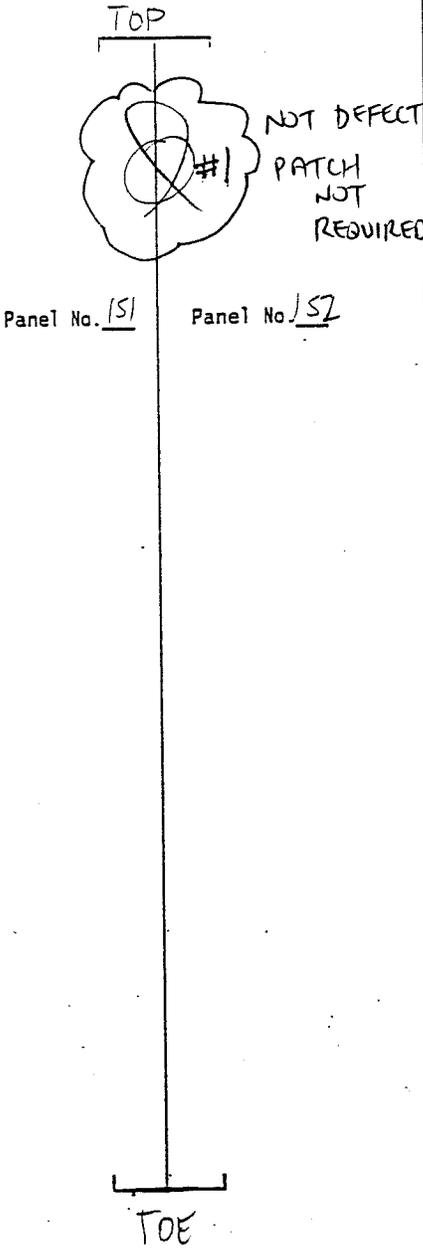
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
8:20 AM	30	8:25 AM	30		39'	-	Y		DC

Legend

I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊙	Repair Tested
●	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NOT TYPE	APPROVED BY
#1	BURN THRU		SX



CQA SEAM INSPECTION FORM

Sheet _____ of _____

PROJECT NAME HALIFAX ASH MONOFILL
 PROJECT NO. 3716
 CONTRACTOR BARSHILL CONTRACTING
 INSTALLER ENVIRONMENTAL DESIGN
 WELDING TECH E.G.
 TYPE OF WELDER FUSION
 DATE WELDED 11-22-93

SEAM NO. 87-88
 SEAM LENGTH 389
 COMMENTS REPAIR
 WELDING UNIT NO. 851
 TIME WELDED 10:45 (a.m./p.m.)

SEAM DETAIL
 (Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH
Date Tested	
QC Technician's Initials	
No. of Defects Found	
Date Repairs Made	
Date Retested	
Date Inspected and Approved	

2. Air Pressure Testing

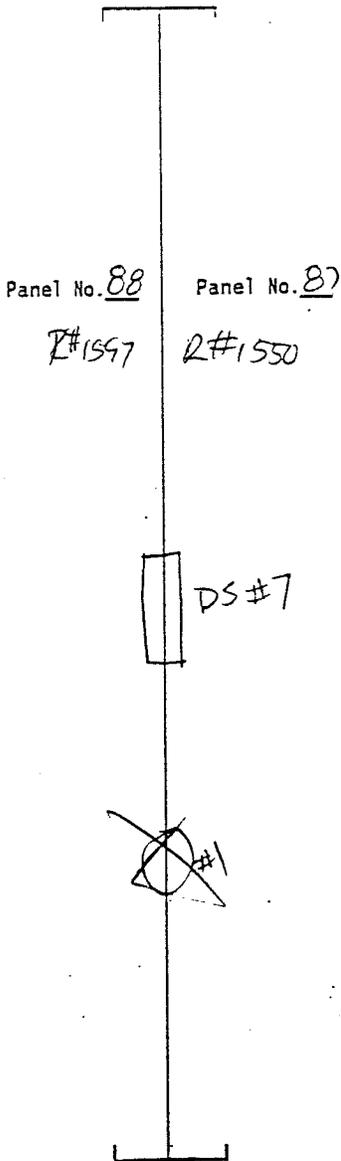
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
3:45	30	3:50	30		389'	-	Y		gc

Legend

I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
▨	Repair Tested
●	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NOT TYPE	APPROVED BY
#1	CUTOUT IN TRUCK	11-29 (PJ)	SAS
DS #7		11-25 (PJ)	CAJ



CQA SEAM INSPECTION FORM

Sheet 39 of

PROJECT NAME HALIFAX ASH MONOFILL
 PROJECT NO. 3716
 CONTRACTOR BARSHILL CONTRACTING
 INSTALLER ENVIRON. DESIGN
 WELDING TECH FZ / MM
 TYPE OF WELDER FUSION
 DATE WELDED 11-22-93

SEAM NO. 89-88
 SEAM LENGTH 392
 COMMENTS DS #8
 WELDING UNIT NO. 327
 TIME WELDED 12:05 a.m./p.m.

