HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 3

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

NEVZAT TURAN
84059

12-29-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 3

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-29-2017

APPENDIX IIIG-B

SITE EXPLORATION DATA

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

AARON K. EVANS
GEOLOGY
11143

12-05-17

LEGEND

— · · — · · —	BFI PROPERTY BOUNDARY
— · — · —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — · — —	CELL BOUNDARY
——70——	EXISTING CONTOUR
——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
—▸— —▸—	PROPOSED LEACHATE COLLECTION LINE
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINED AREA
⊕ MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊙ GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
△ WC-1	WEAVER CONSULTANTS GROUP 2017 EXPANSION BORING WITH SURFACE ELEVATION POSTED IN FT-MSL
▲ WCP-5	WEAVER CONSULTANTS GROUP 2017 EXPANSION PIEZOMETER WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. SWL BOREHOLE AND PIEZOMETER LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM PREVIOUS SUBSURFACE EXPLORATION BOREHOLE LOGS AND INSTALLATION REPORTS.
3. EXISTING WELL AND PROBE LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
4. WEAVER CONSULTANTS GROUP 2017 BOREHOLE AND PIEZOMETER LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON JANUARY 16, 2017.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-B.1_BOREHOLE LOC MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT BOREHOLE LOCATION MAP

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-B.1

O:\0120\758\2214B EXPANSION\IIIG\IIIG-B.1_BOREHOLE LOCATION MAP.dwg, 11/15/2017 1:41:34 PM, rsellers, 1:2

KEY TO EXISTING BOREHOLE GEOLOGIC LOGS
HARDIN COUNTY LANDFILL

LITHOLOGIC DATA SOURCES:

THE LITHOLOGIC LOG SOIL SYMBOLS AND ASSIGNED GENERALIZED DESCRIPTIONS FOR THE 1990 / 1991 SOUTHWESTERN LABORATORIES AND 1998 HYDREX ENVIRONMENTAL LITHOLOGIC LOGS ARE BASED ON THE LOGS AND DESCRIPTIONS OBTAINED FROM THE APPROVED TCEQ PERMIT NUMBER MSW–2214A, ATTACHMENT 4 – GEOLOGY REPORT. THE LITHOLOGIC LOG SOIL SYMBOLS AND ASSIGNED GENERALIZED DESCRIPTIONS DEPICTED FOR THE 2005 AND 2010 HYDREX ENVIRONMENTAL LITHOLOGIC LOGS ARE BASED ON THE LOGS AND DESCRIPTIONS OBTAINED FROM HYDREX ENVIRONMENTAL INSTALLATION REPORTS DATED JULY 15, 2005 AND JULY 7, 2010.

1990/1991 SOUTHESTERN LABORATORIES LITHOLOGIC UNITS

▨ CLAY
▨ CLAYEY SILT OR SILTY CLAY
▨ SANDY CLAY
▨ CLAYEY SAND
▨ SILT
▨ SANDY SILT OR SILTY SAND

1998/2005/2010 HYDREX ENVIRONMENTAL LITHOLOGIC UNITS

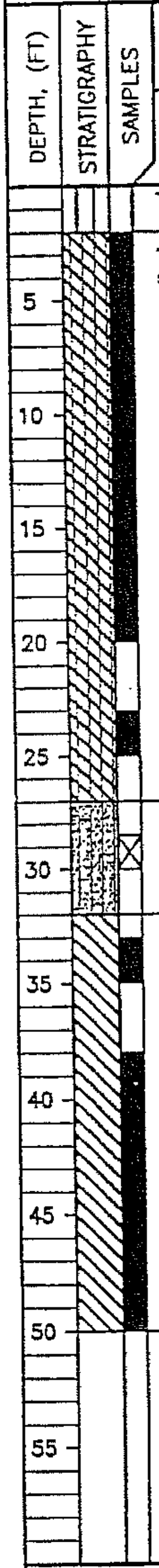
▨ FAT CLAY (1998)
▨ FILL (1998)
▨ LEAN CLAY (1998)
▨ SILTY SAND (1998)
▨ SILT (2005/2010)
▨ CLAYEY SAND (1998)
▨ CLAY (2005/2010)
▨ SANDY CLAY OR SILTY CLAY (2005/2010)
▨ FILL (2005/2010)
▨ SILTY SAND (2005/2010)
▨ CLAYEY SAND (2005/2010)

P:\Groundwater\IESI\Hardin County\SBP\2016 Vert\Comment Response\Existing Boring Legend Key Stuff\HCLF LEGEND TEMPLATE.dwg, 2/5/2017 4:47:50 PM

1990-1991 SOUTHWESTERN LABORATORIES GEOTECHNICAL BOREHOLE LOGS

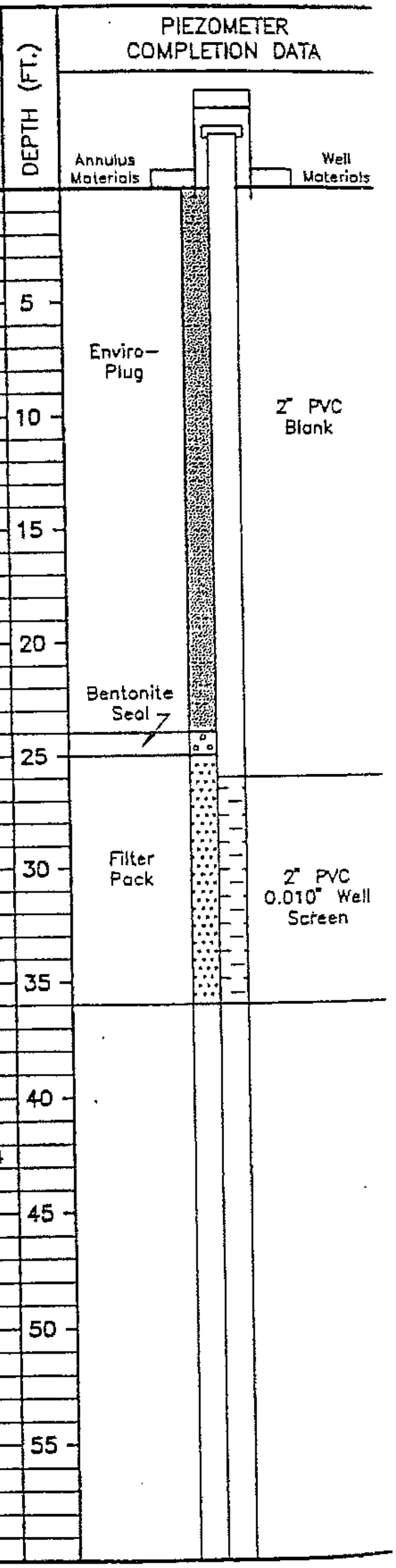
LOG OF PIEZOMETER NO. 1A

▮ Shelby Tube Sample
☒ Standard Penetration



DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan and gray silt, slightly sandy	19				79
Tan, light gray and reddish-brown silty clay with sand pockets and partings	20	37	14	23	85
—becomes clay with sand pockets and partings	20	49	15	34	
—color changes to tan and light gray					
	26	63	21	42	
	12	47	14	33	85
Tan silty fine sand	25				26
Reddish-brown, tan and light gray clay with silt partings					
—color changes to tan and light gray with silt partings and calcareous nodules	28	60	20	40	94

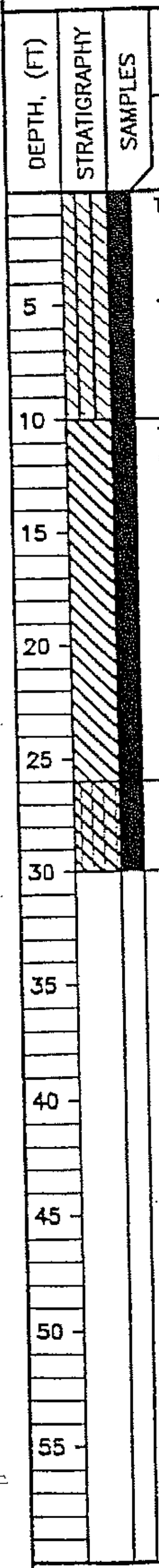
PIEZOMETER COMPLETION DATA



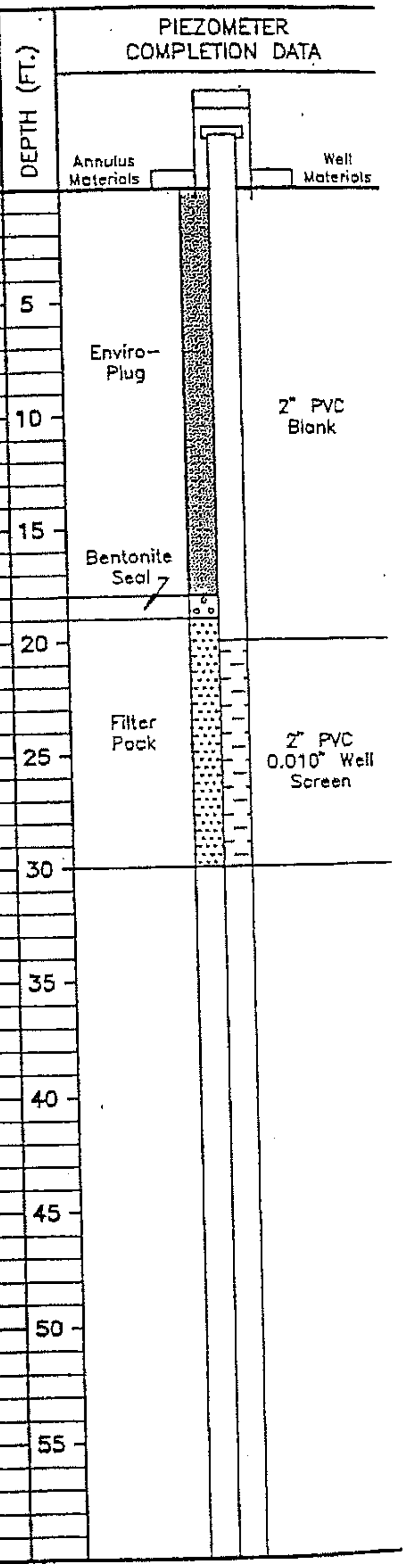
Client: Hardin County
Project No.: 506592-157
Date Drilled: 12-13-90
Driller: SR
Surface Elevation: 82.68
Drilling Method: R/W
Total Depth: 50.0 ft.
Top of Casing Elevation: 85.81
Groundwater Elevation:
Date:
Time:

LOG OF PIEZOMETER NO. 2A

▨ Shelby Tube Sample ☒ Standard Penetration



DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan very silty clay to clayey silt, slightly sandy					
	18				80
–Color changes to reddish–tan and light gray					
	18	33	17	16	83
Tan, light gray and reddish–brown clay, slightly silty with sand partings	18	49	14	35	
–Color changes to tan and light gray with slickensides					
	18	70	17	53	93
–Color changes to light gray, tan and reddish–brown and becomes slightly silty	17	33	16	17	76
Light gray, tan and reddish–brown silty clay					



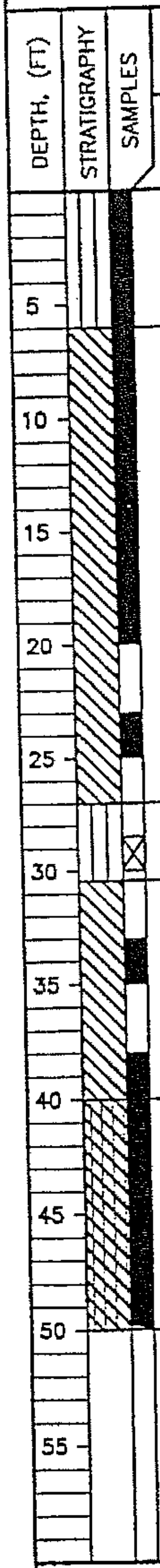
Client: Hardin County Project No.: 506592–157 Date Drilled: 12–13–90 Driller: SR

Surface Elevation: 81.22 Drilling Method: R/A Total Depth: 30.0 ft.

Top of Casing Elevation: 84.21 Groundwater Elevation: ______ Date: ______ Time: ~~HIG-B-5~~

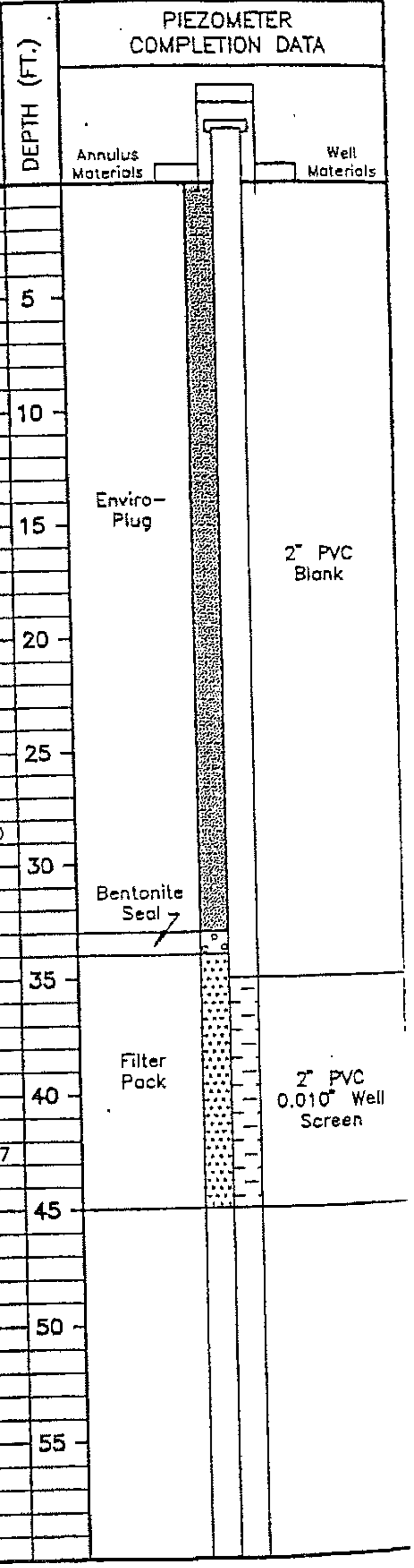
LOG OF PIEZOMETER NO. 3A

▮ Shelby Tube Sample   ☒ Standard Penetration



DESCRIPTION OF STRATUM	ANALYTICAL DATA				
	MOISTURE CONTENT %	ATTERBERG LIMITS			PASSING No.200 SIEVE
		LL	PL	PI	
Tan silt, slightly sandy -color changes to tan, reddish-brown and gray -with clay layer -becomes very silty clay	19				77
Tan, reddish-brown and gray clay, slightly silty with silt pockets and partings	17	35	15	20	83
	23	70	17	53	
-color changes to tan and light gray	14	64	16	48	90
-color changes to tan, reddish-brown and light gray and becomes silty and slightly sandy	16	29	15	14	
Tan silt, slightly sandy, with clay seams	26				80
Tan clay with silt partings	33	74	25	49	
Tan and gray silty clay with sand seams and silt partings	21	29	18	11	77
-color changes to gray and tan					
-becomes less silty					

PIEZOMETER COMPLETION DATA

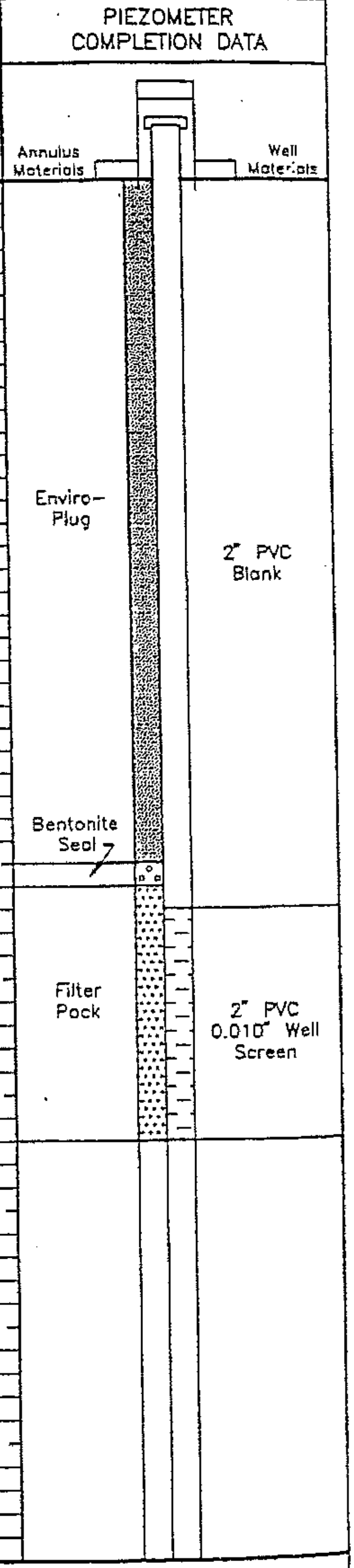


Client: Hardin County
Project No.: 506592-157
Date Drilled: 12-13-90
Driller: SR
Surface Elevation: 80.24
Drilling Method: R/W
Total Depth: 50.0 ft.
Top of Casing Elevation: 83.13
Groundwater Elevation:
Date:
Time:

LOG OF PIEZOMETER NO. 4A

▮ Shelby Tube Sample
☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan and gray very silty clay to clayey silt					
	17	21	16	5	
—becomes very silty clay	19	23	16	7	
Light gray and tan clay with sand pockets and partings					
	29	65	24	41	
	24	67	15	52	93
—slightly silty at 20'–22'	23	44	17	27	
—with silty clay layer at 26'–28'	18	25	15	10	59
	25	65	16	49	
—color changes to reddish-brown, tan and light gray with slickensides					
	25	34	19	15	88
—color changes to brown with silt partings, sand seams and sand layers to 42'					
—color changes to light gray and tan					



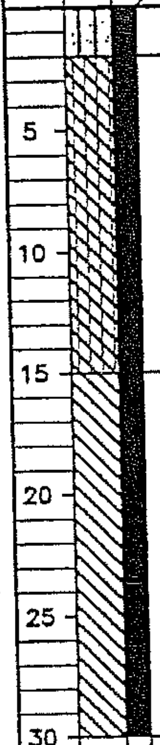
Client: Hardin County
Project No.: 506592-157
Date Drilled: 1-4-91
Driller: SR
Surface Elevation: 77.94
Drilling Method: R/W
Total Depth: 50.0 ft.
Top of Casing Elevation: 81.34
Groundwater Elevation:
Date:
Time:

LOG OF BORING NO. 5A

▮ Shelby Tube Sample

☒ Standard Penetration

DESCRIPTION OF STRATUM



DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE
Tan sandy silt, slightly clayey					
Tan, light gray and reddish-brown very silty clay, slightly sandy	18	29	18	11	
	18	47	16	31	85
	30	74	21	53	
Tan and light gray clay, with sand partings					
–with slickensides					
	24	59	17	42	90
–color changes to light gray, tan and reddish-brown, and becomes slightly sandy					
–becomes firm					

Client: Hardin County Project No.: 506592–157 Date Drilled: 12–11–90 Driller: SR

Surface Elevation: 81.9 Drilling Method: R/A Total Depth: 30.0 ft.

Groundwater Elevation: ____ Date: ____ Time: ____ Geologist: CW

LOG OF BORING NO. 6A

▨ Shelby Tube Sample

☒ Standard Penetration

DEPTH, (FT)	DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE	DEPTH (FT.)
	Tan clayey silt, slightly sandy						
	Tan and reddish-brown silty clay, slightly sandy						
5	-color changes to tan and light gray	18	33	17	16	82	5
10							10
	Tan, light gray and reddish-tan clay with sand partings	22	55	16	39		
15							15
20	-color changes to light gray and tan						20
		20	36	13	23		
25	-becomes slightly sandy						25
	-color changes to tan, light gray and reddish-brown						
30							30
35							35
40							40
45							45
50							50
55							55

Client: Hardin County Project No.: 506592-157 Date Drilled: 12-11-90 Driller: SR

Surface Elevation: 81.4 Drilling Method: R/A Total Depth: 30.0 ft.

Groundwater Elevation: Date: Time: Geologist: CW

LOG OF BORING NO. 8A

▇ Shelby Tube Sample

☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Gray sandy silt, slightly clayey	22				75
Tan, gray and reddish-brown very silty clay					
-becomes slightly sandy	17	27	17	10	
-becomes silty clay with sand partings	18	45	14	31	82
-color changes to tan and light gray					
-color changes to reddish-brown, tan and light gray and becomes slightly sandy	16	30	15	15	57
Tan and light gray clayey fine sand	19	24	18	6	50
-becomes slightly clayey					

Client: Hardin County Project No.: 506592-157 Date Drilled: 12-11-90 Driller: SR

Surface Elevation: 76.3 Drilling Method: R/A Total Depth: 30.0 ft.

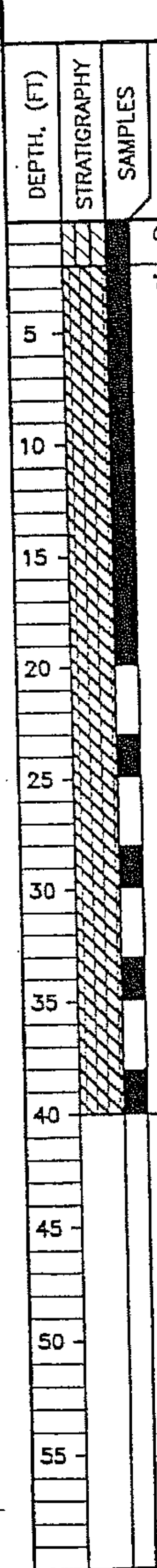
Groundwater Elevation: Date: Time: Geologist: CW

Comments:

LOG OF BORING NO. 9

▮ Shelby Tube Sample

☒ Standard Penetration



DESCRIPTION OF STRATUM	ANALYTICAL DATA				
	MOISTURE CONTENT %	ATTERBERG LIMITS			PASSING No.200 SIEVE
		LL	PL	PI	
Gray clayey silt, slightly sandy	22				75
Tan, reddish-brown and gray very silty clay, slightly sandy					
	17	27	18	9	80
	17	33	16	17	81
-becomes light gray and reddish-brown silty clay with sand pockets and partings	20	39	13	26	85
-color changes to tan and light gray					
	24	64	18	46	
-color changes to reddish-brown, light gray and tan with silty clay layer at 24'					
-with sand layer at 28'-30'					
-color changes to tan with silt partings					

DEPTH (FT.): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

Client: Hardin County Project No.: 506592-157 Date Drilled: 5-14-90 Driller: SR

Surface Elevation: 79.2 - Drilling Method: R/A Total Depth: 40.0 ft.

Groundwater Elevation: ______ Date: ______ Time: ______ Geologist: CW

LOG OF BORING NO. 12A

▮ Shelby Tube Sample

☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE
Tan silt, slightly sandy					
Tan, reddish-brown and gray very silty clay, slightly sandy	20	27	20	7	78
	17	31	17	14	
Reddish-brown, tan and light gray clay, slightly silty	25	59	15	44	91
–color changes to tan and light gray					
	19	46	15	31	72
–color changes to reddish-brown, tan and light gray					
–becomes slightly silty					
Tan and light gray silty clay	33	29	16	13	

Client: Hardin County Project No.: 506592-157 Date Drilled: 12-12-90 Driller: SR

Surface Elevation: 78.5 Drilling Method: R/A Total Depth: 30.0 ft.

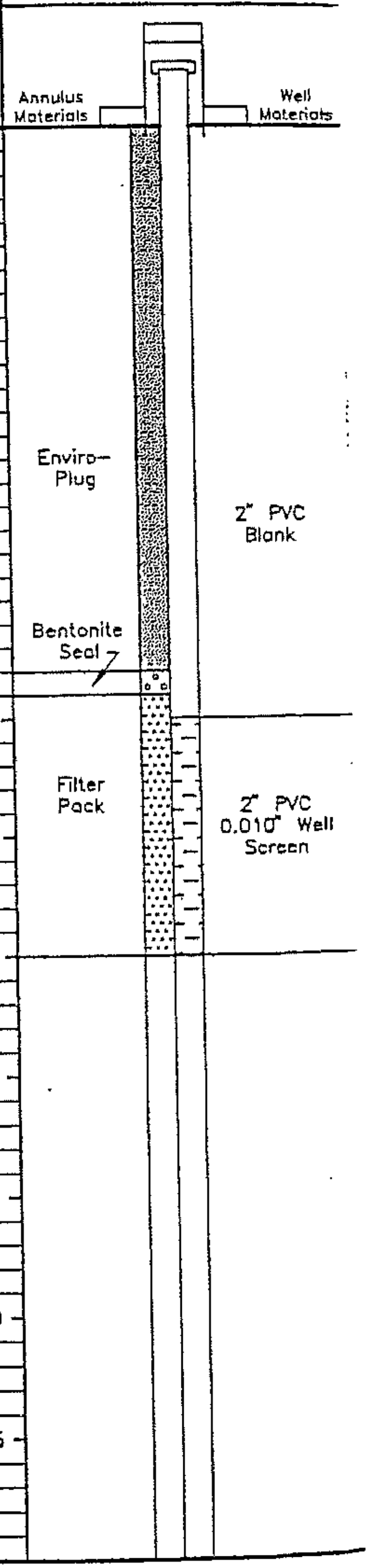
Groundwater Elevation: ______ Date: ______ Time: ______ Geologist: CW

LOG OF PIEZOMETER NO. 20

▩ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan clayey silt					
Tan and gray silty clay, slightly sandy					
	16	27	17	10	
Tan and light gray clay with sand partings					
	26	65	19	46	
—becomes slickensided					
	19	41	14	27	73
—becomes slightly sandy					
	29	68	22	46	
—becomes silty to 44'					
—color changes to reddish-brown, tan and light gray					
	27	57	19	38	
—color changes to light gray and tan					

PIEZOMETER COMPLETION DATA

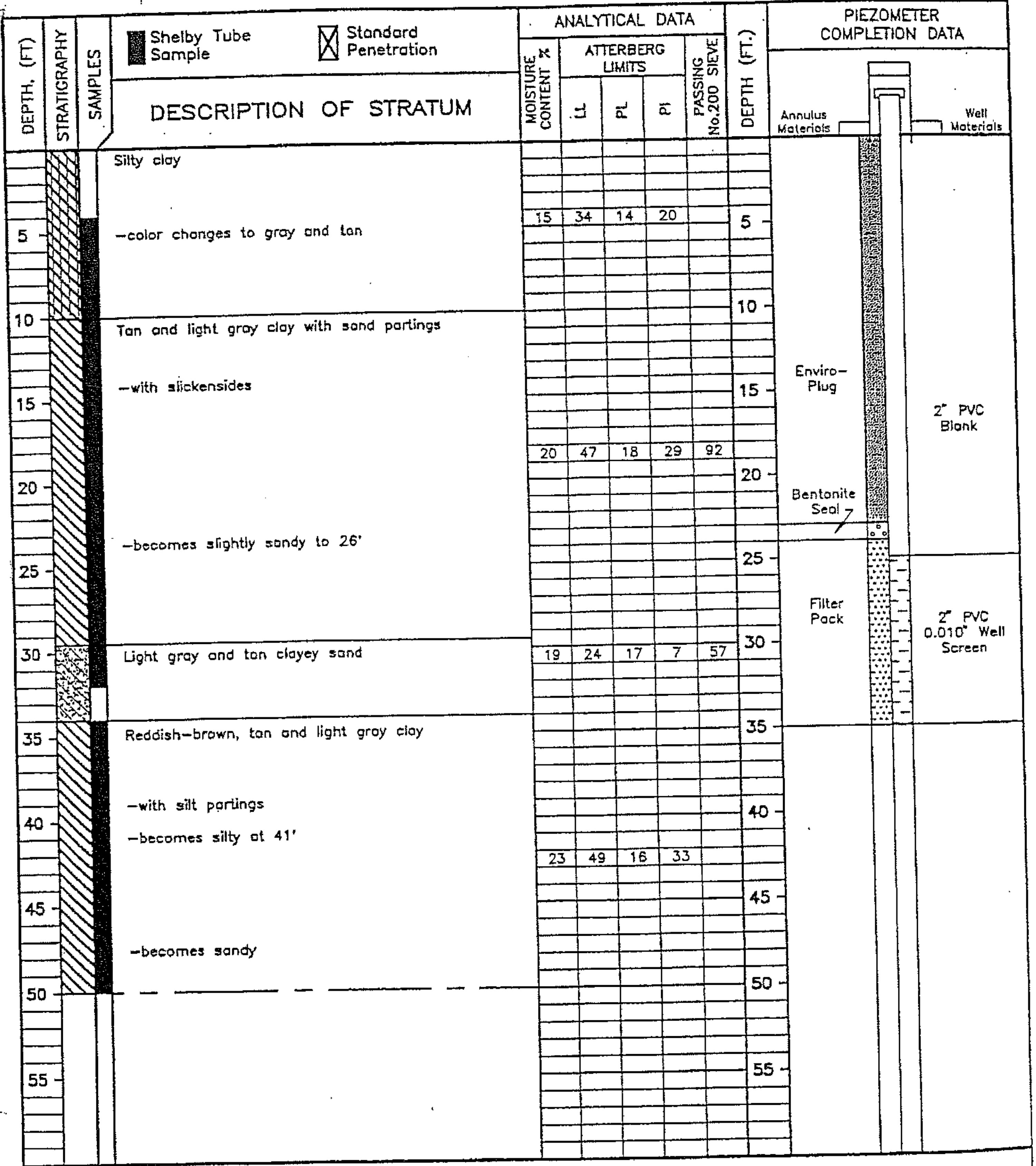


Client: Hardin County Project No.: 506592-157 Date Drilled: 12-28-90 Driller: SR

Surface Elevation: 79.23 Drilling Method: R/W Total Depth: 50.0 ft.

Top of Casing Elevation: 82.06 Groundwater Elevation: Date: Time:

LOG OF PIEZOMETER NO. 21



▩ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	ANALYTICAL DATA				
	MOISTURE CONTENT %	ATTERBERG LIMITS			PASSING No.200 SIEVE
		LL	PL	PI	
Silty clay					
	15	34	14	20	
—color changes to gray and tan					
Tan and light gray clay with sand partings					
—with slickensides					
	20	47	18	29	92
—becomes slightly sandy to 26'					
Light gray and tan clayey sand	19	24	17	7	57
Reddish-brown, tan and light gray clay					
—with silt partings					
—becomes silty at 41'					
	23	49	16	33	
—becomes sandy					

Client: Hardin County Project No.: 506592-157 Date Drilled: 1-2-91 Driller: SR

Surface Elevation: 77.24 Drilling Method: R/W Total Depth: 50.0 ft.

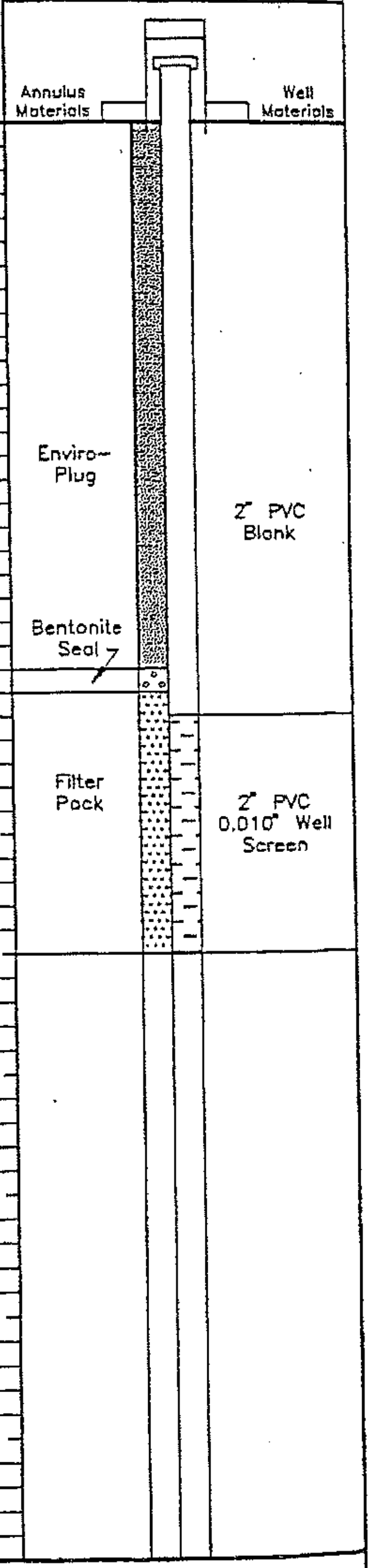
Top of Casing Elevation: 79.30 Groundwater Elevation: ____ Date: ____ Time:

LOG OF PIEZOMETER NO. 22

▓ Shelby Tube Sample ☒ Standard Penetration

DEPTH, (FT)	DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE
	Tan, reddish-brown and gray clayey silt					
5	Tan, reddish-brown and gray silty clay, slightly sandy	15	31	18	13	
	Light gray and reddish-brown clay with sand partings	24	64	18	46	86
10						
15	–color changes to tan and light gray with slickensides					
20		23	56	15	41	93
25						
	–color changes to reddish-brown, tan and light gray and slightly silty					
30	Tan and light gray very silty clay with sand and silt seams	25	27	18	9	94
	Tan and light gray clay with silt partings					
35						
40	–becomes slightly silty					
45	Tan and gray sandy clay					
	–becomes very sandy					
50						
55						

PIEZOMETER COMPLETION DATA



Client: Hardin County Project No.: 506592-157 Date Drilled: 1-3-91 Driller: SR

Surface Elevation: 79.38 Drilling Method: R/W Total Depth: 50.0 ft.

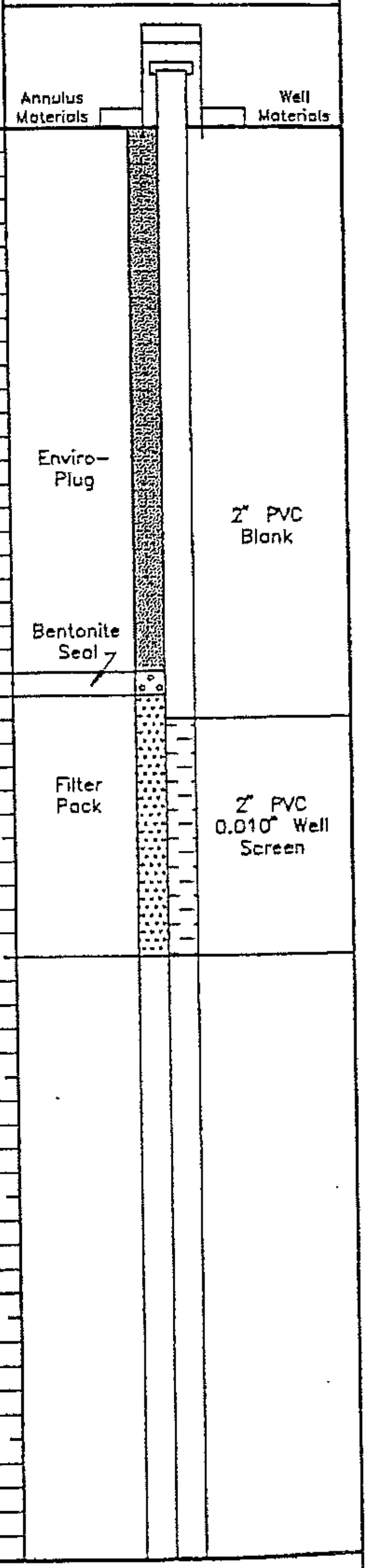
Top of Casing Elevation: 82.67 Groundwater Elevation: Date: Time:

LOG OF PIEZOMETER NO. 23

▨ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE
Tan silt, slightly clayey					
Tan and gray silty clay					
-color changes to tan, reddish-brown and gray					
Reddish-brown and light gray clay with sand partings	28	70	18	52	
-color changes to light gray and tan					
-becomes slickensided					
-color changes to tan and light gray	29	64	20	44	86
-becomes slightly silty	17	36	15	21	70
-color changes to reddish brown and becomes silty					
Tan and light gray clayey sand, slightly silty	16	18	18	0	43
-becomes less clayey					
Brown, tan and light gray clay with silt partings and slickensides					
-with sand partings					
Light gray and tan sandy clay					
Light gray and tan silty fine sand					
-becomes clayey					

PIEZOMETER COMPLETION DATA



Client: Hardin County Project No.: 506592-157 Date Drilled: 12-18-90 Driller: SR

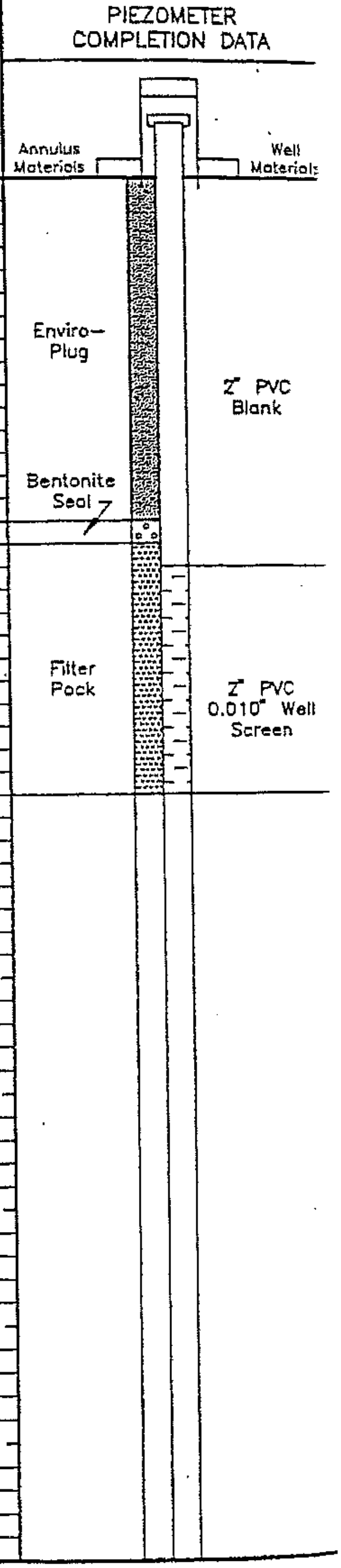
Surface Elevation: 78.29 Drilling Method: R/W Total Depth: 50.0 ft.

Top of Casing Elevation: 81.43 Groundwater Elevation: ____ Date: ____ Time:

LOG OF PIEZOMETER NO. 24

▓ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan silt					
–color changes to light gray and reddish–tan					
–with silty clay seams					
	13	34	16	18	72
Tan, light gray and reddish–brown clay with sand pockets to 14'					
	23	63	16	47	79
–becomes slightly sandy					
–becomes sandy with silty clay layer at 19'					
–becomes very sandy					
Tan and light gray clayey sand	19	24	19	5	51
Tan and light gray clay with silt partings					
	24	23	20	3	
Tan and light gray silt with sand partings to 40'					
–color changes to gray					
Gray silty fine sand, slightly clayey					



Client: Hardin County Project No.: 506592–157 Date Drilled: 12–18–90 Driller: SR

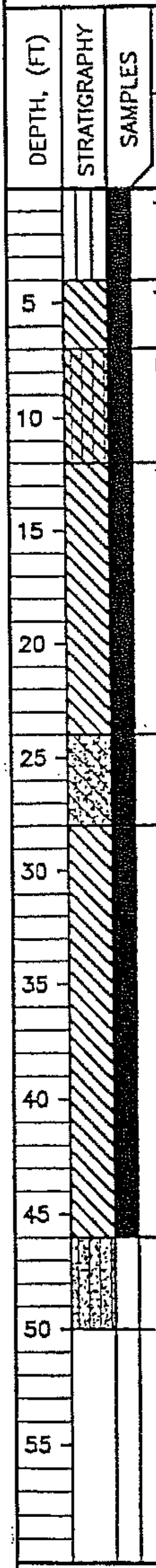
Surface Elevation: 73.51 Drilling Method: R/W Total Depth: 50.0 ft.

Top of Casing Elevation: 76.85 Groundwater Elevation: Date: Time:

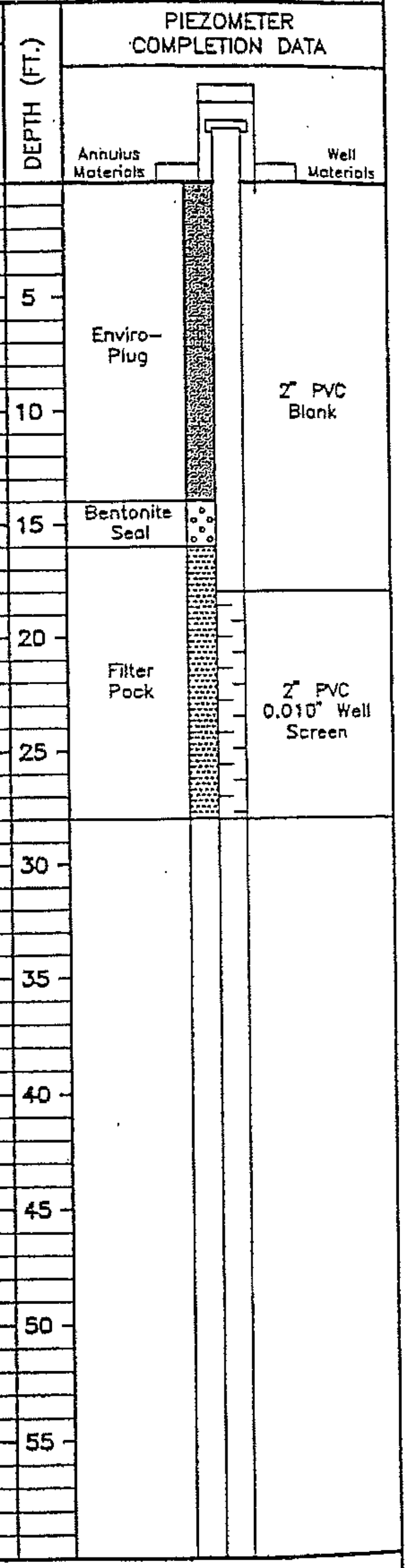
Geologist: CW Comments:

LOG OF PIEZOMETER NO. 25

■ Shelby Tube Sample ☒ Standard Penetration



DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	PL	PI	PASSING No.200 SIEVE
Tan silt					
Tan and dark gray clay	16	31	18	13	
Reddish-brown and tan silty clay					
Tan and light gray clay with sand partings and slickensides	23	56	18	38	85
-color changes to reddish-brown with silty clay layer at 20'-22'					
-becomes sandy					
Tan and light gray clayey sand	21	22	20	2	49
Tan and light gray clay with silt partings					
-slightly silty from 30'-32'					
-with sand seams					
Gray silty fine sand					



Client: Hardin County Project No.: 506592-157 Date Drilled: 12-18-90 Driller: SR

Surface Elevation: 75.81 Drilling Method: R/W Total Depth: 50.0 ft.

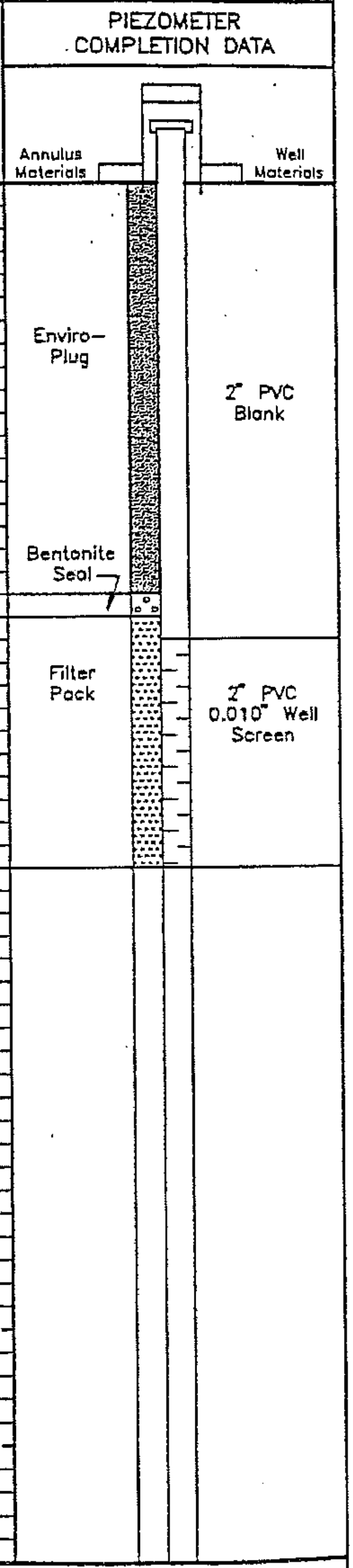
Top of Casing Elevation: 77.86 Groundwater Elevation: ______ Date: ______ Time: ______

Geologist: CW Comments:

LOG OF PIEZOMETER NO. 26

▓ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	ANALYTICAL DATA				
	MOISTURE CONTENT %	ATTERBERG LIMITS			PASSING No.200 SIEVE
		LL	PL	PI	
Tan silt					
Brown and gray silty clay					
—color changes to gray and reddish-tan	16	49	17	32	
Light gray and tan clay with sand partings					
—color changes to tan and light gray with slickensides and iron nodules					
	17	30	15	15	65
—color changes to light gray and reddish-tan and becomes sandy					
—color changes to reddish-brown and becomes silty to 27'					
—color changes to reddish-brown and light gray					
	20	58	18	40	
—color changes to tan and light gray with slickensides and silt partings					
—with silt seams to 42'					
—color changes to gray					
—becomes silty					



Client: Hardin County Project No.: 506592-157 Date Drilled: 12-17-90 Driller: SR

Surface Elevation: 75.48 Drilling Method: R/W Total Depth: 50.0 ft.

Top of Casing Elevation: 78.29 Groundwater Elevation: Date: Time:

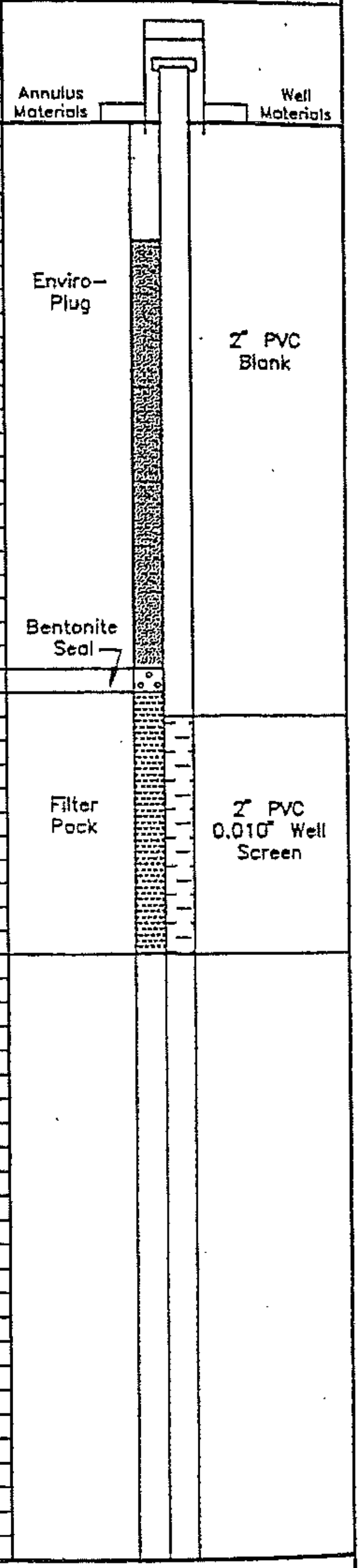
Geologist: CW Comments:

LOG OF PIEZOMETER NO. 27

▓ Shelby Tube Sample ☒ Standard Penetration

DESCRIPTION OF STRATUM	MOISTURE CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	PASSING No.200 SIEVE
Tan clayey silt					
Tan, reddish-brown and gray silty clay, slightly sandy					
Light gray, tan, and reddish-brown clay with sand partings	22	52	17	35	86
-becomes slickensided with iron nodules					
-color changes to tan and light gray	23	61	17	44	89
-color changes to light gray, tan and reddish-brown					
-becomes slightly silty					
Light gray and tan silty fine sand	26	18	18	0	45
Brown, tan and light gray clay with slickensides and silt partings					
-with silt seams					
-color changes to light gray and tan					

PIEZOMETER COMPLETION DATA



Client: Hardin County Project No.: 506592-157 Date Drilled: 12-17-90 Driller: SR

Surface Elevation: 82.20 Drilling Method: R/W Total Depth: 50.0 ft.

Top of Casing Elevation: 85.50 Groundwater Elevation: Date: Time:

Geologist: CW Comments:

1998 HYDREX ENVIRONMENTAL BOREHOLE LOGS AND DATA SHEETS

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill

TNRCC MSW Permit No.: MSW 2214

County: Hardin County

I.D. No.: GMP-1

Date of Installation: April 23, 1998

Date of Completion: April 24, 1998

Borehole Diameter: 8"

Driller Name: Buford E. Collier

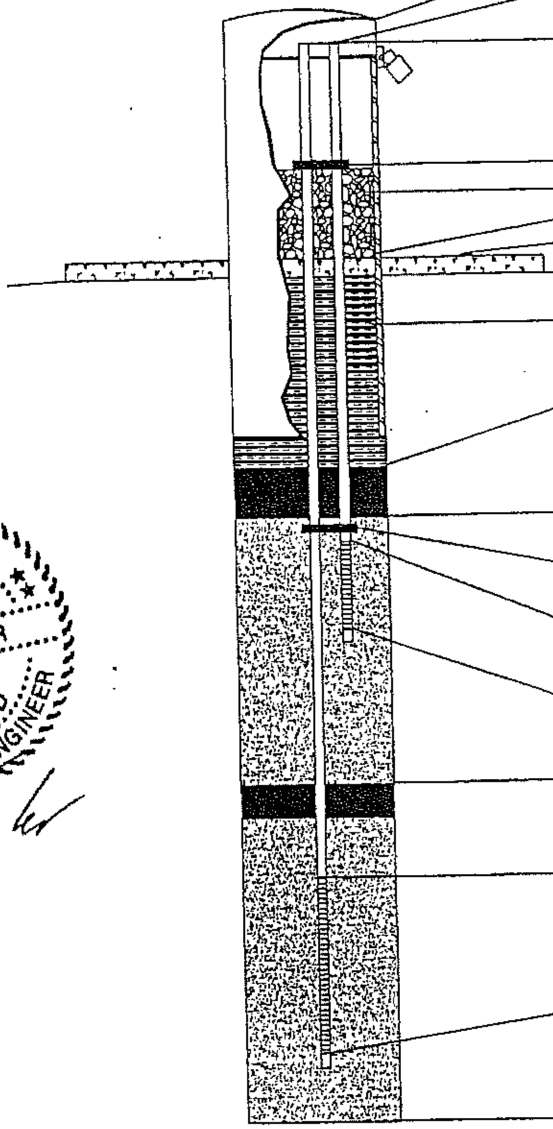
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker

Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation

Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Protective Steel Cover with Padlock

Cap with Shut-Off Valve

Top of Casing Elevation
Shallow: 84.76'
Deep: 84.76'

Probe Spacer

Aggregate

1/2" Weep Hole

Brass Survey Monument Elevation: 82.81'

Portland Cement Seal

Top of Bentonite Seal
Depth: 3.5'
Elevation: 79.31'

Top of Sand Pack
Depth: 5'
Elevation: 77.81'

Probe Spacer

Top of Screen
Depth: 5.5'
Elevation: 77.31'

Bottom of Screen
Depth: 8'
Elevation: 74.81'

Top of Bentonite Seal
Depth: 10'
Elevation: 72.81'

Top of Screen
Depth: 12'
Elevation: 70.81'

Bottom of Screen
Depth: 22'
Elevation: 60.81'

Bottom of Boring
Depth: 29'
Elevation: 53.81'

STATE OF TEXAS
A. W. KESSLER
41963
REGISTERED PROFESSIONAL ENGINEER

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

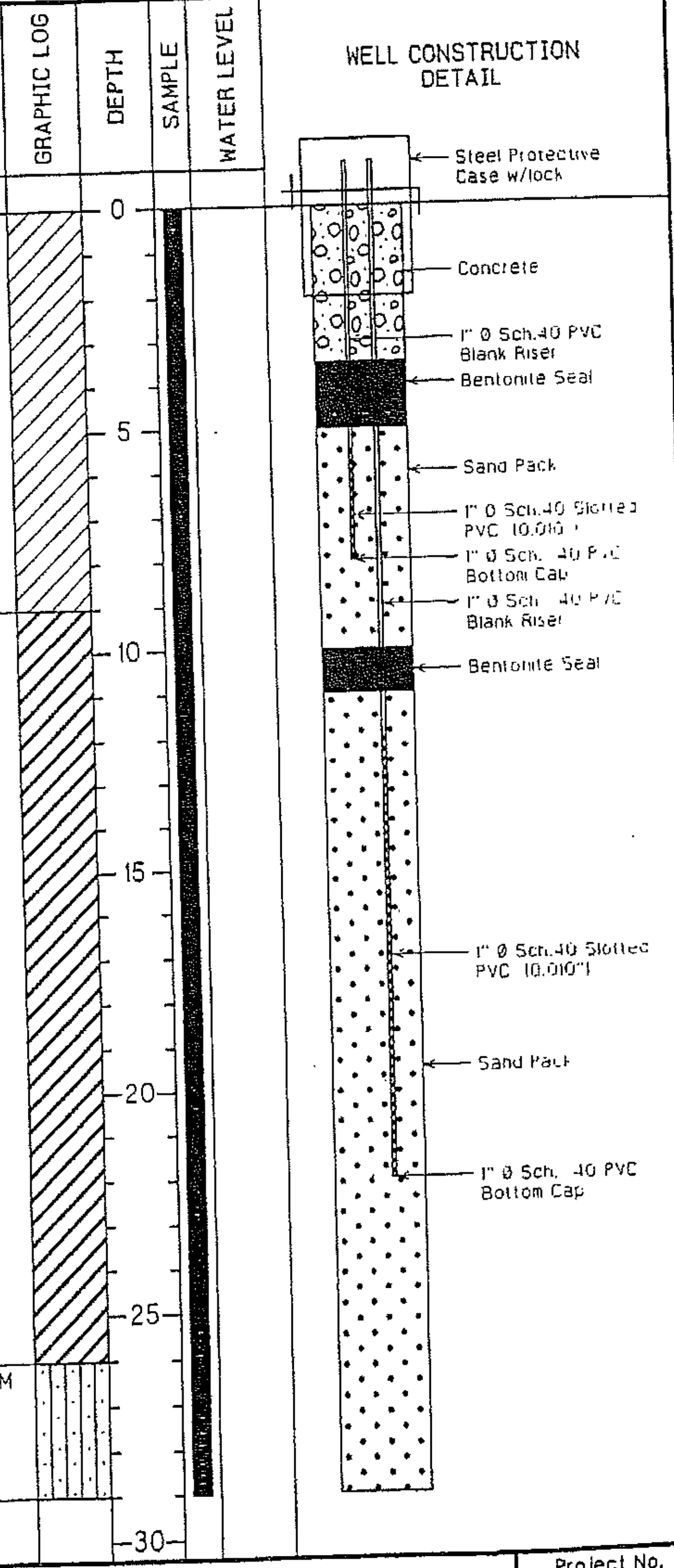
Methane Monitoring Probe No. GMP-1

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 27.03 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 16.96 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 82.81 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist	CL
-becomes stiff and dry @ 5.0'	
- decreasing in sand/silt content with depth	
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry	CH
- slightly sandy @ 11.5' to 12.5'	
- increasing in iron staining with depth	
- increasing in moisture with depth	
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 26.0' to 29.0'	SM
Bottom of Boring @ 29 feet	



Hydrex Environmental, Inc.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:
Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-98-13

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill

TNRCC MSW Permit No.: MSW 2214

County: Hardin County

I.D. No.: GMP-2

Date of Installation: April 23, 1998

Date of Completion: April 24, 1998

Driller Name: Buford E. Collier

Borehole Diameter: 8"

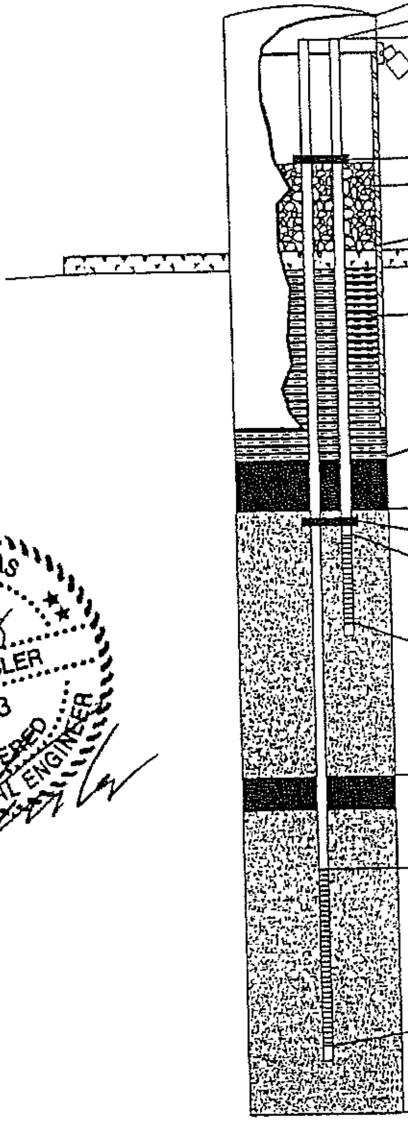
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker

Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation

Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Top of Casing Elevation
Shallow: 84.91'
Deep: 84.91'

Brass Survey Monument Elevation: 82.63'

Top of Bentonite Seal
Depth: 3.6'
Elevation: 79.13'

Top of Sand Pack
Depth: 6'
Elevation: 77.63'

Top of Screen
Depth: 5.6'
Elevation: 77.13'

Bottom of Screen
Depth: 8'
Elevation: 74.63'

Top of Bentonite Seal
Depth: 10'
Elevation: 72.63'

Top of Screen
Depth: 12'
Elevation: 70.63'

Bottom of Screen
Depth: 22'
Elevation: 60.63'

Bottom of Boring
Depth: 29'
Elevation: 53.53'

STATE OF TEXAS
5-19-98
A. W. KESSLER
41963
REGISTERED PROFESSIONAL ENGINEER

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

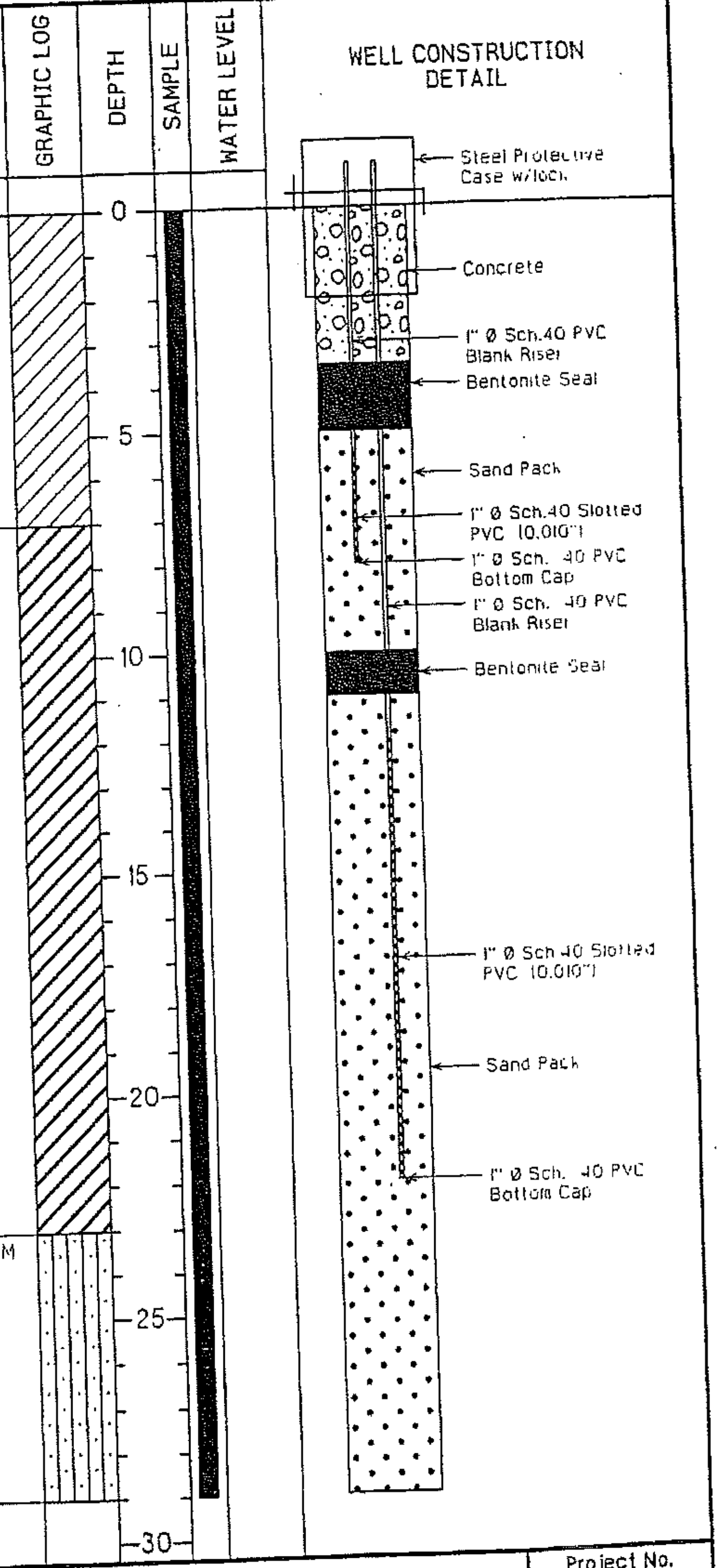
Methane Monitoring Probe No. GMP-2

PROJECT: Hardin County Landfill
RILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.31 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 24.47 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 82.63 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 4.0' - decreasing in sand/silt content with depth	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.5" thick interbeds of clayey sand @ 7.0' to 8.0' - 0.5" to 1.0" thick interbeds containing silt and very fine sand @ 12.0' to 15.0', moist - increasing in iron staining with depth - increasing in moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 24.0' to 32.0'	SM
Bottom of Boring @ 29 feet	



Hydrex Environmental, Inc.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

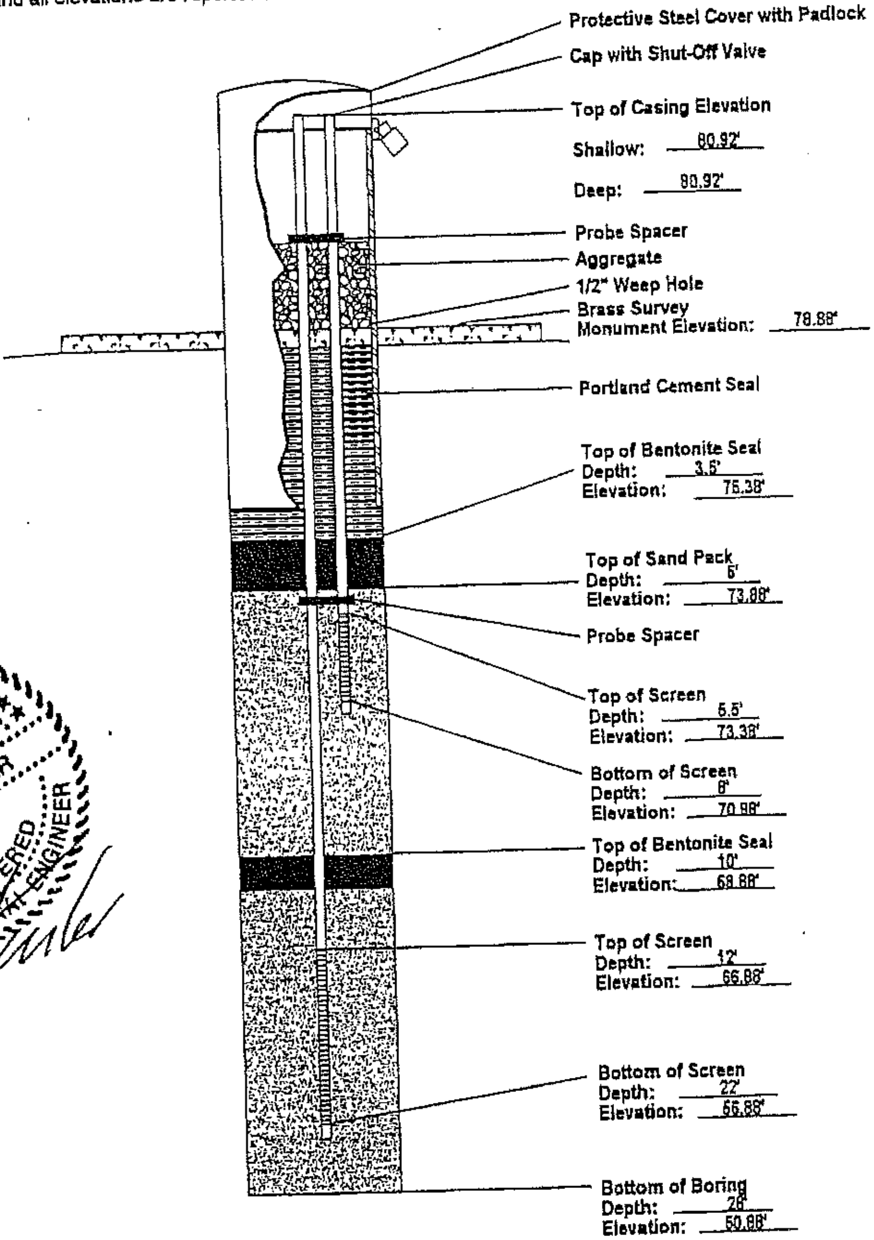
GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill
County: Hardin County
Date of Installation: April 23, 1998
Borehole Diameter: 8"

TNRCC MSW Permit No.: MSW 2214
I.D. No.: GMP-3
Date of Completion: April 24, 1998
Driller Name: Buford E. Collier
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker
Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation
Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Protective Steel Cover with Padlock
Cap with Shut-Off Valve
Top of Casing Elevation
Shallow: 80.92'
Deep: 80.92'
Probe Spacer
Aggregate
1/2" Weep Hole
Brass Survey Monument Elevation: 78.88'
Portland Cement Seal
Top of Bentonite Seal
Depth: 3.5'
Elevation: 75.38'
Top of Sand Pack
Depth: 5'
Elevation: 73.88'
Probe Spacer
Top of Screen
Depth: 5.5'
Elevation: 73.38'
Bottom of Screen
Depth: 8'
Elevation: 70.88'
Top of Bentonite Seal
Depth: 10'
Elevation: 68.88'
Top of Screen
Depth: 12'
Elevation: 66.88'
Bottom of Screen
Depth: 22'
Elevation: 56.88'
Bottom of Boring
Depth: 28'
Elevation: 50.88'

5-14-98
A. W. KESSLER
41963

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

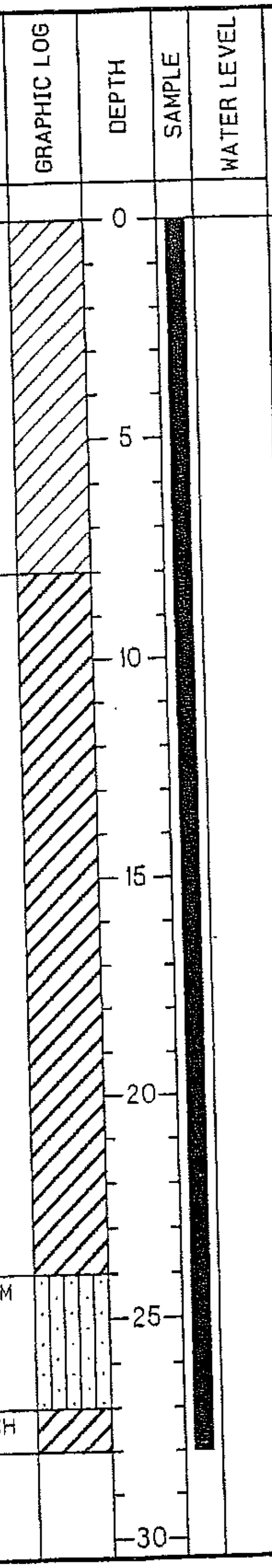
Methane Monitoring Probe No. GMP-3

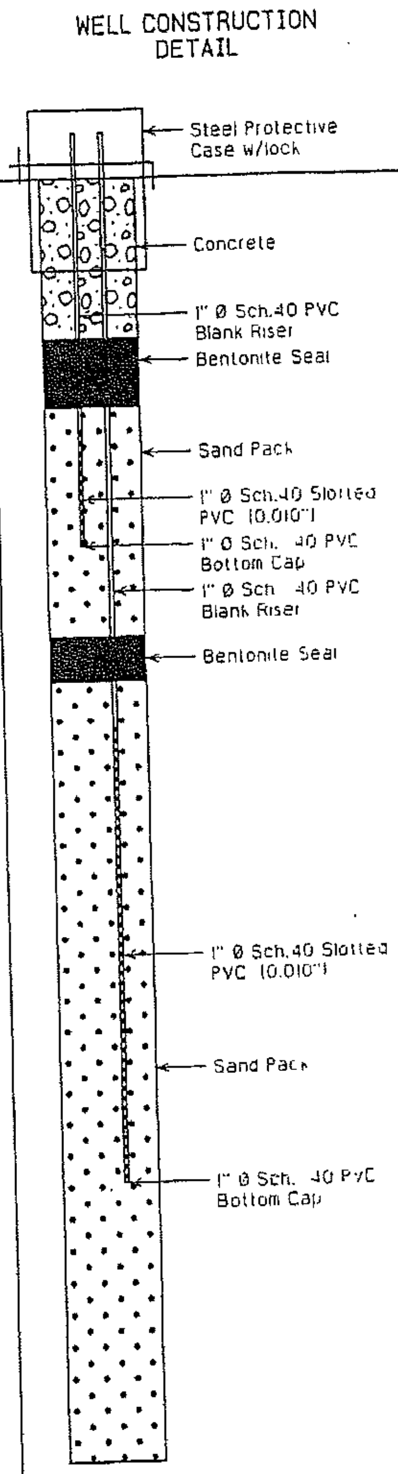
PROJECT: Hardin County Landfill
RILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.16 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 24.27 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 78.88 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 4.0'	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - fracture approximately 30 degrees to core axis @ 9.0' - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 11.0' to 12.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 24.0' to 27.0'	SM
Fat Clay; Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 28 feet	





Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

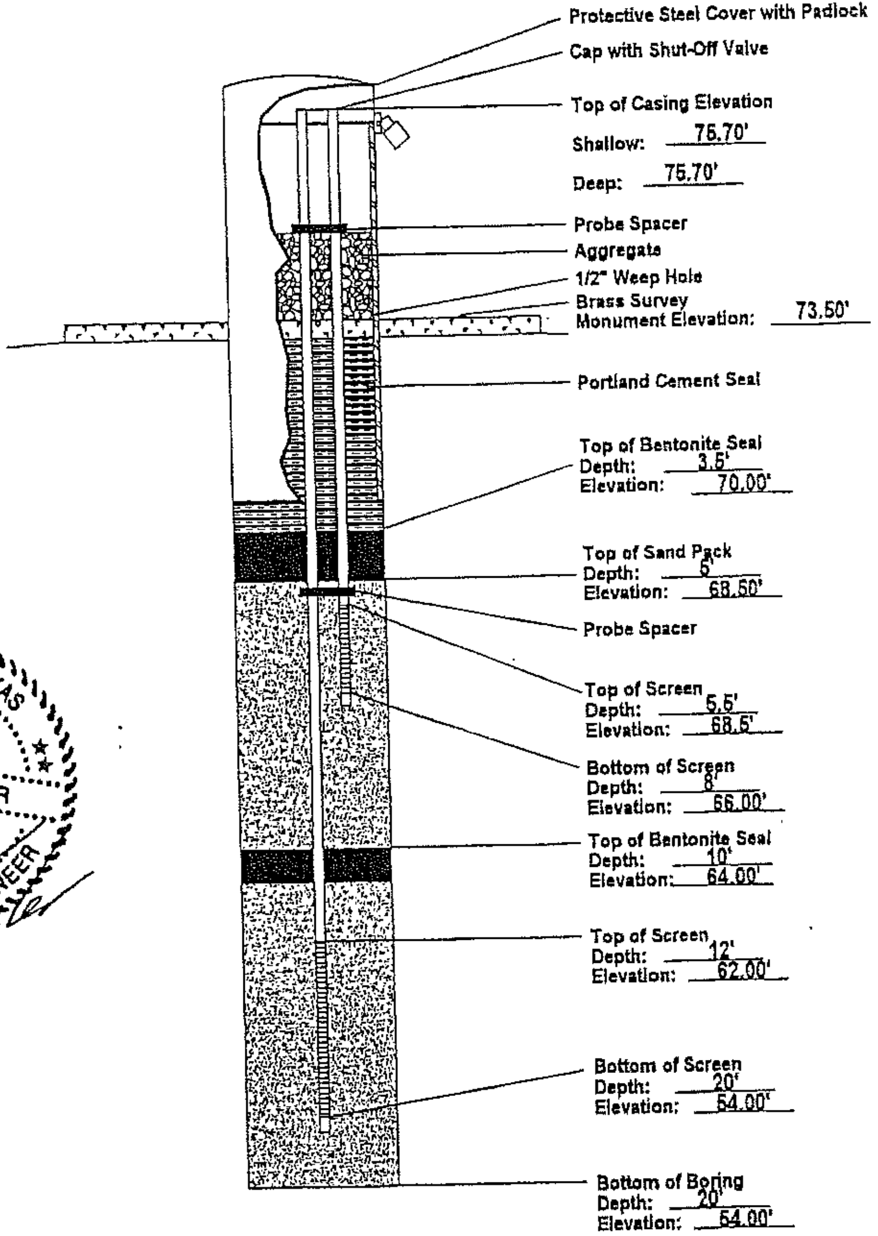
Project No.
L-08-182

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill
TNRCC MSW Permit No.: MSW 2214
County: Hardin County
I.D. No.: GMP-4
Date of Installation: April 23, 1998
Date of Completion: April 24, 1998
Borehole Diameter: 8"
Driller Name: Buford E. Collier
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker
Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation
Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Protective Steel Cover with Padlock
Cap with Shut-Off Valve
Top of Casing Elevation
Shallow: 75.70'
Deep: 75.70'
Probe Spacer
Aggregate
1/2" Weep Hole
Brass Survey Monument Elevation: 73.50'
Portland Cement Seal

Top of Bentonite Seal
Depth: 3.5'
Elevation: 70.00'

Top of Sand Pack
Depth: 5'
Elevation: 68.50'

Probe Spacer

Top of Screen
Depth: 5.5'
Elevation: 68.5'

Bottom of Screen
Depth: 8'
Elevation: 66.00'

Top of Bentonite Seal
Depth: 10'
Elevation: 64.00'

Top of Screen
Depth: 12'
Elevation: 62.00'

Bottom of Screen
Depth: 20'
Elevation: 54.00'

Bottom of Boring
Depth: 20'
Elevation: 54.00'

5-11-98
A. W. KESSLER
41963

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

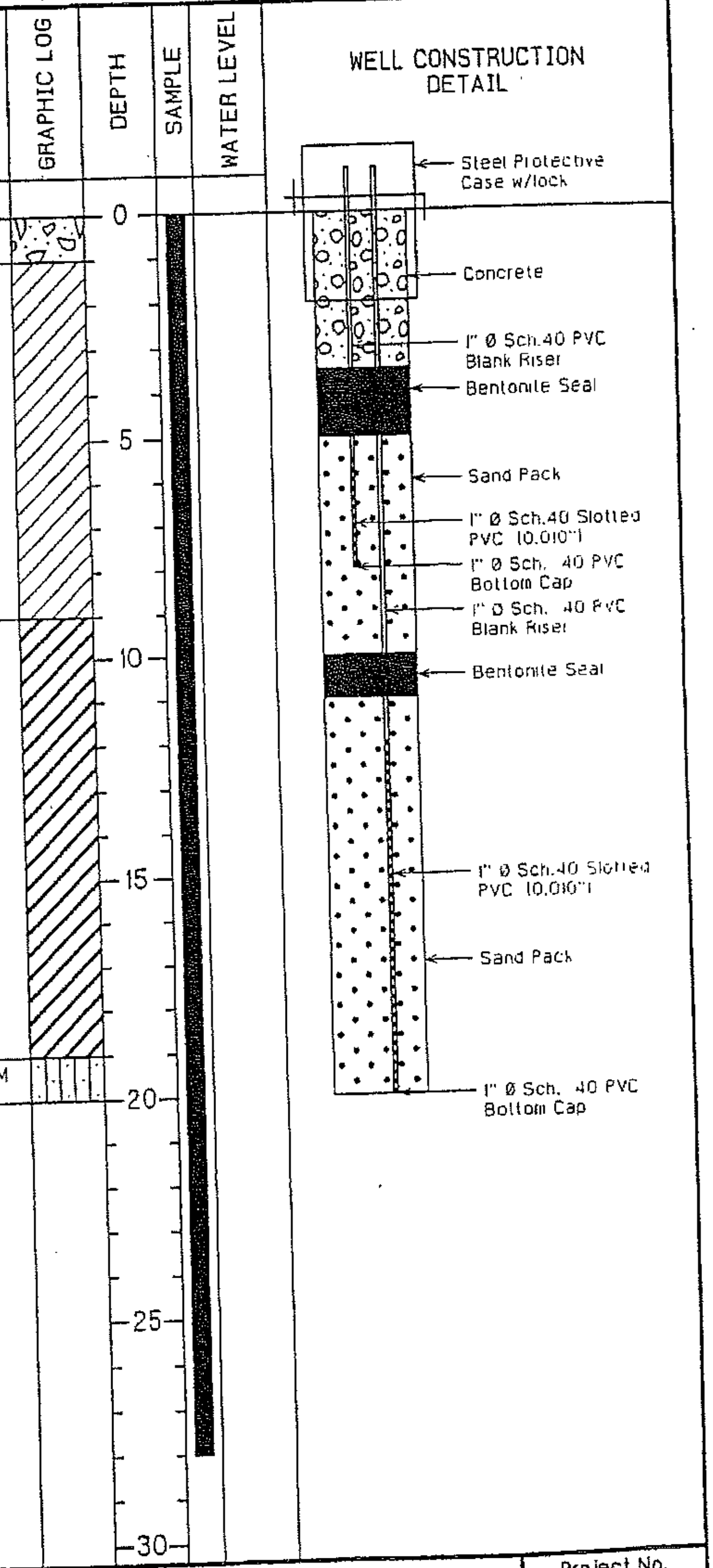
Methane Monitoring Probe No. GMP-4

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 19.23 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 11.25 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 73.50 ft. MSL

DESCRIPTION	USCS CLASS
Fill: Road base material @ 0.0' to 1.0'	
Lean Clay; Soft, mottled tan and reddish-orange, iron staining common, slightly moist - 0.25" to 0.5" thick interbeds containing silt and very fine sand @ 3.0' to 5.0', slightly moist	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, slightly moist - manganese oxide nodules common @ 12.5' to 14.5' - sandy zone @ 16.0' to 19.0', slightly moist - increasing in sand content and moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 19.0' to 26.0'	SM
Bottom of Boring @ 20 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 20.0'

Project No.
L-08-182

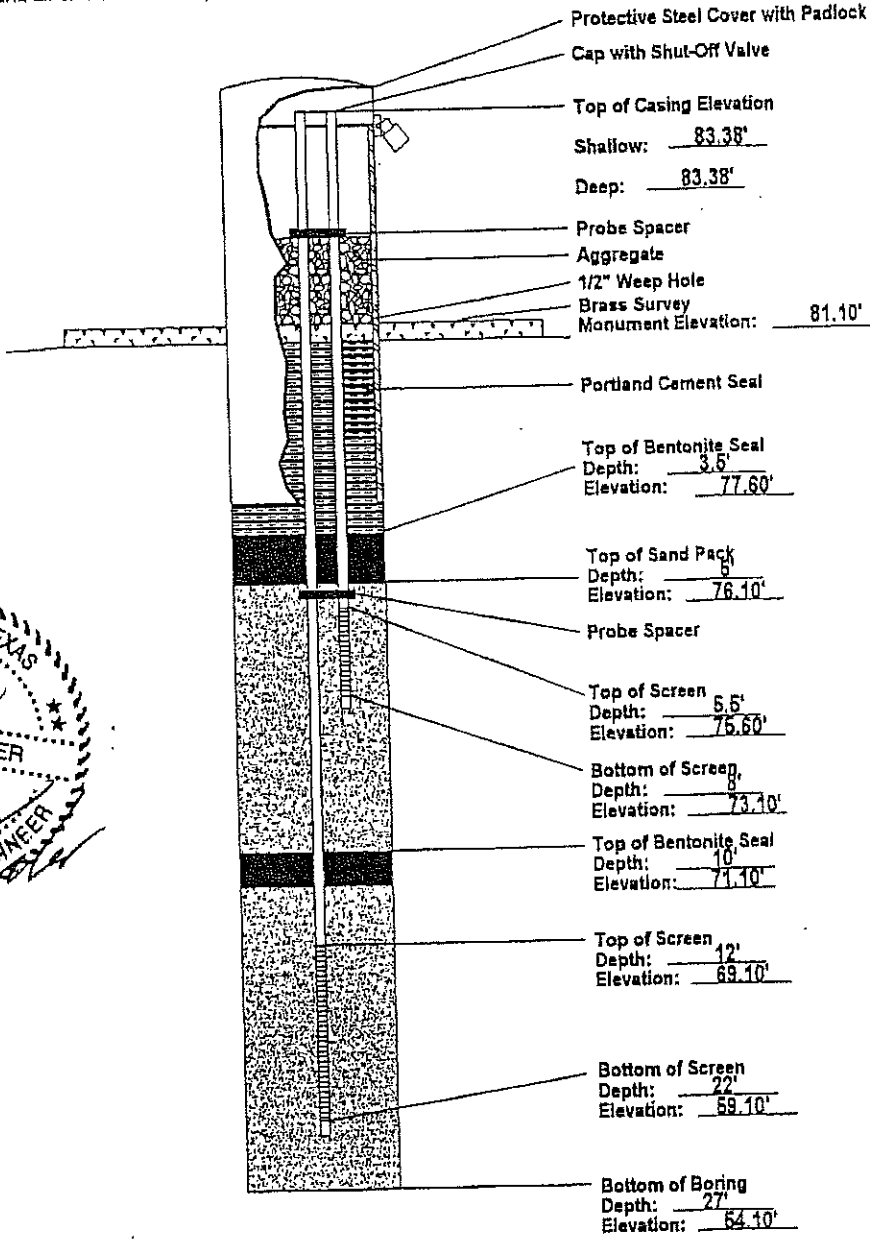
Page 1 of 1

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill
TNRCC MSW Permit No.: MSW 2214
County: Hardin County
I.D. No.: GMP-5
Date of Installation: April 23, 1998
Date of Completion: April 24, 1998
Borehole Diameter: 8"
Driller Name: Buford E. Collier
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker
Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation
Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Top of Casing Elevation
Shallow: 83.38'
Deep: 83.38'

Brass Survey Monument Elevation: 81.10'

Top of Bentonite Seal
Depth: 3.5'
Elevation: 77.60'

Top of Sand Pack
Depth: 5'
Elevation: 76.10'

Top of Screen
Depth: 5.5'
Elevation: 75.60'

Bottom of Screen
Depth: 8'
Elevation: 73.10'

Top of Bentonite Seal
Depth: 10'
Elevation: 71.10'

Top of Screen
Depth: 12'
Elevation: 69.10'

Bottom of Screen
Depth: 22'
Elevation: 59.10'

Bottom of Boring
Depth: 27'
Elevation: 54.10'

3-19-98
A. W. KESSLER
41963

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

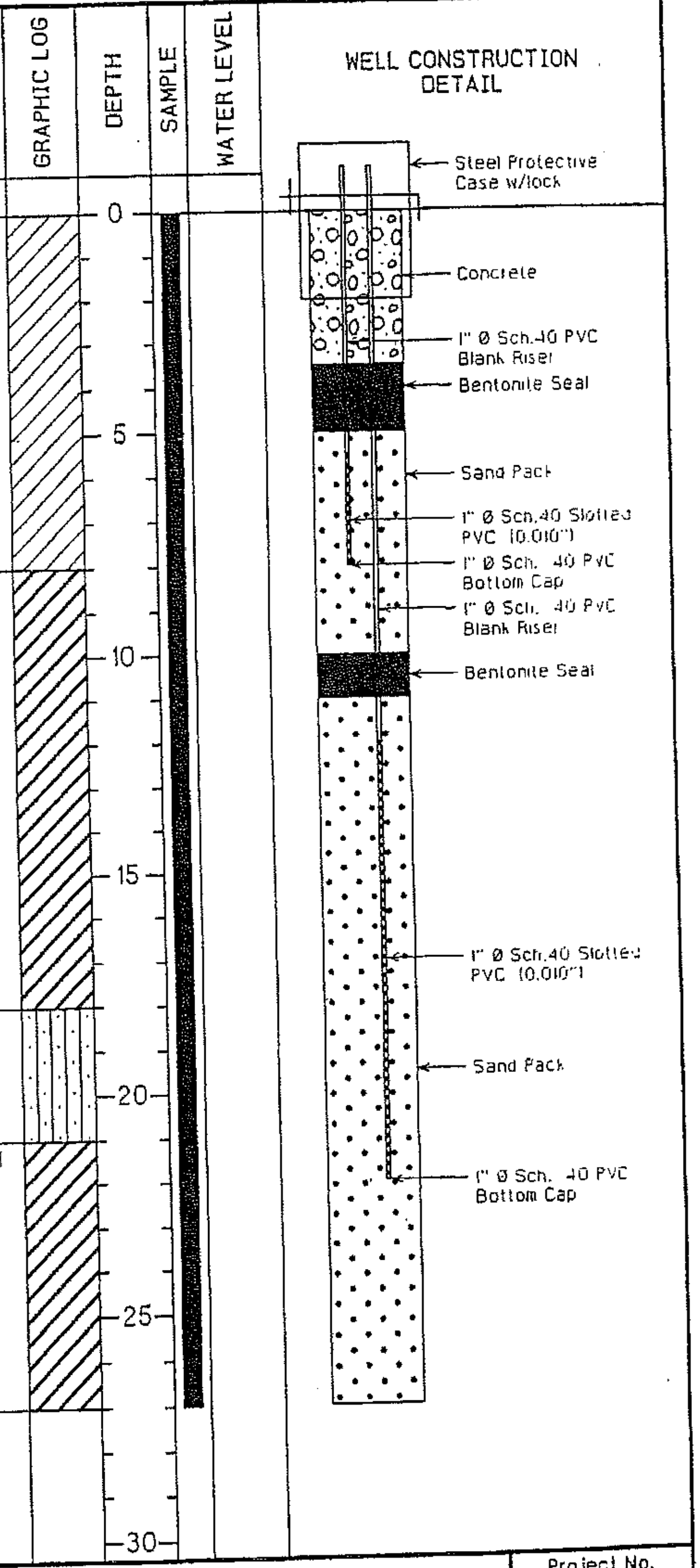
Methane Monitoring Probe No. GMP-5

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 18.23 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 17.85 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 81.10 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 5.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 10.0' to 12.0', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 18.0' to 21.0'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 27 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-183

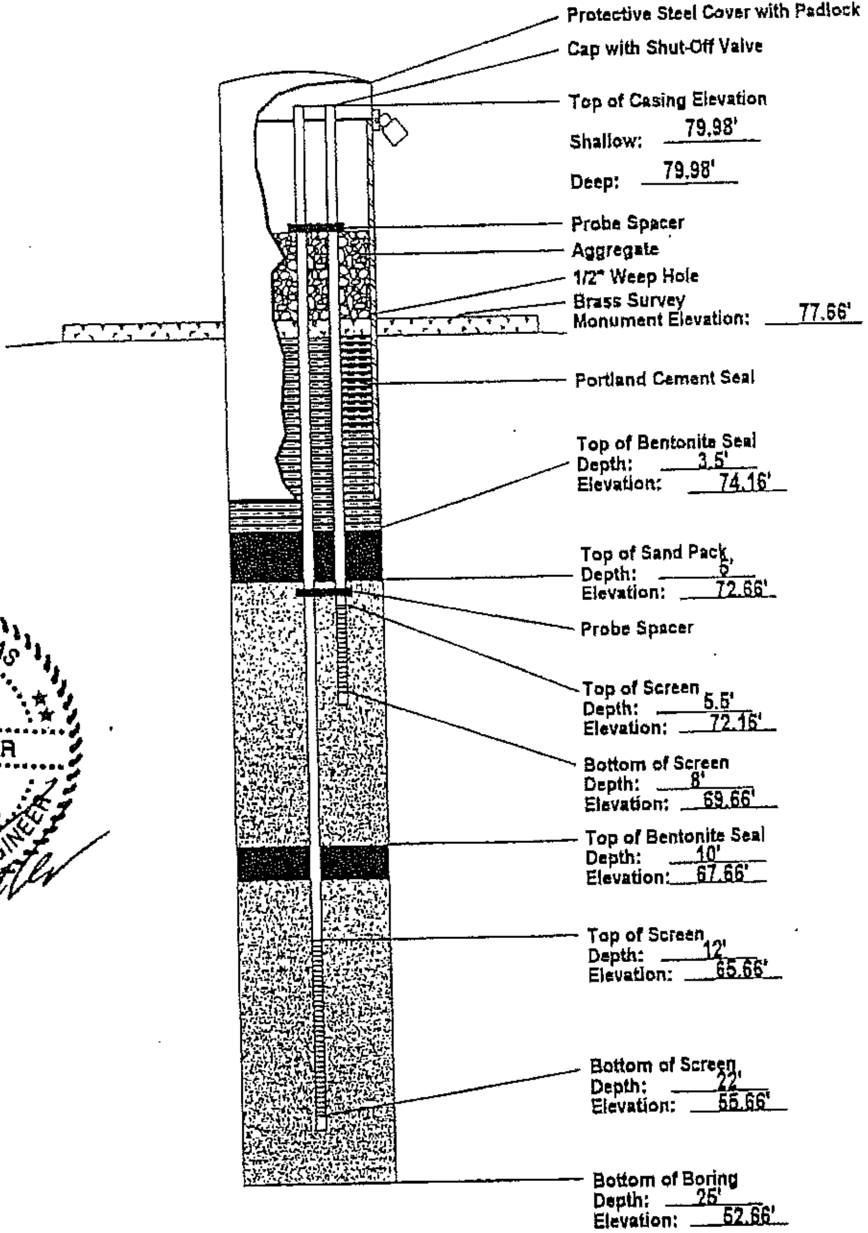
Page 1 of 1

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill
TNRCC MSW Permit No.: MSW 2214
County: Hardin County
I.D. No.: GMP-6
Date of Installation: April 23, 1998
Date of Completion: April 24, 1998
Borehole Diameter: 8"
Driller Name: Buford E. Collier
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker
Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation
Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Top of Casing Elevation
Shallow: 79.98'
Deep: 79.98'

Brass Survey Monument Elevation: 77.66'

Top of Bentonite Seal
Depth: 3.5'
Elevation: 74.16'

Top of Sand Pack,
Depth: 5'
Elevation: 72.66'

Top of Screen
Depth: 5.5'
Elevation: 72.16'

Bottom of Screen
Depth: 8'
Elevation: 69.66'

Top of Bentonite Seal
Depth: 10'
Elevation: 67.66'

Top of Screen
Depth: 12'
Elevation: 65.66'

Bottom of Screen
Depth: 22'
Elevation: 55.66'

Bottom of Boring
Depth: 25'
Elevation: 52.66'

3-17-98
A. W. KESSLER
41963

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

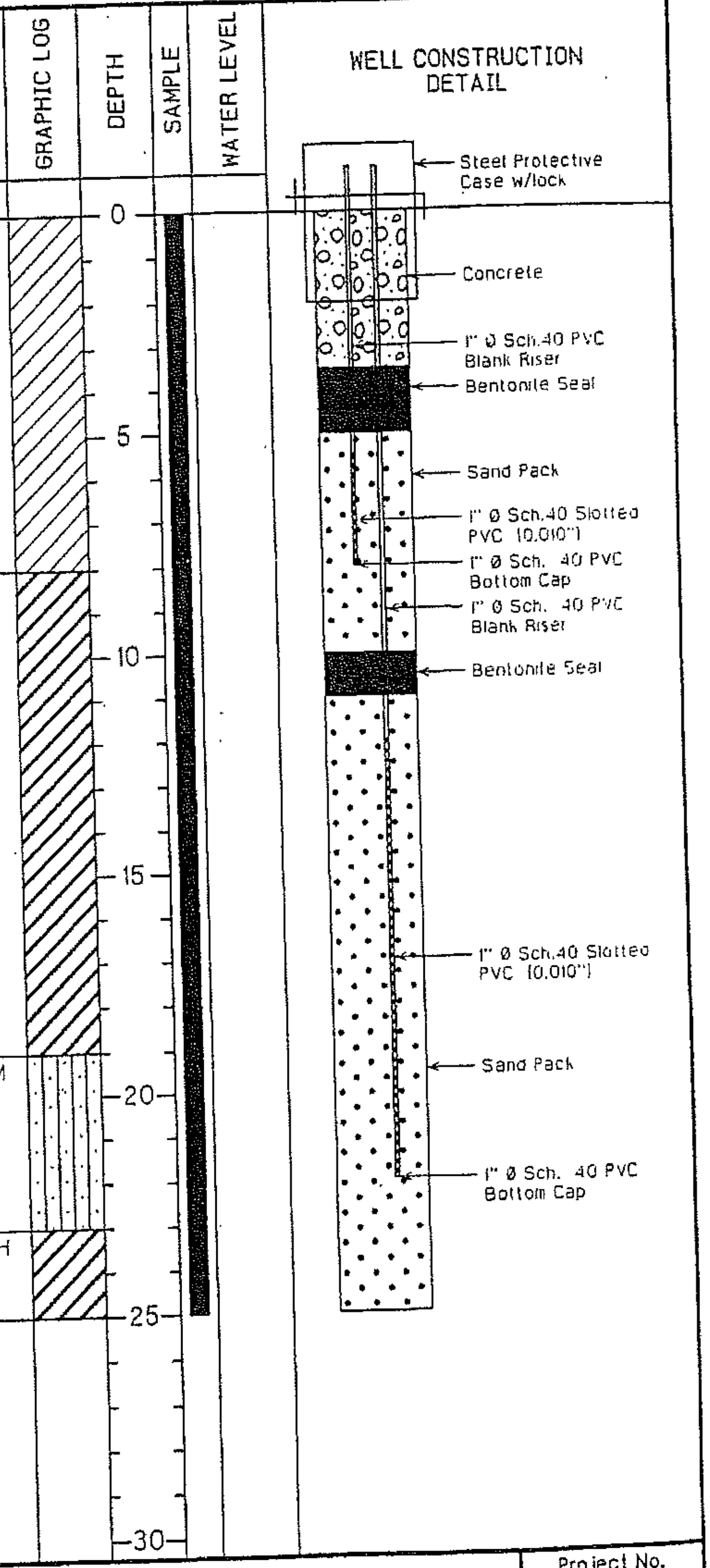
Methane Monitoring Probe No. GMP-6

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 19.44 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 10.64 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 77.66 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay: Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 4.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 12.0' to 14.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 19.0' to 23.0'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 25 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

Page 1 of 1

GAS MONITORING PROBE (GMP) DATA SHEET

Permittee or Site Name: Hardin County Landfill

TNRCC MSW Permit No.: MSW 2214

County: Hardin County

I.D. No.: GMP-7

Date of Installation: April 23, 1998

Date of Completion: April 24, 1998

Borehole Diameter: 8"

Driller Name: Buford E. Collier

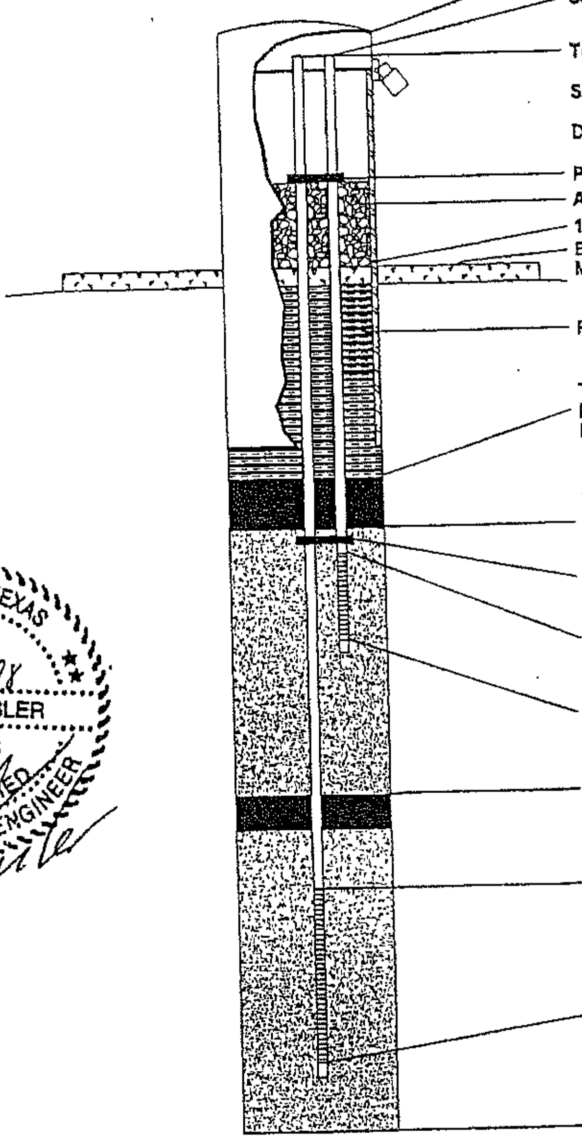
License No.: 50089 M

Geologist, Hydrogeologist or Engineer Supervising GMP Installation: Gary A. Coker

Name of Geologic Formation(s) in which GDP is completed: Quaternary Lissie Formation

Concrete Pad Dimensions: 4' x 4' x 6"

NOTE: All depths from surface and all elevations are reported relative to Mean Sea Level



Protective Steel Cover with Padlock

Cap with Shut-Off Valve

Top of Casing Elevation
Shallow: 80.61'
Deep: 80.61'

Probe Spacer

Aggregate

1/2" Weep Hole

Brass Survey Monument Elevation: 78.90'

Portland Cement Seal

Top of Bentonite Seal
Depth: 3.5'
Elevation: 75.40'

Top of Sand Pack
Depth: 5'
Elevation: 73.90'

Probe Spacer

Top of Screen
Depth: 5.5'
Elevation: 73.40'

Bottom of Screen
Depth: 8'
Elevation: 70.90'

Top of Bentonite Seal
Depth: 10'
Elevation: 68.90'

Top of Screen
Depth: 12'
Elevation: 66.90'

Bottom of Screen
Depth: 22'
Elevation: 56.90'

Bottom of Boring
Depth: 23'
Elevation: 55.90'

STATE OF TEXAS
3-17-98
A. W. KESSLER
41963
REGISTERED PROFESSIONAL ENGINEER

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

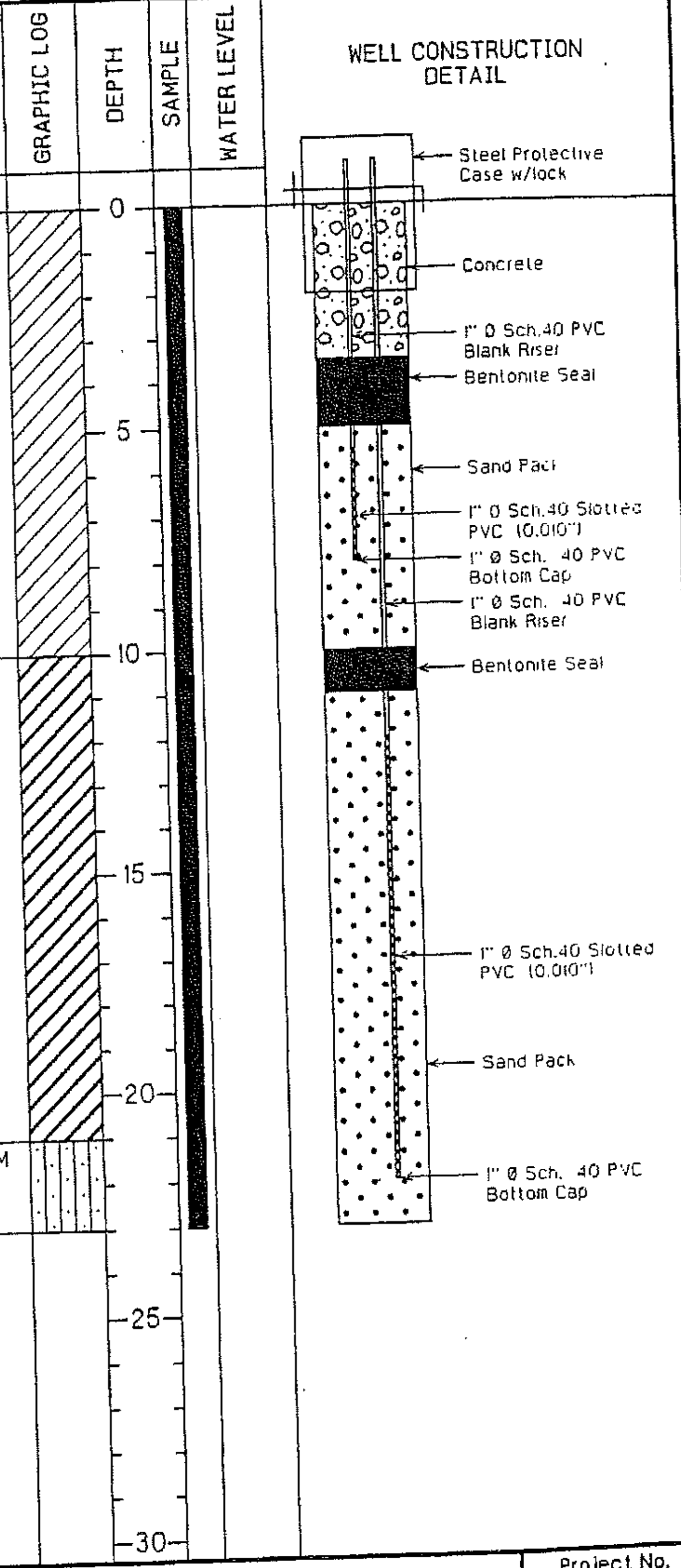
Methane Monitoring Probe No. GMP-7

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 21.05 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 14.76 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 78.90 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 3.0', slightly moist -becomes stiff and dry @ 3.5'	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.5" thick interbeds containing silt and very fine sand @ 11.0' to 12.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 21.0' to 23.0'	SM
Bottom of Boring @ 23 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-18

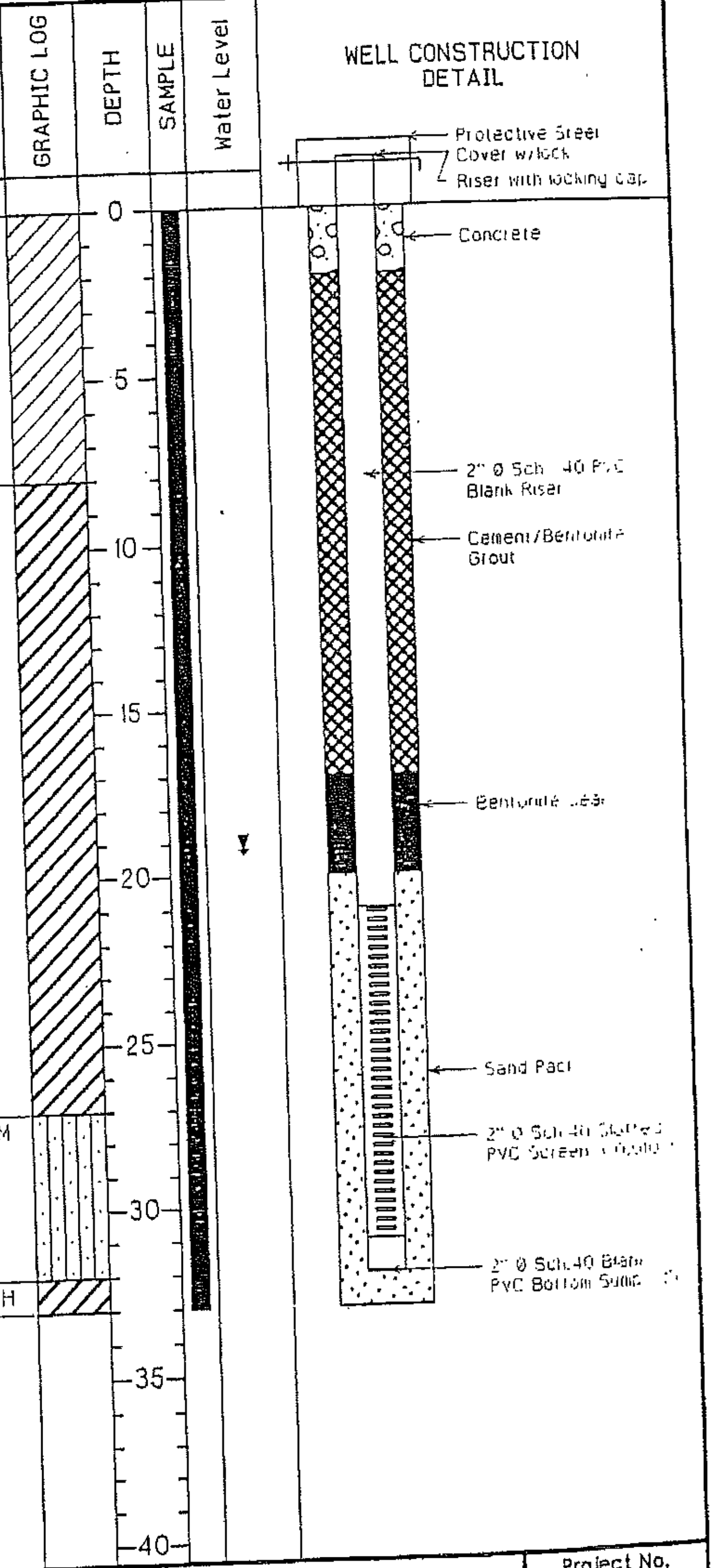
Monitor Well No. MW-1

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 17.12 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 19.14 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 82.90 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist - roots and organic material common @ 0.0' to 3.0' - becomes very stiff and dry @ 4.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, dry - slightly sandy zone @ 10.5' to 11.5', dry - iron staining common @ 12.0' to 16.0' - increasing in iron staining with depth	CH
Silty Sand: Very loose, tan, subangular to subrounded, fine grained quartz grains, iron staining common, wet @ 27.0' to 32.0'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry Bottom of Boring @ 33.0'	CH



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL

Permit No.: MSW 2214

County: HARDIN COUNTY

Monitor Well I.D. No.: MW-1

Date of Monitor Well Installation: 03/25/98

Date of Monitor Well Development: 04/01/98

Monitor Well Grid Coordinates
Northing: 7889.799 Easting: 1249.311

Monitor Well Driller
Name: Buford E. Collier
License No.: 50089-M

Monitor Well Groundwater
Gradient: Upgradient ______ Downgradient X

Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER

Static Water Level Elevation (with respect to MSL) after Well Development: 63.76'

Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION

Type of Casing Protection: 4" x 4" STEEL COLLAR

Type of Locking Device: PADLOCK

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.

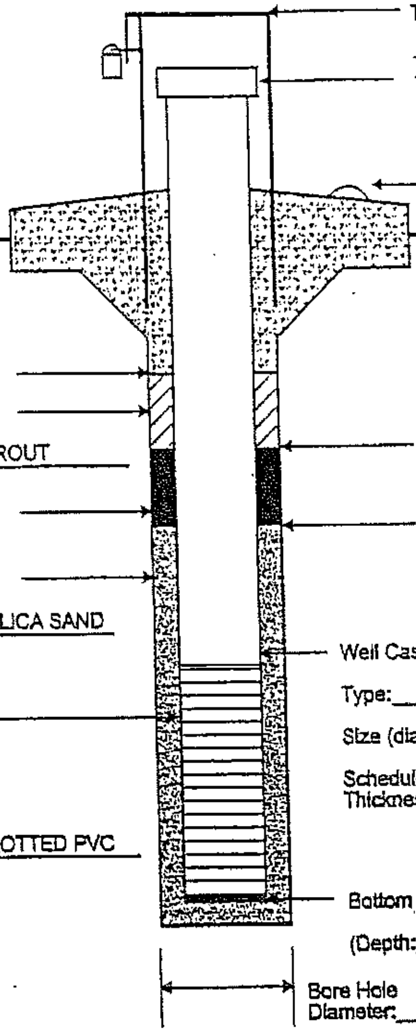
Surface Pad Dimensions: 6' X 6' X 6"

Surface Elevation: NA

Top of Protective Collar Elevation: NA

Top of Casing Elevation: 85.46'

Surveyor's Pin Elevation: 82.90'



Concrete Seal
Depth: 2.0'

Casing Seal (Backfill)
Material: BENTONITE GROUT

Bentonite Seal

Filter Pack

Filter Pack Material: COLORADO SILICA SAND
Sterilized Sand or Glass Beads

Well Screen
Top Depth: 21'
Top Elevation: 61.90'

Type of Well Screen: 2" SCH. 40 SLOTTED PVC

Screen Opening Size: 0.010"

Bentonite Seal Top
Depth: 18' Elevation: 64.90'

Filter Pack Top
Depth: 20' Elevation: 62.90'

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40

Bottom Cap
(Depth: 32')

Bore Hole Diameter: 8"

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

Not To Scale

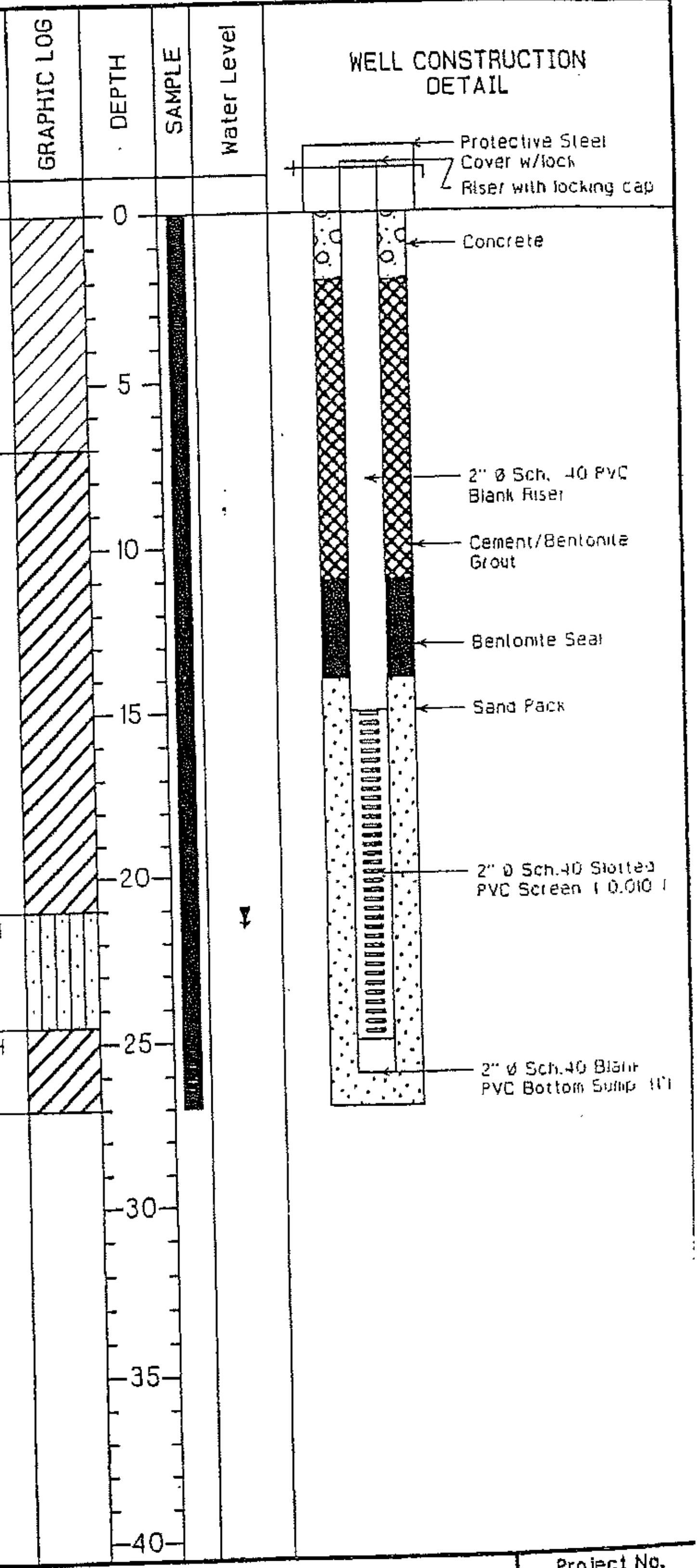
Monitor Well No. MW-2

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 18.80 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 21.42 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 81.74 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist - roots and organic material common @ 0.0' to 1.5' - 3" thick sandy seam @ 3.0', wet - becomes stiff and dry @ 4.0' - decreasing in sand/silt content with depth	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, dry - very thin sandy seams @ 11.5' to 12.0', slightly moist - fracture approximately 30 degrees to core axis containing silt and very fine grained sand @ 15.0' - increasing in iron staining with depth	CH
Silty Sand: Very loose, light gray to tan, subangular to subrounded, fine grained quartz sand, wet @ 21.0' to 24.5'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 27.0'	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL

Permit No.: MSW 2214

County: HARDIN COUNTY

Monitor Well I.D. No.: MW-2

Date of Monitor Well Installation: 03/25/98

Date of Monitor Well Development: 04/01/98

Monitor Well Grid Coordinates
Northing: 7896.810 Easting: 1698.637

Monitor Well Driller
Name: BUFORD E. COLLIER
License No.: 50089-M

Monitor Well Groundwater
Gradient: Upgradient ______ Downgradient X

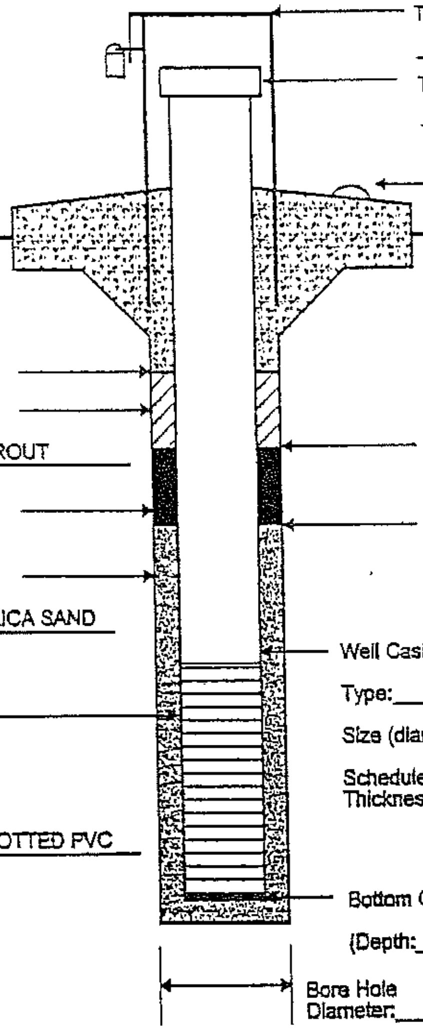
Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER

Static Water Level Elevation (with respect to MSL) after Well Development: 60.32'

Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION



Type of Casing Protection: 4" X 4" STEEL COLLAR

Type of Locking Device: PADLOCK

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.

Surface Pad Dimensions: 6' X 6' X 6"

Surface Elevation: NA

Top of Protective Collar Elevation: NA

Top of Casing Elevation: 84.25'

Surveyor's Pin Elevation: 81.74'

Concrete Seal Depth: 2.0'

Casing Seal (Backfill) Material: BENTONITE GROUT

Bentonite Seal

Bentonite Seal Top Depth: 11' Elevation: 70.74'

Filter Pack

Filter Pack Top Depth: 14' Elevation: 67.74'

Filter Pack Material: COLORADO SILICA SAND
Sterilized Sand or Glass Beads

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40

Well Screen
Top Depth: 15'
Top Elevation: 66.74'
Type of Well Screen: 2" SCH. 40 SLOTTED PVC
Screen Opening Size: 0.010"

Bottom Cap (Depth: 26')

Bore Hole Diameter: 8"

Not To Scale

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

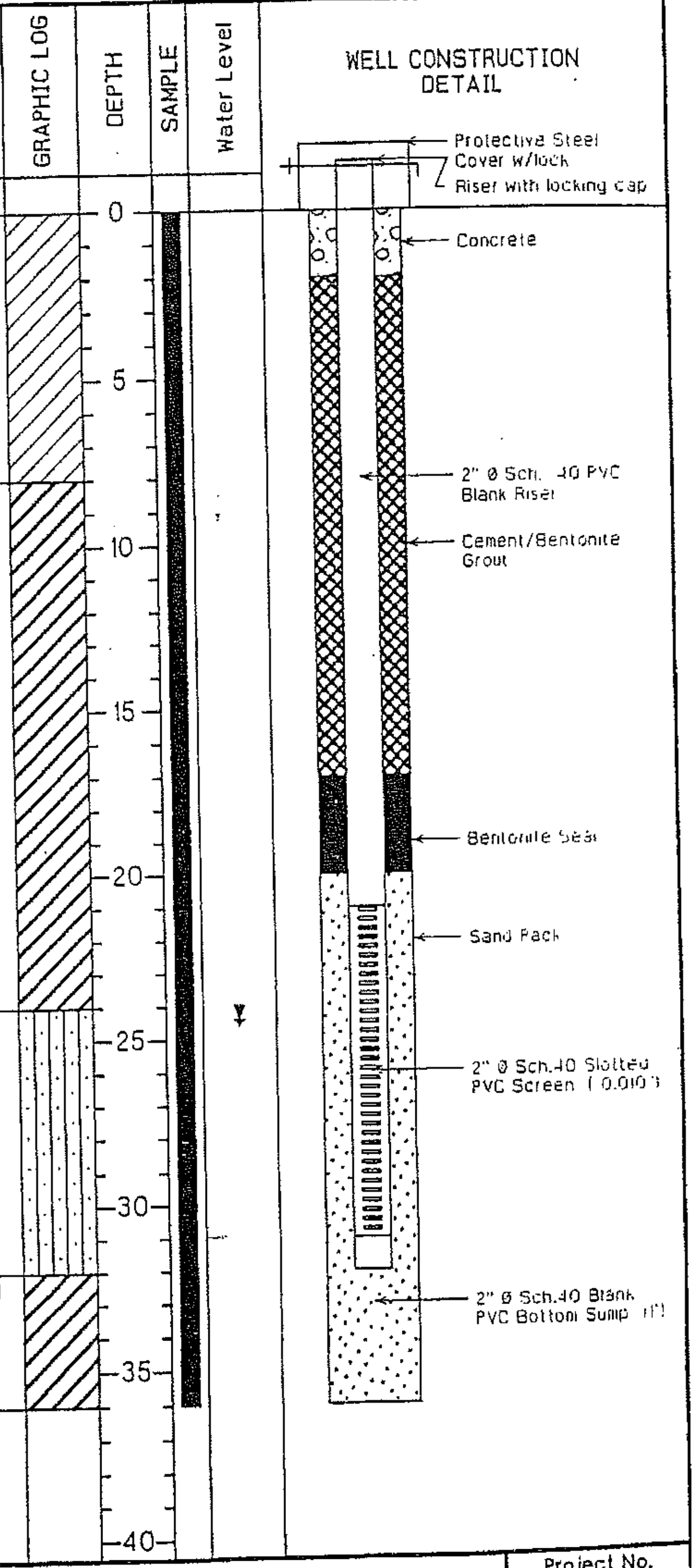
Monitor Well No. MW-3

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.50 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 24.30 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 83.37 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist - roots and organic material common @ 0.0' to 1.5' - becomes stiff and dry @ 4.0' - decreasing in sand/silt content with depth - 0.5" thick interbeds of clayey sand @ 7.0' to 8.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, dry - 0.5" to 1.0" thick interbeds containing silt and very fine grained sand @ 12.0' to 13.5', slightly moist - thin interbeds containing fine grained sand @ 15.0' to 16.0', moist - increasing in iron staining with depth - increasing in sand content @ 22.0' to 23.5', moist	CH
Silty Sand: Very loose, light gray to tan, subangular to subrounded, fine grained quartz sand, wet @ 24.0' to 32.0'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 36.0'	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

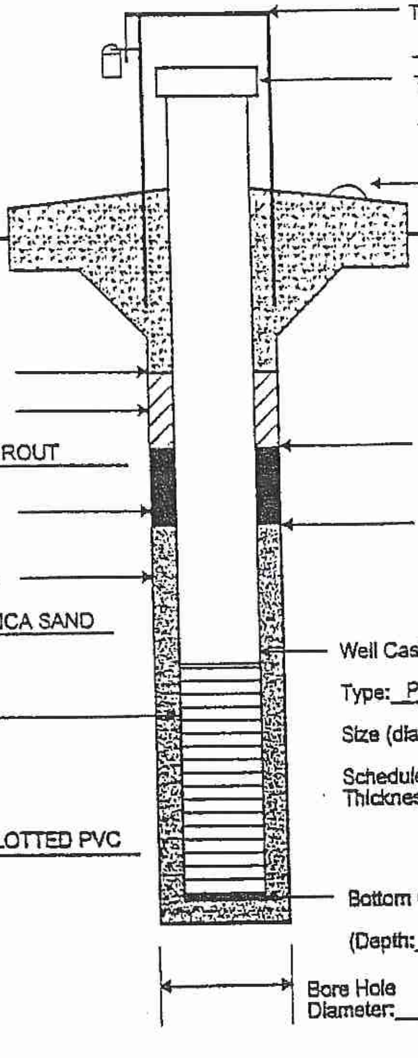
MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL
Permit No.: MSW 2214
County: HARDIN COUNTY
Monitor Well I.D. No.: MW-3
Date of Monitor Well Installation: 03/25/98
Date of Monitor Well Development: 04/01/98
Monitor Well Grid Coordinates
Northing: 7890.917 Easting: 2038.925
Monitor Well Driller
Name: BUFORD E. COLLIER
License No.: 50089-M
Monitor Well Groundwater
Gradient: Upgradient ____ Downgradient X

Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER
Static Water Level Elevation (with respect to MSL) after Well Development: 59.07'
Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION



Type of Casing Protection: 4" x 4" STEEL COLLAR
Type of Locking Device: PADLOCK
Top of Protective Collar Elevation: NA
Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Top of Casing Elevation: 85.85'
Surface Pad Dimensions: 6' x 6' x 6"
Surveyor's Pin Elevation: 83.37'
Surface Elevation: NA
Concrete Seal Depth: 2.0'
Casing Seal (Backfill)
Material: BENTONITE GROUT
Bentonite Seal Top Depth: 17' Elevation: 66.37'
Bentonite Seal
Filter Pack Top Depth: 20' Elevation: 63.37'
Filter Pack
Filter Pack Material: COLORADO SILICA SAND
Sterilized Sand or Glass Beads
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40
Well Screen
Top Depth: 21'
Top Elevation: 62.37'
Type of Well Screen: 2" SCH. 40 SLOTTED PVC
Screen Opening Size: 0.010"
Bottom Cap (Depth: 32')
Bore Hole Diameter: 8"

Not To Scale

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

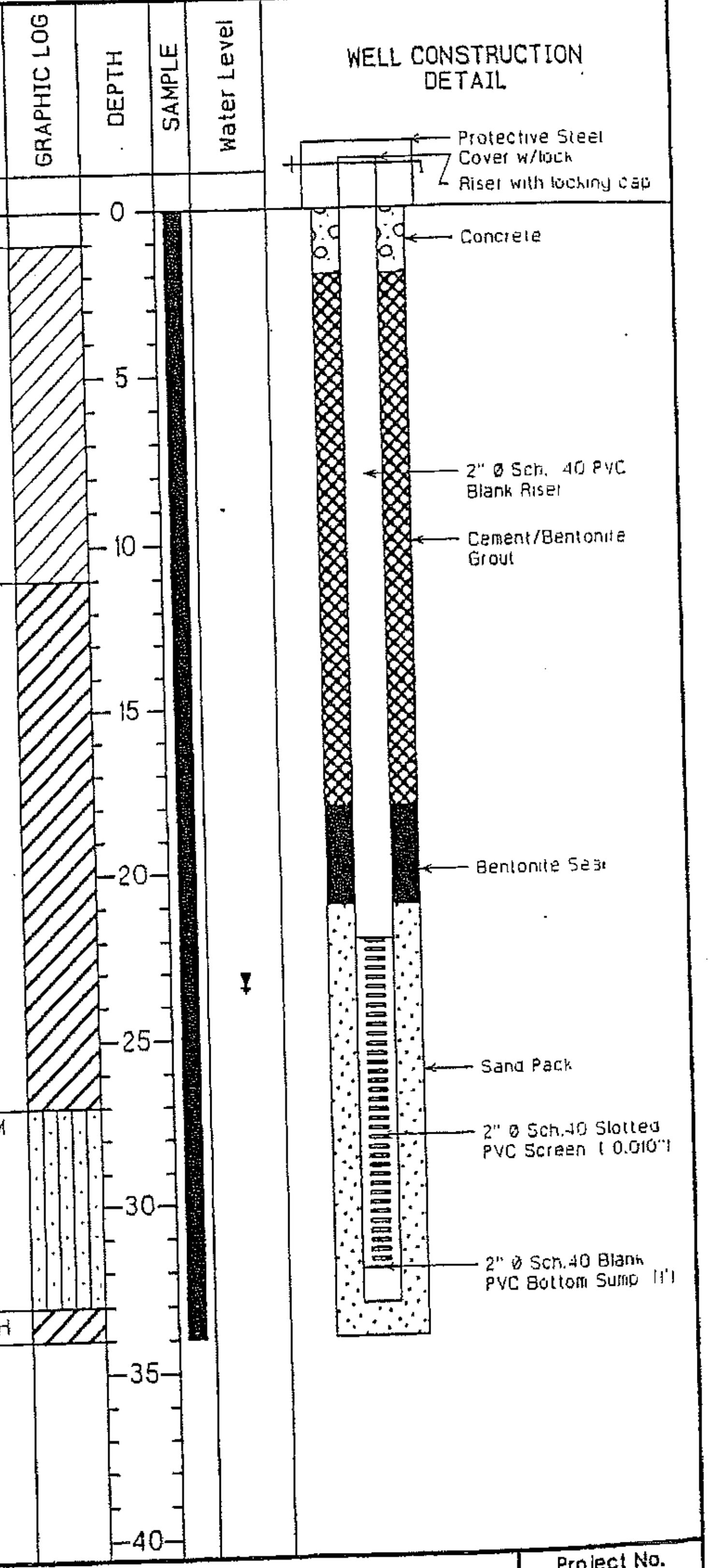
Monitor Well No. MW-4

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.82 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 23.87 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 80.98 ft. MSL

DESCRIPTION	USCS CLASS
Top Soil: Loose, brown, roots and organic material common @ 0.0' to 1.0', slightly moist	
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist - roots and organic material common @ 1.0' to 2.0' - becomes very stiff and dry @ 5.0' - thin interbeds containing silt and very fine grained sand @ 8.0' to 10.0', moist	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, dry - sandy zone @ 12.0' to 14.5', moist - interbeds containing silt and very fine grained sand @ 16.0' to 18.0', moist - interbeds containing silt and very fine sand @ 21.0' to 23.0', moist	CH
Silty Sand: Loose, tan, subangular to subrounded, fine grained quartz grains, iron staining common, wet @ 27.0' to 33.0', slightly clayey	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 34.0'	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL

Permit No.: MSW 2214

County: HARDIN COUNTY

Monitor Well I.D. No.: MW-4

Date of Monitor Well Installation: 03/25/98

Date of Monitor Well Development: 04/01/98

Monitor Well Grid Coordinates
Northing: 7962.757 Easting: 2558.531

Monitor Well Driller
Name: BUFORD E. COLLIER
License No.: 50089-M

Monitor Well Groundwater
Gradient: Upgradient ______ Downgradient x

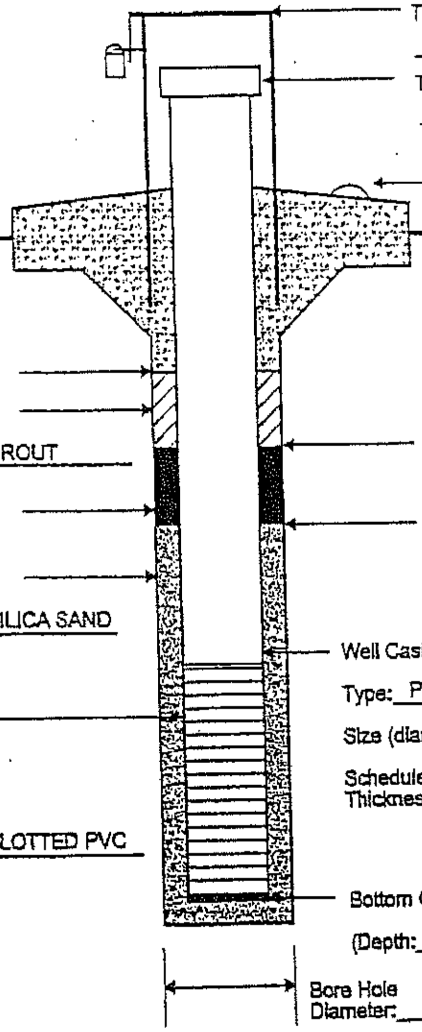
Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER

Static Water Level Elevation (with respect to MSL) after Well Development: 57.11'

Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION



Type of Casing Protection: 4" x 4" STEEL COLLAR

Type of Locking Device: PADLOCK

Top of Protective Collar Elevation: NA

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.

Top of Casing Elevation: 83.51'

Surface Pad Dimensions: 6' x 6' x 6"

Surveyor's Pin Elevation: 80.98'

Surface Elevation: NA

Concrete Seal Depth: 2.0'

Casing Seal (Backfill) Material: BENTONITE GROUT

Bentonite Seal Top
Depth: 18' Elevation: 63.98'

Bentonite Seal

Filter Pack Top
Depth: 21' Elevation: 60.98'

Filter Pack

Filter Pack Material: COLORADO SILICA SAND

Sterilized Sand or Glass Beads

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40

Well Screen
Top Depth: 22'
Top Elevation: 58.98'
Type of Well Screen: 2" SCH. 40 SLOTTED PVC
Screen Opening Size: 0.010"

Bottom Cap
(Depth: 33')

Bore Hole Diameter: 8"

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

Not To Scale

Monitor Well No. MW-5

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 21.53 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 20.06 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 77.65 ft. MSL

DESCRIPTION

Top Soil: Loose, brown, roots and organic material common @ 0.0' to 1.0', slightly moist

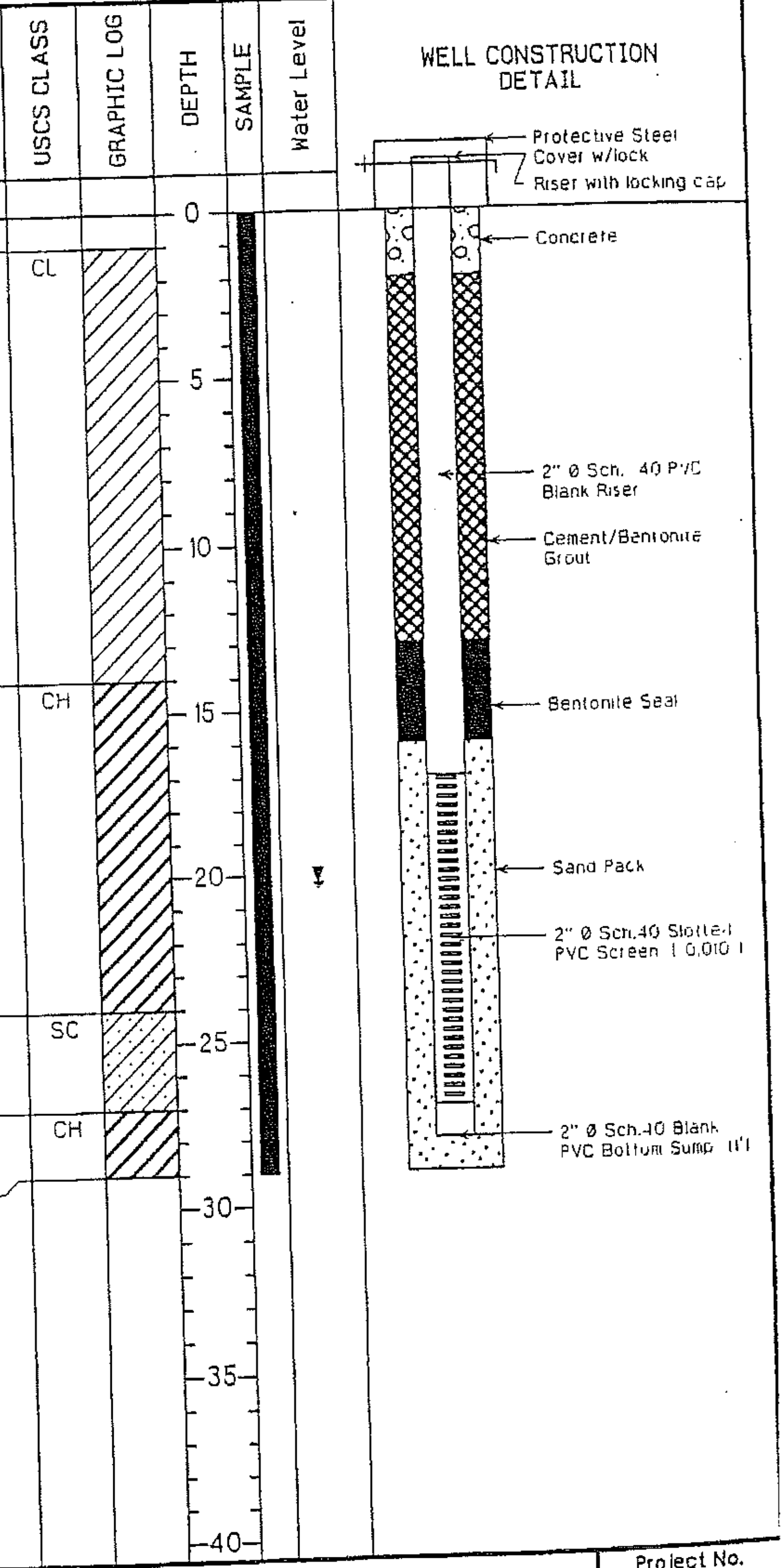
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist
- roots and organic material common @ 1.0' to 2.0'
- becomes very stiff and dry @ 4.0'
- slightly sandy zone @ 8.0' to 9.5', dry
- increasing in iron staining with depth

Fat Clay: Very stiff, mottled tan and reddish-orange, slightly moist
- sandy zone @ 18.0' to 19.5', slightly moist
- increasing in sand content and moisture with depth

Clayey Sand: Loose, tan, subangular to subrounded, fine grained quartz grains, iron staining common, wet @ 24.0' to 27.0'

Fat Clay: Very stiff, mottled light gray and reddish-orange, dry
- 0.5" thick interbeds containing silt @ 28.0' to 29.0'

Bottom of Boring @ 29.0'



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL

Permit No.: MSW 2214

County: HARDIN COUNTY

Monitor Well I.D. No.: MW-5

Date of Monitor Well Installation: 03/25/98

Date of Monitor Well Development: 04/01/98

Monitor Well Grid Coordinates
Northing: 7733.837 Easting: 2992.072

Monitor Well Driller Name: BUFORD E. COLLIER
License No.: 50089-M

Monitor Well Groundwater Gradient: Upgradient ______ Downgradient x

Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER

Static Water Level Elevation (with respect to MSL) after Well Development: 57.29'

Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION

Type of Casing Protection: 4" x 4" STEEL COLLAR

Type of Locking Device: PADLOCK

Top of Protective Collar Elevation: NA

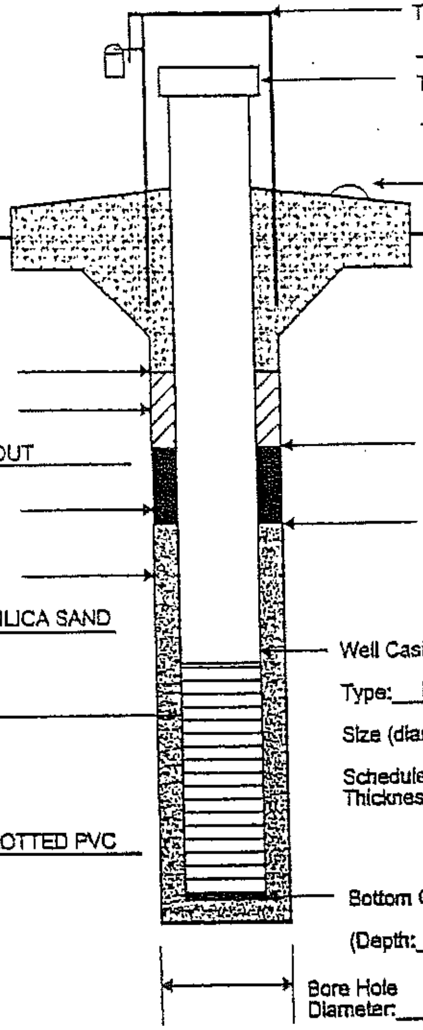
Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.

Surface Pad Dimensions: 6' x 6' x 6"

Top of Casing Elevation: 80.07'

Surveyor's Pin Elevation: 77.65'

Surface Elevation: NA



Concrete Seal Depth: 2.0'

Casing Seal (Backfill) Material: BENTONITE GROUT

Bentonite Seal

Bentonite Seal Top Depth: 13' Elevation: 64.65'

Filter Pack Top Depth: 16' Elevation: 61.65'

Filter Pack

Filter Pack Material: COLORADO SILICA SAND
Sterilized Sand or Glass Beads

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40

Well Screen
Top Depth: 17'
Top Elevation: 60.65'
Type of Well Screen: 2" SCH. 40 SLOTTED PVC
Screen Opening Size: 0.010"

Bottom Cap (Depth: 28')

Bore Hole Diameter: 8"

Not To Scale

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428
(409) 568-9451 FAX: (409) 568-9527

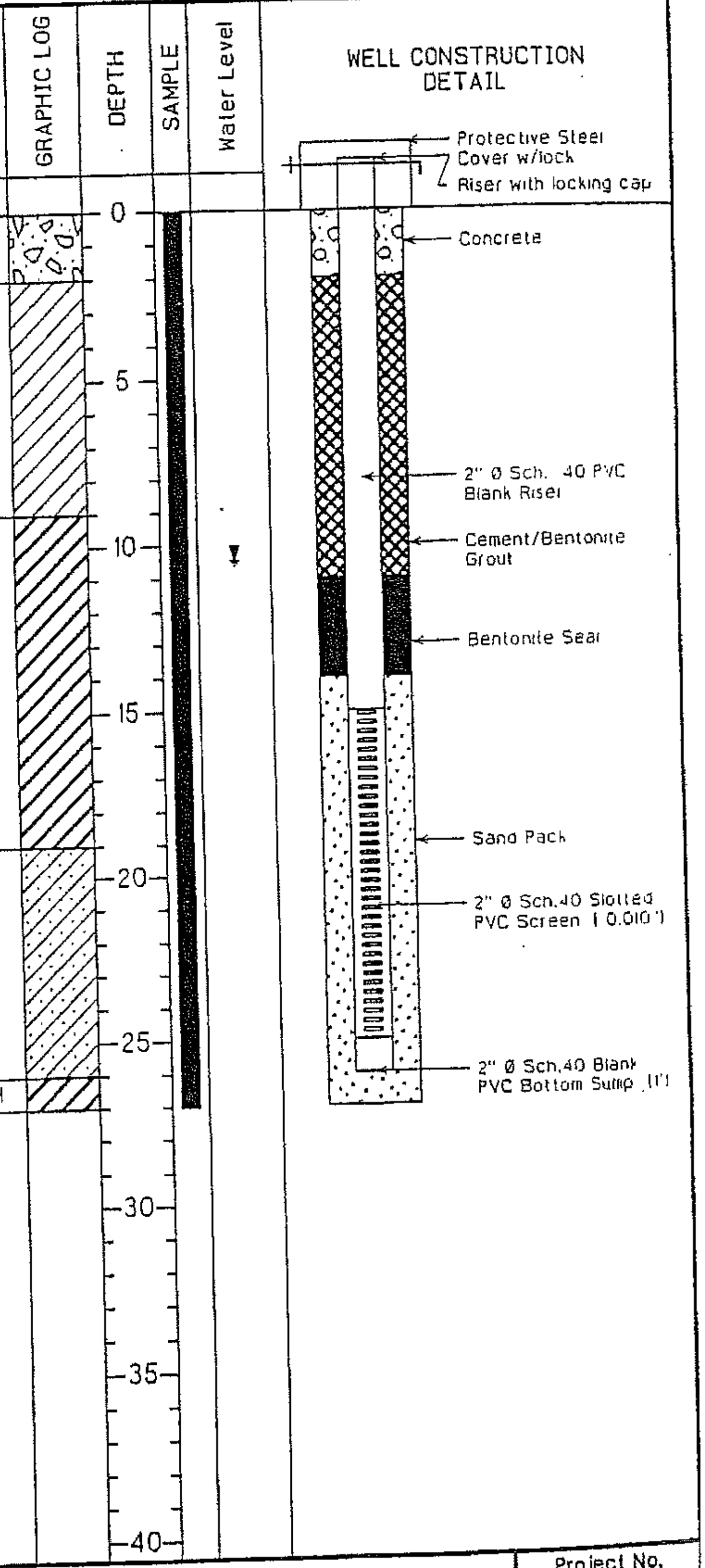
Monitor Well No. MW-6

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 10.68 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 10.53 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 73.46 ft. MSL

DESCRIPTION	USCS CLASS
Fill: Road base material @ 0.0' to 2.0'	
Lean Clay: Soft, mottled tan and reddish-orange, iron staining common, slightly moist - thin interbeds containing silt and very fine sand @ 3.0' to 5.5', slightly moist - becomes very stiff and dry @ 4.0' - slightly silty @ 8.0' to 10.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, slightly moist - manganese oxide nodules @ 13.0' to 15.0' - sandy zone @ 16.0' to 19.5', slightly moist - increasing in iron staining with depth - increasing in sand content and moisture with depth	CH
Clayey Sand: Loose, tan, subangular to subrounded, fine grained quartz grains, iron ore staining common, wet @ 19.0' to 26.0'	SC
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 27.0'	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Project No.
L-04-165

Page 1 of 1

MONITOR WELL DATA SHEET

Permittee or Site Name: HARDIN COUNTY LANDFILL

Permit No.: MSW 2214

County: HARDIN COUNTY

Monitor Well I.D. No.: MW-6

Date of Monitor Well Installation: 03/25/98

Date of Monitor Well Development: 04/01/98

Monitor Well Grid Coordinates
Northing: 7043.915 Easting: 2995.474

Monitor Well Driller
Name: BUFORD E. COLLIER
License No.: 50089-M

Monitor Well Groundwater
Gradient: Upgradient ______ Downgradient x

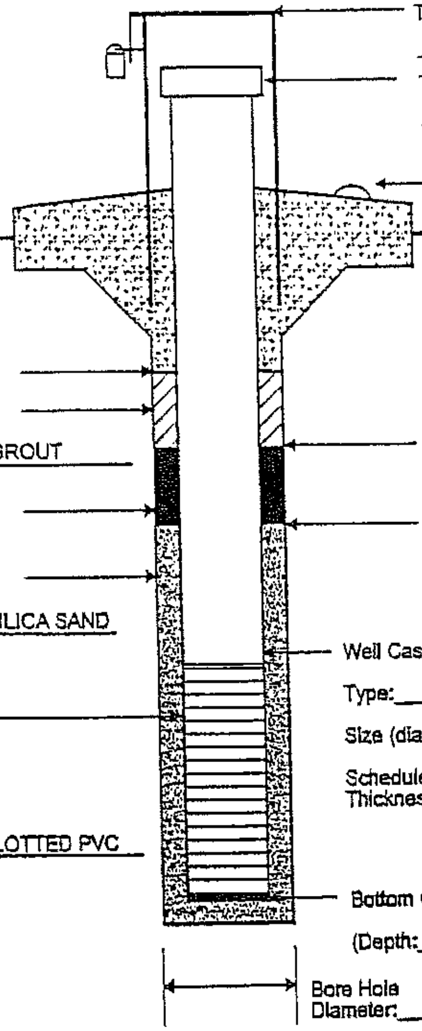
Note:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report all Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimum distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: GARY A. COKER

Static Water Level Elevation (with respect to MSL) after Well Development: 63.93'

Name of Geologic Formation(s) in which Well is completed: PLEISTOCENE LISSIE FORMATION



Type of Casing Protection: 4" x 4" STEEL COLLAR

Type of Locking Device: PADLOCK

Top of Protective Collar Elevation: NA

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.

Top of Casing Elevation: 75.86'

Surface Pad Dimensions: 6' X 6' X 6"

Surveyor's Pin Elevation: 73.46'

Surface Elevation: NA

Concrete Seal
Depth: 2.0'

Casing Seal (Backfill)
Material: BENTONITE GROUT

Bentonite Seal Top
Depth: 11' Elevation: 62.46'

Bentonite Seal

Filter Pack Top
Depth: 14' Elevation: 59.46'

Filter Pack

Filter Pack Material: COLORADO SILICA SAND
Sterilized Sand or Glass Beads

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: SCH. 40

Well Screen
Top Depth: 15'
Top Elevation: 58.46'
Type of Well Screen: 2" SCH. 40 SLOTTED PVC
Screen Opening Size: 0.010"

Bottom Cap
(Depth: 26')

Bore Hole Diameter: 8"

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Not To Scale

2005 HYDREX ENVIRONMENTAL BOREHOLE LOGS AND DATA SHEETS

Hydrex
ENVIRONMENTAL, INC.

Monitorin Well
Monitoring Well No. **MW-7**

PROJECT INFORMATION

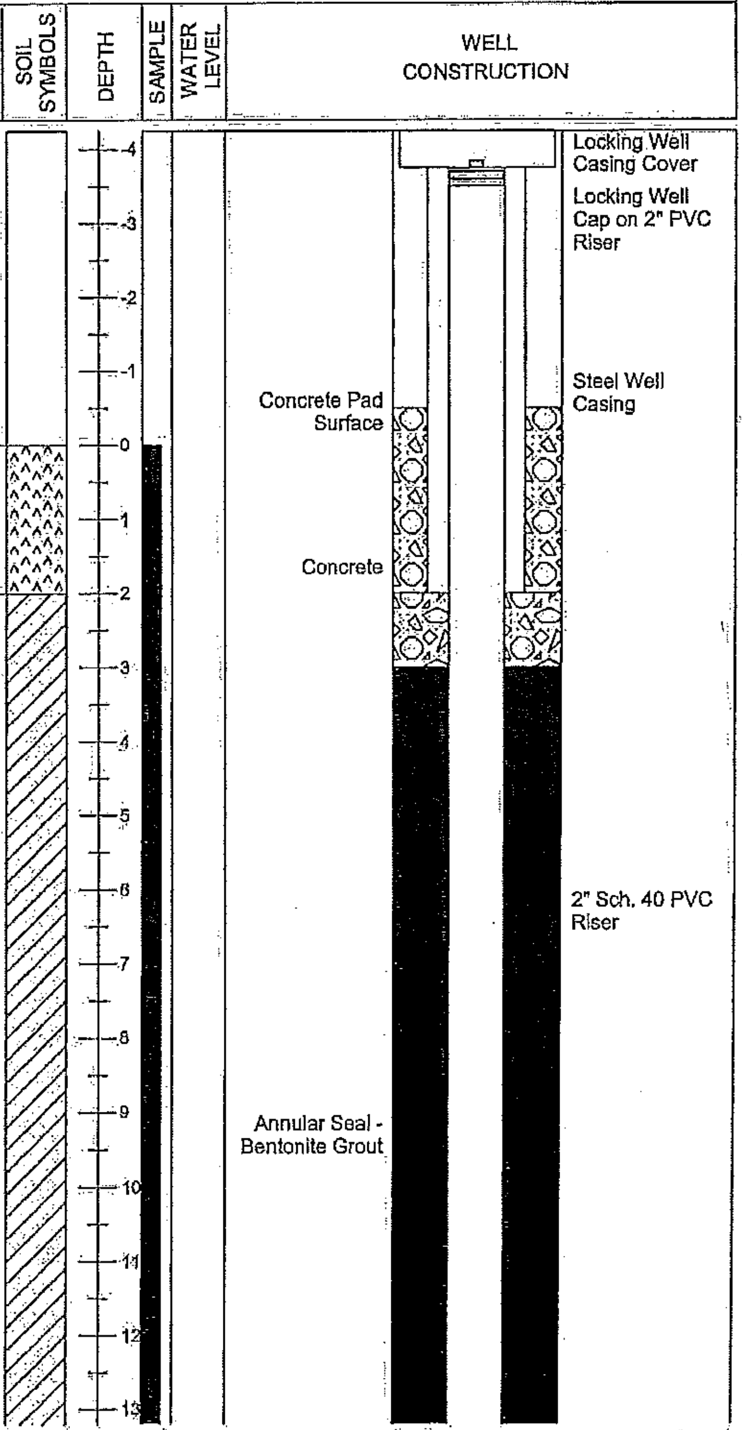
PROJECT:	**IESI Hardin County Landfill**
PROJECT NO.:	**L-04-165**
LOGGED BY:	**Trae Scarborough/Glen Collier**
START DATE:	**04/21/05**
DEVELOPMENT DATE:	
SITE LOCATION:	**Kountze, Texas**
WELL OWNER:	**IESI**

DRILLING INFORMATION

DRILLER:	**Master Monitoring Services/John Woolsey**
DRILLER'S LICENSE NO.:	**3044M**
RIG TYPE:	**Mobile B-61 Drill Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**74.7**
HOLE DIAMETER:	**8.25"**
NORTHING: **6425.68**	EASTING: **2983.64**

▽ Water level during drilling ▼ Water level in completed well ▌ Split Spoon Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
Fill: FILL: Loose; tan and orange; fill material composed of very fine to fine-grained quartz sand; dry	Fill
CL: SANDY CLAY: Soft; gray, tan and orange; mottled sandy clay; occasional gravel; clay content increases with depth; dry - occasional ironstone gravel - gray and orange-red sandy clay - increase in clay content with depth	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 05/05/05.

HYDREX ENVIRONMENTAL, INC.

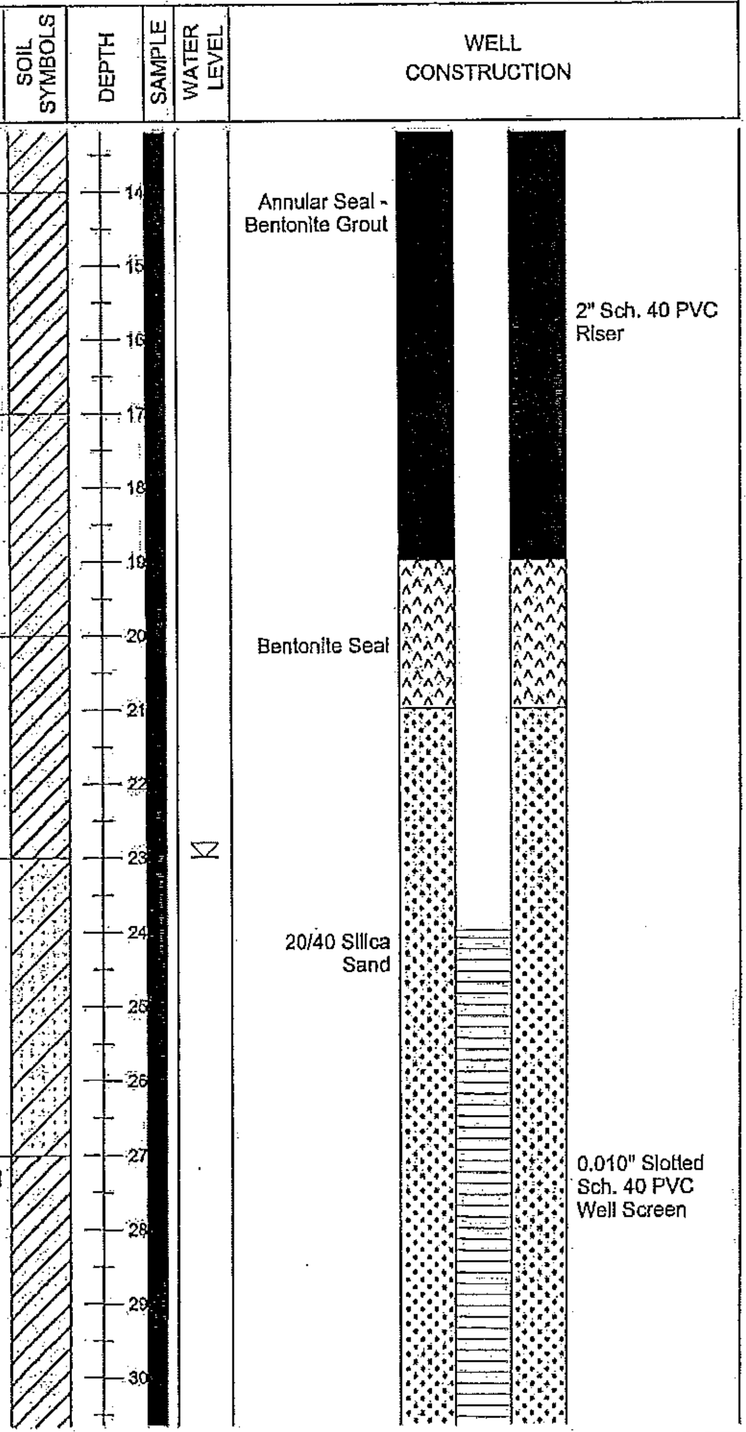
Monitoring Well

Monitoring Well No. **MW-7**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**IESI Hardin County Landfill**	DRILLER:	**Master Monitoring Services/John Woolsey**
PROJECT NO.:	**L-04-165**	DRILLER'S LICENSE NO.:	**3044M**
LOGGED BY:	**Trae Scarborough/Glen Collier**	RIG TYPE:	**Mobile B-61 Drill Rig**
START DATE:	**04/21/05**	METHOD OF DRILLING:	**Hollow Stem Auger**
DEVELOPMENT DATE:		SAMPLING METHODS:	**Split Core Barrel**
SITE LOCATION:	**Kountze, Texas**	SURFACE ELEVATION:	**74.7**
WELL OWNER:	**IESI**	HOLE DIAMETER:	**8.25"**
		NORTHING: **6425.68**	EASTING: **2993.64**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS
CH: CLAY: Stiff; gray and red; mottled clay; clay content increases with depth; dry - color change to gray with black manganese-oxide staining	CH
CL: SANDY CLAY: Medium stiff; reddish-brown and gray; dry - 2" gray and orange sandy zone @ 17.5' - decrease in sand content with depth	CL
CH: CLAY: Very stiff; reddish-brown and gray; dry - occasional black and dark orange gravel	CH
SC: CLAYEY SAND: Loose; tan and gray; clayey sand with minor amounts of clay; fine-grained quartz sand; wet @ 23.0' to 27.0'	SC
CH: CLAY: Very stiff; orange and gray; laminated; dry - color change to orange and tan with black manganese-oxide staining	CH



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 05/05/05.

Hydrex
ENVIRONMENTAL, INC.

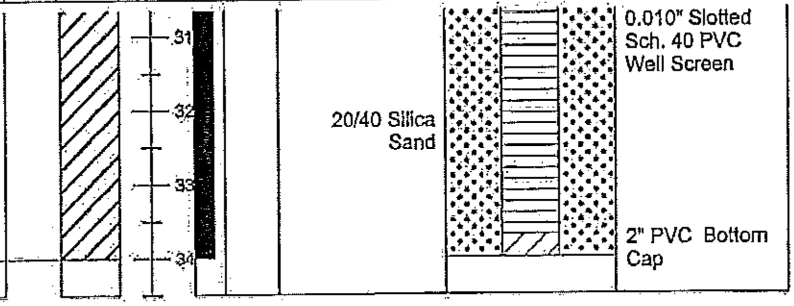
Monitoring Well

Monitoring Well No. MW-7

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	IESI Hardin County Landfill	DRILLER:	Master Monitoring Services/John Woolsey
PROJECT NO.:	L-04-165	DRILLER'S LICENSE NO.:	3044M
LOGGED BY:	Trae Scarborough/Glen Collier	RIG TYPE:	Mobile B-61 Drill Rig
START DATE:	04/21/05	METHOD OF DRILLING:	Hollow Stem Auger
DEVELOPMENT DATE:		SAMPLING METHODS:	Split Core Barrel
SITE LOCATION:	Kountze, Texas	SURFACE ELEVATION:	74.7
WELL OWNER:	IESI	HOLE DIAMETER:	8.25"
		NORTHING: 6425.68	EASTING: 2993.64

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION



Bottom of Boring @ 34'

NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 05/05/05.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: April 21, 2005
Monitor Well Latitude: N 30° 20' 14.8" Longitude: W 94° 21' 11.8"
Monitor Well Groundwater Gradient Position:
Upgradient ______ Downgradient X

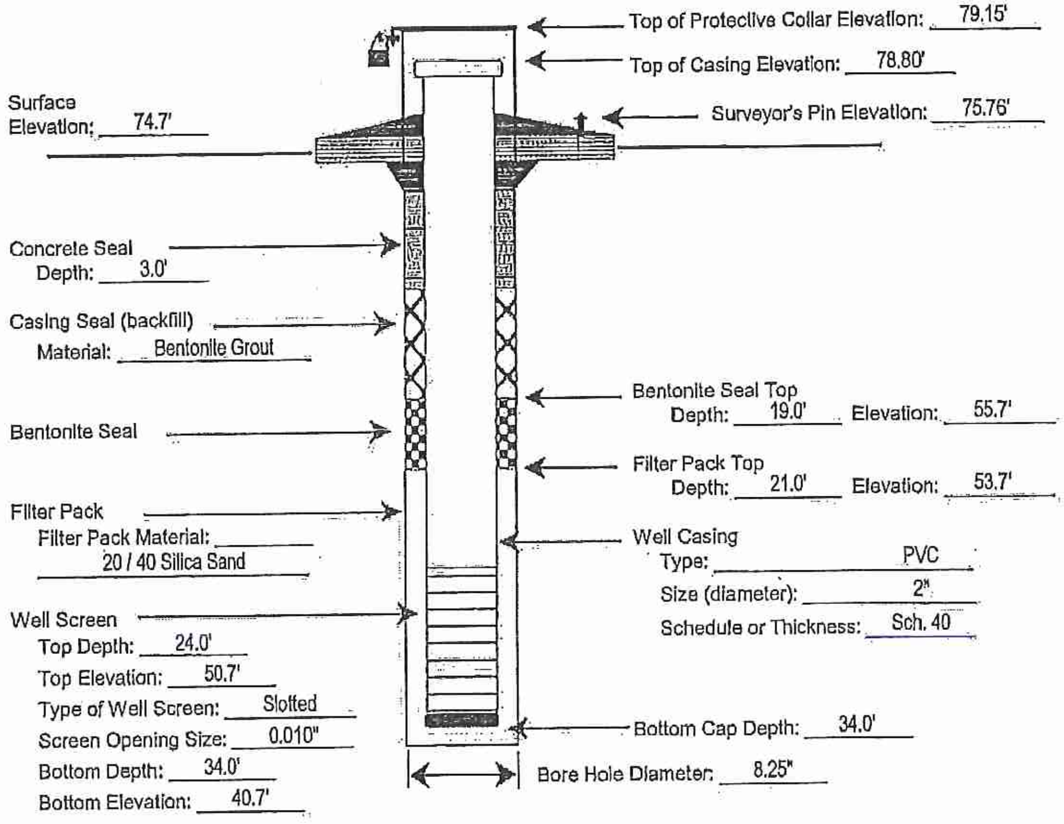
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-7
Date of Monitor Well
Development: May 31, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Trae Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 55.02'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock
Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 79.15'
Top of Casing Elevation: 78.80'
Surveyor's Pin Elevation: 75.76'

Surface Elevation: 74.7'

Concrete Seal
Depth: 3.0'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 19.0' Elevation: 55.7'

Filter Pack Top
Depth: 21.0' Elevation: 53.7'

Filter Pack
Filter Pack Material: 20 / 40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well Screen
Top Depth: 24.0'
Top Elevation: 50.7'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 34.0'
Bottom Elevation: 40.7'

Bottom Cap Depth: 34.0'
Bore Hole Diameter: 8.25"

TCEQ-10308

Hydrex
ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-191
June 2005
Drawing Not To Scale

Hydrex ENVIRONMENTAL, INC.

Monitoring Well

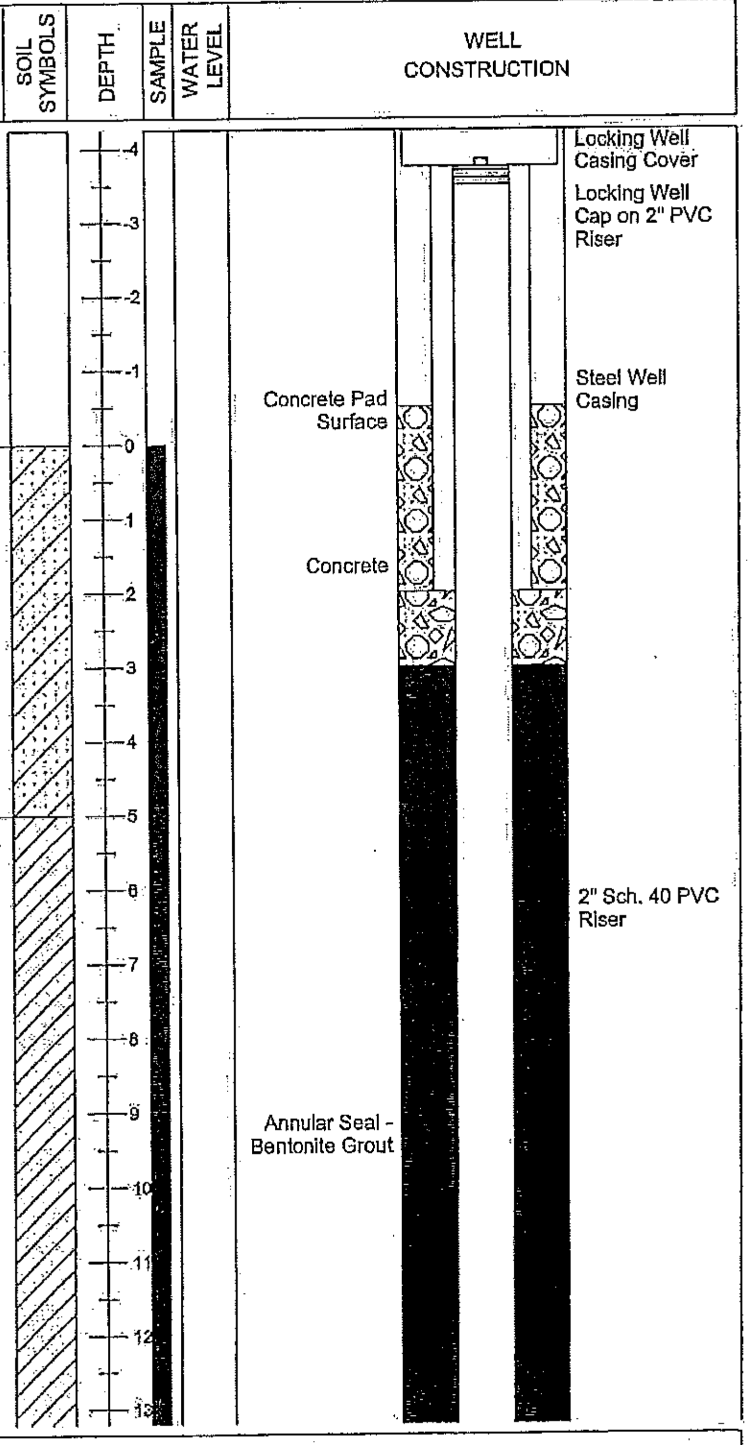
Monitoring Well No. MW-8

PROJECT INFORMATION	
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	02/02/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION	
DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	73.8'
HOLE DIAMETER:	8.25"
NORTHING: 5986.04	EASTING: 2740.78

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAYEY SAND: Loose; tan and orange-red; fine-grained quartz sand with clay layers; iron staining; clay content increases with depth - Blackish-red; ironstone gravel intermixed @ 4.0 to 5.0'	SC
CLAY: Stiff; tan and yellow-brown; silty clay with vertical or nearly vertical sand-filled fractures - Gray and orange-red - Gray and orange-red silty clay with vertical or nearly vertical sand-filled fractures - Gray and orange-brown	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

HYDREX
ENVIRONMENTAL, INC.

Monitoring Well

Monitoring Well No. MW-8

PROJECT INFORMATION

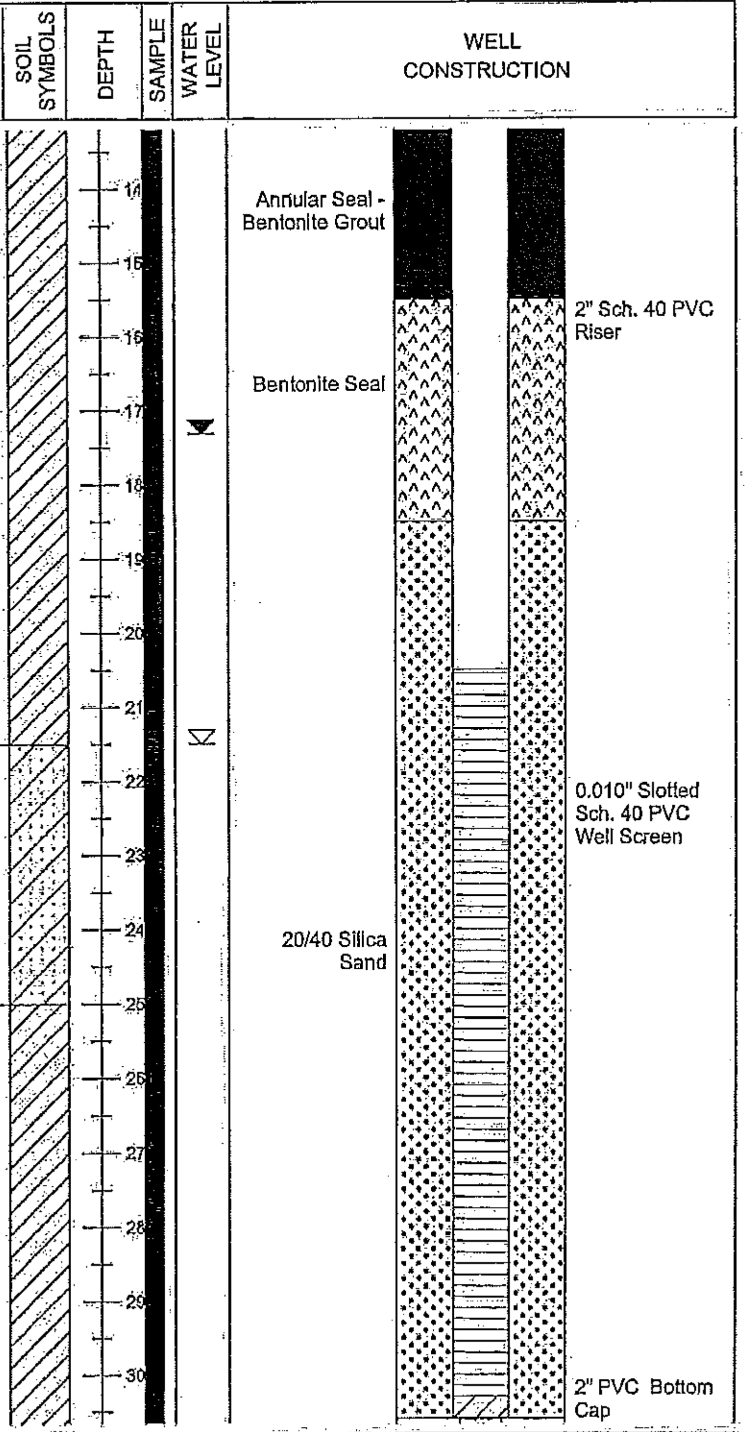
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	02/02/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	73.8'
HOLE DIAMETER:	8.25"
NORTHING: 5886.04	EASTING: 2740.78

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▥ Auger

DESCRIPTION	USCS
- Red and gray - Manganese-oxide staining @ 20.0' to 21.5'	
CLAYEY SAND: Medium dense; reddish-brown and gray; clayey sand lens @ 21.5'; wet @ 22.0' to 25.0'	SC
CLAY: Very stiff; reddish-brown and gray; with silt - Occasional thin sand layers scattered between 25.0' and 27.0' - Calcareous nodules scattered @27.0' to 28.0'; thin sand layers @ 29.0' to 29.75'; dry - Clay with vertical or nearly vertical very fine-grained sand-filled fractures and occasional very thin sand lamination	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

ENVIRONMENTAL, INC.

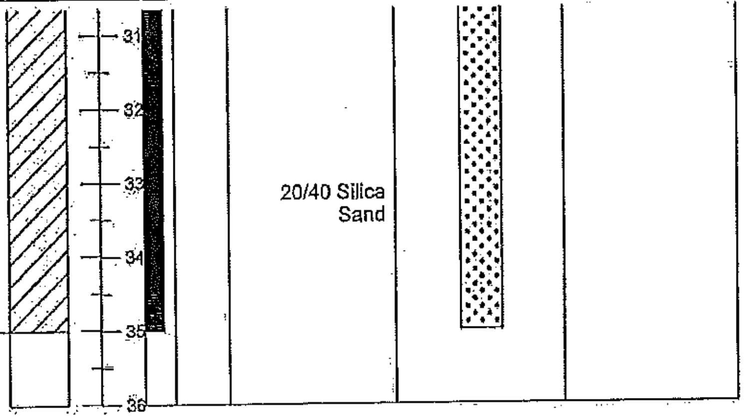
Monitori Well

Monitoring Well No. MW-8

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	IESI Hardin County Landfill	DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
PROJECT NO.:	L-04-165	DRILLER'S LICENSE NO.:	5006M
LOGGED BY:	Greg Flynn/Glen Collier	RIG TYPE:	Mobile B-57 Drill Rig
START DATE:	02/02/05	METHOD OF DRILLING:	Hollow Stem Auger
DEVELOPMENT DATE:	02/25/05	SAMPLING METHODS:	Split Core Barrel
SITE LOCATION:	Kountze, Texas	SURFACE ELEVATION:	73.8'
WELL OWNER:	IESI	HOLE DIAMETER:	8.25"
		NORTHING: 5886.04	EASTING: 2740.78

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ☐ No Recovery ▤ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION
- 1" ironstone layers @ 30.75' and 34.25' - Small calcareous nodules scattered @ 33.0' to 34.0' Bottom of Boring @ 35.0'						



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: February 24, 2005
Monitor Well Latitude: N 30° 20' 09.3" Longitude: W 94° 21' 13.1"
Monitor Well Groundwater Gradient Position:
Upgradient X Downgradient

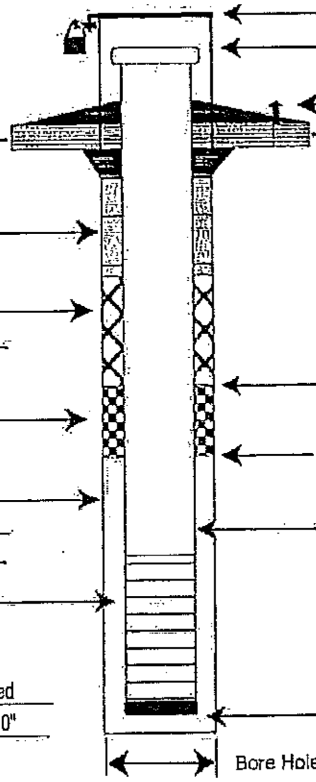
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-8
Date of Monitor Well Development: February 25, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Greg Flynn / Glen Collier
Static Water Level Elevation (with respect to MSL) after Well Development: 60.30'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock
Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: *



Top of Protective Collar Elevation: 77.61'
Top of Casing Elevation: 77.62'
Surveyor's Pin Elevation: 75.05' *
Surface Elevation: 73.8'
Concrete Seal Depth: 3.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 15.5' Elevation: 58.3'
Filter Pack Top Depth: 18.5' Elevation: 55.3'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 20.5'
Top Elevation: 53.3'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 30.5'
Bottom Elevation: 43.3'
Bottom Cap Depth: 30.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

* Alternate Temporary Surface Completion

hydrex
ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-191	June 2005	Drawing Not To Scale

ENVIRONMENTAL, INC.

Monitoring Well

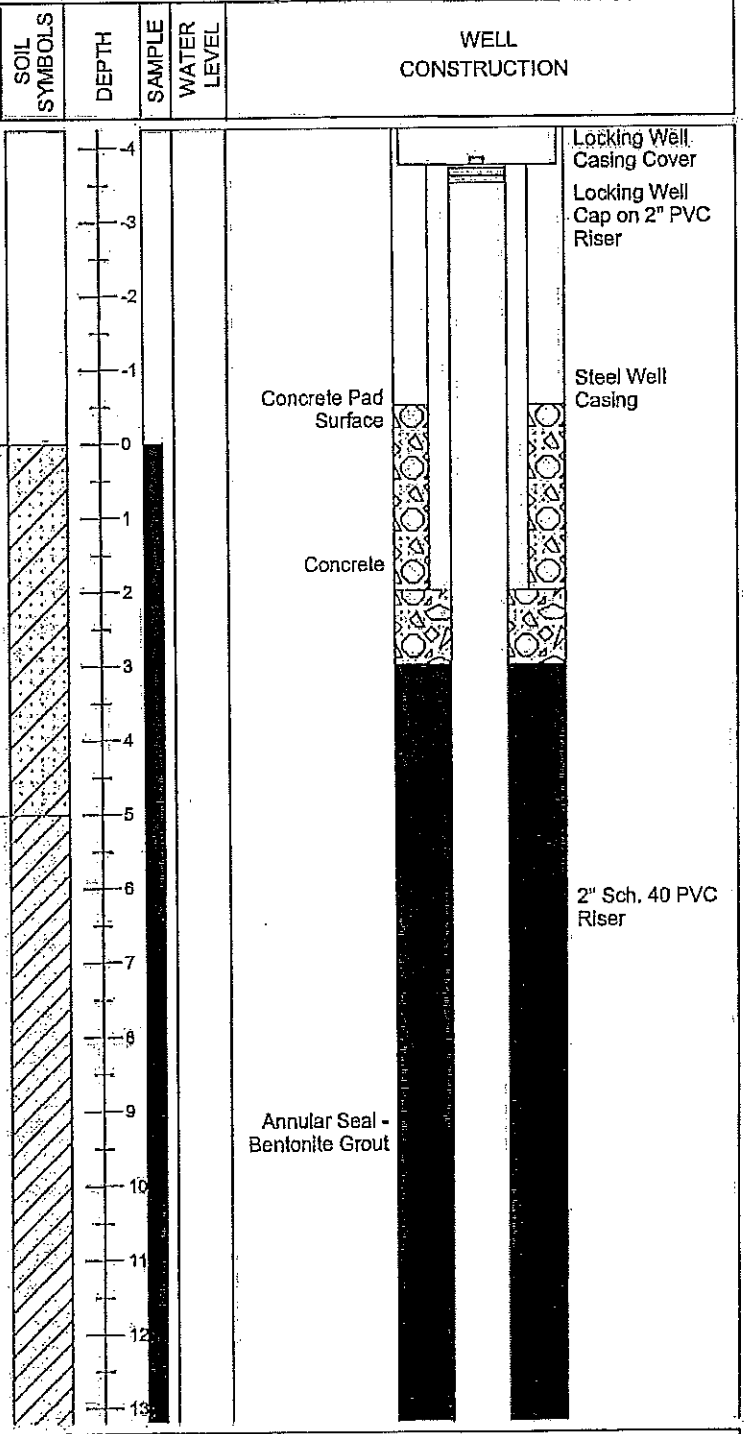
Monitoring Well No. MW-9

PROJECT INFORMATION	
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	02/01/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION	
DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	78.2'
HOLE DIAMETER:	8.25"
NORTHING: 6212.38	EASTING: 2246.87

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS
CLAYEY SAND: Loose; brown and tan; fine-grained quartz clayey sand; scattered iron staining; roots - Iron staining @ 4.25'; clay increasing with depth	SC
CLAY: Stiff; gray, tan, and orange-red; silty clay with vertical and nearly vertical sand-filled fractures - Iron staining scattered throughout; organic streaking @ 10.0' to 12.5'	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Hydrex ENVIRONMENTAL, INC.

Monitoring Well

Monitoring Well No. **MW-9**

PROJECT INFORMATION	
PROJECT:	**IESI Hardin County Landfill**
PROJECT NO.:	**L-04-165**
LOGGED BY:	**Greg Flynn/Glen Collier**
START DATE:	**02/01/05**
DEVELOPMENT DATE:	**02/25/05**
SITE LOCATION:	**Kountze, Texas**
WELL OWNER:	**IESI**

DRILLING INFORMATION	
DRILLER:	**Master Monitoring Services/Benito Guillen, Jr.**
DRILLER'S LICENSE NO.:	**5006M**
RIG TYPE:	**Mobile B-57 Drill Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**78.2'**
HOLE DIAMETER:	**8.25"**
NORTHING: **6212.38**	EASTING: **2246.87**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▥ Auger

DESCRIPTION

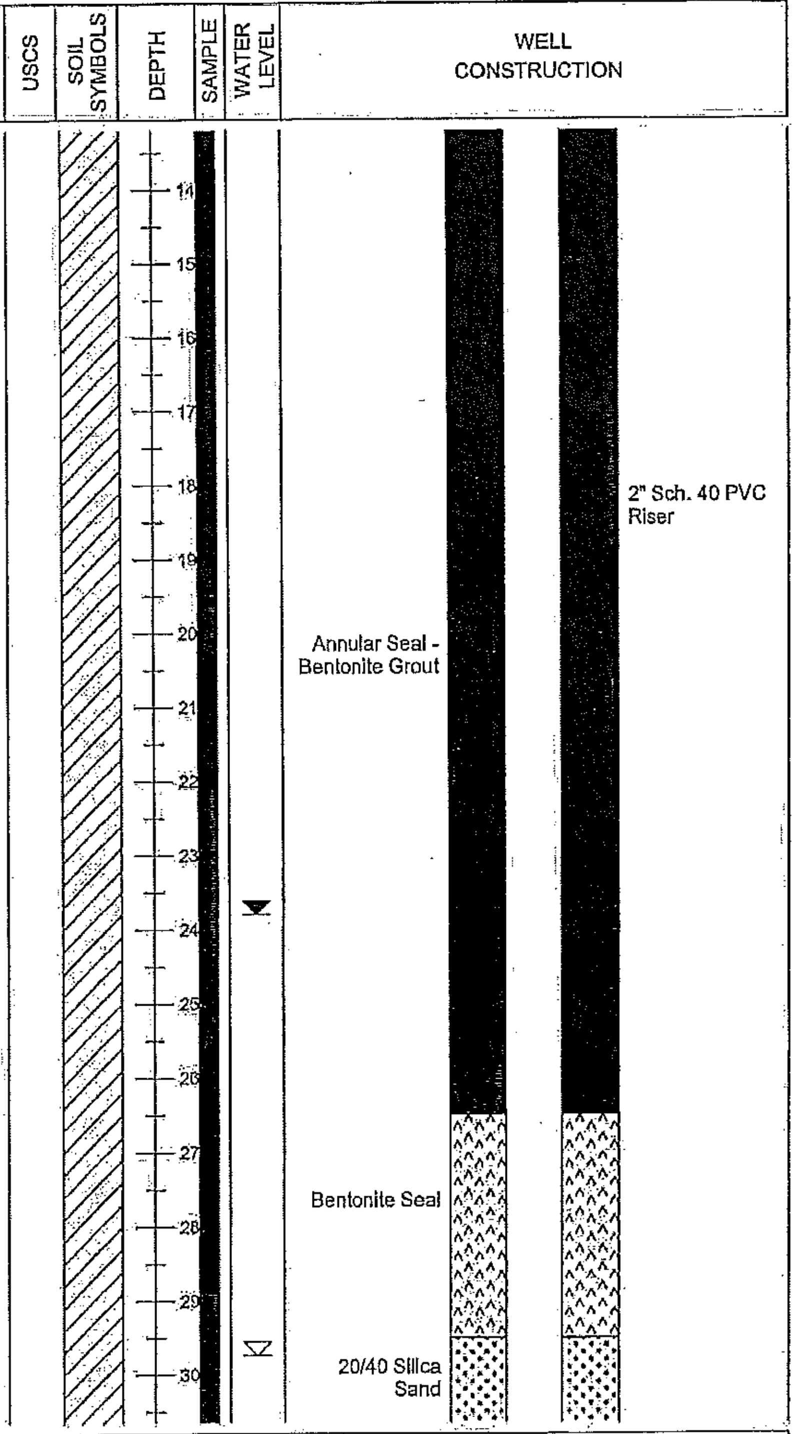
- Very stiff; gray, tan, and orange-brown

- Scattered thin clayey sand layers (dry); iron and manganese oxide staining throughout;

- Red-brown and gray; clayey sand layers @ 22.25' to 22.5' (dry); iron staining increasing with depth

- Vertical and nearly vertical very fine-grained sand-filled fractures present; iron and manganese oxide staining present

- 2" clayey sand layers; wet @ 29.75'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Hydrex
ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. MW-9

PROJECT INFORMATION

PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	02/01/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	78.2'
HOLE DIAMETER:	8.25"
NORTHING: 6212.38	EASTING: 2246.87

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▦ Auger

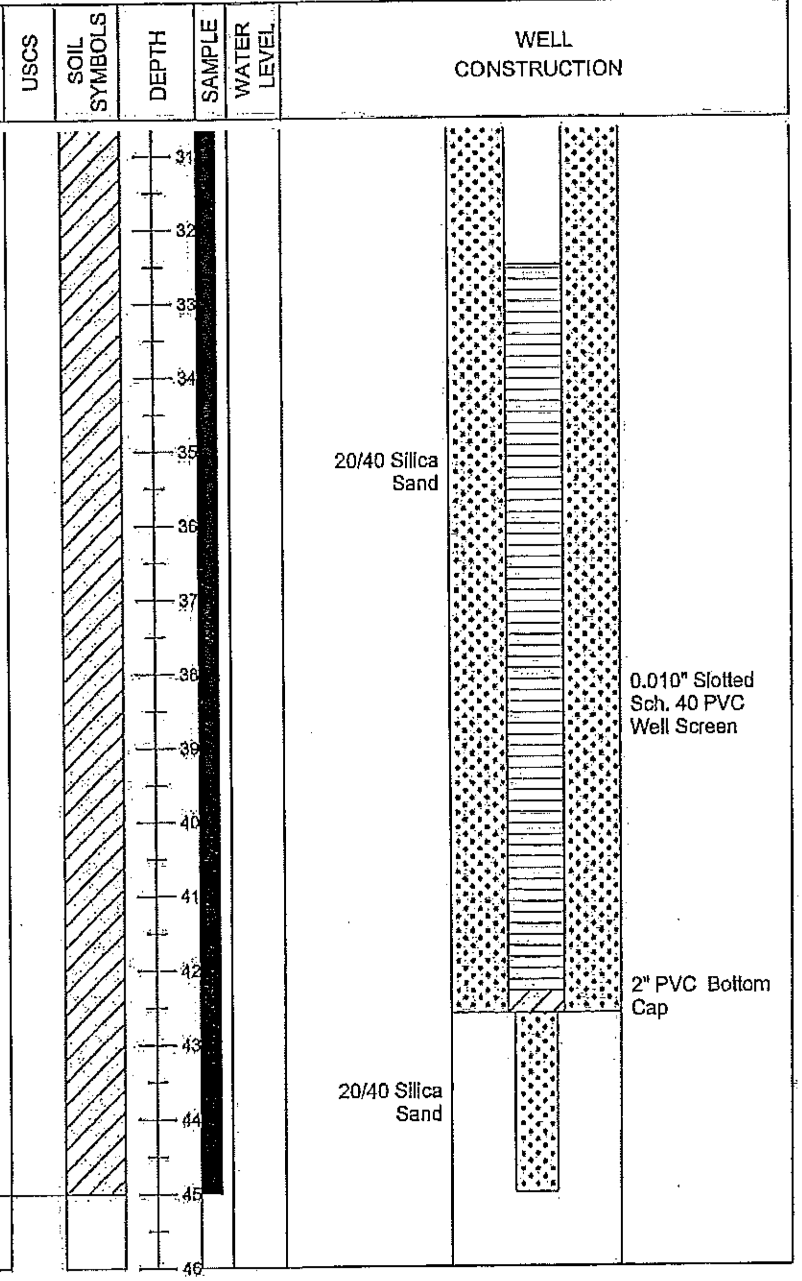
DESCRIPTION

- Red-brown and gray; iron and manganese oxide staining scattered throughout

- Sandy layer @ 39.75'; wet
- Thin sandy layer @ 40.0'

- Gray and tan; clay with vertical and nearly vertical sand-filled fractures

Bottom of Boring @ 45.0'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: February 24, 2005
Monitor Well Latitude: N 30° 20' 11.0" Longitude: W 94° 21' 19.4"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient X

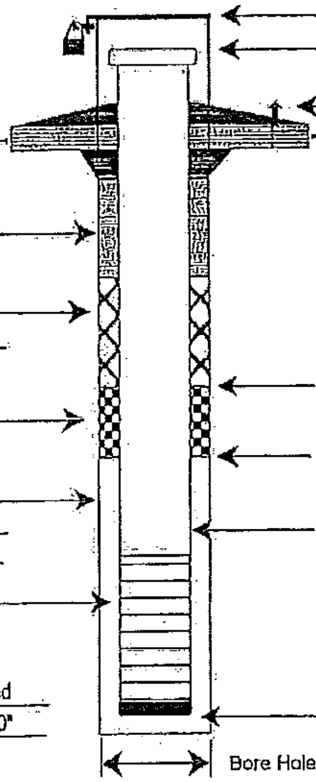
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-9
Date of Monitor Well Development: February 25, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Greg Flynn / Glen Collier
Static Water Level Elevation (with respect to MSL) after Well Development: 57.94'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock
Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 81.77'
Top of Casing Elevation: 81.75'
Surveyor's Pin Elevation: 78.63'

Surface Elevation: 78.2'

Concrete Seal
Depth: 3.0'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 26.5' Elevation: 51.7'

Filter Pack Top
Depth: 29.5' Elevation: 48.7'

Filter Pack
Filter Pack Material: 20 / 40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well Screen
Top Depth: 32.5'
Top Elevation: 57.7'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 42.5'
Bottom Elevation: 35.7'

Bottom Cap Depth: 42.5'

Bore Hole Diameter: 8.25"

TCEQ-10308

Hydrex
ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-191	June 2005	Drawing Not To Scale

HYDREX ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. MW-10

PROJECT INFORMATION

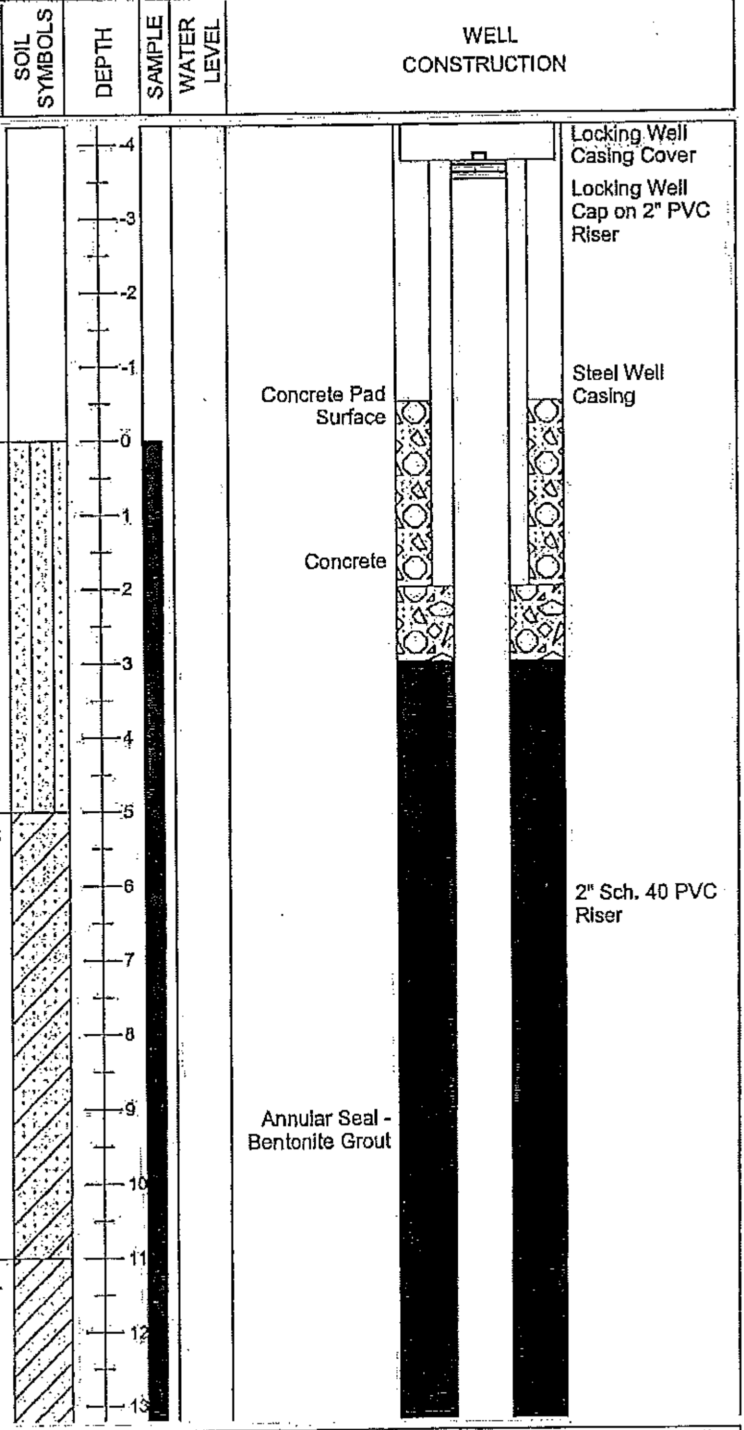
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	01/28/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	79.1'
HOLE DIAMETER:	8.25"
NORTHING: 5924.02	EASTING: 1726.72

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS
SILTY SAND: Loose; brown; fine-grained quartz sand with roots	SM
CLAYEY SAND: Medium dense; gray; fine-grained quartz sand with clay; iron staining (yellow-brown to reddish-black) scattered throughout; roots	SC
CLAY: Stiff; gray and tan; clay with vertical and nearly vertical sand-filled fractures; scattered iron staining - Yellow-brown; iron staining	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05. Page 1 of 3

Hydrex
ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. MW-10

PROJECT INFORMATION

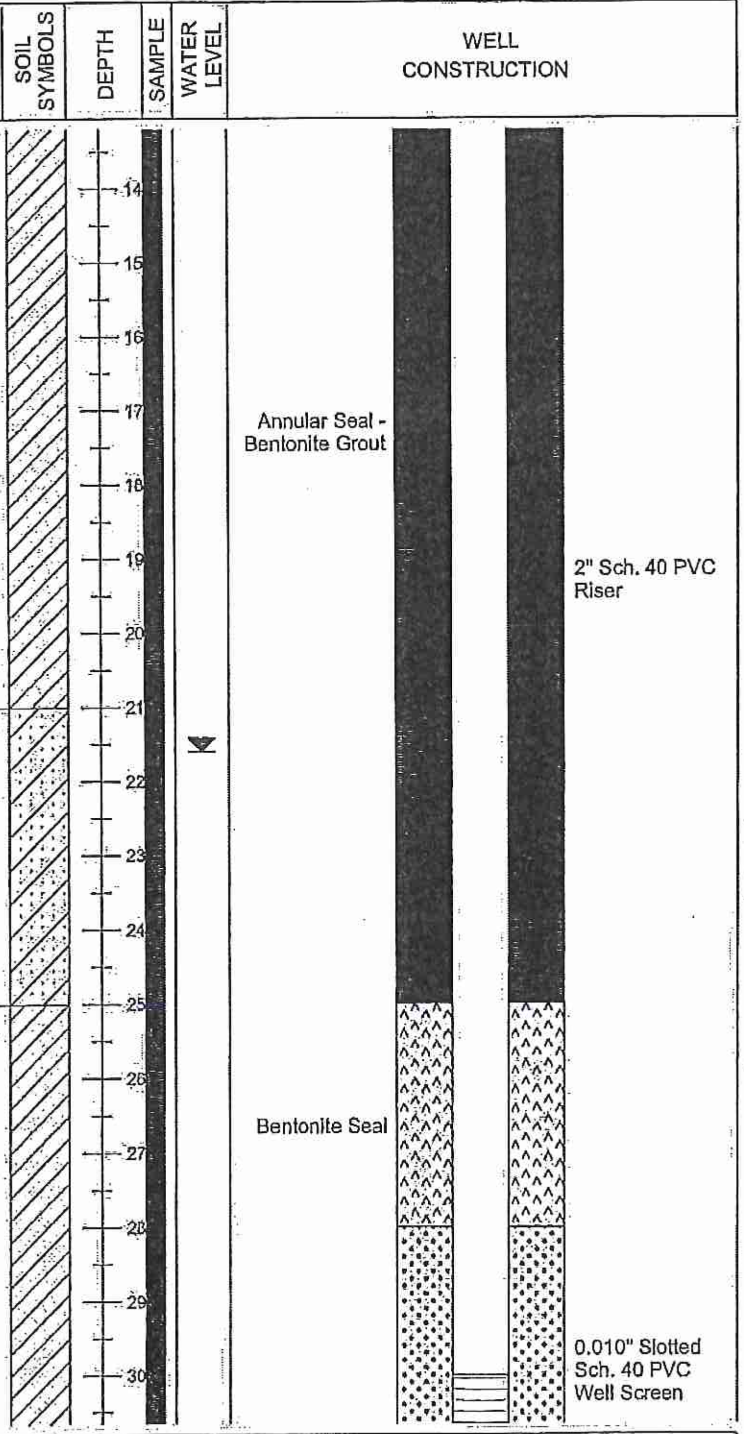
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	01/26/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	79.1'
HOLE DIAMETER:	8.25"
NORTHING: 5924.02	EASTING: 1726.72

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAYEY SAND: Dense; gray, tan, and yellow-brown; fine-grained quartz sand with clay; dry	SC
CLAY: Very stiff; gray and tan; clay with vertical and nearly vertical sand-filled fractures; scattered ironstone clasts @ 25.0' to 29.0' - Iron staining 29.0' to 29.75' in clays	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

HYDREX ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. MW-10

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	IESI Hardin County Landfill	DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
PROJECT NO.:	L-04-165	DRILLER'S LICENSE NO.:	5006M
LOGGED BY:	Greg Flynn/Glen Collier	RIG TYPE:	Mobile B-57 Drill Rig
START DATE:	01/28/05	METHOD OF DRILLING:	Hollow Stem Auger
DEVELOPMENT DATE:	02/25/05	SAMPLING METHODS:	Split Core Barrel
SITE LOCATION:	Kountze, Texas	SURFACE ELEVATION:	79.1'
WELL OWNER:	IESI	HOLE DIAMETER:	8.25"
		NORTHING: 5924.02	EASTING: 1726.72

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

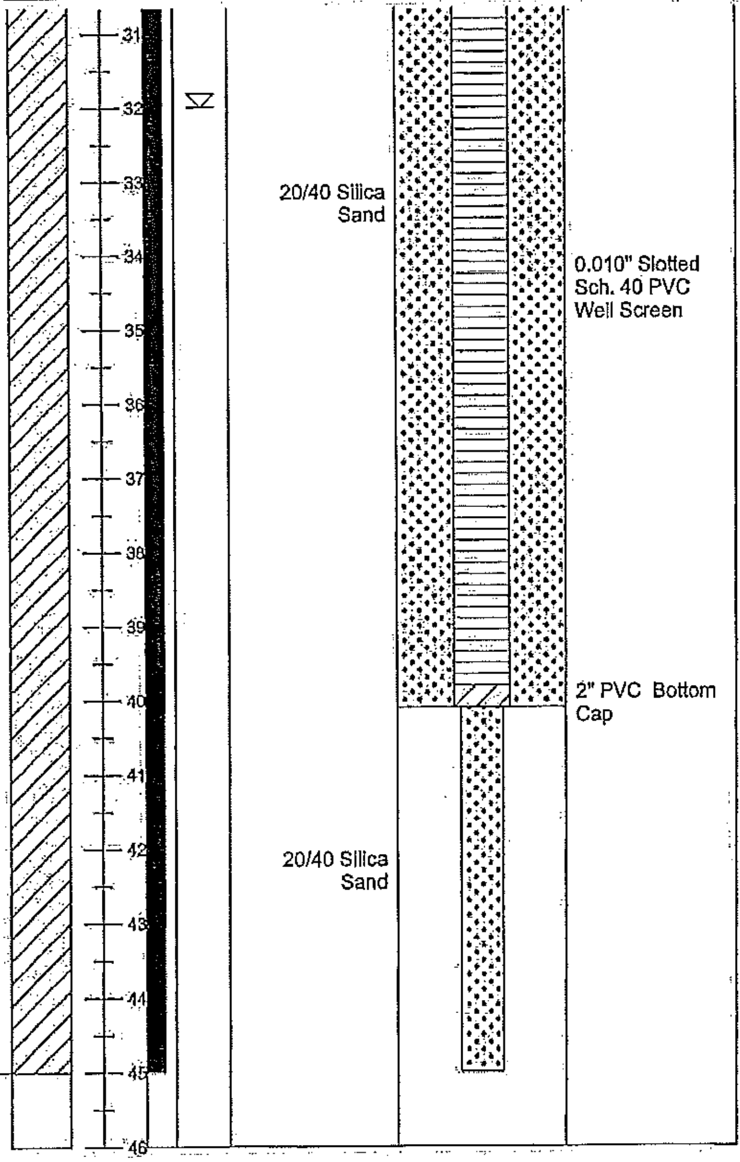
- Clayey sand layer @ 32.0' to 33.5'; wet @ 32.0'

- Gray and yellow-brown

- Red-brown and gray; infrequent organic streaks scattered throughout

- Red-brown and gray

Bottom of Boring @ 45.0'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: February 24, 2005
Monitor Well Latitude: N 30° 20' 07.2" Longitude: W 94° 21' 24.6"
Monitor Well Groundwater Gradient Position:
Upgradient X Downgradient

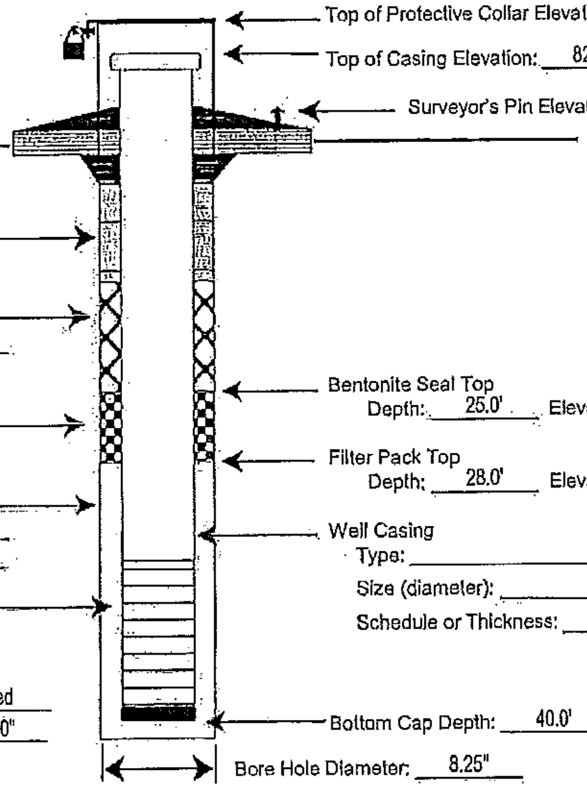
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-10
Date of Monitor Well Development: February 25, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Greg Flynn / Glen Collier
Static Water Level Elevation (with respect to MSL) after Well Development: 61.13'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock
Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: *



Top of Protective Collar Elevation: 82.74'
Top of Casing Elevation: 82.74'
Surface Elevation: 79.1'
Surveyor's Pin Elevation: 80.05' *
Concrete Seal Depth: 3.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 25.0' Elevation: 54.1'
Filter Pack Top Depth: 28.0' Elevation: 51.1'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 30.0'
Top Elevation: 49.1'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 40.0'
Bottom Elevation: 39.1'
Bottom Cap Depth: 40.0'
Bore Hole Diameter: 8.25"

TCEQ-10308

* Alternate Temporary Surface Completion

hydrex ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-191	June 2005	Drawing Not To Scale

HYDREX ENVIRONMENTAL, INC.

Monitoring Well

Monitoring Well No. **MW-11**

PROJECT INFORMATION

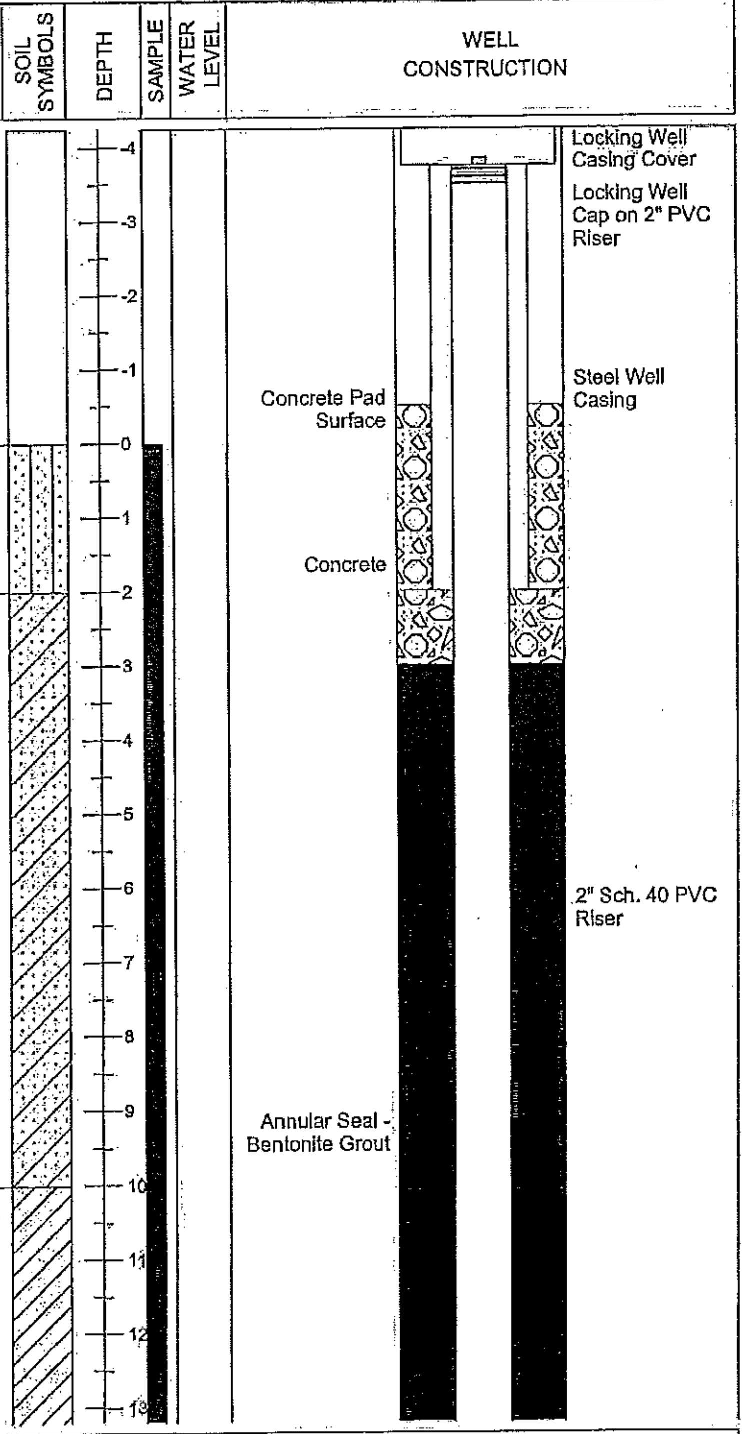
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	01/28/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	80.2'
HOLE DIAMETER:	8.25"
NORTHING: 6620.31	EASTING: 1437.36

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS
SILTY SAND: Loose; brown; fine-grained quartz sand with roots	SM
CLAYEY SAND: Medium dense; tan, gray, and reddish-orange; fine-grained quartz sand with mottled clay; roots	SC
CLAY: Stiff; gray and reddish-brown; clay with vertical and nearly vertical sand-filled fractures - Thin sandy layer @ 13.0'	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Hydrex
ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. **MW-11**

PROJECT INFORMATION

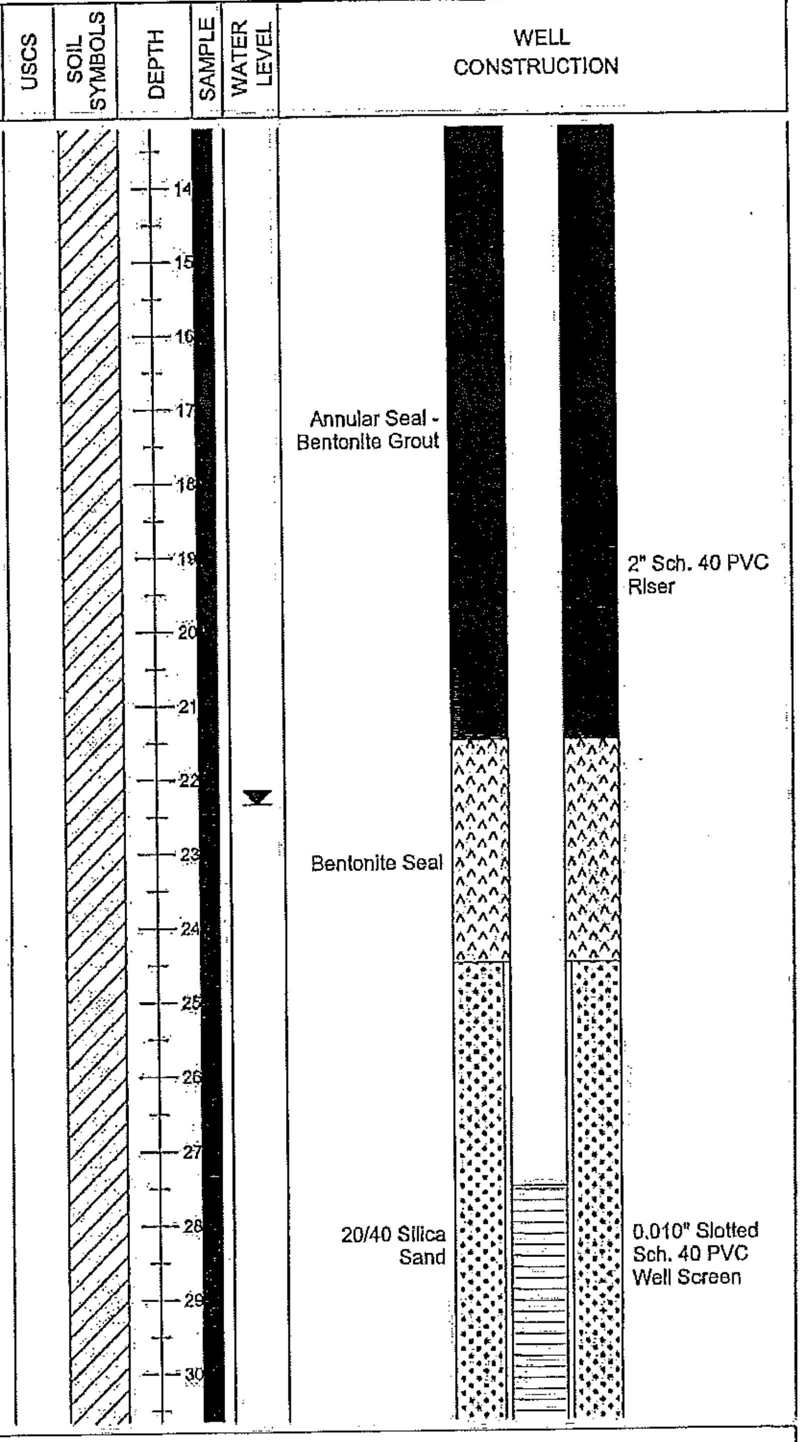
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Greg Flynn/Glen Collier
START DATE:	01/28/05
DEVELOPMENT DATE:	02/25/05
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI

DRILLING INFORMATION

DRILLER:	Master Monitoring Services/Benito Guillen, Jr,
DRILLER'S LICENSE NO.:	5006M
RIG TYPE:	Mobile B-57 Drill Rig
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	80.2'
HOLE DIAMETER:	8.25"
NORTHING: 6620.31	EASTING: 1437.38

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▨ Auger

DESCRIPTION



- Very stiff; tan and gray; mottled silty clay

- Small ironstone clasts @ 19.0' to 19.75'; organic streaks beginning @ 19.75' along root traces and in clay

- Reddish-brown and gray; silty clay

- Clayey sand layer @ 24.5' to 25.0'; damp
- Very stiff

- Thin clayey sand layer @ 29.5'; moist
- Iron or manganese oxide staining @ 30.0' to 31.0'

NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Hydrex ENVIRONMENTAL, INC.