SEAM DETAIL
 (Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
<div style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;"> V.T. OK </div>		
		Data Tested
		QC Technician's Initials
		No. of Defects Found
		Data Repairs Made
		Data Retested
		Dated Inspected and Approved

2. Air Pressure Testing

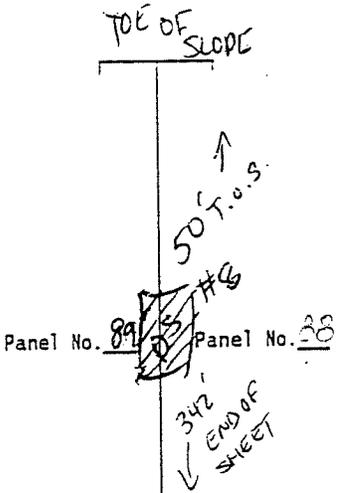
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
4:10 pm	30	4:15	30		392'	-	Y		JK

Legend

	ZONE 1 Air Pressure Zone
	Repair Needed
	Repair Completed
	Repair Tested
	Repair Approved
	Destructive Sample
	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NOT TYPE	APPROVED BY
DS #8	DS		SK



CQA SEAM INSPECTION FORM

Sheet _____ of _____

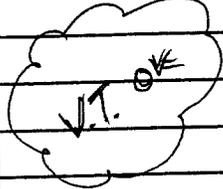
PROJECT NAME HAUER ASH MONOFIN
 PROJECT NO. 3716
 TRACTOR BARNHILL
 INSTALLER ENVIRONMENTAL DESIGN
 WELDING TECH A.G.
 TYPE OF WELDER FUSION
 DATE WELDED 11-25-93

SEAM NO. 178-179
 SEAM LENGTH 39'
 COMMENTS OK
 WELDING UNIT NO. 41
 TIME WELDED 10:20 (a.m.) p.m.

SEAM DETAIL
 (Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
		Date Tested
		QC Technician's Initials
		No. of Defects Found
		Date Repairs Made
		Date Retested
		Dated Inspected and Approved

2. Air Pressure Testing

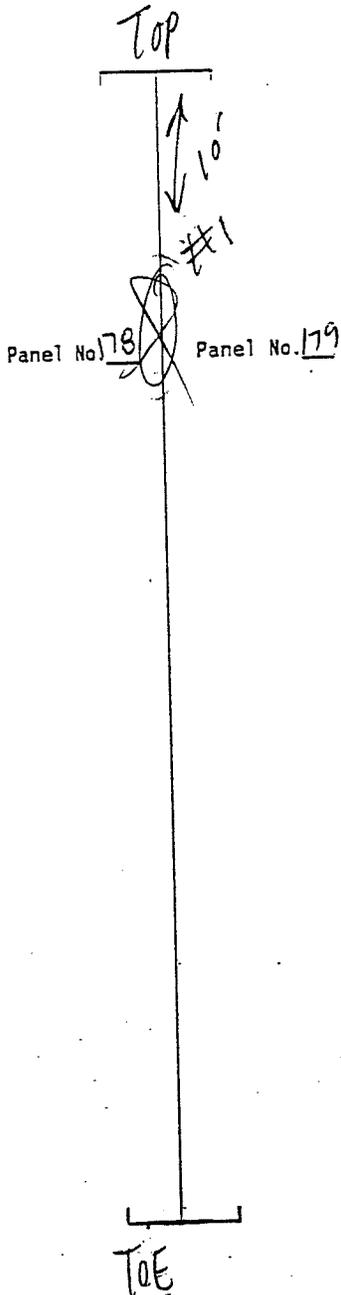
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
8:37 AM	30	8:42 AM	30		39'	-	Y		AG

Legend

	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊙	Repair Tested
●	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NDT TYPE	APPROVED BY
1	Hole	12-1 (FA)	SAG



CQA SEAM INSPECTION FORM

Sheet _____ of _____

PROJECT NAME HALIFAX ASH MONOFILL
 PROJECT NO. 3710
 CONTRACTOR BARSHILL CONTRACTING
 INSTALLER ENVIRONMENTAL DESIGN
 WELDING TECH EG
 TYPE OF WELDER FUSION
 DATE WELDED 11-22-93

SEAM NO. 71-70
 SEAM LENGTH 39'
 COMMENTS OK
 WELDING UNIT NO. 851
 TIME WELDED 9:15 a.m./p.m.

SEAM DETAIL
(Show Dimensions)

QUALITY ASSURANCE SUMMARY

1. Vacuum Box Test

ZONE	LENGTH	
		Date Tested
		QC Technician's Initials
		No. of Defects Found
		Date Repairs Made
		Date Retested
		Date Inspected and Approved

2. Air Pressure Testing

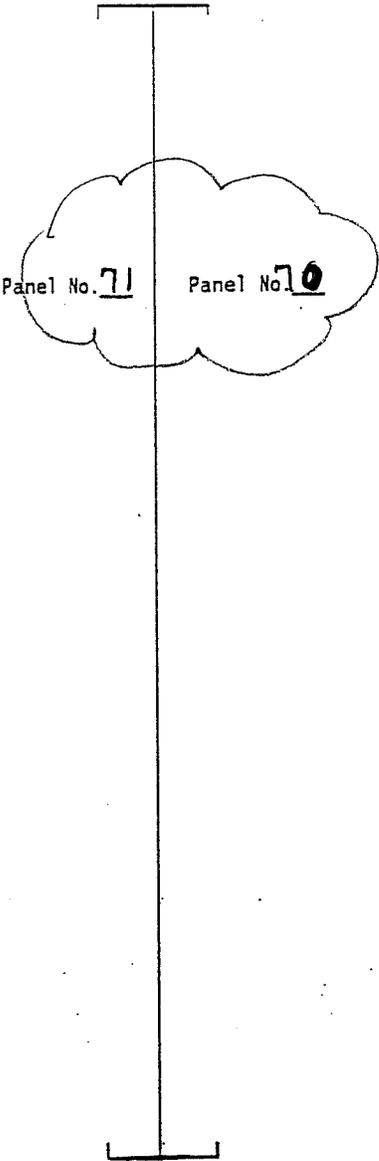
START TIME	START PRESSURE (psi)	END TIME	END PRESSURE (psi)	ZONE	LENGTH (ft)	PRESSURE LOSS (psi)	APPROVED (Y/N)	IF NO. CORRECTIVE ACTION	APPROVED BY
11:37	30	11:42	30		39'	-	Y		ge