Monitoring Well
Monitoring Well No. MW-11

PROJECT INFORMATION

PROJECT: IESI Hardin County Landfill
PROJECT NO.: L-04-165
LOGGED BY: Greg Flynn/Glen Collier
START DATE: 01/28/05
DEVELOPMENT DATE: 02/25/05
SITE LOCATION: Kountze, Texas
WELL OWNER: IESI

DRILLING INFORMATION

DRILLER: Master Monitoring Services/Benito Guillen, Jr.
DRILLER'S LICENSE NO.: 5006M
RIG TYPE: Mobile B-57 Drill Rig
METHOD OF DRILLING: Hollow Stem Auger
SAMPLING METHODS: Split Core Barrel
SURFACE ELEVATION: 80.2'
HOLE DIAMETER: 8.25"
NORTHING: 6620.31 EASTING: 1437.36

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

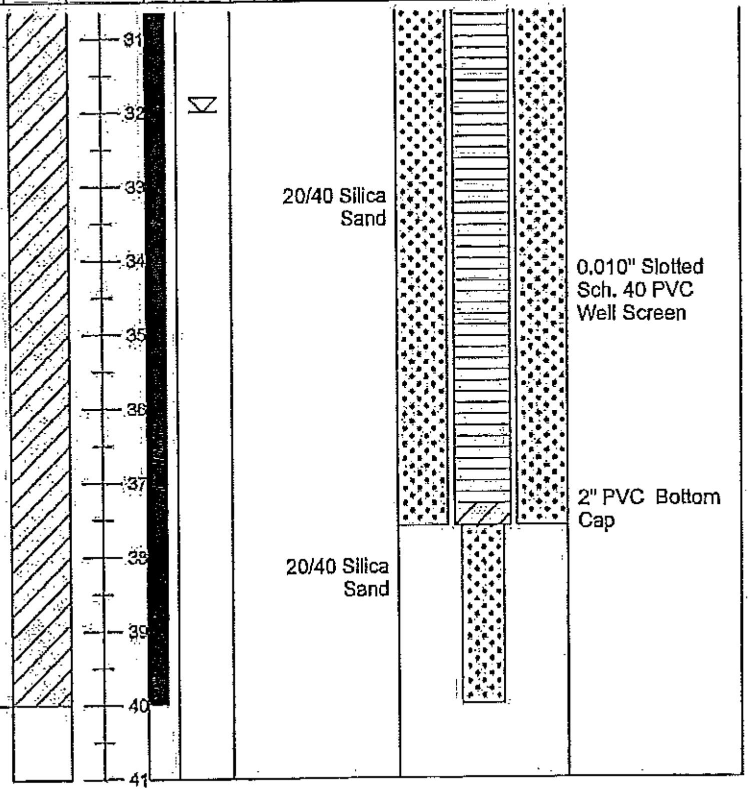
- Clayey sand layer @ 32.0' to 33.0'; wet

- Calcareous zone @ 33.0'; 3" calcareous layer at 34.0'

- Small calcareous nodules scattered @ 36.0' to 37.5'

- Few very thin calcitic-cemented dry sandy laminations scattered between 37.5' to 40.0'

Bottom of Boring @ 40.0'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: February 24, 2005
Monitor Well Latitude: N 30° 20' 10.1" Longitude: W 94° 21' 29.4"
Monitor Well Groundwater Gradient Position:
Upgradient X Downgradient ____

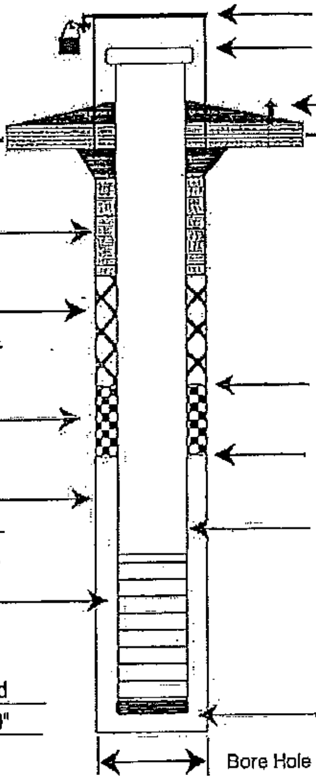
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-11
Date of Monitor Well Development: February 25, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Greg Flynn / Glen Collier
Static Water Level Elevation (with respect to MSL) after Well Development: 61.49'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 83.83'
Top of Casing Elevation: 83.84'
Surface Elevation: 80.2'
Surveyor's Pin Elevation: 80.73'
Concrete Seal Depth: 3.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal Top Depth: 21.5' Elevation: 58.7'
Bentonite Seal
Filter Pack Top Depth: 24.5' Elevation: 55.7'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 27.5'
Top Elevation: 52.7'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 37.5'
Bottom Elevation: 42.7'
Bottom Cap Depth: 37.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

Hydrex ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-191	June 2005	Drawing Not To Scale

Hydrex Environmental, Inc.

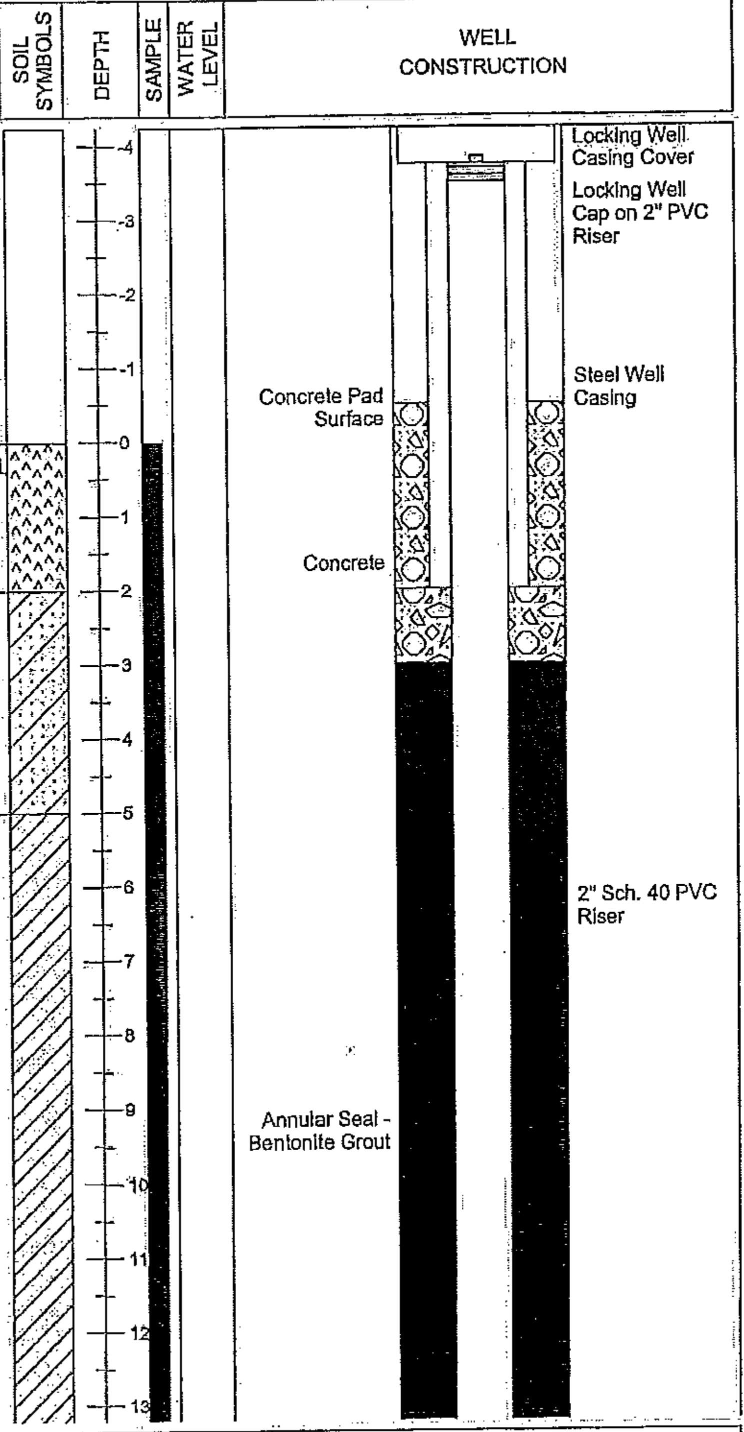
Monitoring Well

Monitoring Well No. MW-12

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	IESI Hardin County Landfill	DRILLER:	Master Monitoring Services/Benito Guillen, Jr.
PROJECT NO.:	L-04-165	DRILLER'S LICENSE NO.:	5006M
LOGGED BY:	Greg Flynn/Glen Collier	RIG TYPE:	Mobile B-57 Drill Rig
START DATE:	02/01/05	METHOD OF DRILLING:	Hollow Stem Auger
DEVELOPMENT DATE:	02/25/05	SAMPLING METHODS:	Split Core Barrel
SITE LOCATION:	Kountze, Texas	SURFACE ELEVATION:	82.0'
WELL OWNER:	IESI	HOLE DIAMETER:	8.25"
		NORTHING: 7217.02	EASTING: 1337.98

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

DESCRIPTION	USCS
FILL: Stiff; red and gray; silty clay	FILL
CLAYEY SAND: Loose; gray, red, and tan; fine-grained quartz sand with clay	SC
CLAY: Stiff; gray, red, and tan; silty mottled clay with sandy layers; scattered iron staining and clasts	CL



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05 Page 1 of 3

Monitoring Well
Monitoring Well No. **MW-12**

PROJECT INFORMATION

PROJECT:	**IESI Hardin County Landfill**
PROJECT NO.:	**L-04-165**
LOGGED BY:	**Greg Flynn/Glen Collier**
START DATE:	**02/01/05**
DEVELOPMENT DATE:	**02/25/05**
SITE LOCATION:	**Kountze, Texas**
WELL OWNER:	**IESI**

DRILLING INFORMATION

DRILLER:	**Master Monitoring Services/Benito Guillen, Jr.**
DRILLER'S LICENSE NO.:	**5006M**
RIG TYPE:	**Mobile B-57 Drill Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**82.0'**
HOLE DIAMETER:	**8.25"**
NORTHING: **7217.02**	EASTING: **1337.98**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ☐ No Recovery ▨ Auger

DESCRIPTION | USCS | SOIL SYMBOLS | DEPTH | SAMPLE | WATER LEVEL | WELL CONSTRUCTION

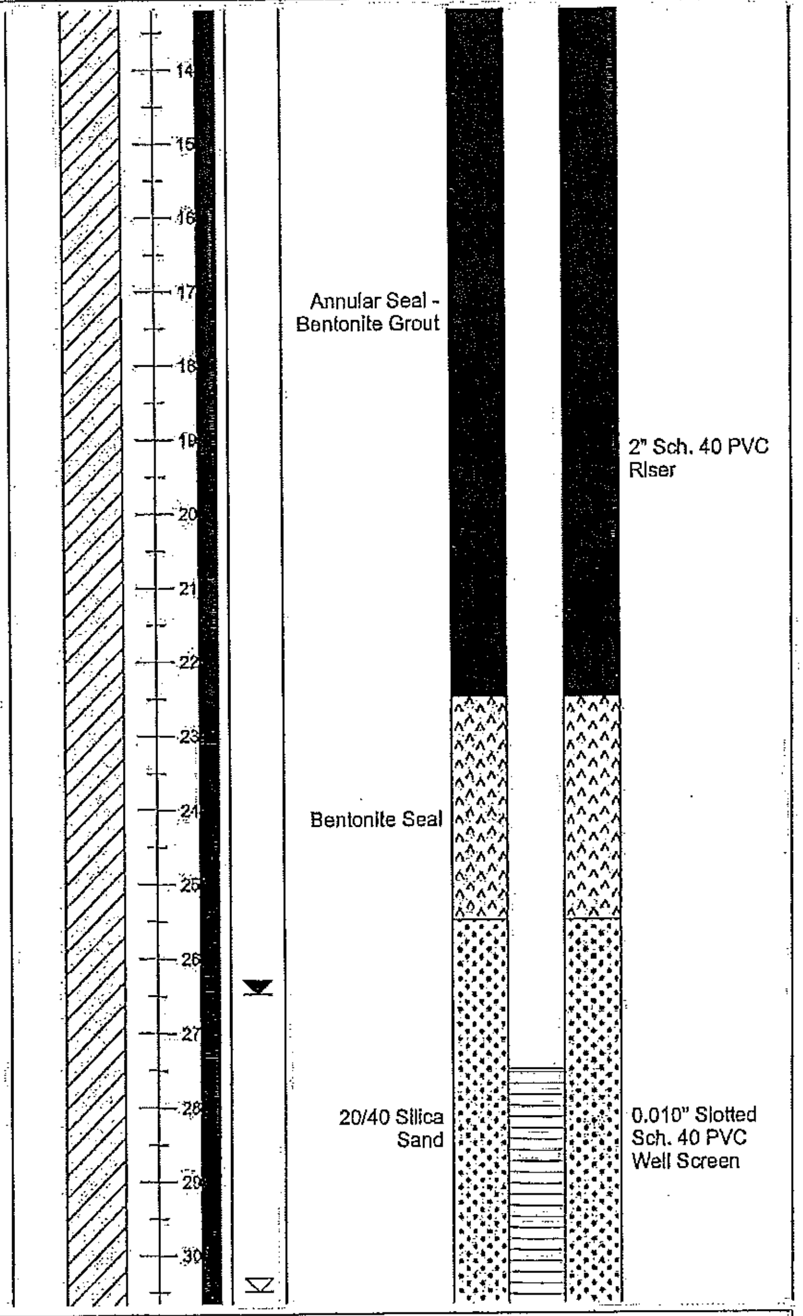
- Very stiff; gray, tan, and orange-brown; silty clay with vertical and nearly vertical sand-filled fractures

- Very stiff; gray and reddish-brown; mottled silty clay; organic streaking along vertical and nearly vertical fractures and root traces

- Gray; vertical and nearly vertical sand-filled fractures; organic streaking

- Clayey sand layer @ 29.0'; dry

- Gray and tan; clayey sand layer wet @ 30.5'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05

Hydrex ENVIRONMENTAL, INC.

Monitoring Well

Monitoring Well No. **MW-12**

PROJECT INFORMATION

PROJECT:	**IESI Hardin County Landfill**
PROJECT NO.:	**L-04-165**
LOGGED BY:	**Greg Flynn/Glen Collier**
START DATE:	**02/01/05**
DEVELOPMENT DATE:	**02/25/05**
SITE LOCATION:	**Kountze, Texas**
WELL OWNER:	**IESI**

DRILLING INFORMATION

DRILLER:	**Master Monitoring Services/Benito Guillen, Jr.**
DRILLER'S LICENSE NO.:	**5006M**
RIG TYPE:	**Mobile B-57 Drill Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**82.0'**
HOLE DIAMETER:	**8.25"**
NORTHING: **7217.02**	EASTING: **1337.98**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Spoon Core ▯ No Recovery ▤ Auger

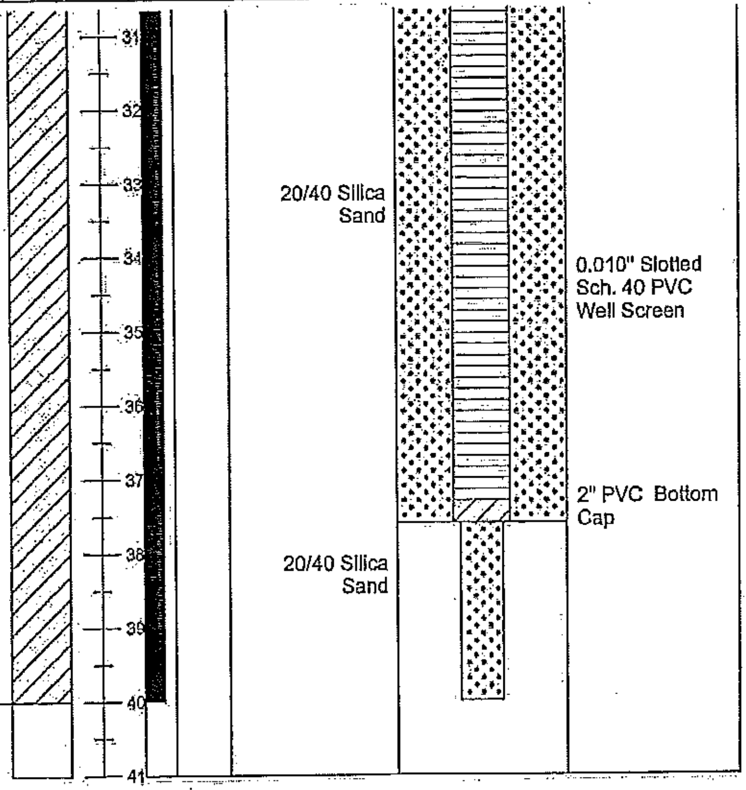
DESCRIPTION | USCS | SOIL SYMBOLS | DEPTH | SAMPLE | WATER LEVEL | WELL CONSTRUCTION

- Clayey sand layers @ 34.3' and 34.8'

- Gray and reddish-brown; calcareous nodules and manganese oxide staining @ 35.0' to 37.5'

- Ironstone scattered @ 37.5' to 40.0'; occasional very thin silt lamination; dry

Bottom of Boring @ 40.0'



NOTES: This log should not be used separately from the original report. Water levels taken in feet bgs. Compiled 02/25/05

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill
County: Hardin County, Texas
Date of Monitor Well Installation: February 24, 2005
Monitor Well Latitude: N 30° 20' 18.7" Longitude: W 94° 21' 32.3"
Monitor Well Groundwater Gradient Position:
Upgradient X Downgradient ____

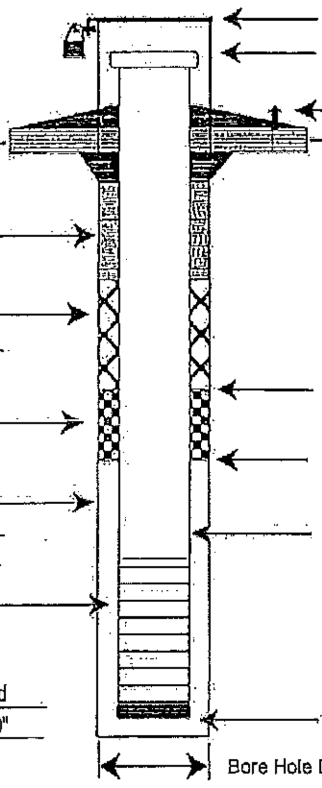
MSW Permit No.: MSW 2214A
Monitor Well I.D. No.: MW-12
Date of Monitor Well Development: February 25, 2005
Monitor Well Driller
Name: Benito Guillen, Jr.
License No.: 5006 M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Greg Flynn / Glen Collier
Static Water Level Elevation (with respect to MSL) after Well Development: 59.14'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock Type of Casing Protection: 4" x 4" Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 85.63'
Top of Casing Elevation: 85.63'
Surface Elevation: 82.0'
Surveyor's Pin Elevation: 82.54'
Concrete Seal Depth: 3.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 22.5' Elevation: 59.5'
Filter Pack Top Depth: 25.5' Elevation: 56.5'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 27.5'
Top Elevation: 54.5'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 37.5'
Bottom Elevation: 44.5'
Bottom Cap Depth: 37.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

2010 HYDREX ENVIRONMENTAL BOREHOLE LOGS AND DATA SHEETS

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.: MW-5R

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS
LICENSED PROFESSIONAL GEOSCIENTIST

PROJECT INFORMATION

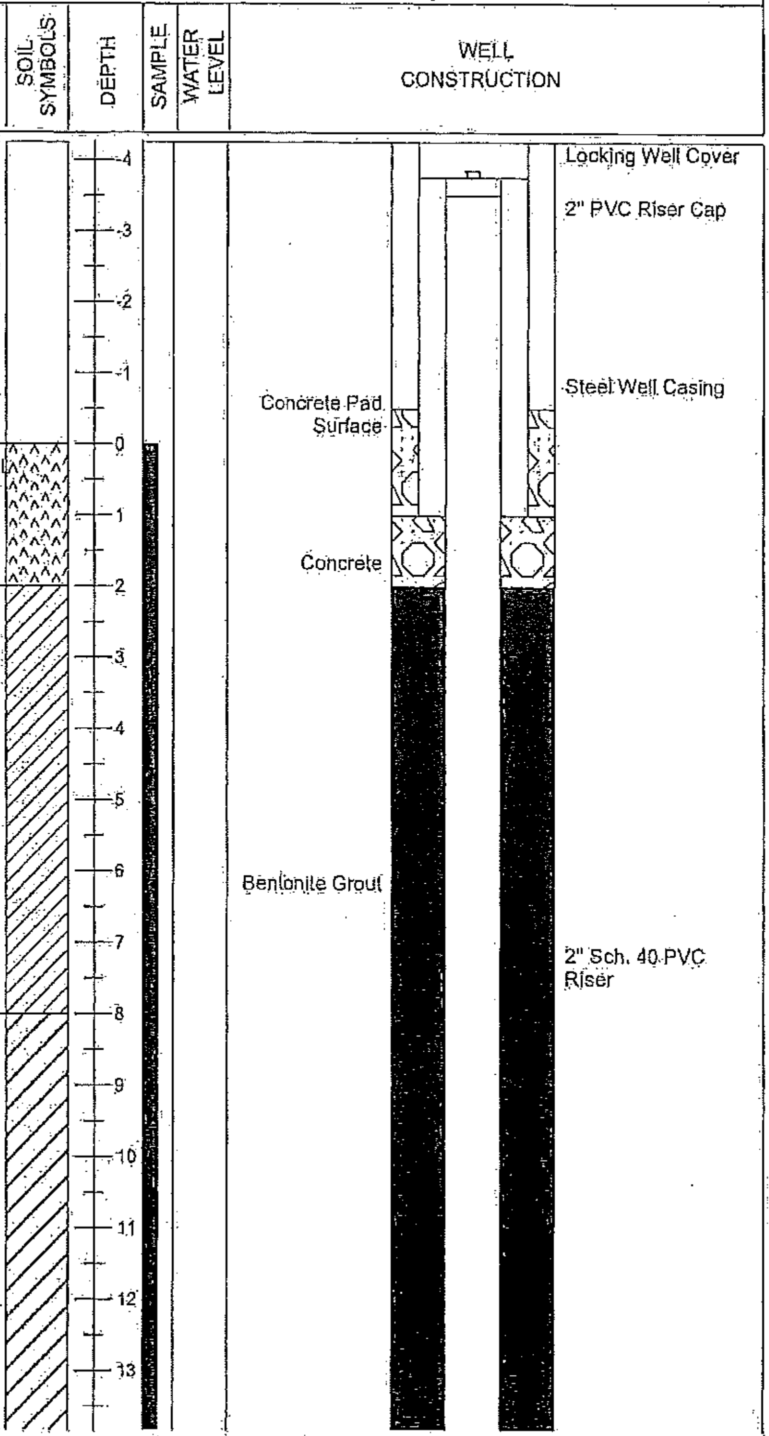
PROJECT: IESI Hardin County Landfill
PROJECT NO.: L-04-165
LOGGED BY: Mellisa Sanchez
SUPERVISING PG: Leonell Scarborough
INSTALLATION: 03/26/10
DEVELOPMENT: 03/29/10
SITE LOCATION: Kountze, Texas
WELL OWNER: IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER: Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.: 3026M
RIG TYPE: Mobil Drill Rig B-57
METHOD OF DRILLING: Hollow Stem Auger
SAMPLING METHODS: Split Core Barrel
SURFACE ELEVATION: 75.3'
HOLE DIAMETER: 8.25"
NORTHING: 7463.96 EASTING: 2995.28

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS
FILL: Red-brown; stiff; clay; fill material; iron staining; dry	FILL
SILTY CLAY: Brown; soft; very silty clay; iron staining; dry - red-brown and gray, mottling; silty clay with iron oxide concretions, gravel and pebble size - less gravel and less silt content	CL
CLAY: Red-brown and gray, mottling; stiff; less amounts of sand with increasing depth; occassional silt partings; iron staining and small amounts of iron concretions; dry	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:MW-5R

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

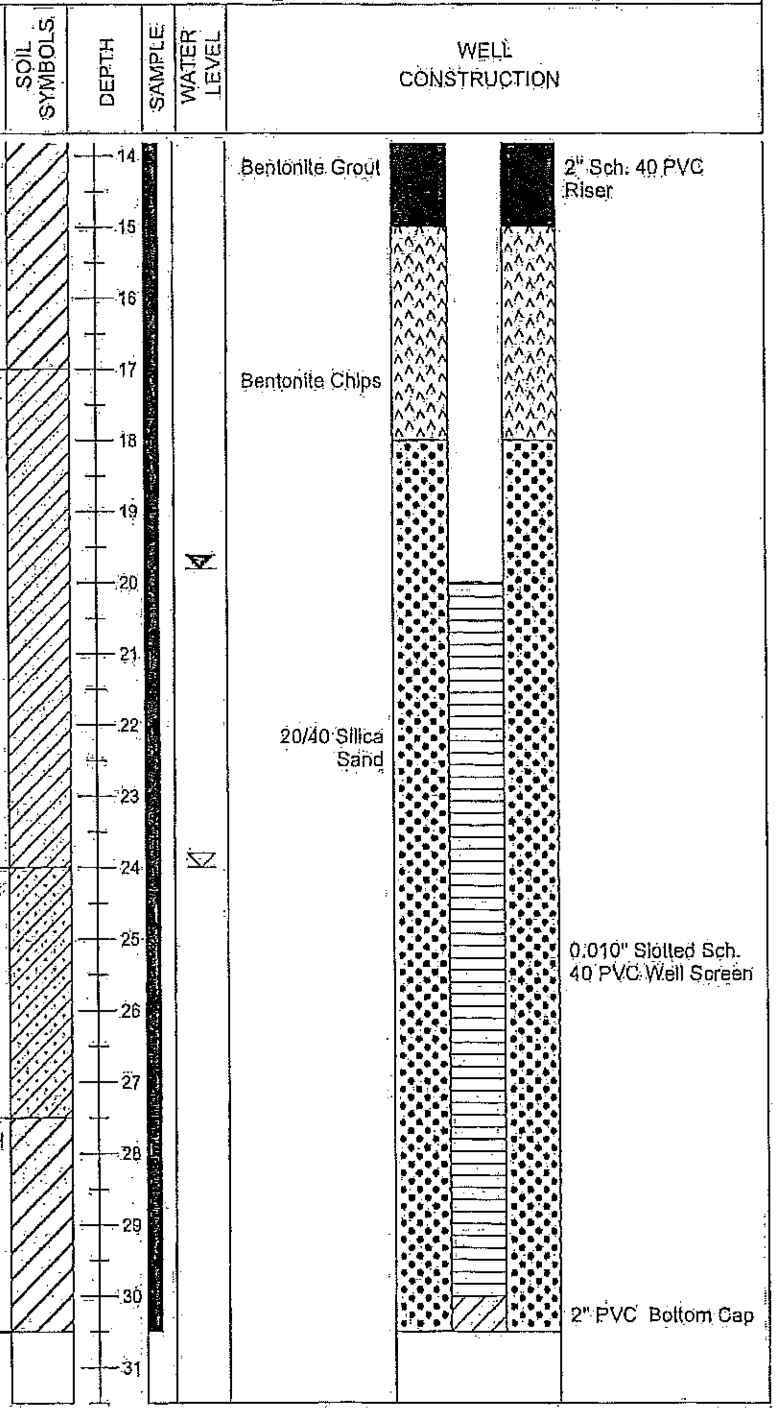
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonall Scarborough
INSTALLATION:	03/26/10
DEVELOPMENT:	03/29/10
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill Rig B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	75.3'
HOLE DIAMETER:	8.25"
NORTHING:	7463.96
EASTING:	2995.28

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
- no silt partings and very hard clay, mottling	
SANDY CLAY: Light gray and red-brown, mottling; stiff; sandy clay, increase in sand content with depth; iron staining; dry	CL
CLAYEY SAND: orange-tan; loose; fine-grained quartz sand with clay; wet @ 24.0' - decreasing amount of clay with depth	SC
CLAY: Gray and red-brown, mottling; stiff; no silt; iron oxide staining	CH
Bottom of Boring @ 30.5'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Monitor Well Data Sheet

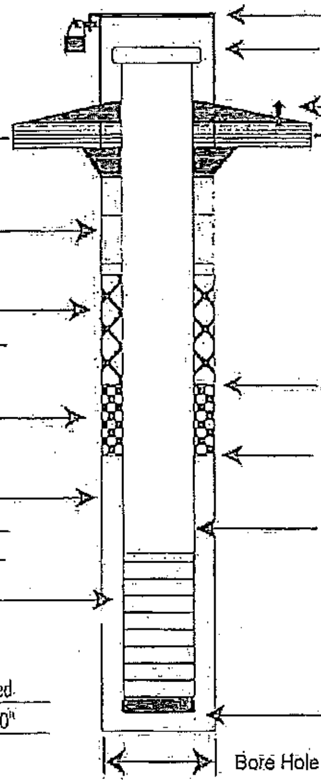
Permittee or Site Name: IESI Hardin County Landfill
MSW Permit No.: MSW 2214A
County: Hardin County, Texas
Monitor Well I.D. No.: MW-5R
Date of Monitor Well Installation: March 26, 2010
Date of Monitor Well Development: March 29, 2010
Monitor Well Latitude: N 30° 20' 24.94" Longitude: W 94° 21' 14.69"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient X
Monitor Well Driller Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 55.49'
Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock
Type of Casing Protection: Steel Well Protector
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 79.19'
Top of Casing Elevation: 78.71'
Surface Elevation: 76.3'
Surveyor's Pin Elevation: 75.77'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 15.0' Elevation: 60.3'
Filter Pack Top Depth: 18.0' Elevation: 57.3'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 20.0'
Top Elevation: 55.3'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 30.0'
Bottom Elevation: 45.3'
Bottom Cap Depth: 30.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

hydrex
ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-04-165	May 2010	Drawing Not To Scale

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:MW-6R

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
5/18/10

PROJECT INFORMATION

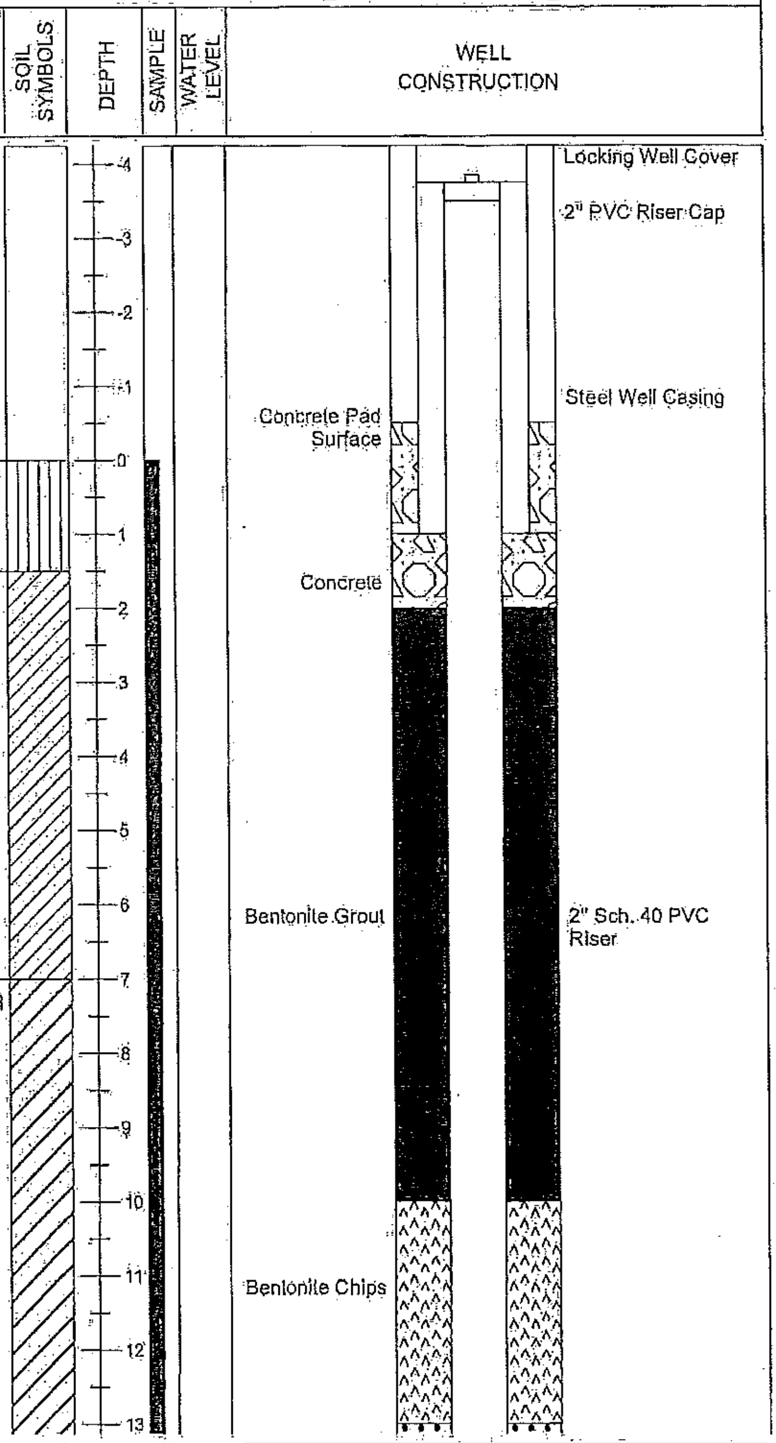
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	03/25/10
DEVELOPMENT:	03/29/10
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill Rig B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	74.6'
HOLE DIAMETER:	8.25"
NORTHING:	6935.42
EASTING:	2994.14

▽ Water level during drilling. ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
SILT: Tan; loose; very silty with some clay; fill material; iron staining; organic material, grass and roots; dry	ML
SILTY CLAY: Red-brown with slight gray mottling; stiff; very silty clay; gravel sized iron concretions from 3.0' to 4.0'; dry - light gray; stiff; very sandy clay @ 4.5' - red-brown and light gray, mottling; very stiff; decreasing amounts of sand or silt with depth; iron staining	CL
CLAY: Light gray and yellow-orange, mottling; very stiff; no sand with increasing depth; occassional silt partings; iron staining; dry	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:MW-6R

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST

PROJECT INFORMATION

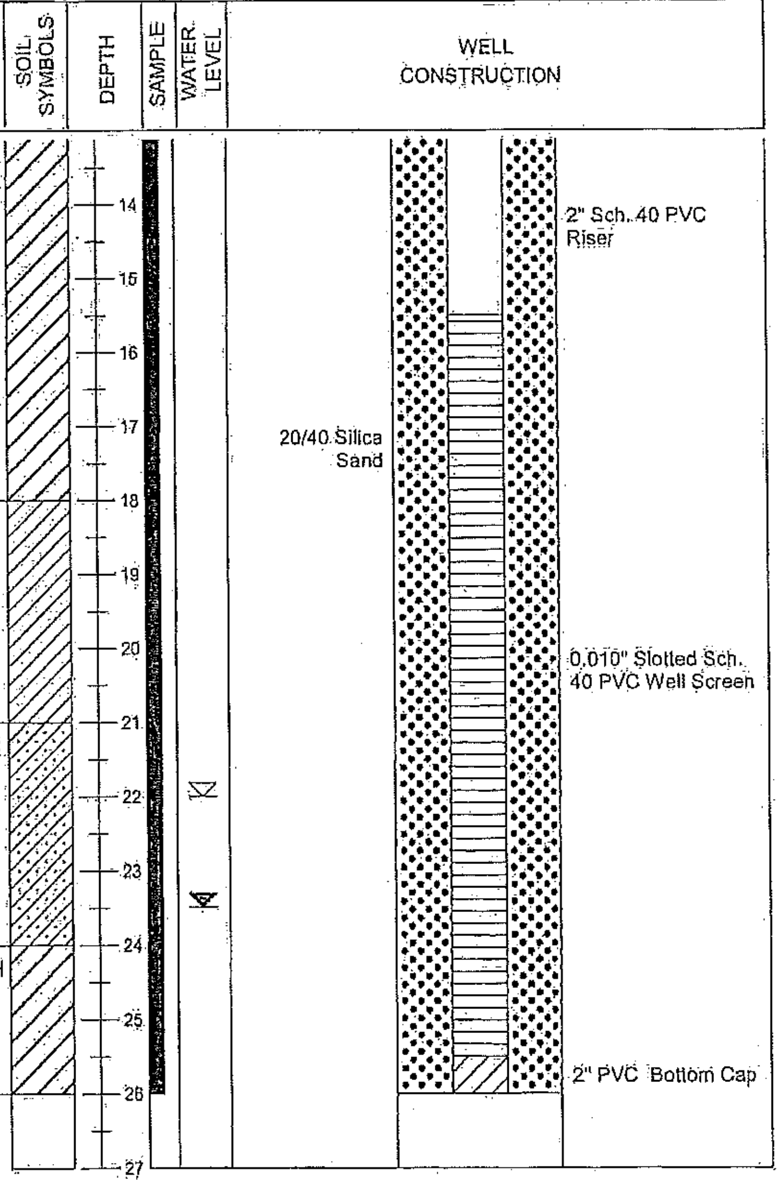
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Mellisa Sanchez
SUPERVISING P.G:	Leonell Scarborough
INSTALLATION:	03/25/10
DEVELOPMENT:	03/29/10
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE.	Mobil Drill Rig B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	74.6'
HOLE DIAMETER:	8.25"
NORTHING: 6935.42	EASTING: 2994.14

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS
- light gray and tan, mottling; stiff; increase in silt and sand content with depth; organic material	
SANDY CLAY; Light gray and red-brown, mottling; medium stiff; sandy clay, increase in sand content with depth; iron staining; dry	CL
CLAYEY SAND: orange-tan and light gray, slight mottling; loose; fine-grained quartz sand with clay; wet - wet @ 22.0'	SC
CLAY: Gray and red-brown, mottling; stiff; no silt; iron oxide staining	CH
Bottom of Boring @ 26.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill

County: Hardin County, Texas

Date of Monitor Well Installation: March 25, 2010

Monitor Well Latitude: N 30° 20' 19.86" Longitude: W 94° 21' 13.16"

Monitor Well Groundwater Gradient Position:

Upgradient ______ Downgradient X

MSW Permit No.: MSW 2214A

Monitor Well I.D. No.: MW-6R

Date of Monitor Well Development: March 29, 2010

Monitor Well Driller

Name: Lawrence H. Toboja

License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

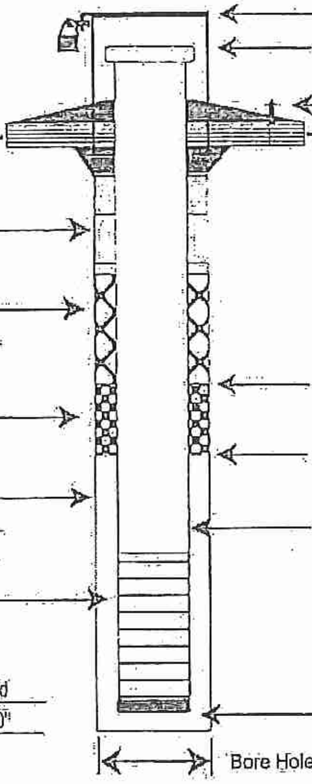
Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough

Static Water Level Elevation (with respect to MSL) after Well Development: 51.11'

Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock Type of Casing Protection: Steel Well Protector

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 78.18'

Top of Casing Elevation: 77.63'

Surface Elevation: 74.6'

Surveyor's Pin Elevation: 74.82'

Concrete Seal Depth: 2.0'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 10.0' Elevation: 64.6'

Filter Pack Top Depth: 13.0' Elevation: 61.6'

Filter Pack

Filter Pack Material: 20 / 40 Silica Sand

Well Casing

Type: PVC

Size (diameter): 2'

Schedule or Thickness: Sch. 40

Well Screen

Top Depth: 15.5'

Top Elevation: 59.1'

Type of Well Screen: Slotted

Screen Opening Size: 0.010"

Bottom Depth: 25.5'

Bottom Elevation: 49.1'

Bottom Cap Depth: 26.0'

Bore Hole Diameter: 8.25"

TCEQ-10308

HYDREX ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-04-165	May 2010	Drawing Not To Scale

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:MW-13

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

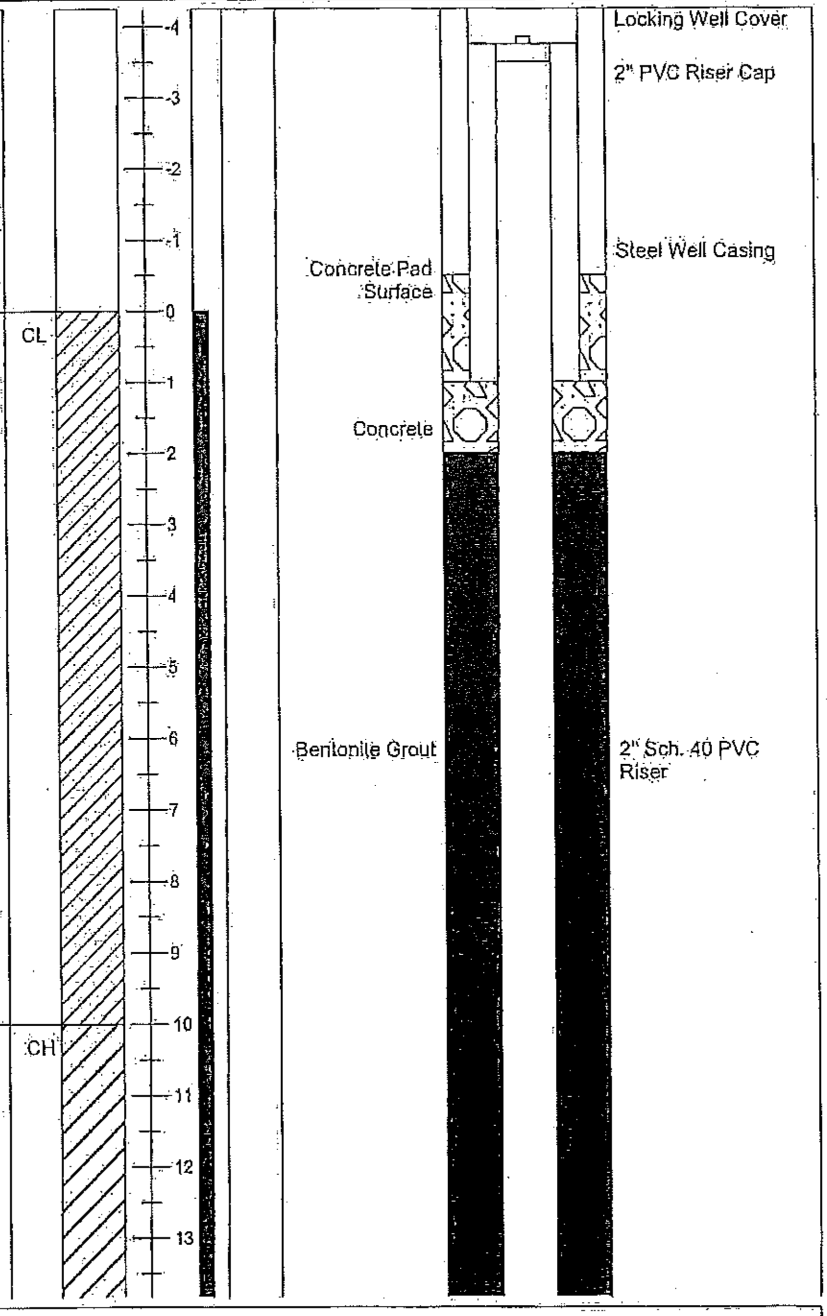
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	03/25/10
DEVELOPMENT:	03/29/10
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill Rig B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	78.7'
HOLE DIAMETER:	8.25"
NORTHING: 7463.96	EASTING: 2995.28

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▥ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION
SILTY CLAY: Tan and light brown; medium stiff; very silty clay; organic material, roots and grass; dry	CL		0			
- dark gray and red-brown; stiff; clay with decreasing silt with depth; iron staining						
- red-brown and gray, mottling; medium stiff; very silty clay; increase in iron staining						
CLAY: Light gray and red-brown mottling; very stiff; very little to no silt with increasing depth; iron staining; dry	CH		10			



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:MW-13

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

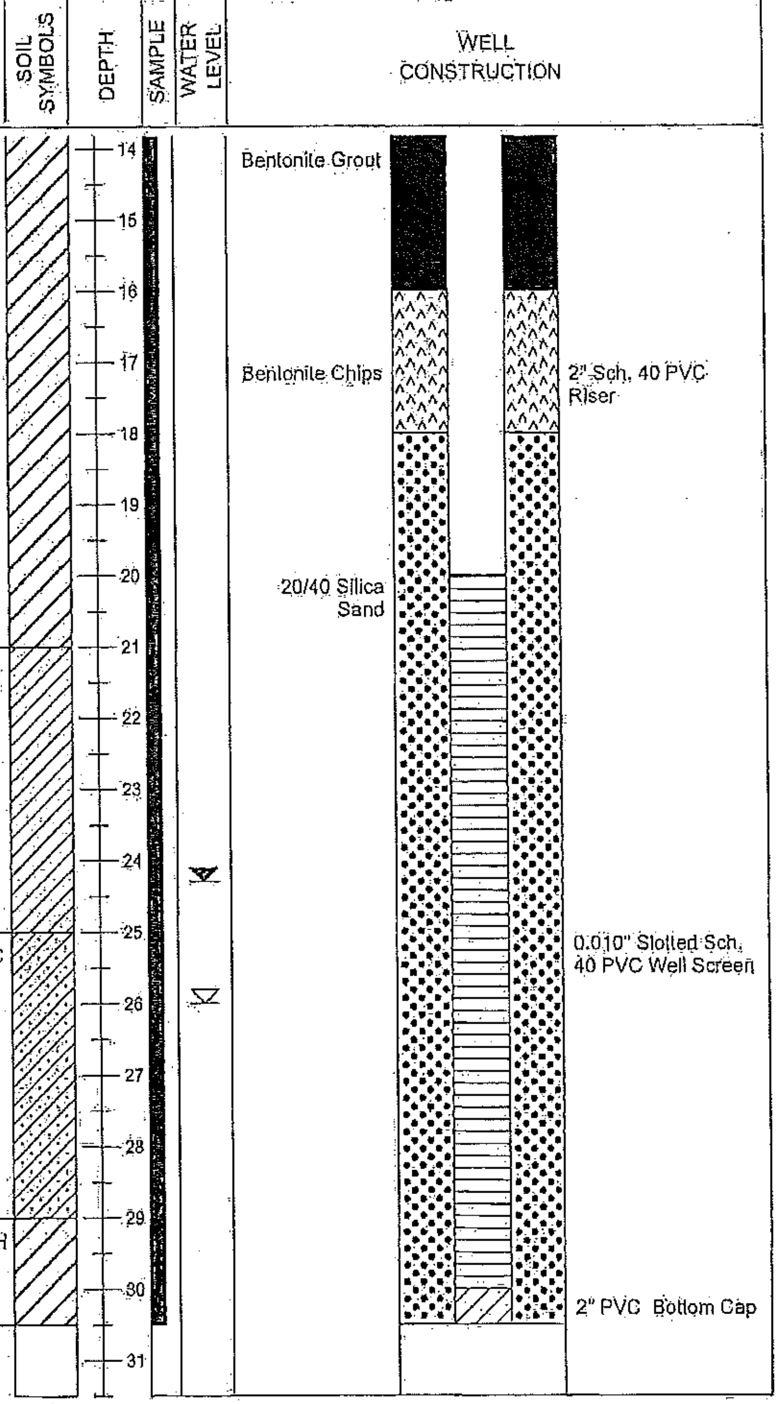
PROJECT:	IESI Hardin County Landfill
PROJECT NO.:	L-04-165
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	03/25/10
DEVELOPMENT:	03/29/10
SITE LOCATION:	Kountze, Texas
WELL OWNER:	IESI Hardin County Landfill

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill Rig B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	78.7'
HOLE DIAMETER:	8.25"
NORTHING: 7463.96	EASTING: 2995.28

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
- red-brown and light gray, mottling; very stiff clay with silt partings; small, scattered lenses of very fine-grained quartz sand - Increase in sand content with depth @ 20.0'	
SANDY CLAY: Light gray and red-brown, mottling; medium stiff; sandy clay, increase in sand content with depth; iron oxide staining and concretions, black in color; dry	CL
CLAYEY SAND: Red-brown and gray; slight mottling; medium loose; fine-grained quartz sand with clay; wet - wet @ 26.0'	SC
CLAY: Gray and red-brown, mottling; stiff; no silt	CH
Bottom of Boring @ 30.5'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 2 of 2

Monitor Well Data Sheet

Permittee or Site Name: IESI Hardin County Landfill

MSW Permit No.: MSW 2214A

County: Hardin County, Texas

Monitor Well I.D. No.: MW-13

Date of Monitor Well Installation: March 25, 2010

Date of Monitor Well Development: March 29, 2010

Monitor Well Latitude: N 30° 20' 29.30" Longitude: W 94° 21' 15.89"

Monitor Well Groundwater Gradient Position:

Upgradient ____ Downgradient X

Monitor Well Driller

Name: Lawrence H. Tobola

License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough

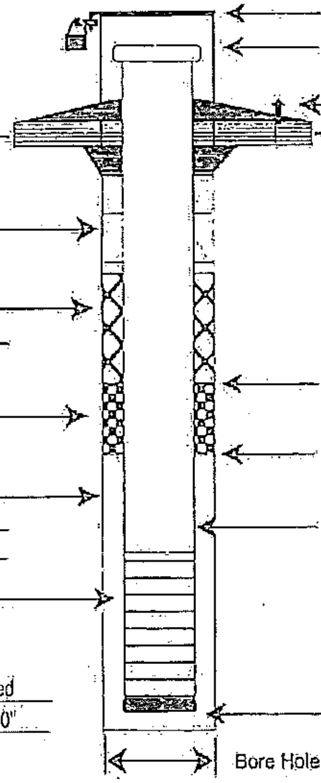
Static Water Level Elevation (with respect to MSL) after Well Development: 54.4'

Name of Geologic Formation(s) in which Well is completed: Lissie Formation

Type of Locking Device: Padlock

Type of Casing Protection: Steel Well Protector

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' x 6' x 6" (min.)



Top of Protective Collar Elevation: 82.80'

Top of Casing Elevation: 82.19'

Surface Elevation: 78.7'

Surveyor's Pin Elevation: 79.71'

Concrete Seal Depth: 2.0'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 16.0' Elevation: 62.7'

Filter Pack Top Depth: 18.0' Elevation: 60.7'

Filter Pack

Filter Pack Material: 20 / 40 Silica Sand

Well Casing Type: PVC

Size (diameter): 2"

Schedule or Thickness: Sch. 40

Well Screen

Top Depth: 20.0'

Top Elevation: 58.7'

Type of Well Screen: Slotted

Screen Opening Size: 0.010"

Bottom Depth: 30.0'

Bottom Elevation: 48.7'

Bottom Cap Depth: 30.5'

Bore Hole Diameter: 8.25"

TCEQ-10308

Project No. L-04-165	May 2010	Drawing Not To Scale

2017 WEAVER CONSULTANTS GROUP GEOTECHNICAL BOREHOLE LOGS AND LEGEND KEY

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

WEAVER CONSULTANTS GROUP, LLC

KEY TO WCG LITHOLOGIC LOGS
HARDIN COUNTY LANDFILL
JANUARY 2017 GEOTECHNICAL BOREHOLES

SAMPLING METHODS:

Symbol:	Sampling Method:
U	Thin Walled Shelby Tube
S	Split Spoon Barrel
C	Double Tube Core Barrel
P	Pitcher Barrel
A	Auger Sample
W	Rotary Wash Sample

RELATIVE DENSITY OF COARSE GRAINED SOILS:

Penetration Resistance: (Blows/Foot)	Relative Density:
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
Over 50	Very Dense

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength: (Tons per Square Foot)	Consistency:	Field Criteria:
Less than 0.25	Very Soft	Squeezes between fingers when fist is closed.
0.25 to 0.50	Soft	Easily molded by fingers.
0.50 to 1.00	Firm	Molded by strong pressure of fingers.
1.00 to 2.00	Stiff	Imprinted very slightly by finger pressure.
2.00 to 4.00	Very Stiff	Cannot imprint with finger pressure / can penetrate w/ pencil.
4.00 and Up	Hard	Imprinted only slightly by pencil point.

MOISTURE:

Description:	Criteria:
Dry	Absence of moisture.
Moist	Damp, but no visible water.
Wet	Very damp to visible water.

PLASTICITY

Description:	Criteria:
Non-plastic	1/8" Thread Can't Be Rolled.
Low	1/8" Thread Difficult to Roll / No Lump.
Medium	1/8" Thread Easy to Roll / No reroll / No Lump.
High	Long time to 1/8" Thread at Plastic Limit.

STRATIFICATION:

Description:	Thickness:
Massive Bedding	> 10 ft.
Very Thickly Bedded	3 ft. to 10 ft.
Thickly Bedded	1 ft. to 3 ft.
Moderately Bedded	3 in. to 1 ft.
Thinly Bedded	1.2 in. to 3 in.
Very Thinly Bedded	3/8 in. to 1.2 in.
Laminated	< 3/8 in.
Intermixed	None (irregularly mixed clasts)

SEDIMENTARY TEXTURES:

Description:	Definition:
Slickensides	Polished fracture surface seen in stiff clay.
Fractures	Failure plane, commonly w/ mineralization.
Blocky	Angular lumps that resist further breakdown.
Brecciated	Angular fragments commonly due to faulting.
Fissures	Cracks from shrinkage and frost w/ definite fracture plane.
Weathered	Irregular discoloration and diminished soil structure.
Parting	Separation surface, commonly filled w/ coarser sediments.

SUBSURFACE CONDITIONS:

The lithologic log soil and rock descriptions are based on visual field observations and, where indicated on the logs, geotechnical testing. The geotechnical classifications are based only on the samples analyzed. Where no geotechnical classification or analysis is indicated, the stratum classifications are based on visual field classifications only. The lithologic unit contacts shown on the logs indicate approximate boundaries between materials. The actual contacts may be gradational and vary between borehole locations. The visual/manual procedures used for the field classification of soils were performed in general accordance with ASTM Standard D-2488. Soil classifications based on geotechnical laboratory results were performed in general accordance with ASTM Standard D-2487. Water level observations were made at the time of drilling and at subsequent times, as indicated. Future water levels may vary significantly from those indicated due to climatic factors, construction activity, or other factors.

LITHOLOGIC UNITS

▨	CLAY OR SILTY CLAY
▩	EARTHEN FILL
░	SAND, SILTY SAND, OR CLAYEY SAND
▨	SANDY CLAY
▥	SILT, CLAYEY SILT, OR SANDY SILT

PIEZOMETER SUBSURFACE CONSTRUCTION

▯	RISER CASING IN BENTONITE SEAL
░	RISER CASING IN SAND FILTER PACK
▤	SLOTTED WELL SCREEN IN SAND FILTER PACK

Weaver Consultants Group, LLC	LOG OF BORING: WC-1 Project Title: Hardin County Landfill Project No: 0771-365-11-07-24	Geologist: Aaron K. Evans Driller: Joseph Ray	Page 1 of 2

Boring Start Date: 1/10/2017 Northing: 10137062.03
Boring End Date: 1/10/2017 Easting: 4180847.14
Ground Elevation: 70.6 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 74' bgs.

▽ = Upper Water Elevation at Time of Drilling: 50.6 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 13.9 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▨	CLAY, silty, trace sand, moist, very stiff to hard, high plasticity, light brown with dusky red mottling, laminated, cross-bedded, very fine grained, with common iron stones, and iron and manganese staining.	56.6	4.0 2.0									
	U	▨			2.0 2.5									
5	U	▨			2.5 3.0									
	U	▨	- clay becomes interbedded with silty sand laminations below 6'.		3.0 3.5									
	U	▨			3.0 3.5									
10	A	▨												
15	U	░	SAND, silty, moist, hard, non-plastic, very light gray, no visible bedding, homogenous.	53.6	4.0 4.0									
	S	▨	CLAY, silty, moist, very stiff to hard, high plasticity, very light gray and light brown mottled, intermixed clasts with some laminated cross-bedding, common manganese staining.	50.6		4/6/5								
	S	▨				4/7/11								▽
20	U	░	SAND, silty, wet, very stiff, non-plastic, very light gray and light brown mottled, no visible bedding, very fine grained.	48.6	2.5 2.0									
	S	▨	(CH) CLAY, silty, with silty sand clasts, moist to wet in zones, loose to hard in zones, low to high plasticity in zones, very light gray with light brown mottling, very fine grained.	38.6		6/6/15								
25	U	▨	- 6" wet silty sand seam at 25.5' - clay contains occasional fine calcareous nodules below 26'.											
	U	▨												
	U	▨												
30	U	▨			2.5 2.5		98	30.4	91.6	66	29	37	$1.7x10^{-7}$ V	
	U	▨	CLAY, silty, trace sand in zones, moist, very stiff, medium to high plasticity in zones, very light gray / light brown / dark reddish brown mottled, laminated, with ocassional very fine grained silty sand and sandy silt laminations.	32.6	2.0 2.0									
35	U	▨												
	U	▨	- silt becomes sandy, homogenous with no visible bedding below 36'.		2.0 2.5									
	U	▨	CLAY, silty, moist, very stiff, medium to high plasticity, very light gray with light brown mottling, laminated, cross-bedded, with common fine iron stones and staining.		3.5									

Weaver Consultants Group, LLC

LOG OF BORING: WC-1

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/10/2017 Northing: 10137062.03
Boring End Date: 1/10/2017 Easting: 4180847.14
Ground Elevation: 70.6 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 74' bgs.

▽ = Upper Water Elevation at Time of Drilling: 50.6 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 13.9 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	A	▨	CLAY, silty, moist (continued).		3.0									
	S	▨	- clay becomes highly plastic and homogenous with no visible bedding below 43'.	25.6		4/8/10								
45	U	▨	CLAY, silty, moist, very stiff to hard, low to medium plasticity, very light gray, no visible bedding, homogenous.		3.5 4.5									
	S	▨				4/7/9								
	A	▨												
50	U	▨	- clay becomes intermixed with clayey silt and silty sand clasts below 50'.		3.0 3.5									
	U	▨			2.5 3.0									
55	A	▨				4/8/10								
	S	▨	- 3" wet sandy silt seam at 56.75'.	13.6										▽
	U	▥	SILT, sandy, trace clay, wet, very stiff, non-plastic to medium plasticity in zones, very light gray, no visible bedding, very fine grained.		2.0 3.0									
60	A	▥	- 6" wet silty sand seam at 58.5'.	10.1	3.0 3.5									
	U	▨	CLAY, silty, moist, hard, high plasticity, very light gray with dark reddish brown mottling, no visible bedding, homogenous.		4.5									
	S	▨				7/9/13								
65	A	▨	- clay contains common fine iron stones, iron staining, and trace fine calcareous nodules below 65'.											
	U	▨			4.5 4.0									
	U	▨	- 6" moist silty sand seam at 68.5'.		4.0 4.5									
70	A	▨			4.5 4.5									
	U	▨			4.5 4.5									
	U	▨		-3.4	4.5									
75			Total Boring Depth = 74' bgs.											

Weaver
Consultants
Group,
LLC

LOG OF BORING: WC-2

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Page 1 of 2

Boring Start Date: 1/11/2017 Northing: 10136791.64
Boring End Date: 1/11/2017 Easting: 4181048.44
Ground Elevation: 70.8 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 63' bgs.

▽ = Upper Water Elevation at Time of Drilling: 50.3 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 16.8 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U		SILT, sandy, clayey, with some silty clay clasts, moist, very stiff to hard, low to medium plasticity in zones, very light gray / dark reddish brown / light brown mottled, intermixed, very fine grained.		4.0									
				67.8	3.8									
	U		CLAY, silty, sandy, moist, very stiff, low to medium plasticity in zones, very light gray and dark reddish brown mottled, intermixed, very fine grained, with common slickensides and manganese staining.		2.8									
					2.8									
5	U				2.5									
			- clay contains common vertical silty sand filled partings below 5'.	63.8	2.3									
	U		CLAY, silty, trace sand, moist, very stiff, high plasticity, very light gray with light brown mottling, no visible bedding, very fine grained, with ocassional vertical silty sand filled partings, slickensides, and manganese staining.		2.0									
					3.5									
	U			60.8	2.0									
10			CLAY, trace silt, moist, very stiff, high plasticity, very light gray with dark reddish brown and light brown mottling, no visible bedding, with common slickensides, manganese staining, and occasional wood fragments.		3.5									
	U				2.5									
					3.5									
	U		- clay becomes silty below 12.5'.		2.5									
			- clay becomes silty with trace sand and stiff below 14'.		2.5									
	U													
15				54.8	1.0									
	U		(CH) CLAY, silty, trace sand, with sandy silt and silty clay clasts, moist, very stiff to hard, medium to high plasticity in zones, very light gray and light brown mottled, intermixed, very fine grained.		1.3									
						5/10/12								
	S													
					3.5									
20	U			50.3	4.0		96	32.2	91.8	73	24	49	9.7×10^{-8} V	▽
	S		SILT, sandy, trace clay, wet, stiff to very stiff, non-plastic to low plasticity in zones, very light gray with light brown mottling, no visible bedding, very fine grained.			4/4/5								
						4/5/7								
	S			45.8										
25			CLAY, silty, moist, very stiff, medium to high plasticity, very light gray / light brown / black mottled, no visible bedding, with common iron stones and staining, and manganese staining.			6/7/10								
	S													
			- clay becomes laminated with trace silt, high plasticity, and very light gray with dark reddish brown mottling below 27'.			6/10/12								
	S													
					3.5									
	U													
30														
	U				2.0									
			- clay becomes silty with common silty sand lamination below 32'.		4.0									
	U		- 6" moist silt seam at 34'.		4.0									
					0.0									
					4.0									
35	U		- clay becomes hard with trace silt below 35'.		4.5									
	U													
	A		- clay becomes silty and intermixed below 39'.		4.5									

Weaver Consultants Group, LLC

LOG OF BORING: WC-2

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Page 2 of 2

Boring Start Date: 1/11/2017 Northing: 10136791.64
Boring End Date: 1/11/2017 Easting: 4181048.44
Ground Elevation: 70.8 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 63' bgs.

▽ = Upper Water Elevation at Time of Drilling: 50.3 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 16.8 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▨	CLAY, silty, moist (continued).		4.5									
		▨			4.0									
	U	▨			4.0									
	A	▨			4.5									
		▨			4.5									
45	U	▨												
		▨		23.8	4.5									
	U	▨	CLAY, silty, trace sand, moist, hard, medium plasticity, very light gray with dark reddish brown mottling, intermixed, very fine grained.		4.5									
	A	▨		21.8	4.5									
		▨	CLAY, silty, moist, hard, high plasticity, very light gray and dark reddish brown mottled, intermixed.		4.0									
50	U	▨			4.5									
		▨			4.5									
	U	▨			4.0									
	A	▨		16.8	4.0									▽
		▥	SILT, sandy, wet, stiff to very stiff, non-plastic to low plasticity in zones, very light gray with dark reddish brown mottling, intermixed, very fine grained.											
55	U	▥		14.8	2.5									
		▨	CLAY, silty, moist, hard, high plasticity, very light gray and dark reddish brown mottled, intermixed, with occasional silty sand laminations, very fine grained.		4.5									
	U	▨			4.5									
	A	▨												
		▨												
60	U	▨	- clay becomes homogenous below 60'.		4.5									
		▨			4.5									
	U	▨		7.8	4.0									
			Total Boring Depth = 63' bgs.											
65														
70														
75														

Weaver Consultants Group, LLC

LOG OF BORING: WC-3

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/13/2017
Boring End Date: 1/14/2017
Ground Elevation: 68.9 ft-msl
Northing: 10137260.46
Easting: 4181768.94

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 65' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.9 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 22.9 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▥	SILT, clayey, trace sand, moist, stiff, low to medium plasticity, dark reddish brown with light brown mottling, no visible bedding, very fine grained.	66.9	1.5									
5	U U U U	▨	CLAY, silty, trace sand, moist, stiff, medium plasticity, dark reddish brown with light brown mottling, no visible bedding, very fine grained, with ocassional slickensides. - clay becomes intermixed, medium to high plasticity, with ocassional silty sand clasts below 3.5'. - clay becomes highly plastic with low to medium plasticity below 5'.	58.9	2.0 1.5 2.5 2.5 3.5 2.5 3.8 3.5									
10	U U	▨	CLAY, silty, moist, very stiff to hard, high plasticity, very light gray with light brown and dark reddish brown mottling, no visible bedding, common manganese stains.	53.9	3.5 2.5 4.0 4.5 2.5									
15 20	U U A U	▥	SILT, sandy, trace clay, moist, very stiff, non-plastic to low plasticity in zones, dark reddish brown with very light gray mottling, intermixed, very fine grained. - silt becomes wet and very soft below 19'. - 6" moist silty clay seam at 20.5'.	47.9	3.0 3.0 2.5 4.0									▽
	U	░	SAND, silty, andy silt and silty clay clasts, wet, loose, non-plastic, light brown, ntermixed, very fine grained.	46.4										
25 30 35	A U U U U U A U U A	▨	(CH) CLAY, silty, moist, very stiff to hard, medium to high plasticity, light brown with dark reddish brown and very light gray mottling, laminated, with occasional interbedded wet silty sand and sandy silt laminations, very fine grained. - clay becomes very light gray below 29'. - clay becomes very light gray and light brown mottled and intermixed below 34'.	28.9	3.0 4.0 3.0 2.0 2.5 3.0 4.5 4.0 3.0 3.0 2.5 4.5 4.5 4.5 3.5 3.5 2.0		99	31.4	87.1	65	24	41	$1.1x10^{-8}$ V	

Weaver
Consultants
Group,
LLC

LOG OF BORING: WC-3

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Page 2 of 2

Boring Start Date: 1/13/2017
Boring End Date: 1/14/2017
Ground Elevation: 68.9 ft-msl
Northing: 10137260.46
Easting: 4181768.94

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 65' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.9 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 22.9 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
45	U U A U	▨	CLAY, silty, sandy, with clayey silt and sandy silt clasts, moist, loose to very stiff in zones, low to high plasticity in zones, light brown with dark reddish brown and very light gray mottling, intermixed, with common fine iron stones and staining.	22.9	2.5 0.0 2.0 2.0 1.0 2.5									▽
50	U A U U A	▥	Silt, trace clay, trace sand, wet, loose to soft, non-plastic, very light gray, no visible bedding, very fine grained. - silt becomes intermixed with loose sandy silt, and stiff silty clay clasts below 48'.	14.9	0.0 0.5 0.0 1.0 1.0 0.5									
55 60	U U A U U S	░	SAND, silty, wet, loose, non-plastic, very light gray, no visible bedding, interbedded with thin sandy silt seams. - Sand becomes flowing below 63'.	3.9	0.0 0.0	4/4/7								
65 70 75			Total Boring Depth = 65' bgs.											

Weaver Consultants Group, LLC

LOG OF BORING: WC-4

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/12/2017
Boring End Date: 1/13/2017
Ground Elevation: 70.9 ft-msl
Northing: 10136876.79
Easting: 4181609.78

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 63' bgs.

▽ = Upper Water Elevation at Time of Drilling: 52.9 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 16.9 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▥	SILT, sandy, moist, firm to stiff, non-plastic, light brown / very light gray / dark reddish brown mottled, no visible bedding, very fine grained. - silt contains trace sand and clay, low plasticity, with common limonite staining below 2'.		1.0									
					1.5									
	U			67.9	4.0									
		▨	(CL) CLAY, silty, moist, hard, medium to high plasticity, dark reddish brown / very light gray / light brown mottled, no visible bedding. - clay becomes highly plastic below 4'.		4.5									
5	U				4.0									
					4.0									
	U				4.0									
					4.5									
	U				4.5									
10			- 4"moist sandy silt seam at 10'.		0.0									
	U		- clay becomes very silty and intermixed, with ocasional clayey silt clasts below 11'.		4.0									
					4.0									
	U				4.5									
			- clay becomes very stiff, with common sandy silt clasts and manganese staining below 14'.		4.5									
15	U				4.5									
					2.5		57	17.3	110.7	44	14	30		
	U				4.5									
				52.9	4.0									▽
	A	▥	SILT, sandy, trace clay, with silty clay clasts, wet, very soft to hard in zones, non-plastic to medium plasticity in zones, light brown / very light gray / dark reddish brown mottled, intermixed, very fine grained.		0.0									
20	U				0.0									
					0.0									
	U				0.0									
					2.0									
	A			46.9										
25	U	▨	CLAY, silty, moist, very stiff to hard, high plasticity, very light gray and dark reddish brown mottled, laminated, with occasional fine calcareous nodules and manganese staining.		4.5									
					2.5									
	U			43.9	4.0									
		▥	SILT, sandy, with silty sand and clayey silt clasts, wet, very stiff to hard, non-plastic to high plasticity in zones, very light gray and light brown mottled, intermixed, very fine grained.		4.0									
	A			41.9	4.0									
30	U	▨	CLAY, silty, moist, very stiff to hard, high plasticity, very light gray / dark reddish brown / light brown mottled, laminated with some cross bedding, with occasional sandy silt laminations, and iron, manganese, and limonite staining.		4.0									
					3.5									
	U				4.0									
														▽
	A			36.9										
35	U	▥	SILT, sandy, wet, very soft to loose, non-plastic, light brown with dark reddish brown mottling, laminated, very fine grained.	35.9										
			SILT, clayey, trace sand, with silty clay clasts, moist, very stiff to hard, medium to high plasticity in zones, very light gray with light brown and dark reddish brown mottling, intermixed, very fine grained.		4.5									
	U				3.5									
					4.5									
	A													
				30.9	2.5									

Weaver Consultants Group, LLC

LOG OF BORING: WC-4

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Page 2 of 2

Boring Start Date: 1/12/2017
Boring End Date: 1/13/2017
Ground Elevation: 70.9 ft-msl
Northing: 10136876.79
Easting: 4181609.78

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 63' bgs.

▽ = Upper Water Elevation at Time of Drilling: 52.9 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 16.9 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
45 50	U U A U U A U U A	▨	CLAY, silty, moist, hard, high plasticity, very light gray with light brown and dark reddish brown mottling, no visible bedding, homogenous with common manganese staining. - clay contains common fine iron stones and staining below 49'.	16.9	4.0 4.0 4.5 4.0 4.5 4.0 4.5 4.5 4.5 4.5 4.5 4.5									▽
55	U	▥	SILT, sandy, with clayey silt clasts, wet, very stiff to hard, non-plastic to low plasticity in zones, very light gray with light brown mottling, very fine grained.	13.9	2.0 4.5 2.0									
60	U A U U	▨	CLAY, silty, trace sand, moist, hard, medium plasticity, very light gray with light brown mottling, no visible bedding, very fine grained. - clay becomes highly plastic below 59'.	7.9	4.5 4.0 4.5 4.0 4.0 4.5									
65 70 75			Total Boring Depth = 63' bgs.											

Weaver Consultants Group, LLC

LOG OF BORING: WC-5

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/3/2017
Boring End Date: 1/6/2017
Ground Elevation: 80.0 ft-msl
Northing: 10137147.28
Easting: 4182051.22

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 98' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 32.0 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▨	CLAY, silty, moist, very soft to stiff, medium plasticity, dark yellowish brown, with very light gray mottling, no visible bedding.		0.0 0.5									
	U	▨	- 10" clayey silt seam at 3'.		0.0 1.5									
5	U	▨		74.0	1.5									
	S	░	SAND, silty, moist, very loose to loose, non-plastic, very light gray, no visible bedding, very fine grained, with common wood fragments. - sand becomes very silty, with trace clay, loose, and low plasticity below 8'.			16/5/5								
	S	░				2/4/9								
10	U	░												
	U	░		66.5	2.0									
15	S	▨	CLAY, silty, sandy, moist, very stiff to hard, low to high plasticity in zones, dusky red and very light gray mottled, laminated to thinly bedded (vertical), very fine grained, with commion vertical silty sand filled partings and wood fragments.	64.0		4/12/12								
	S	▨	(CH) CLAY, silty, trace sand in zones, moist, very stiff to hard, medium to high plasticity in zones, very light gray with pale yellow brown mottling, intermixed, very fine grained, with occasional wood fragment and manganese staining.			10/13/15								
	A	▨												
20	U	▨			4.0 3.5									
	U	▨	- clay contains common intermixed silty sand clasts below 22'.	57.0	4.5 2.5		87	23.7	101.5	67	22	45		
	U	░	SAND, silty, trace clay, moist, very stiff to hard, non-plastic with low plasticity zones, light brown and pale yellow brown mottled, intermixed, very fine to fine grained, with occasional wood fragments and manganese and iron staining.		3.5 4.5									
25	U	░			4.5 3.5									
	U	░												
30	U	░		49.0	2.3 1.3									▽
	U	░	(SC) SAND, silty, clayey in zones, wet, very loose to loose, non-plastic to low plasticity in zones, very light gray and dark yellowish brown mottled, no visible bedding, very fine to fine grained.		0.5		34	19.3		27	16	11		
	S	░		46.0		3/3/3								
35	U	▨	(CH) CLAY, silty, trace sand, moist, very stiff, medium to high plasticity, very light gray and dusky red mottled, laminated to thinly bedded, very fine grained, with ocassional interbedded silty sand laminations.		2.5 1.5									
	S	▨	- clay becomes very stiff to hard and light brown below 37'.			3/4/5								
		▨		40.0	2.0		99	30.6	92.1	51	22	29	$1.1x10^{-8}$	

Weaver Consultants Group, LLC

LOG OF BORING: WC-5

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/3/2017
Boring End Date: 1/6/2017
Ground Elevation: 80.0 ft-msl
Northing: 10137147.28
Easting: 4182051.22

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 98' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 32.0 ft-msl

					Field Tests		Laboratory Tests							
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	U	▨	(CL) CLAY, silty, trace sand, moist, very loose to stiff in zones, low to medium plasticity, light brown with very light gray mottling, laminated, very fine grained.		1.5								V	
	S	▨				3/2/4								
45	A	▨			4.5									
	U	▨		32.0	4.5 4.5		63	18.7	110.0	35	17	18		▽
	S	░	(SC-SM) SAND, silty, trace clay, wet, very loose to loose, non-plastic, very light gray, no visible bedding, very fine grained. - sand becomes flowing and very fine to fine grained below 50'.			12/14/13								
50	S	░				3/6/9								
	S	░				3/3/4								
55	S	░	- sand becomes very silty with no clay below 55'.			2/7/10								
	S	░				2/7/11	13			25	18	7		
	S	░												
60	S	░				2/2/8								
	A	░												
65	S	░				1/2/5								
	A	░												
70	S	░				1/3/7								
	A	░												
75	S	░				2/2/5								
	A	░												

Weaver Consultants Group, LLC

LOG OF BORING: WC-5

Project Title: Hardin County Landfill

Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans

Driller: Joseph Ray

Page 3 of 3

Boring Start Date: 1/3/2017
Boring End Date: 1/6/2017
Ground Elevation: 80.0 ft-msl
Northing: 10137147.28
Easting: 4182051.22

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Boring continuously sampled via shelby tube and split spoon samplers. Total borehole depth = 98' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 32.0 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Counts Per 6" of Split Spoon Advancement)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Water Level Elevation Observed at Time of Drilling (ft-msl)
	S	░	SAND, silty, wet (continued).			7/9/12	2							
	A	░												
85		░				5/7/12								
	S	░												
	A	░												
90		░												
				-12.0										
	A	▨	(CL) CLAY, silty, moist, hard, medium to high plasticity, very light gray, no visible bedding, homogenous.											
95		▨			4.0									
	U	▨			4.0									
		▨			4.0		66	17.4	113.9	45	15	30	$2.8x10^{-8}$ V	
	U	▨		-18.0	4.0									
			Total Boring Depth = 98' bgs.											
100														
105														
110														
115														

Weaver Consultants Group, LLC

LOG OF BORING: WCP-5

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date:	1/9/2017	Northing:	10137168.43
Boring End Date:	1/10/2017	Easting:	4182163.42
Ground Elevation:	74.0 ft-msl	T.O.C.:	77.0 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Auger cuttings continuously logged. 2-inch Groundwater piezometer installed in borehole. Total borehole depth = 90' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 34.0 ft-msl
▼ = Static Water Elevation: 45.20 ft-msl

					Field Tests		Laboratory Tests								
Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
5	A A A	░	SAND, silty, moist, very loose to loose, non-plastic, very light gray, no visible bedding, very fine grained, with occasional wood fragment.	66.5											
	A	▨	CLAY, silty, sandy, moist, very stiff to hard, low to high plasticity in zones, dusky red and very light gray mottled, laminated, very fine grained, with occasional wood fragments and iron staining.	64.0											
10 15	A A A	▨	CLAY, silty, trace sand, moist, very stiff to hard, medium to high plasticity, very light gray with pale yellow brown mottling, intermixed, very fine grained, with occasional wood fragment and manganese staining.	56.5											
	A	▨	CLAY, silty, sandy, moist, very stiff, medium to high plasticity, very light gray and dusky red mottled, laminated to thinly bedded, very fine grained.	54.0											
20	A A	░	SAND, silty, trace clay, moist, very stiff to hard, non-plastic to low plasticity, light brown and pale yellow brown mottled, intermixed, very fine to fine grained, occasional wood fragments and manganese and iron staining.	49.0											▽
25	A	░	SAND, trace silt, wet, very loose, non-plastic, very light gray and dark yellowish brown mottled, no visible bedding, very fine to fine grained.	46.5											
30 35	A A A A A	▨	CLAY, silty, trace sand, moist, soft to stiff, low to medium plasticity, light brown with very light gray mottling, laminated, very fine grained.	34.0											▼ ▽

Weaver Consultants Group, LLC

LOG OF BORING: WCP-5

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

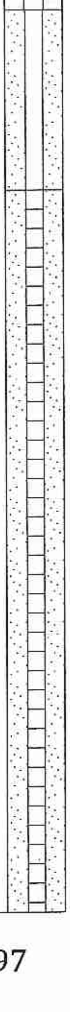
Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date:	1/9/2017	Northing:	10137168.43
Boring End Date:	1/10/2017	Easting:	4182163.42
Ground Elevation:	74.0 ft-msl	T.O.C.:	77.0 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Auger cuttings continuously logged. 2-inch Groundwater piezometer installed in borehole. Total borehole depth = 90' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 34.0 ft-msl
▼ = Static Water Elevation: 45.20 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Field Tests: Hand Penetrometer Test (tsf)	Field Tests: Penetration (Blow Count Per 6" or as noted)	Laboratory Tests: Percent Passing No. 200	Laboratory Tests: Percent Moisture Content	Laboratory Tests: Unit Dry Weight (pcf)	Laboratory Tests: Liquid Limit	Laboratory Tests: Plastic Limit	Laboratory Tests: Plasticity Index	Laboratory Tests: Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	A		SAND, silty, wet, soft to loose, non-plastic, very light gray, no visible bedding, very fine grained.												
	A														
45	A		- sand becomes flowing and very fine to fine grained below 45'.												
	A														
50	A														
	A														
55	A													19.0	
	A														
60	A													14.0	
	A														
65	A														
	A														
70	A														
	A														
75	A														
	A														



Weaver Consultants Group, LLC

LOG OF BORING: WCP-5

Project Title: Hardin County Landfill
Project No: 0771-365-11-07-24

Geologist: Aaron K. Evans
Driller: Joseph Ray

Boring Start Date: 1/9/2017
Boring End Date: 1/10/2017
Ground Elevation: 74.0 ft-msl
Northing: 10137168.43
Easting: 4182163.42
T.O.C.: 77.0 ft-msl

Remarks: Borehole advanced using 8.25" O.D. hollow stem augers. Auger cuttings continuously logged. 2-inch Groundwater piezometer installed in borehole. Total borehole depth = 90' bgs.

▽ = Upper Water Elevation at Time of Drilling: 49.0 ft-msl
▽ = Lower Water Elevation at Time of Drilling: 34.0 ft-msl
▼ = Static Water Elevation: 45.20 ft-msl

Depth (ft)	Samples	Graphic Log	Description	FT MSL	Hand Penetrometer Test (tsf)	Penetration (Blow Count Per 6" or as noted)	Percent Passing No. 200	Percent Moisture Content	Unit Dry Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Hydraulic Conductivity (cm/s) (V=vertical, H=horizontal)	Well Detail Elevations (ft-msl)	Well Detail
	A A		SAND, silty, wet (continued).	-12.0										-11.0	
85	A A		CLAY, silty, moist, hard, medium to high plasticity, very light gray, no visible bedding.	-16.0										-16.0	
90			Total Boring Depth = 90' bgs.												
95															
100															
105															
110															
115															

Field Tests: Hand Penetrometer Test (tsf); Penetration (Blow Count Per 6" or as noted)
Laboratory Tests: Percent Passing No. 200 through Hydraulic Conductivity

APPENDIX IIIG-C

SITE GEOLOGIC DATA

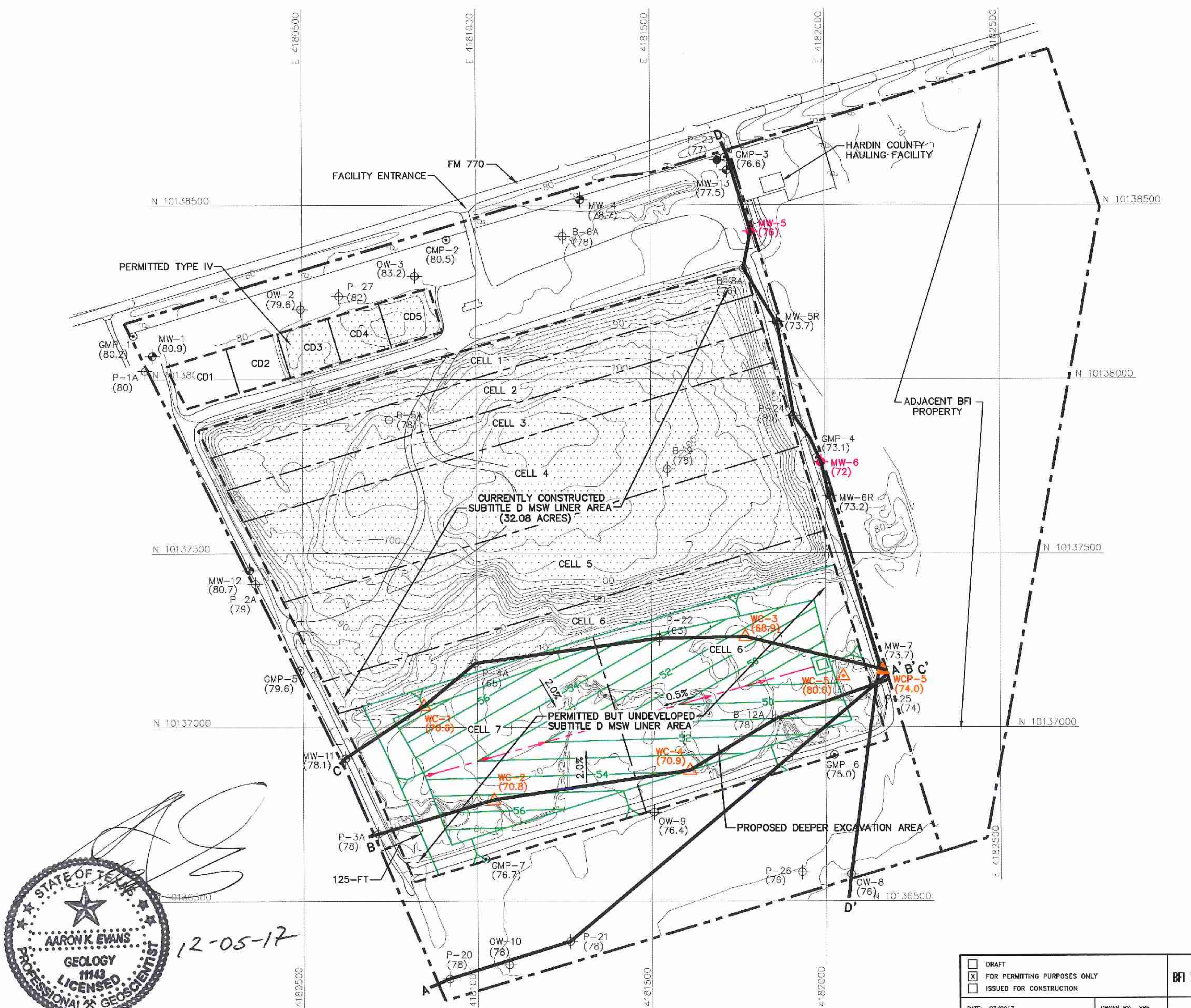
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17



LEGEND

— - — - —	BFI PROPERTY BOUNDARY
— - - —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— - — -	CELL BOUNDARY
—70—	EXISTING CONTOUR
—60—	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
– ▸ – ▸ –	PROPOSED LEACHATE COLLECTION LINE
N 10137500	STATE PLANE COORDINATE GRID
A———A'	GEOLOGIC CROSS SECTION LOCATION
▨	EXISTING SUBTITLE-D LINED AREA
⊕ MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊙ GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
● B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
△ WC-1	WEAVER CONSULTANTS GROUP 2017 EXPANSION BORING WITH SURFACE ELEVATION POSTED IN FT-MSL
▲ WCP-5	WEAVER CONSULTANTS GROUP 2017 EXPANSION PIEZOMETER WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. SWL BOREHOLE AND PIEZOMETER LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM PREVIOUS SUBSURFACE EXPLORATION BOREHOLE LOGS AND INSTALLATION REPORTS.
3. EXISTING WELL AND PROBE LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
4. WEAVER CONSULTANTS GROUP 2017 BOREHOLE AND PIEZOMETER LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON JANUARY 16, 2017.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.

AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-C.1_CROSS SECTION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

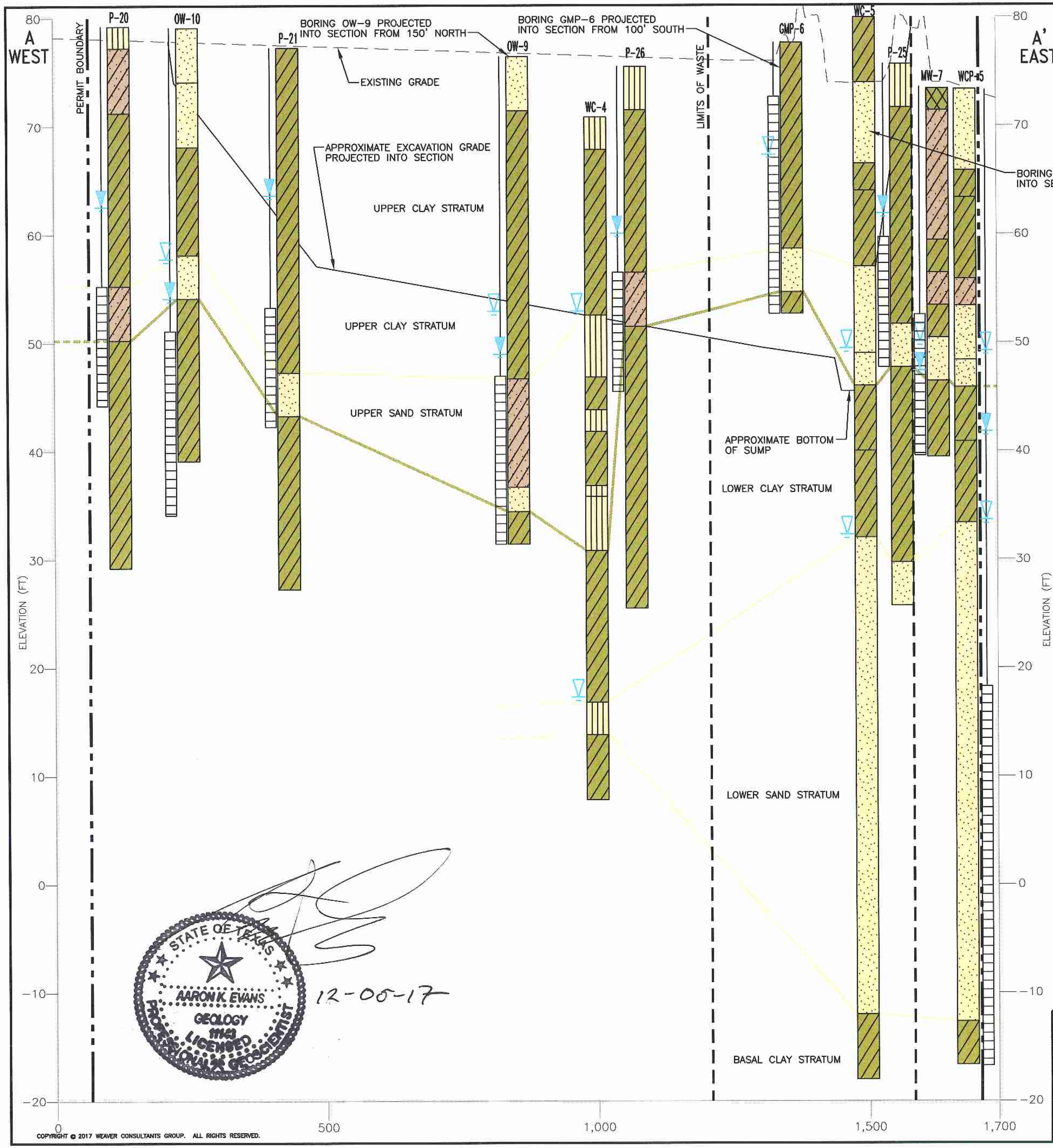
MAJOR PERMIT AMENDMENT GEOLOGIC CROSS-SECTION INDEX MAP

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

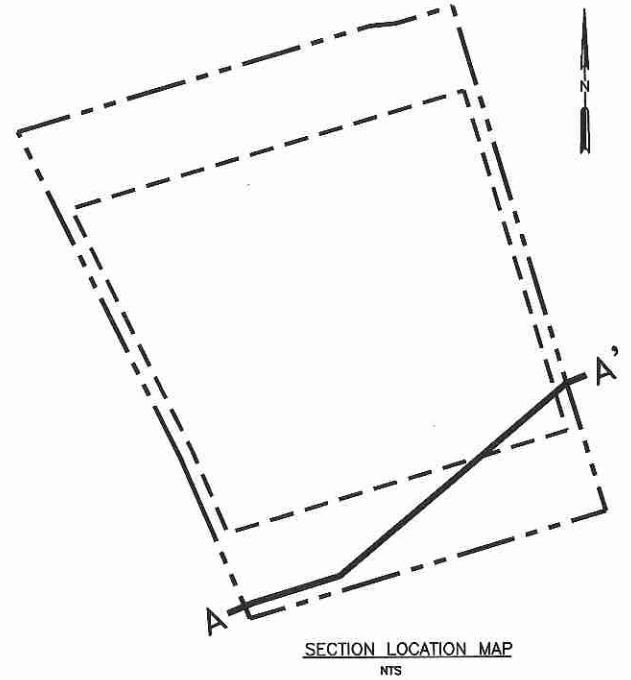
FIGURE IIIG-C.1

O:\0120\758\2214B EXPANSION\IIIG\IIIG-C.1_GEOLOGIC CROSS SECTION INDEX MAP.dwg, 11/15/2017 1:42:32 PM, rsellers, 1:2



AARON K. EVANS

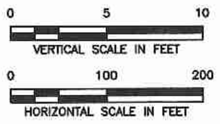
12-05-17



SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- ▥ SILT, CLAYEY SILT, OR SANDY SILT
- ▨ CLAY OR SILTY CLAY
- ░ SAND, SILTY SAND, OR CLAYEY SAND
- ▨ SANDY CLAY
- ▩ EARTHEN FILL
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREENED INTERVAL (BOTTOM)
- ▽ STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER GAUGING DATA
- ▽ GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)



NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND IIIG-C.1.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.2 FT-MSL.
4. BORINGS GMP-6, OW-9, AND WC-5 PROJECTED INTO LINE OF SECTION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-C.2_CROSS SECTION A.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

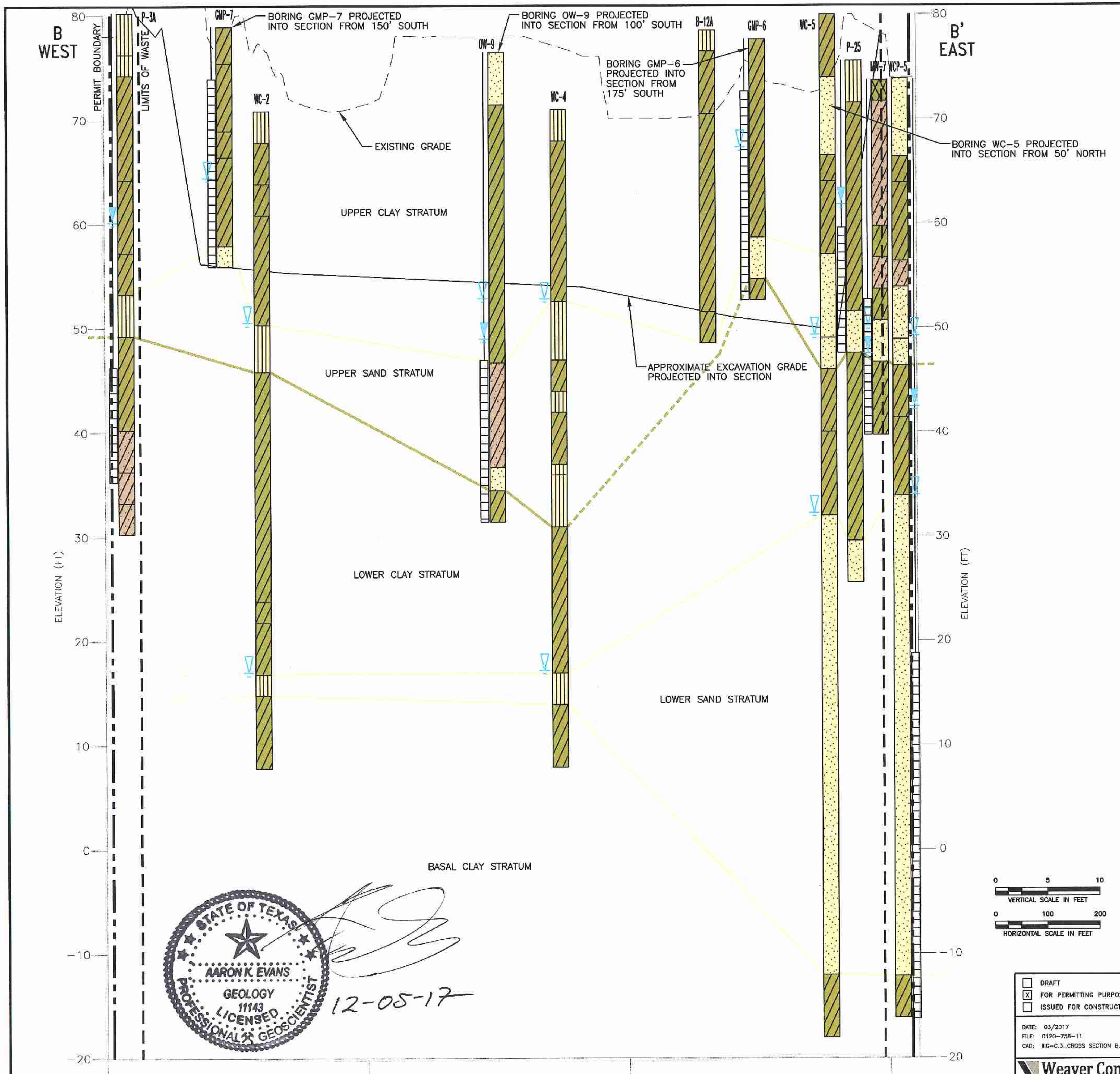
MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS-SECTION A-A'

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

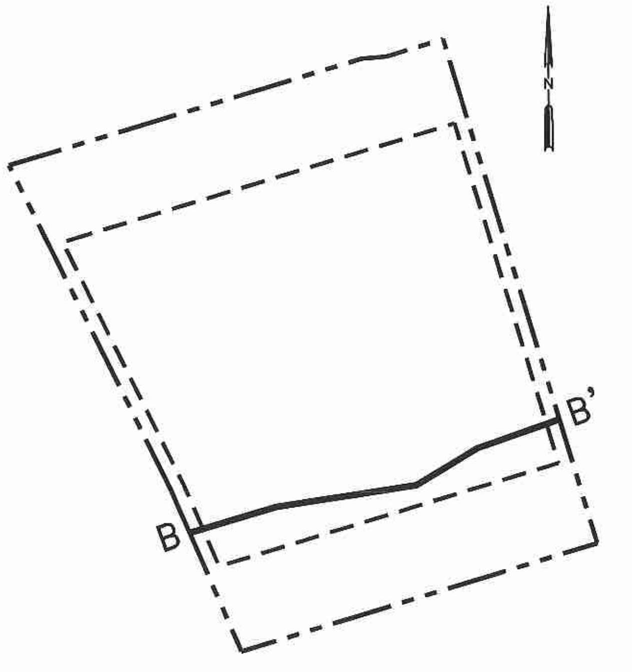
FIGURE IIIG-C.2

O:\0120\758\2214B EXPANSION\IIIG\IIIG-C.2_SECTION A-A'.dwg, 11/15/2017 1:43:05 PM, rsellers, 1:2



AARON K. EVANS
GEOLOGY
11143

12-05-17



SECTION LOCATION MAP
NTS

LEGEND

— · — · —	PERMIT BOUNDARY
— — —	PERMITTED LIMITS OF WASTE
▥	SILT, CLAYEY SILT, OR SANDY SILT
▨	CLAY OR SILTY CLAY
░	SAND, SILTY SAND, OR CLAYEY SAND
▩	EARTHEN FILL
▨	SANDY CLAY
▤	MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREENED INTERVAL (BOTTOM)
▽	STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER GAUGING DATA
▽	GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND IIIG-C.1.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.2 FT-MSL.
4. BORINGS GMP-6, GMP-7, OW-9, AND WC-5 PROJECTED INTO LINE OF SECTION.

0 5 10
VERTICAL SCALE IN FEET

0 100 200
HORIZONTAL SCALE IN FEET

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-C.3_CROSS SECTION B.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

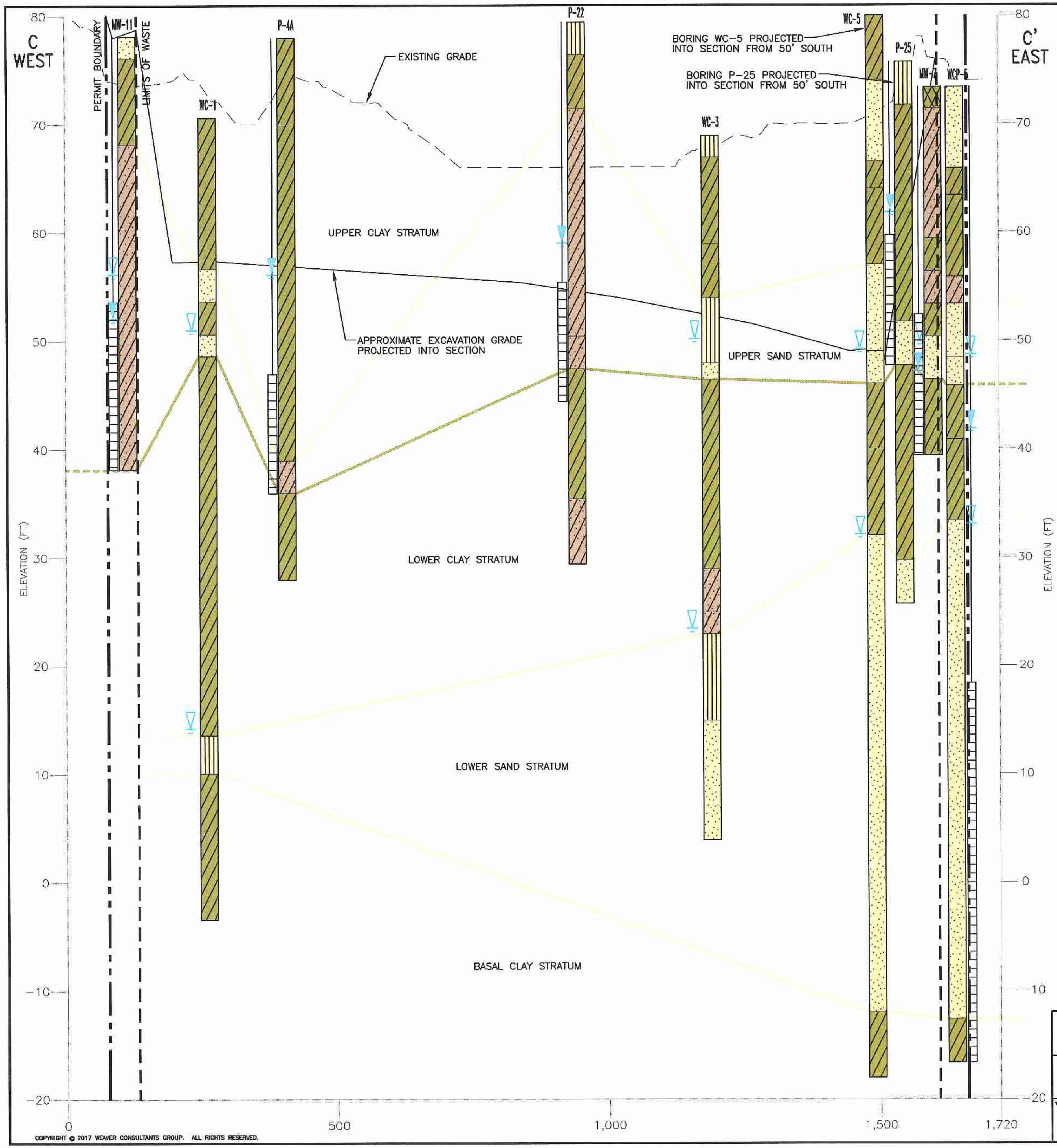
MAJOR PERMIT AMENDMENT GEOLOGIC CROSS-SECTION B-B'

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

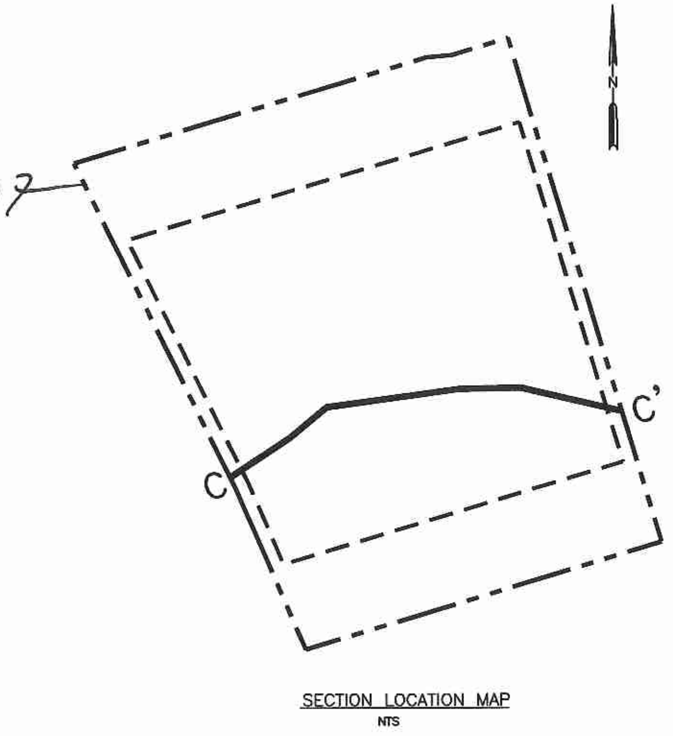
WWW.WCGRP.COM

FIGURE IIIG-C.3

O:\0120\758\2214B EXPANSION\IIIG\IIIG-C.3_SECTION B-B'.dwg, 11/15/2017 1:43:24 PM, rsellers, 1:2



AARON K. EVANS
11143
12-05-17



SECTION LOCATION MAP
NTS

LEGEND

— · —	PERMIT BOUNDARY
— — —	PERMITTED LIMITS OF WASTE
▥	SILT, CLAYEY SILT, OR SANDY SILT
▨	CLAY OR SILTY CLAY
⁘	SAND, SILTY SAND, OR CLAYEY SAND
▩	EARTHEN FILL
▨	SANDY CLAY
⊟	MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREENED INTERVAL (BOTTOM)
▽	STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER GAUGING DATA
▽	GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

0 5 10
VERTICAL SCALE IN FEET

0 100 200
HORIZONTAL SCALE IN FEET

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND IIIG-C.1.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.2 FT-MSL.
4. BORINGS P-25 AND WC-5 PROJECTED INTO LINE OF SECTION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-C.4_CROSS SECTION C.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

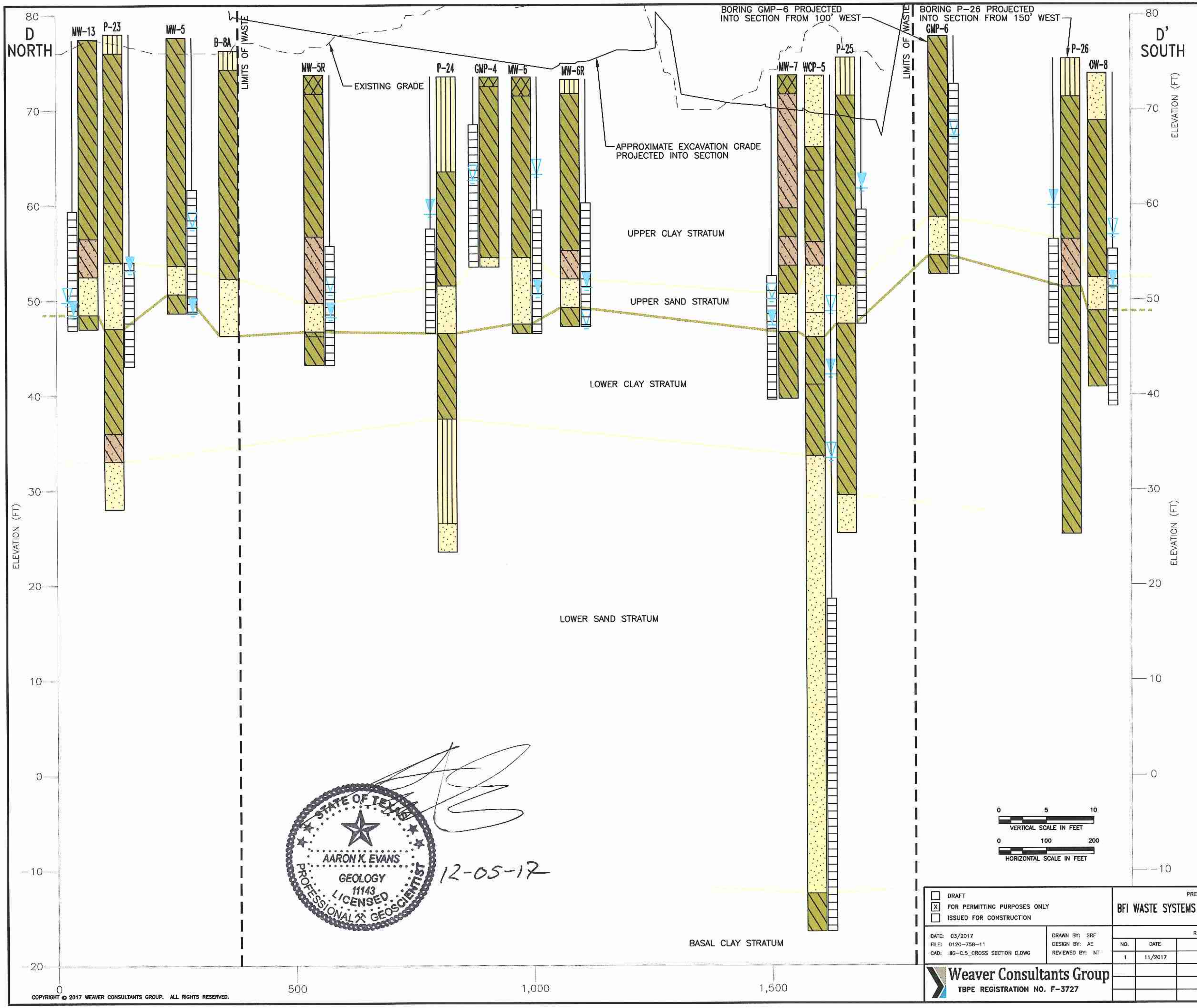
NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS-SECTION C-C'

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

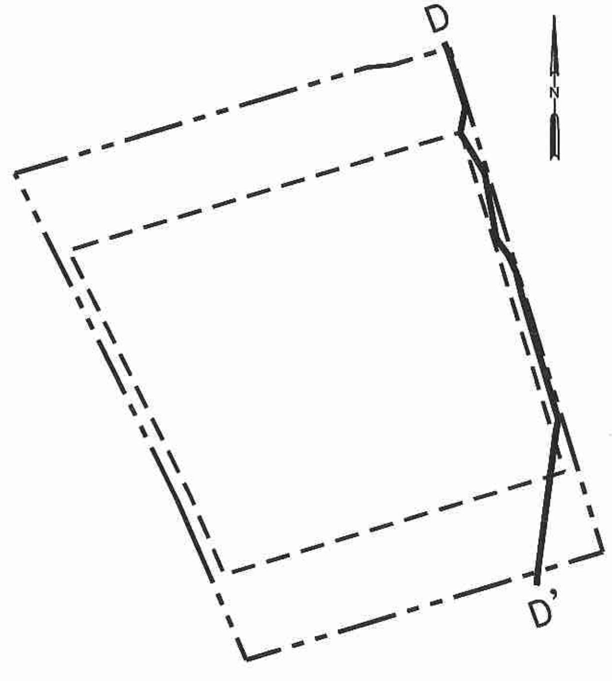
WWW.WCGRP.COM

FIGURE IIIG-C.4



AARON K. EVANS
GEOLOGY
11143

12-05-17



SECTION LOCATION MAP
NTS

LEGEND

— · — · —	PERMIT BOUNDARY
— — — —	PERMITTED LIMITS OF WASTE
▥	SILT, CLAYEY SILT, OR SANDY SILT
▨	CLAY OR SILTY CLAY
░	SAND, SILTY SAND, OR CLAYEY SAND
▩	EARTHEN FILL
▧	SANDY CLAY
▤	MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREENED INTERVAL (BOTTOM)
▼	STATIC GROUNDWATER ELEVATION (FT−MSL) FROM GROUNDWATER GAUGING DATA
▽	GROUNDWATER ELEVATION AT TIME OF DRILLING (FT−MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND IIIG−C.1.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.2 FT−MSL.
4. BORINGS GMP−6 AND P−26 PROJECTED INTO LINE OF SECTION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120−758−11
CAD: IIIG−C.5_CROSS SECTION D.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F−3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

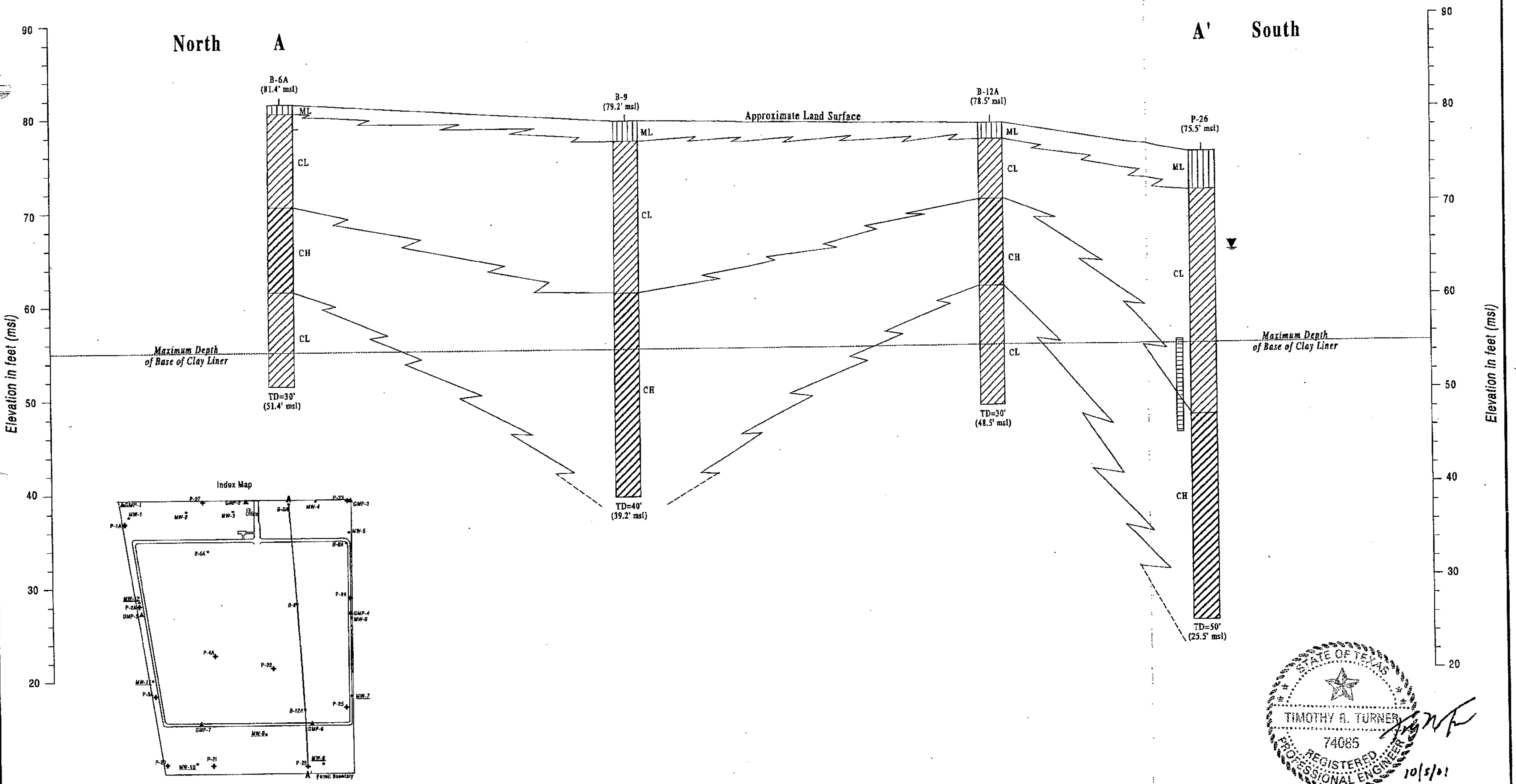
MAJOR PERMIT AMENDMENT GEOLOGIC CROSS−SECTION D−D'

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG−C.5

2001 HYDREX ENVIRONMENTAL GEOLOGIC CROSS SECTIONS



▨	CH
▨	CL
▥	ML
▨	SC
▦	SM

B-23 Soil Boring Number
MW-4 Monitor Well Number
P-7 Piezometer Number
(229.3) (Surface elevation in feet above Mean Sea Level)
Screened Interval
▼ Water Levels in Piezometers (May 20, 1992)

0 200
Feet

TIMOTHY R. TURNER
74085
10/5/01
exp 12/31/01

Hydrex
ENVIRONMENTAL, INC.
1128 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Hardin County
Municipal Solid Waste Landfill
Hardin County, Texas
Permit No. MSW 2214A

Attachment #4

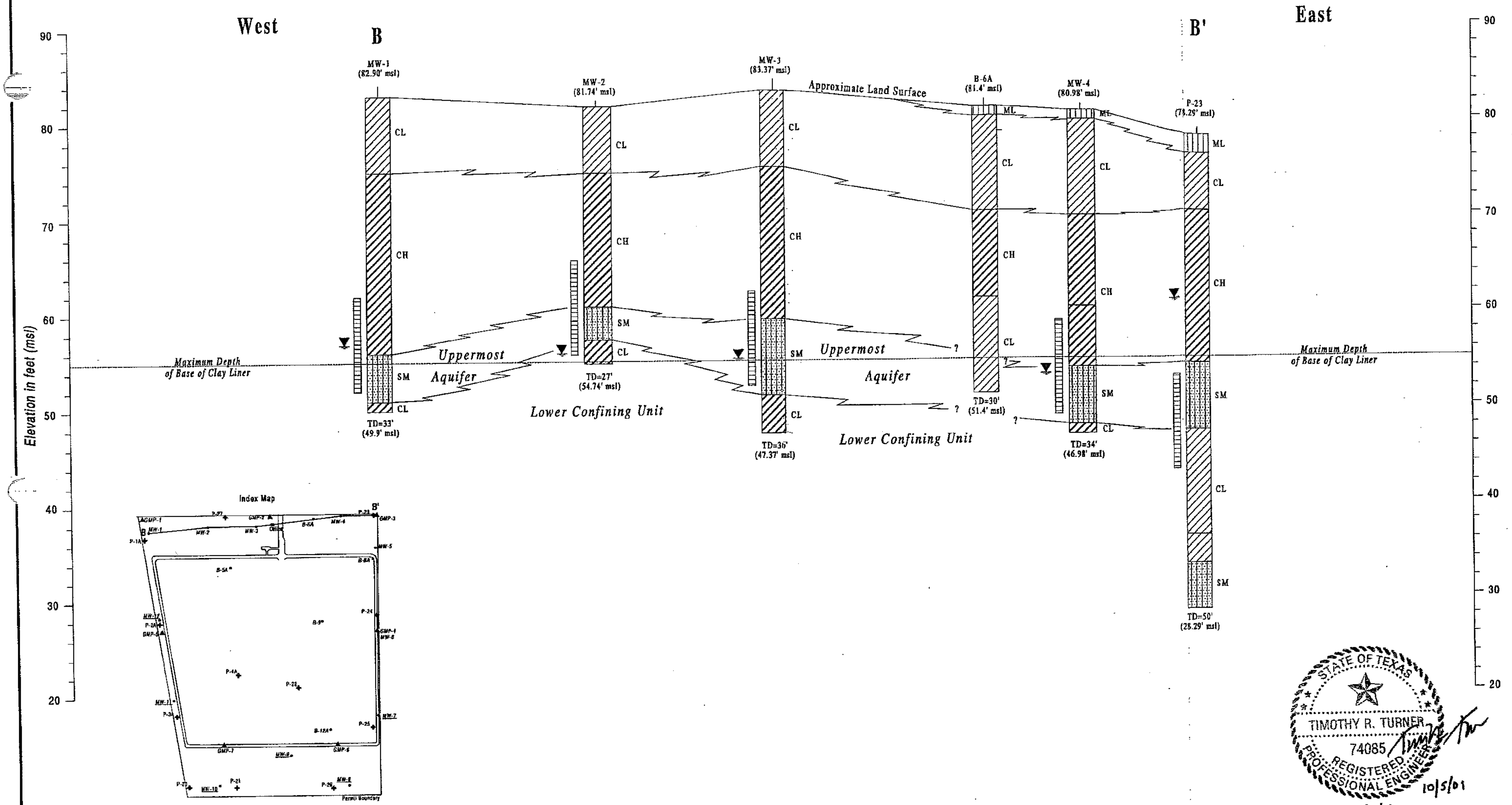
Sept. 2001

Project No.
L-01-338

Revision No. 0

Figure A-8

Geologic Cross Section
A - A'



▨ CH

▨ CL

▥ ML

▨ SC

▦ SM

MW-4 Monitor Well Number
P-7 Piezometer Number
(229.3) (Surface elevation in feet above Mean Sea Level)

▯ Screened Interval

▼ Water Levels in Piezometers (May 20, 1992)

▼ Water Levels in Monitor Wells (July 9, 2001)

0 200
Feet

TIMOTHY R. TURNER
74085

10/5/01

ovp 12/31/02

Hydrex ENVIRONMENTAL, INC. 1128 NW Stallings Drive Nacogdoches, Texas 75964 (936) 568-9451 Fax (936) 568-9527	Hardin County Municipal Solid Waste Landfill Hardin County, Texas Permit No. MSW 2214A	Attachment #4	Project No. L-01-338	Figure A-9
		Sept. 2001	Revision No. 0	Geologic Cross Section B - B'

APPENDIX IIIG-D

SITE HYDROGEOLOGIC DATA

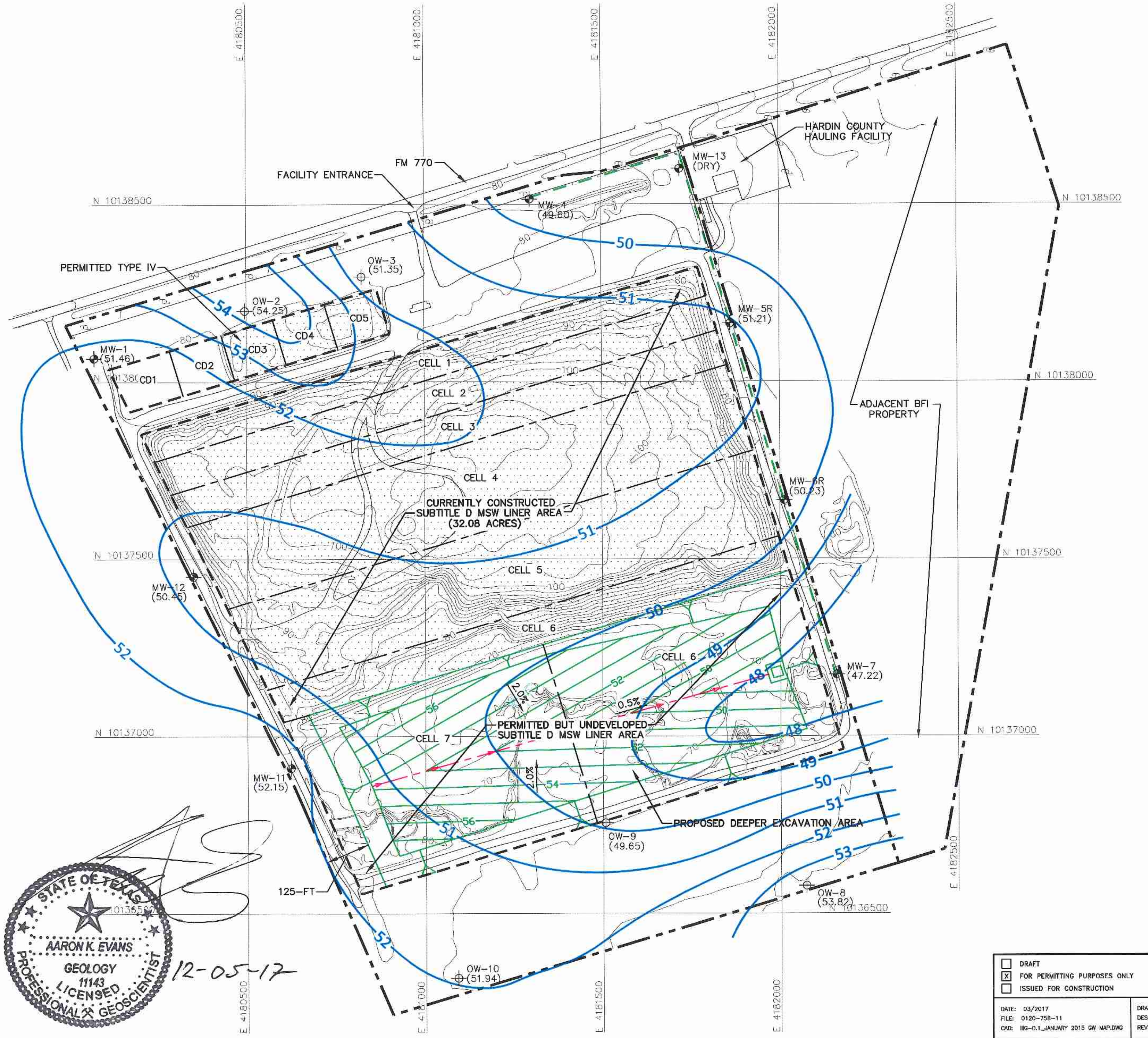
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17



LEGEND

— · — · —	BFI PROPERTY BOUNDARY
— — · — —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — — —	CELL BOUNDARY
——70——	EXISTING CONTOUR
——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
— → — →	PROPOSED LEACHATE COLLECTION LINE
——55——	GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
⊕ MW-1 (51.46)	EXISTING GROUNDWATER MONITOR WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
⊕ OW-2 (54.25)	EXISTING GROUNDWATER OBSERVATION WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
— · — · —	PERMITTED POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
3. GROUNDWATER ELEVATIONS OBTAINED FROM HYDREX ENVIRONMENTAL INC., MEASURED ON JANUARY 6, 2015.
4. GROUNDWATER ELEVATION CONTOURS SHOWN ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS INDICATED. ACTUAL GROUNDWATER ELEVATIONS BETWEEN MEASUREMENT LOCATIONS MAY VARY FROM THOSE ILLUSTRATED.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
7. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED PROFESSIONAL GEOSCIENTIST

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-D.1_JANUARY 2015 GW MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

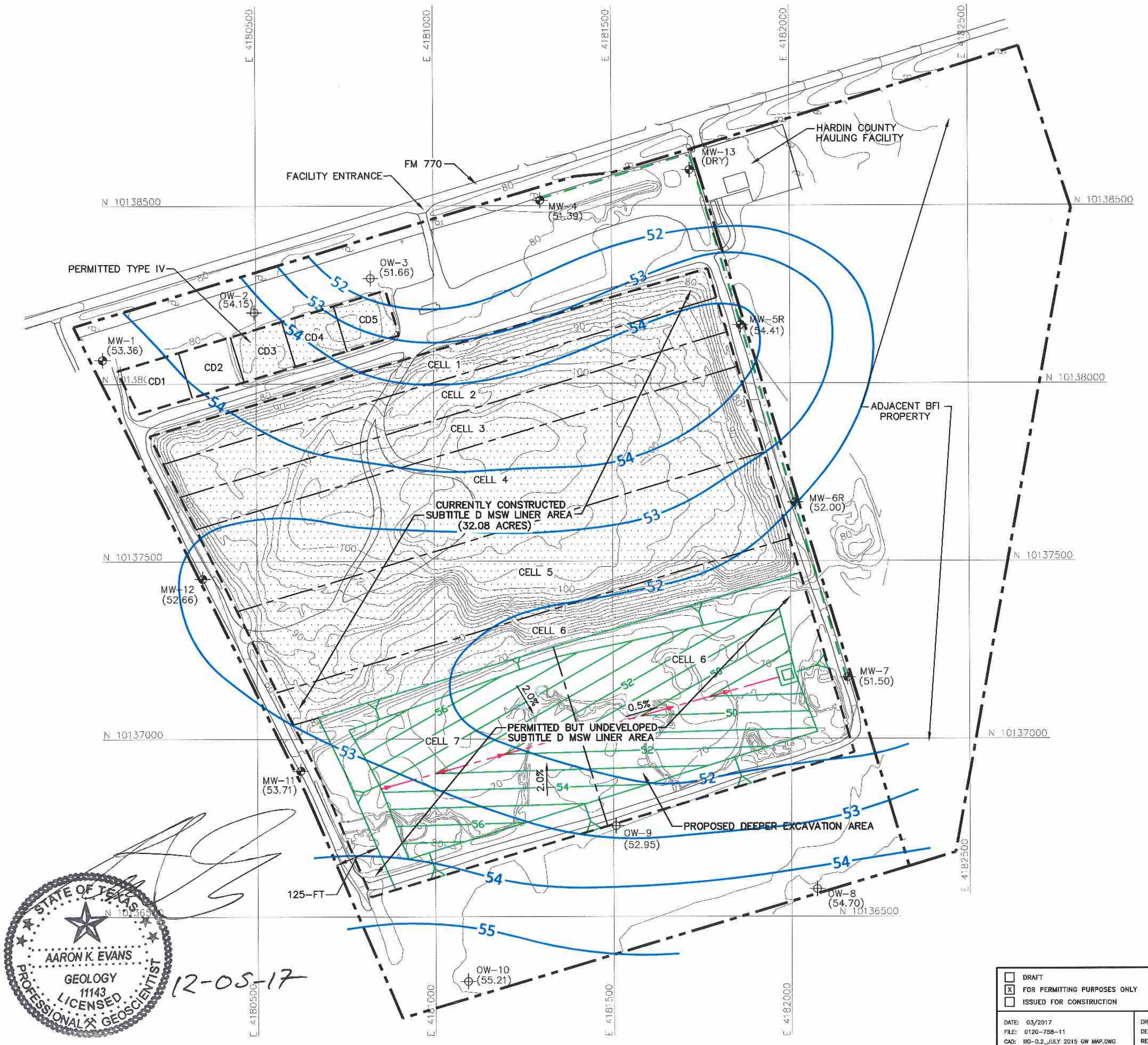
MAJOR PERMIT AMENDMENT GROUNDWATER CONTOUR MAP JANUARY 6, 2015

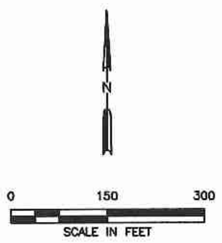
HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-D.1

O:\0120\758\2214B EXPANSION\IIIG\IIIG-D.1_JANUARY 2015 GW MAP.dwg, 11/15/2017 1:45:04 PM, rsellers, 1:2





LEGEND

— · — · —	BFI PROPERTY BOUNDARY
— — · — —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — — —	CELL BOUNDARY
——70——	EXISTING CONTOUR
——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
— → — →	PROPOSED LEACHATE COLLECTION LINE
——55——	GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1 (53.36)	EXISTING GROUNDWATER MONITOR WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
OW-2 (54.15)	EXISTING GROUNDWATER OBSERVATION WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
— · — · —	PERMITTED POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
3. GROUNDWATER ELEVATIONS OBTAINED FROM HYDREX ENVIRONMENTAL INC., MEASURED ON JULY 20, 2015.
4. GROUNDWATER ELEVATION CONTOURS SHOWN ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS INDICATED. ACTUAL GROUNDWATER ELEVATIONS BETWEEN MEASUREMENT LOCATIONS MAY VARY FROM THOSE ILLUSTRATED.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
7. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-D.2_JULY 2015 GW MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

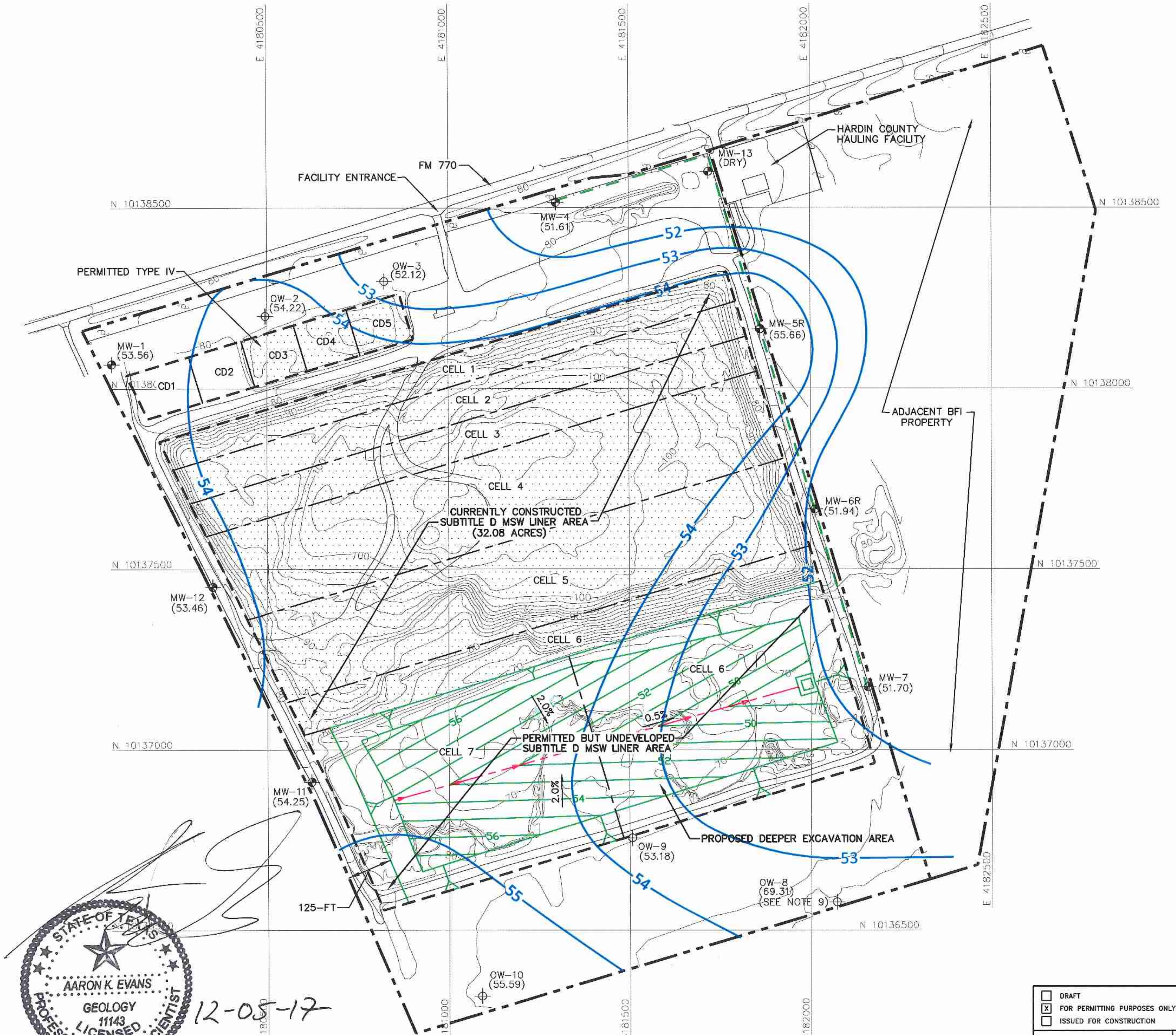
MAJOR PERMIT AMENDMENT GROUNDWATER CONTOUR MAP JULY 20, 2015

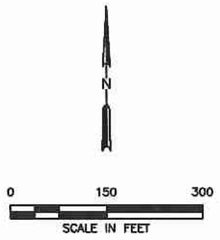
HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-D.2

O:\0120\758\2214B EXPANSION\IIIG\IIIG-D.2_JULY 2015 GW MAP.dwg, 11/15/2017 1:46:20 PM, rsellers, 1:2





LEGEND

— · — · —	BFI PROPERTY BOUNDARY
— · · —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— - —	CELL BOUNDARY
—— 70 ——	EXISTING CONTOUR
—— 60 ——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
– → – →	PROPOSED LEACHATE COLLECTION LINE
—— 55 ——	GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1 (53.56)	EXISTING GROUNDWATER MONITOR WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
OW-2 (54.22)	EXISTING GROUNDWATER OBSERVATION WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
— · — · —	PERMITTED POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
3. GROUNDWATER ELEVATIONS OBTAINED FROM HYDREX ENVIRONMENTAL INC., MEASURED ON JANUARY 25, 2016.
4. GROUNDWATER ELEVATION CONTOURS SHOWN ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS INDICATED. ACTUAL GROUNDWATER ELEVATIONS BETWEEN MEASUREMENT LOCATIONS MAY VARY FROM THOSE ILLUSTRATED.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
7. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.
8. OBSERVATION WELL OW-8 GROUNDWATER ELEVATION OF 69.31 FT-MSL IS SIGNIFICANTLY HIGHER THAN HISTORICAL ELEVATIONS IN THIS WELL AND ACROSS THE SITE. THIS ANOMALOUS VALUE WAS NOT USED IN CONTOURING.

AARON K. EVANS
GEOLOGY
11143
12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-D.3_JANUARY 2016 GW MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT
GROUNDWATER CONTOUR MAP
JANUARY 25, 2016

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-D.3

O:\0120\758\2214B EXPANSION\IIIG\IIIG-D.3_JANUARY 2016 GW MAP.dwg, 11/15/2017 1:47:14 PM, rsellers, 1:2

LEGEND

— · — · —	BFI PROPERTY BOUNDARY
— · · —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — —	CELL BOUNDARY
····70····	EXISTING CONTOUR
—60—	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
- → - →	PROPOSED LEACHATE COLLECTION LINE
—55—	GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1 (55.94)	EXISTING GROUNDWATER MONITOR WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
OW-2 (55.32)	EXISTING GROUNDWATER OBSERVATION WELL WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
— · — · —	PERMITTED POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
3. GROUNDWATER ELEVATIONS OBTAINED FROM HYDREX ENVIRONMENTAL INC., MEASURED ON JULY 12, 2016.
4. GROUNDWATER ELEVATION CONTOURS SHOWN ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS INDICATED. ACTUAL GROUNDWATER ELEVATIONS BETWEEN MEASUREMENT LOCATIONS MAY VARY FROM THOSE ILLUSTRATED.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
7. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

AARON K. EVANS
GEOLOGY
11143

12-05-17

O:\0120\758\2214B EXPANSION\IIIG\IIIG-D.4_JULY 2016 GW MAP.dwg, 11/15/2017 1:48:05 PM, rsellers, 1:2

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-D.4_JULY 2016 GW MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

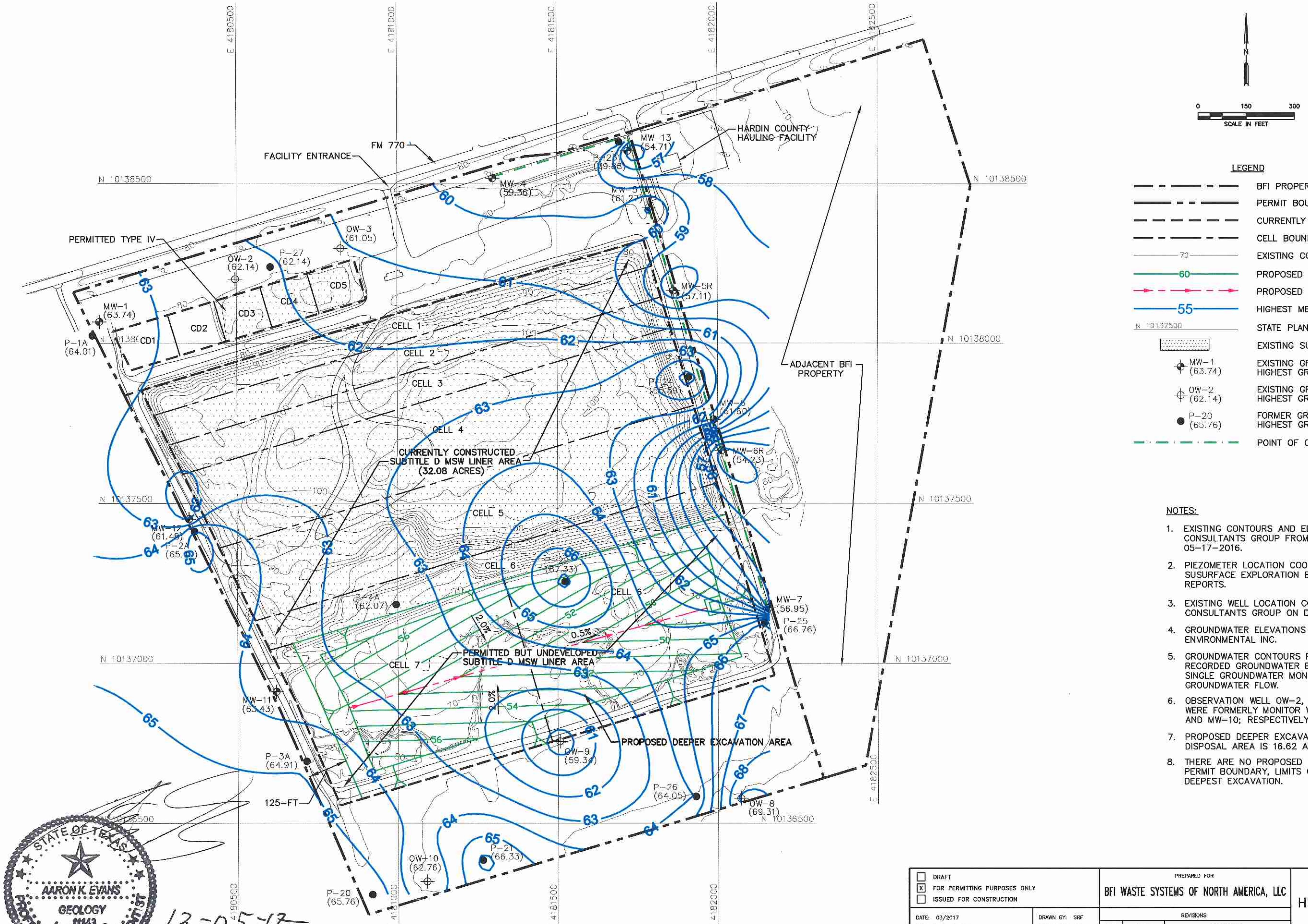
NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT GROUNDWATER CONTOUR MAP JULY 12, 2016

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-D.4



LEGEND

	BFI PROPERTY BOUNDARY
	PERMIT BOUNDARY
	CURRENTLY PERMITTED LIMITS OF WASTE
	CELL BOUNDARY
70	EXISTING CONTOUR
60	PROPOSED EXCAVATION CONTOUR (SEE NOTE 7)
	PROPOSED LEACHATE COLLECTION LINE
55	HIGHEST MEASURED GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1 (63.74)	EXISTING GROUNDWATER MONITOR WELL WITH MEASURED HIGHEST GROUNDWATER ELEVATION POSTED IN FT-MSL
OW-2 (62.14)	EXISTING GROUNDWATER OBSERVATION WELL WITH MEASURED HIGHEST GROUNDWATER ELEVATION POSTED IN FT-MSL
● P-20 (65.76)	FORMER GROUNDWATER PIEZOMETER WITH MEASURED HIGHEST GROUNDWATER ELEVATION POSTED IN FT-MSL
	POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. PIEZOMETER LOCATION COORDINATES OBTAINED FROM PREVIOUS SUSURFACE EXPLORATION BOREHOLE LOGS AND INSTALLATION REPORTS.
3. EXISTING WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
4. GROUNDWATER ELEVATIONS MEASURED BY SWL AND HYDREX ENVIRONMENTAL INC.
5. GROUNDWATER CONTOURS PRODUCED USING EACH WELL'S HIGHEST RECORDED GROUNDWATER ELEVATION AND DO NOT REPRESENT A SINGLE GROUNDWATER MONITORING EVENT OR ACTUAL GROUNDWATER FLOW.
6. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
7. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
8. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIG-D.5_GW MONITORING SYSTEM.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

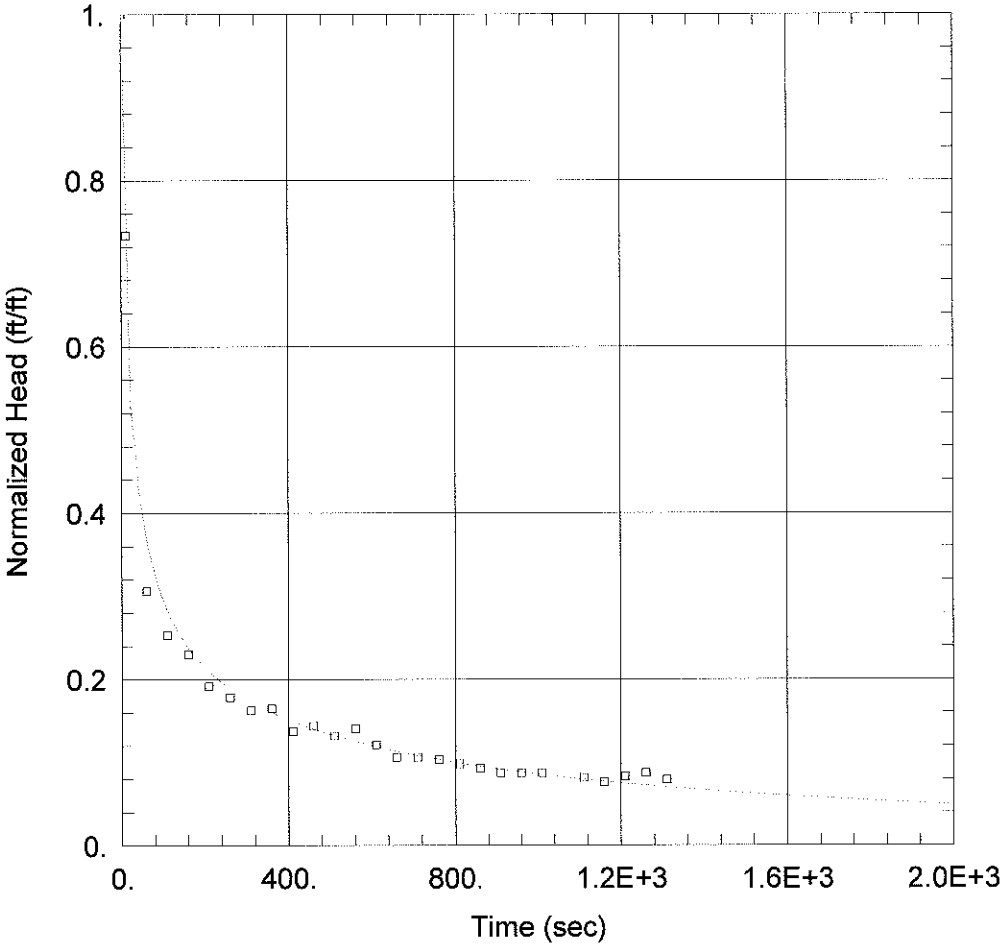
NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT HIGHEST MEASURED GROUNDWATER CONTOUR MAP

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-D.5



WELL TEST ANALYSIS

Data Set: P:\Groundwater\IESI\Hardin County\Expansion 2016\Slugs\MW-7 (2).aqt
Date: 01/24/17 Time: 17:14:52

PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Hardin County Landfill
Project: 0771-365-11-07-24
Test Well: MW-7
Test Date: January 9, 2017

AQUIFER DATA

Saturated Thickness: 3. ft

WELL DATA (MW-7)

Initial Displacement: 1.47 ft
Total Well Penetration Depth: 34. ft
Casing Radius: 0.166 ft
Well Skin Radius: 1. ft

Static Water Column Height: 9.14 ft
Screen Length: 10. ft
Well Radius: 0.6875 ft

SOLUTION

Aquifer Model: Unconfined

Kr = 0.0003025 cm/sec
Kz/Kr = 1.
Ss' = 0.03901 ft^{-1}

Solution Method: KGS Model w/skin

Ss = 0.03333 ft^{-1}
Kr' = 0.0006628 cm/sec
Kz/Kr' = 1.

1991 SWL PIEZOMETER WATER LEVEL DATA

TABLE 1
WATER LEVEL READINGS
Hardin County Landfill
Hardin County, Texas

PIEZOMETER	# 1A		# 2A		# 3A		# 4A		# 20		# 21	
CASING ELEV.	85.81	msl	84.21	msl	83.13	msl	81.34	msl	82.06	msl	79.30	msl
DATE	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.
2-12-91	31.06	54.75	28.90	55.31	28.10	55.03	28.44	52.90	26.20	55.86	24.30	55.00
2-19-91	31.05	54.76	28.87	55.34	27.90	55.23	28.25	53.09	25.87	56.19	23.95	55.35
2-26-91	30.90	54.91	28.63	55.58	27.75	55.38	28.09	53.25	25.72	56.34	23.65	55.65
3-05-91	30.50	55.31	28.17	56.04	27.30	55.83	27.76	53.58	25.17	56.89	23.00	56.30
3-12-91	30.23	55.58	27.95	56.26	27.13	56.00	27.68	53.66	24.95	57.11	22.71	56.59
3-19-91	30.35	55.46	28.05	56.16	27.00	56.13	27.47	53.87	24.73	57.33	22.48	56.82
3-26-91	30.10	55.71	27.75	56.46	26.75	56.38	27.31	54.03	24.40	57.66	22.15	57.15
4-02-91	29.82	55.99	27.55	56.66	26.53	56.60	27.05	54.29	24.20	57.86	21.76	57.54
4-09-91	29.75	56.06	27.23	56.98	26.05	57.08	26.83	54.51	23.69	58.37	21.36	57.94
4-16-91	29.52	56.29	26.94	57.27	25.55	57.58	26.54	54.80	23.25	58.81	20.94	58.36
4-23-91	29.22	56.59	26.55	57.66	25.13	58.00	26.26	55.08	22.81	59.25	20.46	58.84
4-29-91	29.24	56.57	26.54	57.67	24.93	58.20	26.13	55.21	22.52	59.54	20.30	59.00
5-07-91	28.98	56.83	26.20	58.01	24.65	58.48	25.93	55.41	22.32	59.74	20.05	59.25
5-14-91	28.50	57.31	25.54	58.67	24.13	59.00	25.63	55.71	21.83	60.23	19.55	59.75
5-21-91	28.25	57.56	25.03	59.18	23.58	59.55	25.19	56.15	21.30	60.76	19.00	60.30
5-28-91	28.10	57.71	24.84	59.37	23.35	59.78	24.97	56.37	21.00	61.06	18.80	60.50
6-04-91	27.72	58.09	24.44	59.77	23.00	60.13	24.66	56.68	20.65	61.41	18.48	60.82
6-11-91	27.50	58.31	24.20	60.01	22.68	60.45	24.33	57.01	20.35	61.71	18.25	61.05
6-18-91	27.20	58.61	23.80	60.41	22.38	60.75	24.00	57.34	20.00	62.06	17.90	61.40
6-25-91	27.00	58.81	23.50	60.71	22.05	61.08	23.82	57.52	19.75	62.31	17.65	61.65
7-02-91	26.77	59.04	23.20	61.01	21.74	61.39	23.51	57.83	19.46	62.60	17.45	61.85
7-09-91	26.49	59.32	22.87	61.34	21.44	61.69	23.25	58.09	19.20	62.86	17.13	62.17
7-16-91	26.30	59.51	22.65	61.56	21.20	61.93	23.00	58.34	19.00	63.06	16.90	62.40
7-23-91	26.20	59.61	22.55	61.66	21.13	62.00	22.90	58.44	18.85	63.21	16.93	62.37
7-30-91	26.05	59.76	22.42	61.79	21.05	62.08	22.74	58.60	18.79	63.27	16.92	62.38
8-06-91	26.14	59.67	22.47	61.74	21.12	62.01	22.80	58.54	18.85	63.21	17.12	62.18
8-14-91	26.05	59.76	22.39	61.82	21.10	62.03	22.66	58.68	18.95	63.11	17.20	62.10
8-20-91	26.05	59.76	22.27	61.94	21.05	62.08	22.75	58.59	18.90	63.16	17.10	62.20
8-27-91	25.94	59.87	22.13	62.08	20.97	62.16	22.70	58.64	18.83	63.23	17.00	62.30
9-03-91	25.81	60.00	21.98	62.23	20.83	62.30	22.54	58.80	18.69	63.37	16.80	62.50
9-10-91	25.70	60.11	21.82	62.39	20.65	62.48	22.46	58.88	18.55	63.51	16.69	62.61
9-18-91	25.44	60.37	21.60	62.61	20.47	62.66	22.22	59.12	18.34	63.72	16.37	62.93

TABLE 1
WATER LEVEL READINGS
Hardin County Landfill
Hardin County, Texas

PIEZOMETER	# 1A		# 2A		# 3A		# 4A		# 20		# 21	
CASING ELEV.	85.81	msl	84.21	msl	83.13	msl	81.34	msl	82.06	msl	79.30	msl
DATE	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.
9-24-91	25.24	60.57	21.48	62.73	20.40	62.73	22.16	59.18	18.26	63.80	16.30	63.00
10-01-91	25.21	60.60	21.50	62.71	20.44	62.69	22.15	59.19	18.25	63.81	16.31	62.99
10-08-91	25.48	60.33	21.83	62.38	20.68	62.45	22.25	59.09	18.45	63.61	16.61	62.69
10-15-91	25.52	60.29	22.00	62.21	20.85	62.28	22.40	58.94	18.65	63.41	16.90	62.40
10-22-91	25.87	59.94	22.36	61.85	21.24	61.89	22.63	58.71	19.00	63.06	-	-
10-29-91	26.15	59.66	22.68	61.53	21.55	61.58	22.80	58.54	19.37	62.69	16.69	62.61
11-05-91	26.45	59.36	22.88	61.33	21.81	61.32	23.15	58.19	19.70	62.36	16.92	62.38
11-12-91	26.52	59.29	22.80	61.41	21.83	61.30	23.18	58.16	19.75	62.31	16.85	62.45
11-19-91	26.25	59.56	22.55	61.66	21.64	61.49	23.05	58.29	19.61	62.45	16.64	62.66
11-26-91	26.33	59.48	22.58	61.63	21.60	61.53	23.10	58.24	19.64	62.42	16.60	62.70
12-02-91	26.30	59.51	22.39	61.82	21.48	61.65	22.95	58.39	19.50	62.56	16.35	62.95
12-10-91	25.87	59.94	22.25	61.96	21.30	61.83	22.81	58.53	19.30	62.76	16.04	63.26
12-17-91	25.69	60.12	22.10	62.11	21.15	61.98	22.64	58.70	19.17	62.89	16.01	63.29
12-31-91	24.90	60.91	21.55	62.66	20.65	62.48	22.10	59.24	18.60	63.46	15.24	64.06
1-06-92	24.55	61.26	21.25	62.96	20.35	62.78	21.72	59.62	18.30	63.76	14.95	64.35
1-13-92	24.25	61.56	21.00	63.21	20.17	62.96	21.58	59.76	18.11	63.95	14.80	64.50
1-22-92	23.70	62.11	20.60	63.61	19.85	63.28	21.25	60.09	17.78	64.28	14.31	64.99
1-29-92	23.45	62.36	20.40	63.81	19.60	63.53	21.00	60.34	17.65	64.41	14.32	64.98
2-11-92	22.75	63.06	19.82	64.39	19.20	63.93	20.52	60.82	17.25	64.81	13.83	65.47
2-24-92	22.54	63.27	19.61	64.60	19.00	64.13	20.31	61.03	17.05	65.01	13.61	65.69
3-01-92	22.37	63.44	19.38	64.83	18.80	64.33	20.00	61.34	16.85	65.21	13.43	65.87 66.00
3-08-92	22.00	63.81	19.06	65.15	18.52	64.61 64.47	20.11	61.23 61.60	16.60	65.46 65.48	13.51	65.79
3-16-92	21.80	64.01 63.82	18.85	65.36 65.20	18.47	64.66	19.60	61.74	16.53	65.53	13.15	66.15
3-24-92	21.90	63.91	18.91	65.30	18.40	64.73	19.54	61.80	16.48	65.58	13.22	66.08
3-31-92	21.87	63.94	18.84	65.37	18.35	64.78	19.45	61.89	16.44	65.62	13.16	66.14
4-07-92	21.83	63.98	18.74	65.47	18.25	64.88	19.34	62.00	16.38	65.68	12.97	66.33
4-14-92	21.82	63.99	18.72	65.49	18.22	64.91	19.34	62.00	16.35	65.71	13.03	66.27
4-21-92	21.85	63.96	18.75	65.46	18.24	64.89	19.27	62.07	16.30	65.76	13.13	66.17
4-29-92	22.10	63.71	19.00	65.21	18.45	64.68	19.43	61.91	16.54	65.52	13.43	65.87
5-06-92	22.49	63.32	19.19	65.02	18.62	64.51	19.58	61.76	16.64	65.42	13.55	65.75
5-13-92	22.68	63.13	19.31	64.90	18.72	64.41	19.75	61.59	16.84	65.22	13.75	65.55
5-20-92	23.00	62.81	19.61	64.60	18.93	64.20	19.79	61.55	17.00	65.06	13.96	65.34

TABLE 1
WATER LEVEL READINGS
Hardin County Landfill
Hardin County, Texas

PIEZOMETER	# 22		# 23		# 24		# 25		# 26		# 27	
CASING ELEV.	82.67	msl	81.43	msl	76.85	msl	77.86	msl	78.29	msl	85.50	msl
DATE	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.
2-12-91	28.31	54.36	30.16	51.27	21.90	54.95	22.65	55.21	24.37	53.92	32.10	53.40
2-19-91	28.05	54.62	30.10	51.33	21.55	55.30	22.25	55.61	23.97	54.32	32.05	53.45
2-26-91	27.35	55.32	30.00	51.43	20.55	56.30	21.73	56.13	23.49	54.80	32.05	53.45
3-05-91	25.23	57.44	29.60	51.83	19.56	57.29	20.79	57.07	22.75	55.54	31.62	53.88
3-12-91	26.17	56.50	29.25	52.18	19.36	57.49	20.35	57.51	22.41	55.88	31.32	54.18
3-19-91	24.33	58.34	29.33	52.10	19.20	57.65	20.20	57.66	22.18	56.11	31.53	53.97
3-26-91	25.84	56.83	29.08	52.35	18.71	58.14	19.55	58.31	21.75	56.54	31.28	54.22
4-02-91	23.10	59.57	28.94	52.49	18.30	58.55	19.00	58.86	21.56	56.73	31.14	54.36
4-09-91	21.12	61.55	28.82	52.61	17.77	59.08	18.47	59.39	20.95	57.34	31.00	54.50
4-16-91	20.27	62.40	28.55	52.88	17.07	59.78	17.58	60.28	20.34	57.95	30.84	54.66
4-23-91	23.90	58.77	28.39	53.04	16.74	60.11	16.90	60.96	19.86	58.43	30.58	54.92
4-29-91	25.15	57.52	28.37	53.06	17.23	59.62	17.10	60.76	19.74	58.55	30.71	54.79
5-07-91	23.83	58.84	28.18	53.25	16.89	59.96	16.95	60.91	19.71	58.58	30.50	55.00
5-14-91	23.90	58.77	27.81	53.62	15.95	60.90	16.05	61.81	19.16	59.13	30.06	55.44
5-21-91	21.90	60.77	27.62	53.81	15.34	61.51	15.39	62.47	18.60	59.69	29.82	55.68
5-28-91	23.15	59.52	27.55	53.88	15.60	61.25	15.42	62.44	16.48	61.81	29.86	55.64
6-04-91	23.00	59.67	27.30	54.13	15.35	61.50	15.25	62.61	18.32	59.97	29.55	55.95
6-11-91	18.78	63.89	27.18	54.25	15.49	61.36	15.40	62.46	18.21	60.08	29.37	56.13
6-18-91	21.76	60.91	26.94	54.49	14.95	61.90	14.90	62.96	17.90	60.39	29.14	56.36
6-25-91	16.54	66.13	26.80	54.63	14.86	61.99	14.72	63.14	17.70	60.59	29.00	56.50
7-02-91	17.03	65.64	26.65	54.78	15.07	61.78	14.72	63.14	17.65	60.64	28.75	56.75
7-09-91	16.00	66.67	26.50	54.93	14.55	62.30	14.40	63.46	17.33	60.96	28.50	57.00
7-16-91	16.53	66.14	26.28	55.15	14.68	62.17	14.45	63.41	17.25	61.04	28.30	57.20
7-23-91	20.65	62.02	26.20	55.23	15.25	61.60	14.97	62.89	17.40	60.89	28.15	57.35
7-30-91	22.11	60.56	26.10	55.33	15.74	61.11	15.47	62.39	17.58	60.71	27.85	57.65
8-06-91	22.73	59.94	26.21	55.22	16.32	60.53	16.13	61.73	17.91	60.38	27.85	57.65
8-14-91	22.05	60.62	26.10	55.33	16.05	60.80	16.13	61.73	18.00	60.29	27.65	57.85
8-20-91	16.55	66.12	26.05	55.38	15.30	61.55	15.66	62.20	17.80	60.49	27.69	57.81
8-27-91	15.80	66.87	25.87	55.56	15.58	61.27	15.23	62.63	17.55	60.74	27.59	57.91
9-03-91	15.34	67.33	25.80	55.63	14.90	61.95	14.78	63.08	17.27	61.02	27.50	58.00
9-10-91	18.10	64.57	25.63	55.80	14.73	62.12	14.52	63.34	17.00	61.29	27.38	58.12
9-18-91	16.75	65.92	25.45	55.98	14.48	62.37	14.05	63.81	16.76	61.53	27.12	58.38

TABLE 1
WATER LEVEL READINGS
Hardin County Landfill
Hardin County, Texas

PIEZOMETER	# 22		# 23		# 24		# 25		# 26		# 27	
CASING ELEV.	82.67	msl	81.43	msl	76.85	msl	77.86	msl	78.29	msl	85.50	msl
DATE	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.	DEPTH	ELEV.
9-24-91	20.72	61.95	25.23	56.20	14.70	62.15	14.11	63.75	16.73	61.56	26.88	58.62
10-01-91	21.30	61.37	25.20	56.23	15.18	61.67	14.96	62.90	16.82	61.47	26.80	58.70
10-08-91	21.81	60.86	25.44	55.99	16.10	60.75	15.36	62.50	17.27	61.02	26.98	58.52
10-15-91	22.14	60.53	25.48	55.95	16.47	60.38	15.90	61.96	17.60	60.69	26.90	58.60
10-22-91	22.67	60.00	25.70	55.73	17.10	59.75	16.70	61.16	18.14	60.15	27.15	58.35
10-29-91	23.13	59.54	25.90	55.53	17.55	59.30	17.35	60.51	18.55	59.74	27.38	58.12
11-05-91	23.13	59.54	26.05	55.38	17.00	59.85	17.05	60.81	18.70	59.59	27.69	57.81
11-12-91	16.15	66.52	26.07	55.36	16.25	60.60	16.57	61.29	18.90	59.39	27.80	57.70
11-19-91	18.23	64.44	25.80	55.63	15.30	61.55	15.90	61.96	18.18	60.11	27.55	57.95
11-26-91	21.75	60.92	25.70	55.73	14.40	62.45	16.10	61.76	18.29	60.00	27.75	57.75
12-02-91	21.33	61.34	25.54	55.89	14.05	62.80	15.18	62.68	17.73	60.56	27.48	58.02
12-10-91	20.57	62.10	25.29	56.14	13.47	63.38	14.55	63.31	17.31	60.98	27.49	58.01
12-17-91	19.00	63.67	25.10	56.33	13.16	63.69	14.10	63.76	17.00	61.29	27.40	58.10
12-31-91	17.78	64.89	24.52	56.91	12.57	64.28	13.00	64.86	16.26	62.03	26.81	58.69
1-06-92	16.80	65.87	24.35	57.08	12.42	64.43	12.74	65.12	15.95	62.34	26.45	59.05
1-13-92	17.75	64.92	24.13	57.30	12.32	64.53	12.55	65.31	15.79	62.50	26.20	59.30
1-22-92	17.55	65.12	23.65	57.78	11.92	64.93	12.05	65.81	15.45	62.84	25.59	59.91
1-29-92	17.78	64.89	23.45	57.98	11.88	64.97	11.92	65.94	15.27	63.02	25.34	60.16
2-11-92	16.88	65.79	22.87	58.56	11.58	65.27	11.49	66.37	14.85	63.44	24.60	60.90
2-24-92	16.60	66.07	22.70	58.73	11.50	65.35	11.33	66.53	14.60	63.69	24.43	61.07
3-01-92	16.57	66.10	22.50	58.93	11.42	65.43	11.29	66.57	14.47	63.82	24.25	61.25
3-08-92	16.54	65.88 66.13	22.08	59.44 59.35	11.26	65.48 65.59	11.10	66.32 66.76	14.24	63.88 64.05	23.82	61.79 61.68
3-16-92	17.15	65.52	21.71	59.72	11.43	65.42	11.44	66.42	14.30	63.99	23.41	62.09
3-24-92	17.39	65.28	21.87	59.56	11.77	65.08	11.95	65.91	14.48	63.81	23.55	61.95
3-31-92	17.30	65.37	21.78	59.65	11.55	65.30	11.90	65.96	14.44	63.85	23.50	62.00
4-07-92	17.20	65.47	21.69	59.74	11.45	65.40	11.79	66.07	14.35	63.94	23.49	62.01
4-14-92	17.50	65.17	21.63	59.80	11.56	65.29	11.75	66.11	14.32	63.97	23.50	62.00
4-21-92	17.80	64.87	21.55	59.88	11.95	64.90	12.22	65.64	14.50	63.79	23.36	62.14
4-29-92	18.50	64.17	21.72	59.71	12.62	64.23	12.95	64.91	14.95	63.34	23.45	62.05
5-06-92	17.46	65.21	22.05	59.38	12.19	64.66	12.87	64.99	14.87	63.42	23.89	61.61
5-13-92	18.67	64.00	22.05	59.38	12.60	64.25	13.19	64.67	15.13	63.16	23.95	61.55
5-20-92	18.24	64.43	22.41	59.02	12.63	64.22	13.46	64.40	15.38	62.91	24.32	61.18

APPENDIX IIIG-E

2016 SOIL BORING PLAN AND TCEQ APPROVAL LETTER

AARON K. EVANS
GEOLOGY
11143

12-05-17

CONTENTS

AARON K. EVANS
GEOLOGY
11143

12-05-17

Bryan W. Shaw, Ph.D., P.E., *Chairman*
Toby Baker, *Commissioner*
Jon Niermann, *Commissioner*
Richard A. Hyde, P.E., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 27, 2016

Mr. Aaron K. Evans, P.G.
Municipal Solid Waste Permit 2214A
Weaver Consultants Group, LLC
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109

Re: IESI Landfill TX LP - Hardin County
Municipal Solid Waste (MSW) - Permit No. 2214B
Soil Boring Plan Comment Response.
Tracking No. 21206699; RN103759643/CN601668486

Dear Mr. Evans,

On October 10, 2016, we received a soil boring plan (SBP) for a proposed vertical expansion of a 16.62 acre area of the referenced MSW type I facility. The proposed vertical expansion includes deepening cell 7 and the southern two thirds of cell 6. There are no changes to the existing permit boundary and the maximum depth of excavation will not exceed the permit depth of 45.23 feet Elevation of Deepest Excavation (EDE). On December 7, 2016 we received revisions to the SBP in response to our letter dated November 10, 2016. In the letter we asked that five borings be drilled to at least 30 feet below the EDE and one hole to at least 5 feet below EDE. Our review of the revised plan indicates that it complies with MSW regulations. This letter constitutes approval of your plan.

The SBP proposes six geotechnical borings for the purpose of characterizing the proposed 16.62 acre excavation area. One of the four existing boreholes in the expansion area will be utilized as a shallow borehole (greater than 5 feet below EDE) and five new borings will be drilled to an elevation of 15.23 feet mean sea level, at least 30 feet deeper than the EDE. Two of the proposed deep borings will be completed as piezometers.

Please be advised that under Title 30 Texas Administrative Code, Chapter 330 Section 330.63(e)(4)(B), the uppermost aquifer and any hydraulically interconnected aquifers below the site must be identified, as well as the underlying confining unit. Although this plan appears to comply with the MSW regulations concerning site investigations, additional soil borings and piezometers could be required if the data generated by this SBP prove to be inconclusive.

If you have questions regarding this letter, please contact me at (512) 239-3142. When addressing written correspondence, please use mail code MC 124.

Sincerely,

Terance Virtue

Terance Virtue, P. G., Project Manager
Municipal Solid Waste Permits Section
Waste Permits Division

TLV/cgm

cc: Mr. Aaron K. Evans, Weaver Consultants Group, Fort Worth

2016 SOIL BORING PLAN
(EXCERPTS ONLY)
(APPENDICES C THROUGH E ARE NOT INCLUDED)

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

SOIL BORING PLAN

Prepared for

IESI Landfill TX LP

October 2016

AARON K. EVANS
GEOLOGY
11143

10-5-16

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0771-365-11-07-03

Weaver
Consultants
Group

October 5, 2016
Project # 0771-365-11-05-03

Mr. Chance Goodin
MC 124
Municipal Solid Waste Permits Section
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: Soil Boring Plan for Major Permit Amendment
IESI Hardin County Landfill
TCEQ Permit No. MSW-2214B
Hardin County, Texas
RN103759643/CN601668480

Dear Mr. Goodin:

The purpose of this submittal, prepared on behalf of IESI TX Landfill LP, is to provide the Texas Commission on Environmental Quality (TCEQ) with a Soil Boring Plan (SBP) in accordance with Title 30 Texas Administrative Code (TAC) §330.63(e)(4) for the referenced Type I Municipal Solid Waste (MSW) facility. The SBP has been prepared to support the proposed vertical expansion of the facility.

The proposed vertical expansion includes deepening of Cell 7 and the southern two thirds of Cell 6 (approximately 16.62 acres total), and increasing the peak final grade from approximately 115 ft-msl to 234 ft-msl. The reconfigured Cells 6 and 7 will be constructed with maximum depth of excavation elevation equal to the 1995 permitted Elevation of Deepest Excavation (EDE) within the currently approved permit of 45.23 ft-msl. The existing Type IV area will not be changed for this amendment. There are no changes proposed to the landfill's existing 79.0-acre permit boundary.

A description of the site geology and hydrogeology based on the currently available site specifications and regional information is included in the attached SBP. Site plan drawings depicting the currently permitted and proposed site conditions are provided in Appendix A of the SBP. Appendix B of the SBP includes site geology figures, Appendix C includes currently available site exploration data, and Appendix D includes historical groundwater contour maps of the facility.

Two copies of this report have been provided for your use and distribution. One copy has been sent to the TCEQ Region 10 office. A copy of this report has been placed in the facility's Site Operating Record.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,
Weaver Consultants Group, LLC

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

10-5-16

Aaron K. Evans, P.G.
Project Geologist

Attachment: Soil Boring Plan

cc: TCEQ Region 10 Office
Brett O'Connor, IESI TX Landfill LP
Forrest Hunter, IESI TX Landfill LP

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

10-5-16

CONTENTS

AARON K. EVANS
GEOLOGY
11143

10-5-16

1 INTRODUCTION

1.1 Purpose

The IESI Hardin County Landfill is in the process of developing a major permit amendment application (Texas Commission on Environmental Quality (TCEQ) Permit No. MSW-2214B) which will include a vertical expansion of the existing permitted waste footprint area. Appendix A includes currently permitted top of protective cover plans and proposed (draft) excavation plan drawings to provide an overview of this project. The following drawings are included in Appendix A.

- Figure A-1 (Aerial Photograph) shows the permitted landfill area on an aerial image. The proposed vertical expansion will include both a height increase and excavation depth increase from currently permitted grades within the facility's existing permitted Type I disposal area footprint.

- Figure A-2 (Site Plan) shows the existing site condition and depicts the currently developed areas and the undeveloped areas.

- Figure A-3 (Permitted and Proposed Excavation Plan) shows the currently permitted top of protective cover plan and the proposed excavation plan. As shown, the proposed excavation plan includes most of the southern undeveloped area (approximately 16.62 acres) which will be lowered by installing a second leachate collection pump. The bottom elevation of proposed excavation for the new sump is 45.23 ft-msl. The new sump bottom elevation is the same elevation as the landfill's permitted Elevation of Deepest Excavation (EDE) within the currently approved permit (from Attachment 15, Sheet No. 77, KSA Engineers, Inc., dated December 11, 2000).

- Figure A-4 (Permitted and Proposed Landfill Completion Plan) shows the permitted and proposed completion plan. As shown, the proposed vertical expansion includes a height increase of approximately 119 feet.

The proposed expansion does not include any changes to the landfill's existing permitted permit boundary, limits of waste, or EDE. The proposed vertical expansion area is located entirely within the existing 49.56-acre Type I limits of waste and 79-acre permit boundary currently approved under Permit No. MSW-2214A. The proposed changes to both the excavation and final cover grades have been developed by providing a minimum 125-foot buffer from the permit or property boundary line on property that is owned by IESI.

1.2 Site History

The IESI Hardin County Landfill is an existing municipal solid waste (MSW) Type I and Type IV landfill facility located in Hardin County, approximately 3 miles southwest of the city of Kountze, Texas; west of the intersection of FM 770 and state highway 326. The facility has been owned and operated by IESI TX Landfill LP (IESI) since 2002.

The facility was originally permitted (Permit No. 2214) as a Type I and Type IV municipal solid waste facility in 1995. Prior to its permitting as an MSW landfill, the property was used for commercial lumber production. In 2002, the facility completed a major permit amendment (Permit No. 2214A) to allow the facility to receive additional waste streams. The 2002 permit amendment also included updates to Attachment 4 (Geology Report) and Attachment 5 (Groundwater Characterization Report) of the facility's Site Development Plan (SDP).

1.3 Proposed Excavation Plan

Figure A-3 shows the currently permitted top of liner protective cover grades and proposed excavation plan. As shown, the facility has 32.08 acres of constructed Subtitle D liner (Cells 1 through Cell 5 and the northern third of Cell 6) of its permitted 49.56-acre Type I waste footprint. The permitted grading design directs leachate to a single northern sump with a bottom of excavation elevation of 49.66 ft-msl. The permitted excavation grades rise toward the south, southeast, and southwest limits of waste. The proposed excavation plan includes a deepening of the facility's remaining permitted waste footprint that includes Cell 7 and the southern two thirds of Cell 6. The proposed plan optimizes the excavation grades of the remaining undeveloped permitted Type I waste footprint without exceeding the permitted EDE of 45.23 ft-msl. No changes are proposed to the currently permitted excavation grades within 125 feet from the permit boundary on the west side. On the south side, the current limits of waste line has more than 125 feet of buffer from the south permit boundary. The property to the east of the proposed expansion area (see Figure A-2) is also owned by IESI. Therefore, the proposed excavation plan is developed based on the currently permitted eastern limit of waste boundary. A leachate collection sump is proposed on the east edge of the revised excavation plan.

1.4 Proposed Completion Plan

Figure A-4 (Appendix A) shows the permitted and proposed landfill completion plan. As illustrated in this figure, the vertical extent of the permitted Type I final cover contour is 115 ft-msl. The proposed completion plan includes an increase in final cover height from 115 ft-msl to 234 ft-msl. This proposed 119-foot height increase is designed to optimize air space within the facility's permitted Type I waste footprint.

2 REGIONAL GEOLOGIC SETTING

2.1 Geologic History

Marine deposition dominated during the late Cretaceous period, with most of Texas covered in shallow seas. Toward the end of the Cretaceous period, this marine deposition largely ceased following a regional uplift to the west. This resulted in a retreat of the seas gulf ward. Subsequent erosion of Cretaceous deposits continued from the early Cenozoic Era to the present. During this time, thick fluviodeltaic progradational sequences of Cretaceous-sourced sediments were deposited seaward under influence of glacio-eustatic sea-level fluctuations that drove erosional downcutting.

2.2 Regional Stratigraphy

Regional stratigraphy consists of geologic units of the Gulf Coastal Plain. Geologic formations that outcrop in the site vicinity are largely Cenozoic aged alluvial sediments and include the Deweyville, Beaumont, Lissie, Willis, Fleming, and Catahoula Formations, as well as Holocene age Alluvium and late Pleistocene Fluviatile Terrace Deposits (BEG, Beaumont Sheet, 1992). Stratigraphic positions of these groups, along with lithologic characteristics and approximate depths to the formations, are presented in Table 2-1 (modified from Young, et al., 2012).

According to the Texas Bureau of Economic Geology Geologic Atlas of Texas (1992), the site is located upon the Quaternary Lissie Formation as shown on the Figure B-1 – Regional Geologic Map and Figure B-2 – Regional Geologic Cross Section. As indicated on Figure B-2, the Cenozoic stratums form a southward-thickening wedge extending toward the Gulf of Mexico. Outcrops of Cenozoic geologic formations generally strike parallel to the gulf coastline in a monoclinal structure that dips gulfward at rates ranging from 5 to 20 feet per mile (Young, et al., 2012). The Lissie Formation is described as a sequence of interbedded fluviatile channel sands separated by interchannel muds consisting of clay, silt, sand, and minor quantities of gravel. The Lissie formation is approximately 400 feet thick beneath the facility as indicated Figure B-3 – Lissie Formation Elevation and Thickness map.

The Willis Formation (Pliocene) and Goliad Sand, Fleming, and Catahoula Formations (Miocene) constitute the Tertiary aged stratigraphic units that underlay the Lissie. The approximate depths and thicknesses of these units and their predominantly lithologic characteristics are summarized in Table 2-1.

Table 2-1
Regional Stratigraphy in the Vicinity of IESI Hardin County Landfill

System	Series	Stratigraphic Unit	Hydrogeologic Units	Approximate Depth to Top of Formation and (Formation Thickness) at the Site in Feet	Lithologic Characteristics
Quaternary	Holocene	Alluvium	Chicot Aquifer	Not present beneath site Outcrops 3 miles northeast of site (0-50 ft. thick regionally)	Clay, silt, sand, and gravel
	Pleistocene	Deweyville Formation		Not present beneath site Outcrops 7 miles east of site (0-100 ft. thick regionally)	Sand, silt, clay , and gravel
		Fluviatile Terrace Deposits (Undivided)		Not present beneath site Outcrops 4 miles northeast of site (0-50 ft. thick regionally)	Gravel, sand, and silt
		Beaumont Formation		Not present at the site Outcrops 6 miles south of site (0-800 ft. thick regionally)	Clay, silt, and sand
		Lissie Formation		At surface (400 ft.)	Clay, silt, sand, and gravel
Tertiary	Pliocene	Willis Formation		400 ft. (100 ft.)	Clay, silt, sand, and gravel
	Miocene	Goliad Sand	Evangeline Aquifer	500 ft. (800 ft.)	Sand and gravel
		Fleming/Lagarto Formation	Burkville Confining System	1,300 ft. (500 ft.)	Clay, silt, and sand
		Fleming/Oakville Formation	Jasper Aquifer	1,800 ft. (1,000 ft.)	Sand, silt, and clay
		Catahoula Formation	Catahoula Confining System	0-500 ft. thick regionally	Mudstone and sand

Modified from Young, et al., 2012.

2.3 Regional and Site Hydrogeology

Regional groundwater is controlled by hydraulically connected complex interbedded clays, silts, sands, and gravels of the Gulf Coast Aquifer. The Texas Water Development Board (TWDB) classifies the Gulf Coast Aquifer as a major Texas aquifer. The Gulf Coast Aquifer is comprised of, from youngest to oldest, the Chicot Aquifer, the Evangeline Aquifer, the Burkeville confining system, the Jasper Aquifer, and the Catahoula confining system (Baker, 1979). The approximate depths and thicknesses of these hydrogeologic units and their predominant stratigraphic and lithologic characteristics are summarized in Table 2-1. As indicated in this table, the Chicot Aquifer is the uppermost hydrogeologic unit present beneath the IESI Hardin County Landfill.

The Chicot Aquifer is described as an unconfined to leaky-confined aquifer that ranges in thickness from less than 100 feet in the north to over 3,000 feet in southeast down-dip areas of the gulf (Young, et. al., 2012). Stratigraphic units which constitute the Chicot Aquifer include Holocene-age Alluvium and Deweyville Formation, and Pleistocene-age Fluviatile Terrace deposits (undivided), Beaumont Formation, Lissie Formation, and Willis Formation (Baker, 1979).

Figure B-4 in Appendix B presents a regional Chicot Aquifer potentiometric surface map which is based on locally gauged and simulated water well water level data obtained from the TWDB (Young, et. al., 2012). As shown in Figure B-4, the potentiometric surface in the vicinity of the landfill is projected to be about 30 ft-msl which is consistent with gauged water levels in facility piezometers and wells. The regional Chicot groundwater flow direction follows the regional dip of the formation gulfward to the south. The primary source of recharge to the aquifer is precipitation infiltration on the outcrop, which the landfill is founded on.

3 SITE-SPECIFIC GEOLOGY

3.1 Site-Specific Stratigraphy

3.1.1 Upper Clay Stratum

The uppermost site-specific stratigraphic unit is the Upper Clay Stratum. This stratum is continuous beneath the landfill. The Upper Clay Stratum is characterized by SWL (1992) and Hydrex (2001) as predominantly dry to moist, low permeability clay and silty clay with minor amounts of sand, and discontinuous surficial sandy and clayey silt. According to the existing borehole data, the Upper Clay Stratum ranges in thickness from 8 to 29 feet.

3.1.2 Upper Sand Stratum

Beneath the Upper Clay Stratum is the Upper Sand Stratum, which contains the permitted groundwater monitoring zone (uppermost aquifer). This stratum is continuous beneath the landfill. The Upper Sand Stratum was characterized by SWL (1992) and Hydrex (2001) as saturated silty sand to clayey sand. According to the existing borehole data, the Upper Sand Stratum is present in most borings in thicknesses ranging from 1 to 7 feet, with some of the older borings describing this zone as thinly interbedded seams of saturated sand and silty clay. All facility detection monitor wells are screened in the Upper Sand Stratum.

3.1.3 Lower Clay Stratum

Beneath the Upper Sand Stratum lies the Lower Clay Stratum. This stratum is the permitted lower confining unit to the Upper Sand Stratum uppermost aquifer and is continuous beneath the landfill. The Lower Clay Stratum is characterized by SWL (1992) and Hydrex (2001) as predominantly dry to moist, low permeability clay with minor amounts of silt and sand. According to the existing borehole data set, the lower Clay Stratum ranges in thickness from 1 to 18 feet.

3.1.4 Lower Sand Stratum

The Lower Sand Stratum lies beneath the low permeability Lower Clay Stratum. Five of the 39 existing borings (P-21, 22, 23, 24, and 25) penetrated the top of this stratum. The Lower Sand Stratum was characterized by SWL (1992) and Hydrex (2001) as a very fine grained saturated sand with varying amounts of silt and clay. According to the existing borehole data, the lower Sand Stratum ranges in thickness from two to eight feet. However, no existing borings fully penetrated the full vertical extent of the Lower Sand Stratum.

3.2 Hydrogeologic Interpretation

Appendix D presents historical groundwater potentiometric surface contour maps by Hydrex Environmental and Biggs and Mathews taken from Attachment 5 of the facility's permit and the facility's 2015 Annual Groundwater Monitoring Report submittal. As indicated by these figures, groundwater in the uppermost aquifer flows generally to the east and northeast toward tributaries of the Neches River (Cypress Creek and Longston Branch). Biggs and Mathews (2009) described this groundwater regime as closely mimicking surface topography, flowing from the west to topographic lows in the eastern and northeastern areas of the permit boundary.

4 EXISTING AND PROPOSED SITE EXPLORATIONS

4.1 Existing Site Explorations

Subsurface characterization of the site has been performed during five drilling events at the landfill. Geotechnical and geological subsurface explorations, and piezometer, monitor well, and landfill gas probe installations were completed by Southwestern Laboratories, Inc. (SWL) in 1990 and 1991, and Hydrex Environmental in 1998, 2005, and 2015. These investigations included a total of 39 exploratory borings across the site whose locations are shown on Figure B-5 in Appendix B. Site-specific geologic cross sections have been constructed from the existing boring logs and are presented as Figures B-7 and B-8 in Appendix B. The cross section locations are provided in Figure B-6 of Appendix B. The borehole specifications are summarized in Table C-1 (Appendix C) and in the following text:

- A 1990 subsurface characterization by SWL included at least nine geotechnical borings that were advanced to evaluate subsurface conditions for a proposed landfill facility. Attachment 4 of the facility's permitted Site Development Plan (SDP) states that 10 borings within the 79-acre permit boundary (B-1, 2, 3, 4, 5, 6, 8, 9, and 12) and an additional unspecified number of off-site borings were drilled in May, 1990. With the exception of boring B-9, no lithologic information is available for these initial investigatory boreholes and they have not been included in the summation of existing facility exploration borings. Per the currently approved Attachment 4, the Texas Department of Health (TDH) required SWL to re-drill the ten borings referenced above to greater depths and advance additional borings to characterize the site. In accordance with this TDH request, SWL redrilled several borings (within five feet of the former borehole locations) and drilled additional borings from December 1990 to January 1991.
- A 1990-1991 subsurface characterization continuation by SWL included an additional 16 geotechnical borings (P-1A, P-2A, P-3A, P-4A, B-5A, B-6A, B-8A, B-12A, and P-20 through P-27) that were drilled to further evaluate subsurface conditions for the proposed landfill facility. Twelve of these borings were completed as piezometers. All of the boreholes fully penetrated the Upper Sand Zone Stratum uppermost aquifer, most of the borings encountered the underlying low permeability Lower Clay Stratum, and five of the borings penetrated a portion of the Lower Sand Stratum.
- A 1998 subsurface characterization by Hydrex Environmental included 20 geotechnical borings for the installation of six groundwater monitor wells

(MW-1 through MW-6) and seven LFG monitoring probes (GMP-1 through GMP-7). Most of these boreholes penetrated the Upper Sand Stratum uppermost aquifer and in most cases encountered the top of the underlying low permeability Lower Clay Stratum.

- A 2005 subsurface characterization by Hydrex Environmental included six geotechnical borings for the installation of six groundwater monitor wells (MW-7 through MW-12). These boreholes penetrated the Upper Sand Stratum uppermost aquifer.
- A 2010 subsurface characterization by Hydrex Environmental included three geotechnical borings for the installation of three groundwater monitor wells (MW-5R, MW-6R, and MW-13). These boreholes penetrated the Upper Sand Stratum uppermost aquifer and encountered the top of the underlying low permeability Lower Clay Stratum.

4.2 Proposed Site Exploration

The site has previously received TCEQ approval of its Subtitle D geology and hydrogeology characterization based on the permitted EDE and disposal waste footprint, neither of which have any proposed changes. Per 30 TAC §330.63(e)(4), the subsurface investigation requires that a sufficient number of borings be drilled deep enough to allow identification of the uppermost aquifer and the underlying aquiclude, to establish subsurface stratigraphy, and determine geotechnical properties. Previous field investigations for the existing permit boundary have provided subsurface characterization deemed satisfactory by TCEQ for approval of the currently permitted Type I Subtitle D landfill unit and groundwater monitoring system design. For these reasons, no additional subsurface investigations or new soil borings are proposed.

5 REFERENCES

Ashworth, J. B. and Hopkins, J., 1995, Major and Minor Aquifers of Texas, Texas Water Development Board.

Barnes, V. E., 1992, Geologic Atlas of Texas, Beaumont Sheet, Bureau of Economic Geology, The University of Texas at Austin. Scale 1:250,000

Bureau of Economic Geology (BEG), 1996, Physiographic Map of Texas, The University of Texas at Austin.

Baker, E.T., Jr., 1964, Geology and Groundwater Resources of Hardin County, Texas, United States Geological Survey, Bulletin 6406.

Baker, E.T., Jr., 1979, Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas, Texas Department of Water Resources, Report 236.

Biggs and Mathews Environmental, 2009, Attachment 5 in Subtitle D Well Spacing Permit Modifications - MSW Permit No. 2214A.

Bureau of Economic Geology (BEG), 1996, Physiographic Map of Texas, The University of Texas at Austin.

Hydrex Environmental (Hydrex), 2001, Attachments 4 and 5 - MSW Permit No. 2214A.

Kasmarek, Mark C., 2013, Hydrology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas, 1891-2009 (Revised), U.S. Geological Survey.

Southwestern Laboratories, Inc. (SWL), 1992, Attachments 4 and 5 - MSW Permit No. 2214.

Young, et al., 2012, Final Report – Updating the Hydrogeological Framework for the Northern Portion of the Gulf Coast Aquifer, Texas Water Development Board.

APPENDIX A

LANDFILL OVERVIEW DRAWINGS

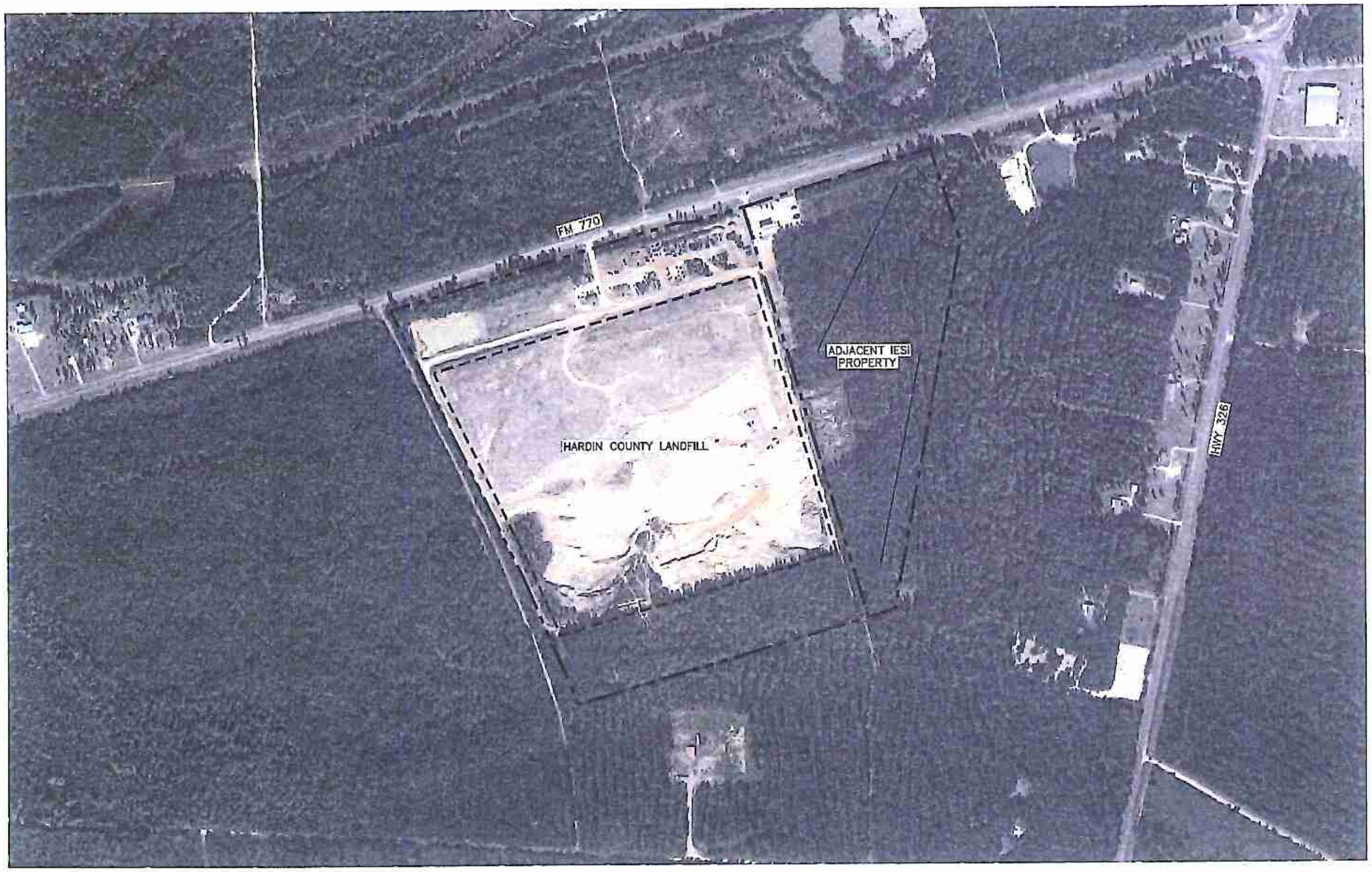
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

10-5-16

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

10-5-16



N

0 300 600
SCALE IN FEET

LEGEND

— · — — · —	IESI PROPERTY BOUNDARY
——— · · ———	PERMIT BOUNDARY
— — — — —	LIMITS OF WASTE

NOTE:

1. AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH AND DATED 2016.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG A1-AERIAL PHOTOGRAPH.DWG

DRAWN BY: SRF
DESIGN BY: AC
REVIEWED BY: JIT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

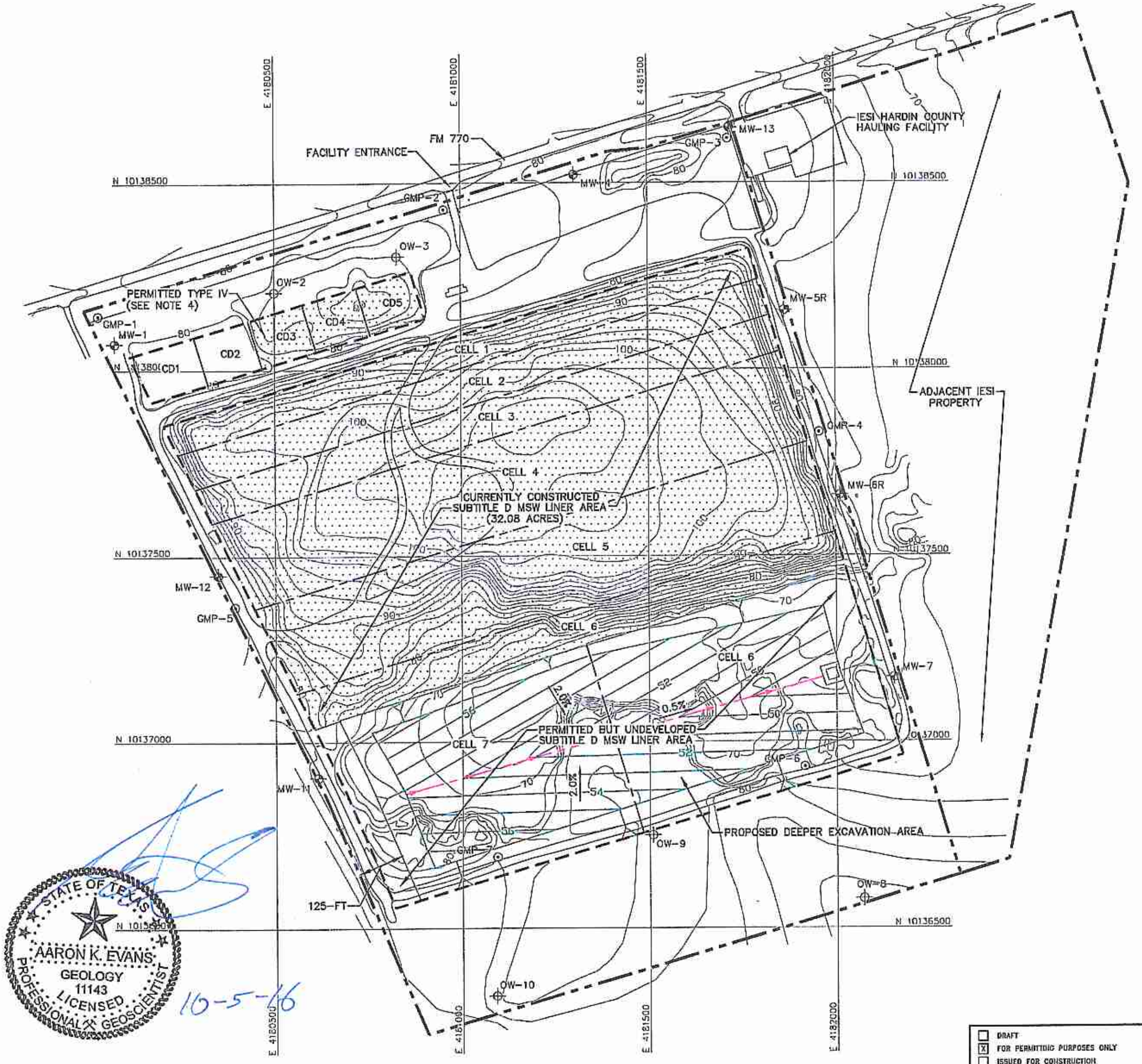
SOIL BORING PLAN
AERIAL PHOTOGRAPH

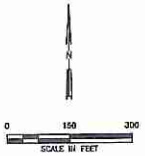
IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-1

O:\0771\365\EXPANSION (2016)\SOIL BORING PLAN\FIG A1-SITE LOCATION MAP.dwg, 10/7/2016 10:03:08 AM, rmorris, 1:2





LEGEND

— · — · —	IESI PROPERTY BOUNDARY
— · · —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — · —	CELL BOUNDARY (SEE NOTE 5)
—70—	EXISTING CONTOUR
—60—	PROPOSED EXCAVATION CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1	EXISTING GROUNDWATER MONITOR WELL
OW-2	EXISTING GROUNDWATER OBSERVATION WELL
GMP-1	EXISTING GAS MONITORING PROBE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
3. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.
4. CURRENTLY PERMITTED TYPE IV CELLS INCLUDES CD1 THROUGH CD5. CD3, CD4, AND CD5 ARE CURRENTLY DEVELOPED AND RECEIVED TYPE IV WASTE.
5. CURRENTLY APPROVED CELL DEVELOPMENT (CELL BOUNDARIES AND LABELS) SHOWN.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG A2-EXPANSION AREA PLAN.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

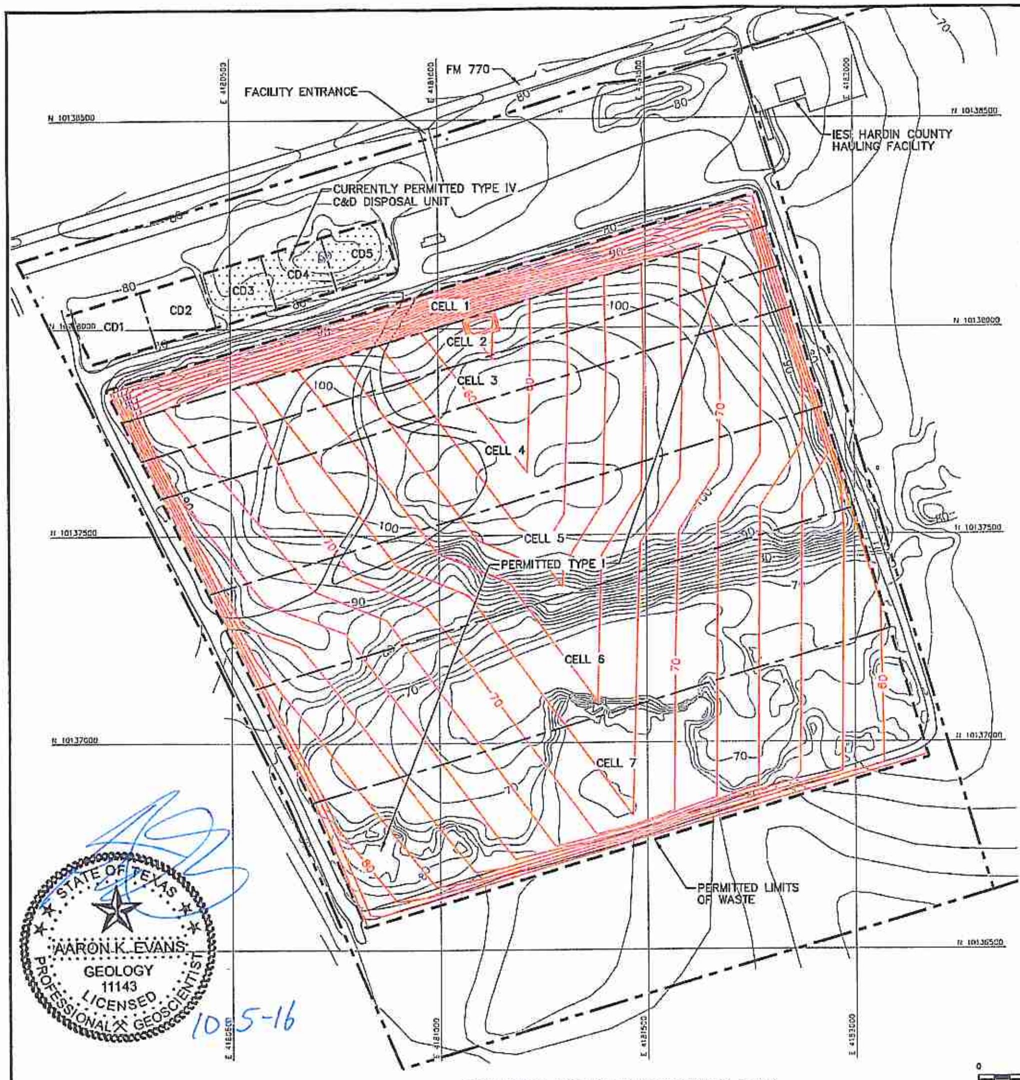
SOIL BORING PLAN
SITE PLAN

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-2

P:\Solid waste\IESI\Hardin County\2214B Expansion\NEW EXCAVATION PLAN (10-7-16)\FIG A2-SITE PLAN.dwg, cmichael, 1:2

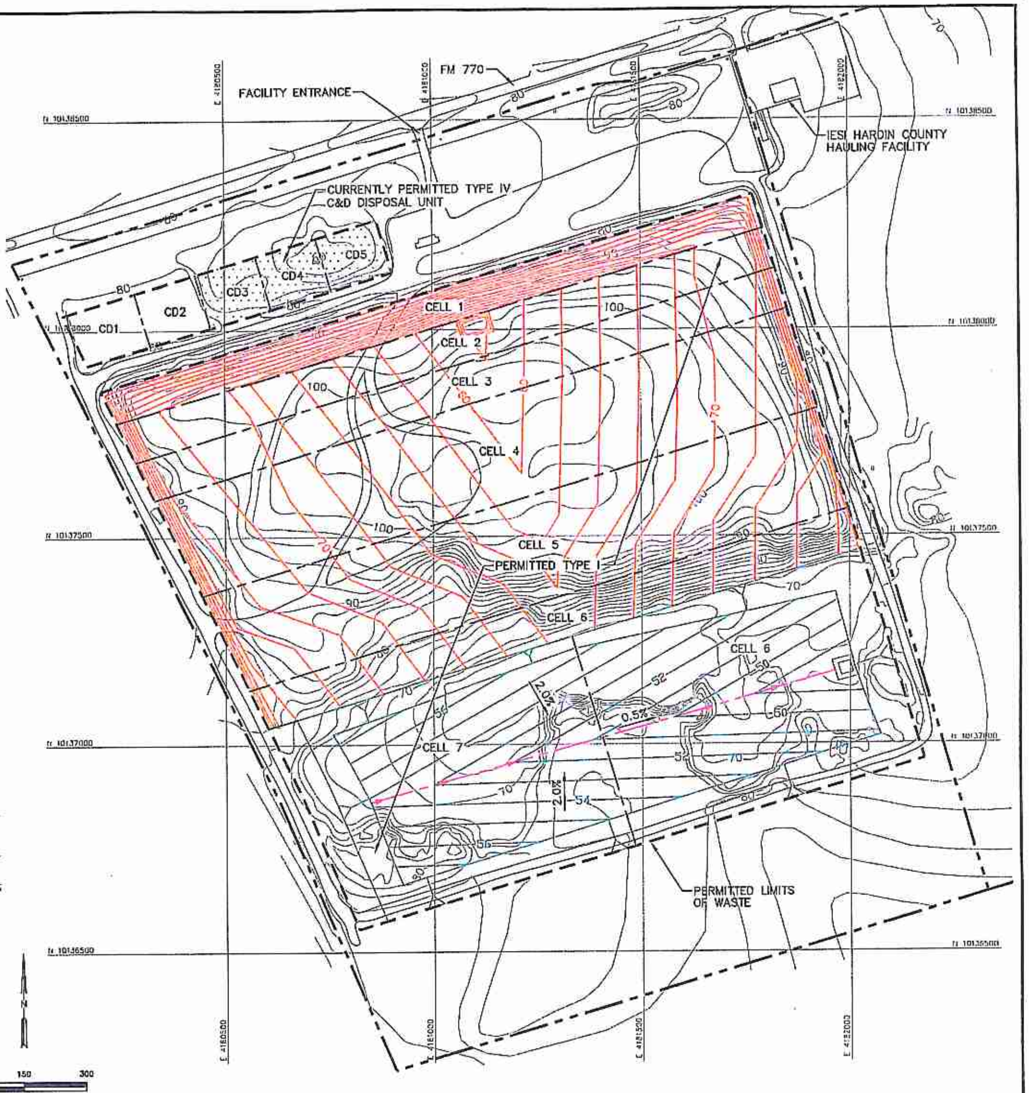


CURRENTLY PERMITTED CONDITIONS PLAN

AARON K. EVANS
GEOLOGY
11143

10-5-16

0 150 300
SCALE IN FEET



PROPOSED EXCAVATION PLAN

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016. GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NAD 83, CENTRAL ZONE.
2. CONTOURS FOR THE CURRENTLY PERMITTED CONDITIONS PLAN REPRESENT THE TOP OF LINER PROTECTIVE COVER CONTOURS WHICH ARE 4 TO 5 FEET ABOVE THE EXCAVATION GRADES. THE PROPOSED EXCAVATION PLAN CONTOURS WERE DEVELOPED BY WEAVER CONSULTANTS GROUP AS PART OF THE DESIGN BASIS MEMORANDUM FOR THE PROPOSED MAJOR AMENDMENT APPLICATION.
3. FINALIZED DRAINAGE PLANS WILL BE SUBMITTED TO TEXAS COMMISSION OF ENVIRONMENTAL QUALITY (TCEQ) AS PART OF THE PROPOSED MAJOR PERMIT AMENDMENT AND THE SITE DRAINAGE WILL EVENTUALLY BE DEVELOPED PER THE FINAL DRAINAGE PLAN APPROVED BY TCEQ.