Legend

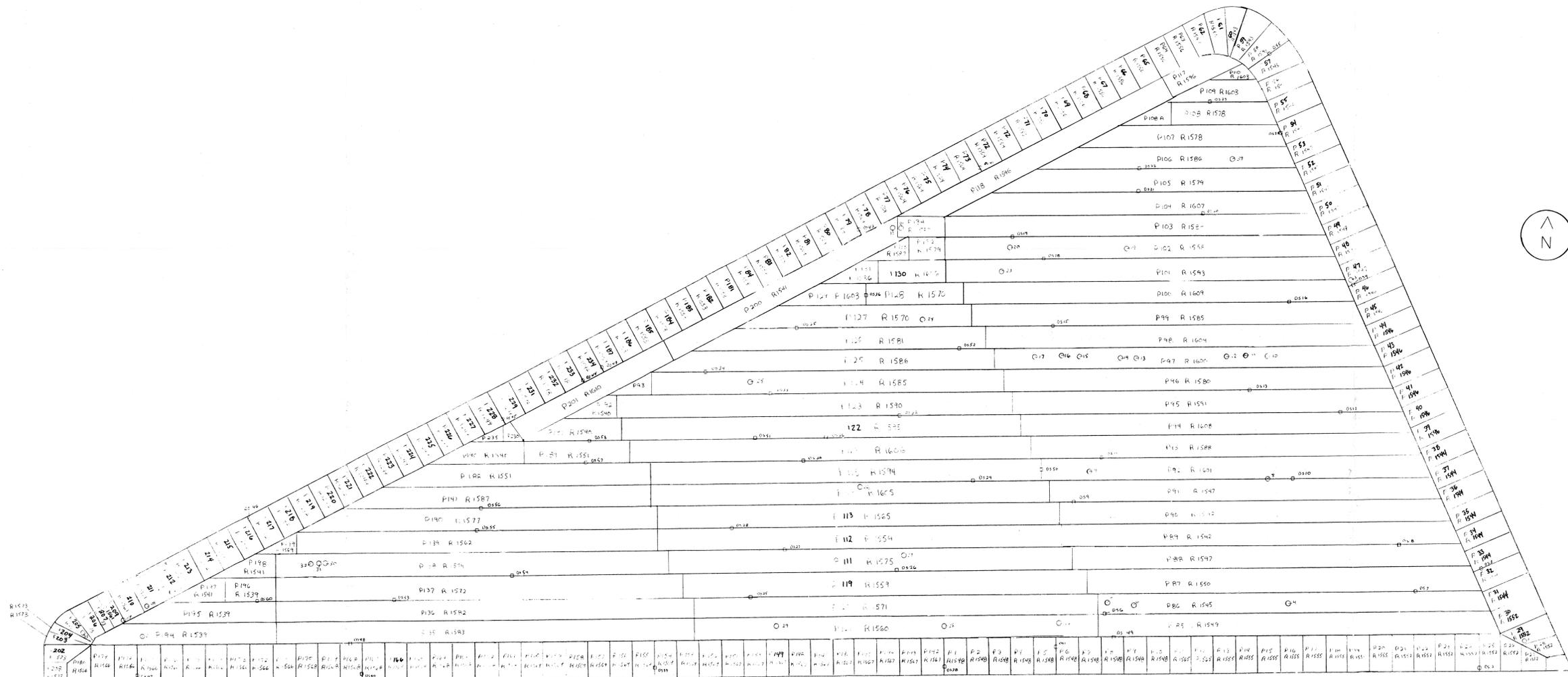
I	ZONE 1 Air Pressure Zone
○	Repair Needed
⊗	Repair Completed
⊘	Repair Tested
●	Repair Approved
□	Destructive Sample
▨	CAP Strip Repair

3. Seam Repairs (Patches)

REPAIR NO.	DEFECT TYPE	DATE/NOT TYPE	APPROVED BY



ZONE LTR	REVISIONS		DATE	APPROVED
	DESCRIPTION			



LEGEND :
 ○ = DEST - DUCTIVE
 ○ = PATCH
 P = PANEL
 R = ROLL



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONS ± 3 PLACE DECIMALS ± 2 PLACE DECIMALS ±		FIELD SUPERVISOR: DARYL BRINKMAN	AS BUILT HALIFAX CO. ASH MONOFILL HALIFAX, NC
MATERIAL 60 MIL HDPE POLYFLEX		DATE: 2-8-94	ENVIRONMENTAL DESIGN AND CONSTRUCTION, INC.
NEXT ASSY		CHECKED	HUNTSVILLE, AL
USED ON		ENGINEER	SIZE CODE IDENT NO. DRAWING NO.
APPLICATION		APPROVED	F 18876
		SCALE 1/4" = 50'	SHEET 1 OF 1

4204-INDUS-1994
 Halifax Coal Ash Landfill
 2-8-1994



3200 Wellington Court, Suite G
Raleigh, North Carolina 27615
919-954-1514
Fax 919-954-1428

February 7, 1994

Hazen & Sawyer
4011 West Chase Boulevard, Suite 500
Raleigh, NC 27607

Attention: Mr. John Bove

Reference: Response to Comments Regarding
Halifax Density Test Data
Halifax County Landfill
Halifax County, North Carolina
GeoTechnologies Project No. 1-92-367-CB

Gentlemen:

This letter is written in response to questions raised by the Department of Environmental Health and Natural Resources regarding density test data submitted on the Halifax County Landfill project located in Halifax County, North Carolina. This letter provides a short response to each of the questions raised and includes a revised summary.

GEOTECHNOLOGIES' REPORTS

9/29/93 - Which density tests correspond to undercut area? The pipe outfall alignment at sediment basin #1 was undercut to provide suitable compaction for subsequent fill. The area was undercut 3 to 4 feet which exposed wet conditions. It was therefore decided to stabilize the undercut area by placing a bridge lift which was represented by density test #15. The recorded density of 92.5% was considered adequate for obtainment of compaction on subsequent fill.