LEGEND

	IESI EAST PROPERTY BOUNDARY
	PERMIT BOUNDARY
	PERMITTED LIMITS OF WASTE
	PROPOSED LIMITS OF WASTE
	CELL BOUNDARY
70	EXISTING CONTOUR (SEE NOTE 1)
N 10137000	STATE PLANE COORDINATE SYSTEM (SEE NOTE 1)
60	PERMITTED TOP OF PROTECTIVE COVER CONTOUR (SEE NOTE 2)
60	PROPOSED EXCAVATION CONTOUR (SEE NOTE 2)
	LEACHATE LINE

IIIG-E-22

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-355-11
CAD: FIG A-3-EXCAVATION PLAN COMP.DWG

DRAWN BY: SRF
DESIGN BY: AC
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

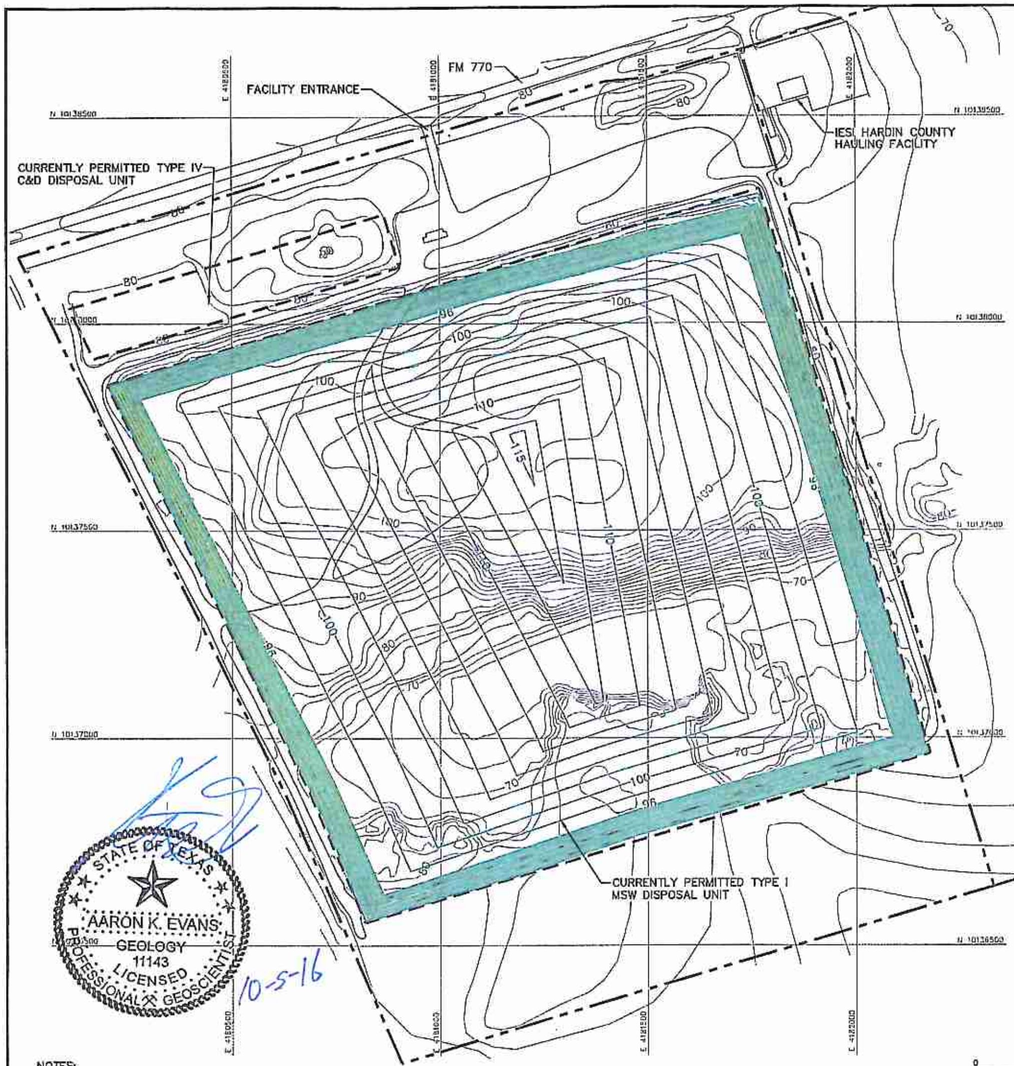
REVISIONS		
NO.	DATE	DESCRIPTION

SOIL BORING PLAN
PERMITTED AND PROPOSED
EXCAVATION PLAN

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

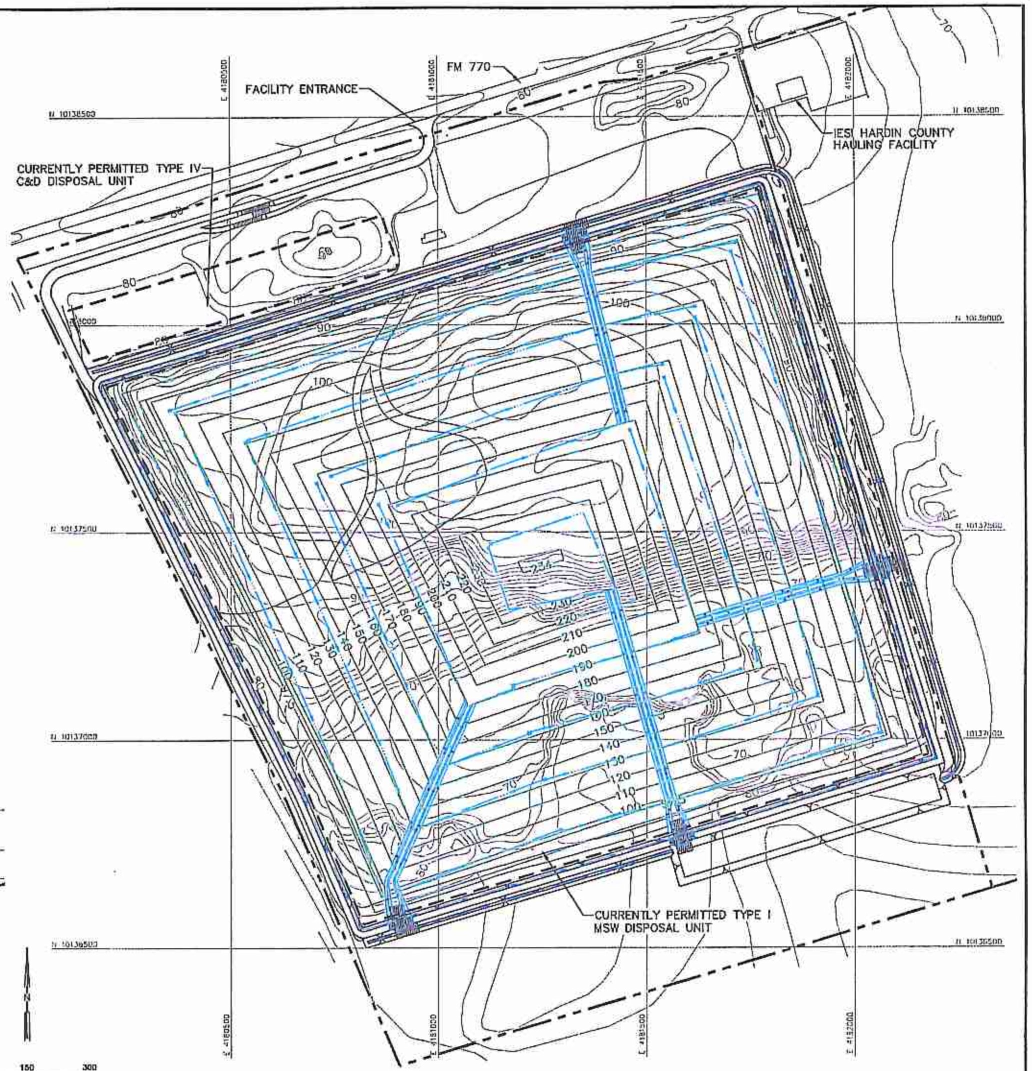
FIGURE A-3



AARON K. EVANS
GEOLOGY
11143

10-5-16

PERMITTED COMPLETION PLAN



PROPOSED COMPLETION PLAN

0 150 300
SCALE IN FEET

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016. GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NAD 83, CENTRAL ZONE.
2. PERMITTED COMPLETION PLAN FINAL COVER CONTOURS ARE OBTAINED FROM 1995 HARDIN COUNTY LANDFILL MSW PERMIT NO. 2214. THE PROPOSED PERMITTED COMPLETION PLAN FINAL COVER CONTOURS WERE DEVELOPED BY WEAVER CONSULTANTS GROUP AS PART OF THE DESIGN BASIS MEMORANDUM FOR THE PROPOSED MAJOR AMENDMENT APPLICATION.
3. THE PROPOSED COMPLETION PLAN DRAINAGE STRUCTURES ARE SHOWN FOR INFORMATIONAL PURPOSES. FINALIZED DRAINAGE PLANS WILL BE SUBMITTED TO TEXAS COMMISSION OF ENVIRONMENTAL QUALITY. (TCEQ) AS PART OF THE PROPOSED MAJOR PERMIT AMENDMENT AND THE SITE DRAINAGE WILL EVENTUALLY BE DEVELOPED PER THE FINAL DRAINAGE PLAN APPROVED BY TCEQ.

LEGEND

— - — - —	IESI PROPERTY BOUNDARY
—— - - ——	PERMIT BOUNDARY
— — — — —	CURRENTLY PERMITTED LIMITS OF WASTE
——70——	EXISTING CONTOUR (SEE NOTE 1)
N 10137000 ———	STATE PLANE COORDINATE SYSTEM (SEE NOTE 1)
——220——	FINAL COVER CONTOUR (SEE NOTE 2)
———	PROPOSED DRAINAGE SWALE
═══	PROPOSED DRAINAGE CHUTE

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG A-4-SOIL BORING PLAN.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: [illegible]

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

SOIL BORING PLAN PERMITTED AND PROPOSED COMPLETION PLAN

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-4

O:\0771\365\EXPANSION (2016)\SOIL BORING PLAN\FIG A4-COMPLETION PLAN COMPARISON.dwg, sford, 1:2

APPENDIX B

GEOLOGY FIGURES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

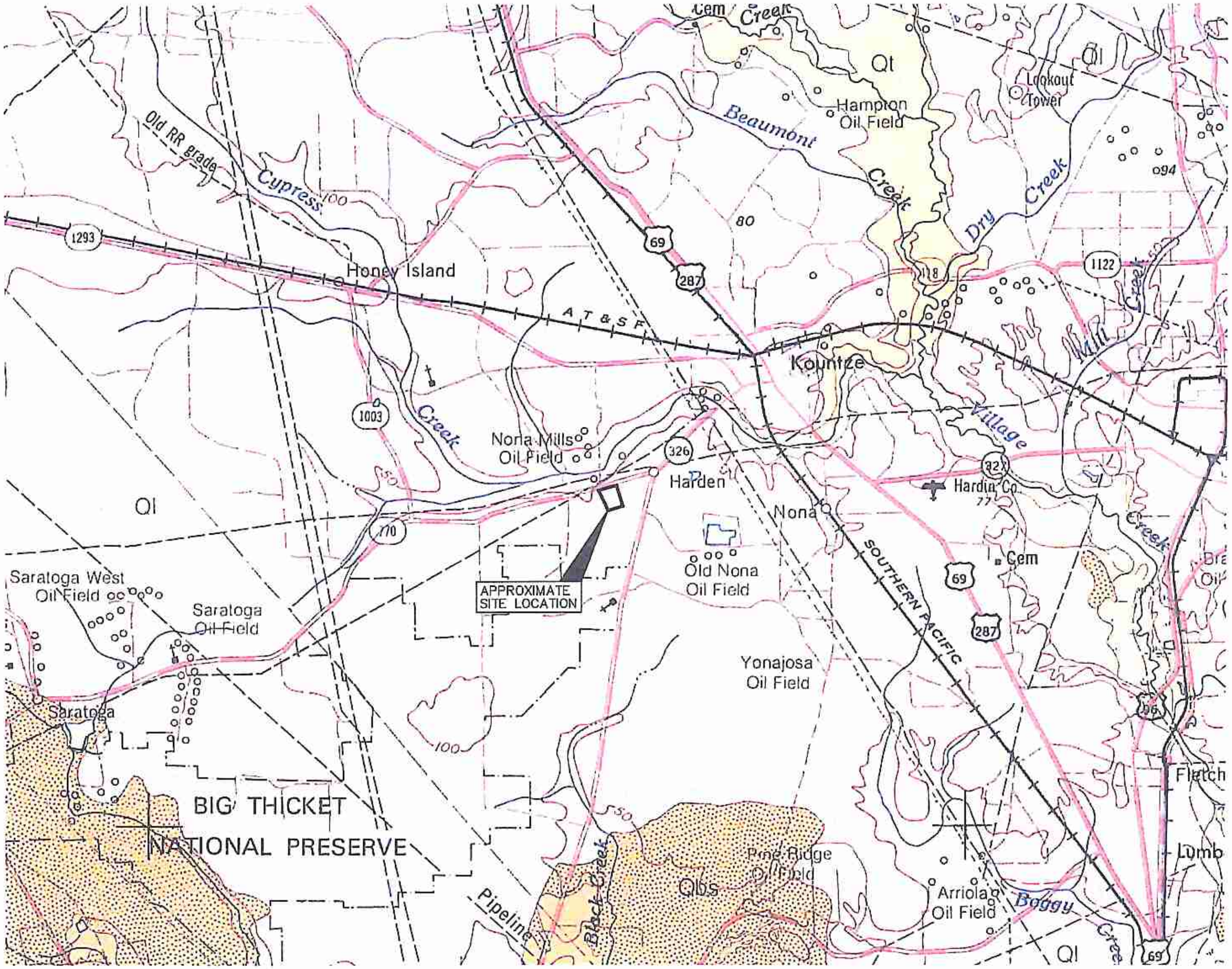
10-5-16

CONTENTS

FIGURES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

10-5-16



N

0 1 2
SCALE IN MILES

LEGEND

Qal
Alluvium

Qd Qd?
Deweyville Formation

Qt
Fluviatile terrace deposits undivided

Qbc Qbs Qnt
Beaumont Formation

Ql
Lissie Formation

NOTE:

1. REGIONAL GEOLOGIC MAP MODIFIED FROM GEOLOGIC ATLAS OF TEXAS MAP, BEAUMONT SHEET 1992, BUREAU OF ECONOMIC GEOLOGY.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-385-11
CAD: FIG B1-REGIONAL GEO MAP.DWG

DRAWN BY: SRF
DESIGN BY: AC
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

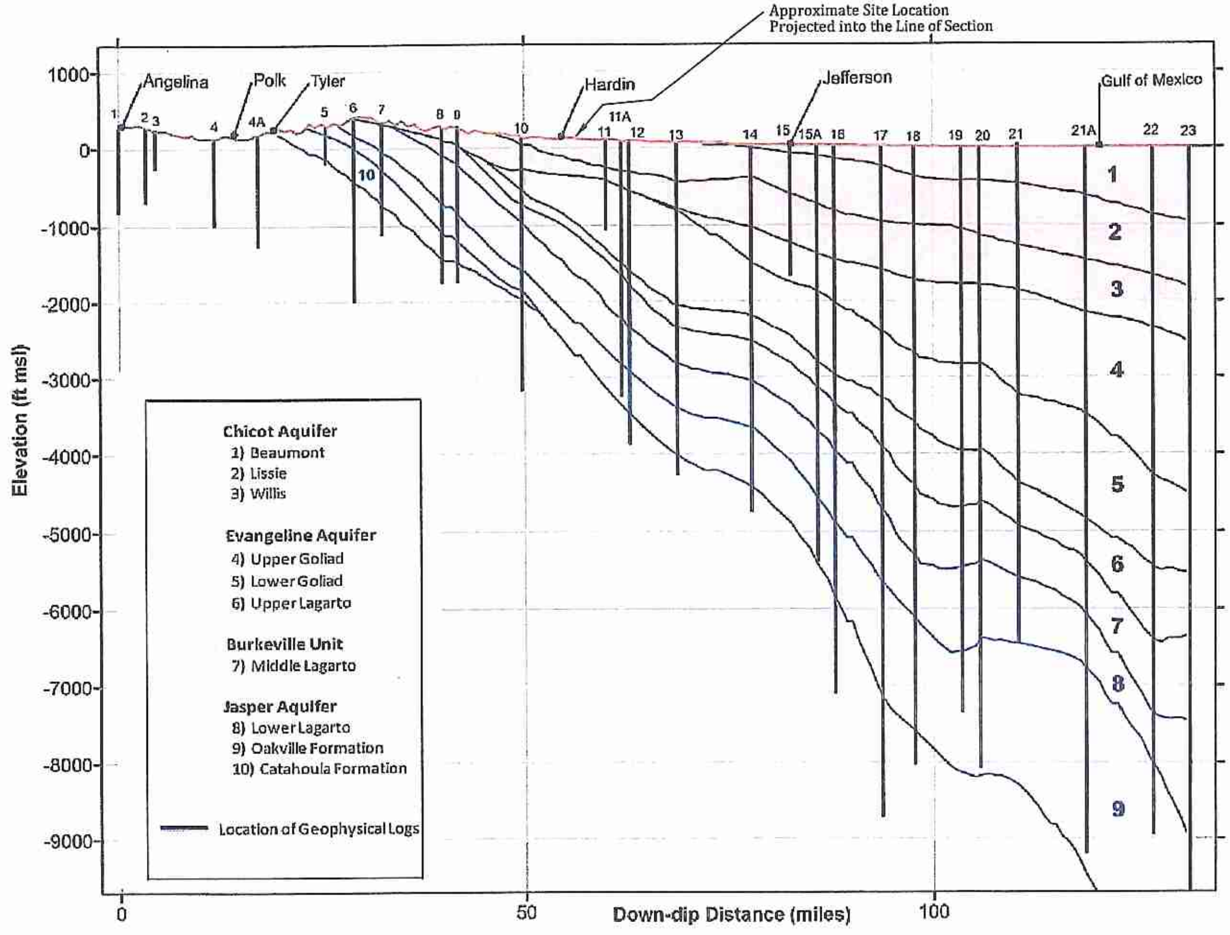
SOIL BORING PLAN
REGIONAL GEOLOGIC MAP

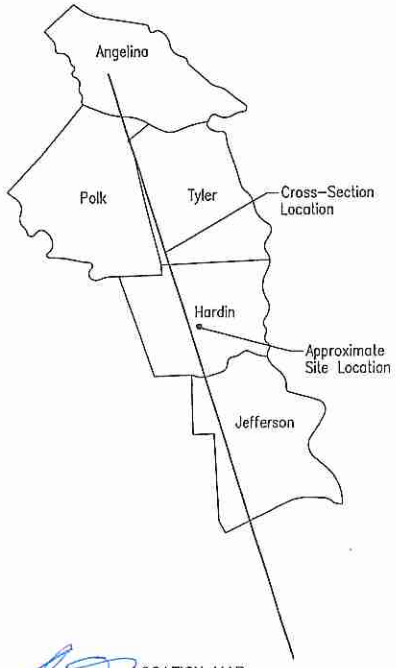
IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-1

O:\0771\385\EXPANSION (2016)\SOIL BORING PLAN\FIG B1-REGIONAL GEOLOGIC MAP.dwg, sford, 1:2





LOCATION MAP
NTS

AARON K. EVANS
11143

10-5-16

NOTE:

1. REGIONAL GEOLOGIC CROSS–SECTION MODIFIED FROM YOUNG, et.Al., 2012, UPDATING THE HYDROGEOLOGIC FRAMEWORK FOR THE NORTHERN PORTION OF THE GULF COAST AQUIFER, TEXAS WATER DEVELOPMENT BOARD, FINAL REPORT.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B2-REGIONAL GEO SECTION.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

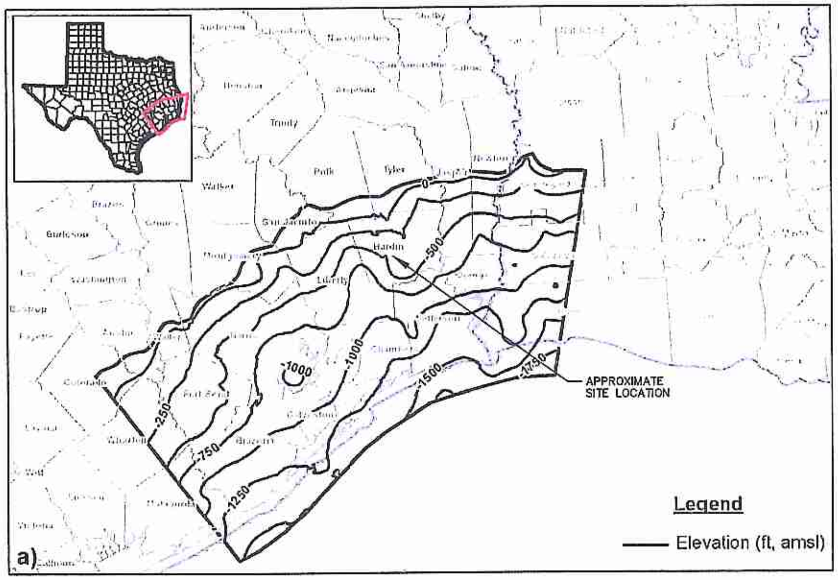
SOIL BORING PLAN
REGIONAL GEOLOGIC CROSS–SECTION

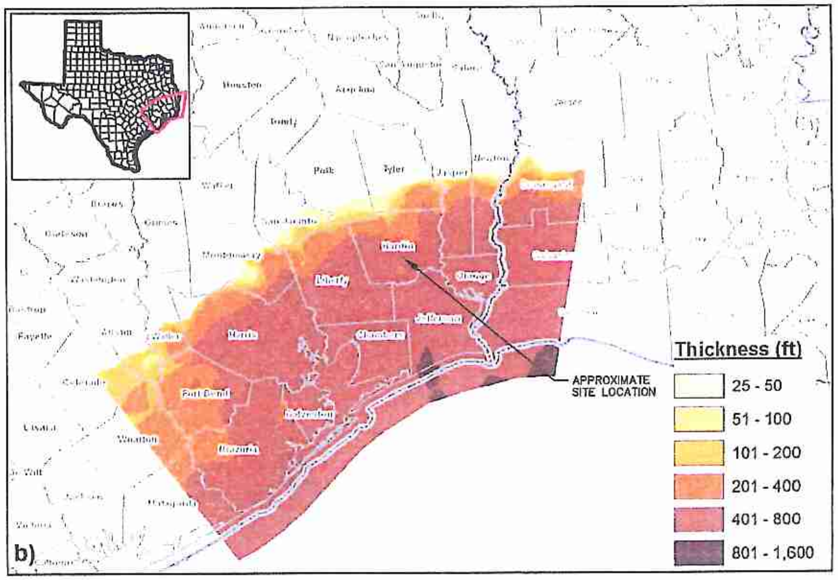
IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

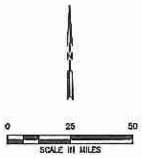
WWW.WCGRP.COM

FIGURE B-2

G:\0771\365\EXPANSION (2016)\SOIL BORING PLAN\FIG B2-REGIONAL GEOLOGIC CROSS SECTION.dwg, sford, 1:2







NOTE:

1. LISSIE FORMATION ELEVATION AND THICKNESS MAPS MODIFIED AFTER YOUNG, et.Al., 2012, UPDATING THE HYDROGEOLOGIC FRAMEWORK FOR THE NORTHERN PORTION OF THE GULF COAST AQUIFER, TEXAS WATER DEVELOPMENT BOARD, FINAL REPORT.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B3-LISSIE FORMATION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: IIT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

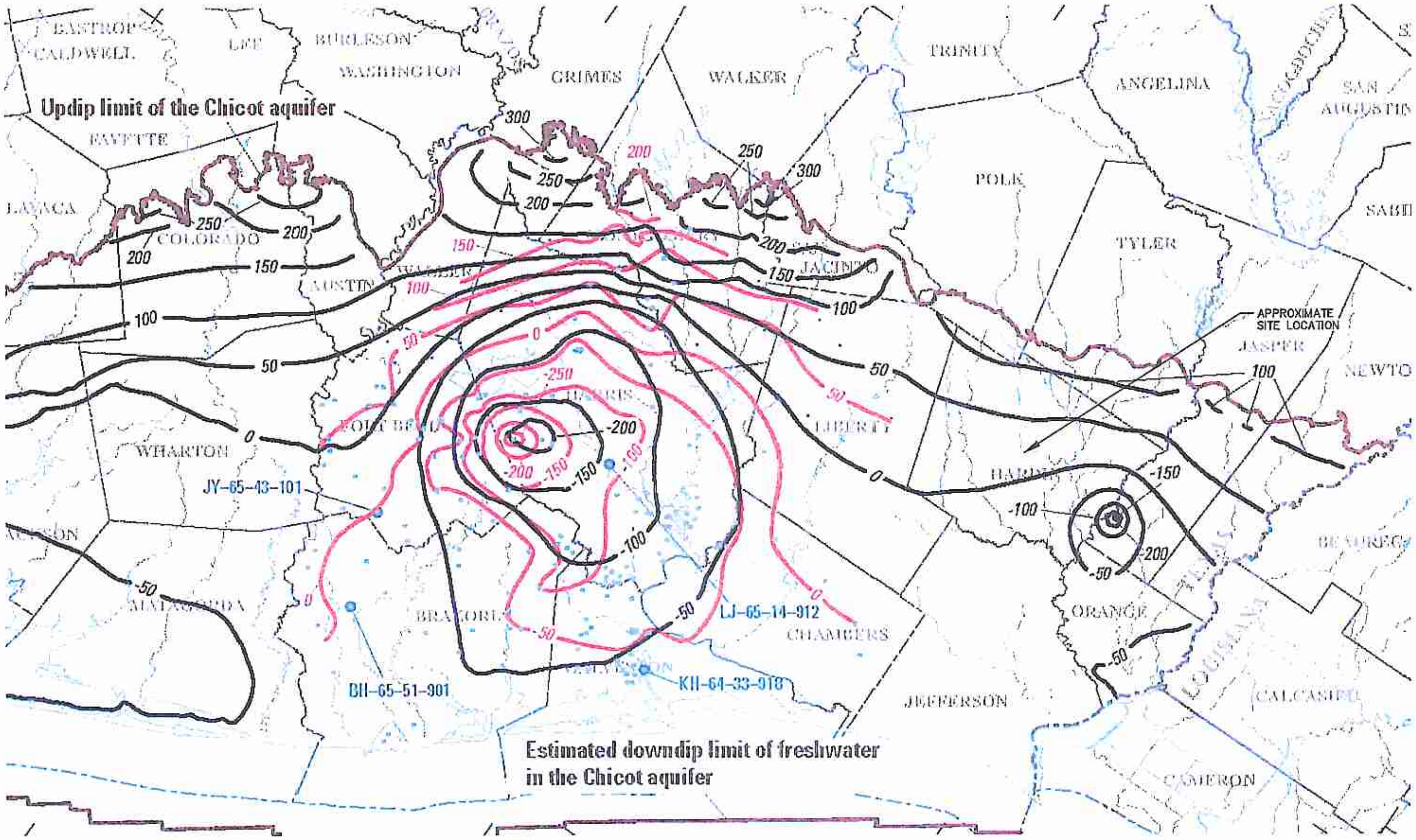
SOIL BORING PLAN
LISSIE FORMATION
ELEVATION AND THICKNESS MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-3

O:\0771\365\EXPANSION (2016)\SOIL BORING PLAN\FIG B3-LISSIE FORMATION MAP.dwg, sford, 1:2



EXPLANATION

-50 — Simulated potentiometric contour—Shows altitude at which water would have stood in tightly cased well. Interval 50 feet. Datum is NAVD 88

-50 — Measured potentiometric contour—Shows altitude at which water would have stood in tightly cased well. Interval 50 feet. Datum is NAVD 88

• Data point—Well in which water-level measurement was made

● LJ-65-14-912 Data point and well number—Well in which water-level measurement was made and for which hydrograph is shown on figure 26

NAVD 88, North American Vertical Datum of 1988

NOTE:

1. POTENTIOMETRIC SURFACE MAP MODIFIED AFTER KASMAREK, 2013, USGS, SCIENTIFIC INVESTIGATION REPORT 2012-5154.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B4-POTENTIOMETRIC SURFACES.DWG

DRAWN BY: SRF
DESIGN BY: AC
REVIEWED BY: MT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

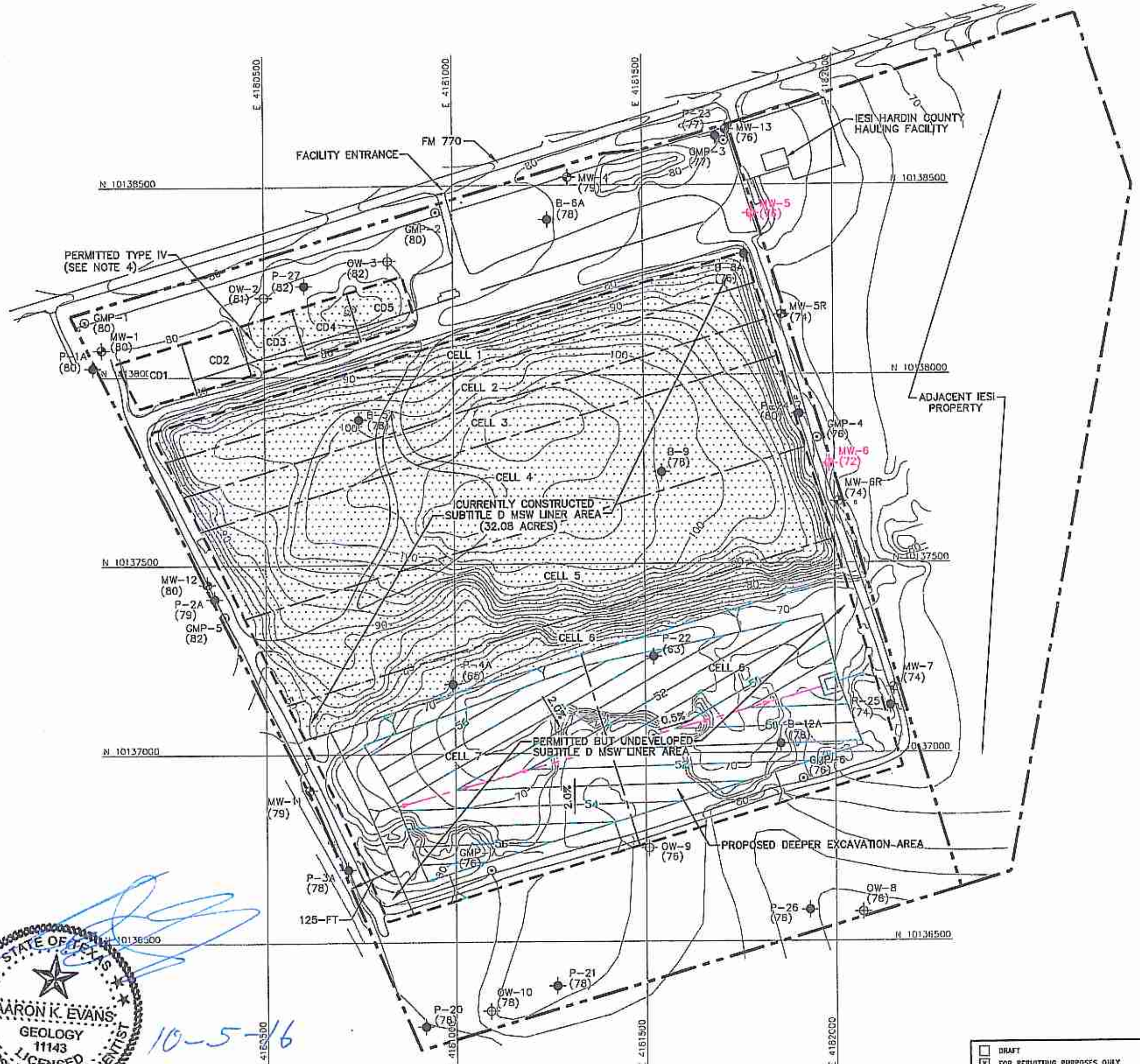
REVISIONS		
NO.	DATE	DESCRIPTION

SOIL BORING PLAN
REGIONAL CHICOT AQUIFER
POTENTIOMETRIC SURFACE MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-4



AARON K. EVANS
GEOLOGY
11143

10-5-16

LEGEND

— · — · —	IESI PROPERTY BOUNDARY
— · · —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — - — —	CELL BOUNDARY
——70——	EXISTING CONTOUR
——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 2)
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
⊕ MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊙ GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
● B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
⊕ MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
3. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B5-BOREHOLE LOCATION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

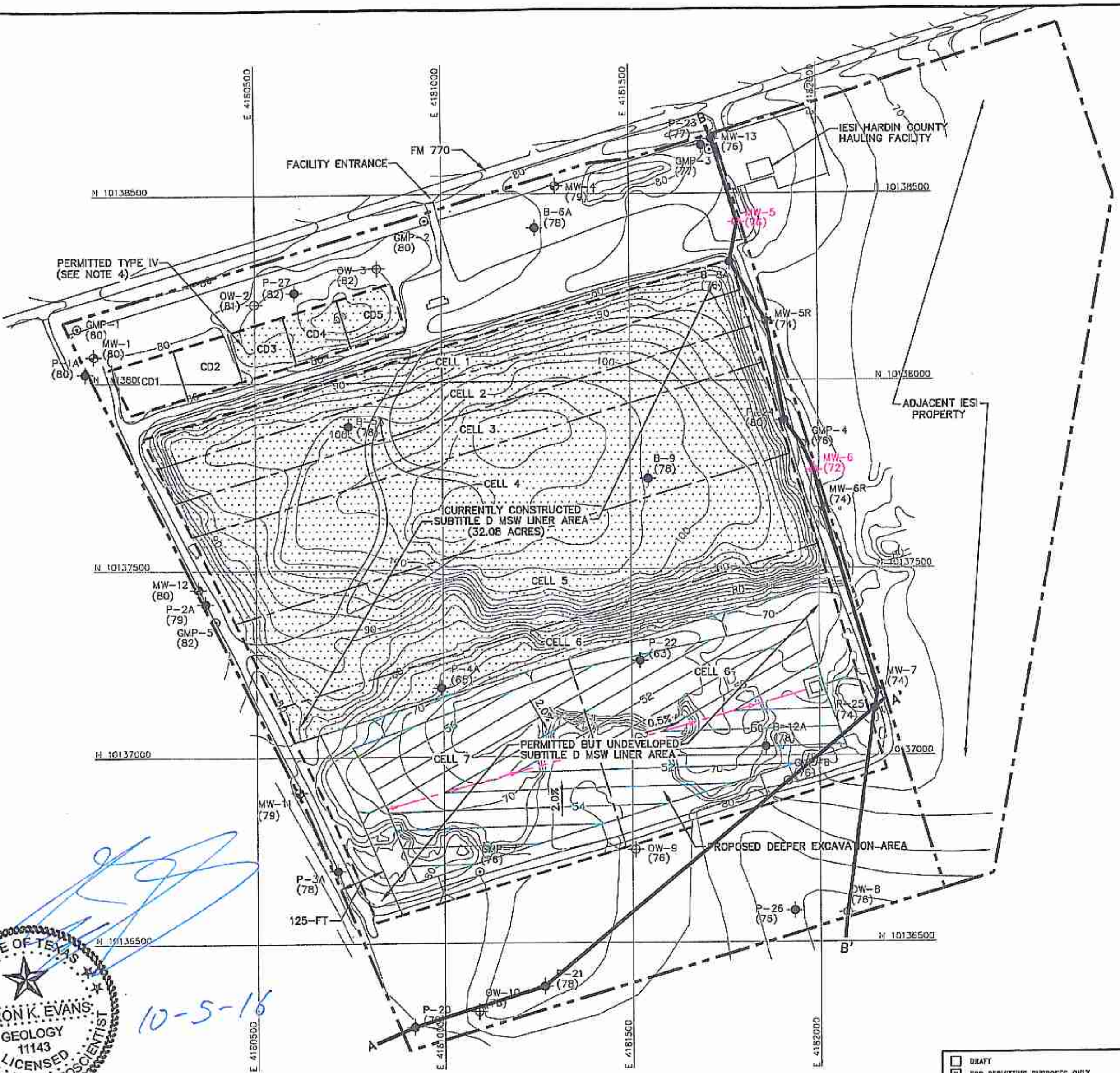
SOIL BORING PLAN
BOREHOLE LOCATION MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-5

P:\Solid waste\IESI\Hardin County\221-D Expansion\NEW EXCAVATION PLAN (10-7-16)\FIG B5-BOREHOLE LOCATION MAP.dwg, cmichael, 1:2



N

0 150 300

SCALE IN FEET

LEGEND

— - — — - —	IESI PROPERTY BOUNDARY
——— - - ———	PERMIT BOUNDARY
— — — — — —	CURRENTLY PERMITTED LIMITS OF WASTE
——— - ——— - —	CELL BOUNDARY
——70——	EXISTING CONTOUR
——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTE 2)
N 10137500	STATE PLANE COORDINATE GRID
A——A'	GEOLOGIC CROSS SECTION LOCATION
▨	EXISTING SUBTITLE-D LINED AREA
⌖ MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⌖ OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊙ GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
● B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
⌖ MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.

AARON K. EVANS
GEOLOGY
11143

10-5-16

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B6-CROSS SECTION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: IAT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS		
NO.	DATE	DESCRIPTION

SOIL BORING PLAN
GEOLOGIC CROSS SECTION INDEX MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

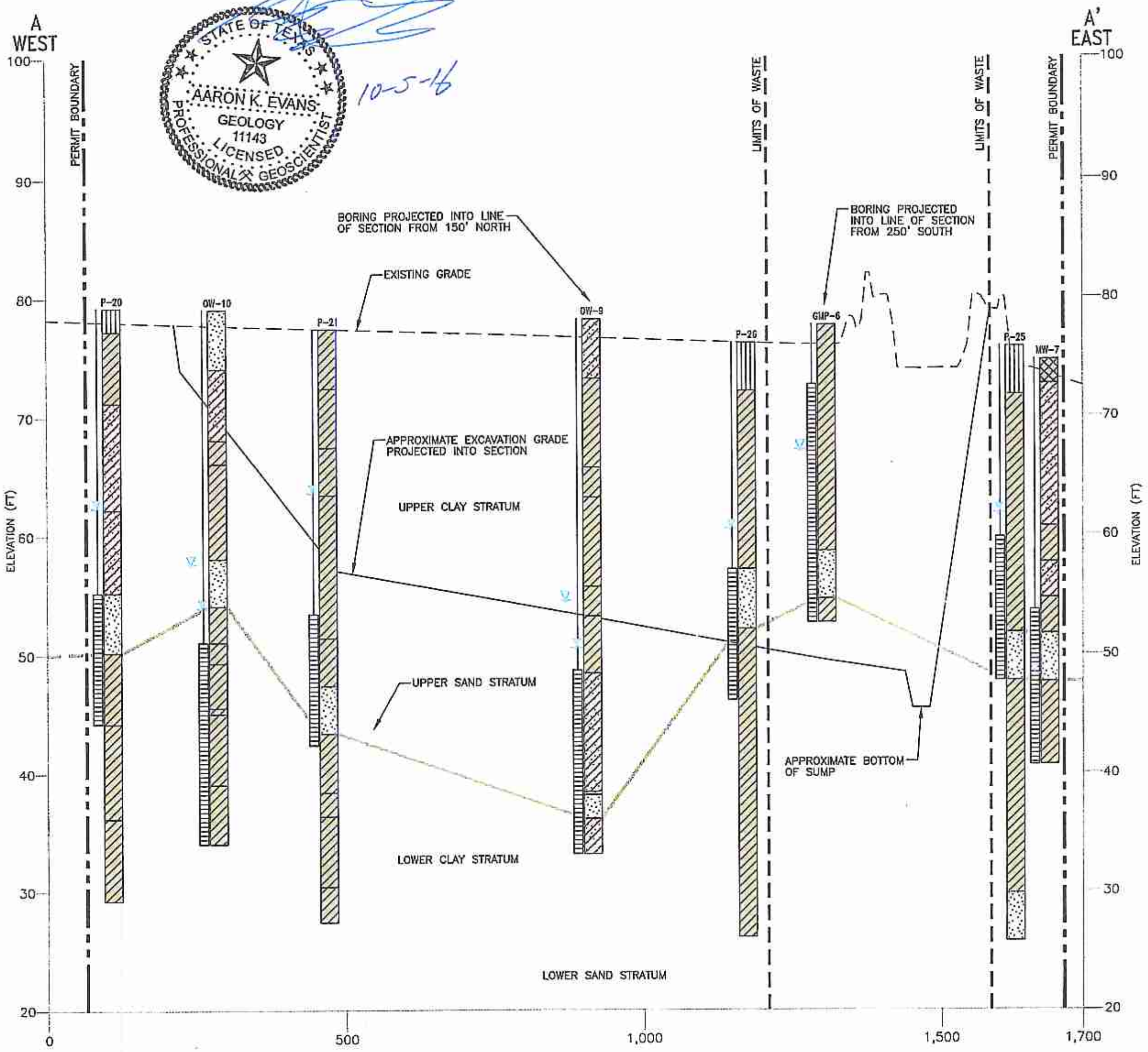
WWW.WCGRP.COM

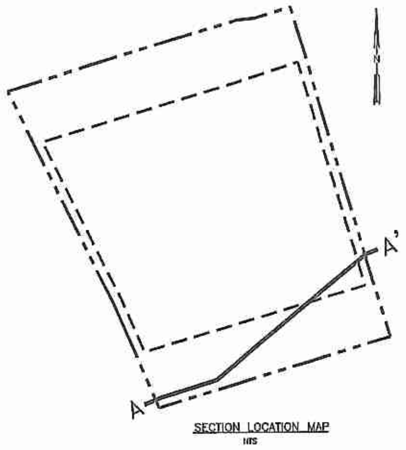
FIGURE B-6

P:\Solid waste\IESI\Hardin County\2214B Expansion\NEW EXCAVATION PLAN (10-7-16)\FIG B6-GEOLOGIC CROSS SECTION.dwg, cmichael, 1:2

AARON K. EVANS
GEOLOGY
11143

10-5-16





SECTION LOCATION MAP
NTS

LEGEND

- — · — PERMIT BOUNDARY
- — — — CURRENTLY PERMITTED LIMITS OF WASTE
- ▥ SILT, CLAYEY SILT, OR SANDY SILT
- ▨ CLAY OR SILTY CLAY
- ⁘ SAND, SILTY SAND, OR CLAYEY SAND
- ▨ SANDY CLAY
- ▦ EARTHEN FILL
- ▤ MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND SCREENED INTERVAL (BOTTOM)
- ▽ STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER GAUGING DATA
- ▽ GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE B-6.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.23 FT-MSL.

0 5 10
VERTICAL SCALE IN FEET
0 100 200
HORIZONTAL SCALE IN FEET

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-385-11
CAD: FIG B7-CROSS SECTION A-A'.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: MT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS		
NO.	DATE	DESCRIPTION

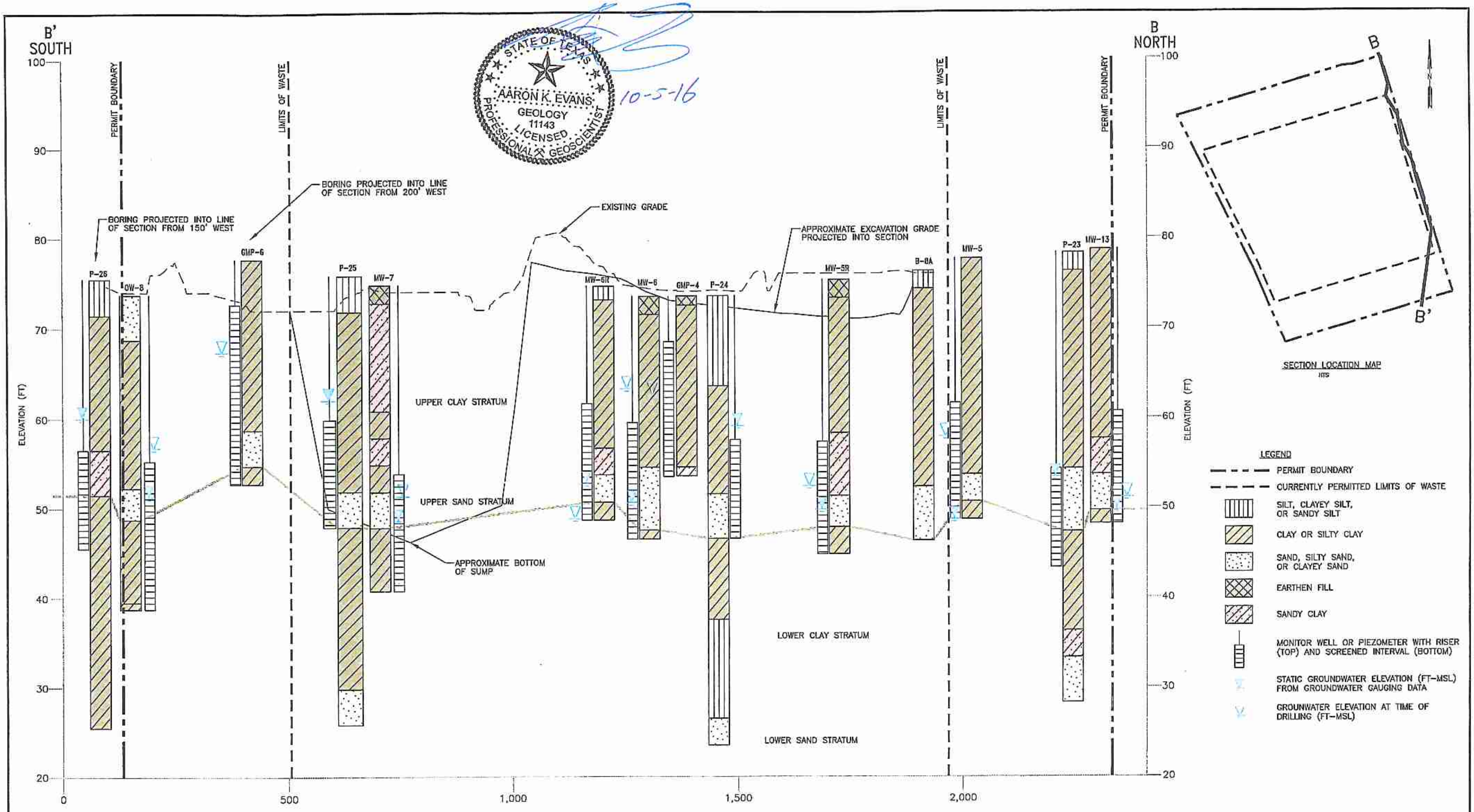
SOIL BORING PLAN
GEOLOGIC CROSS SECTION A-A'

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-7

O:\0771\385\EXPANSION (2016)\SOIL BORING PLAN\FIG B7-SECTION A-A'.dwg, sford, 1:2



AARON K. EVANS
11143
10-5-16

0 5 10
VERTICAL SCALE IN FEET

0 100 200
HORIZONTAL SCALE IN FEET

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING AND STATIC GROUNDWATER ELEVATIONS FROM PREVIOUS SUBSURFACE INVESTIGATION DATA AND MONITORING RECORDS.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE B-6.
3. PERMITTED DEEPEST EXCAVATION (EDE) ELEVATION IS 45.23 FT-MSL.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B8-CROSS SECTION B-B'.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION

SOIL BORING PLAN
GEOLOGIC CROSS SECTION B-B'

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-8

O:\0771\365\EXPANSION (2016)\SOIL BORING PLAN\FIG B8-SECTION B-B'.dwg, sford, 1:2

2016 SOIL BORING PLAN COMMENT RESPONSE
(CLEAN PAGES ONLY)

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

3-31-17

Weaver
Consultants
Group

December 6, 2016
Project # 0771-365-11-05-03

Mr. Terance Virtue, P.G.
MC 124
Municipal Solid Waste Permits Section
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: Soil Boring Plan Comment Response
IESI Hardin County Landfill
TCEQ Permit No. MSW-2214B
Hardin County, Texas
Tracking No. 20879574; RN103759643/CN601668480

Dear Mr. Virtue:

On behalf of IESI TX Landfill LP, Weaver Consultants Group, LLC (WCG) is submitting this comment response and attached revised Soil Boring Plan (SBP) replacement pages for the proposed MSW Permit No. 2214B. These revisions are designed to address Texas Commission on Environmental Quality (TCEQ) comments included in the SBP comment letter dated November 10, 2016. This response letter contains each item identified in the comment letter in bold and a response to each item in the same order listed within the comment letter.

A detailed response to each of the TCEQ comments follows:

1. **The boring plan suggests that previous investigations for the existing permit boundary have provided subsurface characterization for the currently permitted Type I landfill and that no additional subsurface investigations are proposed in section 4.2 on page 9 of the Soil Boring Plan. According to 30 TAC §330.63(e)(4)(B),the total number of borings needs to be six with five borings to extend to a depth of at least 30 feet below the EDE. Please revise the number of borings accordingly.**

Response:

Per your request, the SBP has been revised to utilize a total of six geotechnical borings for the purpose of further characterizing the proposed 16.62-acre (deepened) excavation area. Per our conversations on November 17, and 18, 2016, existing boreholes P-3A, P-4A, P-22, and P-25 will be utilized as shallow borings (greater than 5 feet below the EDE) and five new deep borings (WC-1 through WC-5) will be advanced within the deepened expansion area to a minimum depth of 30 feet below the proposed EDE. Figure B-5 – Borehole Location Map has been revised to indicate the use of existing borings P-3A, P4A, P-22, and P-25 as shallow borings and show the five proposed new deep boring locations (WC-1 through WC-5). Two of the proposed deep expansion borings (WC-4 and WC-5) will be completed as groundwater piezometers and screened within the Lower Sand Stratum to aid characterization of this stratum. Section 4.2 in the SBP has been revised and amended to include these proposed changes and outline the proposed site exploration for the proposed 16.62-acre deeper excavation area.

As indicated in the attached SBP revision and replacement pages, the proposed 16.62-acre deeper excavation area contours are illustrated and discussed as tentative representations with respect to the proposed EDE. The proposed excavation grades and EDE for the Major Permit Amendment application will be determined based on the 2016/2017 subsurface characterization data. In any case, the proposed EDE determination for the Major Permit Amendment application will comply with the boring depth requirements (i.e. five feet and 30 feet below) as outlined in your comment and prescribed in 30 TAC §330.63(e)(4)(B).

2. **Please add a Drilling Methods section to the SBP and state that all borings will be conducted in accordance with established field exploration methods as required by 30 TAC §330.63(e)(4)(C).**

   Response:

   Section 4.3 has been added to discuss drilling methods pertinent to the proposed site exploration as requested.

3. **Please state within the SBP that all borings, subsurface investigations, and plugging and abandonment will be conducted in accordance with applicable rules in Title 16 TAC Chapter 76 (Water Well Drillers and Water Well Pump Installers, administered by the Texas Department of Licensing and Regulation), including the preparation and submittal of the well installation and plugging reports.**

Response:

The requested text has been incorporated into Section 4.3 of the SBP.

4. **Please collect geotechnical information such as permeability, sieve analysis, atterberg limits and soil moisture as required in 30 TAC §330.63(e)(5).**

Response:

The requested geotechnical analyses will be performed as part of the proposed 16.62-acre subsurface characterization site exploration. Section 4.3 includes a discussion pertaining to the requested geotechnical analyses.

5. **Please add a key explaining the symbols used on the boring logs and the classification terminology for soil type, consistency, and structure must be provided in accordance with 30 TAC §330.63(e)(4).**

Response:

Per your comment, no site specific lithologic log legend key exists within the currently permitted Attachment 4 – Geology Report (MSW Permit No. 2214A) for the existing borings. A legend key was created based on the existing SWL (1990/1991) and Hydrex (1998, 2005, and 2010) boring log lithologic unit symbols and descriptions and has been included as new page C-2A in Appendix C of the Soil Boring Plan to facilitate your review. A detailed legend key will be provided in the major permit amendment application for proposed new subsurface characterization borings WC-1 through WC-5.

In addition to the changes made per your comments, the following revisions have been made to the proposed SBP:

- Figure A-2 – Site Plan notes have been revised to indicate (1) that the proposed expansion area is 16.62 acres, (2) that there are no proposed changes to the permitted permit boundary and limits of waste, and (3) that the excavation grades and EDE for the proposed major permit amendment application will be based on pending subsurface characterization data.
- Figure B-5 – Borehole Location Map notes have been revised to indicate (1) borehole coordinates sources, (2) that there are no proposed changes to the permitted permit boundary and limits of waste, (3) that the excavation grades and EDE for the proposed major permit amendment application will be based on pending subsurface characterization data, (4) that the proposed expansion boring locations are approximate and actual locations will be determined in the field based on site conditions and accessibility, and (5)

that all proposed borings will be advanced within the 16.62 acre expansion area.

- Sections 1.1 and 1.3 have been revised to indicate that the excavation grades and EDE for the proposed major permit amendment application will be based on pending subsurface characterization data.

The following appendices are included to complete this revision to the SBP in accordance with TCEQ's request.

- Attachment 1 includes replacement pages in redline/strikeout format for the applicable portions of the SBP to facilitate your review.
- Attachment 2 includes unmarked (clean) replacement pages for the applicable portions of the SBP to facilitate your review.

One original and one copy of this SBP submittal are provided for your review and distribution. One copy of this submittal has been sent to the TCEQ Region 10 office. Another copy of this submittal has been placed in the facility's Site Operating Record.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,

Weaver Consultants Group, LLC

AARON K. EVANS
GEOLOGY
11143

12-6-2016

Aaron K. Evans, P.G.
Project Geologist

Attachment: SBP Replacement Pages

cc: TCEQ Region 10 Office
Brett O'Connor, IESI TX Landfill LP
Forrest Hunter, IESI TX Landfill LP

ATTACHMENT 1

SBP REPLACEMENT PAGES
(REDLINE/STRIKEOUT COPY)

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

SOIL BORING PLAN

Prepared for

IESI Landfill TX LP

October 2016

Revised December 2016

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0771-365-11-07-03

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

1 INTRODUCTION

1.1 Purpose

The IESI Hardin County Landfill is in the process of developing a major permit amendment application (Texas Commission on Environmental Quality (TCEQ) Permit No. MSW-2214B) which will include a vertical expansion of the existing permitted waste footprint area. Appendix A includes currently permitted top of protective cover plans and proposed (draft) excavation plan drawings to provide an overview of this project. The following drawings are included in Appendix A.

- Figure A-1 (Aerial Photograph) shows the permitted landfill area on an aerial image. The proposed vertical expansion will include both a height increase and excavation depth increase from currently permitted grades within the facility's existing permitted Type I disposal area footprint.

- Figure A-2 (Site Plan) shows the existing site condition and depicts the currently developed areas and the undeveloped areas.

- Figure A-3 (Permitted and Proposed Excavation Plan) shows the currently permitted top of protective cover plan and the proposed excavation plan. As shown, the proposed excavation plan includes most of the southern undeveloped area (approximately 16.62 acres) which will be lowered by installing a second leachate collection pump. As illustrated in Figure A-3, ~~T~~the bottom elevation of proposed excavation for the new sump is tentatively contoured at 45.23 ft-msl. ~~The new sump bottom elevation is the same elevation as the landfill's permitted Elevation of Deepest Excavation (EDE) within the currently approved permit (from Attachment 15, Sheet No. 77, KSA Engineers, Inc., dated December 11, 2000).~~ The proposed excavation grades and EDE for the Major Permit Amendment application (2214B) may be determined based on the proposed 2016/2017 subsurface characterization data as discussed in Section 4.2..

- Figure A-4 (Permitted and Proposed Landfill Completion Plan) shows the permitted and proposed completion plan. As shown, the proposed vertical expansion includes a height increase of approximately 119 feet.

The proposed expansion does not include any changes to the landfill's existing permitted permit boundary~~,~~ or limits of waste~~, or EDE~~. The proposed vertical expansion area is located entirely within the existing 49.56-acre Type I limits of waste and 79-acre permit boundary currently approved under Permit No. MSW-

2214A. The proposed changes to both the excavation and final cover grades have been developed by providing a minimum 125-foot buffer from the permit or property boundary line on property that is owned by IESI.

1.2 Site History

The IESI Hardin County Landfill is an existing municipal solid waste (MSW) Type I and Type IV landfill facility located in Hardin County, approximately 3 miles southwest of the city of Kountze, Texas; west of the intersection of FM 770 and state highway 326. The facility has been owned and operated by IESI TX Landfill LP (IESI) since 2002.

The facility was originally permitted (Permit No. 2214) as a Type I and Type IV municipal solid waste facility in 1995. Prior to its permitting as an MSW landfill, the property was used for commercial lumber production. In 2002, the facility completed a major permit amendment (Permit No. 2214A) to allow the facility to receive additional waste streams. The 2002 permit amendment also included updates to Attachment 4 (Geology Report) and Attachment 5 (Groundwater Characterization Report) of the facility's Site Development Plan (SDP).

1.3 Proposed Excavation Plan

Figure A-3 shows the currently permitted top of liner protective cover grades and the tentatively illustrated proposed excavation plan. As shown, the facility has 32.08 acres of constructed Subtitle D liner (Cells 1 through Cell 5 and the northern third of Cell 6) of its permitted 49.56-acre Type I waste footprint. The permitted grading design directs leachate to a single northern sump with a bottom of excavation elevation of 49.66 ft-msl. The permitted excavation grades rise toward the south, southeast, and southwest limits of waste. The proposed excavation plan includes a deepening of the facility's remaining permitted waste footprint that includes Cell 7 and the southern two thirds of Cell 6. As depicted in Figure A-3, ~~T~~the proposed plan optimizes the excavation grades of the remaining undeveloped permitted Type I waste footprint utilizing ~~without exceeding~~ the permitted EDE of 45.23 ft-msl. However, the proposed excavation grades and EDE for the Major Permit Amendment application (2214B) may be revised based on the proposed 2016/2017 subsurface characterization data as discussed in Section 4.2. No changes are proposed to the currently permitted excavation grades within 125 feet from the permit boundary on the west side. On the south side, the current limits of waste line has more than 125 feet of buffer from the south permit boundary. The property to the east of the proposed expansion area (see Figure A-2) is also owned by IESI. Therefore, the proposed excavation plan is developed based on the currently permitted eastern limit of waste boundary. A leachate collection sump is proposed on the east edge of the revised excavation plan.

(MW-1 through MW-6) and seven LFG monitoring probes (GMP-1 through GMP-7). Most of these boreholes penetrated the Upper Sand Stratum uppermost aquifer and in most cases encountered the top of the underlying low permeability Lower Clay Stratum.

- A 2005 subsurface characterization by Hydrex Environmental included six geotechnical borings for the installation of six groundwater monitor wells (MW-7 through MW-12). These boreholes penetrated the Upper Sand Stratum uppermost aquifer.
- A 2010 subsurface characterization by Hydrex Environmental included three geotechnical borings for the installation of three groundwater monitor wells (MW-5R, MW-6R, and MW-13). These boreholes penetrated the Upper Sand Stratum uppermost aquifer and encountered the top of the underlying low permeability Lower Clay Stratum.

4.2 Proposed Site Exploration

The site has previously received TCEQ approval of its Subtitle D geology and hydrogeology characterization based on the permitted EDE and disposal waste footprint~~, neither of which have any proposed changes~~. Per 30 TAC §330.63(e)(4), the subsurface investigation requires that a sufficient number of borings be drilled deep enough to allow identification of the uppermost aquifer and the underlying aquiclude, to establish subsurface stratigraphy, and determine geotechnical properties. ~~Previous field investigations for the existing permit boundary have provided subsurface characterization deemed satisfactory by TCEQ for approval of the currently permitted Type I Subtitle D landfill unit and groundwater monitoring system design. For these reasons, no additional subsurface investigations or new soil borings are proposed.~~

Per TCEQ's letter dated November 10, 2016, six total geotechnical borings are requested for subsurface characterization of the proposed 16.62-acre deeper excavation area. Of these six borings, one is required to extend a minimum of five feet below the proposed EDE and the remaining five borings are required to extend a minimum of 30 feet below the EDE. As illustrated in Figure B-5, existing borings P-3A, P-4A, P-22, and P-25 are associated with the proposed 16.62-acre deeper excavation area. These existing borings will be utilized as designated shallow (five foot below EDE) borings for subsurface characterization of the deeper excavation area. Five additional/new deep borings (WC-1 through WC-5) are proposed to address the TCEQ's request. These five borings will be advanced to a minimum of 30 feet below the proposed EDE. Two of these new borings (WC-4 and WC-5) will be advanced adjacent existing facility groundwater wells MW-7 and OW-9 to be completed as groundwater piezometers screened within the Lower Sand Zone. The subsurface characterization information obtained from the proposed new borings and piezometers will be used to determine the proposed EDE for the 16.62-acre deeper excavation area in the MSW Permit No. 2214B Major Permit Amendment application. Existing borings P-3A, P-4A, P-22, and P-25 are a minimum of 15 feet below the currently permitted EDE of 45.23 ft-msl. Depending on the subsurface conditions encountered during the 2016/2017 subsurface characterization drilling, the EDE in the proposed major permit amendment application may be lowered. In any case, the proposed major permit amendment EDE will satisfy both the number of borings that are a minimum five of feet below the EDE using the existing borings (P-3A, P-4A, P-22, P-25) and the number of borings that are a minimum of 30 feet below the EDE using the new borings (WC-1 through WC-5).

4.3 Drilling and Subsurface Investigation Methods

The proposed subsurface characterization drilling and relating activities will be conducted in accordance with established field exploration methods as required by 30 TAC §330.63(e)(4)(C). All borings, subsurface investigations, and plugging and abandonment will be conducted in accordance with applicable rules in Title 16 TAC Chapter 76 (Water Well Drillers and Water Well Pump Installer, administered by the Texas Department of Licensing and Regulation). Geotechnical information will be obtained in accordance with 30 TAC §330.63(e)(5), pursuant to the proposed SBP subsurface characterization and subsequent MSW Permit No. 2214B major permit amendment application.

APPENDIX A

LANDFILL OVERVIEW DRAWINGS

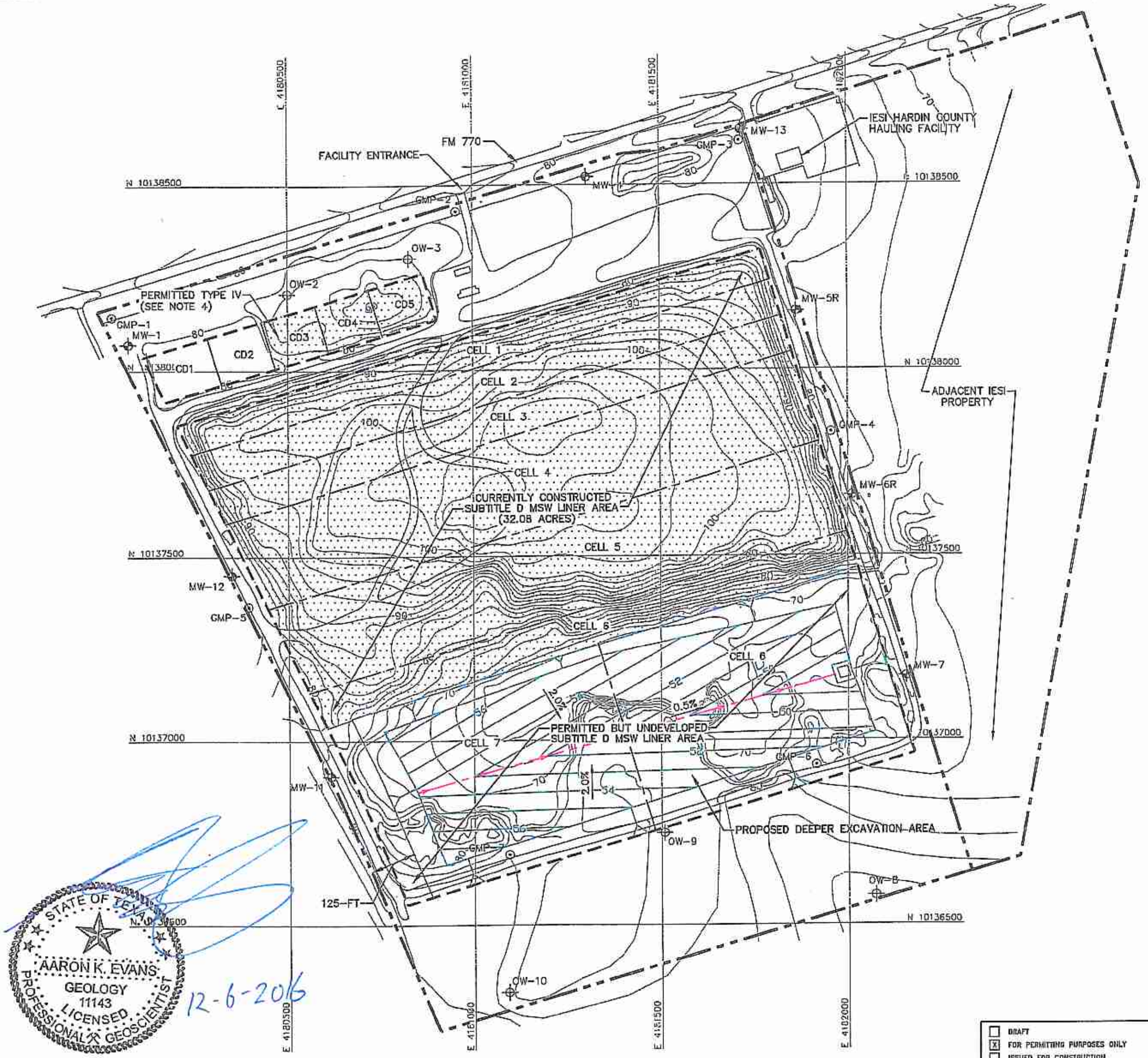
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016



LEGEND

- IESI PROPERTY BOUNDARY
- PERMIT BOUNDARY
- CURRENTLY PERMITTED LIMITS OF WASTE
- CELL BOUNDARY (SEE NOTE 5)
- 70 EXISTING CONTOUR
- 60 PROPOSED EXCAVATION CONTOUR (SEE NOTES 2 AND 6) △1
- N 10137500 STATE PLANE COORDINATE GRID
- ▨ EXISTING SUBTITLE-D LINER AREA
- MW-1 EXISTING GROUNDWATER MONITOR WELL
- OW-2 EXISTING GROUNDWATER OBSERVATION WELL
- GMP-1 EXISTING GAS MONITORING PROBE
- △ INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. △2 PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
3. △2 THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY OR LIMITS OF WASTE.
4. △2 CURRENTLY PERMITTED TYPE IV CELLS INCLUDES CD1 THROUGH CD5. CD3, CD4, AND CD5 ARE CURRENTLY DEVELOPED AND RECEIVED TYPE IV WASTE.
5. CURRENTLY APPROVED CELL DEVELOPMENT (CELL BOUNDARIES AND LABELS) SHOWN.
6. △2 THE PROPOSED EXCAVATION CONTOURS WERE DEVELOPED BY WCG AS PART OF THE DESIGN BASIS MEMORANDUM. PROPOSED EXCAVATION GRADES AND EDE FOR THE MAJOR PERMIT AMENDMENT APPLICATION WILL BE DETERMINED BASED ON THE 2016/2017 SUBSURFACE CHARACTERIZATION DATA.

LIST OF REVISIONS:

1. LEGEND UPDATED.
2. NOTES UPDATED.

AARON K. EVANS
GEOLOGY
11143

12-6-2016

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG A2-EXPANSION AREA PLAN.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2016	SEE LIST OF REVISIONS

SOIL BORING PLAN
SITE PLAN

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-2

O:\0771\365\2214B EXPANSION\SOIL BORING PLAN\FIG A2-SITE PLAN.dwg, jwilson, 1:2

APPENDIX B

GEOLOGY FIGURES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

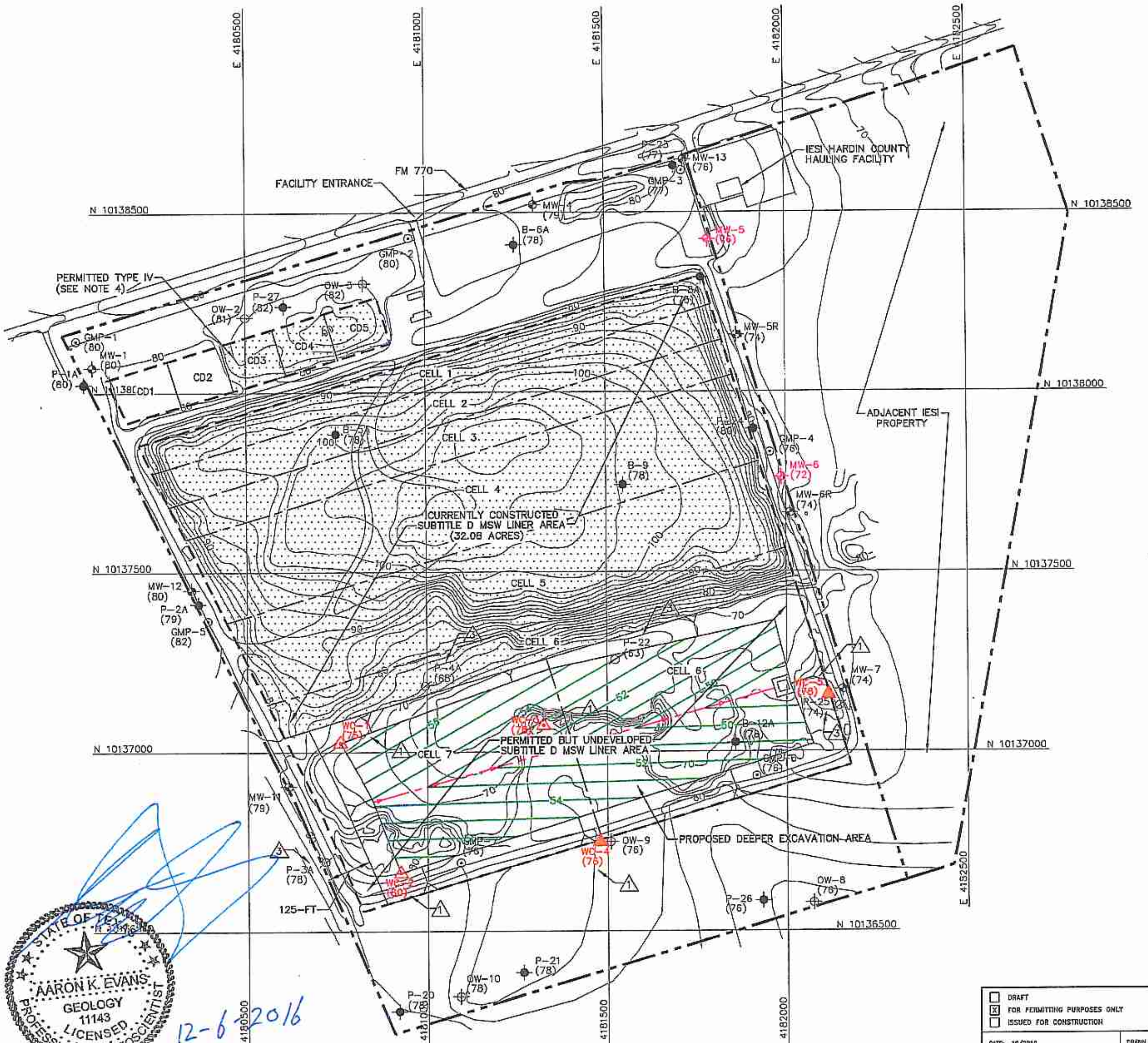
12-6-2016

CONTENTS

FIGURES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016



LEGEND

— · — · —	IESI PROPERTY BOUNDARY
— — · — —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — — —	CELL BOUNDARY
——70——	EXISTING CONTOUR
△2 ——60——	PROPOSED EXCAVATION CONTOUR (SEE NOTES 2 AND 5)
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
⌖ MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⌖ OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
⊙ GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
● B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
⌖ MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
△2 △3 ⌀ P-22	SWL 1990/1991 BORING LOCATION TO BE USED IN EXPANSION AREA CHARACTERIZATION
△ WC-1	PROPOSED EXPANSION BORING LOCATION (BOREHOLE ONLY) WITH SURFACE ELEVATION POSTED IN FT-MSL
△1 △2 ▲ WC-5	PROPOSED EXPANSION BORING AND PIEZOMETER LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
△1	INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. △4 EXISTING BOREHOLE LOCATION COORDINATES OBTAINED FROM PREVIOUS SUBSURFACE EXPLORATION BOREHOLE LOGS AND GROUNDWATER MONITORING WELL INSTALLATION REPORTS.
3. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
4. △4 THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY OR LIMITS OF WASTE.
5. △4 THE PROPOSED EXCAVATION CONTOURS WERE DEVELOPED BY WCG AS PART OF THE DESIGN BASIS MEMORANDUM. PROPOSED EXCAVATION GRADES AND EDE FOR THE MAJOR PERMIT AMENDMENT APPLICATION WILL BE DETERMINED BASED ON THE 2016/2017 SUBSURFACE CHARACTERIZATION DATA.
6. △4 PROPOSED EXPANSION BORING LOCATIONS ARE APPROXIMATE. ACTUAL BORING LOCATION WILL BE DETERMINED IN FIELD BASED ON SITE CONDITIONS AND ACCESSIBILITY.
7. △4 ALL PROPOSED EXPANSION BORINGS WILL BE ADVANCED WITHIN THE PROPOSED 16.62 ACRE EXPANSION AREA.

LIST OF REVISIONS:

1. FIVE PROPOSED BORING LOCATIONS ADDED.
2. LEGEND UPDATED.
3. PIEZOMETER DESIGNATION REVISED TO INDICATE USE IN EXPANSION AREA CHARACTERIZATION.
4. NOTES UPDATED.

AARON K. EVANS
GEOLOGY
11143

12-6-2016

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B5-BOREHOLE LOCATION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: MT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2016	SEE LIST OF REVISIONS

SOIL BORING PLAN
BOREHOLE LOCATION MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE-B-5

O:\0771\365\2214B EXPANSION\SOIL BORING PLAN\FIG B5-BOREHOLE LOCATION MAP-CALL.dwg, jwilson, 1:2

ATTACHMENT 2

SBP REPLACEMENT PAGES
(CLEAN COPY)

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

SOIL BORING PLAN

Prepared for

IESI Landfill TX LP

October 2016

Revised December 2016

AARON K. EVANS
GEOLOGY
11143

12-6-20

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0771-365-11-07-03

CONTENTS

AARON K. EVANS
GEOLOGY
11143

12-6-2016

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

1 INTRODUCTION

1.1 Purpose

The IESI Hardin County Landfill is in the process of developing a major permit amendment application (Texas Commission on Environmental Quality (TCEQ) Permit No. MSW-2214B) which will include a vertical expansion of the existing permitted waste footprint area. Appendix A includes currently permitted top of protective cover plans and proposed (draft) excavation plan drawings to provide an overview of this project. The following drawings are included in Appendix A.

- Figure A-1 (Aerial Photograph) shows the permitted landfill area on an aerial image. The proposed vertical expansion will include both a height increase and excavation depth increase from currently permitted grades within the facility's existing permitted Type I disposal area footprint.
- Figure A-2 (Site Plan) shows the existing site condition and depicts the currently developed areas and the undeveloped areas.
- Figure A-3 (Permitted and Proposed Excavation Plan) shows the currently permitted top of protective cover plan and the proposed excavation plan. As shown, the proposed excavation plan includes most of the southern undeveloped area (approximately 16.62 acres) which will be lowered by installing a second leachate collection pump. As illustrated in Figure A-3, the bottom elevation of proposed excavation for the new sump is tentatively contoured at 45.23 ft-msl. The proposed excavation grades and EDE for the Major Permit Amendment application (2214B) may be determined based on the proposed 2016/2017 subsurface characterization data as discussed in Section 4.2.
- Figure A-4 (Permitted and Proposed Landfill Completion Plan) shows the permitted and proposed completion plan. As shown, the proposed vertical expansion includes a height increase of approximately 119 feet.

The proposed expansion does not include any changes to the landfill's existing permitted permit boundary or limits of waste. The proposed vertical expansion area is located entirely within the existing 49.56-acre Type I limits of waste and 79-acre permit boundary currently approved under Permit No. MSW-2214A. The proposed changes to both the excavation and final cover grades have been developed by providing a minimum 125-foot buffer from the permit or property boundary line on property that is owned by IESI.

1.2 Site History

The IESI Hardin County Landfill is an existing municipal solid waste (MSW) Type I and Type IV landfill facility located in Hardin County, approximately 3 miles southwest of the city of Kountze, Texas; west of the intersection of FM 770 and state highway 326. The facility has been owned and operated by IESI TX Landfill LP (IESI) since 2002.

The facility was originally permitted (Permit No. 2214) as a Type I and Type IV municipal solid waste facility in 1995. Prior to its permitting as an MSW landfill, the property was used for commercial lumber production. In 2002, the facility completed a major permit amendment (Permit No. 2214A) to allow the facility to receive additional waste streams. The 2002 permit amendment also included updates to Attachment 4 (Geology Report) and Attachment 5 (Groundwater Characterization Report) of the facility's Site Development Plan (SDP).

1.3 Proposed Excavation Plan

Figure A-3 shows the currently permitted top of liner protective cover grades and the tentatively illustrated proposed excavation plan. As shown, the facility has 32.08 acres of constructed Subtitle D liner (Cells 1 through Cell 5 and the northern third of Cell 6) of its permitted 49.56-acre Type I waste footprint. The permitted grading design directs leachate to a single northern sump with a bottom of excavation elevation of 49.66 ft-msl. The permitted excavation grades rise toward the south, southeast, and southwest limits of waste. The proposed excavation plan includes a deepening of the facility's remaining permitted waste footprint that includes Cell 7 and the southern two thirds of Cell 6. As depicted in Figure A-3, the proposed plan optimizes the excavation grades of the remaining undeveloped permitted Type I waste footprint utilizing the permitted EDE of 45.23 ft-msl. However, the proposed excavation grades and EDE for the Major Permit Amendment application (2214B) may be revised based on the proposed 2016/2017 subsurface characterization data as discussed in Section 4.2. No changes are proposed to the currently permitted excavation grades within 125 feet from the permit boundary on the west side. On the south side, the current limits of waste line has more than 125 feet of buffer from the south permit boundary. The property to the east of the proposed expansion area (see Figure A-2) is also owned by IESI. Therefore, the proposed excavation plan is developed based on the currently permitted eastern limit of waste boundary. A leachate collection sump is proposed on the east edge of the revised excavation plan.

(MW-1 through MW-6) and seven LFG monitoring probes (GMP-1 through GMP-7). Most of these boreholes penetrated the Upper Sand Stratum uppermost aquifer and in most cases encountered the top of the underlying low permeability Lower Clay Stratum.

- A 2005 subsurface characterization by Hydrex Environmental included six geotechnical borings for the installation of six groundwater monitor wells (MW-7 through MW-12). These boreholes penetrated the Upper Sand Stratum uppermost aquifer.
- A 2010 subsurface characterization by Hydrex Environmental included three geotechnical borings for the installation of three groundwater monitor wells (MW-5R, MW-6R, and MW-13). These boreholes penetrated the Upper Sand Stratum uppermost aquifer and encountered the top of the underlying low permeability Lower Clay Stratum.

4.2 Proposed Site Exploration

The site has previously received TCEQ approval of its Subtitle D geology and hydrogeology characterization based on the permitted EDE and disposal waste footprint. Per 30 TAC §330.63(e)(4), the subsurface investigation requires that a sufficient number of borings be drilled deep enough to allow identification of the uppermost aquifer and the underlying aquiclude, to establish subsurface stratigraphy, and determine geotechnical properties.

Per TCEQ's letter dated November 10, 2016, six total geotechnical borings are requested for subsurface characterization of the proposed 16.62-acre deeper excavation area. Of these six borings, one is required to extend a minimum of five feet below the proposed EDE and the remaining five borings are required to extend a minimum of 30 feet below the EDE. As illustrated in Figure B-5, existing borings P-3A, P-4A, P-22, and P-25 are associated with the proposed 16.62-acre deeper excavation area. These existing borings will be utilized as designated shallow (five foot below EDE) borings for subsurface characterization of the deeper excavation area. Five additional/new deep borings (WC-1 through WC-5) are proposed to address the TCEQ's request. These five borings will be advanced to a minimum of 30 feet below the proposed EDE. Two of these new borings (WC-4 and WC-5) will be advanced adjacent existing facility groundwater wells MW-7 and OW-9 to be completed as groundwater piezometers screened within the Lower Sand Zone. The subsurface characterization information obtained from the proposed new borings and piezometers will be used to determine the proposed EDE for the 16.62-acre deeper excavation area in the MSW Permit No. 2214B Major Permit Amendment application. Existing borings P-3A, P-4A, P-22, and P-25 are a minimum of 15 feet below the currently permitted EDE of 45.23 ft-msl. Depending on the subsurface conditions encountered during the 2016/2017 subsurface characterization drilling, the EDE in the proposed major permit amendment application may be lowered. In any case, the proposed major permit amendment EDE will satisfy both the number of borings that are a minimum five of feet below the EDE using the existing borings (P-3A, P-4A, P-22, P-25) and the number of borings that are a minimum of 30 feet below the EDE using the new borings (WC-1 through WC-5).

4.3 Drilling and Subsurface Investigation Methods

The proposed subsurface characterization drilling and relating activities will be conducted in accordance with established field exploration methods as required by 30 TAC §330.63(e)(4)(C). All borings, subsurface investigations, and plugging and abandonment will be conducted in accordance with applicable rules in Title 16 TAC Chapter 76 (Water Well Drillers and Water Well Pump Installer, administered by the Texas Department of Licensing and Regulation). Geotechnical information will be obtained in accordance with 30 TAC §330.63(e)(5), pursuant to the proposed SBP subsurface characterization and subsequent MSW Permit No. 2214B major permit amendment application.

APPENDIX A

LANDFILL OVERVIEW DRAWINGS

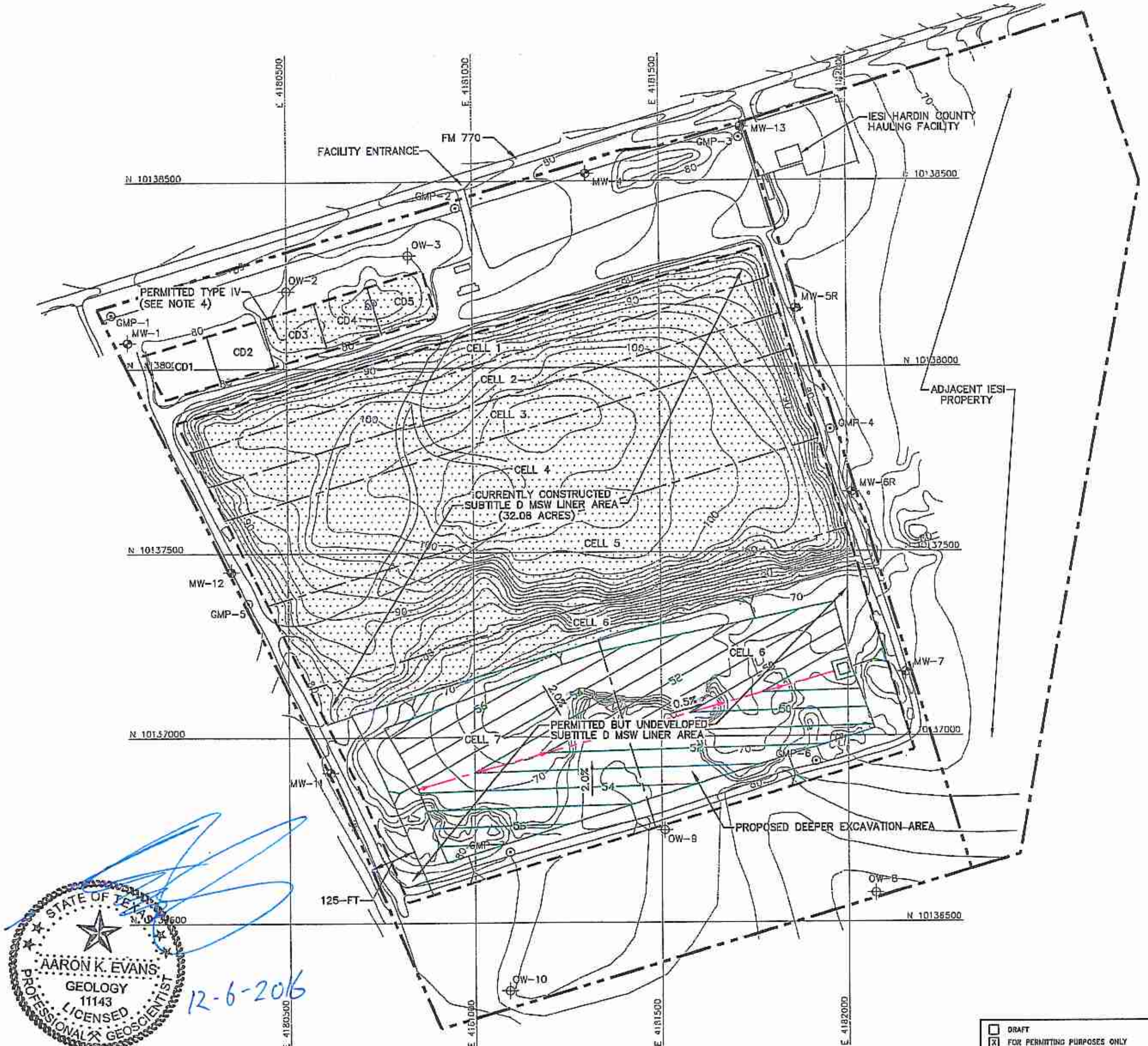
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-6-2016



LEGEND

— · — · —	IESI PROPERTY BOUNDARY
—— · · ——	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
— - — - —	CELL BOUNDARY (SEE NOTE 5)
—70—	EXISTING CONTOUR
△1 —60—	PROPOSED EXCAVATION CONTOUR (SEE NOTES 2 AND 6)
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
⊕ MW-1	EXISTING GROUNDWATER MONITOR WELL
⊕ OW-2	EXISTING GROUNDWATER OBSERVATION WELL
⊙ GMP-1	EXISTING GAS MONITORING PROBE
△1	INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. △2 PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
3. △2 THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY OR LIMITS OF WASTE.
4. CURRENTLY PERMITTED TYPE IV CELLS INCLUDES CD1 THROUGH CD5. CD3, CD4, AND CD5 ARE CURRENTLY DEVELOPED AND RECEIVED TYPE IV WASTE.
5. CURRENTLY APPROVED CELL DEVELOPMENT (CELL BOUNDARIES AND LABELS) SHOWN.
6. △2 THE PROPOSED EXCAVATION CONTOURS WERE DEVELOPED BY WCG AS PART OF THE DESIGN BASIS MEMORANDUM. PROPOSED EXCAVATION GRADES AND EDE FOR THE MAJOR PERMIT AMENDMENT APPLICATION WILL BE DETERMINED BASED ON THE 2016/2017 SUBSURFACE CHARACTERIZATION DATA.

LIST OF REVISIONS:

1. LEGEND UPDATED.
2. NOTES UPDATED.

AARON K. EVANS
GEOLOGY
11143

12-6-2016

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-369-11
CAD: FIG A2-EXPANSION AREA PLAN.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2016	SEE LIST OF REVISIONS

SOIL BORING PLAN
SITE PLAN

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-2

G:\0771\369\2214B EXPANSION\SOIL BORING PLAN\FIG A2-SITE PLAN.dwg, jwilson, 1:2

APPENDIX B

GEOLOGY FIGURES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

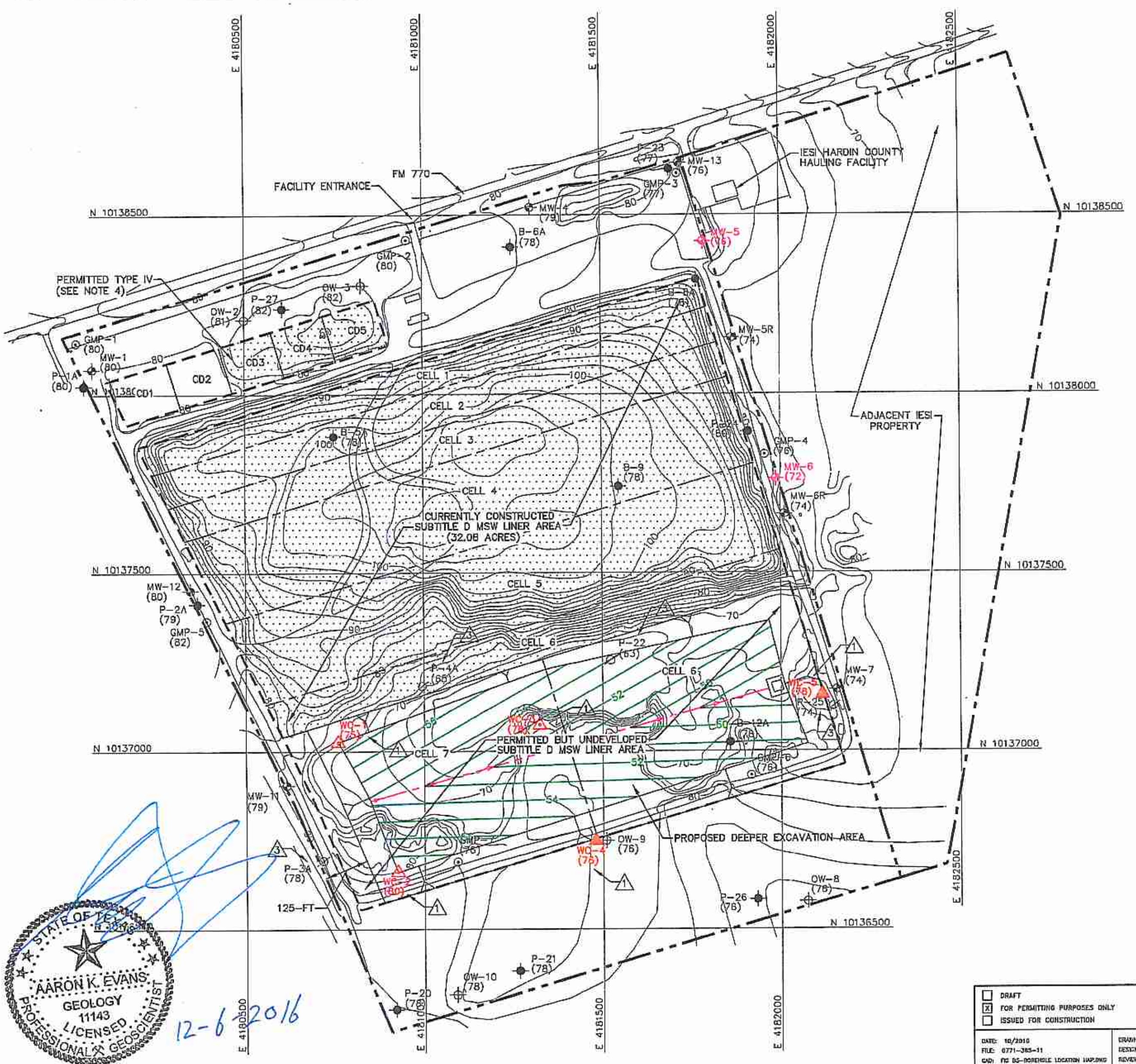
12-6-2016

CONTENTS

FIGURES

AARON K. EVANS
GEOLOGY
11143

12-6-2016



0 150 300
SCALE IN FEET

LEGEND

▬ ▪ ▬ ▪ ▬	IESI PROPERTY BOUNDARY
▬ ▪ ▪ ▬	PERMIT BOUNDARY
▬ ▬ ▬ ▬	CURRENTLY PERMITTED LIMITS OF WASTE
— - — - —	CELL BOUNDARY
—70—	EXISTING CONTOUR
—60—	PROPOSED EXCAVATION CONTOUR (SEE NOTES 2 AND 5)
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1	EXISTING GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
OW-2	EXISTING GROUNDWATER OBSERVATION WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
GMP-1	EXISTING GAS MONITORING PROBE WITH SURFACE ELEVATION POSTED IN FT-MSL
B-9	SWL 1990/1991 BORING LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
MW-5	FORMER GROUNDWATER MONITOR WELL WITH SURFACE ELEVATION POSTED IN FT-MSL
P-22	SWL 1990/1991 BORING LOCATION TO BE USED IN EXPANSION AREA CHARACTERIZATION
WC-1	PROPOSED EXPANSION BORING LOCATION (BOREHOLE ONLY) WITH SURFACE ELEVATION POSTED IN FT-MSL
WC-5	PROPOSED EXPANSION BORING AND PIEZOMETER LOCATION WITH SURFACE ELEVATION POSTED IN FT-MSL
△	INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. EXISTING BOREHOLE LOCATION COORDINATES OBTAINED FROM PREVIOUS SUBSURFACE EXPLORATION BOREHOLE LOGS AND GROUNDWATER MONITORING WELL INSTALLATION REPORTS.
3. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
4. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY OR LIMITS OF WASTE.
5. THE PROPOSED EXCAVATION CONTOURS WERE DEVELOPED BY WCG AS PART OF THE DESIGN BASIS MEMORANDUM. PROPOSED EXCAVATION GRADES AND EDE FOR THE MAJOR PERMIT AMENDMENT APPLICATION WILL BE DETERMINED BASED ON THE 2016/2017 SUBSURFACE CHARACTERIZATION DATA.
6. PROPOSED EXPANSION BORING LOCATIONS ARE APPROXIMATE. ACTUAL BORING LOCATION WILL BE DETERMINED IN FIELD BASED ON SITE CONDITIONS AND ACCESSIBILITY.
7. ALL PROPOSED EXPANSION BORINGS WILL BE ADVANCED WITHIN THE PROPOSED 16.62 ACRE EXPANSION AREA.

LIST OF REVISIONS:

1. FIVE PROPOSED BORING LOCATIONS ADDED.
2. LEGEND UPDATED.
3. PIEZOMETER DESIGNATION REVISED TO INDICATE USE IN EXPANSION AREA CHARACTERIZATION.
4. NOTES UPDATED.

AARON K. EVANS
GEOLOGY
11143

12-6-2016

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 10/2016
FILE: 0771-365-11
CAD: FIG B5-BOREHOLE LOCATION MAP.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: HT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2016	SEE LIST OF REVISIONS

SOIL BORING PLAN
BOREHOLE LOCATION MAP

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE-B-5

O:\0771\365\2214B EXPANSION\SOIL BORING PLAN\FIG B5-BOREHOLE LOCATION MAP-CALL.dwg, jwilson, 1:2

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIH
GROUNDWATER MONITORING, SAMPLING, AND ANALYSIS PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED PROFESSIONAL GEOSCIENTIST

12-05-17

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-758-11-02

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

CONTENTS (CONTINUED)

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS (CONTINUED)

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

TABLES

1 INTRODUCTION

Appendix IIIH addresses §330.63(f)

This groundwater monitoring, sampling and analysis plan (GWSAP) has been prepared for the Hardin County Landfill (Municipal Solid Waste [MSW] Permit No. 2214B). This plan incorporates the GWSAP procedures and methodology from the previous permit. The following plan contains the groundwater monitoring system design aspects, system engineering report, and the procedures for collecting representative samples from groundwater monitoring wells and the basic laboratory requirements for obtaining valid, defensible data. The plan also includes monitoring well placement, design and construction, and well development procedures. This GWSAP has been prepared, and will be followed, in accordance with Title 30 TAC §330.401 through §330.415, §330.419 and §330.421. Groundwater monitoring will be conducted at the site through the active life and post-closure care period of the landfill, pursuant to Title 30 TAC §330.401(f).

2 GROUNDWATER MONITORING SYSTEM

2.1 Groundwater Monitoring System

The currently approved groundwater monitoring system network was designed by Biggs and Mathews Environmental (B&M) in 2009 to comply with Title 30 TAC §330.403(a)(2) as part of the TCEQ-approved 600-foot groundwater monitoring well spacing permit modification. The facility's existing groundwater monitoring well network is shown on Figure IIIH-A.1 (Groundwater Monitoring System) in Appendix IIIH-A. The existing groundwater monitoring system was approved by TCEQ on February 16, 2010. The proposed changes to the existing groundwater monitoring system are illustrated on Figure IIIH-A.1 and serve to augment the existing/approved system. Existing and proposed facility groundwater wells are listed in Table 2-1.

The existing groundwater monitoring system is comprised of eight groundwater detection monitoring wells. Monitoring wells MW-4, MW-5R, MW-6R, MW-7, and MW-13 are the designated point of compliance wells. Monitoring wells MW-1, MW-11, and MW-12 are the designated background wells (i.e., hydraulically upgradient wells). The facility also maintains five observation wells (OW-2, OW-3, OW-8, OW-9, and OW-10) for groundwater gauging purposes. These observation wells were converted from their former monitor well designations (MW-2, MW-3, MW-8, MW-9, and MW-10) following approval of the 600-foot well spacing permit modification by B&M (2009). Each monitoring well is constructed in accordance with the requirements of Title 30 TAC §330.421.

The proposed groundwater monitoring system is illustrated in Figure IIIH-A.1 in Appendix IIIH-A. Per TCEQ request, proposed changes to the groundwater monitoring system augment the existing/approved groundwater monitoring network by extending the point of compliance from MW-7 to OW-9 and adding two point of compliance wells (MW-9 and MW-14) along this extension. The proposed system retains all existing permitted groundwater detection monitoring wells. Observation well OW-9 will be converted to its former monitor well designation MW-9 at least two years prior to waste placement in Cell 7. New monitor well MW-14 will be installed between MW-7 and MW-9 to facilitate an interwell spacing less than 600 feet. Monitor well MW-14 will be installed at least two years prior to waste placement in Cell 7. A certification of the groundwater monitoring system is provided on page IIIH-A.4 of Appendix IIIH-A.

The uppermost aquifer beneath the facility is comprised of the site-specific Upper Sand Stratum. The groundwater monitoring system was designed to monitor a single uppermost aquifer within the Upper Sand Stratum sediments. All facility groundwater monitor wells are screened within the Upper Sand Stratum. The site-specific Lower Clay Stratum comprises the lower confining unit (aquiclude) for groundwater present in unconfined (water table) conditions within the Upper Sand Stratum (monitored uppermost aquifer). Groundwater elevations measured in the wells indicate groundwater flow largely mimics natural surface topography and flows across the top of the Lower Clay Stratum towards the permitted point of compliance to the east and northeast. The regional and site specific geology and hydrogeology are detailed in Appendix IIIG (Geology Report) of Part III. A discussion of historical groundwater potentiometric surface data, and interpretation, is discussed in the following section.

Table 2-1
Groundwater Monitoring Well Network

Well Name	Gradient Position	Status
MW-1	Background	Existing, retained in system
OW-2 (MW-2)	Background/Observation	Existing observation well to remain
OW-3 (MW-3)	Background/Observation	Existing observation well to remain
MW-4	Point of Compliance	Existing, retained in system
MW-5R	Point of Compliance	Existing, retained in system
MW-6R	Point of Compliance	Existing, retained in system
MW-7	Point of Compliance	Existing, retained in system
OW-8 (MW-8)	Background/Observation	Existing observation well to remain
MW-9 (OW-9 (MW-9))	Point of Compliance	Existing observation well to convert to detection well MW-9 at least two years prior to waste placement in Cell 7
OW-10 (MW-10)	Background/Observation	Existing observation well to remain
MW-11	Background	Existing, retained in system
MW-12	Background	Existing, retained in system
MW-13	Point of Compliance	Existing, retained in system
MW-14	Point of Compliance	New, to be installed at least two years prior to waste placement in Cell 7

Note: Former well names are listed in parenthesis.
Monitor well MW-9's former designations were MW-9, then OW-9.

2.2 Former Groundwater Monitoring System

Prior to the approval of the facility's 600-foot monitoring well spacing permit modification, the uppermost groundwater zone was monitored by 12 detection monitoring wells (MW-1 through MW-12). This former groundwater monitoring system included one background well (MW-1) and 11 point of compliance wells (MW-2 through MW-12). According to Permit No. MSW-2214A, Attachment 5, Section 2.2, the former groundwater monitoring system design was based on "data from likely flawed piezometer installations or from water levels on only part of the site" (B&M, 2009).

To accurately illustrate representative site-wide groundwater flow, B&M produced 10 potentiometric surface maps (Figures A-7 through A-16 in Attachment 5 of Permit No. MSW-2214A) using groundwater gauging data collected during routine sampling events from July 2005 through January 2009. These B&M groundwater maps are included as Figures IIIH-A-6 through IIIH-A-16 in Appendix IIIH-A and demonstrate consistent groundwater flow toward the east and northeast permit boundary. The existing permitted groundwater monitoring system design is based on this revised and accurate groundwater flow regime.

Groundwater potentiometric surface contour maps prepared from the facility's four preceding semiannual groundwater monitoring event's well gauging data were obtained from Hydrex in 2016. These contour maps are included as Figures IIIG-D.1 through IIIG-D.4 in Appendix IIIG. These recent potentiometric surface contours and the groundwater flow regime remain consistent with those depicted by B&M. Regional and site-specific geology and hydrogeology are discussed in Appendix IIIG (Geology Report) of Part III.