9/30/93 - 8 feet of fill. Which tests correspond? Tests 15, 34, 35, 36, 61, 62, and 63 were performed on fill placed in the sediment basin #1 area above the general area represented by density test #15.

11/15/93 - Was subgrade adequate in trench bottoms to satisfy H & S? Subsequent to finding the one small soft area in the trench bottom near the outfall which had to be undercut and repaired on 11/15/93, our personnel inspected approximately half of the remaining line without finding any additional problem areas. It was our understanding based on instructions given to the contractor by H & S that the remaining sections of the line were not to be covered until the subgrade and bedding were inspected by H & S personnel.

GEOTECHNOLOGIES' DENSITY TESTS

Only one standard Proctor is presented in the report . . . although check plug maximum density and optimum moisture values range from 89.9 to 108 pcf at 16% to 31%, respectively? Only one laboratory Proctor was run; however, three field proctors were also performed in addition to the one laboratory test. The family of curves used for evaluating the one point check plug data for the individual tests is attached with this letter.

Page 5 - Tests 84 through 87, 88? 7.2, 7.2, 7.3, 7.3. (100+) Cut? Fill? All density tests were performed on fill soils. All of the above referenced tests report high degrees of compaction despite being significantly wet of optimum. This is a problem which we occasionally see caused by a loosening of the sidewalls (which causes a shrinkage of the test hole). When this occurs, it is generally with a very well compacted clay or silt which is significantly wet of optimum. Our observations and the data reflect that these soils were well compacted. Density test #88 was invalid due to a weighing error on the check plug.

Page 6 - Test 95? Why is it bad? Test 101, 119% Compaction? Test 120? The technician noted that the density on test #95 appeared to be too high and the note "bad test" is a reference to that fact. After reviewing the data on that test, it was determined that significant rock fragments in that sample were sieved out through the No. 10 sieve before running the check plug. The check plug therefore indicated a lower maximum dry density than was representative of the material actual removed from the test hole at this location. However, the compaction was excellent. This same situation occurred on tests 101, 113, 114, and 115. Additionally, the moisture was initially reported incorrectly on test #101; however, the recorded density is still 111% due to rock fragments having been sieved from the check plug sample.

Page 7 - Test #109, 112 retests? Tests 113, 114, and 115 seem high. Test #120? Test 111 is the retest for test #109. Tests 113, 114, and 115 are high due to rock fragments having been screened from the check plug sample (see explanation for Page 6). Test #120 failed due to high moisture and low density and was reworked and retested with test #121. Test 112 reported a failing density. A specific retest was not performed; however, subsequent to the failing test, drier material was imported to the area and subsequent compaction testing indicates adequate compaction in the area. Fill placed in the areas represented by these tests have been well compacted.

Page 8 - Test #122 Retest. Test #128, 12.2% over optimum, but passed? Test #122 recorded 94% compaction and was rerolled prior to the next fill lift placement but was not specifically retested. The results of test #128 are odd; however, the fill appeared well compacted in this area and we therefore have no comment other than to indicate that the fill has been properly compacted in this area.

Tests on base of landfill subgrade? If cut, was area proofrolled and documented?
Proofrolling was witnessed by H & S personnel. GeoTechnologies performed tests on recompacted fill.

SUMMARY

In summary, earthwork operations were conducted in accordance with good engineering practice and the fill soils have been well compacted. There is one series of our tests where it is believed that a high degree of compaction on significantly wet of optimum soils caused a slight shrinkage of the test holes and another case involving five tests where the quantity of rock fragments elevated the measured density. However, in both cases, the fill soils were well compacted.

Please contact us if you should have questions regarding these comments or if we may be of any further assistance.

Very truly yours,

GeoTechnologies, Inc.



Edward B. Hearn, P.E.
NC Registration No. 9520



David L. Israel, P.E.
NC Registration No. 14319



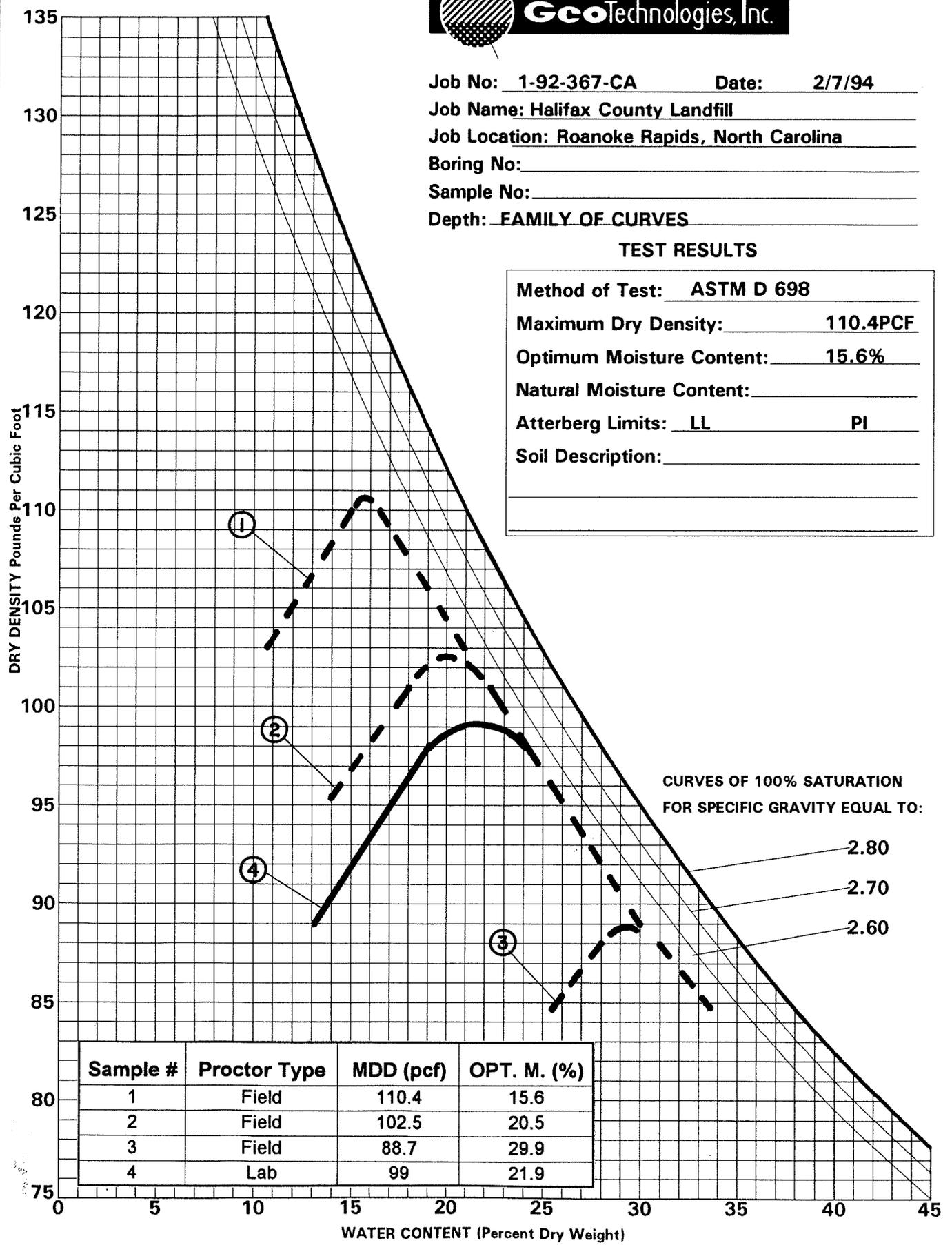
EBH/fgo
Attachments



Job No: 1-92-367-CA Date: 2/7/94
 Job Name: Halifax County Landfill
 Job Location: Roanoke Rapids, North Carolina
 Boring No: _____
 Sample No: _____
 Depth: FAMILY OF CURVES

TEST RESULTS

Method of Test: ASTM D 698
 Maximum Dry Density: 110.4PCF
 Optimum Moisture Content: 15.6%
 Natural Moisture Content: _____
 Atterberg Limits: LL PI
 Soil Description: _____



Sample #	Proctor Type	MDD (pcf)	OPT. M. (%)
1	Field	110.4	15.6
2	Field	102.5	20.5
3	Field	88.7	29.9
4	Lab	99	21.9

MOISTURE-DENSITY RELATIONSHIP

Geotechnologies, Inc.
 Raleigh, North Carolina

SOIL DENSITY TEST REPORT

CLIENT: Hazen & Sawyer
 PROJECT: Halifax County Landfill

DATE: 12/6/93
 PROJ. NO: 1-92-367-CB

TEST DATE	TEST NO.	WATER CONTENT (%)	WET WEIGHT (PCF)	DRY DENSITY (PCF)	MAX DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	ACTUAL COMPACT. (%)	SPECIFIED COMPACT. (%)	LOCATION	DEPTH (ft)
9/23/93	1	16.5	121.3	104.1	104.0	19.9	100.1	95	250' W 20' N of Riser Internal Storm Water Basin	SG
9/23/93	2	18.9	122.2	102.8	102.0	20.7	100.8	95	60' E 5' S of Riser on Sedm. Basin #2	-2.0
9/23/93	3	20.1	118.9	99.0	99.0	21.9	100.0	95	115' N 50' W of Riser Internal Stormwater Basin	-4.0
9/23/93	4	17.4	103.2	87.9	103.5	19.2	84.9	95	60' W 50' N of Riser Internal Stormwater Basin	-2.0
9/23/93	5	18.3	114.7	97.0	100.6	21.0	96.4	95	27' S 10' W of Riser on Sedm. Basin #2	SG
9/23/93	6	20.4	121.0	100.5	100.7	20.9	99.8	95	145' W 90' N of Riser on Internal Stormwater Basin	-3.0
9/23/93	4A	21.1	123.1	101.7	98.1	22.0	103.6	95	Retest of #4	-1.5
9/24/93	7	18.6	114.1	96.2	101.9	20.0	95.0	95	32' E 60' S of Riser of Sedm. Basin #2	SG
9/24/93	8	15.6	128.8	111.4	107.7	16.0	103.5	95	80' N 160' W of Riser Internal Stormwater Basin	-1.0
9/24/93	9	17.8	124.0	105.3	101.9	19.8	103.3	95	20' S 20' W of Riser Internal Stormwater Basin	SG
9/24/93	10	18.6	121.0	102.0	101.9	20.0	100.1	95	70' S 20' W of Riser Internal Stormwater Basin - Trench Backfill	-6.0
9/25/93	11	19.8	116.4	97.2	99.5	21.5	97.7	95	21' S 44' W of Riser on Internal Stormwater Basin	-3.0
9/25/93	12	19.7	125.8	105.1	101.0	21.5	104.1	95	10' N 110' W of Riser of Internal Stormwater Basin	SG

SOIL DENSITY TEST REPORT

CLIENT: Hazen & Sawyer
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DATE: 12/6/93
 PROJ. NO: 1-92-367-CB