2.3 Monitoring Well Design and Maintenance

Well location coordinates, nearest ground elevations, and top of casing elevations for all existing facility wells (except OW-8 and OW-10) were surveyed by Weaver Consultants Group (WCG) in December 2016. Observations wells OW-8 and OW-10 could not be surveyed due to dense canopy obstruction. Well construction details were obtained from the Hydrex monitor well borehole logs and construction diagrams included in Appendix IIIG-B of Appendix IIIG. These Hydrex and WCG groundwater monitoring well data are summarized in Figure IIIH-A.2 (Groundwater Monitoring Well Details) in Appendix IIIH-A. Typical groundwater monitoring well specifications are depicted in Figure IIIH-A.3 in Appendix IIIH-A. Consistent with Title 30 TAC §330.421, all existing facility monitoring and observation wells were drilled and installed by a qualified Texas-licensed monitor well driller. Existing detection monitoring well construction details are summarized as follows:

- Well Casing: 2-inch-diameter Schedule 40 PVC with 10 foot 0.010-inch slotted well screens and bottom cap.
- Filter Pack: 20/40 mesh silica sand extending from screen bottom to least two feet above the top of the well screen.
- Annular Seal: At least 2 feet of hydrated bentonite chips or pellets placed directly above the filter pack.

- Casing Seal: Bentonite grout placed directly above the annular seal extending to within about two feet of ground surface.
- Surface Completion: 4-foot by 4-foot concrete pad extending to top casing seal, lockable metallic protective casing, and protective bollards (as needed).

All parts of the groundwater monitoring system will be operated and maintained so that they perform to design specifications throughout the life of the monitoring program. Any monitoring well that is damaged to the extent that it is no longer suitable for sampling will be reported to the TCEQ who may make a determination about whether to repair or replace the well. Well plugging and abandonment will be performed by a Texas-licensed monitoring well driller in accordance with TCEQ and any other applicable regulatory requirements. No monitoring well will be plugged and abandoned without prior TCEQ written authorization. Any replacement monitoring well installation will be performed in accordance with Title 30 TAC §330.421 by a Texas-licensed monitoring well driller.

Following any monitoring well installation, the well will be adequately developed to remove drilling artifacts. Development will continue until all of the water used or affected during drilling activities has been removed and field measurements of pH, specific conductance, turbidity and temperature have stabilized. In addition, the monitoring well location and all appropriate elevations associated with the top-of-well equipment will be surveyed by a registered professional surveyor. The elevations will be surveyed to the nearest 0.01 foot and referenced to mean seal level. The point on the well casing where the top of casing datum elevation is determined will be permanently marked. Within 60 days of well completion, a monitoring well installation report will be submitted to the TCEQ. The report will include a lithologic log, a site map drawn to scale locating the well, and the relevant point of compliance details regarding the well. Any forms required by any applicable agency will be submitted to that agency, and form copies will be provided to the TCEQ with the monitoring well installation report.

2.4 Groundwater Monitoring Program

All facility detection monitoring wells are sampled semi-annually for the detection monitoring parameters in 40 Code of Federal Regulations (CFR) 258 Appendix I which are listed in Table 5-1 in Section 5.1. Details regarding groundwater sampling, analyses, and statistical comparison procedures are discussed in the following sections of Appendix IIIH.

3 GROUNDWATER SAMPLING PROCEDURES

3.1 Health and Safety Plan

A health and safety plan is required for all groundwater sampling events at the landfill. Prior to monitoring well purging and sampling, the sampling contractor's Ground Water Sampling Health and Safety Plan must be in place. Designing the site Ground Water Sampling Health and Safety Plan will be the responsibility of the party performing the actual work. In addition, each laboratory facility is responsible for their own standard laboratory health and safety plan as required by current Occupational and Safety and Health Administration (OSHA) regulations.

3.2 Sample Event Preparation and QA/QC

3.2.1 General Event Preparation

The laboratory performing the groundwater analysis will supply all necessary transportation coolers, pre-cleaned sample containers, quality assurance and quality control (QA/QC) trip blanks, chemical preservatives, sample container labels, custody seals, and chain-of-custody forms. All field data will be entered on a field data sheet (see example provided in Appendix IIIH-C) or an equivalent form. A specific contact person should be established at both the facility and contract laboratory for communication between the two parties.

3.2.2 Sample Container Selection

Each sample container will to be constructed of materials compatible and non-reactive with the sample it is designed to contain. Consult Appendix IIIH-D (Containerization and Preservation of Samples) to determine the number, type, and volume of appropriate containers. As noted in Section 3.2.1, the contract laboratory performing the analysis will supply all the required containers. Sample containers will be purchased as a pre-cleaned product or cleaned in the laboratory in a manner consistent with EPA protocol.

3.2.3 Equipment Preparation Prior to Site Arrival

Equipment preparation includes, at a minimum, decontamination procedures for water level indicators and field parameter (temperature, pH, specific conductivity, and turbidity) measurement devices. Operation and calibration of field instruments will be performed per the manufacturers' instructions.

- Water Level Indicators – Water level indicators will be decontaminated prior to initial site arrival by hand-washing the sensor probe and entire length of tape in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free deionized or distilled water.
- Field Parameter Measuring Devices – Field parameter measuring devices will be decontaminated by hand washing the sample cells in a laboratory grade non-phosphate detergent followed by a triple rinse with organic free deionized or distilled water. Meters will then be checked for proper calibration and operation as per the manufacturers' instructions. Any malfunctioning meters will be replaced prior to packing.

In the case of equipment failure, it is recommended that back-up instruments be in the sample crew's possession. If a back-up instrument is not available, then sampling will not proceed until the necessary properly functioning and calibrated replacement equipment is made available.

3.2.4 Field QA/QC Samples

Field QA/QC samples are used to identify sample contamination from the field, and/or shipping procedures, and document the precision of analytical processing by the laboratory. These blanks consist of one trip blank per sampling event, one field blank for each day of sampling, and one field duplicate per sampling event. A basic description of these field QA/QC samples follows:

- Trip Blank – These samples will be prepared in the laboratory by filling the appropriate clean sample containers with organic-free water and adding the applicable chemical preservative, as indicated in Appendix IIIH-D. Trip blank samples will be shipped in the transportation cooler to the field and shipped back to the laboratory with the collected groundwater samples. The trip blank will be tested to detect any contamination that may occur as a result of the containers, sample coolers, cleaning procedures, or chemical preservatives used. Trip blank samples will be analyzed for the VOC constituents indicated in Appendix IIIH-D at a frequency of one per sampling event.
- Field Blank – These sample containers will be collected in the field at a routine sample collection point by filling the appropriate sample containers with laboratory-grade distilled or deionized water. The field blank samples will be tested to detect contamination that may occur as a result of site ambient air conditions and serve as an additional check for contamination in sample containers or transport coolers. Field blanks samples will be collected and analyzed for the VOC constituents indicated in Table 5-1 of Section 5.1 at a frequency of one per day of sampling.

- Field Duplicate – These are a duplicate set of groundwater samples collected from a detection monitoring well and labeled with a non-existent well number so that the laboratory is unaware that the samples are duplicates. These samples are obtained by consecutively filling two sets of separate sample containers with groundwater obtained from the same detection monitoring well and analyzing each set of samples independently. Field duplicate samples are useful in documenting the precision of sampling and analytical processes. Field duplicate samples will be collected in proper alternating order for each parameter (e.g. VOCs for the sample point container, VOCs for the field duplicate container, metals for the sample point container, metals for the field duplicate container, etc.). Field duplicate samples will be collected and analyzed at a frequency of one per sampling event.

Appropriate field QA/QC documentation will be recorded on the field data sheet; an example of which is included in Appendix IIIH-C.

3.3 Monitor Well Inspection

During each monitoring event, every gauged well and its surface completion will be visually examined for anything unusual. This includes examination of the well casing, well head, protective cover, locking device, concrete pad, labels, etc. All observations will be recorded on the field data sheet. If any problems are discovered, they will be reported to the facility manager as soon as practical.

3.4 Well Purge

3.4.1 General Well Purge Information

Purging a monitoring well is just as important as the subsequent sampling of the well. Over a certain period of time stagnant well water may become unrepresentative of formation water due to chemical and biochemical changes which alter water quality.

3.4.2 Water Level Measurement

Prior to purging each monitoring well, a water level measurement is required. The water level in each well will be gauged and recorded on the field data sheet. Water level indicator equipment will be constructed of chemically inert materials and will be decontaminated with a non-phosphate detergent, followed with a deionized or distilled water rinse, before use in each well. Water levels will be measured with a precision of +/- 0.01 foot. Groundwater elevations must be measured within a period of time short enough to avoid temporal variations in groundwater flow which could preclude an accurate determination of groundwater flow rate and direction. Water level measurements will be taken from the permanent datum point that will be clearly marked on the top of the well casing.

3.4.3 Purge Equipment and Procedures

Groundwater wells will be purged with disposable bailers, well-dedicated bailers, or well-dedicated pumps to minimize cross contamination potential. An individual disposable bailer will not be used to purge or sample multiple wells. If using a disposable bailer, the bailer will be used to purge/sample one well only and will be disposed of following sampling completion. Bailers will be constructed of Teflon, polypropylene, PVC, or stainless steel. Well-dedicated equipment will remain dedicated to each respective well throughout monitoring unless replacement is necessary due to damage or wear, in which case repairs will be completed or a new dedicated pump will be installed.

Purge and decontamination/rinsate water will be collected in containers and disposed of in accordance with Section 3.4.6. Disposable, powderless gloves will be changed between wells and between purging and sampling to reduce the potential for cross-contamination and exposure to potentially contaminated groundwater.

3.4.4 Purge Order

Based on water-level measurements taken prior to well purging, sampling will generally proceed from the well with the highest groundwater elevation to those with successively lower elevations unless contamination is known to be present. If contamination is present, monitoring wells not likely to be contaminated must be sampled before those that are known to be contaminated. The sampling sequence may be modified to accommodate unusual weather conditions or slow recovery wells.

3.4.5 Purge Volume

Prior to sampling, the well will be purged to remove at least three well casing volumes of groundwater, or to dryness if that occurs first. Purged water will be measured in a graduated container to accurately determine purge volumes. The volume of water to be purged can be calculated as follows: Depth of water in the well column is calculated by subtracting the depth to the water surface from the recorded total depth of the well casing. The volume of water per foot of 2-inch diameter, schedule 40 PVC well casing is 0.163 gallons. The amount of water present in the well casing can be calculated by multiplying the depth of water by the value above for the proper casing diameter. Multiply the amount of water in the casing by three to obtain the amount of water in three well volumes to be purged.

Example:

Total depth of well casing (feet)	41.50
Depth to groundwater (feet)	-12.36
Depth of water column (feet)	29.14
Gallons/feet of 2-inch casing	x 0.163
Amount of water in casing (gallons)	4.75
Three well volumes	x 3
Total volume to be purged (gallons)	14.25

The wells will be considered sufficiently purged once three well volumes of groundwater are removed or the well purges to dryness.

3.4.6 Purge Water Management

All purge water and excess sample water will initially be collected in appropriate sealed containers. Contaminated purge water and excess sample water is considered contaminated if the concentration of any detected constituent statistically exceeds the constituent's background concentration. Contaminated purge water will be handled in the same manner as leachate. If needed, TCEQ will be consulted to assist in assessing proper disposal protocol. Uncontaminated groundwater may be discharged to the ground surface away from the well.

3.5 Monitoring Well Sample Collection

3.5.1 General Sample Collection Information

Sampling will take place within 24 hours of completion of purging. If after 24 hours, a slowly recharging well has not recovered sufficiently for a complete set of samples, a partial set of samples will be collected in the order specified in Section 3.5.2 until no more samples for the set can be collected.

3.5.2 Sample Collection Order

Samples will be collected and containerized according to the volatility of the required analyses. A specific collection order is as follows:

- Volatile Organic Compounds
- Semi-Volatiles (if collected)
- Total Metals
- Field Parameters (temperature, specific conductivity, pH and turbidity)
- Inorganics (if collected)

3.5.3 Sampling Equipment and Procedures

Groundwater wells will be sampled with disposable bailers, well-dedicated bailers, or well-dedicated pumps to minimize cross contamination potential. Groundwater samples will be collected utilizing the same equipment used to purge the well. If a pump is used to sample, the pump controller will be adjusted to reduce the flow rate to between 100 and 250 ml/min. If a bailer is used to sample, sample containers will be filled by draining the bailer-collected groundwater from the bottom of the bailer. Special care will be taken to minimize sample agitation. All groundwater samples will be collected by filling directly into each of the required sample containers.

3.5.4 Sample Preservation

All samples will be containerized and preserved according to Appendix IIIH-D (Sample Containerization and Preservation). Preservation acids may be added to the applicable sample container in the field or pre-preserved by the laboratory prior to sample collection. Methods of preservation are intended to retard biological action, retard hydrolysis of chemical compounds and complexes, and reduce the volatility of constituents.

Samples requiring refrigeration to four degrees Centigrade, according to Appendix IIIH-D will be accomplished by placing the sample containers immediately into coolers containing wet ice and delivering to the analytical laboratory as soon as practical. Groundwater samples for detection or assessment monitoring constituent analyses will not be filtered in the field or the laboratory.

3.5.5 Field Measurements

Required field measurements include water levels, temperature, pH, specific conductance, and turbidity. Water level measurement procedures are described in Section 3.4.2. Field parameters will be measured using either hand held instruments placed directly into discharged water or an in-line flow through cell. All instruments will be properly calibrated and checked with standards according to the manufacturer's instructions. Any improperly operating instruments must be replaced prior to continuing sample collection operations. Field parameter readings will be taken in a separate container not used for sample collection.

3.6 Record Keeping

3.6.1 Field Data Sheets

All field information will be completely and accurately documented and entered on a standard field data sheet, an example of which is provided in Appendix IIIH-C. Information recorded on the field data sheets will be provided in the sampling event's groundwater monitoring report, a copy of which will be included in the facility's Site Operating Record. All field data sheet entries will be made legible in indelible ink.

3.6.2 Chain-of-Custody/Sample Container Labels

Proper chain of custody records are required to insure the integrity of the samples and the conditions of the samples upon receipt at the laboratory, including the temperature of the samples at the time of login. The sample collector will fill in all applicable sections of the chain of custody and transmit the original, with the respective samples, to the laboratory performing the analysis. Upon receipt of the samples at the laboratory, the sample coordinator will complete the applicable receiving information on the chain of custody, make a copy for their files, and make the original documents part of the final analytical report (see Appendix IIIH-E for an example chain-of-custody form). Chain of custody form copies will be included in the sampling event's groundwater monitoring report, a copy of which will be included in the facility's Site Operating Record.

All sample containers will be labeled legibly to prevent misidentification. The following information will be indicated on each sample container label with waterproof pen:

- Collector's name, date, and time of sampling.
- Sample source.
- Sample Identification number.
- Sample preservatives (if any).
- Analytical tests to be performed on the sample.

3.7 Sample Transport

Samples will be transmitted from the field to the analytical laboratory either by hand delivery or via an overnight courier service. Samples are to be shipped with wet ice in insulated shipping containers capable of maintaining all samples at approximately 4 C. Before a shipping container is turned over to a common courier (or any other person who does not complete the chain-of-custody documentation), it will be sealed using a method that will reveal whether the container's security has been compromised. Overnight courier shipping containers must be of a sturdy water-proof design (ice chests are commonly used) equipped with adequate cushioning material to prevent sample container breakage during shipment.

4 LABORATORY PROCEDURES/PERFORMANCE STANDARDS

All groundwater analyses will be performed by a TCEQ-accredited environmental testing laboratory in accordance with acceptable accreditation standards (e.g. NELAC). All groundwater analytical data will be provided to TCEQ in the sampling event's groundwater monitoring report, a copy of which will be included in the facility's Site Operating Record.

The owner or operator will review all analytical data submitted under the requirements of this permit to ensure compliance with data quality objectives, prior to submittal of the data to the commission for review. This data review will include examination of the quality control results and other supporting information.

It is the responsibility of the owner or operator to ensure that the laboratory documents and reports all problems and anomalies observed that are associated with the analysis. If the analysis of the data indicates that it failed to meet the quality control goals for the laboratory's analytical program, it does not necessarily mean that the data is unusable. The owner or operator may still report the analytical data but will include a discussion of any issues identified by the laboratory.

A Laboratory Case Narrative (LCN) report for all problems and anomalies observed must be submitted by the owner and/or operator. A sample laboratory QC checklist is provided in Appendix IIIH-G. The LCN will report the following information:

1. State the exact number of samples, testing parameters and sample matrix.
2. The name of the laboratory involved in the analysis. If more than one laboratory is used, all laboratories will be identified in the case narrative.
3. State the test objective regarding samples.
4. Explain each failed precision and accuracy measurement determined to be outside of the laboratory and/or method control limits
5. Explain if the effect of the failed precision and accuracy measurements on the results induces a positive or negative bias.
6. Identify and explain problems associated with the sample results, along with the limitations these problems have on data usability.
7. A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or when requested.
8. A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix

interferences will be identified. Dilutions will be identified and if dilutions are necessary, they will be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.

9. Identify any and all applicable quality assurance and quality control samples that will require special attention by the reviewer.
10. A statement on the quality control of the analytical method of the permit and the analytical recoveries information will be provided when appropriate and/or when requested.

In addition to the LCN, the following information will be submitted for all analytical data:

1. A table identifying the field sample name with the sample identification in the laboratory report.
2. Chain of custody.
3. An analytical report that documents the results and methods for each sample and analyte to be included for every analytical testing event. The test reports will document the reporting limit/method detection limit the laboratory used.
4. A release statement will be submitted from the laboratory. The statement will state "I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist or Laboratory Case Narrative, and no information or data have been knowingly withheld that would affect the quality of the data."
    a. If it is an in-house laboratory, it will have the following statement: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.
5. If the data is from soil and/or sediment samples, it will be reported on a dry weight basis with the percent solids and the percent moisture reported so that any back calculations of the wet analysis may be performed.
6. A laboratory checklist. The Laboratory Data Package Cover Page, and Laboratory Review Checklist or the laboratory quality assurance and quality

control data and laboratory analytical data (which may be submitted in hard-copy or electronic format), will be included with the TCEQ-0312 forms for each groundwater monitoring event. For every response of "No, NA, or NR" that is reported on the checklist, the permittee will ensure the laboratory provides a detailed description of the "exception report" in the summary of the LCN or by adding additional explanations to the checklist. The permittee will require the laboratory to do an equivalent of an EPA Level 3 review regarding quality control analysis. The facility will explain any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permittee.

7. If requested by TCEQ, laboratory analytical reports may be submitted either electronically or in hard copy.
8. The facility may explain any problems encountered in the laboratory analysis, either by adding additional explanations to the checklist or by extending the laboratory case narrative.
9. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permitee.

5 CONSTITUENTS, PQLS, AND DETECTION MONITORING

5.1 Analyzed Constituents

The detection monitoring constituents at the facility will be as referenced in Title 30 TAC §330.419 and specified in 40 CFR 258 Appendix I and Table 5-1. The laboratory will report the analytical results for each constituent to its respective practical quantitation limit (PQL) concentration. Groundwater samples will be collected and analyzed for the constituents listed in Table 5-1.

Table 5-1
Detection Monitoring Constituents

15 Total Metal Constituents[1]
Total Antimony
Total Arsenic
Total Barium
Total Beryllium
Total Cadmium
Total Chromium
Total Cobalt
Total Copper
Total Lead
Total Nickel
Total Selenium
Total Silver
Total Thallium
Total Vanadium
Total Zinc

[1] Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

Table 5-1 (Continued)
Detection Monitoring Constituents

47 VOC Constituents[1]
Acetone
Acrylonitrile
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform (Tribromomethane)
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane (Ethyl Chloride)
Chloroform (Trichloromethane)
Dibromochloromethane (Chlorodibromomethane)
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene Dibromide or EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans-1,4-Dichloro-2-butene
1,1-Dichloroethane (Ethylidene Chloride)
1,2-Dichloroethane (Ethylene Dichloride)
1,1- Dichloroethylene (Vinylidene Chloride)
Cis-1,2- Dichloroethylene (Cis-1,2- Dichloroethylene)
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)
1,2-Dichloropropane (Propylene Dichloride)
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethyl Benzene
2-Hexanone (Methyl Butyl Ketone or MBK)
Methyl Bromide (Bromomethane)
Methyl Chloride (Chloromethane)
Methylene Bromide (Dibromomethane)

[1] Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

Table 5-1 (Continued)
Detection Monitoring Constituents

47 VOC Constituents (Continued)[1]
Methylene Chloride (Dichloromethane)
Methyl Ethyl Ketone (2-Butanone or MEK)
Methyl Iodide (Iodomethane)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone or MIBK)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetracholorethane)
Toluene
1,1,1 Trichloroethane (Methylchloroform)
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene, TCE)
Trichloroflourmethane (CFC-11)
1,2,3-Trichloropropane
Vinyl Acetate
Vinyl Chloride
Xylenes

[1] Analyses will be performed using the TCEQ – recommended EPA test methods or alternative methods with equivalent or better performance.

5.2 Practical Quantitation Limit

The laboratory reporting limits will meet the requirements of Title 30 TAC §330.405(f)(5). Analytical results will be reported to the lowest concentration levels that can be reliably quantified (practical quantitation limits [PQL]). The following describes the PQL required:

- The PQL will be below the groundwater protection standard established for each analyte in accordance with Title 30 TAC §330.409(h) unless approved otherwise by the executive director.
- The PQL will be determined as the concentration that corresponds to the following precision and accuracy criteria:

Constituents/Chemicals of Concern	Precision (percent RSD)	Accuracy (percent recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi-Volatiles	30	50-150

- The precision and accuracy of the PQL initially will be determined from the PQLs reported over the course of a minimum of eight ground-water monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy limits. The PQL may be updated as more data becomes available.
- The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy.
- Analytical results for data below the limit of detection ("non-detect" results) will be reported as less than the established PQL limit that meets those precision and accuracy requirements.
- If a PQL cannot be established according to the specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternate precision and accuracy limits. This information will be reported to the executive director by the owner or operator and will be evaluated on a case-by-case basis.

All samples will be analyzed within the required holding times for the particular analyses to be tested. A list of appropriate sample containers, sample preservation, and recommended holding times is presented in Appendix IIIH-D.

The sample containers will be filled in the following order.

1. VOCs
2. Semi-volatiles (if collected)
3. Total metals
4. Inorganics (if collected)

5.3 Background Data Collection

As stated in Title 30 TAC §330.405(b)(3)(A), the number of samples to be collected to establish background groundwater quality data for total metals will be consistent with the appropriate statistical procedures pursuant to Title 30 TAC §330.405(f).

Most VOCs are not naturally occurring in groundwater. As a result, detection of a VOC is considered a statistically significant increase (SSI) and no comparisons to a background data pool are necessary to make this determination. There is therefore no need to establish background quality data for VOC constituents for detection monitoring purposes.

A minimum of eight independent samples from each detection monitoring well will be collected in consecutive calendar quarters and analyzed for the total metals constituents referenced in Title 30 TAC §330.419(a) to establish a background water quality data pool. The collection frequency and number of background collection events is necessary due to the seasonal and temporal variations natural in groundwater analytical data and in consideration of potential statistical analyses methodologies and requirements. Groundwater analytical data will be evaluated after each background sampling event for evidence of a potential release from the facility. Upon completion of a new monitoring well's total metal background data collection, the facility will evaluate the background data to ensure that the data are representative of background groundwater total metals constituent concentrations and are unaffected by waste management activities or other potential sources of contamination. The evaluation will be documented in a report and submitted to the TCEQ before the subsequent detection monitoring event following the final (eighth) total metals background data collection event.

5.4 Updating Background Data

The collection of groundwater samples to establish background water quality data for metals constituents will be performed in accordance with Title 30 TAC §330.405(d) and §330.407(a).

For inter-well metals statistical comparisons, and after completion of the initial eight quarterly background events, ongoing analytical data obtained from each monitoring event will be incorporated into the background data pool. Data will be evaluated for potential outliers prior to incorporation into the well's background data pool.

For intra-well statistical comparisons, and following completion of the initial eight quarterly background events, new data may be incorporated into background as frequently as once every two years. New data will be evaluated for any significant trends and potential outliers and, if appropriate, incorporated into the well's background data pool. The facility will evaluate the data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste management activities or other sources of contamination. The evaluation will be documented in a report and submitted to the TCEQ prior to the facility's next scheduled semiannual groundwater detection monitoring event.

5.5 Detection Monitoring Events

Within 6 months after completion of total metals background data collection, sampling and analysis for both background and point of compliance detection monitor wells will be conducted on a semi-annual basis (every 6 months) for the constituents listed in Table 5-1. Newly installed detection monitor wells will be monitored for VOCs semi-annually in conjunction with the facility's semiannual detection monitoring event, while quarterly total metals background data are collected. Water levels in existing observation wells will be gauged during each semiannual detection monitoring event. Observation wells will be maintained for potential groundwater sampling purposes as deemed appropriate for the preparation of Alternative Source Demonstrations (ASDs) or other investigations.

5.6 Ground Water Reporting and Submittals

No later than 60 days following completion of each groundwater monitoring event, statistical analyses will be performed in accordance with Section 6 of Appendix IIIH. Groundwater reporting frequency and procedures will be conducted in accordance with Title 30 TAC §330 Subchapter J, and TCEQ Guidelines for Groundwater Monitoring Report Submittals guidance (December 22, 2014).

5.6.1 Semiannual Detection Monitoring Reporting

In accordance with TCEQ reporting guidance, within 90 days after completion of each semiannual groundwater monitoring event, a semiannual groundwater detection monitoring report will be submitted that includes the following information, determined since the previously submitted semiannual report:

1. The landfill's groundwater sample and field quality control sample analytical data collected during the reporting year in hard-copy format on TCEQ Form-0312 (Groundwater Sampling Report) and in any other format requested by the TCEQ (e.g., electronic format);
2. The laboratory case narrative as described in Section 4 and either:
    a) A completed laboratory checklist equivalent to the example checklist presented in Appendix IIIH-G, or
    b) The laboratory quality assurance and quality control data and laboratory analytical data (which may be submitted in hard-copy or electronic format);
3. An explanation of any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the landfill;
4. A statement regarding SSIs and the status of SSI events;
5. The results of all groundwater monitoring, testing, and analytical work, including a summary of background groundwater quality values, groundwater monitoring analyses, statistical calculations, graphs, and drawings;

6. The groundwater flow rate and direction in the uppermost aquifer, using the preceding semiannual sampling event's data. The report will include all documentation used to determine the groundwater flow rate and direction;
7. A contour map of piezometric water levels in the uppermost aquifer based on concurrent measurements in all gauged facility wells. The report will include all data or documentation used to establish the contour map;
8. Recommendation for any changes; and
9. Any other items requested by the Executive Director.

In accordance with Title 30 TAC 330.408(d), if it is determined that the detection monitoring system no longer satisfies the requirements of Title 30 TAC §330.407, the facility will submit an application for a permit amendment or modification to make appropriate changes within 90 days of this determination.

5.6.2 Semiannual Assessment Monitoring Reporting

If there are one or more facility wells in assessment monitoring status, then the facility will submit a semiannual assessment monitoring report within 60 days after completion of each semiannual groundwater assessment monitoring event. The semiannual groundwater assessment monitoring report will include the same data and information required in the facility's semiannual detection monitoring report (as defined in Section 5.6.1), but will be specific to the facility's assessment monitoring wells, constituents, and statistics.

The required semiannual groundwater assessment monitoring information may be provided either within the facility's semiannual detection monitoring report or submitted in an assessment-specific semiannual groundwater report. If the required detection and assessment monitoring information are combined into a single semiannual report submittal, then the combined report will be submitted to TCEQ within 60 days after completion of the semiannual groundwater monitoring event.

6 STATISTICAL METHODOLOGY – GROUNDWATER DATA ANALYSES

6.1 Statistical Methodology

Statistical analyses of groundwater analytical data will be performed in accordance with Title 30 TAC §330.407 and §330.409, and EPA Unified Guidance (March, 2009). Statistical comparisons will be performed using Sanitas™, a commercial software program developed by Sanitas Technologies, Inc. or other equivalent statistical program. Flow charts depicting statistical analyses protocols for control charts, prediction limits, and 95 percent confidence intervals are included in Appendix IIIH-F. It is not possible to predict all future potential circumstances. Therefore, alternate statistical methods may be used as deemed appropriate for the data distribution of the constituents being evaluated, providing that they conform to the requirements and guidelines set forth in Title 30 TAC §330.407 and §330.409, and EPA Unified Guidance (March, 2009).

6.2 SSI, Resampling, ASD, and Assessment Monitoring

Detection monitoring for the constituents listed in Table 5-1 of Section 5.1 and referenced in Title 30 TAC §330.419(a) will be conducted in accordance with Sections 5.3 and 5.5. An initial SSI of any constituent will be based on a detected concentration that exceeds the constituent's statistical limit. If an initial SSI of any constituent is indicated at any detection monitoring well, a notice will be made to the TCEQ (and any other pollution control agency with jurisdiction that has requested to be notified) within 14 days.

6.2.1 Verification Resampling

Verification re-sampling is an integral part of the statistical methodology that is required to verify if an SSI has occurred. In the event that an initial SSI is indicated for any constituent listed in Table 5-1 (Section 5.1), verification resampling will be completed to either confirm or disconfirm the initial SSI. The verification resampling results will be submitted to TCEQ within 60 days of the initial SSI determination. If the initial SSI is verified through resampling then the facility will either:

(1) Notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the initial SSI within 14 days of the

initial SSI determination date and begin assessment monitoring within 90 days of the written notice (Title 30 TAC §330.407(b)(1)), or

(2) Within 14 days of the initial SSI determination date, notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the facility's intent to submit an alternative source demonstration (ASD) report; and

(3) Within 90 days of the initial SSI determination, submit an ASD report to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) that demonstrates that a source other than the facility caused the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Title 30 TAC §330.407(b)(3)(B)). The report must be prepared and certified by a qualified groundwater scientist. If the report does not sufficiently demonstrate an alternative contamination source to the TCEQ, then the facility must begin assessment monitoring with 90 days of the written ASD intent notification.

If the ASD is accepted by TCEQ then the monitoring well will remain in detection monitoring status. If the owner/operator does not make a demonstration satisfactory to the executive director within 90 days of the date of the SSI notice, as made evident by a letter of denial from TCEQ, then the owner/operator will initiate an assessment monitoring program meeting the requirements of Title 30 TAC §330.409.

6.3 Assessment Monitoring

Assessment monitoring will be conducted in accordance with Title 30 TAC §330.409. The landfill will sample and analyze the groundwater monitoring system for the full list of constituents in Appendix II to 40 CFR Part 258. Analyses for these constituents will also be conducted for the each well located on either side of the well exhibiting the verified SSIs, unless an alternative subset of wells is designated by the TCEQ.

For any new constituent detected in the point of compliance wells as a result of the completed Appendix II analysis, a minimum of four statistically independent samples from each background well will be collected and analyzed to establish background levels for the additional constituent, unless an alternative subset of Appendix II background constituent analyses is designated by the TCEQ. After sampling the assessment monitoring wells for Appendix II constituents, the TCEQ may specify an appropriate subset of wells to be sampled and analyzed for the Appendix II constituents during assessment monitoring and may delete any of the Appendix II constituents if the landfill demonstrates that the constituents are not reasonably expected to be in or derived from the waste contained in the unit.

6.4 Corrective Action Monitoring

Detection of assessment monitoring constituents at statistically significant levels, as defined in Title 30 TAC §330.409, could result in corrective action monitoring. Groundwater monitoring for the purpose of corrective action assessment and remediation will be conducted in accordance with Title 30 TAC §330.411 through §330.415, and in consultation with TCEQ.

7 GROUNDWATER ANALYTICAL RESULTS AND POTENTIAL RESPONSE ACTIONS

7.1 Groundwater Quality

Title 30 TAC §330.63(f)(5-7) require a comparison of the facility's groundwater analytical data to the specific constituents referenced in Title 30 TAC §330.419(a) and listed in 40 CFR Part 258, Appendix I. The facility's historical groundwater analytical data for all existing monitoring and observation wells are presented in Table IIIH-B-1 (total metals constituents) and Table IIIH-B-2 (Volatile Organic Compound constituents). Hydrex has completed groundwater monitoring and statistical analyses for the facility since 1998. According to Hydrex, all detection monitoring wells were exclusively in detection status as of January 2017.

7.2 Potential Contaminant Migration

In the unlikely occurrence of a release of leachate from the landfill unit, the most probable pathway for the migration of pollutants is vertically through the vadose zone and into the saturated Upper Sand Stratum. Once within the Upper Sand Stratum, light non-aqueous phase liquid migration would occur along the upper surface of the Upper Sand Stratum (uppermost aquifer) and dense non-aqueous phase liquid migration would occur within the Upper Sand Stratum along the upper surface of the Lower Clay Stratum (aquiclude). In either case, the pollutants would be transported within the Upper Sand Stratum uppermost aquifer and down gradient in the direction of groundwater flow toward the permitted Point of Compliance and network of groundwater detection monitoring wells.

Excavation into the Upper Sand Stratum is limited to the immediate vicinity of the landfill's exiting northern sump and proposed southeastern sump. Groundwater in the Upper Sand Stratum diverges around the liner in the immediate area of these two sumps.

8 REFERENCES

American Society of Testing and Materials (ASTM), 1986. Standard Guide for Sampling Ground water Monitoring Wells. D 448-850.

American Society of Testing and Materials (ASTM), 1996. Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground Water Detection Monitoring Programs. PS 64-96.

Gibbons, Robert, D., 1994, Statistical Methods for Groundwater Monitoring, John Wiley & Sons, Inc. New York.

Biggs and Mathews Environmental Inc. (B&M), September 2009, Hardin County Landfill, TCEQ Permit Number MSW-2214A, Attachment 11 - Groundwater Sampling and Analysis Plan.

Martin, W.F., Lippirr, J.M., and Protherd, T.G. 1987. Hazardous Waste Handbook for Health and Safety, Butterworth Publishers, Stoneham, Massachusetts, pp. 28-30.

Sanitas Technologies, Inc., 2009, Sanitas® Users Manual, Version 9, Shawnee, Kansas.

Texas Commission on Environmental Quality (TCEQ), "Texas Administrative Code, Title 30, Chapter 330, Municipal Solid Waste", March 27, 2006 (effective date).

U.S. Environmental Protection Agency, 1986. RCRA Ground water Monitoring Technical Enforcement Guidance Document. OSWER – 99550.1, Office of Waste Programs Enforcement, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, 2009. RCRA Ground water Monitoring: Unified Guidance. Office of Solid Waste and Emergency Response, Washington D.C.

U.S. Environmental Protection Agency, 1991b. Handbook – Ground water, Volume II: Methodology. EPA/625/6-90/0166.

U.S. Environmental Protection Agency, November 1986. Test Methods for Evaluating Solid Waste – Physical/Chemical Methods, Third Edition (revised), SW-846. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, November 1993. Solid Waste Disposal Facility Criteria Technical Manual. EPA/530-R-93-017, NTIC #PB94-100-450, Office of Solid Waste and Emergency Response, Washington, D.C.

APPENDIX IIIH-A

GROUNDWATER MONITORING SYSTEM

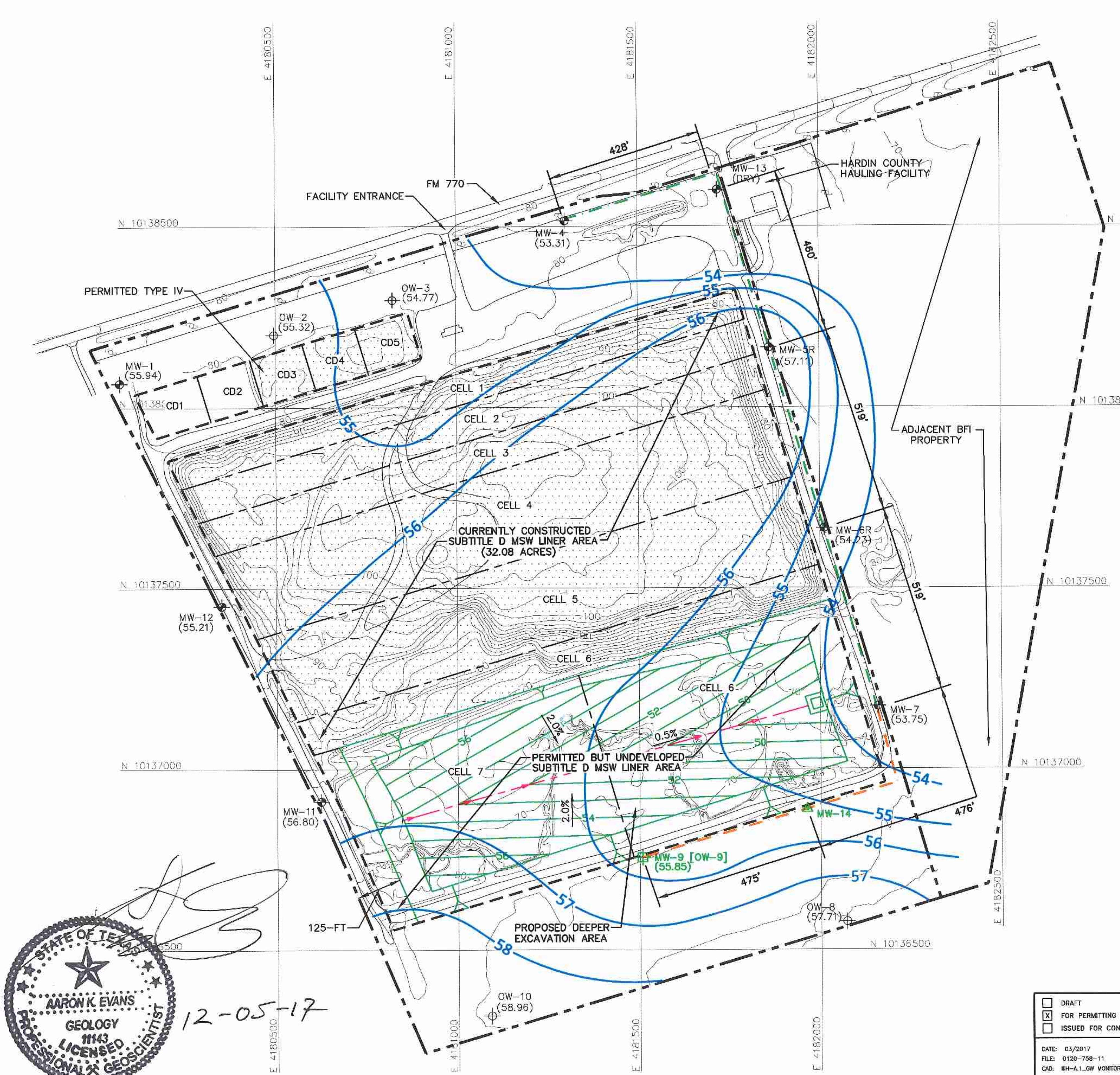
STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17



LEGEND

	BFI PROPERTY BOUNDARY
	PERMIT BOUNDARY
	CURRENTLY PERMITTED LIMITS OF WASTE
	CELL BOUNDARY
70	EXISTING CONTOUR
60	PROPOSED EXCAVATION CONTOUR (SEE NOTE 6)
	PROPOSED LEACHATE COLLECTION LINE
55	GROUNDWATER CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING SUBTITLE-D LINER AREA
MW-1 (55.94)	EXISTING GROUNDWATER MONITOR WELL TO REMAIN WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
OW-2 (55.32)	EXISTING GROUNDWATER OBSERVATION WELL TO REMAIN WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
MW-9 [OW-9] (55.85)	PROPOSED GROUNDWATER MONITORING WELL TO BE CONVERTED FROM EXISTING OBSERVATION WELL WITH FORMER WELL DESIGNATION IN BRACKETS AND WITH MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
△ MW-14	PROPOSED NEW GROUNDWATER MONITOR WELL
	EXISTING PERMITTED POINT OF COMPLIANCE
	PROPOSED POINT OF COMPLIANCE EXTENSION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. WELL LOCATION COORDINATES SURVEYED BY WEAVER CONSULTANTS GROUP ON DECEMBER 28, 2016.
3. GROUNDWATER ELEVATIONS OBTAINED FROM HYDREX ENVIRONMENTAL INC., MEASURED ON JULY 12, 2016.
4. GROUNDWATER ELEVATION CONTOURS SHOWN ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS INDICATED. ACTUAL GROUNDWATER ELEVATIONS BETWEEN MEASUREMENT LOCATIONS MAY VARY FROM THOSE ILLUSTRATED.
5. OBSERVATION WELL OW-2, OW-3, OW-8, OW-9, AND OW-10 WERE FORMERLY MONITOR WELLS MW-2, MW-3, MW-8, MW-9, AND MW-10; RESPECTIVELY.
6. PROPOSED DEEPER EXCAVATION IN EXISTING PERMITTED WASTE DISPOSAL AREA IS 16.62 ACRES.
7. THERE ARE NO PROPOSED CHANGES TO THE EXISTING PERMITTED PERMIT BOUNDARY, LIMITS OF WASTE, OR ELEVATION OF DEEPEST EXCAVATION.

AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIH-A.1_GW MONITORING SYSTEM.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT
GROUNDWATER MONITORING
SYSTEM LAYOUT

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIH-A.1

O:\0120\758\2214B EXPANSION\IIIH\IIIH-A.1_GROUNDWATER MONITORING SYSTEM.dwg, 11/15/2017 1:52:23 PM, rsellers, 1:2

WELL I.D.	NORTHING	EASTING	GROUND ELEVATION	TOP OF WELL CASING ELEVATION	DEPTH TO TOP OF FILTER PACK	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	DEPTH TO BOTTOM OF FILTER PACK	TOP OF FILTER PACK ELEVATION	TOP OF SCREEN ELEVATION	BOTTOM OF SCREEN ELEVATION	BOTTOM OF FILTER PACK ELEVATION	GROUNDWATER ELEVATION[7]
EXISTING AND PROPOSED POINT OF COMPLIANCE MONITORING WELLS													
MW-4	10138518.51	4181298.20	78.7	81.64	21.0	22.0	32.0	34.0	57.7	56.7	46.7	44.7	53.31
MW-5R	10138168.36	4181861.37	73.7	76.80	18.0	20.0	30.0	30.5	55.7	53.7	43.7	43.2	57.11
MW-6R	10137662.20	4182013.71	73.2	76.40	13.0	15.5	25.5	26.0	60.2	57.7	47.7	47.2	54.23
MW-7	10137174.54	4182161.64	73.7	76.95	21.0	24.0	34.0	34.0	52.7	49.7	39.7	39.7	53.75
MW-9 (OW-9)	10136752.90	4181509.87	76.4	79.56	29.5	32.5	42.5	42.5	46.9	43.9	33.9	33.9	55.85
MW-13	10138601.18	4181724.11	77.5	80.33	18.0	20.0	30.0	30.5	59.5	57.5	47.5	47.0	DRY @ 47.5
MW-14	10136889.60	4181962.65	75.0	78.00	18.0	20.0	30.0	30.0	57.0	55.0	45.0	45.0	55.10
EXISTING BACKGROUND MONITORING WELLS													
MW-1	10138068.44	4180066.94	80.9	83.78	20.0	21.0	31.0	33.0	60.9	59.9	49.9	47.9	55.94
MW-11	10136907.90	4180616.45	78.1	81.97	24.5	27.5	37.5	37.5	53.6	50.6	40.6	40.6	56.80
MW-12	10137449.83	4180347.78	80.7	84.10	25.5	27.5	37.5	37.5	55.2	53.2	43.2	43.2	55.21
EXISTING OBSERVATION WELLS													
OW-2 (MW-2)	10138205.68	4180494.81	79.6	82.25	14.0	15.0	25.0	27.0	65.6	64.6	54.6	52.6	55.32
OW-3 (MW-3)	10138298.61	4180822.58	83.2	83.93	20.0	21.0	31.0	36.0	63.2	62.2	52.2	47.2	54.77
OW-8 (MW-8)	10136577.81	4182071.91	73.8	77.62	18.5	20.5	30.5	30.5	55.3	53.3	43.3	43.3	57.71
OW-10 (MW-10)	10136317.91	4181090.46	79.1	82.74	28.0	30.0	40.0	40.0	51.1	49.1	39.1	39.1	58.96

NOTES:

1. ALL ELEVATIONS LISTED IN FEET ABOVE MEAN SEA LEVEL (FT-MSL). ALL DEPTHS LISTED IN FEET BELOW GROUND SURFACE (FT-BGS).
2. FORMER MONITOR WELL I.D. LISTED IN PARENTHESIS UNDER CURRENT OBSERVATION WELL I.D..
3. WELL COORDINATES, GROUND ELEVATIONS, AND TOP OF CASING ELEVATIONS FOR ALL WELLS EXCEPT OW-8 AND OW-10 OBTAINED FROM WCG SURVEY COMPLETED IN DECEMBER 2016.
4. WELL COORDINATES, GROUND ELEVATIONS, AND TOP OF CASING ELEVATIONS FOR WELLS OW-8 AND OW-10 OBTAINED FROM HYDREX WELL COMPLETION LOGS/FORMS.
5. WELL COMPLETION DEPTHS FOR ALL WELLS OBTAINED FROM HYDREX WELL COMPLETION LOGS/FORMS.
6. WELL COMPLETION ELEVATIONS FOR ALL WELLS COMPUTED FROM WELL GROUND ELEVATION AND COMPLETION DEPTH DATA.
7. GROUNDWATER ELEVATIONS GAUGED BY HYDREX ENVIRONMENTAL INC. FOR THE JULY 2016 GROUNDWATER MONITORING EVENT.
8. ALL WELLS ARE EXISTING EXCEPT FOR PROPOSED NEW WELL MW-14.
9. MW-9 IS PROPOSED POINT OF COMPLIANCE WELL CONVERTED FROM OBSERVATION WELL OW-9.
10. MONITOR WELL MW-14 DETAILS ESTIMATED FROM SITE LITHOLOGIC AND TOPOGRAPHIC DATA. ACTUAL DETAILS TO BE DETERMINED BASED ON LITHOLOGY ENCOUNTERED AT TIME OF DRILLING.

AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIH-A.2_TYPICAL WELL DETAILS.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT GROUNDWATER MONITORING WELL DETAILS

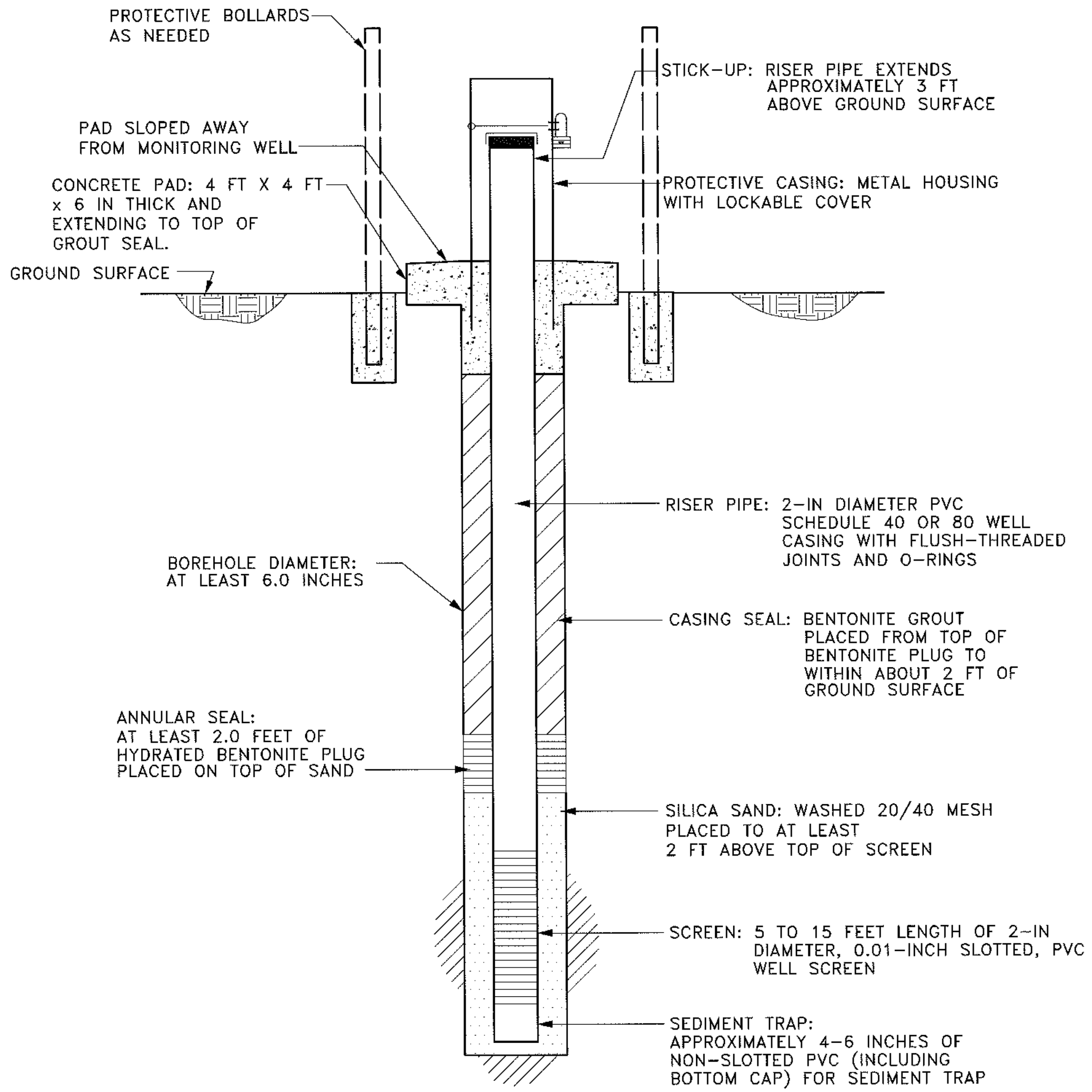
HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIH-A.2

O:\0120\758\22143 EXPANSION\IIIH\IIIH-A.2_GW WELL DETAILS.dwg, 11/16/2017 1:52:54 PM, rsellers, 1:2

TYPICAL GROUNDWATER MONITORING WELL DETAILS



AARON K. EVANS
GEOLOGY
11143

12-05-17

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIH-A.3_TYPICAL WELL DETAILS.DWG

DRAWN BY: SRF
DESIGN BY: AE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT
TYPICAL MONITORING WELL DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIH-A.3

O:\0120\758\2214B EXPANSION\IIIH\IIIH-A.3_TYPICAL WELL DETAILS.dwg, 11/15/2017 1:53:20 PM, rsellers, 1:2

GROUNDWATER MONITORING SYSTEM CERTIFICATION

General Site Information

Site: Hardin County Landfill

Site Location: Hardin County

MSW Permit No.: 2214B

Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a registered professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have reviewed the groundwater monitoring system and supporting details contained herein. In my professional opinion, the groundwater monitoring system design and construction details are in compliance with the groundwater monitoring requirements specified in Title 30 TAC §§330.401, 330.403, 330.405, 330.407, 330.409, 330.419, and 330.421. This system has been designed for the Hardin County Landfill. The only warranty made by me in connection with this document is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address: Weaver Consultants Group, LLC–Southwest
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76019

AARON K. EVANS
11143
12-05-17

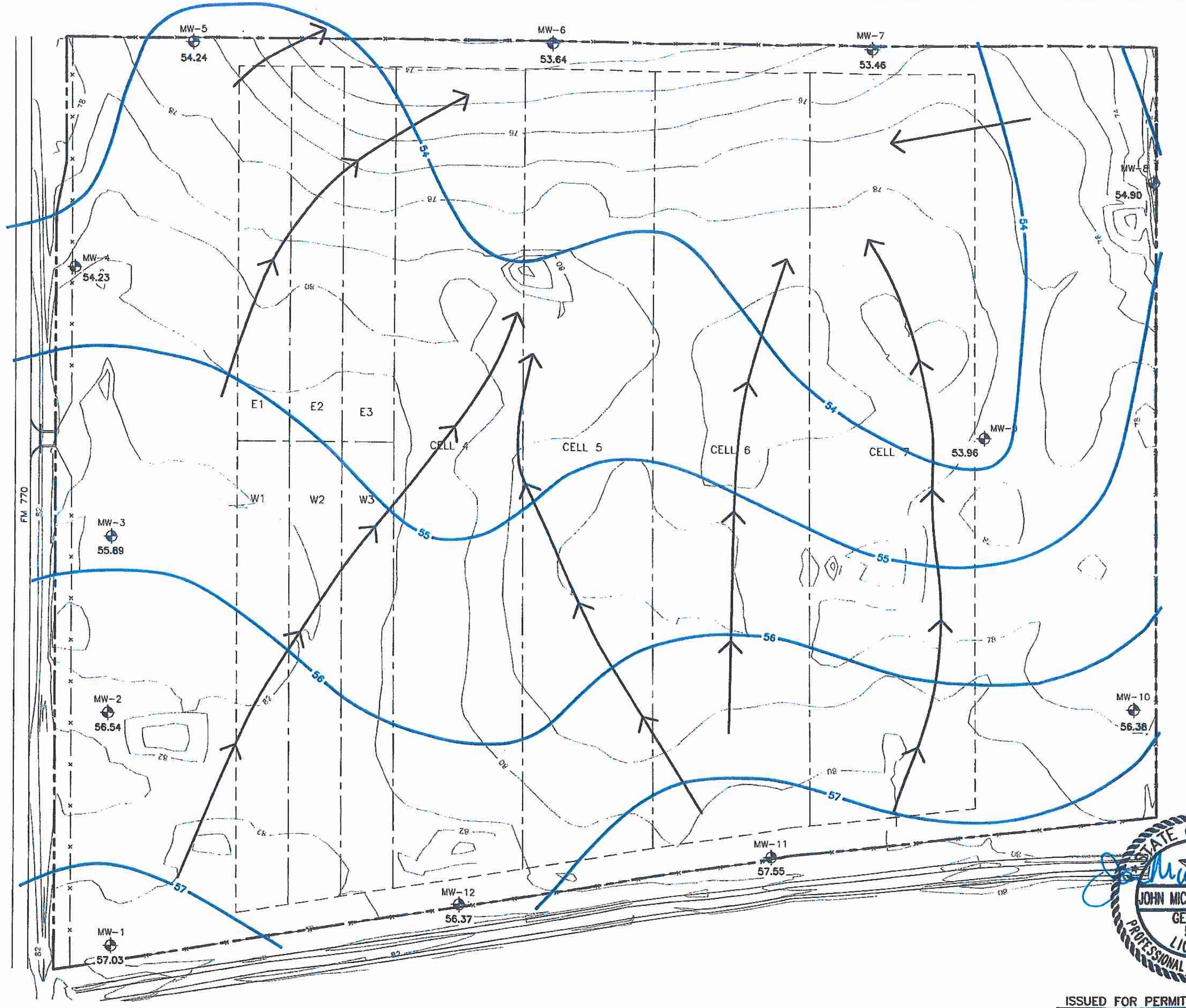
Signature:
Aaron K. Evans, P.G., Texas License No. 11143

Date: 12-05-17

2009 BIGGS AND MATHEWS

GROUNDWATER POTENTIOMETRIC SURFACE MAPS

J:\112\06\103\WtrSurf_7-05.dwg Layout: Layout1 User: scundiff



0 100 200
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- WASTE FOOTPRINT
- 80 EXISTING GROUND CONTOUR
- CELL BOUNDARY
- ⊕ EXISTING GROUNDWATER MONITORING WELL
- 56 GROUNDWATER CONTOUR
- ← APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	57.03
MW-2	56.54
MW-3	55.89
MW-4	54.23
MW-5	54.24
MW-6	53.64
MW-7	53.46
MW-8	54.90
MW-9	53.96
MW-10	56.38
MW-11	57.55
MW-12	56.37

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

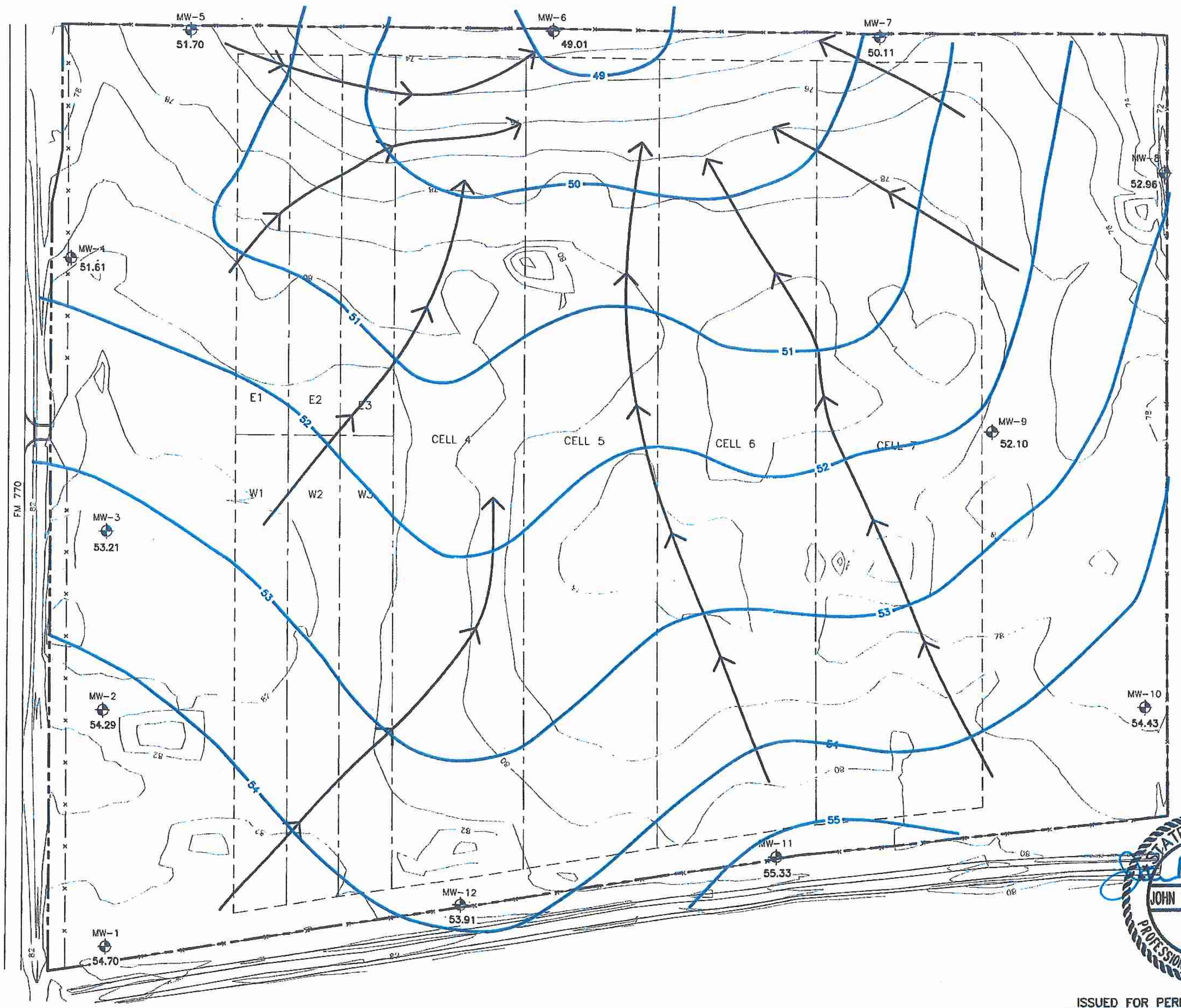
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

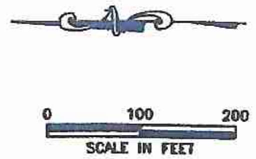
POTENTIOMETRIC SURFACE MAP WATER LEVELS – JULY 2005

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-6
CHK.	JMS	DWG :	WtrSurf_7-05.dwg	





LEGEND

— · — · —	PERMIT BOUNDARY
- - - - -	WASTE FOOTPRINT
----80----	EXISTING GROUND CONTOUR
— - — - —	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
——56——	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	54.70
MW-2	54.29
MW-3	53.21
MW-4	51.61
MW-5	51.70
MW-6	49.01
MW-7	50.11
MW-8	52.96
MW-9	52.10
MW-10	54.43
MW-11	55.33
MW-12	53.91

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

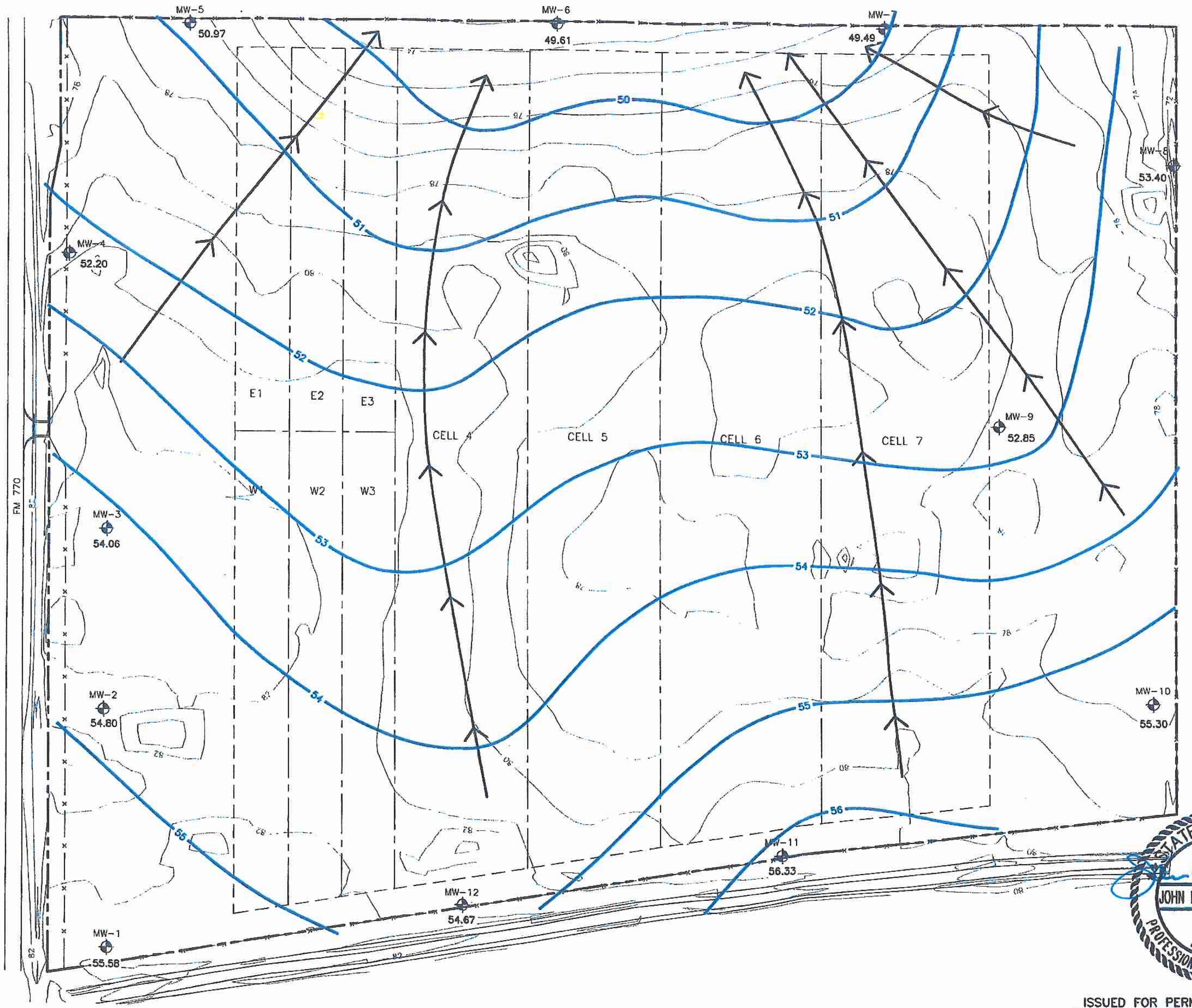
POTENTIOMETRIC SURFACE MAP
WATER LEVELS – FEBRUARY 8, 2006

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-7
CHK.	JMS	DWG :	WtrSurf_2-8-06.dwg	

J:\112\06\103\WtrSurf_2-8-06.dwg Layout: Layout1 User: scundiff



0 100 200
SCALE IN FEET

LEGEND

— - —	PERMIT BOUNDARY
- - - -	WASTE FOOTPRINT
----80----	EXISTING GROUND CONTOUR
——	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	55.58
MW-2	54.80
MW-3	54.06
MW-4	52.20
MW-5	50.97
MW-6	49.61
MW-7	49.49
MW-8	53.40
MW-9	52.85
MW-10	55.30
MW-11	56.33
MW-12	54.67

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

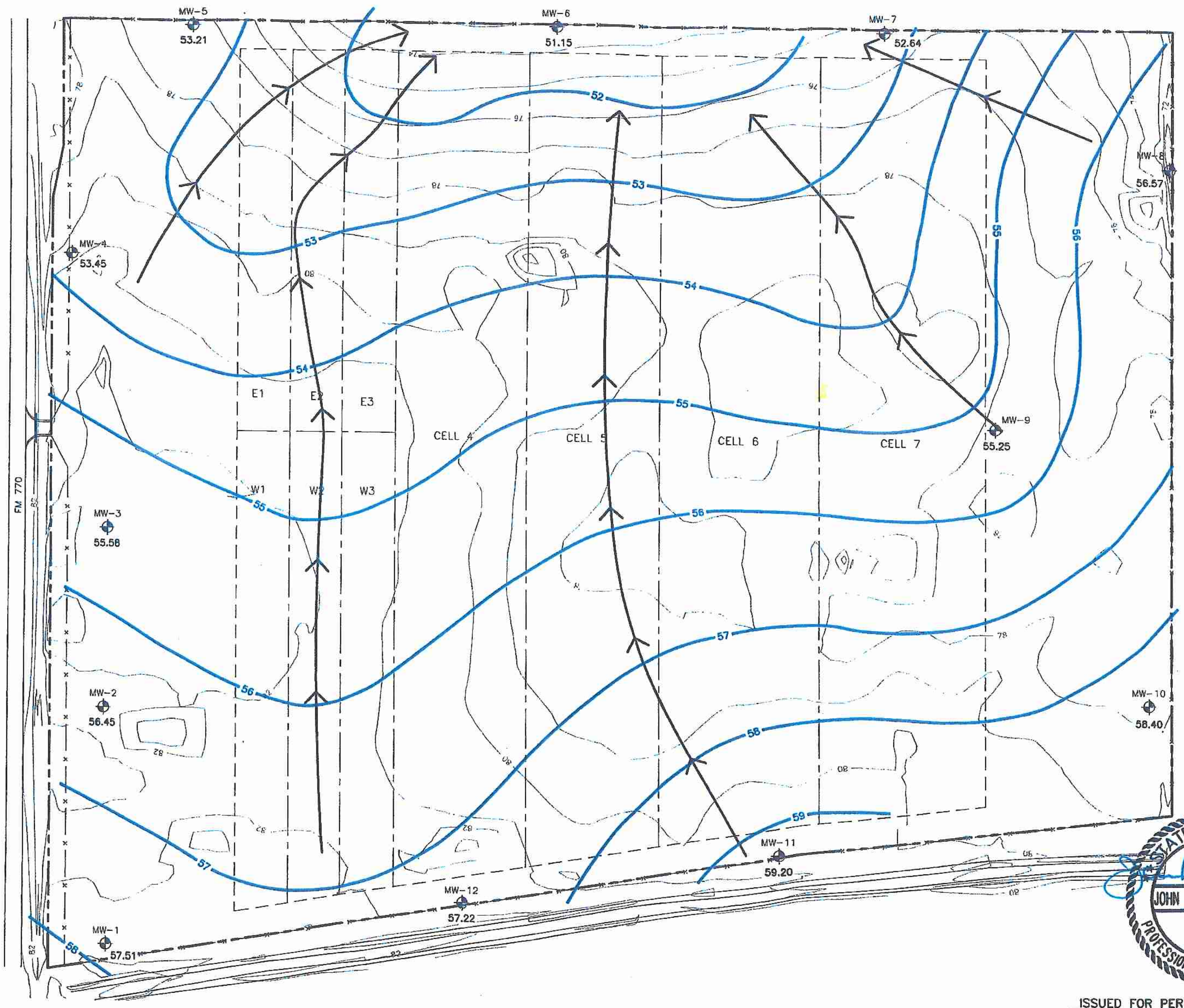
POTENTIOMETRIC SURFACE MAP WATER LEVELS – MAY 15, 2006

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-8
CHK.	JMS	DWG :	WtrSurf_5-15-06.dwg	

J:\112\06\103\WtrSurf_5-15-06.dwg Layout: Layout1 User: scundiff



0 100 200
SCALE IN FEET

LEGEND

— — —	PERMIT BOUNDARY
- - - -	WASTE FOOTPRINT
······80······	EXISTING GROUND CONTOUR
———	CELL BOUNDARY
⌖	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	57.51
MW-2	56.45
MW-3	55.58
MW-4	53.45
MW-5	53.21
MW-6	51.15
MW-7	52.64
MW-8	56.57
MW-9	55.25
MW-10	58.40
MW-11	59.20
MW-12	57.22

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS							
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	

POTENTIOMETRIC SURFACE MAP
WATER LEVELS – NOVEMBER 21, 2006

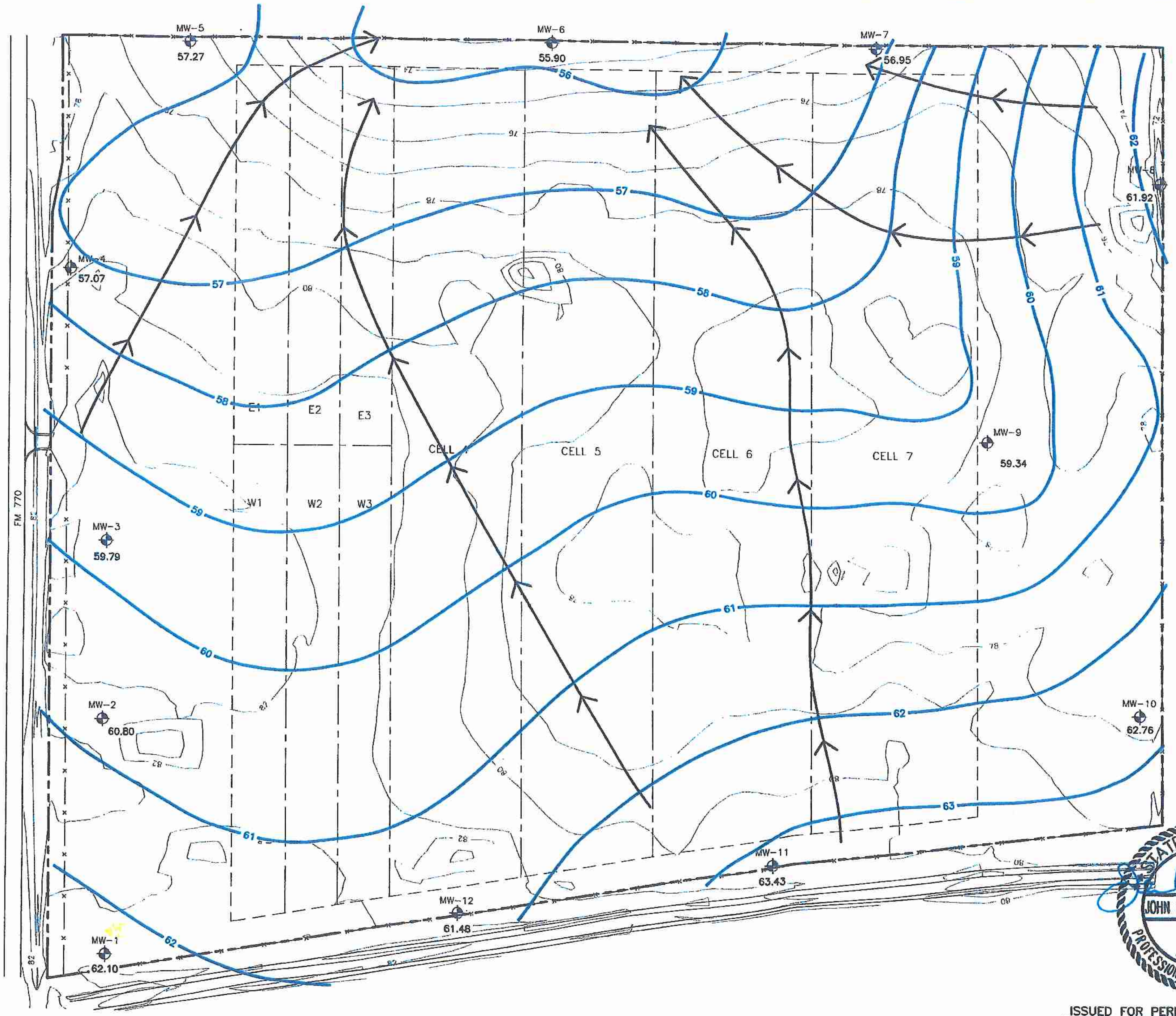
IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-9
CHK.	JMS	DWG :	WtrSurf_11-21-06.dwg	

J:\112\06\103\WtrSurf_11-21-06.dwg Layout: Layout1 User: scundiff

J:\112\06\103\WtrSurf_5-24-07.dwg Layout: Layout1 User: scundiff



0 100 200
SCALE IN FEET

LEGEND

— — —	PERMIT BOUNDARY
- - -	WASTE FOOTPRINT
·····80·····	EXISTING GROUND CONTOUR
———	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	62.10
MW-2	60.80
MW-3	59.79
MW-4	57.07
MW-5	57.27
MW-6	55.90
MW-7	56.95
MW-8	61.92
MW-9	59.34
MW-10	62.76
MW-11	63.43
MW-12	61.48

JOHN MICHAEL SNYDER
GEOLOGY
595
9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

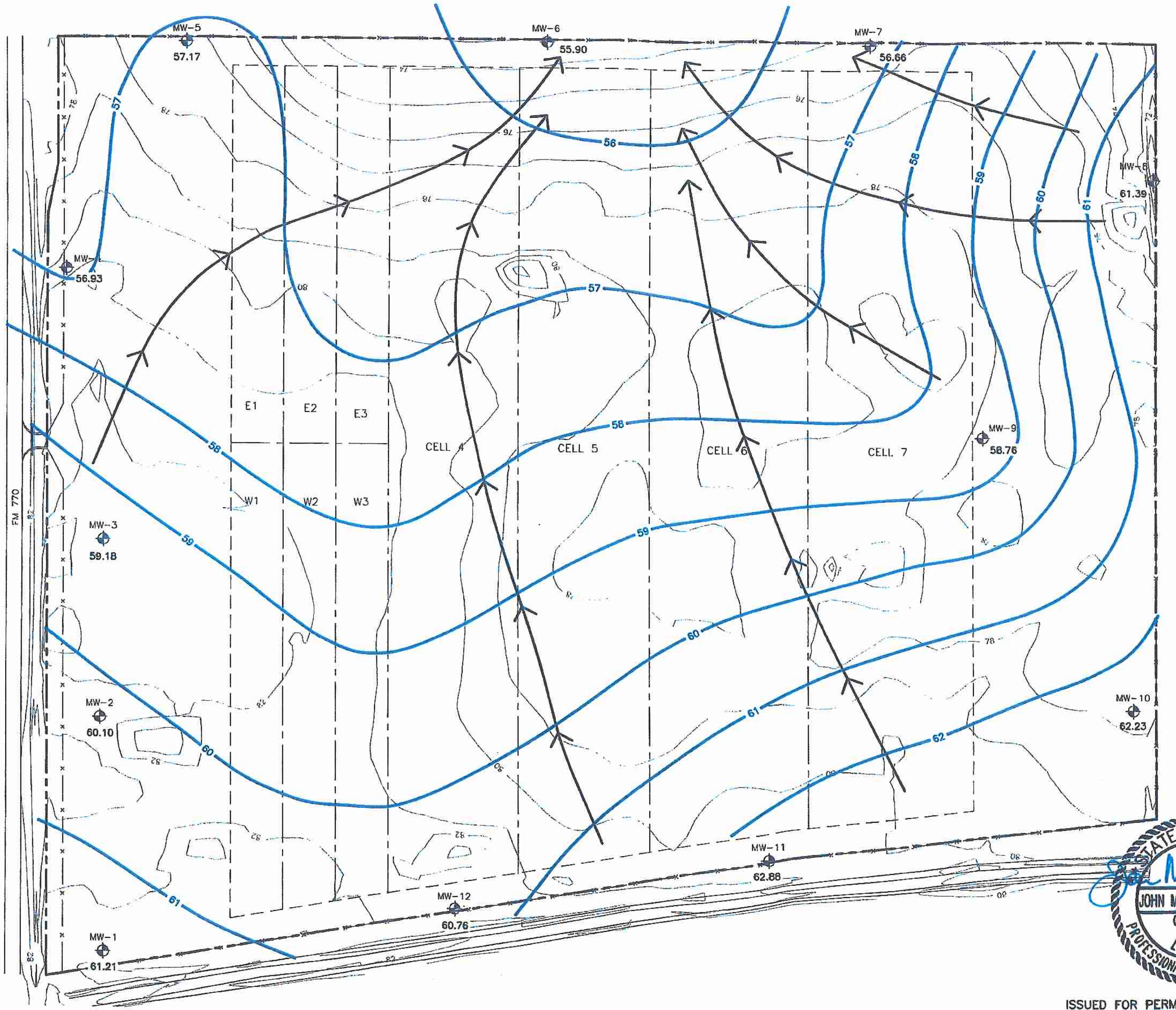
POTENTIOMETRIC SURFACE MAP
WATER LEVELS – MAY 24, 2007

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-10
CHK.	JMS	DWG :	WtrSurf_5-24-07.dwg	

J:\112\06\103\WtrSurf_8-15-07.dwg Layout: Layout1 User: scundiff



LEGEND

— - — -	PERMIT BOUNDARY
- - - -	WASTE FOOTPRINT
---80---	EXISTING GROUND CONTOUR
— - - —	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	61.21
MW-2	60.10
MW-3	59.18
MW-4	56.93
MW-5	57.17
MW-6	55.90
MW-7	56.66
MW-8	61.39
MW-9	58.76
MW-10	62.23
MW-11	62.88
MW-12	60.76

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

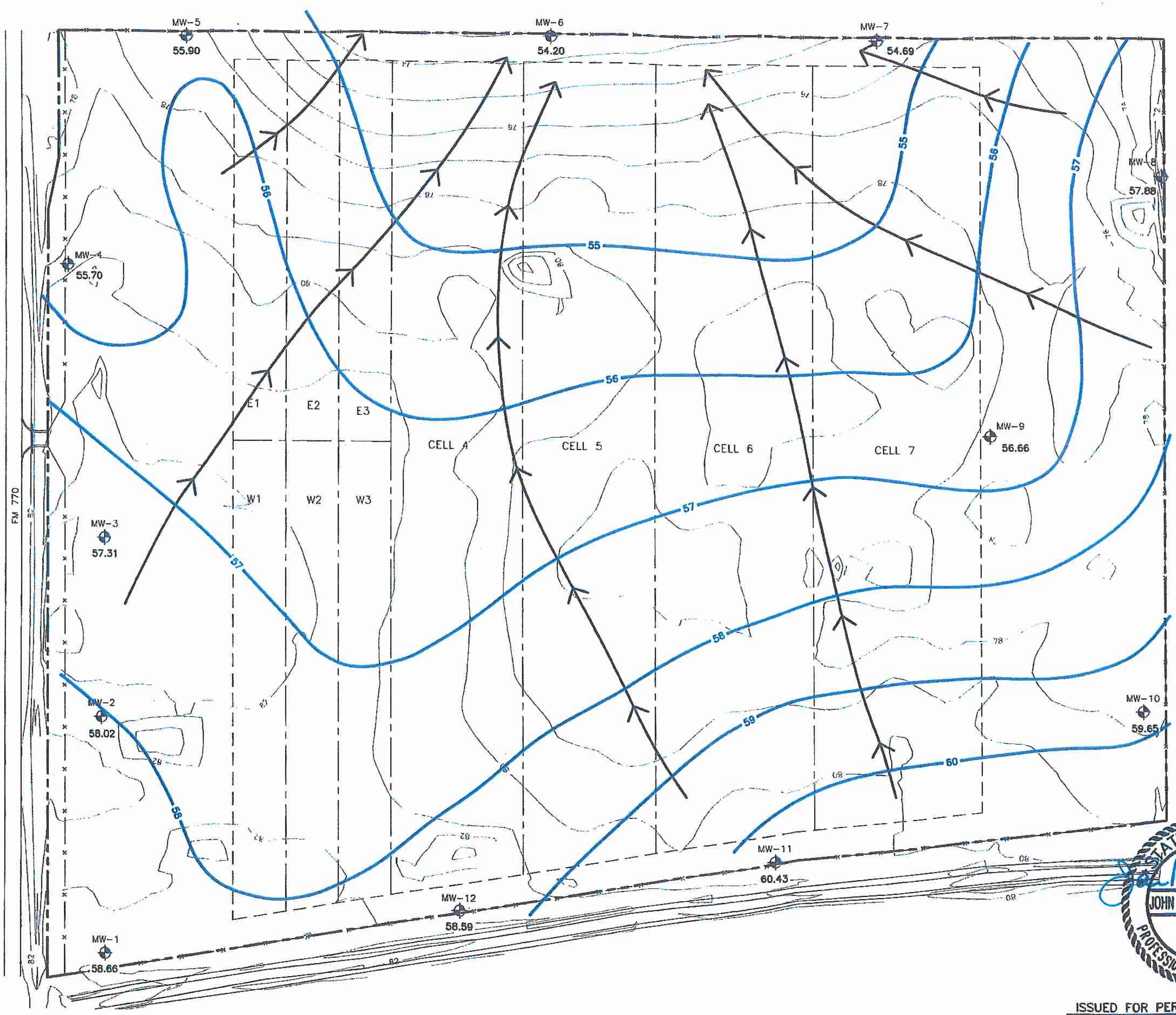
POTENTIOMETRIC SURFACE MAP
WATER LEVELS – AUGUST 15, 2007

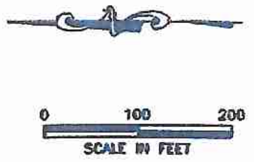
IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-11
CHK.	JMS	DWG :	WtrSurf_8-15-07.dwg	

J:\112\06\103\WtrSurf_10-10-07.dwg Layout: Layout1 User: scundiff





LEGEND

— - — - —	PERMIT BOUNDARY
- - - - - -	WASTE FOOTPRINT
·····80·····	EXISTING GROUND CONTOUR
————	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
——56——	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	58.66
MW-2	58.02
MW-3	57.31
MW-4	55.70
MW-5	55.90
MW-6	54.20
MW-7	54.69
MW-8	57.88
MW-9	56.66
MW-10	59.65
MW-11	60.43
MW-12	58.59

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

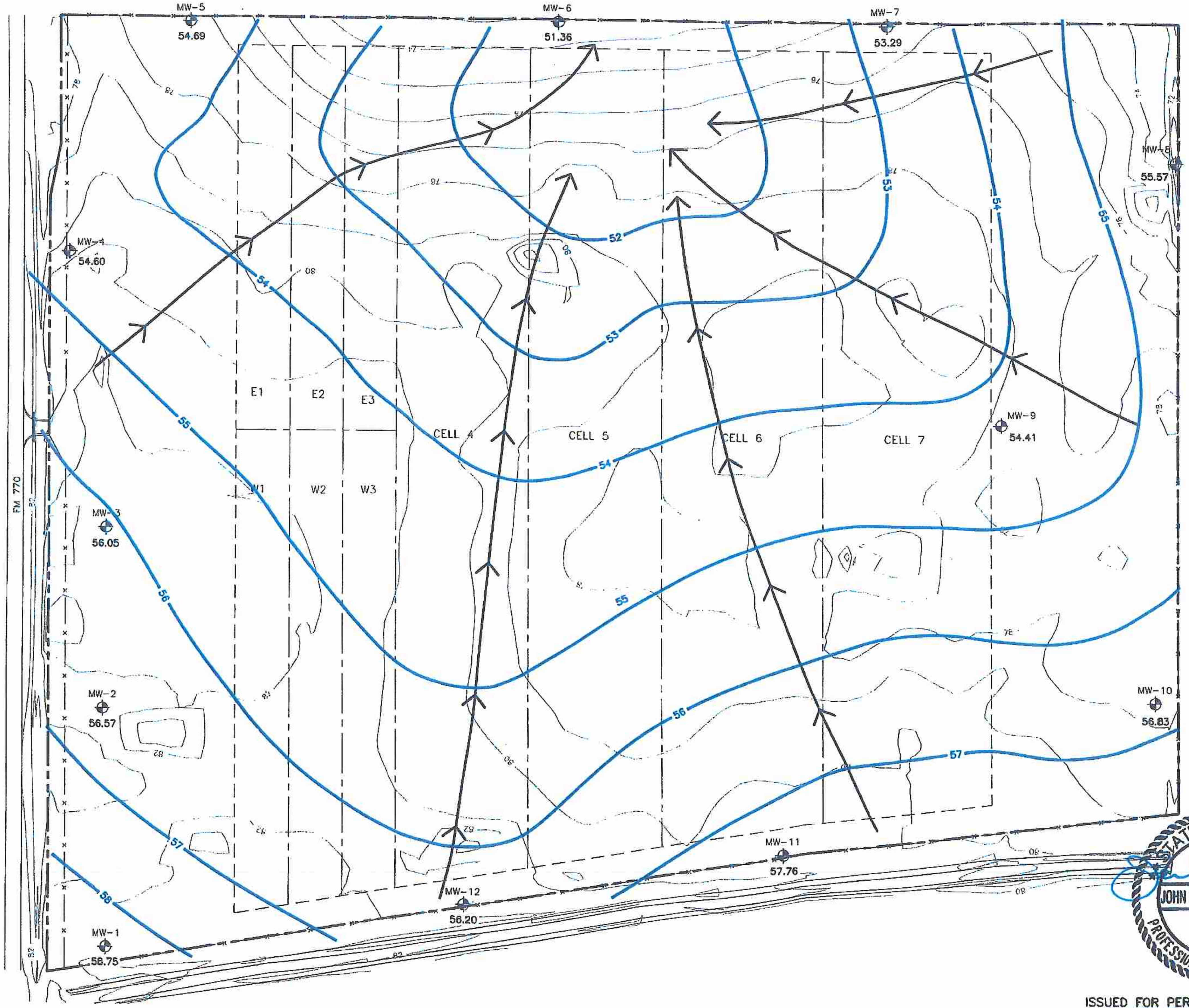
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

POTENTIOMETRIC SURFACE MAP WATER LEVELS – OCTOBER 10, 2007

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-12
CHK.	JMS	DWG :	WtrSurf_10-10-07.dwg	



0 100 200
SCALE IN FEET

LEGEND

— - —	PERMIT BOUNDARY
- - -	WASTE FOOTPRINT
---80---	EXISTING GROUND CONTOUR
— - - —	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	58.75
MW-2	56.57
MW-3	56.05
MW-4	54.60
MW-5	54.69
MW-6	51.36
MW-7	53.29
MW-8	55.57
MW-9	54.41
MW-10	56.83
MW-11	57.76
MW-12	56.20

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

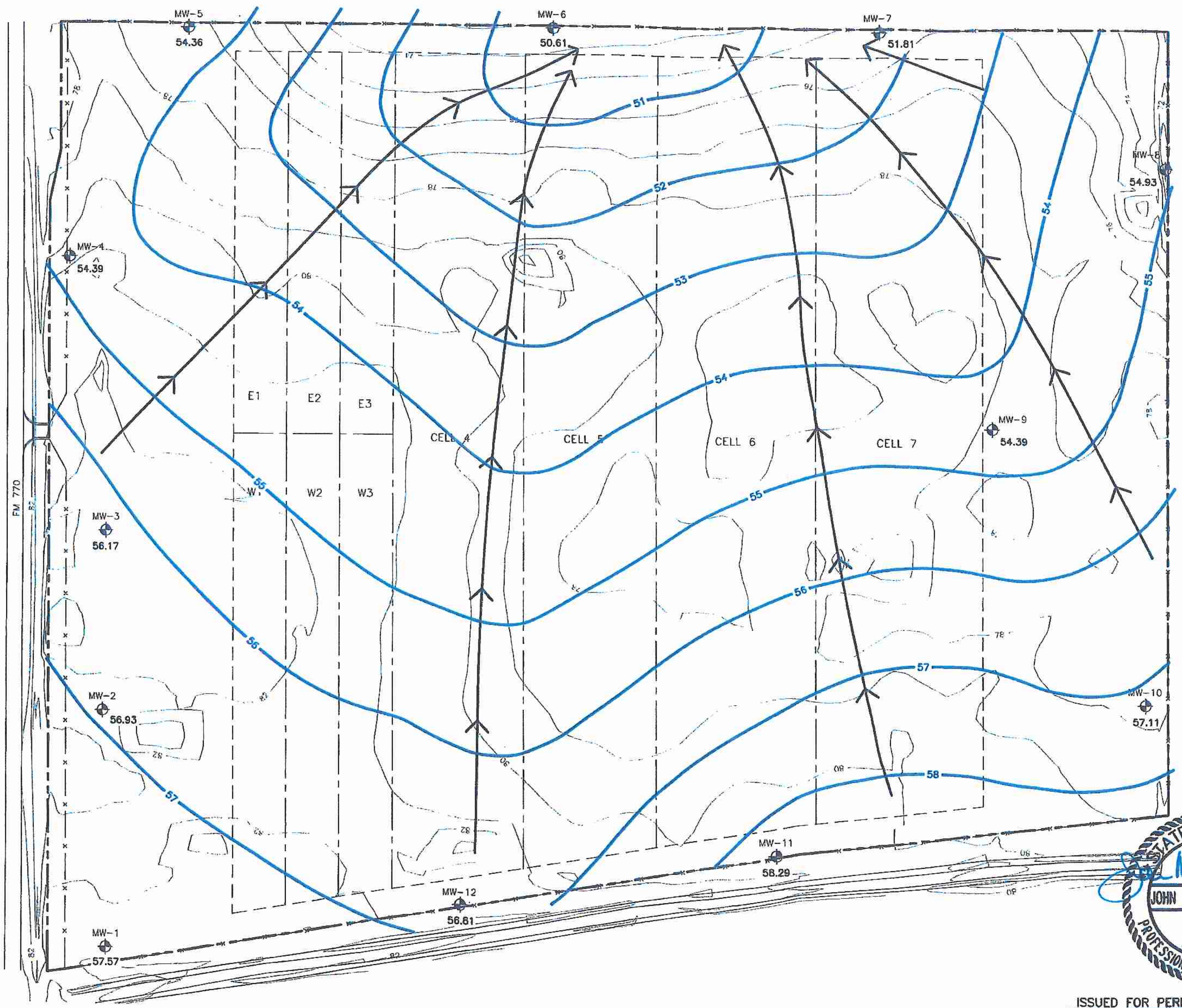
POTENTIOMETRIC SURFACE MAP WATER LEVELS – DECEMBER 26, 2007

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-13
CHK.	JMS	DWG :	WtrSurf_12-26-07.dwg	

J:\112\06\103\WtrSurf_12-26-07.dwg Layout: Layout1 User: scundiff



0 100 200
SCALE IN FEET

LEGEND

— — — —	PERMIT BOUNDARY
- - - - -	WASTE FOOTPRINT
···80···	EXISTING GROUND CONTOUR
———	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	57.57
MW-2	56.93
MW-3	56.17
MW-4	54.39
MW-5	54.36
MW-6	50.61
MW-7	51.81
MW-8	54.93
MW-9	54.39
MW-10	57.11
MW-11	58.29
MW-12	56.81

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

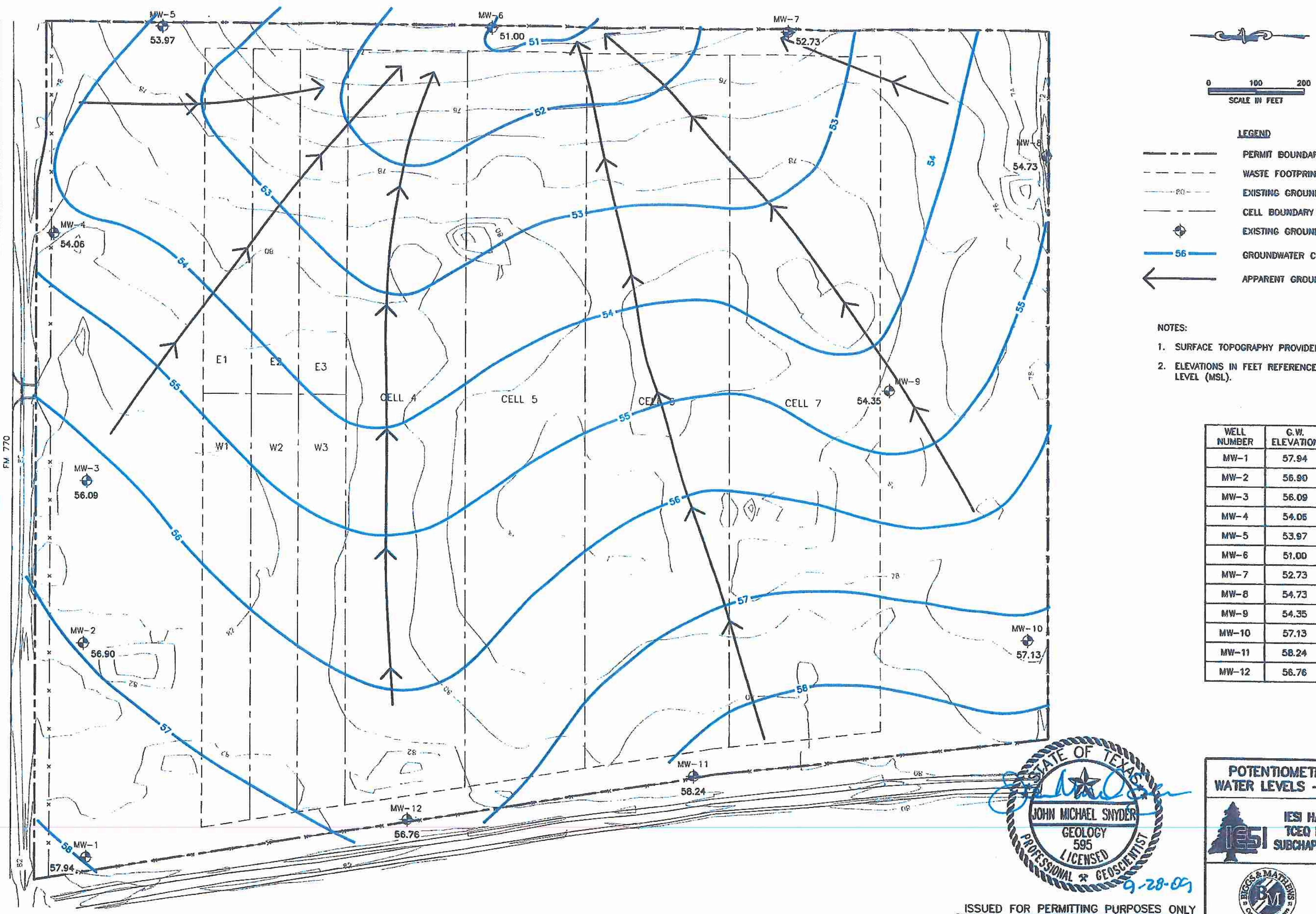
POTENTIOMETRIC SURFACE MAP
WATER LEVELS – AUGUST 7, 2008

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-14
CHK.	JMS	DWG :	WtrSurf_8-07-08.dwg	

J:\112\06\103\WtrSurf_8-07-08.dwg Layout: Layout1 User: scundiff



LEGEND

— — —	PERMIT BOUNDARY
– – –	WASTE FOOTPRINT
---80---	EXISTING GROUND CONTOUR
— —	CELL BOUNDARY
⊕	EXISTING GROUNDWATER MONITORING WELL
—56—	GROUNDWATER CONTOUR
←	APPARENT GROUNDWATER FLOW DIRECTION

NOTES:

1. SURFACE TOPOGRAPHY PROVIDED BY KSA.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).

WELL NUMBER	G.W. ELEVATION
MW-1	57.94
MW-2	56.90
MW-3	56.09
MW-4	54.06
MW-5	53.97
MW-6	51.00
MW-7	52.73
MW-8	54.73
MW-9	54.35
MW-10	57.13
MW-11	58.24
MW-12	56.76

JOHN MICHAEL SNYDER
GEOLOGY
595

9-28-09

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

POTENTIOMETRIC SURFACE MAP
WATER LEVELS – JANUARY 27, 2009

IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
SUBCHAPTER J PERMIT MODIFICATION

BIGGS & MATHEWS
ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

DSN.	JMS	DATE :	09/09	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	A-15
CHK.	JMS	DWG :	WtrSurf_1-27-09.dwg	

J:\112\06\103\WtrSurf_1-27-09.dwg Layout: Layout1 User: scundiff

APPENDIX IIIH-B

GROUNDWATER MONITORING DATA

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

CONTENTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

Table IIIH-B-1
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-1	8/30/2006	<10	<5	330	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	5.3	370	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	15	<20
	2/13/2007	<10	8.3	470	<5	<1	<30	<10	<20	7.3	27	<5	<10	<15	29	45
	5/24/2007	<10	10	490	<5	<1	<30	<10	<20	11	31	<5	<10	<15	39	54
	8/15/2007	<10	8.1	430	<5	<1	<30	<10	<20	9.9	24	<5	<10	<15	30	59
	10/10/2007	<10	16	770	<5	<1	43	20	23	<5	58	<5	<10	<15	70	89
	12/27/2007	<5	<5	250	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	540	2.3	<1	<30	13	<20	11	36	<5	<10	<1	39	53
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	11	1000	4.5	<1	40	24	25	27	63	<5	<10	<1	66	100
	7/14/2010	<5	<5	350	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	325	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	7.7	796	<4	<2	36.4	15.7	22	18.9	42.6	<50	<10	<1	62.1	<100
	1/12/2012	<5	12	1200	<4	<2	31	21	23	25	45	<50	<10	<1	60	<100
	7/17/2012	<5	<5	257	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/16/2013	<5	<5	290	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	6.7	820	<4	<2	21	15	14	15	30	<50	<10	<1	36	<100
	7/30/2014	<5	<5	360	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	280	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	310	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	730	<4	<2	<20	10	10	<15	22	<50	<10	<1	26	<100
	7/13/2016	<5	7.6	680	<4	<2	21	12	13	<15	33	<50	<10	<1	35	<100
OW-2 (MW-2)	11/21/2006	<10	6.2	470	<5	<1	<30	<10	<20	<5	20	<5	<10	<15	18	21
	2/13/2007	<10	<5	450	<5	<1	<30	<10	<20	<5	20	<5	<10	<15	18	23
	5/24/2007	<10	6	410	<5	<1	<30	<10	<20	<5	21	<5	<10	<15	16	28
	8/15/2007	<10	5.4	410	<5	<1	<30	<10	<20	6.4	<20	<5	<10	<15	15	29
	10/10/2007	<20	44	1600	21	<2	86	71	45	34	190	<10	<20	<30	140	220
	12/27/2007	<5	<5	480	2.4	<1	<30	<10	<20	<5	<20	<5	<10	<1	12	29
	2/19/2008	<5	<5	490	2.4	<1	<30	15	<20	<5	20	<5	<10	<1	15	23
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	<5	<5	690	5.5	<1	<30	17	<20	11	46	<5	<10	<1	32	85
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	560	3.8	<1	<30	<10	<20	6.7	29	<5	<10	<1	20	54

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
OW-3 (MW-3)	8/30/2006	<10	8.2	510	<5	<1	<30	11	<20	9	28	<5	<10	<15	34	55
	11/21/2006	<10	9.4	480	<5	<1	<30	<10	<20	<5	<20	<11	<10	<15	22	27
	2/13/2007	<10	15	720	6.6	<1	<30	22	<20	15	55	<5	<10	<15	53	67
	5/24/2007	<10	13	580	<5	<1	<30	19	<20	12	42	<5	<10	<15	44	57
	8/15/2007	<10	17	650	5.3	<1	<30	22	<20	15	45	<5	<10	<15	47	72
	10/10/2007	<10	30	1100	11	<1	56	51	30	11	110	<5	<10	<15	100	130
	12/27/2007	<5	<5	490	1.6	<1	<30	<10	<20	<5	<20	<5	<10	<1	15	28
	2/19/2008	<5	<5	590	3.3	<1	<30	15	<20	8.8	35	<5	<10	<1	34	44
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/23/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	400	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	20
MW-4	8/30/2006	<10	<5	290	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	6.5	380	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	380	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	340	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	5.4	340	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	20
	10/10/2007	<10	<5	370	<5	<1	<30	<10	<20	<7	<20	<5	<10	<15	<10	<20
	12/27/2007	<5	<5	330	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	360	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	13	22
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	370	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	7/14/2010	<5	<5	370	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	342	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	<5	410	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	23	<100
	1/12/2012	<5	<5	340	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2012	<5	<5	300	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/8/2013	<5	<5	322	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2013	<5	<5	340	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	<5	400	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/30/2014	<5	<5	320	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	340	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	280	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	310	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/13/2016	<5	5.4	330	<4	<2	<20	7.5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-5R	4/19/2010	<5	<5	120	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	7/14/2010	<5	<5	98	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	10/19/2010	<5	<5	88.8	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	84.9	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	4/4/2011	<5	<5	104	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	5.58	199	<4	<2	23.4	13.7	11.5	<15	21.7	<50	<10	<1	32.3	<100
	10/10/2011	<5	<5	105	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/12/2012	<5	7.4	240	<4	<2	<20	15	24	<15	24	<50	<10	<1	26	<100
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/17/2012	<5	<5	109	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/8/2013	<5	<5	120	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2013	<5	<5	110	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	<5	130	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/30/2014	<5	<5	81	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	150	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	180	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	220	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/13/2016	<5	<5	210	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
MW-6R	4/19/2010	<5	14	590	5.7	<1	47	27	30	28	54	<5	<10	<1	72	94
	7/14/2010	<5	<5	120	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	17	<100
	10/19/2010	<5	6.54	213	<4	<2	37.2	9.38	16.2	<15	25.6	<50	<10	<1	57.9	<100
	1/13/2011	<5	8.08	231	<4	<2	47.3	12.2	16.2	15.1	32.4	<50	<10	<1	74.2	<100
	4/4/2011	<5	10.1	245	<4	<2	61.3	14.4	23.9	17	38.4	<50	<10	<1	89.8	102
	7/30/2014	<5	6.7	220	<4	<2	<20	8	17	<15	<20	<50	<10	<1	12	<100
	1/7/2015	<5	7.7	180	<4	<2	<20	6.8	<10	<15	<20	<50	<10	<1	30	<100
	7/21/2015	<5	12	130	<4	<2	<20	9.4	<10	<15	<20	<50	<10	<1	18	<100
	1/26/2016	<5	15	180	4.3	<2	<20	11	<10	<15	22	<50	<10	<1	49	<100
	7/13/2016	<5	12	170	<4	<2	<20	15	<10	<15	<20	<50	<10	<1	15	<100

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-7	8/30/2006	<10	<5	170	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	<5	180	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	160	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	140	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	6.9	140	<5	<1	<30	<10	<20	<5	<20	15	<10	15	<10	<20
	10/10/2007	<10	<5	140	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	12/27/2007	<5	<5	140	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	160	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	170	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	7/14/2010	<5	<5	170	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	175	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	<5	197	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/12/2012	<5	<5	170	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2012	<5	<5	158	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/8/2013	<5	<5	192	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2013	<5	<5	140	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	<5	170	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/30/2014	<5	<5	160	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	160	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	160	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	190	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/13/2016	<5	<5	160	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
OW-8 (MW-8)	8/30/2006	<10	<5	640	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	7.7	630	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	580	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	520	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	<5	530	<5	<1	<30	<10	<20	<5	36	<5	<10	<15	<10	<20
	10/10/2007	<10	<5	790	<5	<1	<30	<10	<20	<7	25	<5	<10	<15	31	43
	12/27/2007	<5	<5	570	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	570	<1	<1	<30	<10	<20	<5	<20	<5	<10	1.5	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	630	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
OW-9 (MW-9)	8/30/2006	<10	<5	290	<5	<1	<30	<10	<20	5.1	<20	<5	<10	<15	22	35
	11/21/2006	<10	6.1	300	<5	<1	<30	<10	<20	5.9	<20	<5	<10	<15	27	35
	2/13/2007	<10	<5	270	<5	<1	<30	<10	<20	5.1	<20	<5	<10	<15	24	27
	5/24/2007	<10	5.4	290	<5	<1	<30	<10	<20	5.2	<20	<5	<10	<15	25	36
	8/15/2007	<10	<5	250	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	16	27
	10/10/2007	<10	<5	250	<5	<1	<30	<10	<20	<7	<20	<5	<10	<15	14	23
	12/27/2007	<5	<5	250	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	40
	2/19/2008	<5	<5	200	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	230	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	27
OW-10 (MW-10)	8/30/2006	<10	<5	170	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	5.4	190	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	180	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	180	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	<5	160	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	10/10/2007	<10	<5	250	<5	<1	<30	<10	<20	<8	<20	<5	<10	<15	22	36
	12/27/2007	<5	<5	170	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	150	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	220	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	11	22

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-11	8/30/2006	<10	<5	540	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	<5	610	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	570	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	560	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	<5	520	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	10/10/2007	<10	<5	650	<5	<1	<30	<10	<20	<6	<20	<5	<10	<15	<10	<20
	12/27/2007	<5	<5	640	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	490	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	690	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	24
	7/14/2010	<5	<5	560	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	475	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	<5	466	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2012	<5	<5	421	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/8/2013	<5	<5	522	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/16/2013	<5	<5	590	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	<5	540	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/30/2014	<5	<5	580	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	170	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	560	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	440	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/13/2016	<5	<5	620	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-1 (Continued)
Total Metals Analytical Data from Existing Groundwater Wells

Well No.	Event	Total Antimony	Total Arsenic	Total Barium	Total Beryllium	Total Cadmium	Total Chromium	Total Cobalt	Total Copper	Total Lead	Total Nickel	Total Selenium	Total Silver	Total Thallium	Total Vanadium	Total Zinc
MW-12	8/30/2006	<10	<5	640	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	11/21/2006	<10	6	690	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	2/13/2007	<10	<5	680	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	5/24/2007	<10	<5	600	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	8/15/2007	<10	<5	560	<5	<1	<30	<10	<20	<5	<20	<5	<10	<15	<10	<20
	10/10/2007	<10	<5	670	<5	<1	<30	<10	<20	<6	<20	<5	<10	<15	<10	<20
	12/27/2007	<5	<5	650	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	2/19/2008	<5	<5	640	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/22/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	690	<1	<1	<30	<10	<20	<5	<20	<5	<10	<1	<10	<20
	7/14/2010	<5	<5	670	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	<5	600	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	<5	734	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/12/2012	<5	<5	640	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2012	<5	<5	673	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/8/2013	<5	<5	702	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/17/2013	<5	<5	680	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2014	<5	<5	720	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/30/2014	<5	<5	790	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/7/2015	<5	<5	780	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/21/2015	<5	<5	83	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	1/26/2016	<5	<5	70	<4	<2	<20	<5	<10	<15	<20	<50	<10	<1	<10	<100
	7/13/2016	<5	<5	120	<4	<2	<20	13	<10	<15	<20	<50	<10	<1	<10	<100
MW-13	4/19/2010	<5	<5	380	1.3	<1	<30	<10	<20	<5	<20	<5	<10	<1	10	<20
	7/14/2010	<5	8.1	430	<4	<2	<20	16	<10	<15	<20	<50	<10	<1	<10	<100
	10/19/2010	<5	10.7	412	<4	<2	<20	13.8	<10	<15	<20	<50	<10	<1	<10	<100
	1/13/2011	<5	7.58	421	<4	<2	<20	11.6	<10	<15	<20	<50	<10	<1	<10	<100
	4/4/2011	<5	7.7	377	<4	<2	<20	9.07	<10	<15	<20	<50	<10	<1	<10	<100
	7/12/2011	<5	13.4	974	4.64	<2	39.7	26.3	28.4	24.3	50.9	<50	<10	<1	74.6	115
	10/10/2011	<5	17.7	1230	6.82	<2	62.1	35.2	36.6	41	68.1	<50	<10	<1	114	194
	4/11/2012	<5	<5	358	<4	<2	<20	7.37	<10	<15	<20	<50	<10	<1	<10	<100
	7/23/2012	<5	<5	349	<4	<2	<20	6.94	<10	<15	<20	<50	<10	<1	<10	<100

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-1	11/12/1998	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/15/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/12/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/10/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/30/2001	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/10/2001	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/8/2002	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/10/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/1/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/6/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-1	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/12/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/16/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
	11/12/1998	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
MW-1	1/27/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/15/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/12/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/10/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/30/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/10/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/8/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/10/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/1/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/6/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-1	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/12/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/16/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-1	11/12/1998	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/15/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/12/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/10/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/30/2001	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/10/2001	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/8/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/10/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/1/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/6/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
	7/14/2010	<5	<5	<5	<2	<2	n/a	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-1	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/12/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/16/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Dibromochloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromoethane	1,2-Dichlorobenzene
OW-2 (MW-2)	11/12/1998	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/15/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/1/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/6/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/19/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/6/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
OW-2 (MW-2)	11/12/1998	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/15/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/1/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/6/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/19/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/6/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
OW-2 (MW-2)	11/12/1998	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/15/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/1/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/6/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/19/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/6/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
OW-3 (MW-3)	11/12/1998	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/15/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/1/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/6/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/19/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/6/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	9/23/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
OW-3 (MW-3)	11/12/1998	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/15/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/1/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/6/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/19/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/6/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	9/23/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)

VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
OW-3 (MW-3)	11/12/1998	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/15/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/13/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/11/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/12/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/30/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/10/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/8/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/18/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/10/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/1/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/6/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/19/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/6/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	9/23/2009	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-4	11/12/1998	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/15/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/13/1999	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/12/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/10/2000	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/30/2001	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/10/2001	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/8/2002	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	n/a	n/a	n/a	n/a	n/a	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/10/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/1/2003	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/6/2004	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/11/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
MW-4	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/12/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/8/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-4	11/12/1998	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/15/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/13/1999	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/12/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/10/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/30/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/10/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/8/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/10/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/1/2003	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/6/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/11/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
MW-4	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/12/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/8/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-4	11/12/1998	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/15/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/13/1999	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/12/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/10/2000	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/30/2001	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/10/2001	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/8/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	4/11/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/18/2002	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/10/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/1/2003	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/6/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/19/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/6/2004	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/11/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
	7/14/2010	<5	<5	<5	<2	<2	n/a	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
MW-4	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/12/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/8/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-5R	4/19/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/19/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/8/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-5R	4/19/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/19/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/8/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-5R	4/19/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/19/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1/12/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/8/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylonitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Dibromochloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromoethane	1,2-Dichlorobenzene
MW-6R	4/19/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/19/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-6R	4/19/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/19/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-6R	4/19/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/19/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylonitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Dibromochloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromoethane	1,2-Dichlorobenzene
MW-7	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/12/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/8/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-7	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/12/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/8/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-7	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<1	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/12/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/8/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
OW-8 (MW-8)	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
OW-8 (MW-8)	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
OW-8 (MW-8)	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylonitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Dibromochloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromoethane	1,2-Dichlorobenzene
OW-9 (MW-9)	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
OW-9 (MW-9)	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
OW-9 (MW-9)	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
OW-10 (MW-10)	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
OW-10 (MW-10)	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
OW-10 (MW-10)	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylonitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Dibromochloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromoethane	1,2-Dichlorobenzene
MW-11	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/8/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/16/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-11	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/8/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/16/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-11	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/8/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/16/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
	7/27/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
MW-12	11/14/2005	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/8/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/15/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/30/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	11/21/2006	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	2/13/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	5/24/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/15/2007	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	8/7/2008	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/27/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/22/2009	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	1/12/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/12/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/8/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/17/2013	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/30/2014	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/7/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/21/2015	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/26/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	7/13/2016	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-12	7/27/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/14/2005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/8/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/15/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/30/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	11/21/2006	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	2/13/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	5/24/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/15/2007	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	8/7/2008	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/27/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/22/2009	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	1/12/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<50	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/12/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/8/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/17/2013	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/30/2014	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/7/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/21/2015	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/26/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	7/13/2016	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-12	7/27/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/14/2005	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/8/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/15/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/30/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	11/21/2006	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	2/13/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	5/24/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/15/2007	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	10/10/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	12/27/2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/19/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	8/7/2008	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/27/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/22/2009	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	1/12/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<1	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/12/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/8/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/17/2013	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/30/2014	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/7/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/21/2015	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/26/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	7/13/2016	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

Notes: All constituents listed in micrograms per liter (μg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-ethane	Chloroform	Dibromo-chloromethane	1-2-Dibromo-3-chloropropane	1-2-Dibromo-ethane	1,2-Dichloro-benzene
MW-13	4/19/2010	<20	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5
	7/14/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/19/2010	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	1/13/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/23/2012	<20	<50	<1	<1	<1	<5	<5	<5	<1	<5	<1	<2	<5	<1	<2

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	1,4-Dichloro-benzene	trans-1,4-Dichloro-2-butene	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethylene	cis-1,2-Dichloro-ethylene	trans-1,2-Dichloro-ethylene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	trans-1,3-Dichloro-propene	Ethyl-benzene	2-Hexa-none	Bromo-methane	Chloro-methane	Dibromo-methane	Methylene chloride
MW-13	4/19/2010	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<10	<5	<5
	7/14/2010	<2	<100	<1	<1	<1	<1	n/a	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/19/2010	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	1/13/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/23/2012	<2	<100	<1	<1	<1	<1	<1	<1	<2	<5	<2	<5	<10	<5	<1	<5

Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

Table IIIH-B-2 (Continued)
VOC Analytical Data from Existing Groundwater Wells

Well No.	Event	Methyl Ethyl Ketone	Iodo-methane	4-Methyl-2-Pentanone	Styrene	1,1,1,2-Tetrachloro-ethane	1,1,2,2-Tetrachloro-ethane	Tetrachloro-ethylene	Toluene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethylene	Trichloro-fluoro-methane	1,2,3-Trichloro-propane	Vinyl Acetate	Vinyl Chloride	Total Xylenes
MW-13	4/19/2010	<20	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<10
	7/14/2010	<5	<5	<5	<2	<2	n/a	<1	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/19/2010	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	1/13/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	4/4/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2011	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10
	10/10/2011	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/11/2012	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/23/2012	<5	<5	<5	<2	<2	<1	<5	<1	<1	<1	<5	<10	<1	<100	<2	<10

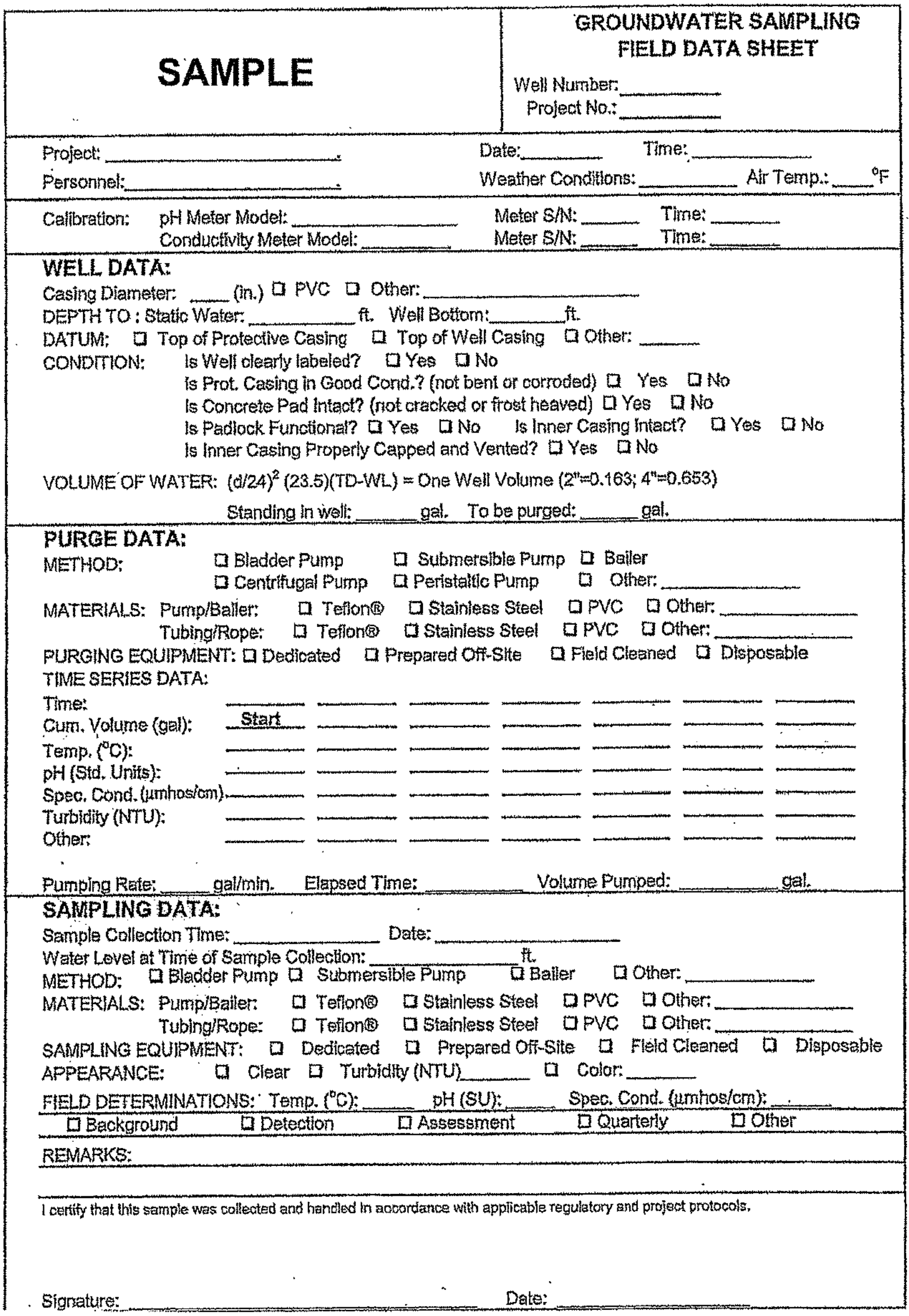
Notes: All constituents listed in micrograms per liter (µg/L).
Former well numbers/names listed in parenthesis.
All groundwater analytical data reproduced from the facility's groundwater database obtained from Hydrex in October 2016.
n/a = No analytical data for this constuent/date in the facility's groundwater database.