TEST DATE	TEST NO.	WATER CONTENT (%)	WET WEIGHT (PCF)	DRY DENSITY (PCF)	MAX DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	ACTUAL COMPACT. (%)	SPECIFIED COMPACT. (%)	LOCATION	DEPTH (ft)
9/28/93	13	23.7	121.0	97.8	99.0	21.9	98.8	95	Cell C STA 8+09 on C.L.	-14.0
9/28/93	14	29.3	119.5	92.4	99.0	21.9	93.4	95	Cell C STA 5+25 on C.L.	-14.0
9/29/93	14A	23.8	119.8	96.8	97.1	23.0	99.7	95	Retest of #14	-14.0
9/30/93	15	25.6	115.0	91.6	99.0	21.9	92.5	95	Berm Sedm. Basin #1 C.L.	-8.0
10/1/93	16	22.1	120.4	98.6	100.7	20.9	97.9	95	STA 1+90 100' Lt Cell #1	SG
10/1/93	17	16.7	125.2	107.3	107.5	16.7	99.8	95	Cell #1 STA 4+50 C.L. Berm	-13.0
10/1/93	18	21.9	117.7	96.6	99.7	21.9	96.8	95	Cell #1 STA 2+75 C.L. of Berm	-11.0
10/1/93	19	25.7	117.7	93.6	99.0	21.9	94.6	95	Cell #1 STA 1+00 C.L. of Berm	-11.0
10/1/93	20	17.5	115.0	97.9	103.0	18.5	95.0	95	CELL #1 STA 2+50 C.L. Berm	-9.0
10/1/93	21	20.0	122.8	102.3	103.0	18.5	99.4	95	Cell #1 STA 4+00 C.L. Berm	-9.0
10/1/93	22	18.7	125.2	105.5	106.7	18.7	98.9	95	Cell #1 STA 10+00 C.L. of Berm	-8.0
10/1/93	23	18.6	126.3	106.5	106.7	18.7	99.8	95	STA 1+50 Cell #1 C.L. of Berm	-7.0
10/1/93	24	23.1	117.7	95.6	100.7	20.9	94.9	95	Cell #1 STA 5+00 C.L. of Berm	-7.0
10/1/93	25	20.6	122.8	101.8	103.9	19.0	98.0	95	Cell #1 STA 10+50 C.L. of Berm	-5.0
10/1/93	26	19.6	123.0	102.8	103.0	18.5	99.8	95	Cell #1 STA 5+50 C.L. of Berm	-5.0
10/2/93	27	21.1	123.6	102.1	99.0	21.9	103.1	95	N Side of Cell #1 NW Cnr 50' E	-4.0
10/2/93	28	21.7	120.0	98.6	99.0	21.9	99.6	95	N Side of CELL #1 NW Cnr 100' E	-4.0
10/2/93	29	21.8	122.4	100.5	99.0	21.9	101.5	95	N Side of Cell #1 NW Cnr 25' E	-3.0
10/2/93	30	21.2	121.2	100.0	99.0	21.9	101.0	95	N Side of Cell #1 NW Cnr 15' E	-3.0

SOIL DENSITY TEST REPORT

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10/2/93	31	22.6	119.4	97.4	99.0	21.9	98.4	95	N Side of Cell #1 NW Cnr 50' E	-2.0
10/2/93	32	21.7	122.1	100.3	99.0	21.9	101.3	95	N Side of Cell NW Cnr 100' E	-2.0
10/2/93	33	22.3	122.9	100.5	99.0	21.9	101.5	95	N Side of CELL #1 NW Cnr 75' E	-1.0
10/4/93	34	23.2	120.4	97.7	99.0	21.9	98.7	95	Sedm Basin #1 West Berm	-8.0
10/4/93	35	21.9	121.9	100.0	99.0	21.9	101.0	95	Sedm Basin #1 West Berm	-7.0
10/4/93	36	17.3	123.1	104.9	99.0	21.9	106.0	95	Sedm Basin #1 West Berm	-6.0
10/4/93	37	19.1	121.9	102.4	105.0	19.5	97.5	95	Cell #1 South Berm Grid 34	-6.0
10/4/93	38	20.6	120.9	100.2	102.0	21.9	98.3	95	Cell #1 South Berm Grid 34 (Moisture Failed)	-4.0
10/4/93	39	21.8	123.1	101.1	100.0	21.9	101.1	95	Retest of #38	-4.0
10/4/93	40	16.8	120.1	102.8	105.0	19.5	97.9	95	Grid 33 Center of Berm Cell #1	-8.0
10/5/93	41	19.8	123.1	102.8	108.0	18.5	95.1	95	Retest of #40	-8.0
10/5/93	42	18.7	124.3	104.7	108.0	18.5	97.0	95	Grid 23 S Berm Center of Berm	-6.0
10/5/93	43	18.8	123.7	104.1	108.0	18.5	96.4	95	Grid 33 S Berm Center of Berm	-4.0
10/5/93	44	21.8	124.6	102.3	99.0	21.9	103.3	95	Grid 23 S Berm Center of Berm	-2.0
10/5/93	45	19.3	123.4	103.4	108.0	18.5	95.8	95	Grid 34 Center of Berm	-3.0
10/5/93	46	21.7	124.0	101.9	99.0	21.9	102.9	95	Grid 34 Center of Berm	-2.0
10/5/93	47	21.7	117.7	96.7	99.0	21.0	97.7	95	Grid 23 S Berm Center of Berm	-1.0
10/6/93	48	19.9	124.3	103.7	105.0	20.9	98.7	95	Grid #19 Center of Berm	-3.0
10/6/93	49	23.5	121.9	98.7	99.0	21.9	99.7	95	Grid 17 Center of Berm	-4.0
10/6/93	50	23.7	123.1	99.5	99.0	21.9	100.5	95	Grid 18 Center of Berm	-3.0

SOIL DENSITY TEST REPORT

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PROJECT: Halifax County Landfill