APPENDIX IIIH-C

SAMPLE FIELD DATA SHEET

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17



SAMPLE

GROUNDWATER SAMPLING FIELD DATA SHEET

Well Number:__________
Project No.:__________

Project: ____________________ Date:________ Time:__________
Personnel:____________________ Weather Conditions: _________ Air Temp.:____°F

Calibration: pH Meter Model: ____________ Meter S/N: _____ Time: ______
Conductivity Meter Model: ________ Meter S/N: _____ Time: ______

WELL DATA:

Casing Diameter: ____ (in.) ☐ PVC ☐ Other: ________________
DEPTH TO : Static Water: _________ ft. Well Bottom:_______ft.
DATUM: ☐ Top of Protective Casing ☐ Top of Well Casing ☐ Other: ______
CONDITION: Is Well clearly labeled? ☐ Yes ☐ No
Is Prot. Casing in Good Cond.? (not bent or corroded) ☐ Yes ☐ No
Is Concrete Pad Intact? (not cracked or frost heaved) ☐ Yes ☐ No
Is Padlock Functional? ☐ Yes ☐ No Is Inner Casing Intact? ☐ Yes ☐ No
Is Inner Casing Properly Capped and Vented? ☐ Yes ☐ No

VOLUME OF WATER: $(d/24)^2$ (23.5)(TD-WL) = One Well Volume (2"=0.163; 4"=0.653)
Standing in well: _____ gal. To be purged: _____ gal.

PURGE DATA:

METHOD: ☐ Bladder Pump ☐ Submersible Pump ☐ Bailer
☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Other: ____________
MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________
Tubing/Rope: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________
PURGING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable
TIME SERIES DATA:

Time:							
Cum. Volume (gal):	Start						
Temp. (°C):							
pH (Std. Units):							
Spec. Cond. (μmhos/cm)							
Turbidity (NTU):							
Other:							

Pumping Rate: _____ gal/min. Elapsed Time: _________ Volume Pumped: _________ gal.

SAMPLING DATA:

Sample Collection Time: ____________ Date: _______________
Water Level at Time of Sample Collection: ____________ ft.
METHOD: ☐ Bladder Pump ☐ Submersible Pump ☐ Bailer ☐ Other: __________
MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________
Tubing/Rope: ☐ Teflon® ☐ Stainless Steel ☐ PVC ☐ Other: ____________
SAMPLING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable
APPEARANCE: ☐ Clear ☐ Turbidity (NTU)______ ☐ Color: ______
FIELD DETERMINATIONS: Temp. (°C): _____ pH (SU): _____ Spec. Cond. (μmhos/cm): _____
☐ Background ☐ Detection ☐ Assessment ☐ Quarterly ☐ Other

REMARKS:

I certify that this sample was collected and handled in accordance with applicable regulatory and project protocols.

Signature: __________________________ Date: ______________

APPENDIX IIIH-D

CONTAINERIZATION AND PRESERVATION OF SAMPLES

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES

Measurement$_a$	Volume (mL)	Container$_b$	Preservative	Holding Times	Reference
Physical Properties					
Specific Cond. (Field)	100	P,G	Cool, 4 °C	Det. on Site	1
Specific Cond. (Lab)	100	P,G	Cool, 4 °C	28 Days	1
pH (Field)	50	P,G	None	Det. on Site	1,2
pH (Lab)	50	P,G	None	24 Hrs	1,2
Temperature	1000	P,G	None	Det. On Site	1
Turbidity	100	P,G	Cool, 4 °C	Det. On Site	1

Measurement$_a$	Volume (mL)	Container$_b$	Preservative	Holding Times	Reference
Inorganics, Non-Metallics					
Ammonia as Nitrogen	1000	P,G	Cool, 4 °C H_2SO_4 to pH <2	28 days	2,3
Carbonate/Bicarbonate	200	P,G	Cool, 4 °C	14 days	1
Chemical Oxygen Demand (COD)	50	P,G	H_2SO_4 to pH <2	28 days	1
Chloride	200	P,G	None	28 Days	1,2
Nitrate plus Nitrite	200	P,G	Cool, 4 °C H_2SO_4 to pH <2	28 days	1,2
Sulfate	100	P,G	Cool, 4 °C	28 days	1,2
Total Alkalinity	200	P, G	Cool, 4 °C	14 days	1
Total Dissolved Solids (TDS)	500	P,G	Cool, 4 °C	7 days	2,3
Total Organic Carbon (TOC)	250	P,G	Cool, 4 °C HCL or H_2SO_4 to pH <2	28 days	2,3

RECOMMENDED CONTAINERIZATION AND PRESERVATION OF SAMPLES

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Metals (except mercury)					
Total	500	P,G	HNO_3 to pH <2	6 Mos	1,2
Dissolved	500	P,G	Filt. + HNO_3 to pH <2	6 Mos	1,2
Mercury – Total	500	P,G	HNO_3 to pH <2	28 days	1,2
Mercury – Dissolved	300	P,G	Filt. + HNO_3 to pH <2	28 days	1,2

Measurement[a]	Volume (mL)	Container[b]	Preservative	Holding Times	Reference
Organics					
Volatile Organics by GC/MS	100 (2 vials @ 40ml)	G, Teflon septum cap	Cool, 4 °C HCL to pH <2	14 days	2,3
Herbicides	1000	Glass Only	Cool, 4 °C	7 days [c] 40 days [d]	2,3
Pesticides and PCB's	1000	Glass Only	Cool, 4 °C	7 days [c] 40 days [d]	2,3
Semi-Volatiles Acid and Base/Neutral Compounds	2000	Glass Only	Cool, 4 °C	7 days [c] 40 days [d]	2,3

NOTES:

a Additional measurements not required per the GWSAP are included in the event assessment monitoring is initiated or if the need to sample for additional parameters arises due to unforeseen circumstances.

b Plastic (P) or Glass (G). For metals, polyethylene with an all polypropylene cap is preferred.

c Maximum holding time from sampling to extraction.

d Maximum holding time from extraction to analysis.

REFERENCES:

1 Methods for Chemical Analysis of Water and Wastes, March, 1983, USEPA, 600/4-79-020 and additions thereto.

2 Test Methods for Evaluating Solid Waste, Physical/Chemical Method, November, 1986, Third Edition, USEPA, SW-846 and additions thereto.

3 "Guidelines Establishing Test Procedures for the Analysis of Pollutant Under the Clean Water Act", Environmental Protection Agency, Code of Federal Regulations (CFR), Title 40, Part 136.

APPENDIX IIIH-E

SAMPLE CHAIN-OF-CUSTODY FORM

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

TO ENSURE PROPER HANDLING OF SAMPLES PLEASE COMPLETE THE SHADED AREAS OF THIS FORM

HERITAGE ENVIRONMENTAL SERVICES, LLC.
COMMERCIAL LABORATORY OPERATIONS
7901 West Morris Street Indianapolis IN 46231
www.heritage-enviro.com (800)827-4374 Fax: (317) 486-5095

I -

Bill to Customer:
Project Name:
Z Quote No:
PO No. or Project/Activity ID:

PRINT HERITAGE TSR NAME:

CUSTOMER STATUS: New / Existing

If no previous credit has been established with Heritage, **prepayment** (check,VISA,etc) is required at the time of sample submittal to the laboratory.

Sampled By:

Send Report To:
Co:
Add:
Attn:
Phone:
Fax:
E-mail:

Sample Turn Around Time

Standard:_x Rush Date___/___/___
Mo Day Yr

(Accelerated TAT subject to Additional Charge)
(Date must be Accepted and Approved by Lab)

SAMPLE

Date Sampled	Time sampled	Comp	Grab	Sample ID and/or Location where your sample was taken	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Swipe, Other	Number Of Containers	Analyses Requested (Note special detection limits or methods)										Remarks:	Lab use only Sample No.
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	
	AM PM																	

Relinquished by: (Signature)	Date/Time /	Received by: (Signature)
Relinquished by: (Signature)	Date/Time /	Received by: (Signature)
Relinquished by: (Signature)	Date/Time /	Received by: (Signature)
Received for Lab by: (Signature)	Date Time	Temp. °C ROI: Yes / No

Distribution: White original and Yellow copies to accompany sample to the laboratory.
Pink copy to be retained by the client.

Laboratory use only	Yes	No
Custody seals present/intact?		
Broken containers?		
COC agree with sample labels?		
Correct containers for testing?		
Headspace issues acceptable?		
Holding time(s) acceptable?		
Preservative pH's acceptable?		
Was pH left unadjusted?		

Comments:

APPENDIX IIIH-F

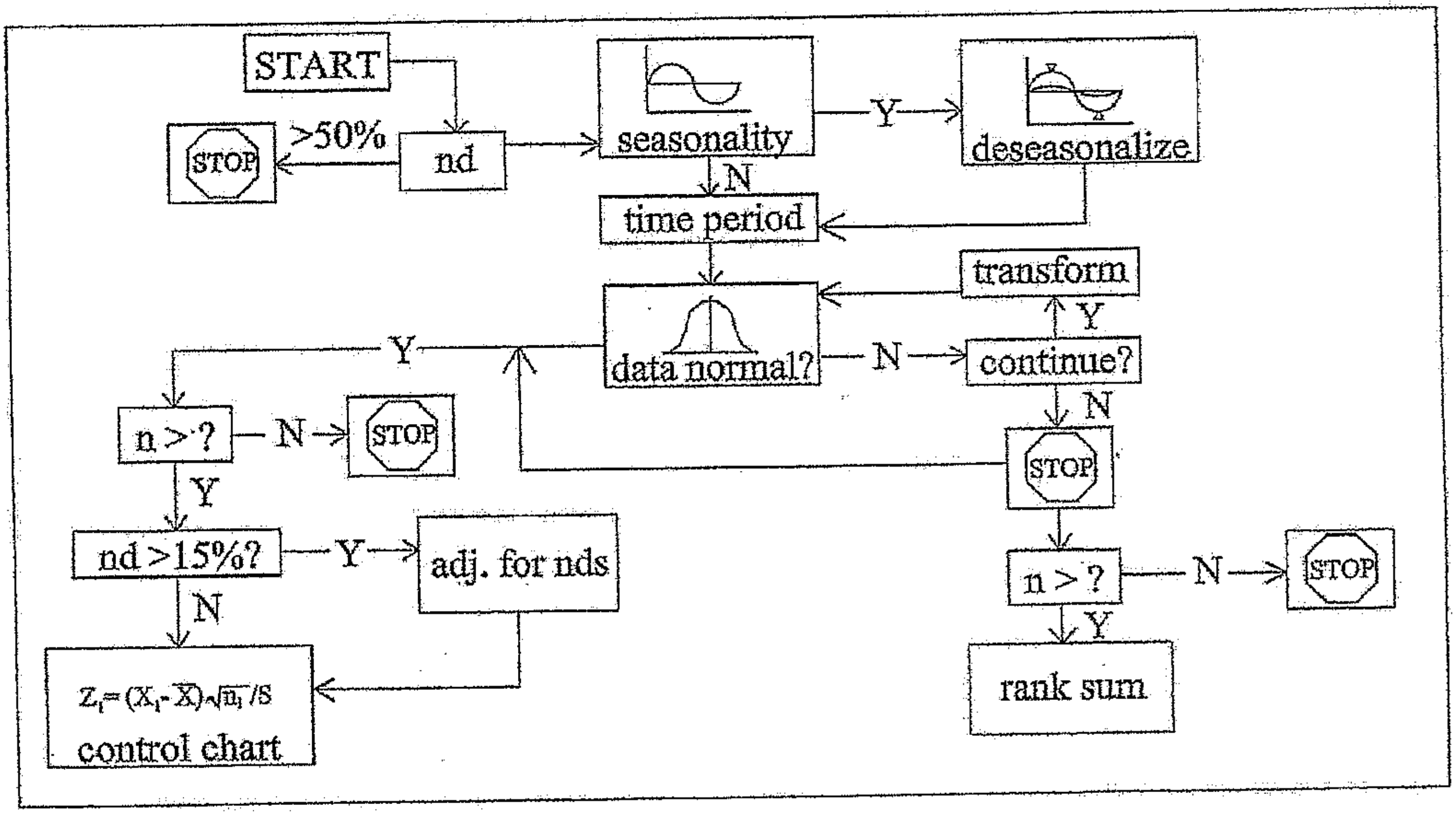
STATISTICAL ANALYSIS FLOW CHARTS

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

FIGURE 1

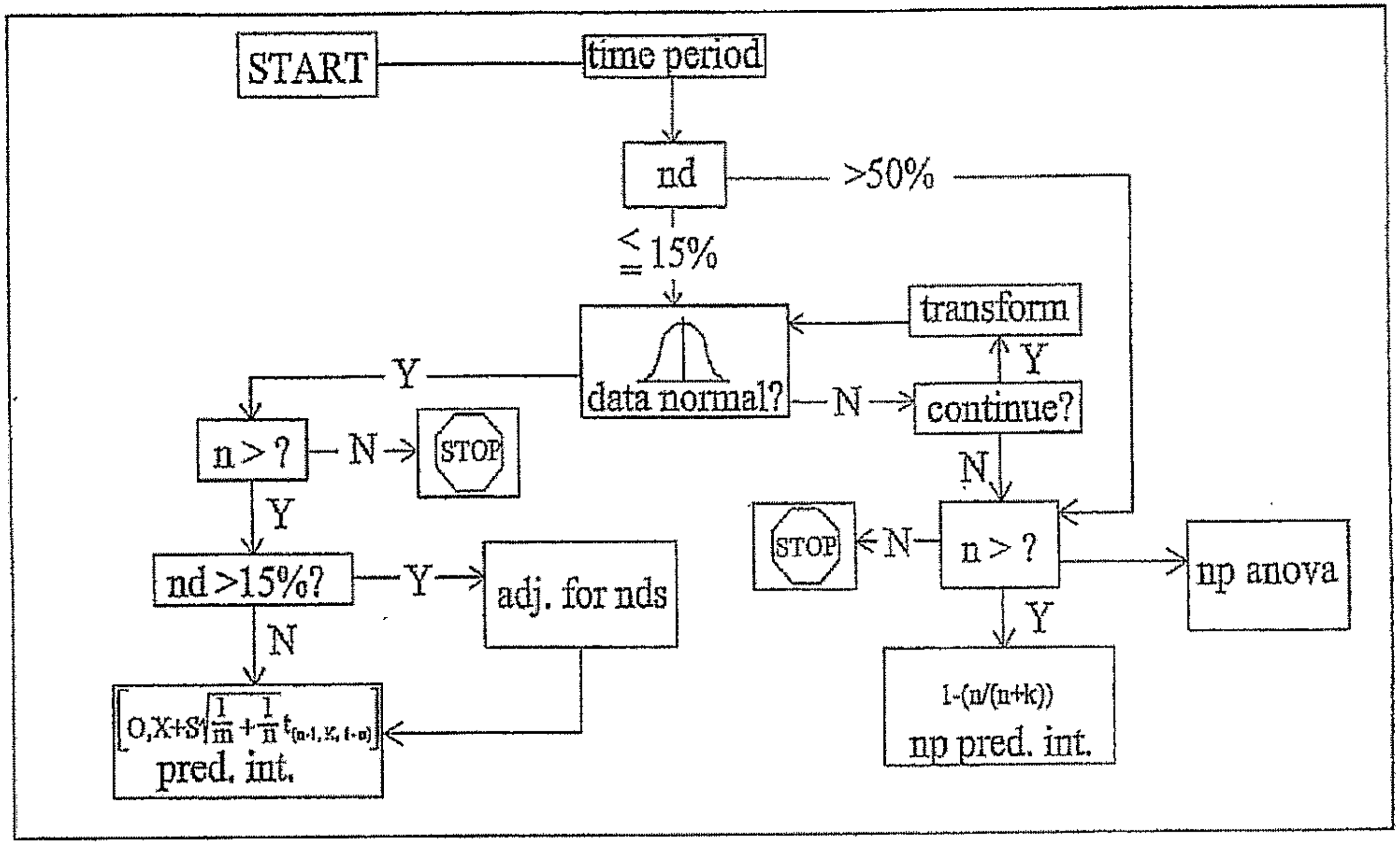
CONTROL CHART FLOWCHART



Source: Sanitas^{TM} version 7.5

FIGURE 2

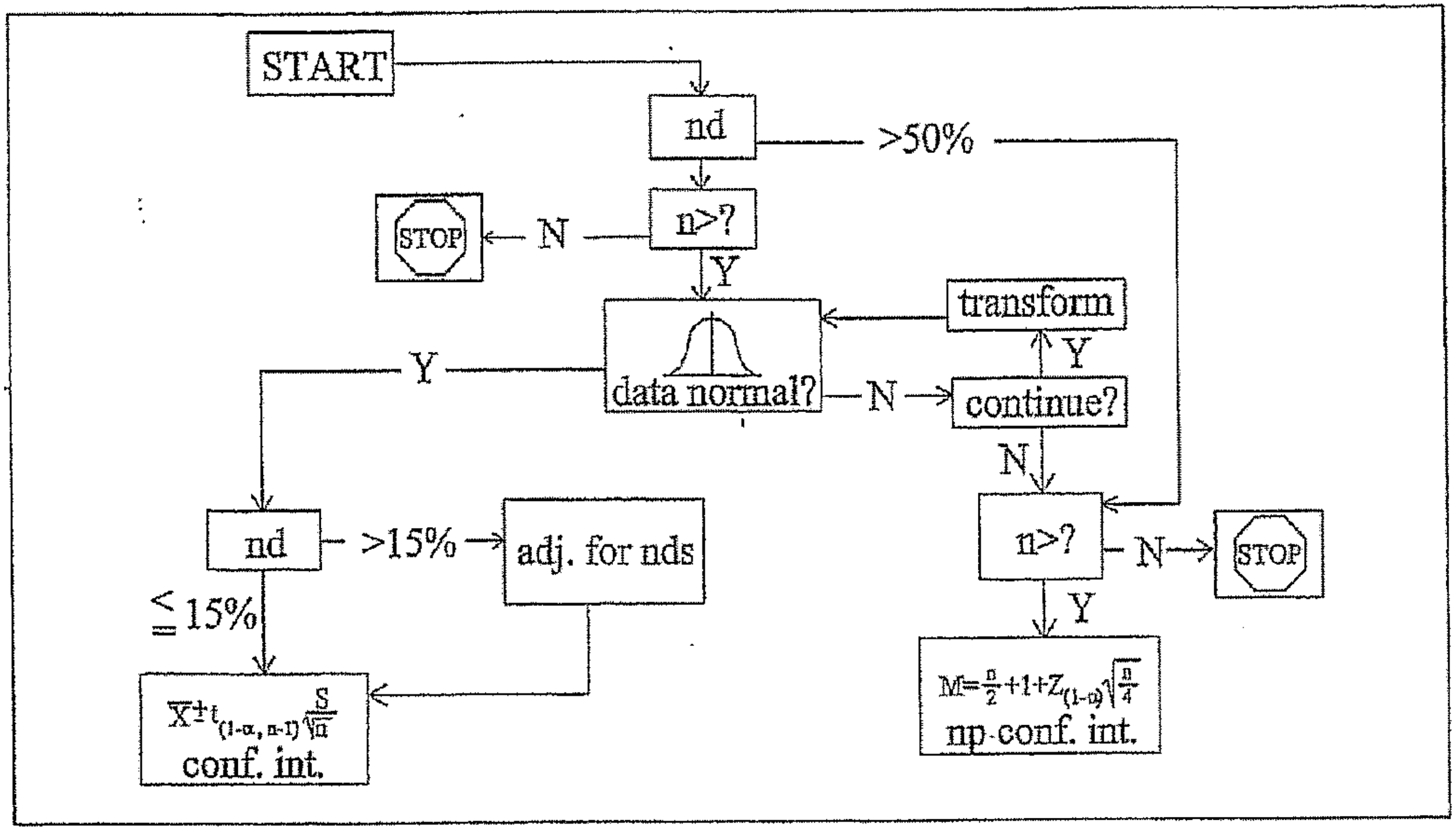
PREDICTION LIMIT FLOWCHART



Source: Sanitas™ version 7.5

FIGURE 3

95% CONFIDENCE INTERVAL FLOWCHART



Source: Sanitas^{TM} version 8.0

APPENDIX IIIH-G

SAMPLE LABORATORY QC CHECKLIST

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12-05-17

Laboratory Data Package Cover Page

This data package consists of:

- This signature page, the laboratory review checklist, and the following reportable data:
- R1 Field chain-of-custody documentation;
- R2 Sample identification cross-reference;
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
  - a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
  - b) dilution factors,
  - c) preparation methods,
  - d) cleanup methods, and
  - e) if required for the project, tentatively identified compounds (TICs).
- R4 Surrogate recovery data including:
  - a) Calculated recovery (%R), and
  - b) The laboratory's surrogate QC limits.
- R5 Test reports/summary forms for blank samples;
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
  - a) LCS spiking amounts,
  - b) Calculated %R for each analyte, and
  - c) The laboratory's LCS QC limits.
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  - a) Samples associated with the MS/MSD clearly identified,
  - b) MS/MSD spiking amounts,
  - c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  - d) Calculated %Rs and relative percent differences (RPDs), and
  - e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
  - a) the amount of analyte measured in the duplicate,
  - b) the calculated RPD, and
  - c) the laboratory's QC limits for analytical duplicates.
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;
- R10 Other problems or anomalies.
- The Exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: [ ] This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (printed)	Date

Laboratory Review Checklist: Reportable Data

Laboratory Name:	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name:	Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
		Chain-of-custody (C-O-C)					
R1	OI	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?					
		Were all departures from standard conditions described in an exception report?					
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?					
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?					
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?					
		Other than those results < MQL, were all other raw values bracketed by calibration standards?					
		Were calculations checked by a peer or supervisor?					
		Were all analyte identifications checked by a peer or supervisor?					
		Were sample quantitation limits reported for all analytes not detected?					
		Were all results for soil and sediment samples reported on a dry weight basis?					
		Were % moisture (or solids) reported for all soil and sediment samples?					
		If required for the project, TICs reported?					
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?					
		Were surrogate percent recoveries in all samples within the laboratory QC limits?					
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?					
		Were blanks analyzed at the appropriate frequency?					
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?					
		Were blank concentrations < MQL?					
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?					
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?					
		Were LCSs analyzed at the required frequency?					
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?					
		Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?					
		Was the LCSD RPD within QC limits?					
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?					
		Were MS/MSD analyzed at the appropriate frequency?					
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?					
		Were MS/MSD RPDs within laboratory QC limits?					
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?					
		Were analytical duplicates analyzed at the appropriate frequency?					
		Were RPDs or relative standard deviations within the laboratory QC limits?					
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?					
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?					
		Are unadjusted MQLs included in the laboratory data package?					
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?					
		Were all necessary corrective actions performed for the reported data?					
		Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?					

Laboratory Review Checklist: Supporting Data

Laboratory Name:	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name:	Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?					
		Were percent RSDs or correlation coefficient criteria met?					
		Was the number of standards recommended in the method used for all analytes?					
		Were all points generated between the lowest and highest standard used to calculate the curve?					
		Are ICAL data available for all instruments used?					
		Has the initial calibration curve been verified using an appropriate second source standard?					
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank[6] :**					
		Was the CCV analyzed at the method-required frequency?					
		Were percent differences for each analyte within the method-required QC limits?					
		Was the ICAL curve verified for each analyte?					
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?					
S3	O	**Mass spectral tuning:**					
		Was the appropriate compound for the method used for tuning?					
		Were ion abundance data within the method-required QC limits?					
S4	O	**Internal standards (IS):**					
		Were IS area counts and retention times within the method-required QC limits?					
	OI	**Raw data (NELAC section 1 appendix A glossary, and section 5.)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?					
		Were data associated with manual integrations flagged on the raw data?					
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?					
S7	O	**Tentatively identified compounds (TICs):**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?					
S8	I	**Interference Check Sample (ICS) results:**					
		Were percent recoveries within method QC limits?					
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?					
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?					
		Is the MDL either adjusted or supported by the analysis of DCSs?					
S11	OI	**Proficiency test reports:**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?					
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?					
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?					
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5C?					
		Is documentation of the analyst's competency up-to-date and on file?					
S15	OI	**Verification/validation documentation for methods** (NELAC Chap 5n 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?					
S16	OI	**Laboratory standard operating procedures (SOPs):**					
		Are laboratory SOPs current and on file for each method performed?					

Laboratory Review Checklist: Exception Reports

Laboratory Name:	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name:	Prep Batch Number(s):

ER #[5]	DESCRIPTION

1. Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O= organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

6. CCB = Continuing Calibration Blank

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2214B
PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN

APPENDIX III I
LANDFILL GAS MANAGEMENT PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

CONTENTS (Continued)

TABLES

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

1 INTRODUCTION

1.1 Scope

This Landfill Gas Management Plan (LGMP) has been developed for Hardin County Landfill consistent with the requirements set forth in the Texas Commission on Environmental Quality (TCEQ) Municipal Solid Waste (MSW) regulations Title 30 Texas Administrative Code (TAC) §330.371, §330.159, and RCRA Subtitle D regulations in 40 CFR §258.23. The landfill is owned and operated by BFI Waste Systems of North America, LLC, a subsidiary of Republic Services, Inc. (RSI).

In accordance with TCEQ "Guidelines for Preparing a Landfill Gas Management Plan," this LGMP describes the existing and proposed upgrades to the landfill gas (LFG) monitoring network. It also discusses the operation and monitoring of this network, notification procedures, and possible remediation activities, if required. In addition, this LGMP includes a description of the Landfill Gas Collection and Control System (GCCS) installation.

1.2 Purpose

30 TAC §330.159 requires landfills to develop a LGMP in accordance with 30 TAC §330.371. Compliance with 30 TAC §330.371 requires landfills to implement a routine monitoring program for methane to verify that (1) the concentration of methane gas generated by the facility does not exceed 1.25% by volume in facility structures (excluding LFG control or recovery system components) within the permit boundary, and (2) the concentration of methane gas does not exceed 5% by volume in monitoring points, probes, subsurface soils, or other matrices at the facility boundary as defined by the legal description in the permit or permit by rule.

The purpose of the LGMP is to provide guidelines for management of LFG at the site. These guidelines cover the evaluation of LFG migration at the permit boundary and in structures within the permit boundary. The presence of LFG will be verified by monitoring LFG concentrations in monitoring probes near the facility's permit boundary and within on-site occupied structures. LFG migration may be controlled by various options which are discussed in Section 5.

The LFG monitoring (postclosure care period) program will continue for a period of 30 years after final closure of the facility or until the owner or operator receives written authorization from TCEQ to revise or discontinue the program.

2 SITE CHARACTERISTICS

2.1 Introduction

The Hardin County Landfill is an existing MSW disposal facility (TCEQ Permit No. MSW-2214B) located approximately 3 miles southwest of the City of Kountze on FM 770 in Hardin County, Texas. The address of the landfill is:

Hardin County Landfill
2525 Farm to Market 770 Rd.
Kountze, TX 77625

A site plan for the Hardin County Landfill is included as Figure III I-A-1 in Appendix III I-A. As shown on Figure III I-A-1, currently there are seven permanent existing landfill gas (LFG) monitoring probes installed around the perimeter of the permit boundary to monitor the potential migration of LFG. The probes were constructed as multiple completions (shallow and deep) in single borings with each having two monitoring points. Information regarding the existing LFG monitoring probes is included in Appendix III I-C.

The perimeter landfill gas monitoring system includes a total of eight probes. The three existing probes will be abandoned and four new probes will be installed. The four existing probes will remain in-place. Table III I-1 summarizes the probes that will remain in-place, probes that will be abandoned, and the probes that will be added as part of this plan. Refer to Section 3 for a detailed discussion of the perimeter monitoring network and probe installation schedule.

Table III I-1
List of Existing and Proposed LFG Monitoring Probes

Existing Probes To Remain In-Place	Existing Probes To Be Abandoned	New Probes To Be Added
GMP-1	GMP-4	GMP-4A
GMP-2	GMP-6	GMP-6A
GMP-3	GMP-7	GMP-7A
GMP-5		GMP-8

The design of the LFG monitoring system for this site is based on the following factors: geologic conditions, hydrogeologic conditions, hydraulic conditions, location of facility structures and off-site structures, underground utilities, land use, nature and age of waste, climate, and depth of waste. These factors are described in detail in the following subsections.

2.2 Geologic Conditions

According to the Texas Bureau of Economic Geology, the site is located upon the outcrop of the Lissie Formation as shown on the Figure IIIG-A.1 – Regional Geologic Map (modified from the Barnes, 1992). The Lissie Formation is described as a sequence of interbedded fluviatile channel sands separated by interchannel muds consisting of clay, silt, sand, and minor quantities of gravel. The site stratigraphy is presented in the text, borings, and geologic cross sections in Part III, Appendix IIIG. The site-specific lithologies include Upper Clay, Upper Sand, Lower Clay, Lower Sand, and Basal Clay Strata. Groundwater occurs predominately in the Upper Sand and Lower Sand Strata. Refer to Part III, Appendix IIIG – Geology Report for additional information on geologic conditions at the site. Based on the site geology, a single probe design will be used for the proposed new probe.

2.3 Hydrogeologic Conditions

The uppermost groundwater at the site is located within the Upper Sand Stratum. This stratigraphic unit is generally composed of saturated silty sand or sandy silt to clayey sand or sandy clay. The groundwater is unconfined and laterally continuous across the site. Groundwater flows predominantly from west and southwest toward the east and northeast beneath the site. Refer to Part III, Appendix IIIG – Geology Report for additional information on hydrogeologic conditions at the site. The groundwater data was evaluated for the design of the gas probe depth. Since the seasonal low ground water level was variable above or below or near the bottom of waste elevation, the probes were extended down to the minimum bottom of waste elevation within 1,000 feet of the probe or to the seasonal low groundwater elevation at the probe location, whichever is encountered first.

2.4 Hydraulic Conditions

The site is located within the Cypress Creek watershed and the Village Creek watershed of Hardin County, Texas. The site drains to the north into Cypress Creek and to the East toward the Longston Branch tributary of Cypress Creek. Cypress Creek drains into Village Creek approximately 6 miles northeast of the landfill. The hydraulic conditions were considered in the layout of the LFG monitoring probes. Each existing and proposed probe location was evaluated to minimize interference with surface drainage (e.g., probes not located within channels, letdowns, ponds, etc.).

2.5 Facility Structures Within the Permit Boundary

Currently, there are two on-site structures located within the permit boundary: a scalehouse and a storage shed. Both structures are equipped with continuous LFG monitoring systems. Existing and future onsite structures, including but not limited to buildings, subsurface vaults, utilities, or any other areas where potential gas buildup would be of concern installed within the permit boundary will be monitored as described in Section 3.2 of this appendix. The need for monitoring of existing and future structures was considered in the design of the LFG monitoring system.

In addition, any other changes on site which may affect the LFG monitoring system will be reviewed and any needed changes to the LFG monitoring system will be made to protect human health and the environment. All proposed changes will be submitted to the TCEQ for approval.

2.6 Underground Utilities

In developing the design of the LFG monitoring system, the location of underground utilities was reviewed as possible pathways for LFG migration. Passive vent pipes will be installed near underground utilities where they cross the permit boundary to monitor for the potential presence of LFG.

Currently, there are three existing underground utilities at the site that cross the existing permit boundary. The first is a telephone line that crosses along the northeast and northwest corners of the existing permit boundary, the second is the water line that crosses the northeast corner of the permit boundary, and the third is a fiber optic line that crosses the permit boundary at the site entrance road along the northern permit boundary. Utility trench vents (TV-1, TV-2, TV-3, and TV-4) have been installed adjacent to the pipe bedding of these existing underground utility crossings, as shown on Figure III I-A-1 in Appendix III I-A.

In addition, all future underground utilities which cross the permit boundary will be vented and monitored as well. The future passive vents will be installed within 6 months after utility construction. A construction detail for the passive trench vent pipes is provided on Figure III I-A-2 in Appendix III I-A. The vents will be equipped with monitoring ports to facilitate routine methane monitoring.

2.7 Land Use and Offsite Structures

Land use within 1,000 feet of the site predominantly consists of undeveloped and uncultivated open land area. There are no residential buildings within 1,000 feet of the permit boundary. The nearest structure, a waste hauling facility, is within 1,000 feet of the permit boundary at the northeast corner of the site. There is also industrial (non-residential) oil and gas company equipment storage area located approximately 650 feet from the limits of waste along the southern permit boundary. A site map showing the off-site structures located within 1,000 feet of the permit boundary is presented in Appendix III I-B. The surrounding land use and off-site structures were reviewed, and the spacing between the existing probes (which ranges from 686 feet to 1,068 feet) was deemed acceptable.

For future development at the site, the LFG monitoring system will be reviewed and revised as needed to protect human health and the environment. All proposed changes to the LFG monitoring system will be submitted to the TCEQ for approval.

2.8 Nature and Age of Waste

The Hardin County Landfill includes both the Type I and Type IV disposal areas. The facility accepts waste for disposal from residences and businesses of Hardin County and surrounding counties.

The major classifications of MSW accepted into the Type I landfill include household waste, yard waste, commercial waste, Class 2, and Class 3 nonhazardous industrial waste and some special wastes. Wastes disposed in the Type IV disposal area include yard waste, brushy waste, rubbish, and construction and demolition debris that is free from putrescible and household solid wastes. Consistent with 30 TAC §330.15, the facility will not accept for disposal regulated hazardous waste, medical waste, radioactive waste, liquid wastes, or other wastes prohibited by TCEQ regulations.

The currently permitted 49.6 acres Type I MSW area began accepting waste in 1999. Refer to Parts I/II, Section 2 for additional information. The nature and age of waste was used in LFG generation modeling to estimate current and future LFG generation for the site.

2.9 Climate

The climate of the region is characterized as very warm and humid. According to the U.S. Climate Data for the region, the average annual precipitation is approximately 60.38 inches. The temperature ranges between an average low of 42°F in January and an average high of 93°F in August. The climate was considered in the surface completion design of the probes. Given the rainfall for this area, a minimum of 5-foot bentonite/concrete surface seal was used in the gas probe to reduce the potential of surface water infiltration.

2.10 Depth of Waste and Liner Description

The waste fill areas of the existing landfill were lined in accordance with liner requirements set forth in the permit. The permitted site consists of 79 acres, of which about 49.6 acres are permitted for Type I waste disposal. Approximately 32.0 acres of the 49.6-acre Type I disposal area have been constructed with a Subtitle D liner system. The facility does not include a pre-Subtitle D MSW disposal area. The 2.4-acre Type IV area (1.4 acres of which is currently developed) is permitted on the north portion of the permit boundary as a separate unit. The Type I landfill Subtitle D liner system includes 24 inches of protective cover, geocomposite drainage layer, 60-mil HDPE geomembrane, and a 24-inch-thick compacted clay liner. The landfill's elevation of deepest excavation is 45.23 feet above mean sea level (msl), and the maximum elevation of the landfill final cover will be approximately 234 ft msl. Refer to Appendix IIIA-A for additional waste depth and liner information.

Waste depth and liner configurations were considered in the probe design. The probe is designed to monitor subsurface soil layers and extends down to the lowest bottom of waste placement near the probe location or to the seasonal low groundwater elevation at the probe location, whichever is encountered first.

2.11 Summary

The existing probe design and monitoring system layout were based on the geologic conditions, hydrogeologic conditions, hydraulic conditions, location of the facility structures, underground utilities, land use, climate, and depth of waste discussed in the above sections. The existing LFG monitoring system, along with quarterly monitoring, will continue to meet the performance standards of 30 TAC §330.371(a) based on above mentioned parameters and the existing probe design.

3 MONITORING

3.1 Perimeter Monitoring

3.1.1 Existing Perimeter Monitoring Network

The site currently has seven permanent existing LFG monitoring probes and four utility trench vents to monitor the concentration of methane gas in accordance with 30 TAC §330.371(a)(2). The probes were constructed as multiple completions (shallow and deep) in single borings, with each having two monitoring points. The locations of the existing perimeter monitoring probes are shown on Figure III F-A-1 in Appendix III F-A. The boring logs for the existing LFG monitoring probes are included in Appendix III F-C. The existing probes were installed with an interprobe spacing of 833 feet to 1,073 feet. Based on the information provided in the boring logs, existing probes were extended down to the minimum bottom of waste placement elevation within 1,000 feet of the probe location or to the seasonal low groundwater elevation, whichever was encountered first.

As a result of proposed landfill expansion, three existing probes, as listed in Table III I-1, will be abandoned and redrilled. The abandonment will include removing the surface completion material, attempting to pull the probe casing materials, and grouting the borehole with bentonite grout from the total depth to surface. The probes will be abandoned and plugged in accordance with applicable rules in Title 16 TAC Chapter 76.

3.1.2 Proposed Landfill Gas Monitoring Network

The perimeter landfill gas monitoring network will consist of eight LFG monitoring probes. As part of the proposed landfill expansion, three existing gas monitoring probes will be abandoned and four new probes will be installed within 6 months following the issuance of the permit (MSW-2214B) by TCEQ. The proposed probes will be installed in accordance with applicable rules in Title 16 TAC Chapter 76. The location of the proposed new probes, the existing probes that will be abandoned, and the existing probes that will be remain in-place are shown on Figure III I-A-1 in Appendix III I-A. The new probe will be installed as shown on Figure III I-A-2 in Appendix III I-A. The proposed probe is designed to be single tube probe. The depth of the new probe will be dependent on the field conditions at the time of installation, however at a minimum; the depth of the probe will extend down to the lowest bottom of waste placement elevation within 1,000 feet of the proposed probe location or to the seasonal low groundwater elevation at the probe location, whichever is encountered first. Data regarding the new probes is summarized in Table III I-2 at the end of this section.

Table III I-2
Proposed LFG Monitoring Probe Data[1]

Probe ID	Probe Ground Surface Elevation[2] (ft msl)	Lowest Bottom of Waste within 1,000 ft[3] (ft msl)	Lowest Groundwater Elevation[4] (ft msl)	Proposed Probe Bottom Elevation (ft msl)	Proposed Boring Depth (ft bgs)
GMP-4A	76	47	49	47	29
GMP-6A	79	47	47	45	34
GMP-7A	80	50	49	48	32
GMP-8	79	47	52	50	29

[1] The data given is approximate. Actual elevation and depth will be determined at the time of installation.

[2] Probe ground surface elevation based on aerial topographic survey flown on May 17, 2016.

[3] Lowest bottom of waste elevation within 1,000 feet of the proposed probe based on Drawing I/IIA.8 – Excavation Plan included in Parts I/II, Appendix A.

[4] Lowest groundwater elevation adjacent to the proposed probe based on lowest groundwater elevation contour map prepared by Weaver Consultants Group based on historical groundwater monitoring well readings at the site.

3.1.3 Proposed Passive Trench Vents

LFG trench vents have been installed near the existing underground utility trenches where they cross the permit boundary, as discussed in Section 2.6 and shown on Figure III I-A-1. Passive trench vents will also be installed in or near any future underground utilities which crosses the permit boundary. A typical detail of the vent pipe construction is shown on Figure III I-A-2 in Appendix III I-A. The underground utility locations will be identified and located by representatives of the utility easement owners. The installation of any new passive trench vents will occur within 6 months after the new utility construction.

3.1.4 Monitoring Procedures

Methane concentrations will be measured using a portable gas detection device pre-calibrated against reference methane and oxygen standards. In accordance with manufacturer recommendations, the portable gas detector will be field calibrated prior to each monitoring event. As such, the portable gas detector will be field calibrated at least once a quarter prior to taking the quarterly probe measurements. The portable gas detection device will be equipped with a suction sampling line equipped with an air tight fitting. This fitting will match with a corresponding air tight fitting installed at the top of each probe and on each passive trench vent to enable gas samples to be drawn directly into the monitoring instrument without diluting the sample. The instrument is designed to give a direct reading of the methane concentration in two scales, either percent of the LEL or percent methane by volume. A qualified landfill representative or consultant will conduct the monitoring and the percent methane by volume reading from the device will be recorded. The monitoring equipment will be maintained and calibrated in accordance with the manufacturer's recommended procedures included in Appendix III I-E, prior to use.

Monitoring data will be recorded on the Landfill Gas Monitoring Report (LGMR) form shown in Appendix III I-D, or a similar form, and the data maintained in the facility's Site Operating Record. Probe and passive trench vent monitoring procedures will be as recommended by the gas detection device instrument manufacturer. The manufacturers' information on perimeter monitoring equipment currently used at the site is provided in Appendix III I-E.

If LFG monitoring determines that methane has been detected in concentrations exceeding the regulatory limit, notification procedures, as described in Section 4, and remediation procedures, as described in Section 5, will be implemented.

3.1.5 Maintenance Procedures

As part of the overall maintenance program, routine inspection of the probes/trench vents will be conducted at least once a quarter. In addition, each time LFG monitoring is conducted, the sampler will inspect the integrity of the monitoring probes/trench vents. The sampler will record pertinent information on the Landfill Gas Monitoring Report (LGMR) form (Appendix III I-D) or similar form. Each probe/trench vent will be routinely inspected once a quarter for the following:

- Verify that the monitoring probes/trench vents are clearly numbered.
- Verify that the protective cover or piping is intact and is not bent or excessively corroded.
- Verify that the concrete pad is intact.
- Verify that the padlock is functional on the probe casing.
- Verify that the visible portion of the PVC riser is intact.

If damage or excessive wear to the monitoring probe/trench vent is observed, it will be reported to the Landfill Manager and the monitoring probe/trench vent will be repaired. If it is not possible to repair the monitoring probe/trench vent and the damage can potentially affect the accuracy of future monitoring results, the monitoring probe/trench vent will be abandoned and replaced with a new monitoring probe/trench vent in accordance with Sections 3.1.2, 3.1.3, and 3.4.

3.2 Monitoring of Facility Structures

3.2.1 Monitoring Procedures

All on-site enclosed structures, including, but not limited to, buildings, subsurface vaults, utilities, or any other areas where potential gas build-up would be of concern, as applicable will be equipped with a continuous monitor/alarm that provides an audible alarm if methane concentrations exceed the regulatory limits. If the methane level above the regulatory limit of 1.25 percent by volume is detected, it will be reported as outlined in Section 3.3.

The continuous monitors' performance will be tested using a known methane calibration gas at least once a quarter prior to taking the quarterly measurements and will be documented on the LGMR form shown in Appendix III I-D, or similar form. If the monitoring equipment alarm does not test properly during quarterly testing, they will be repaired or replaced. The manufacturer's information regarding the monitors/alarms currently used at the site is provided in Appendix III I-E.

If methane concentrations exceeding the regulatory limits are detected within an enclosed building, the building will be immediately evacuated and ventilated by opening doors and windows. Notification procedures described in Section 4 will then be implemented. If existing enclosed structures are removed from the site to allow for the continued development of the landfill, the monitors/alarms installed in the structures will be decommissioned.

3.2.2 Maintenance Procedures

The continuous LFG monitors/alarms will be maintained and tested in accordance with the manufacturer's recommendations and specifications. Based on the manufacturer's information in Attachment III I-D, the alarm has a projected 7-year life following the initial power up. As such, the alarm will be replaced every 7 years. In addition, on a quarterly basis the monitors/alarms will be inspected to ensure they are properly installed and connected to power.

3.3 Recordkeeping/Reporting

The recordkeeping and reporting requirements will be consistent with those outlined in 30 TAC §330.159, §330.371, and §330.125. Records will be maintained for the methane monitoring. The records will be kept on site and maintained as part of the Site Operating Record. Field data will be recorded on the LGMR form (or similar form) as shown in Appendix III I-D.

The LFG monitoring probes/trench vents and any on-site structures will be monitored quarterly and the results will be placed in the Site Operating Record and made available to the TCEQ upon request. In the event continuous LFG monitors/alarms require replacements, then it will be documented in the Site Operating Record.

For those quarterly LFG monitoring events when the measured methane levels are either: (1) above 5% methane by volume in monitoring points, probes, subsurface soils, or other matrices at the facility boundary defined by the legal description in the permit; or (2) above 1.25% methane by volume in air in facility structures (excluding gas control or recovery system components), LFG monitoring reports will be submitted to the TCEQ.

3.4 Contingency Plan

In accordance with 30 TAC §330.371(g)(3), the following contingency plan will be used if the main monitoring system breaks down or becomes ineffective.

LFG Monitoring Probes/Trench Vents

1. Within 60 days, when it is noted that an LFG monitoring probe/trench vent has been damaged or inoperative, a notification will be submitted to the TCEQ. The notification will describe the proposed repair and the schedule for implementation.
2. Should a monitoring event occur prior to replacement of a damaged probe/trench vent, a bar-hole will be placed next to the damaged probe/trench vent, and a portable gas detection device suitable for methane detection will be used until the probe/trench vent is replaced. The portable gas detection device will be calibrated prior to use per the manufacturer's guidance.
3. Upon completion of the replacement probe/trench vent, an installation report including any boring logs and construction details will be submitted to the TCEQ.

Continuous LFG Monitors/Alarms

1. Damaged or inoperative continuous monitors/alarms will be repaired or replaced within 30 days of the monitoring event during which the damage was noted.
2. A portable gas detection device calibrated for 1.25% volume will be used to monitor weekly until the stationary unit(s) is replaced.

4 EXCEEDANCE ACTION PLAN

4.1 Exceedance Response Measures

This action plan has been prepared for the protection of human health and the environment in the event concentrations of methane exceed allowable limits either within any enclosed structures that may be constructed within the permit boundary or in the LFG monitoring probes. The appropriate emergency response is different for each situation; therefore, the following plan will address the situations for enclosed structures and probes separately.

This action plan will be implemented upon the initial exceedance of a perimeter monitoring probe/trench vent or enclosed structure monitor.

4.1.1 Initial Action

The initial action in the event methane is detected at levels above regulation limits is to immediately take all necessary steps to ensure protection of human health and notify the Executive Director, local and county officials, emergency officials, and the public. The specific response depends on the circumstances of the situation.

Building/Structures. If a continuous monitoring device installed within an enclosed structure located within the permit boundary is triggered or if LFG monitoring equipment indicates that 1.25 percent methane by volume has been exceeded, the building or structure is to be immediately evacuated of all personnel and the Landfill Manager will be notified. Personnel (except for qualified monitoring personnel) will not be allowed to reenter the affected building or structure until additional measures are taken. Notification procedures will be implemented as described in Section 4.2.

Perimeter Monitoring Probes/Trench Vents. If an exceedance of allowable limits of methane is detected at the permit boundary in one of the monitoring probes/trench vents, the Landfill Manager will be notified immediately. The immediate emergency response measure will be for the Landfill Manager to determine if any nearby buildings or structures (including off site) are at risk and if evacuation of the buildings should be requested. Notification procedures will be implemented as described in Section 4.2.

4.2 Notification Procedures

When methane levels above the regulatory limit have been detected, sampling personnel will immediately notify the Landfill Manager by telephone, SMS text message, or e-mail. The landfill manager or his representative will notify the Executive Director of the TCEQ by writing and the local and county and emergency officials by writing, telephone, fax, or by e-mail after initial detection:

Executive Director
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087
Telephone: 512-239-3900
Fax: 512-239-3939
E-mail: execdir@tceq.texas.gov

City of Kountze
1025 N Pine
Kountze, TX 77625
Telephone: 409-246-3463
Fax: 409-246-2319

Hardin County Office of Emergency Management
300 West Monroe Street
Kountze, TX 77625
Telephone: 409-246-5119

Kountze Fire Department
Deer Street
Kountze, TX 77625
Telephone: 409-246-3131

The public (property owners located within 1,000 feet of the probe/vent) will also be notified by writing, telephone, fax, or by e-mail after the initial detection.

The site will then take action as described in Section 5. Subsequent notifications during remediation activities will be followed as described in the remediation plan, if deemed necessary.

The TCEQ will be notified again in writing for any additional monitored points that were not part of the original notification which now exhibit methane exceedances above the regulatory limit. If the new monitored points affect property owners which were not originally notified, they will be notified as described above.

4.3 Placement into Operating Record

Records of LFG monitoring, including the data and methane gas levels, whether for routine monitoring, or remediation purposes, will be maintained and placed in the Site Operating Record. In the event that levels of methane above the regulatory limit have been detected either in facility structures and monitoring points, in monitoring probes/trench vents, a description of steps taken to protect human health must also be placed in the Site Operating Record. Notifications made, verbally or in writing, will also be recorded and placed into the Site Operating Record. These placements into the Site Operating Record will occur within 7 days after detection of methane above the regulatory limit.

5 REMEDIATION PLAN

Once methane levels above regulatory limits have been detected in the facility buildings/structures or in one or more of the LFG monitoring probes/utility trench vents at the permit boundary, the remediation plan as listed below will be developed and implemented within 60 days of detection. An incident specific remediation plan may also be prepared and/or implemented. The Executive Director may establish an alternative schedule for demonstrating compliance with routine monitoring and required actions if methane gas exceeds the limits noted in 30 TAC §330.371(a).

The first remediation action will be an investigation of the cause of the methane levels. The investigation may include some or all of the following elements, depending on the circumstances:

- Bar-hole probe or hydropunch testing in the vicinity of the impacted monitoring probe/trench vent
- Sampling and laboratory analysis of LFG samples collected from the monitoring probe/trench vent to determine the concentration of methane and trace compounds
- A gas analysis to try to determine the source
- Additional LFG monitoring

Using accumulated data, an assessment will be made to determine an appropriate course of action to mitigate the LFG migration. Such actions may vary with the specific incident, but may include (and are not limited to) installation of the following:

- Passive vents
- Cut-off trenches
- Active GCCS

The incident specific remediation actions will be performed within 60 days of the detection per §330.371(c)(3). The TCEQ will be notified that this or an incident specific remediation plan has been implemented, within 60 days of detection.

6 LFG COLLECTION AND CONTROL SYSTEMS

6.1 SVE System

The site currently has a soil vapor extraction (SVE) system and LFG trenches installed outside the limits of waste along the northern perimeter of the landfill to facilitate the control of potential LFG migration. The SVE system consists of vertical SVE wells, a piping network, condensate sump, and a blower. The condensate generated from the existing SVE system is drained into the condensate collection sump. From the sump, the liquid is pumped into the forcemain which terminates at the existing storage tank and the condensate disposed of along with the leachate from the landfill. The SVE system and LFG trenches including their detail drawings are included in Appendix III I-G.

6.2 Future GCCS Installation

The Hardin County Landfill currently does not have an active landfill gas collection and control system (GCCS) installed at the site. The expanded landfill has a refuse design capacity less than 2.5 million megagrams and 2.5 million cubic meters. This makes the facility not subject to the compliance requirements under 40 CFR Part 60, Subpart WWW, New Source Performance Standards for Municipal Solid Waste Landfills (NSPS).

However, as the site develops, vertical LFG extraction wells and related GCCS components may be installed in phases as needed to reduce the buildup of internal gas pressures caused by the increased generation of LFG. The future GCCS will include LFG extraction wells, a LFG collection piping network, condensate management system, LFG control equipment, and associated LFG system components as shown on Figure III I-F-2. The typical details of the future GCCS components are included in Appendix III I-F. In addition, interim horizontal LFG collectors may also be installed in areas of the landfill that are not yet at final grade and will be replaced by future LFG extraction wells once the landfill achieves its final elevation. The horizontal LFG collectors will be installed similar to the detail shown on Figure III I-F-6 of Appendix III I-F. Each LFG extraction well will be installed in vertical borings drilled within the waste and completed similar to the detail shown on Figure III I-F-3 of Appendix III I-F. The extraction wells will not be drilled closer to the liner system than the distance specified on Figure III I-F-3 of Appendix III I-F. Excavated waste from the borings will be temporarily accumulated next to the borehole and then transported to an onsite active disposal area and/or to a nearby permitted landfill.

Based on industry standards for internal extraction wells, a spacing of approximately 200 to 300 feet was used to develop the future extraction well layout. LFG extraction wells in areas receiving additional waste will be extended and/or replaced with a new well as necessary based on the additional waste fill.

Each extraction well and horizontal collector will be equipped with a control valve and monitoring port similar to the detail shown on Figure III I-F-3 of Appendix III I-F. These control valves and monitoring ports, used in conjunction with controls on the blower, will allow the site to regulate vacuum and LFG levels at each individual extraction well/horizontal collector. This will allow the site to make adjustments in order to effectively reduce the potential for subsurface migration and odors, as well as to protect the integrity of the final cover system.

It is expected that the GCCS will be installed prior to final cover placement and the LFG extraction wells will be connected to the geomembrane with a boot and skirt when the final cover system is installed. If installation of a LFG extraction well is required after the final cover installation, the geomembrane cover will be cut and removed in the work area prior to LFG extraction well installation and then the geomembrane boot and skirt will be installed. The geomembrane boot will have sufficient skirt to allow welding of the boot to the existing geomembrane cover or additional geomembrane will be welded to both the geomembrane boot and the existing geomembrane cover.

The as-built information for each phase of the GCCS installation will be maintained in the site operating record. The as-built information will document the location of the extraction wells, piping, and related GCCS components. The GCCS will be installed as described in this section; as such, no additional authorization (i.e. permit modification) will be required to install each phase of the GCCS unless there is a significant change in the number of extraction wells or the layout of GCCS.

Following each GCCS installation, an as-built GCCS drawing will be submitted to the TCEQ to incorporate each GCCS installation into the existing permit in the form of revision to Appendix III I-F. The new drawing will be placed behind the existing Figure III I-F-2. In addition, the existing site layout will also be submitted in the form of revision to Figure III I-F-2 of Appendix III I-F to update the existing GCCS conditions.

6.3 GCCS Operation and Maintenance

When the site is subject to the NSPS requirements for the operation and maintenance of the GCCS, the operation and maintenance of the proposed GCCS will be performed consistent with NSPS requirements and industry guidelines and practices. Wellhead and system monitoring will be performed on a routine basis to monitor overall system performance. As needed, system adjustments will be made to optimize the extraction of LFG from the landfill to control LFG migration, odors, and greenhouse gases. In addition, the system will routinely be visually inspected for any evidence of needed repairs or other maintenance. The routine monitoring and checks will include the following:

- Each wellhead will be monitored and adjusted as needed to control LFG while reducing oxygen intrusion into the landfill.
- Pressure readings will be taken at various locations along the piping system to evaluate vacuum distribution.
- Condensate sumps will be checked for proper operation.
- Blowers and flares will be inspected for proper operation.

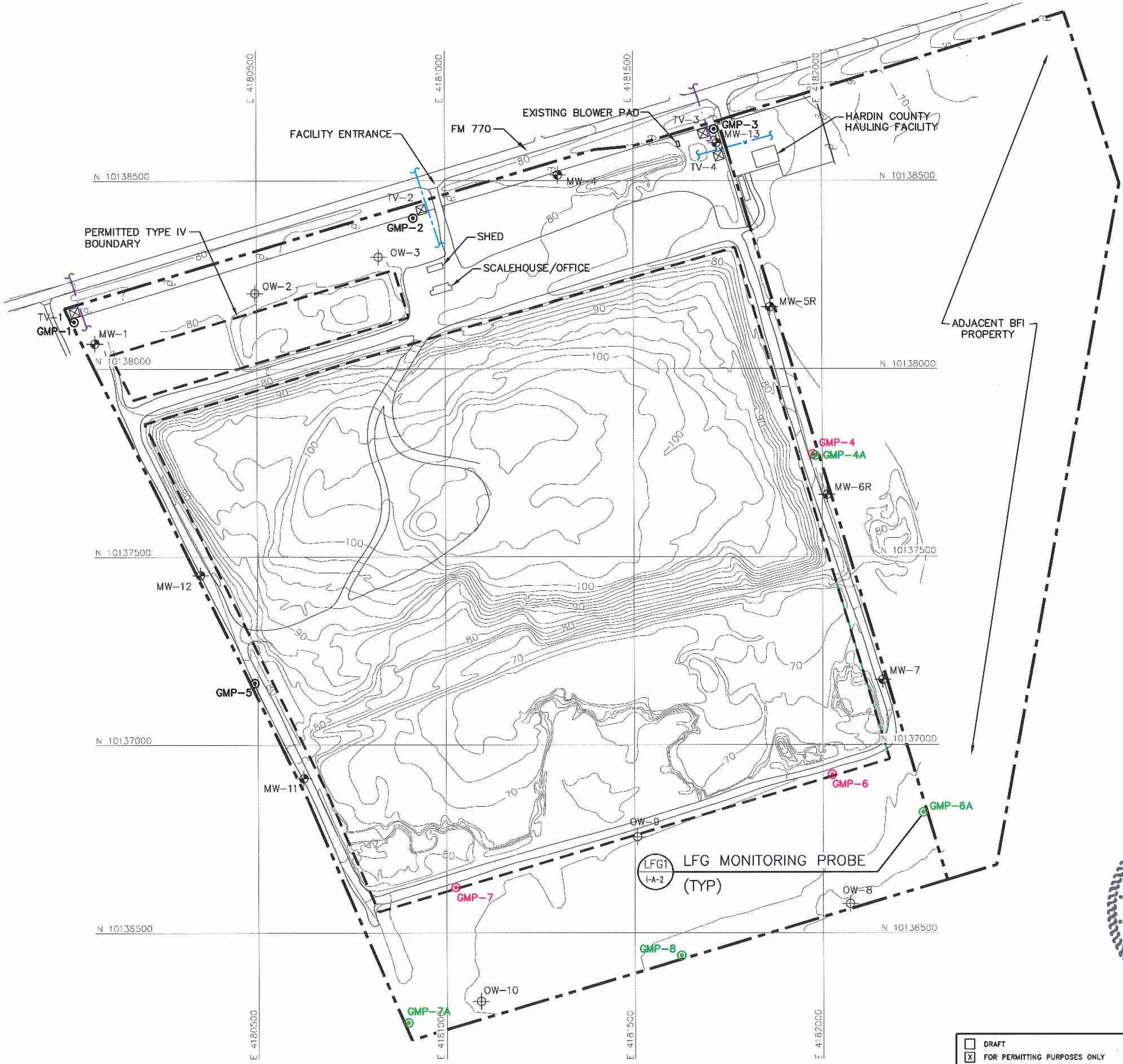
APPENDIX III I-A

PERIMETER LANDFILL GAS MONITORING SYSTEM
LANDFILL GAS PROBE/VENT DETAILS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

Includes Figures III I-A-1 and III I-A-2



LEGEND

— · —	BFI PROPERTY BOUNDARY
— · · —	PERMIT BOUNDARY
— — —	CURRENTLY PERMITTED LIMITS OF WASTE
——70——	EXISTING CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
— · — · —	EXISTING TELEPHONE LINE
— · — · —	EXISTING FIBER OPTIC LINE
—v—v—v—	EXISTING WATER LINE
MW-1	EXISTING GROUNDWATER MONITOR WELL
OW-2	EXISTING GROUNDWATER OBSERVATION WELL
⊙ GMP-1	EXISTING LFG MONITORING PROBE
☒ TV-1	EXISTING UTILITY TRENCH VENT
⊙ GMP-4	EXISTING LFG MONITORING PROBE (TO BE ABANDONED)
⊙ GMP-4A	PROPOSED LFG MONITORING PROBE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. EXISTING TELEPHONE LINE, FIBER OPTIC LINE, WATER LINE, AND UTILITY TRENCH VENT LOCATIONS ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY HARDIN COUNTY LANDFILL.
3. LOCATION OF THE PROPOSED LFG MONITORING PROBES ARE APPROXIMATE. ACTUAL LOCATION WILL BE DETERMINED BASED ON FIELD CONDITIONS AT THE TIME OF INSTALLATION.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-A-1 LFG MONITORING SYSTEM.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

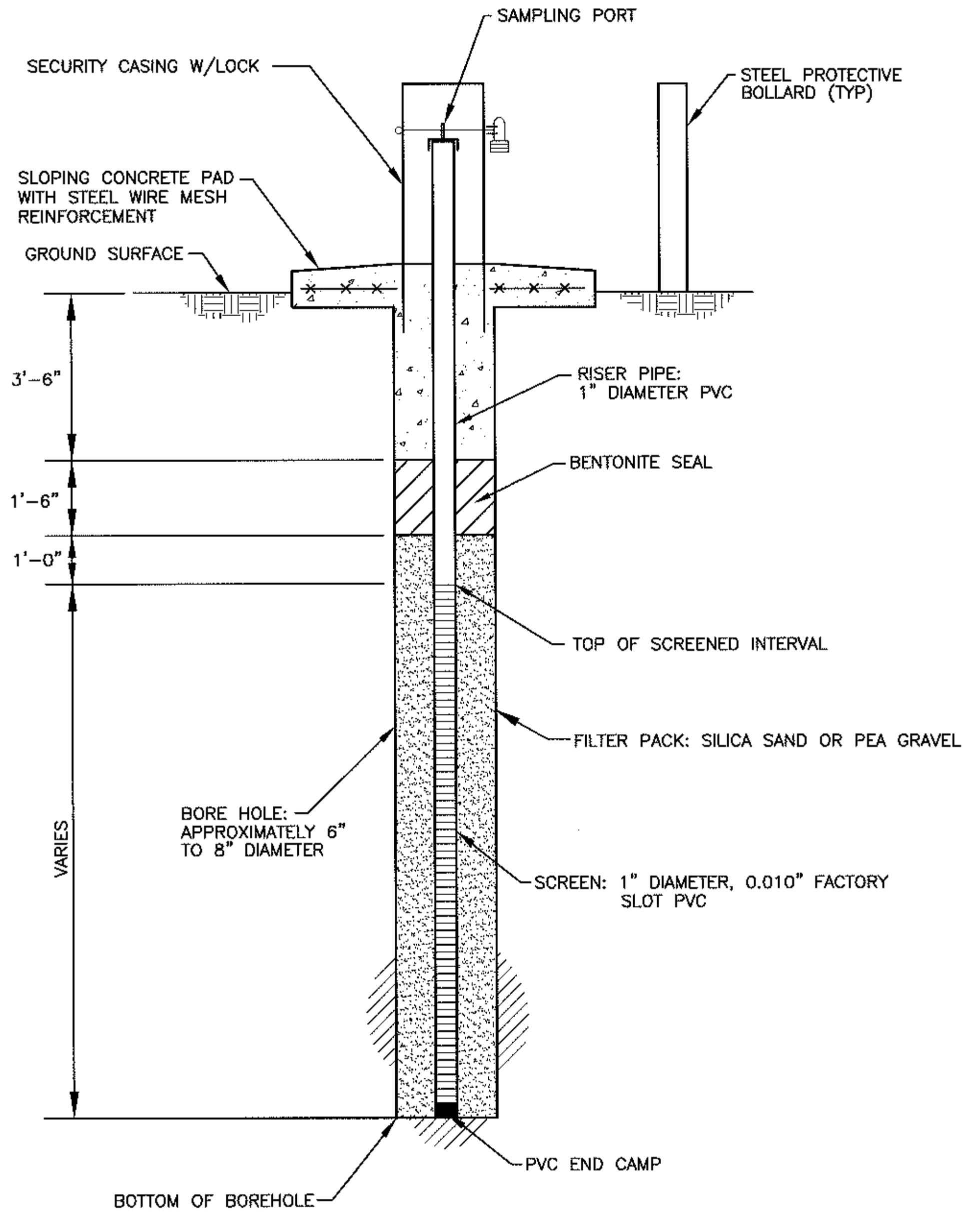
MAJOR PERMIT AMENDMENT
PERIMETER LANDFILL GAS
MONITORING SYSTEM

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-A-1

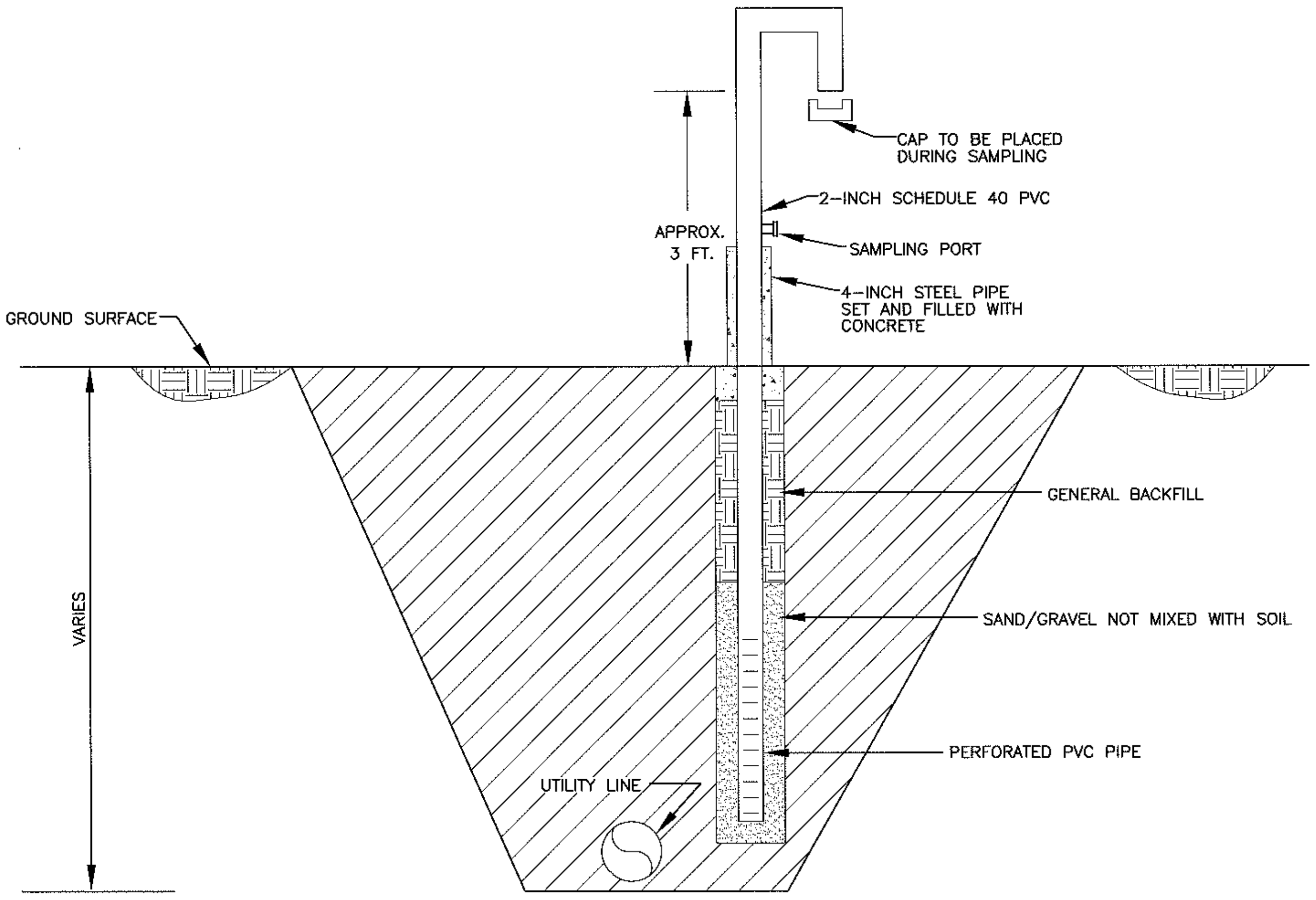
O:\0120\758\2214B EXPANSION\III\III I-A-1 LFG MONITORING SYSTEM.dwg, 11/15/2017 2:06:20 PM, rsellers, 1:2



LFG MONITORING PROBE (LFG1 I-A-2)
NTS

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. ACTUAL DIMENSION OF THE GAS MONITORING PROBE WILL BE DETERMINED BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION.



LFG PASSIVE VENT (LFG2 I-A-2)
NTS

NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-A-2 PROBE/VENT DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

MAJOR PERMIT AMENDMENT
LANDFILL GAS PROBE/
VENT DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-A-2

O:\0120\758\2214B EXPANSION\III\III I-A-2 PROBE DETAILS.dwg, 11/15/2017 2:08:49 PM, rsellers, 1:2

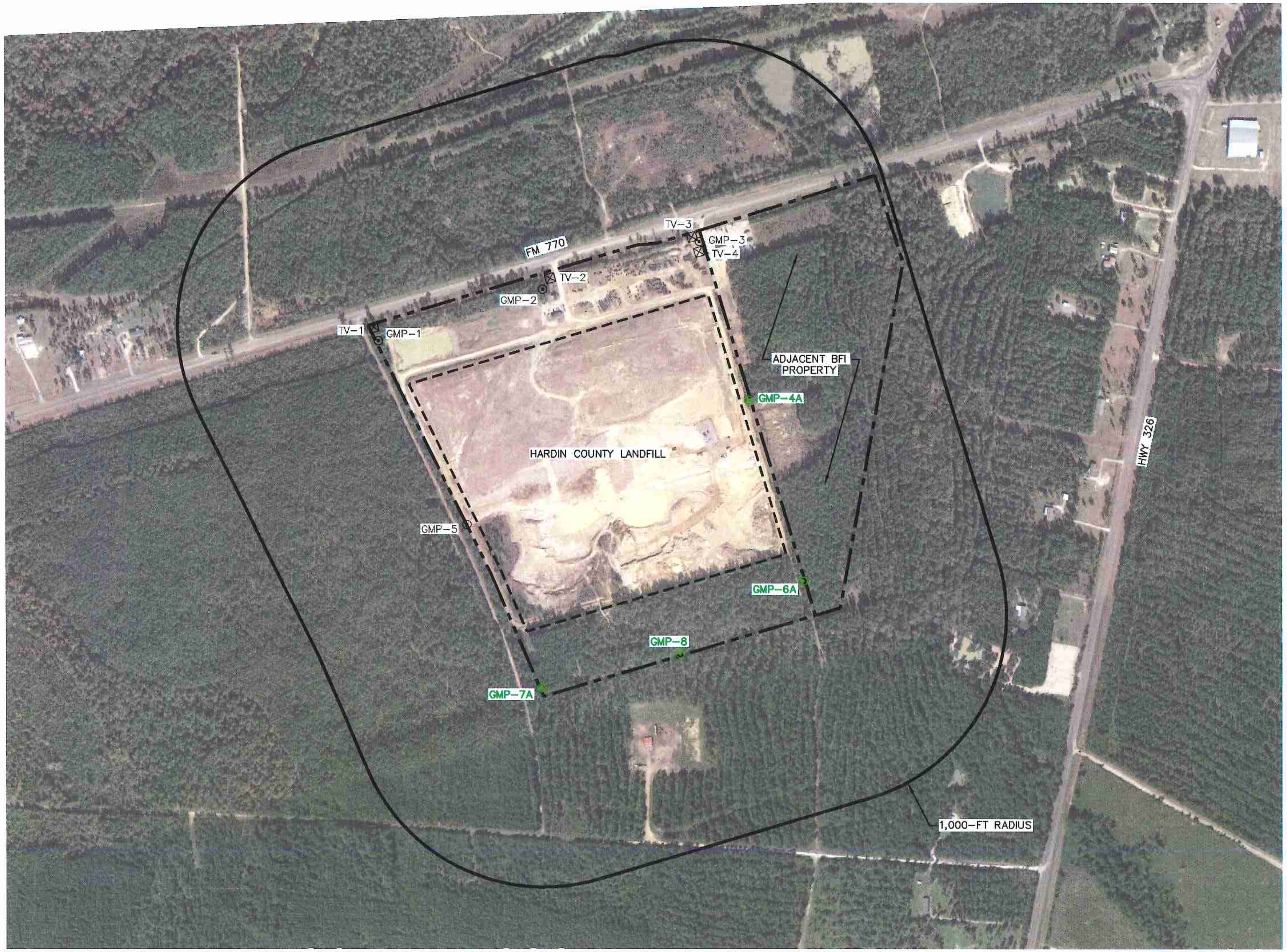
APPENDIX III I-B

SURROUNDING DEVELOPMENT MAP

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

Includes Figure III I-B-1



N

0 300 600
SCALE IN FEET

LEGEND

— - - —	EXISTING PERMIT BOUNDARY
— - — -	EAST PROPERTY BOUNDARY
- - - -	PERMITTED LIMITS OF WASTE
⊙ GMP-1	EXISTING GAS MONITORING PROBE
☒ TV-1	EXISTING UTILITY TRENCH VENT
⊙ GMP-4A	PROPOSED LFG MONITORING PROBE

NOTES:

1. AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH AND DATED 2016.
2. LOCATION OF THE PROPOSED LFG MONITORING PROBES ARE APPROXIMATE. ACTUAL LOCATION WILL BE DETERMINED BASED ON FIELD CONDITIONS AT THE TIME OF INSTALLATION.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-B-1 DEVELOPMENT MAP.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT SURROUNDING DEVELOPMENT MAP

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-B-1

O:\0120\758\2214B EXPANSION\III\III I-B-1 SURROUNDING DEVELOPMENT MAP.dwg, 11/15/2017 2:09:59 PM, rsellers, 1:2

APPENDIX III I-C

EXISTING LANDFILL GAS MONITORING PROBE INFORMATION

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

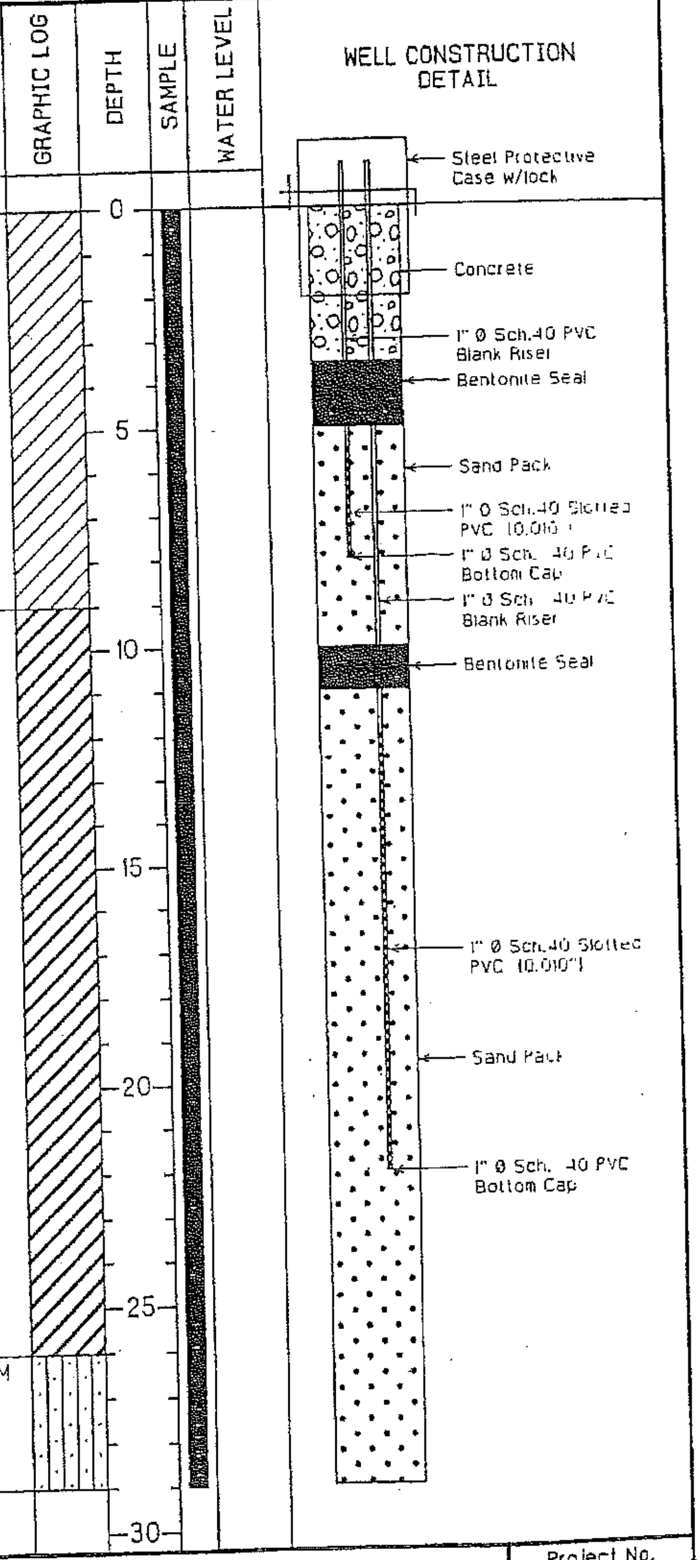
12-5-2017

Includes pages III I-C-1 through III I-C-7

Methane Monitoring Probe No. GMP-1

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 27.03 ft.
DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 16.96 ft.
GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 82.81 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 5.0' - decreasing in sand/silt content with depth	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - slightly sandy @ 11.5' to 12.5' - increasing in iron staining with depth - increasing in moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 26.0' to 29.0'	SM
Bottom of Boring @ 29 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:
Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

III I-C-1

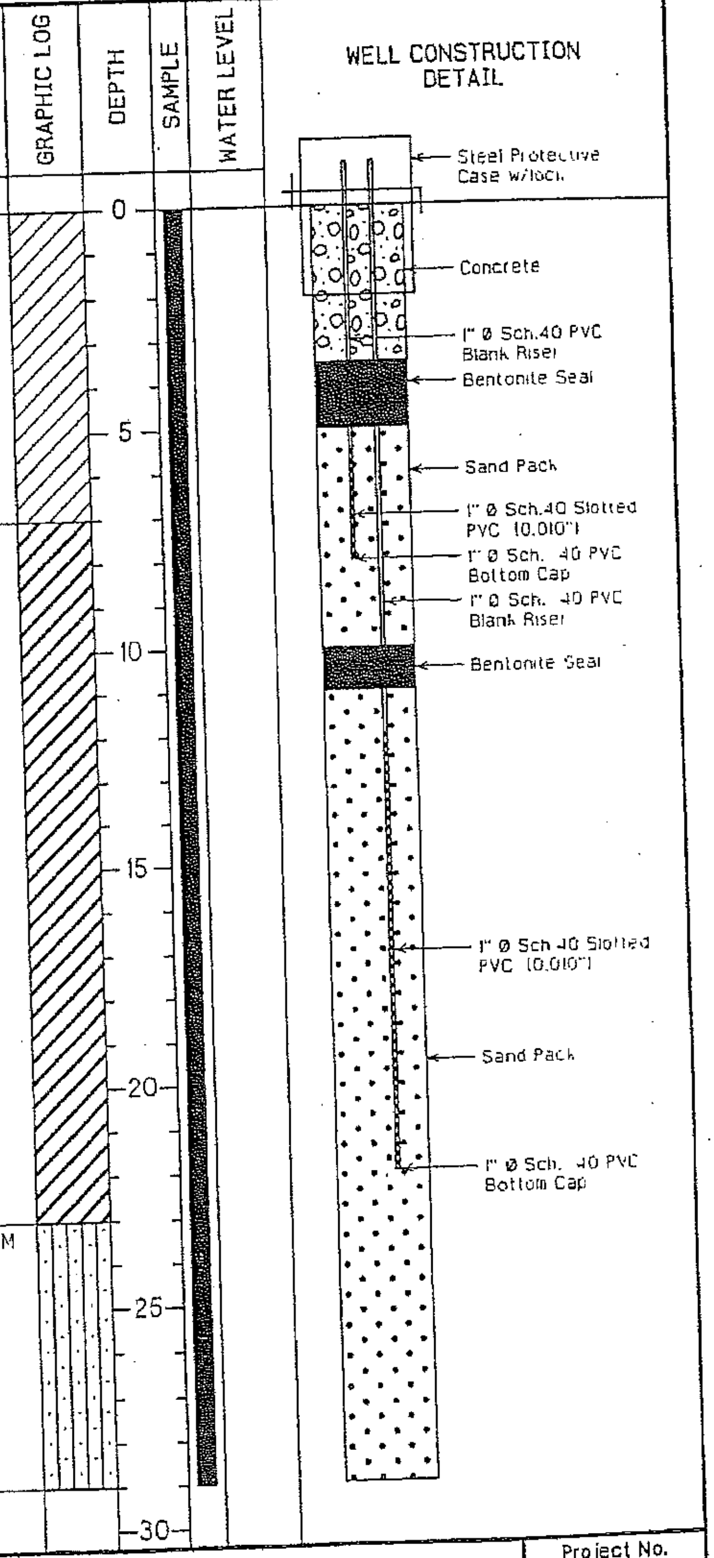
Project No.
L-98-13

Page 1 of 1

Methane Monitoring Probe No. GMP-2

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.31 ft.
DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 24.47 ft.
GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 82.63 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist	CL
-becomes stiff and dry @ 4.0'	
– decreasing in sand/silt content with depth	
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry	CH
– 0.5" thick interbeds of clayey sand @ 7.0' to 8.0'	
– 0.5" to 1.0" thick interbeds containing silt and very fine sand @ 12.0' to 15.0', moist	
– increasing in iron staining with depth	
– increasing in moisture with depth	
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 24.0' to 32.0'	SM
Bottom of Boring @ 29 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion – Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

Page 1 of 1

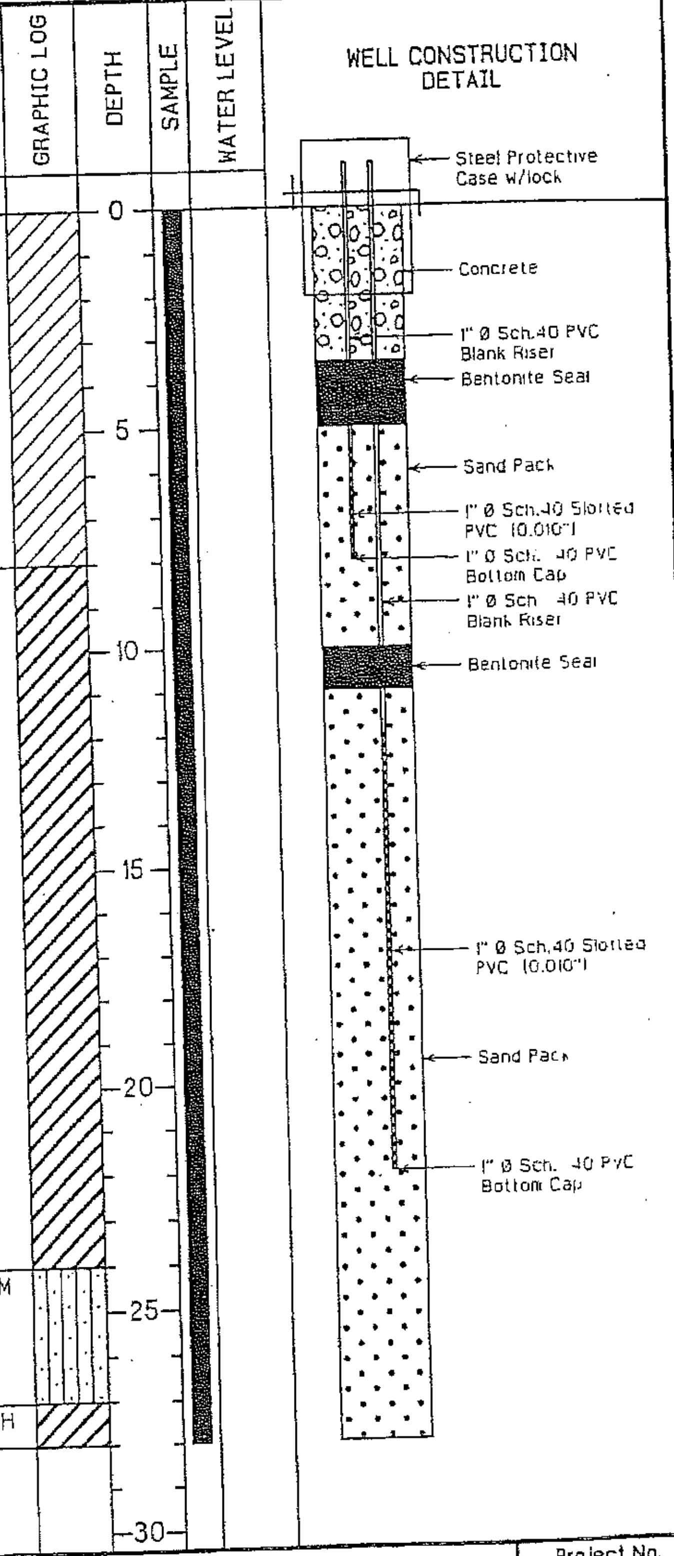
Methane Monitoring Probe No. GMP-3

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 24.16 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 24.27 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 78.88 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 4.0'	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, iron staining common, dry - fracture approximately 30 degrees to core axis @ 9.0' - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 11.0' to 12.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 24.0' to 27.0'	SM
Fat Clay: Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 28 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

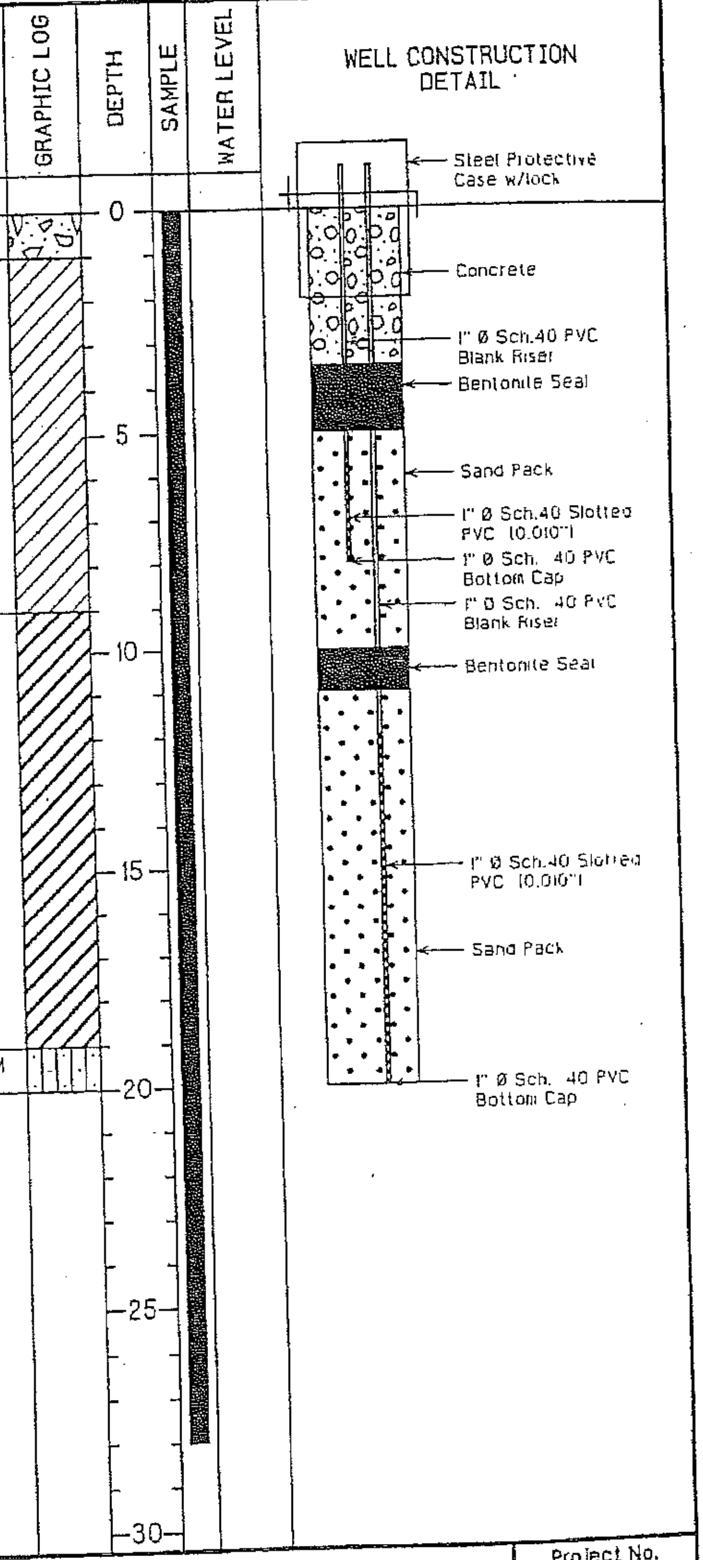
Methane Monitoring Probe No. GMP-4

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 19.23 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 11.25 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 73.50 ft. MSL

DESCRIPTION	USCS CLASS
Fill: Road base material @ 0.0' to 1.0'	
Lean Clay; Soft, mottled tan and reddish-orange, iron staining common, slightly moist – 0.25" to 0.5" thick interbeds containing silt and very fine sand @ 3.0' to 5.0', slightly moist	CL
Fat Clay: Very stiff, mottled tan and reddish-orange, slightly moist – manganese oxide nodules common @ 12.5' to 14.5' – sandy zone @ 16.0' to 19.0', slightly moist – increasing in sand content and moisture with depth	CH
Silty Sand: Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 19.0' to 20.0'	SM
Bottom of Boring @ 20 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion – Screened @ 5.5' to 8.0' and 12.0' to 20.0'

Project No.
L-08-182

Page 1 of 1

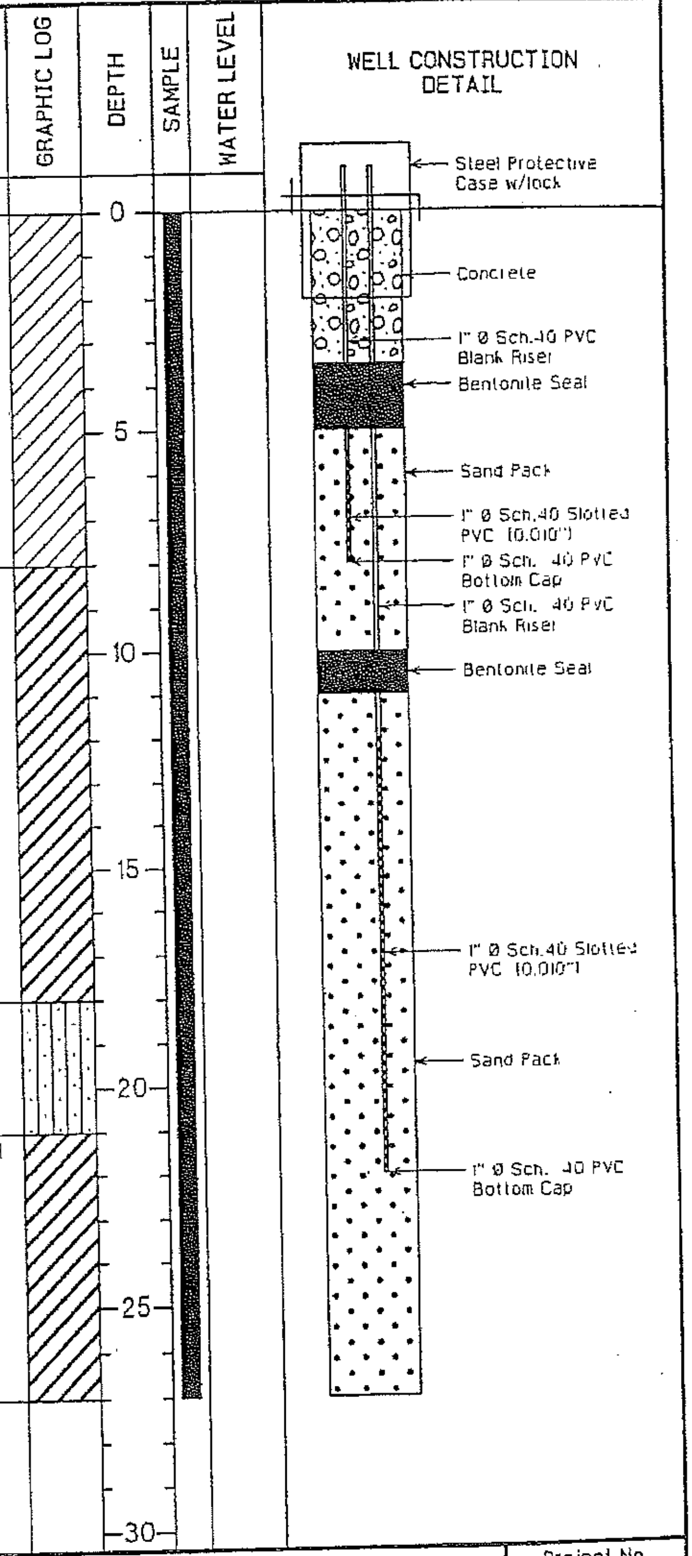
Methane Monitoring Probe No. GMP-5

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 18.23 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 17.85 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 81.10 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 5.0'	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 10.0' to 12.0', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 18.0' to 21.0'	SM
Fat Clay; Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 27 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No. L-08-182

Page 1 of 1

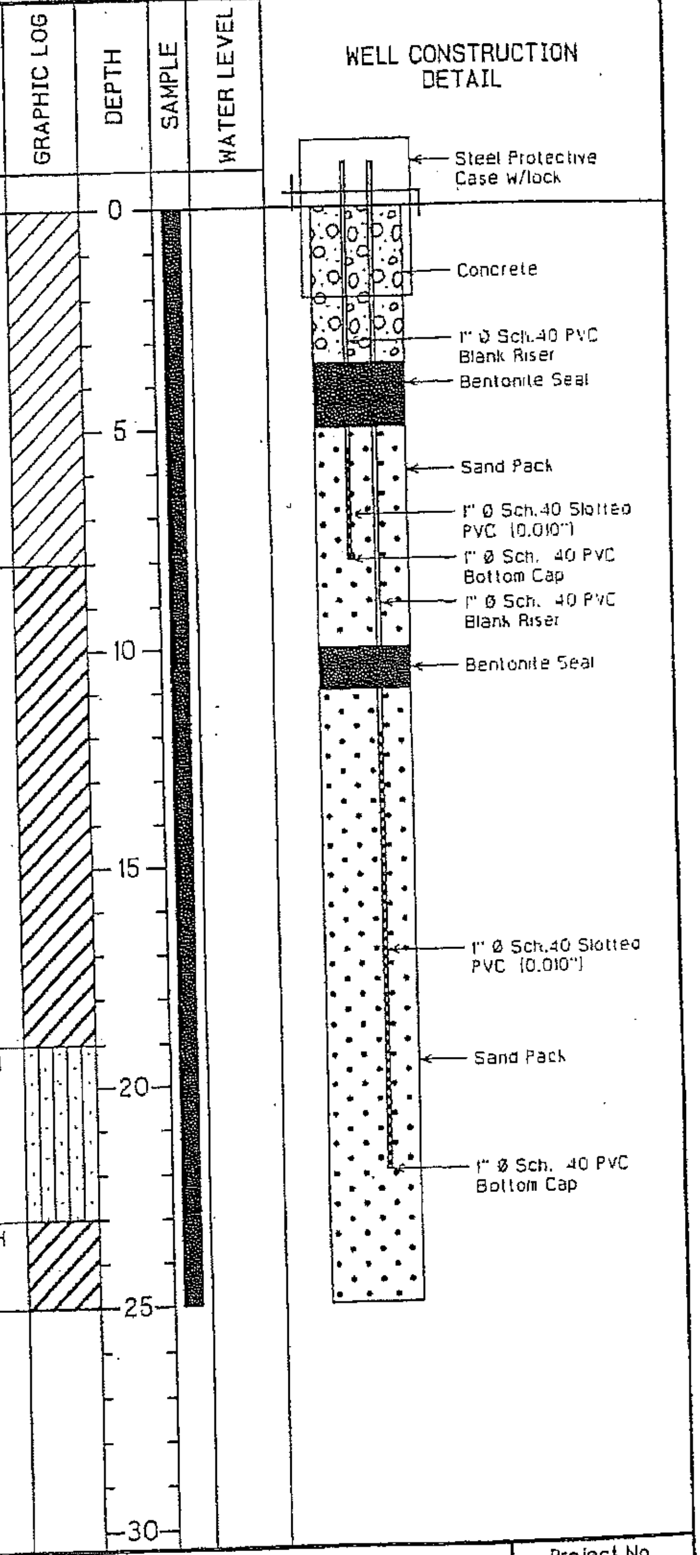
Methane Monitoring Probe No. GMP-6

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 19.44 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 10.64 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 77.66 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 2.0', slightly moist -becomes stiff and dry @ 4.0'	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.75" thick interbeds containing silt and very fine sand @ 12.0' to 14.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 19.0' to 23.0'	SM
Fat Clay; Very stiff, mottled light gray and reddish-orange, dry	CH
Bottom of Boring @ 25 feet	



Hydrex Environmental, Inc.
1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:
Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

Page 1 of 1

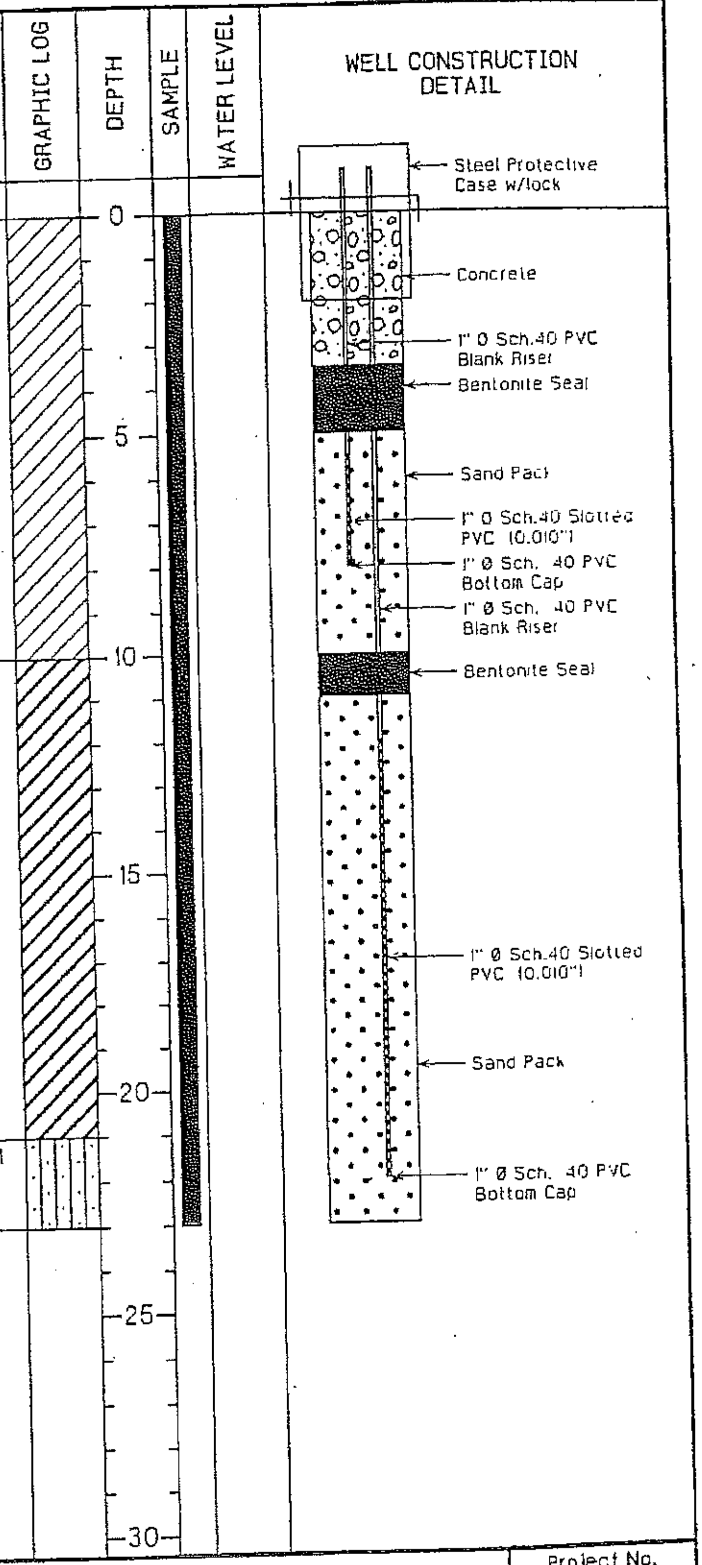
Methane Monitoring Probe No. GMP-7

PROJECT: Hardin County Landfill
DRILL RIG: Mobile Drill B-61
INITIAL GW DEPTH: 21.05 ft.