PROJ. NO: 1-92-367-CB

TEST DATE	TEST NO.	WATER CONTENT (%)	WET WEIGHT (PCF)	DRY DENSITY (PCF)	MAX DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	ACTUAL COMPACT. (%)	SPECIFIED COMPACT. (%)	LOCATION	DEPTH (ft)
10/6/93	51	26.7	124.3	98.1	99.0	21.9	99.1	95	Grid 17 Center of Berm	-2.0
10/6/93	52	19.4	127.2	106.5	105.0	20.9	101.5	95	Grid 18 Center of Berm (Moisture Failed)	-1.0
10/6/93	53	22.6	124.8	101.8	105.0	20.9	96.9	95	Grid 19 Center of Berm	-2.0
10/6/93	54	19.5	125.7	105.2	105.0	20.9	100.2	95	Grid 19 Center of Berm	-1.0
10/6/93	55	21.6	128.0	105.3	105.0	20.9	100.3	95	Retest of #52	-1.0
10/7/93	56	20.9	123.7	102.3	100.0	21.9	102.3	95	Grid 16 Center of Berm	-5.0
10/7/93	57	24.2	122.5	98.6	100.0	21.9	98.6	95	Grid 17 Center of Berm	-4.0
10/7/93	58	22.2	127.3	104.2	105.0	20.9	99.2	95	Grid 16 Center of Berm	-3.0
10/7/93	59	21.0	125.8	104.0	105.0	20.9	99.0	95	Grid 17 Center of Berm	-2.0
10/7/93	60	23.1	124.9	101.5	105.0	20.9	96.6	95	Grid 16 Center of Berm	-1.0
10/12/93	61	21.5	126.6	104.2	105.0	20.9	99.2	95	W Berm at Sediment Basin #1	-4.0
10/12/93	62	24.6	125.4	100.6	105.0	20.9	95.8	95	W Berm at Sediment Basin #1	-2.0
10/12/93	63	22.6	127.8	104.2	105.0	20.9	99.3	95	W Berm at Sediment Basin #1	-1.0
10/12/93	64	22.6	127.2	103.8	105.0	20.9	98.8	95	Cell #1 Grid #9 S of CL of Berm	-6.0
10/12/93	65	20.8	121.8	100.8	101.0	21.0	99.8	95	Cell #1 Grid #9 S of CL of Berm	-4.0
10/12/93	66	20.2	120.9	100.6	101.0	21.0	99.6	95	Cell #1 Grid #9 S of CL of Berm	-3.0
10/13/93	67	23.4	125.0	101.3	105.0	19.9	96.5	95	Cell #1 Grid #24 CL of Berm	SG
10/13/93	68	22.4	124.0	101.3	105.0	19.9	96.5	95	Cell #1 Grid #16 CL of Berm	SG

SOIL DENSITY TEST REPORT

CLIENT: Hazen & Sawyer
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DATE: 12/6/93
 PROJ. NO: 1-92-367-CB

TEST DATE	TEST NO.	WATER CONTENT (%)	WET WEIGHT (PCF)	DRY DENSITY (PCF)	MAX DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	ACTUAL COMPACT. (%)	SPECIFIED COMPACT. (%)	LOCATION	DEPTH (ft)
10/13/93	69	23.6	122.4	99.0	103.0	21.0	96.1	95	Cell #1 Grid #9 CL of Berm	SG
10/13/93	70	20.4	126.4	105.0	106.0	20.0	99.0	95	Cell #1 Grid #34 CL of Berm	SG
10/14/93	71	26.3	117.0	92.6	97.0	21.0	95.5	95	Cell #1 Grid #22 CL of Rd	-4.0
10/14/93	72	27.5	117.6	92.2	97.0	21.0	95.1	95	Cell #1 Grid 21 CL of Rd	-4.0
10/14/93	73	26.4	122.4	96.8	97.0	21.0	99.8	95	Cell #1 Grid #13 CL of Rd	-3.0
10/14/93	74	23.8	122.4	98.9	99.0	21.9	99.9	95	Cell #1 Grid #21 CL of Rd	-3.0
10/14/93	75	28.9	120.0	93.1	99.0	21.9	94.0	95	Cell #1 Grid #21 CL of Rd	-2.0
10/14/93	76	24.3	123.0	99.0	99.0	21.9	100.0	95	Retest of #75	-2.0
10/14/93	77	28.5	118.8	92.5	99.0	21.9	93.4	95	Cell #1 Grid #21 Lt of CL	SG
10/14/93	78	25.5	118.8	94.7	99.0	21.9	95.6	95	Retest of #77	SG
10/15/93	79	28.1	123.0	96.0	99.0	21.9	97.0	95	Access Rd Grid #31 CL of Rd	-1.0
10/16/93	80	27.9	121.8	95.2	99.0	21.9	96.2	95	Access Rd Grid #22 CL of Rd	-8.0
10/17/93	81	24.4	123.6	99.4	99.0	21.9	100.4	95	Access Rd Grid #22 CL of Rd	-7.0
10/18/93	82	27.3	122.1	95.9	99.0	21.9	96.9	95	Access Rd Grid #22 CL of Rd	-6.0
10/19/93	83	27.1	122.4	96.3	99.0	21.9	97.3	95	Access Rd Grid #22 CL of Rd	-5.0
11/2/93	84	29.1	129.3	100.2	99.0	21.9	101.2	95	Grid #22 Access Rd to Back-In Area - (High compaction implies some shrinkage of test hole due to elevated moisture content.)	-2.5

SOIL DENSITY TEST REPORT

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11/2/93	85	29.1	127.0	98.4	99.0	21.9	99.4	95	Grid #33 Middle of Proposed Slab or Lot (High compaction implies some shrinkage of test hole due to elevated moisture content.)	-1.5
11/2/93	86	29.2	128.5	99.5	99.0	21.9	100.5	95	Grid #3 End of Lot Center (High compaction implies some shrinkage of test hole due to elevated moisture content.)	-1.5
11/2/93	87	29.2	129.1	99.9	99.0	21.9	100.9	95	Grid #22 Center of Proposed Road Way and Back-in Area (High compaction implies some shrinkage of test hole due to elevated moisture content.)	-1.0
11/3/93	88	29.4	117.8	91.0					Invalid Test	-1.0
11/3/93	89	23.5	119.1	96.4	99.0	21.9	97.4	95	Grid #32 Cnr of Back-in Lot	-1.0
11/3/93	90	23.8	118.4	95.6	100.2	21.0	95.4	95	Grid #23 Edge of Lot, End of Access Rd	-13.0
11/3/93	91	23.7	118.2	95.6	100.2	21.0	95.4	95	Grid #22 Beginning of Back-in Lot CL of Access Rd	-13.0

GeoTechnologies, Inc.

SOIL DENSITY TEST REPORT

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11/3/93	92	24.0	119.3	96.2	99.8	21.1	96.4	95	Grid #23 Edge Closest to Proposed Berm	-11.0
11/3/93	93	23.0	123.0	100.0	100.2	21.0	99.8	95	Grid #22 4' into Lot From Access Rd	-11.0
11/3/93	94	23.5	120.2	97.3	100.2	21.0	97.1	95	Grid #22 Outside Cnr Closest to Access Rd	-11.0
11/3/93	95	24.3	134.8	108.4	98.5	24.5	110.1	95	Grid #22 Access Rd 6' from Back-in Lot (Rock fragments in test hole not included in one point Proctor.)	-7.0
11/4/93	96	25.2	123.4	98.6	99.5	21.5	99.1	95	Grid #23 Berm Side of Unloading Area	-6.0
11/4/93	97	23.0	120.7	98.1	97.3	23.0	100.8	95	Grid #33 Berm Side NE Cnr	-5.0
11/4/93	98	22.5	122.7	100.2	99.0	21.9	101.2	95	Grid #32 Middle Edge Access Rd Side	-4.0
11/4/93	99	23.5	124.9	101.1	97.2	22.9	104.0	95	Grid #22 CL Access Rd 10' from Unloading Area	-2.0
11/4/93	100	24.0	119.8	96.6	99.0	21.9	97.6	95	Grid #22 Storm Drain Ditch	-3.0
11/4/93	101	23.3	136.1	110.4	98.8	24.3	111.7	95	Grid #33 Berm Side of Loading Lot (Rock fragments in test hole not included in one point Proctor.)	SG
11/9/93	102	27.3	125.6	98.7	100.8	20.5	97.9	95	CL of Lot Grid #22	-1.0

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11/9/93	103	25.1	124.4	99.4	104.1	18.3	95.5	95	Edge of Berm SW Side Grid #23	-5.0
11/9/93	104	23.7	129.1	104.4	99.0	21.9	105.4	95	SW Berm Tie-In to Load Pad Grid #33	-7.0
11/9/93	105	24.7	122.9	98.6	98.2	22.2	100.4	95	SW Berm Tie-In to Load Pad Grid #33	-5.0
11/9/93	106	24.4	125.7	100.8	99.9	21.0	100.9	95	SW Berm Tie-In to Load Pad Grid #33	-3.0
11/9/93	107	25.2	124.0	99.0	102.0	19.8	97.1	95	SW Berm Tie-In to Load Pad Grid #33	-1.0
11/10/93	108	22.1	125.9	103.1	103.3	19.0	99.8	95	SW Berm Grid #33 Tie-In to Load Ramp	SG
11/10/93	109	23.3	120.8	98.0	104.2	18.4	94.0	95	Edge of Load Pad Access Rd Side Grid #22	-1.0
11/10/93	110	22.5	125.0	102.0	99.0	21.9	103.1	95	SW Berm Side of Load Ramp Grid #23	-1.0
11/10/93	111	22.4	122.7	100.2	102.5	19.5	97.8	95	Retest of Test #109	-1.0
11/10/93	112	22.1	120.3	98.5	107.2	16.8	91.9	95	NW Berm Tie-In to Load Pad Grid #23	-3.0
11/11/93	113	21.5	137.3	113.0	102.9	23.8	109.8	95	NW Berm Tie-In to Load Area Grid #23 (Rock fragments in test hole not included in one point Proctor.)	SG

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11/11/93	114	21.0	135.6	112.1	103.2	23.2	108.6	95	SW Berm Tie-In to Load Area Grid #33 (Rock fragments in test hole not included in one point Proctor.)	SG
11/12/93	115	23.3	134.8	109.3	102.0	19.8	107.2	95	Storm Drain Under Access Rd Grid #31 (Rock fragments in test hole not included in one point Proctor.)	-1.0
11/13/93	116	30.7	113.9	87.1	89.9	31.0	96.9	95	Berm Drain Pipe in SW Cnr Landfill	SG
11/13/93	117	24.6	128.5	103.1	100.5	25.0	102.6	95	STA 15+50 on Access Road	SG
11/13/93	118	24.1	125.2	100.9	100.5	25.0	100.4	95	STA 12+50 on Access Rd	SG
11/13/93	119	25.4	127.3	101.5	100.5	25.0	101.0	95	STA 10+50 on Access Rd	SG
11/19/93	120	33.8	120.5	90.1	103.8	18.5	86.8	95	Berm Drain Pipe Under Berm	-12.0
11/19/93	121	22.0	120.4	98.7	103.8	18.5	95.1	95	Retest of Test #120	-12.0
11/19/93	122	25.2	120.4	96.2	102.3	19.7	94.0	95	Halfway Between Sump 2 and 3	-2.0
11/20/93	123	22.4	123.5	100.9	100.1	21.0	100.8	95	Drain Under NE Berm	-10.0
11/20/93	124	22.1	120.7	98.9	103.3	19.0	95.7	95	NE Berm Drain Line	-8.0
11/20/93	125	24.3	128.4	103.3	100.2	21.1	103.1	95	NE Berm Drain Line Through Berm Under	-6.0
11/20/93	126	23.1	121.0	98.3	101.2	20.2	97.1	95	NE Berm Drain Line Cut	-4.0

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11/20/93	127	23.3	120.3	97.6	102.0	19.8	95.7	95	NE Berm Drain Line Cut	-2.0
11/20/93	128	29.4	132.2	102.2	106.2	17.2	96.2	95	Halfway Down from Sump #3 to Leeching Pond	SG