DATE: 4-23-98
HOLE DIA.: 8 in.
FINAL GW: 14.76 ft.

GEOLOGIST: Gary A. Coker
SAMPLER: Gary A. Coker
HOLE ELEV.: 78.90 ft. MSL

DESCRIPTION	USCS CLASS
Lean Clay; Medium stiff, mottled tan and reddish-orange, iron staining common, roots and organic material @ 0.0' to 3.0', slightly moist -becomes stiff and dry @ 3.5'	CL
Fat Clay; Very stiff, mottled tan and reddish-orange, iron staining common, dry - 0.25" to 0.5" thick interbeds containing silt and very fine sand @ 11.0' to 12.5', slightly moist - increasing in iron staining and moisture with depth	CH
Silty Sand; Loose, tan to light gray, fine to very fine grained quartz grains, iron staining common, wet @ 21.0' to 23.0'	SM
Bottom of Boring @ 23 feet	



Hydrex Environmental, Inc.

1128 NW Stallings Drive
Nacogdoches, Texas 75964-3428

Notes:

Dual gas probe completion - Screened @ 5.5' to 8.0' and 12.0' to 22.0'

Project No.
L-08-182

APPENDIX III I-D

LANDFILL GAS
MONITORING REPORT FORM

Includes page III I-D-1

HARDIN COUNTY LANDFILL
QUARTERLY GAS MONITORING RECORD FORM

Sampled by:________________ Date:________________

Time:______(Start) ______ (Finish) Temperature:____________

Weather:____________ Barometric Pressure (optional): __________

Monitoring Equipment:__________ Date of Calibration: __________

CALIBRATION:

Standard Concentration: _____ % by Vol. Instrument Reading: ________%

Probe No.	% METHANE (By Volume)[3] 0-100	%[1] LEL 0-100	STATIC PRESSURE "w.c."[2] (Optional)	O_2 % (Optional)	PROBE INTEGRITY VERIFIED Yes/No
GMP-1S					
GMP-1D					
GMP-2S					
GMP-2D					
GMP-3S					
GMP-3D					
GMP-4S					
GMP-4D					
GMP-5S					
GMP-5D					
GMP-6S					
GMP-6D					
GMP-7S					
GMP-7D					
TV-1					
TV-2					
TV-3					
TV-4					

ONSITE STRUCTURES	Verify if Continuous LFG Alarm is Operational (Circle One)		Was Continuous LFG Alarm Tested (Circle One)		Continuous LFG Alarm Activated (>1.25% CH_4 by volume / LEL>25%)[3] During Previous Quarter (Circle One)	
Scalehouse	YES	NO	YES	NO	YES	NO
Shed Building	YES	NO	YES	NO	YES	NO
	YES	NO	YES	NO	YES	NO
	YES	NO	YES	NO	YES	NO
	YES	NO	YES	NO	YES	NO

[1] % LEL = (20) x (observed % methane) – Note: Record >100% in LEL column if percent methane is over 5%. The reference to LEL is for methane by volume % conversion purpose only.

[2] "w.c." – Inches Water Column

[3] Monitoring results shall be recorded as percent methane by volume. The reference to LEL is for methane by volume % conversion purpose only.

APPENDIX III I-E

TYPICAL MONITORING EQUIPMENT MANUFACTURER'S INFORMATION

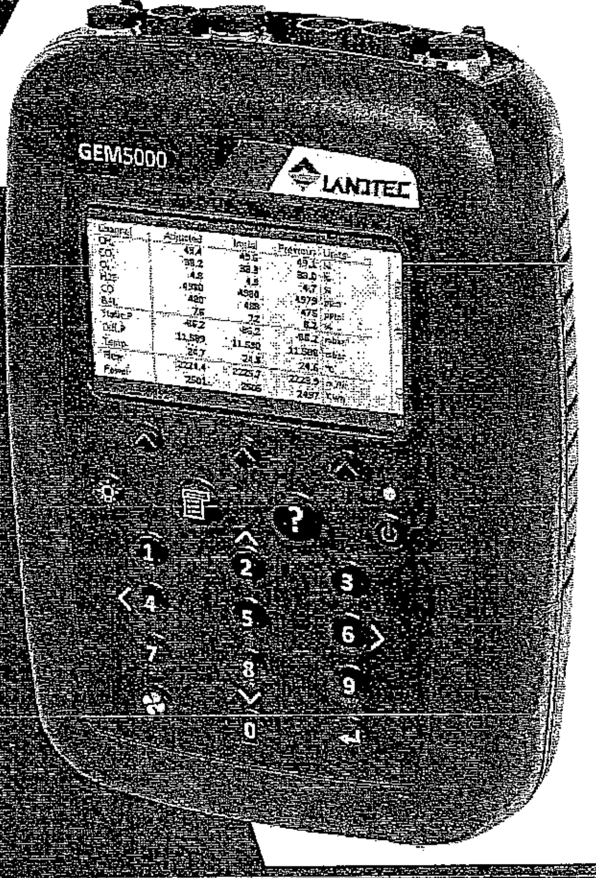
STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12. 5-2017

Includes pages III I-E-1 through III I-E-19

PERIMETER MONITORING EQUIPMENT

LANDTEC
A QED COMPANY



GEM™5000

PORTABLE GAS ANALYZER INSTRUMENTATION

PATENT #8,021,612

WWW.LANDTECNA.COM

- SIX TIMES MORE ACCURATE
- ANNUAL RECOMMENDED FACTORY SERVICE
- AVAILABLE WITH GPS AND ADDITIONAL GAS DETECTION

THE NEXT GENERATION OF GEM™ INSTRUMENT

The GEM™5000 is designed specifically for use on landfills to monitor Landfill Gas (LFG) Collection & Control Systems. The GEM™5000 samples and analyzes the methane, carbon dioxide and oxygen content of landfill gas with options for additional analysis.

✉ INFO@LANDTECNA.COM

☎ 800-LANDTEC
909-783-3636

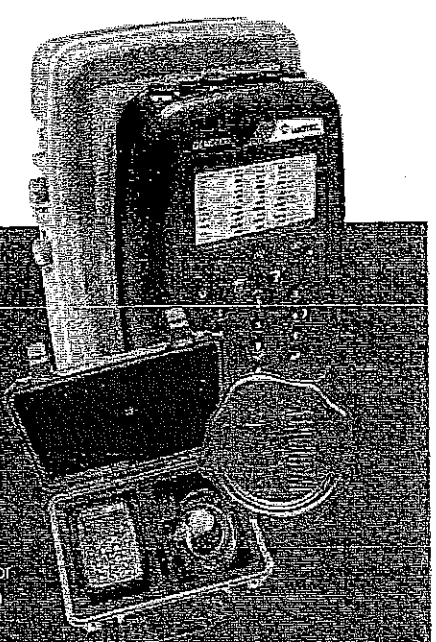
QED ENVIRONMENTAL
2355 Bishop Circle West
Dexter, MI 48130, USA

LANDTEC
A QED COMPANY

GEM™5000

PORTABLE GAS ANALYZER INSTRUMENTATION

PATENT #8,021,612



FEATURES

- Measures % CH_4, CO_2 and O_2 Volume, static pressure and differential pressure
- Calculates balance gas, flow (SCFM) and calorific value
- CO and H_2S (on Plus models only)
- High Accuracy and Fast Response Time
- Lighter and More Compact
- Certified intrinsically safe for landfill use
- Annual recommended factory service
- Calibrated to ISO/IEC 17025
- 3 year warranty with optional service plan

APPLICATIONS

- Landfill Gas Collection & Control Systems
- Environmental Compliance
- Landfill Gas to Energy
- Subsurface Migration Probes

KEY BENEFITS

- Designed specifically for use on landfills to monitor landfill gas (LFG) extraction systems, flares, and migration control systems
- No need to take more than one instrument to site
- Can be used for monitoring subsurface migration probes and for measuring gas composition, pressure and flow in gas extraction systems
- The user is able to set up comments and questions to record information at site and at each sample point
- Ensures consistent collection of data for better analysis
- Streamlined user experience reduces operational times

TECHNICAL SPECIFICATION

GAS RANGES

Gases Measured	CH_4	By dual wavelength infrared cell with reference channel		
	CO_2	By dual wavelength infrared cell with reference channel		
	O_2	By internal electrochemical cell		
	CO	By internal electrochemical cell		
	H_2S	By internal electrochemical cell		
Ranges	CH_4	0-100% (vol)		
	CO_2	0-100% (vol)		
	O_2	0-25% (vol)		
	CO	0-2000ppm***		
	H_2S	0-500ppm***		
Gas Accuracy*	CH_4	0-5% ± 0.3% (vol)	0-70% ± 0.5% (vol)	70-100% ± 1.5% FS
	CO_2	0-5% ± 0.3% (vol)	0-60% ± 0.5% (vol)	60-100% ± 1.5% FS
	O_2	0-25% ±1.0% (vol)		
	CO(H_2)**	0-2000ppm ± 2.0% FS		
	H_2S	0-500ppm ± 2.0% FS		

* Typical accuracy after calibration as recommended in the operations manual.
**Hydrogen compensated Carbon Monoxide measurement.
***Additional ranges available, contact LANDTEC for more information.

OTHER PARAMETERS

	Unit	Resolution	Comments
Energy	BTU/hr	1000 BTU/hr	Calculated from specific parameters
Static Pressure	in. H_2O	0.01 in. H_2O	Direct Measurement
Differential Pressure	in. H_2O	0.001 in. H_2O	Direct Measurement
Temperature Accuracy	°F	0.1	±1 (Range -58°F to 482°F)

Important Note: The information in this document is correct at the time of generation. We do, however, reserve the right to change the specification without prior notice as a result of continuing development.

PUMP

Flow	Typically 550cc/min
Flow with 80 in. H2O vacuum	Approximately 80cc/min

ENVIRONMENTAL CONDITIONS

Operating Temperature Range	14°F – 122°F (-10°C to +50°C)
Operating Pressure	-100 in. H_2O, +100 in. H_2O (-250mbar, +250mbar)
Relative Humidity	0-95% non condensing
Barometric Pressure	± 14.7 in.Hg (±500mbar) from calibration pressure
Barometric Pressure Accuracy	± 1% typically

POWER SUPPLY

Battery Life	Typical use 8 hours from fully charged
Charge Time	Approximately 4 hours from complete discharge

CERTIFICATION RATING

ATEX	II 2G Ex ib IIA T1 Gb (Ta= -10°C to +50°C)
ISO17025	ISO/IEC17025:2005 Accreditation #66916
CSA	Ex ib IIA T1 (Ta= -10°C to +50°C) (Canada), AEx ib IIA T1 (Ta= -10°C to +50°C) USA

ISWA International Solid Waste Association

WWW.LANDTECNA.COM

CTS-GEM5K-REV-11-10-16

INFO@LANDTECNA.COM

800-LANDTEC
909-783-3636

QED ENVIRONMENTAL
2355 Bishop Circle West
Dexter, MI 48130, USA

9 Calibration

9.1 *Calibration introduction*

The GEM5000 gas analyzer is carefully calibrated at time of manufacturer and when returned for service. However, it is desirable to be able to carry out a calibration process between services.

This section outlines the correct procedures to enable the field technician to field calibrate the gas analyzer.

✍ Note: This does not replace the factory service and calibration. If this calibration is completed incorrectly it may decrease the accuracy of the gas analyzer.

CH_4, CO_2 and O_2 can be measured by all GEM5000 gas analyzer models as a standard; these channels can be user calibrated. Optionally, the analyzers can have other gas channel specified at purchase; these channels can be calibrated as well. This section will describe in detail how to calibrate the three standard gas channels plus the CO channel.

The GEM5000 instrument can have a H_2 compensated CO channel. This option requires that H_2 is used in the calibration process and is also set out within this section. Refer to section 4.2 GEM5000 Part Number Legend to determine if you have an H_2 compensated CO channel. While H2 is used for calibration of the compensated CO cell, it is not a gas that is measured by the instrument as a part of a reading. As such it only appears on the gas check and View Data screens but not the reading screen.

For the other gas channel options contact LANDTEC for advice.

Two important terms that are used within this section are '**Zero**' and '**Span**'.

Zero: The point at which the gas analyzer is calibrated when there is none (Zero percent or ppm) of the target gases present.

Span: The point at which the gas analyzer is calibrated when a known quantity of the target gas is present.

9.2 *Frequency of calibration—best practice.*

The GEM5000 gas analyzers can be checked against a known concentration of gas, to give confidence that the analyzer is operating as expected at the time and conditions in which it is being used. A field calibration should be performed if the ambient temperature changes by more than 20° Fahrenheit over the course of a monitoring since the last field calibration.

It is recommended that the instrument is regularly serviced and calibrated by LANDTEC. Please refer to the instrument's calibration certificate for the last date of calibration.

When defining the frequency of user calibration, the following are factors to be considered:

- The frequency of use of the analyzer. (daily?/monthly?)
- The level of confidence and accuracy required for readings to be taken.
- Historical user calibration data.
- Site specific requirements or conditions.
- Historical understanding of expected readings on site.

Zeroing of the gas analyzer should be undertaken at the start of each day's monitoring.

Use historical data to drive your frequency of calibration.
If there is no historical data a good starting point for a daily monitoring round is performing a calibration daily at the beginning of a monitoring event.

The results of the calibrations will need to be recorded to monitor over time whether the frequency of calibration needs to be increased or decreased relative to the confidence required.

The confidence required is most often driven by the site specific, user, and/or regulatory requirements.

When undertaking the monitoring with an understanding of the history of the gas levels of that site, a calibration check could be triggered if the readings measured are different to what is expected.

✍ Note: For assistance please contact Technical Support at +1 (909) 783-3636

9.3 *Calibration gases*

User calibration of a gas analyzer will greatly improve the data accuracy in the range of the calibration gases used. This may cause less accurate readings of concentrations outside this calibrated range. Users should select the correct calibration gas for the expected gas levels on their particular application.

- To improve calibration at lower levels the use of CG-00-00-04 and CG-15-15-00 is recommended. To improve calibration at higher levels use of CG-50-35-00 is recommended.
- For standard CO only 100ppm CO gas is needed.
- For CO (H_2 compensated) both CO 100ppm and H_2 1000ppm gases are needed.

The following table indicates a partial listing of gases sold by LANDTEC for calibration:

Calibration gas Part Number	**CH_4**	**CO_2**	**O_2**	**N_2**
CG-00-00-04	0%	0%	4%	Balance
CG-15-15-00	15%	15%	0%	Balance
CG-50-35-00	50%	35%	0%	Balance
CG-N2-00	0%	0%	0%	100%

Calibration targets for gas cells are dependent on the gas/range and type of cell fitted. Contact Technical Support for assistance.

These are for general use but other gas concentrations can be used.

✍ Note: The above gases and most other gas concentrations can be supplied by LANDTEC. For further information please contact Sales on +1 (909) 783-3636 email sales@landtecna.com

⚠ **Warning**	Calibration gases can be dangerous. For each gas used the appropriate material safety data sheet must be read and understood before proceeding.

9.4 *Calibration set-up*

⚠ **Warning**	Do NOT attach the gas supply to the gas analyzer before putting the analyzer into the 'Gas Check' screen. Select 'Check Spans' from the 'Operation Settings' menu.

The regulator supplied with the calibration kit has been configured to deliver a fixed flow.

As the regulator's flow is factory set, it only requires a few turns to open, no adjustment is necessary.

⚠ **Warning**	**Exhaust port** When the gas analyzer is being calibrated, there are two possible exits for the gas, via the usual manner out of the exhaust (yellow) port of the analyzer or through the optional pressure relief valve. In cases of over-pressurization the port on the pressure relief valve will open. It is recommended that tubing is attached to the instrument during a calibration or gas check. The exhaust tubing must emerge in a well-ventilated area. Ensure there are no leaks in the tubing and connections. The calibration of the gas analyzer should be carried out in a safe area with all necessary precautions taken when using potentially dangerous, explosive or toxic gases.

9.5 *Calibration equipment*

The following diagram displays the regulator, tubing and carrying case used for user calibration:

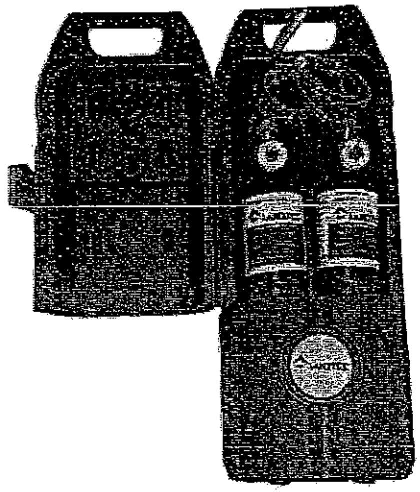


Figure 34—LANDTEC Calibration Gas Kit

- Certified calibration gas cylinders are supplied with the LANDTEC calibration kit. The volume of gas is typically 34 liters. Certain gas mixtures may have different volumes. Please refer to the LANDTEC website www.landtena.com for further information.

- The regulator supplied with the calibration kit is pre-set for flow and pressure rates that are factory set. If using other gas sources and regulators please match the flow and pressure of the LANDTEC regulators. An optional pressure relief valve is suggested if using a NON-LANDTEC regulator just as a safety precaution. Over pressurization of the analyzer can cause damage to the analyzer and cause it to malfunction.

9.6 *Gas Check (Field Calibration)*

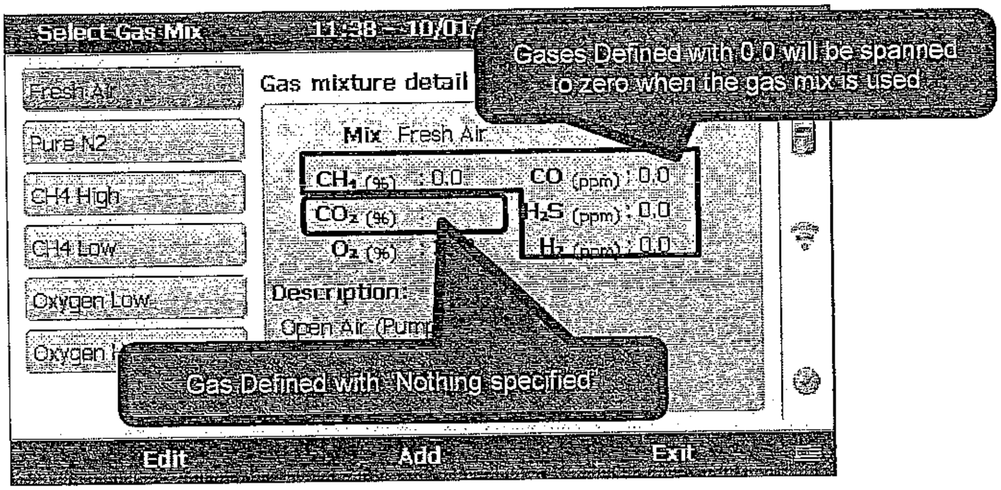
Gas Check

The GEM5000 instrument series has a "Gas Check" to both perform a test or check the gases and then allow calibration to a known standard or "gas mix". The calibration will calibrate to a zero target or other target value if defined. If a gas is missing or not defined in the mix, then the Gas Check Calibration will not calibrate to it.

A default set of "gas mixes" covering the majority of scenarios for basic calibration of CH4, CO2, & O2 have been preloaded into the instrument for your convenience. To meet your particular needs, you are able to adjust the existing mixes to or add additional gas mixes. The following table shows the mixes that are pre-loaded into your instrument.

	CH_4	CO_2	O_2	CO	H_2S	Pump On
Fresh Air	0.0	▨	20.9*	0.0	0.0	Yes
Pure N_2	0.0	▨	0.0	0.0	0.0	No
CH_4 :High	50.0	35.0	0.0	▨	▨	No
CH_4 Low	15.0	15.0	0.0	▨	▨	No
Oxygen Low	▨	▨	4.0	▨	▨	No
Oxygen High	▨	▨	20.9	▨	▨	Yes

On the instrument, this would be displayed as follows:



Gases Defined with 0.0 will be spanned to zero when the gas mix is used

Gas Defined with 'Nothing specified'

Gas mixture detail

Mix: Fresh Air

CH_4 (%) : 0.0
CO_2 (%)
O_2 (%)
CO (ppm) : 0.0
H_2S (ppm) : 0.0
H_2 (ppm) : 0.0

Description:
Open Air (Pump

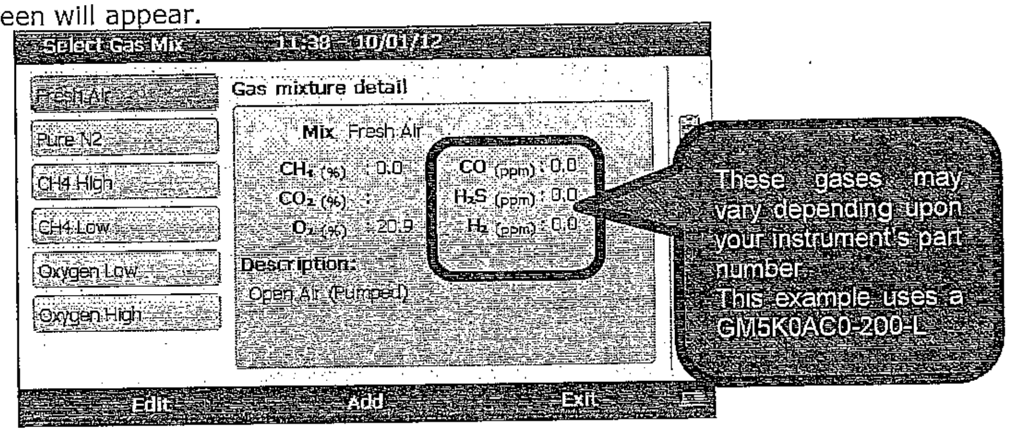
It is important to note that a 0.0 is different than Nothing defined. In the above example for Fresh Air, only CO_2 is not defined or has "Nothing specified". What this means is that when the mix named Fresh Air is applied to the instrument you will Zero the CH_4, O_2, CO, H_2S & H_2 Channels. You will Span Oxygen to 20.9 percent. Carbon Dioxide CO_2 will not be touched when Fresh Air is applied. This distinction is important because as gas mixes are defined you may choose to omit defining a constituent as 0.0 if you want to span only and not Zero a particular gas. The following example will describe this in a step-by-step single bottle gas check/calibration sequence.

Single Bottle Calibration

The following will walk through a typical calibration using Air and a single bottle of 50% Methane / 35% Carbon Dioxide / Balance Nitrogen.
The three simple steps to performing this calibration are:

- Apply Fresh air, Zero channels
- Apply Span to CH_4, CO_2, Zero O_2
- Apply Span for O_2

To begin, press the Menu Key ▤ on the instrument. From the Operations Settings Menu, press 2 for Gas Check. From the Gas Check Screen, press 1 to perform the Gas Check. The Select Gas Mix screen will appear.



Gas mixture detail

Mix: Fresh Air

CH_4 (%) : 0.0
CO_2 (%) :
O_2 (%) : 20.9
CO (ppm) : 0.0
H_2S (ppm) : 0.0
H_2 (ppm) : 0.0

Description:
Open Air (Pumped)

These gases may vary depending upon your instrument's part number
This example uses a GM5K0AC0-200-L

13 Service

The GEM5000 gas analyzer should be regularly serviced to ensure correct and accurate operation. LANDTEC recommends a service and recalibration every **12 months**.

The GEM5000 analyzer is CSA and ATEX certified for use in potentially explosive areas. As such it should be serviced only by qualified engineers. Failure to observe this will result in the warranty becoming invalid and could invalidate the CSA, ATEX, and other certifications.

⚠ **Warning**	If the GEM5000 is to be serviced by trained LANDTEC personnel. Service by any untrained personnel will negate service technicians serviced by unqualified engineers the CSA, ATEX, and other certifications may be invalidated and the instrument may be unsafe for use in a potentially explosive atmosphere.

User serviceable parts:

There are no user serviceable parts inside the instrument.

The following parts can be user serviced:

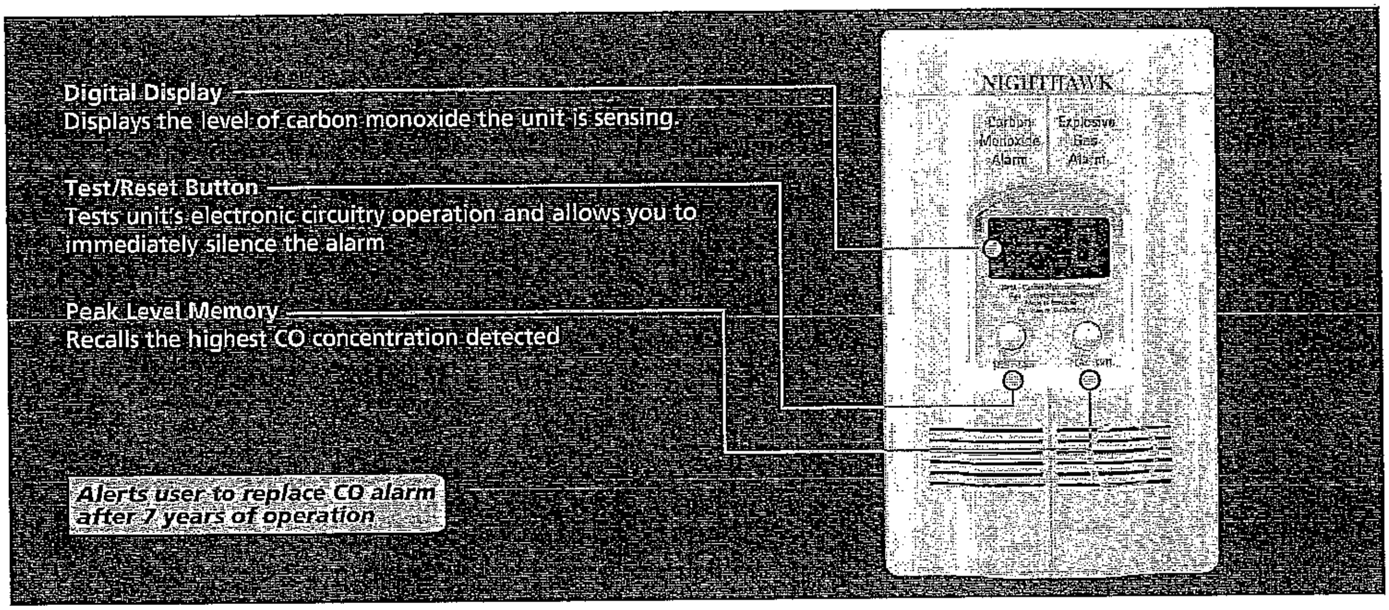
In-line water filter	This should be regularly inspected for obstructions, moisture or damage and changed if needed. The instrument should never be operated without the in-line water filter as this may result in water entering the instrument.
Sample tubing	Always ensure that sample tubes are not contaminated or damaged.
Gas port connectors	Periodically check that the O-rings on the gas port connectors of the hoses are not damaged. A damaged O-ring can let air into the sample gas and result in incorrect readings. If the O-ring it should be replaced immediately.
H_2S filter material	When the filter material changes color to a *light grey* color the filter should be replaced.

BUILDING MONITORING EQUIPMENT

Kidde

AC Powered, Plug-In CO/Gas Combination Alarm w/ Battery Backup

Part Number 900-0113 Model KN-COEG-3



Description

The Kidde 900-0113 AC powered, plug-in CO and explosive gas alarm protects you and your family from two deadly threats. The 900-0113 includes 9V battery back up that provides protection during a power outage, when AC-only units can not provide protection. By pressing the Peak Level Button you can see the peak CO level recorded by the alarm since it was last reset or unplugged. The continuous digital display shows you the level of carbon monoxide (if any) the unit is sensing as well as if gas is present. The gas sensor is a metal oxide sensor designed to detect natural gas (methane) or propane.

Consumer Benefits

The Kidde 900-0113 provides you and your family a level of protection that you have come to expect in a Kidde product. The alarm is easily installed in any of your AC wall outlets, giving you the choice of a direct-plug, a 6' power cord or a table top unit. Depending on how or where you wish to mount your unit, you can get exactly what you need for a perfect application. The 900-0113 is UL listed and offers a 7-year life and a 5-year limited warranty.

Alarm

- **Sounder Alarm** – The 900-0113 offers a loud 85-decibel pulsing alarm that will sound to alert you to a potential problem.

Alarm Condition

- Carbon Monoxide – *4 quick beeps, followed by 5 seconds of silence, followed by 4 quick beeps. Repeat with a number showing in the display (CO concentration in ppm).*
- Gas – *one second of alarm on, one second of alarm off, repeating with "GAS" shown in display.*

5 YEAR LIMITED WARRANTY

SIGNALING UL LISTED

AC Powered, Plug-In
CO/Gas Combination Alarm

Part Number 900-0113
Model KN-COEG-3

Architectural and Engineering Specifications

The carbon monoxide and explosive gas alarm shall be Kidde Unit Number KN-COEG-3 (part number 900-0113) or approved equal. It shall be powered by a 120VAC, 60 Hz source along with a 9V battery back up. The temperature operation range shall be between 40°F and 100°F (4°C and 38°C) and the humidity operating range shall be 5% - 95% relative humidity.

The CO sensor shall be of a fuel cell design and shall meet the sensitivity requirements of Underwriters Laboratories UL2034 Single and Multiple Station Carbon Monoxide Detectors. The unit shall provide accuracy of ±20% +15 ppm when reading CO concentration levels.

The Gas sensor shall be a metal oxide sensor designed to detect natural gas (methane) or propane. The Gas sensor shall be calibrated to alarm before 25% of the LEL.

The alarm shall include an attached plug that can be installed in any outlet following the UL/NPFA/Manufacturer's recommended guidelines. The plug can be snapped into the back of the unit and shall be capable of being rotated so the alarm remains vertical independent of whether the electrical socket is mounted vertically or horizontally. In addition, the alarm plug will have an attached extension cord so the unit can be plugged into the wall outlet and then placed on a table or shelf.

The unit shall incorporate a digital display that meets the sensitivity requirements of UL2034. The display will identify the levels of CO in parts per million (ppm) once that level reaches 30ppm (i.e.: "abnormal" levels). The display will identify "GAS" if gas is present. The display will have a red dot in the lower right corner that will blink to indicate the normal operation.

The alarm shall include a test button that will electronically simulate the presence of CO or GAS and cause the unit to go into alarm. This sequence tests the unit's electronics to ensure proper operation.

The alarm shall include a piezoelectric horn that is rated at 85 decibels at 10 feet. When the unit detects carbon monoxide, the alarm pattern will be 4 quick beeps – followed by 5 seconds of silence – followed by 4 quick beeps. Repeated with a number showing in the display (CO concentration in PPM). When the unit detects GAS, the alarm pattern will be a 1/2 second alarm on, 1/2 second of silence – repeating with "GAS" shown in the display.

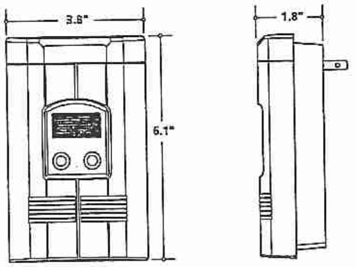
The unit shall include a peak level memory feature that will store the peak CO level sensed since the unit was last reset. The peak CO level stored in the unit's memory shall be displayed (in ppm) on the digital display by pressing the appropriate button on the unit. The memory shall also be capable of being reset.

The unit shall also indicate a low battery warning utilizing each of the following methods: a blinking dot will be displayed and the sounder will chirp every 15 seconds, the display will alternate between "Lb" (low battery) and CO reading while chirping.

The unit shall be listed to UL 2034. It shall also include a 5-year manufacturer's limited warranty.

Technical Specifications

Part Number:	900-0113
Model:	KN-COEG-3
UPC Number:	7-84908-01130-5
Power Source:	120VAC
Sensor:	Electrochemical
Audio Alarm:	85dB at 10ft
Temperature Range:	40°F (4.4°C) to 100°F (37.8°C)
Humidity Range:	5%-95% relative humidity (RH)
Size:	6.1"L x 3.8"W x 1.8"H
Weight:	1.5lbs
Interconnects:	No
Wiring:	Plug-In
LED:	Displays CO concentration in PPM
Warranty:	5 year limited



Ordering Information

Clam Shell UPC: 7-84908-01130-5

Part Number	12 of 5	Pack Quantity	Dimensions (w x d x h inches)	Weight	Case/ Skid	Layers/ Skid	Skid Weight
900-0113**	N/A	Individual	7.5 x 2.25 x 11.25	1.5lbs	N/A	N/A	N/A
900-0113-02	107 84908 01130 2	PDQ (2 units)	7.75 x 6 x 12	3.56lbs	105	3	374lbs
900-0113-16	207 84908 01130 9	Cut Case (12 units)	16 x 18 x 12	16.67lbs	18	3	300lbs
900-0113-37	307 84908 01130 6	Power Tower (36 units)	20 x 24 x 41 (incl. pallet)	40lbs	3	3	120lbs

***Not for sale by individual unit*

UNIT

PDQ

CUT CASE

POWER TOWER

Kidde
1016 Corporate Park Drive
Mebane NC 27302
1-800-880-6788
www.Kidde.com

Distributed by:

2. Product Features and Specifications

IMPORTANT: Seven (7) years after the initial power up, this alarm will "beep" two times every 30 seconds to indicate that it is time to replace the alarm. Replace the alarm immediately! It will not detect CO in this condition.

To help identify the date to replace the alarm, a label has been affixed to the side of the alarm. Write the "replace by" date (seven years from power up) in a permanent marker on this label.

Temperature:
Operating Range: 40°F (4.4°C) to 100°F (37.8°C)

Humidity:
Operating range: 10-95% non-condensing

Audible Alarm:
85+ dB at 10' @ 3.4±0.5 KHz pulsing alarm

CO Sensor:
Electrochemical

Gas Sensor:
Metal Oxide

Power:
120 volts AC, 60 Hz, 60 mA max, 9 volt battery back-up

Accuracy of Digital Display:
30-999 PPM +/-30% when measured in conditions of 80° F (+/- 10° F), atmospheric pressure +/- 10% and 40% +/- 3% relative humidity. Display readings may vary slightly depending on changes in the ambient condition (temperature, humidity) and the condition of the sensor.

CO Alarm Response Times:
70 PPM = 60-240 min., 150 PPM = 10-50 min., 400 PPM = 4-15 min.

Gas Alarm Response Times:
Before 25% of low explosion limit (LEL) for natural gas or propane is detected.

5. Alarm Characteristics

WARNING: When powered by battery backup only; after four minutes, this alarm pattern occurs only every 60 seconds, until the alarm is reset or the CO is eliminated.

- The digital display will show a the PPM of CO or show "GAS" only if it senses carbon monoxide or gas while in backup mode.
- If gas is detected while on battery backup, the unit will display "GAS" and alarm in 1/2 second beeps. For the first four minutes after the unit goes into battery backup operation, the explosive gas sensor will operate as if on AC power.

However, after four minutes, to extend battery life, the unit will go into battery conserve mode and will only sample for explosive gas once every eight minutes. Explosive gas could be present during this 8-minute period without the unit going into alarm. If the alarm is on battery backup for an extended period of time, replace the battery to ensure maximum protection is provided. The battery will last only a couple hours in a gas alarm condition.

WARNING: If at any time you test the alarm and it does not perform as described, have it replaced immediately.

6. Model KN-COEG-3 Operating Characteristics

Whenever the CO and Gas alarm is first powered up, it will sound briefly to let you know it is receiving power and that the alarm is functioning.

You will see three eights on the digital display, indicating the alarm is in the start-up mode. The three eights will remain for approximately 20 seconds. You will see a blinking red dot to the lower right of the digital display. The blinking dot shows that the alarm is operating.

Within 20 seconds, your CO and Gas alarm will start monitoring for CO. Within 2 minutes your alarm will start monitoring for gas. This alarm will display a 0 if CO concentrations between 0 and 30 PPM have been detected within the last 15 seconds. The alarm has begun monitoring the air for CO and gas and will continue to as long as it receives power.

When the alarm is unplugged or loses power and a good 9V battery is installed: The alarm will automatically switch to its battery backup mode and you will notice the following:

- After 4 minutes the digital display will show a blinking dot only – this helps conserve the battery's power.

6. Model KN-COEG-3 Operating Characteristics

If the battery is low or missing, or if the unit malfunctions, it will display other readings (and alarm differently) to alert you of specific conditions. Please familiarize yourself, and other family members, to the difference between a CO reading and and indication signifying a problem with the unit itself.

NOTE: When AC power is restored, the alarm will automatically switch back to normal operating mode.

The alarm will not detect CO or gas if battery is depleted. Replace battery.

The following table illustrates the possible digital displays, describes the audible alarm patterns, and the recommended actions to take.

Operating and Alarm Characteristics

LED Display Shows	Alarm Sound	Unit Status	Recommendation
 A display of CO concentration from 30-999.	4 quick beeps, 5 seconds silence, repeating	Alarm condition. Dangerous concentrations of CO detected	Refer to "What to do When the Alarm Sounds" (inside front cover)
 Brief "888" along with any number between 100 and 300.	4 quick beeps, 5 seconds silence, repeated once	Self checking when AC powered (Test button was pressed or unit was first powered)	None – CO has not been detected. Numbers shown for test purposes only
 Steady "0" displayed.	None	Normal AC operation (sensing no CO) and with a good battery	None
  "Lb" flashes alternately with any number.	One quick beep every 15 seconds	AC powered and low or missing battery	Install or replace 9V battery
 Steady "Err displayed	One quick beep every 30 seconds	Unit malfunction	Replace battery. If "Err" continues, unit has malfunctioned. Replace immediately. Unit will not respond CO
  No display alternating with display of CO concentration every 60 seconds.	4 quick beeps, 5 seconds silence, repeating every 60 secs	Alarm condition powered on battery backup. Dangerous concentrations of CO detected	Refer to "What to do When the Alarm Sounds" (inside front cover). Replace battery

6. Model KN-COEG-3 Operating Characteristics

Operating and Alarm Characteristics

LED Display Shows	Alarm Sound	Unit Status	Recommendation
  No display alternating with "0" every 60 seconds.	None	Normal operation after first 4 minutes of 9 V battery operation. Unit monitoring for CO	Verify AC power is restored as soon as possible to conserve battery. Replace battery
 Display shows "GAS"	1/2 second beep, 1/2 second silence, repeating	Unit has detected gas	Refer to "What to do When the Alarm Sounds" for Gas (inside front cover)
 Flashing dot	None	Normal battery-only operation– unit will show reading only if it senses CO or gas	Plug into AC power as soon possible to conserve battery
 "End" displayed. Red LED flashes every 30 seconds	Two quick beeps every 30 seconds	End of unit life	Replace unit immediately. Unit will not respond to CO or Gas

Peak Level Memory

When the Peak Level button is pressed and held, the display shows the highest CO reading taken by the CO alarm since its last reset or power up. The Peak Level display feature will display levels between 11-999 PPM. Although the Peak Level feature will display levels below 30 PPM, these levels will not result in an alarm no matter how long the device is exposed to these levels. The Peak Level feature is helpful in identifying if you have had a CO reading since resetting the alarm.

Concentrations of CO between 1 and 30 PPM can often occur in normal, everyday conditions. Concentrations of CO below 30 PPM may be an indication of a transient condition that may appear today and never reappear. Some CO conditions may start out as low level leaks but could develop into CO concentrations that may become harmful.

Peak Level Memory Reset

Press the Peak Level button; with the button still pressed, press the Test/Reset button for two seconds and release. The number on the display will turn to "0", the memory will be cleared and the alarm will begin monitoring for CO. The Peak Level memory is also reset when the unit loses power.

7. Maintenance

NOTE: This unit is sealed. The cover is not removable.

Due to the loudness of the alarm, we suggest that you place your fingers over the sounder opening while testing your alarm.

CAUTION: Continuous exposure to the high sound level of this alarm over an extended period of time may cause hearing loss.

Testing

Observe the alarm weekly to make sure the red dot is blinking, indicating normal operation.

If the dot is not blinking, unplug the alarm for three minutes, then plug in again. This will clear the alarm for restart. If the dot does not resume blinking, your alarm may be malfunctioning.

To test the alarm, press the Test/Reset button. If the alarm is operating properly, you will notice the following:

- The display shows three "eights", then shows the word "GAS" while the alarm is sounding three short "beeps". Then, the display shows a number (usually around 200). You will then hear four quick "beeps" – followed by five seconds of silence – followed by four quick "beeps" repeating until reset stops. The unit will then show three "eights" for several seconds. It will then return to monitoring for CO and gas.

Familiarize yourself and household members with the alarm pattern described above for a CO or gas event. While on AC power, in the event of a CO or gas incident, the appropriate pattern will continue to repeat as long as CO or gas is present.

NOTE: Pressing the Test/Reset button tests the functions of the alarm's internal components, circuitry and micro-computer. **You do not need to press the Test/Reset button to take a CO or gas reading.** CO readings or the presence of gas are automatically shown on the alarm's digital display. If the alarm shows "0", then no measurable amount of CO or gas has been sensed by the alarm within the past 15 seconds.

Battery Replacement

NOTE: This CO and Gas alarm is not battery operated. However, this alarm is equipped with 9 volt battery backup – the 9 volt battery is to supply short term back-up during a power outage.

When replacing the battery, use one of the following approved brands:

• **Duracell**	**MN1604 or MX1604**
• **Energizer**	**522**
• **Gold Peak**	**1604A**

These batteries can be purchased where you bought the alarm or at a local hardware store. Use of a different battery may have a detrimental effect on the alarm operation.

The 9 volt battery is not rechargeable. If the 9 volt battery is missing, disconnected, or if the battery's power is low, "Lb" will be displayed alternately with the current CO reading once every second accompanied by an audible beep every 15 seconds. If this happens, the battery must be replaced.

To replace battery:

Remove back door by sliding it down and out. Remove battery by unsnapping it from the battery clip. Install a new battery by connecting it to the battery clip and place into the recessed battery cavity. Reinstall the back door of the unit.

IMPORTANT: Constant exposures to high or low humidity may reduce battery life. A good safety measure is to replace the battery at least once a year, or at the same time as you change your clocks for daylight saving time.

After installing or changing the battery, reinstall your alarm. Test your alarm by using the Test/Reset button and check that the display is on.

Maintenance Tips

To keep your alarm in good working order, you must follow these steps:

- Test the alarm once a week by pressing the Test/Reset button.
- Vacuum the alarm cover once a month to remove accumulated dust.
- Never use detergents or solvents to clean the alarm. Chemicals can permanently damage or temporarily contaminate the sensor.
- Avoid spraying air fresheners, hair spray, paint or other aerosols near the alarm.
- Do not paint the unit. Paint will seal the vents and interfere with proper sensor operation.

7. Maintenance

Move the CO and Gas alarm to a remote location, to prevent possible damage or contamination of the sensor, prior to performing any of the following:

- Staining or stripping floors or furniture, painting or wall-papering
- Using aerosols or adhesives

WARNING: Reinstall the CO and Gas alarm as soon as possible to assure continuous protection.

The following is a list of substances that at high levels can damage the sensor or cause temporary readings that are not CO readings:

- Ethylene, ethanol, alcohol, iso-propanol, benzene, toluene, ethyl acetate, hydrogen, hydrogen sulfide and sulfur dioxide.
- Also most aerosol sprays, alcohol based products, paint, thinner, solvent, adhesive, hair spray, after shave, perfume, auto exhaust (cold start) and some cleaning agents.

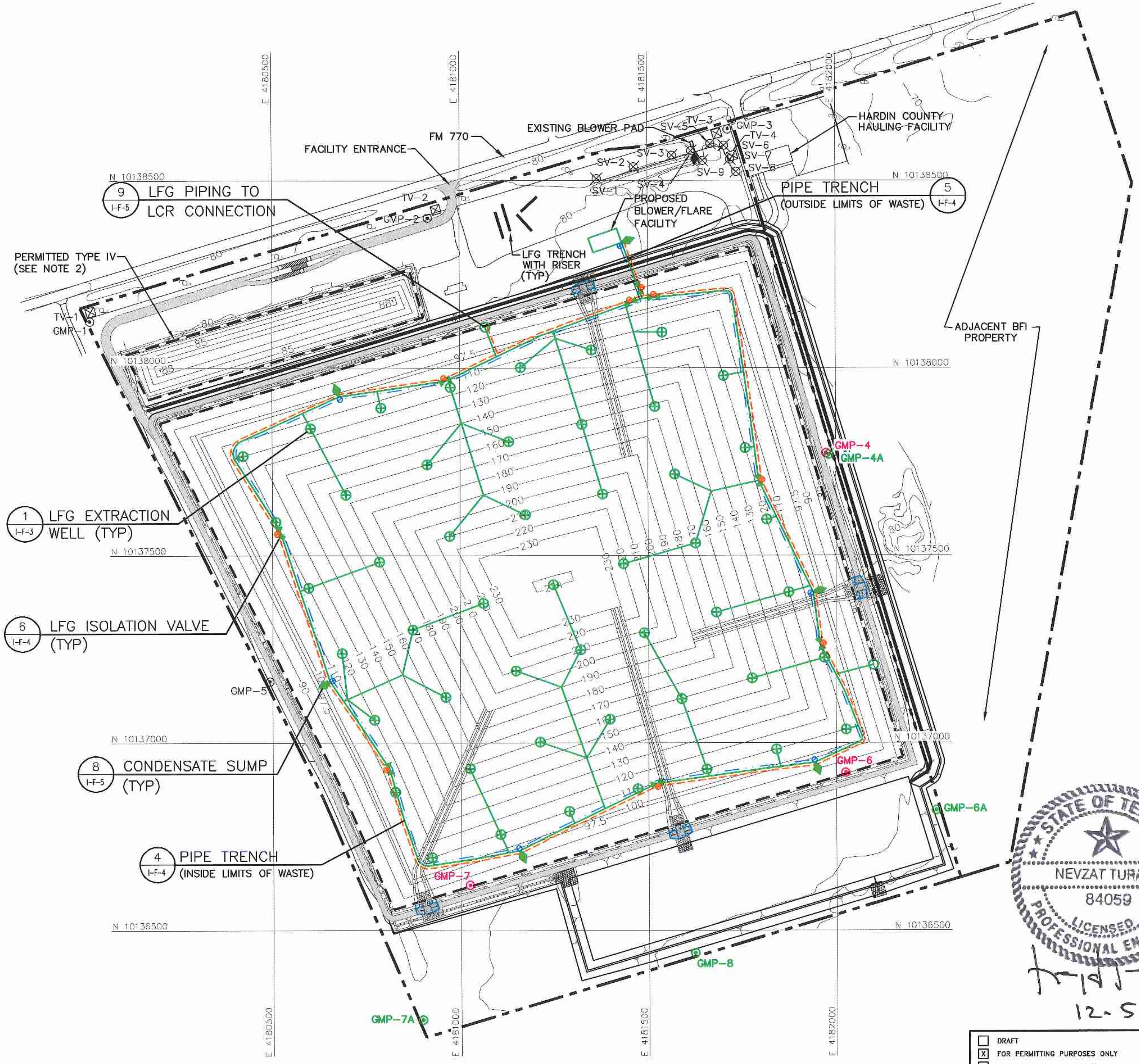
APPENDIX III I-F

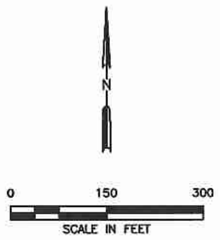
LANDFILL GAS COLLECTION AND CONTROL SYSTEM PLAN

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

Includes Figures III I-F-1 through III I-F-6





LEGEND

— · — · —	BFI PROPERTY BOUNDARY
—— · ——	PERMIT BOUNDARY
— — —	CURRENTLY PERMITTED LIMITS OF WASTE
——70——	EXISTING CONTOUR
——70——	FINAL CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
	DOWNCHUTE
⊙ GMP-1	EXISTING LFG MONITORING PROBE
☒ TV-1	EXISTING UTILITY TRENCH VENT
⊙ GMP-4	EXISTING LFG MONITORING PROBE (TO BE ABANDONED)
⊙ GMP-4A	PROPOSED LFG MONITORING PROBE
☒ SV-1	EXISTING SOIL VAPOR EXTRACTION WELL
——	EXISTING GAS COLLECTION PIPING
◆	EXISTING CONDENSATE SUMP
⊕	PROPOSED LFG EXTRACTION WELL
——	PROPOSED GAS COLLECTION PIPING
◆	PROPOSED CONDENSATE SUMP
⋈	PROPOSED LFG ISOLATION VALVE
○	PROPOSED LCR CONNECTION
— · · —	PROPOSED AIR SUPPLY LINE
- - - -	PROPOSED CONDENSATE FORCEMAIN
● ●	PROPOSED AIR/FORCEMAIN VALVE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. PERMITTED TYPE IV UNIT CONTAINS C&D WASTE, AND AS SUCH, THIS AREA HAS BEEN EXCLUDED FROM THE FUTURE GCCS.
3. EXISTING UTILITY TRENCH VENT LOCATIONS ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY HARDIN COUNTY LANDFILL.
4. LOCATIONS SHOWN FOR THE PROPOSED LFG EXTRACTION WELLS, COLLECTION PIPING, BLOWER/FLARE FACILITY, AND ASSOCIATED LFG SYSTEM COMPONENTS ARE APPROXIMATE. ACTUAL NUMBERS, LOCATIONS, AND PIPING CONFIGURATION TO BE DETERMINED BASED ON THE FIELD CONDITIONS AT THE TIME OF INSTALLATION.
5. PROPOSED LFG SYSTEM COMPONENTS WILL BE INSTALLED IN PHASES AS NEEDED.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-F-1 GCCS COMPLETION PLAN.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT
GCCS COMPLETION PLAN

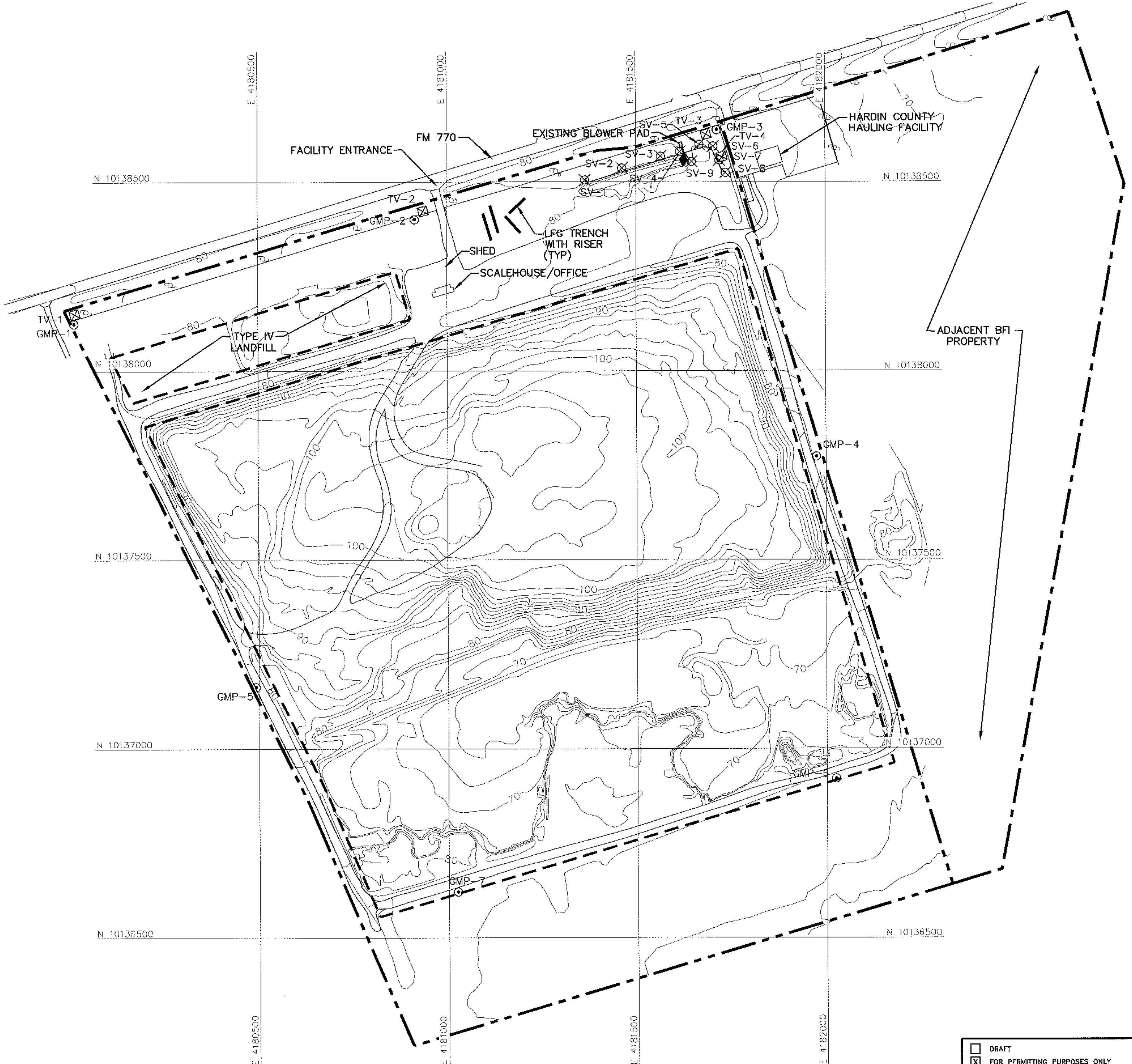
HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

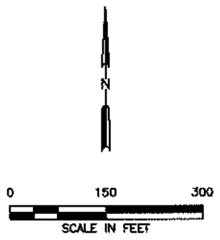
WWW.WCGRP.COM

FIGURE III I-F-1

0:\0120\758\2214B EXPANSION\III\III I-F-1 GCCS COMPLETION PLAN.dwg, 11/15/2017 2:12:29 PM, rsellers, 1:2

O:\0120\758\2214B EXPANSION\IIII\III I-F-2 EXISTING SITE LAYOUT.dwg, 11/15/2017 2:13:23 PM, rsellers, 1:2





LEGEND

— - — - —	BFI PROPERTY BOUNDARY
— — - — —	PERMIT BOUNDARY
— — — —	CURRENTLY PERMITTED LIMITS OF WASTE
········ 70 ········	EXISTING CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
⊙ GMP-1	EXISTING GAS MONITORING PROBE
⊠ SV-1	EXISTING SOIL VAPOR EXTRACTION WELL
———	EXISTING GAS COLLECTION PIPING
◆	EXISTING CONDENSATE SUMP
⊠ TV-1	EXISTING UTILITY TRENCH VENT

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. EXISTING UTILITY TRENCH VENT LOCATIONS ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY HARDIN COUNTY LANDFILL.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-F-2 EXISTING SITE LAYOUT.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

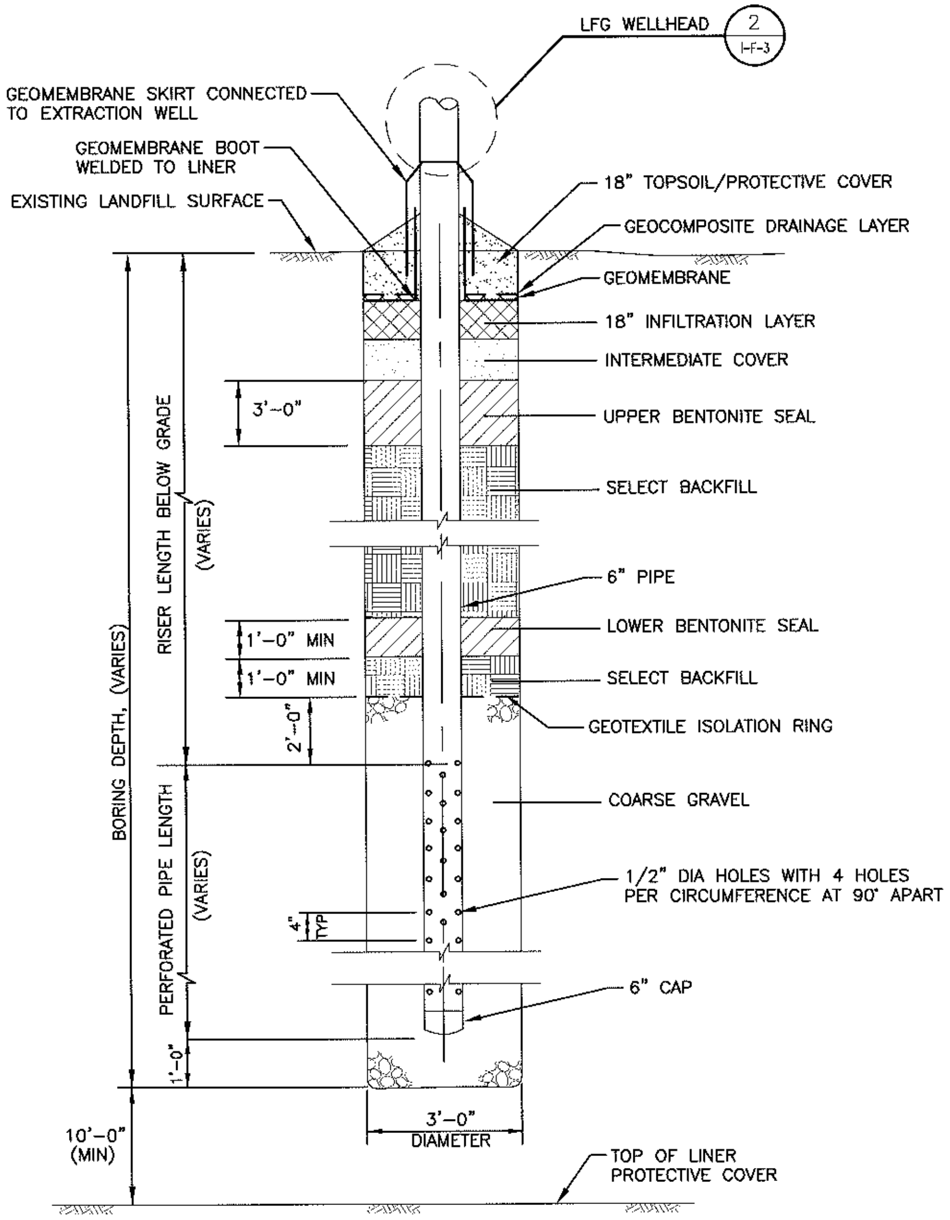
NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

MAJOR PERMIT AMENDMENT EXISTING SITE LAYOUT

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-F-2

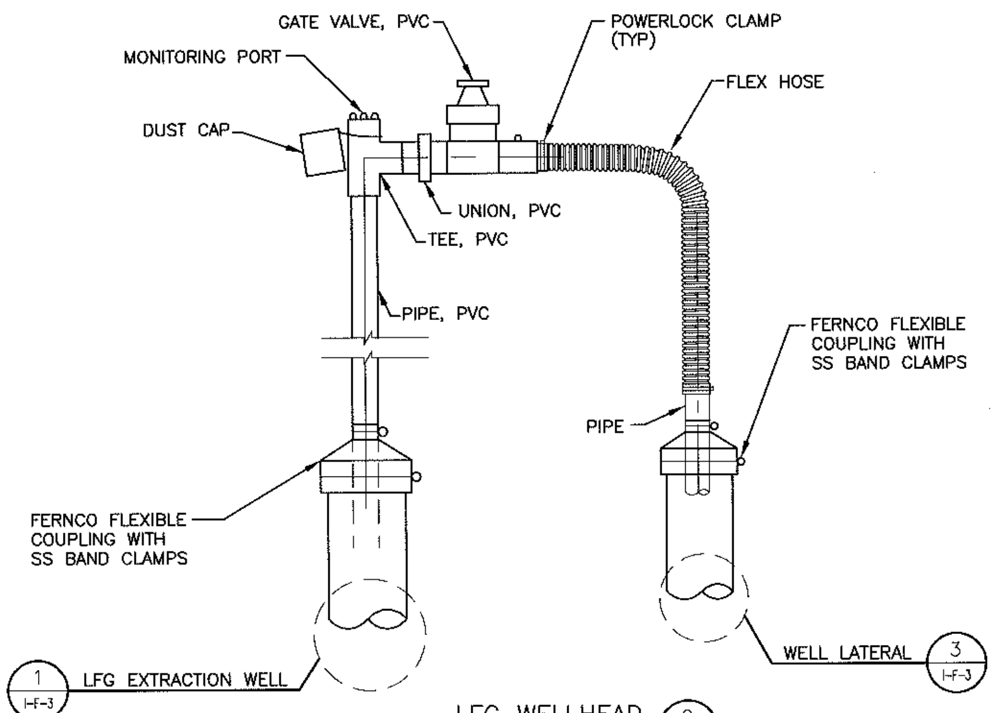


LFG EXTRACTION WELL ① I-F-3

NTS

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. GEOMEMBRANE BOOT AND SKIRT ONLY APPLICABLE IN LANDFILL AREAS WITH GEOMEMBRANE FINAL CAP.

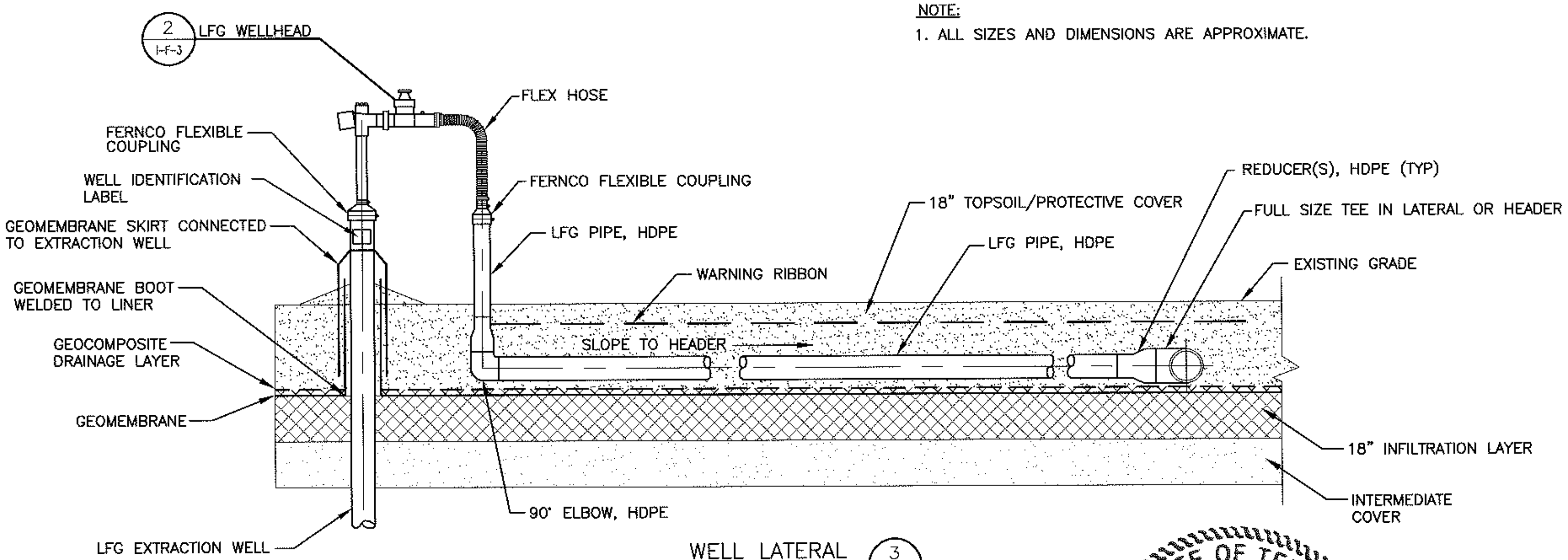


LFG WELLHEAD ② I-F-3

NTS

NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.



WELL LATERAL ③ I-F-3

NTS

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. GEOMEMBRANE BOOT AND SKIRT ONLY APPLICABLE IN LANDFILL AREAS WITH GEOMEMBRANE FINAL CAP.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-F-3 DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

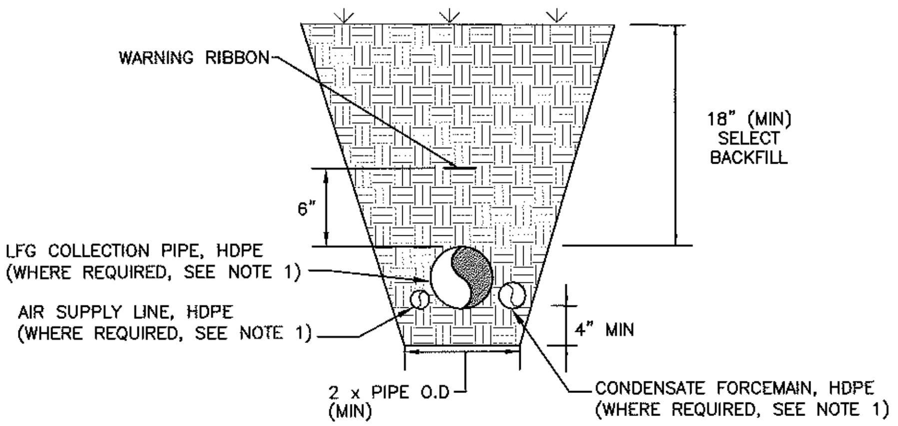
MAJOR PERMIT AMENDMENT
EXTRACTION WELL DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

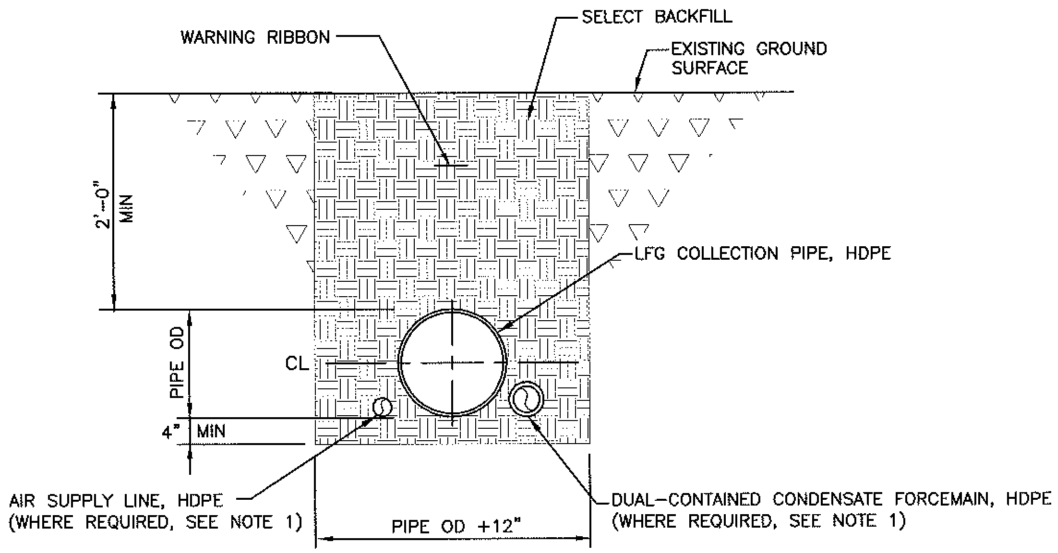
FIGURE III I-F-3

O:\0120\758\2214B EXPANSION\III\III I-F-3 EXTRACTION WELL DETAILS.dwg, 11/15/2017 2:13:49 PM, rsellers, 1:2



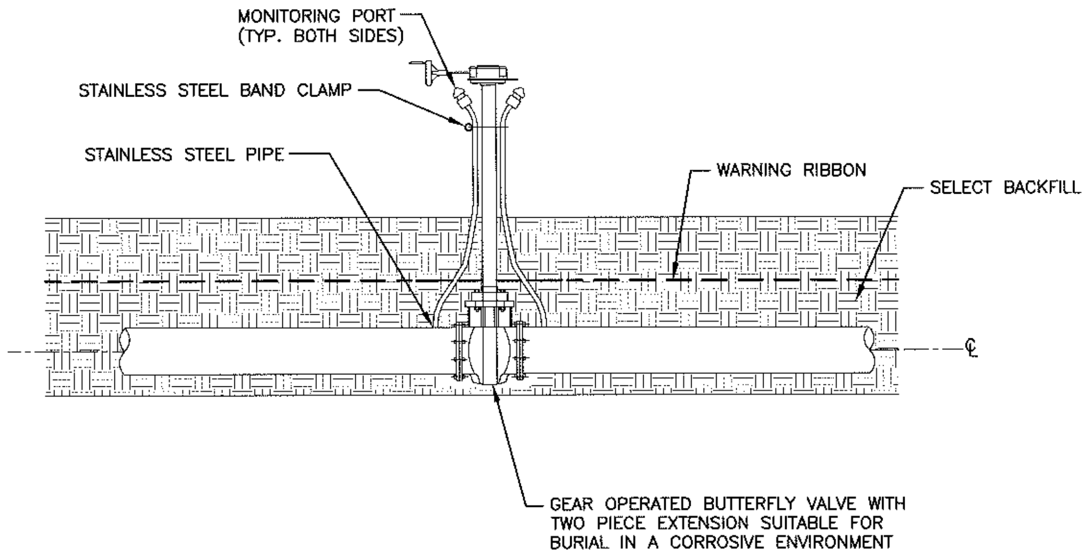
PIPE TRENCH ④ I-F-4
(INSIDE LIMITS OF WASTE)
NTS

NOTES:
1. THE NUMBER OF PIPES IN THE PIPE TRENCH VARIES.
2. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.



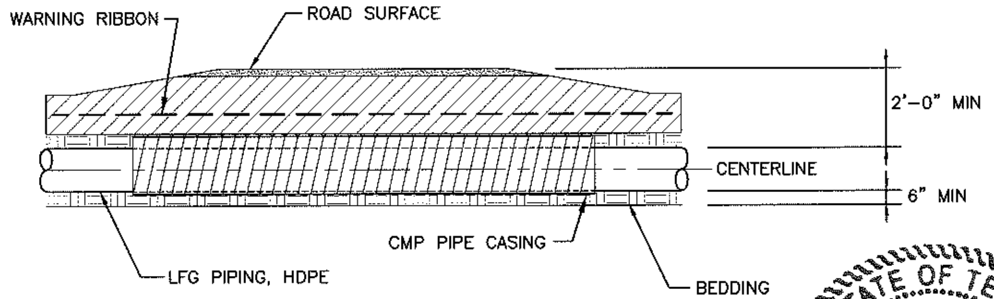
PIPE TRENCH ⑤ I-F-4
(OUTSIDE LIMITS OF WASTE)
NTS

NOTES:
1. THE NUMBER OF PIPES IN THE PIPE TRENCH VARIES.
2. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.



LFG ISOLATION VALVE ⑥ I-F-4
NTS

NOTE:
1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.



ROAD CROSSING ⑦ I-F-4
NTS

NOTE:
1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-755-11
CAD: III I-F-4 DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

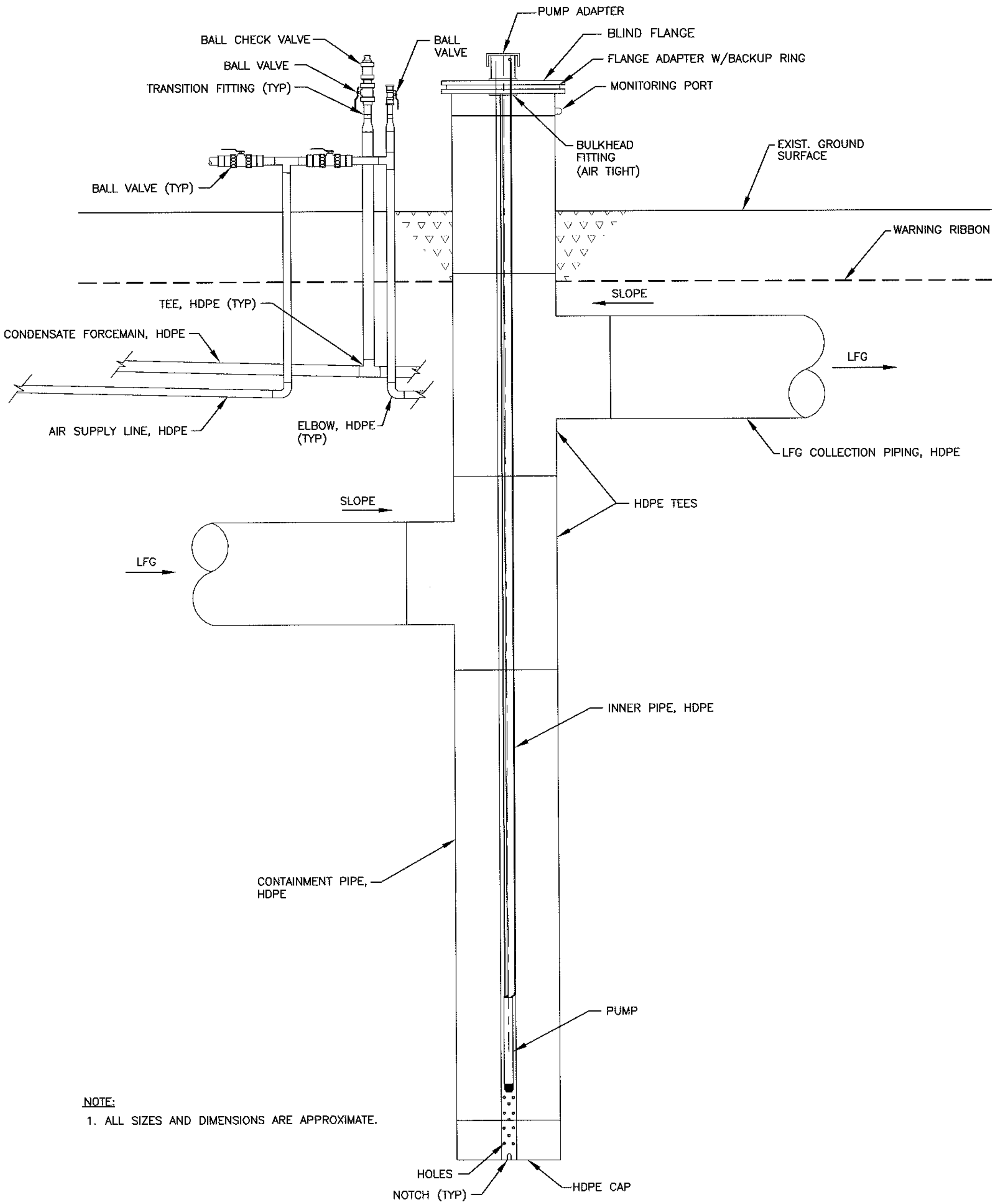
MAJOR PERMIT AMENDMENT
PIPING DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-F-4

O:\0120\755\2214B EXPANSION\III\III I-F-4 PIPING DETAILS.dwg, 11/15/2017 2:14:13 PM, rsellers, 1:2

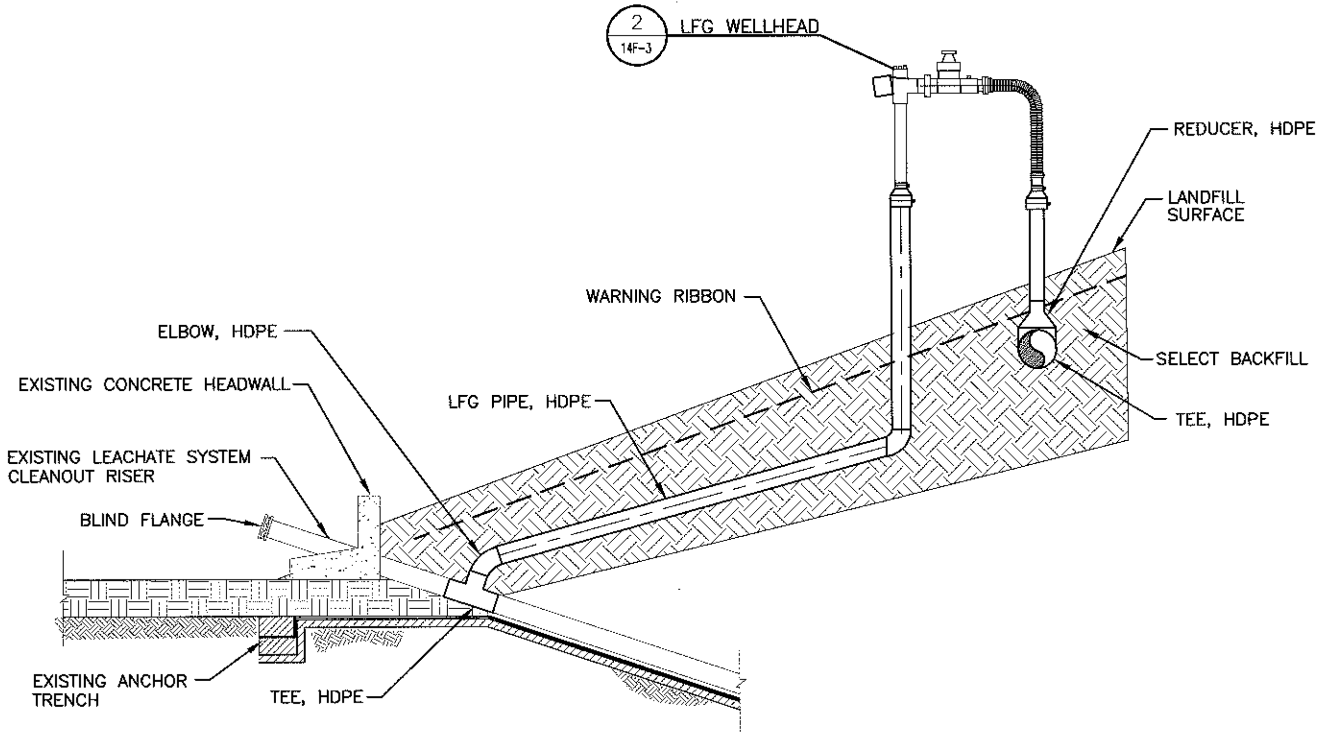


NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

CONDENSATE SUMP 8 I-F-5

NTS



LFG PIPING TO LCR CONNECTION 9 I-F-5

NTS

NOTE:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-F-5 DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

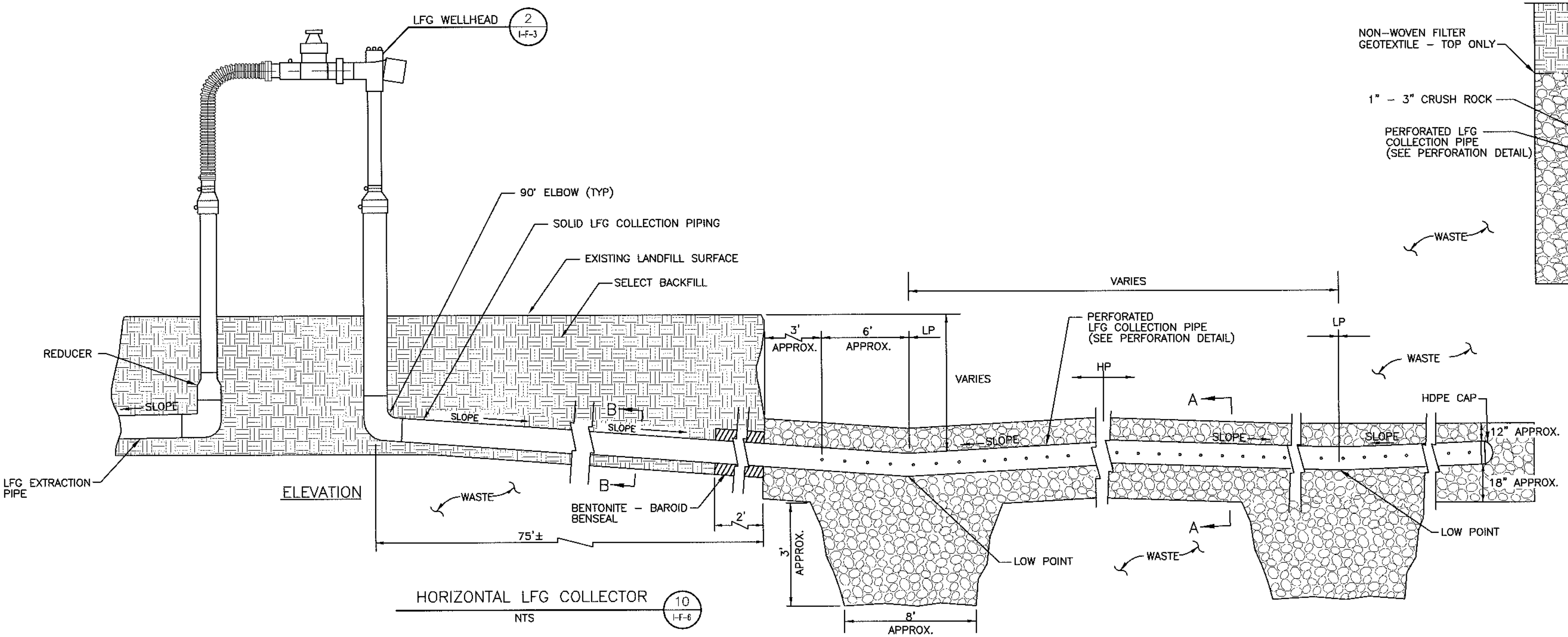
MAJOR PERMIT AMENDMENT
CONDENSATE SUMP/LCR DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-F-5

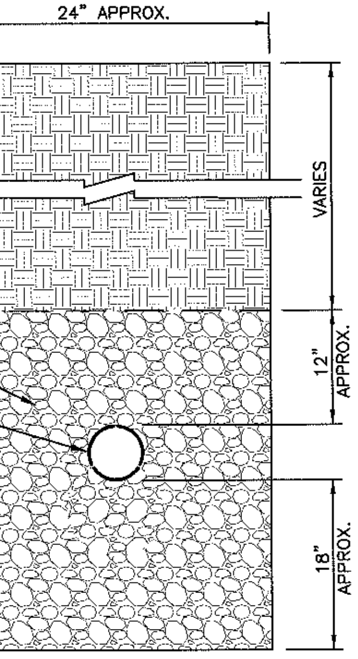
O:\0120\758\2214B EXPANSION\III\III I-F-5 SUMP_LCR DETAILS.dwg, 11/15/2017 2:14:35 PM, rsellers, 1:2



HORIZONTAL LFG COLLECTOR

NTS

10
I-F-6

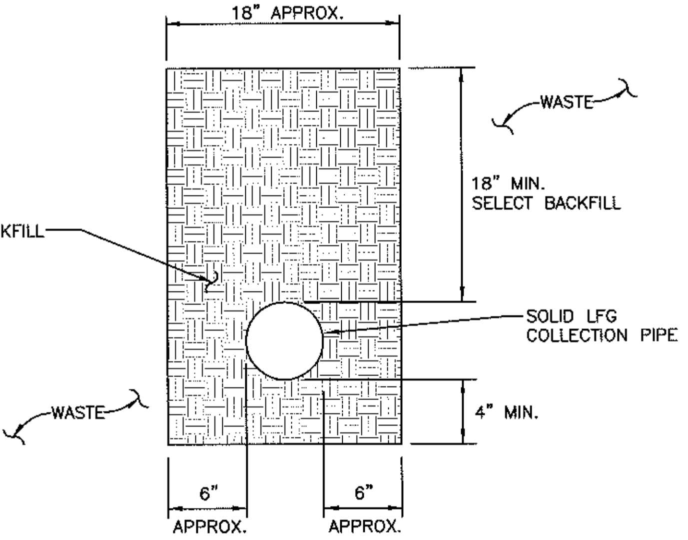


SECTION A–A

NTS

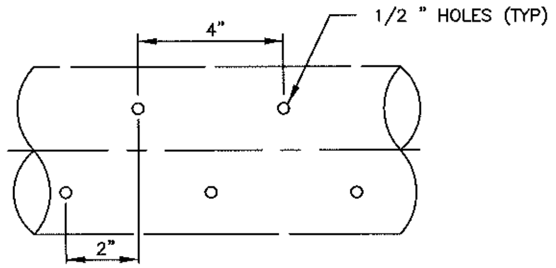
NEVZAT TURAN
84059

12-5-2017



SECTION B–B

NTS



LFG COLLECTION PIPE PERFORATION DETAIL

NTS

NOTES:

1. ALL SIZES AND DIMENSIONS ARE APPROXIMATE.
2. HORIZONTAL LFG COLLECTORS MAY BE USED FOR INTERIM GAS CONTROL.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2017
FILE: 0120-758-11
CAD: III I-F-6 DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: SR
REVIEWED BY: NT

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

MAJOR PERMIT AMENDMENT HORIZONTAL LFG COLLECTOR DETAILS

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III I-F-6

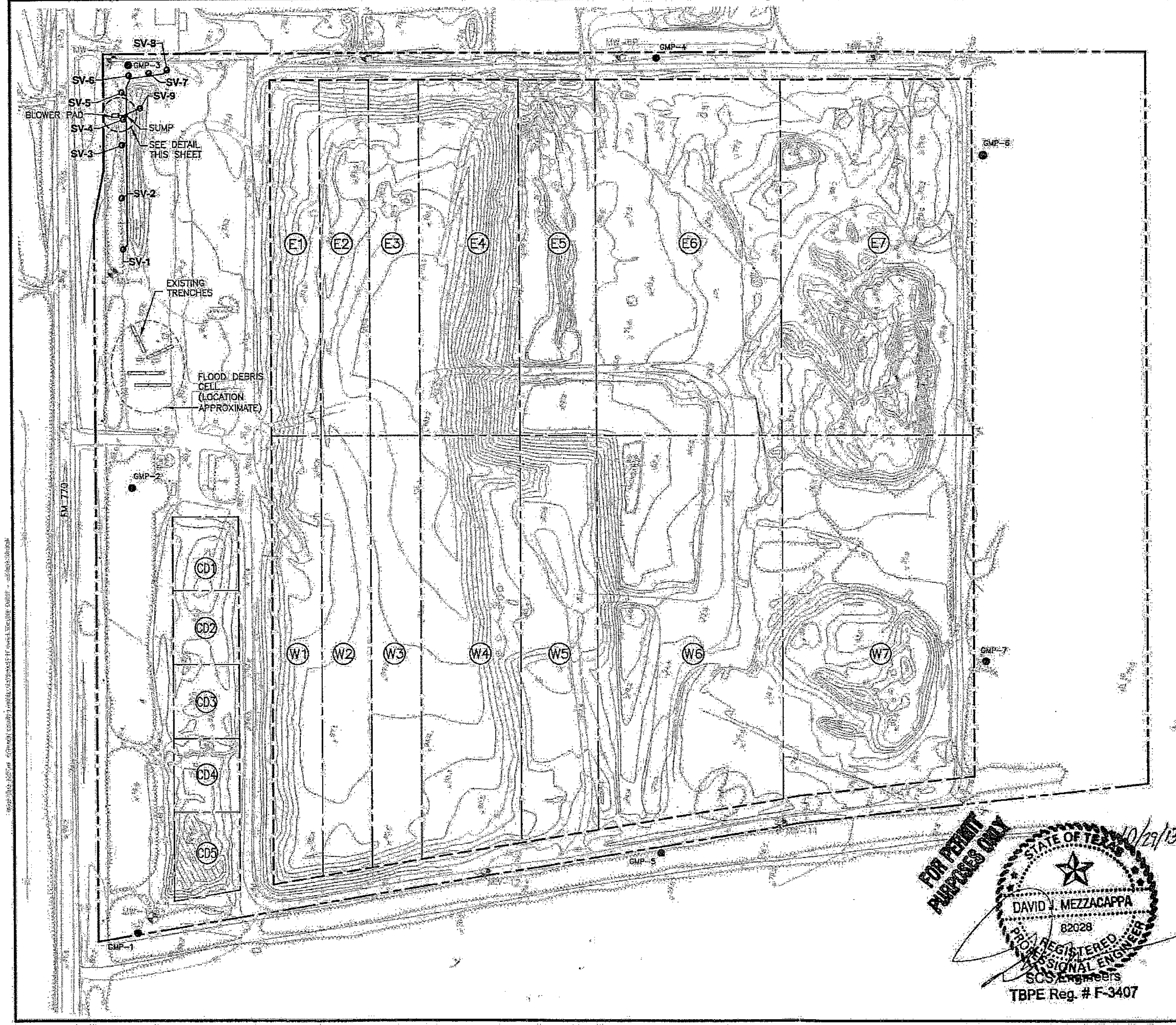
O:\0120\758\2214B EXPANSION\III\III I-F-6 HZ COLLECTOR DETAILS.dwg, 11/15/2017 2:14:58 PM, rsellers, 1:2

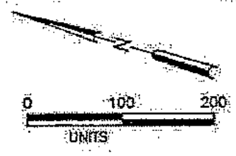
APPENDIX III I-G
EXISTING REMEDIATION PLAN DRAWINGS

NEVZAT TURAN
84059

12-5-2017

Includes pages III I-G-1 through III I-G-5



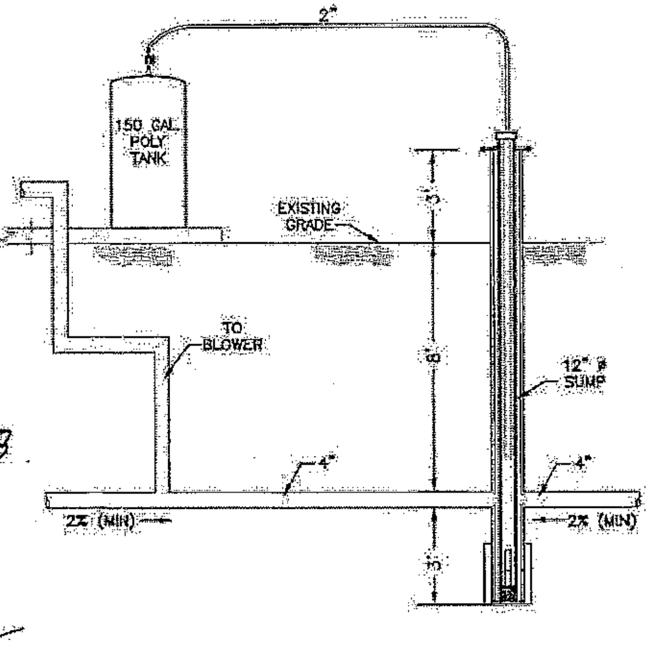


LEGEND

— · — · —	PERMIT BOUNDARY
— — — —	WASTE FOOTPRINT
———	CELL BOUNDARY
(E1)	SECTOR DESIGNATION
········	EXISTING GROUND CONTOUR
⌖ MW-7	EXISTING GROUNDWATER MONITORING WELL
● GMP-6	EXISTING GAS MONITORING PROBE
● SV-11	SOIL VENT (SEE NOTE 3)

NOTES:

1. EXISTING GRADE TOPOGRAPHY PRODUCED FROM AERIAL PHOTOGRAPHY PERFORMED BY DALLAS AERIAL SURVEY, INC., FLOWN JUNE 28, 2011.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL)
3. REFER TO DETAIL IN ATTACHMENT D FOR GMP-3 REMEDIATION PLAN (2012) FOR SOIL VENT DETAIL.
4. UTILITIES ALONG THE NORTH PROPERTY BOUNDARY ARE NOT SHOWN. DRILLER SHALL TAKE ABOVE-GROUND POWER LINE INTO CONSIDERATION WHEN INSTALLING VENTS. ALL KNOWN UTILITIES SHALL BE MARKED PRIOR TO DRILLING AND A SEARCH CONDUCTED FOR AND UNKNOWN BELOW-GRADE UTILITIES.



FOR PERMIT PURPOSES ONLY

DAVID J. MEZZACAPPA
82028
10/29/13
SCS Engineers
TBPE Reg. # F-3407

REV	DATE	DESCRIPTION	BY
1	10/13	SHOW SOIL VENT PIPING; ADD SUMP DETAIL	DAG

DRAWING TITLE:
REMEDIATION PLAN FOR GMP-3

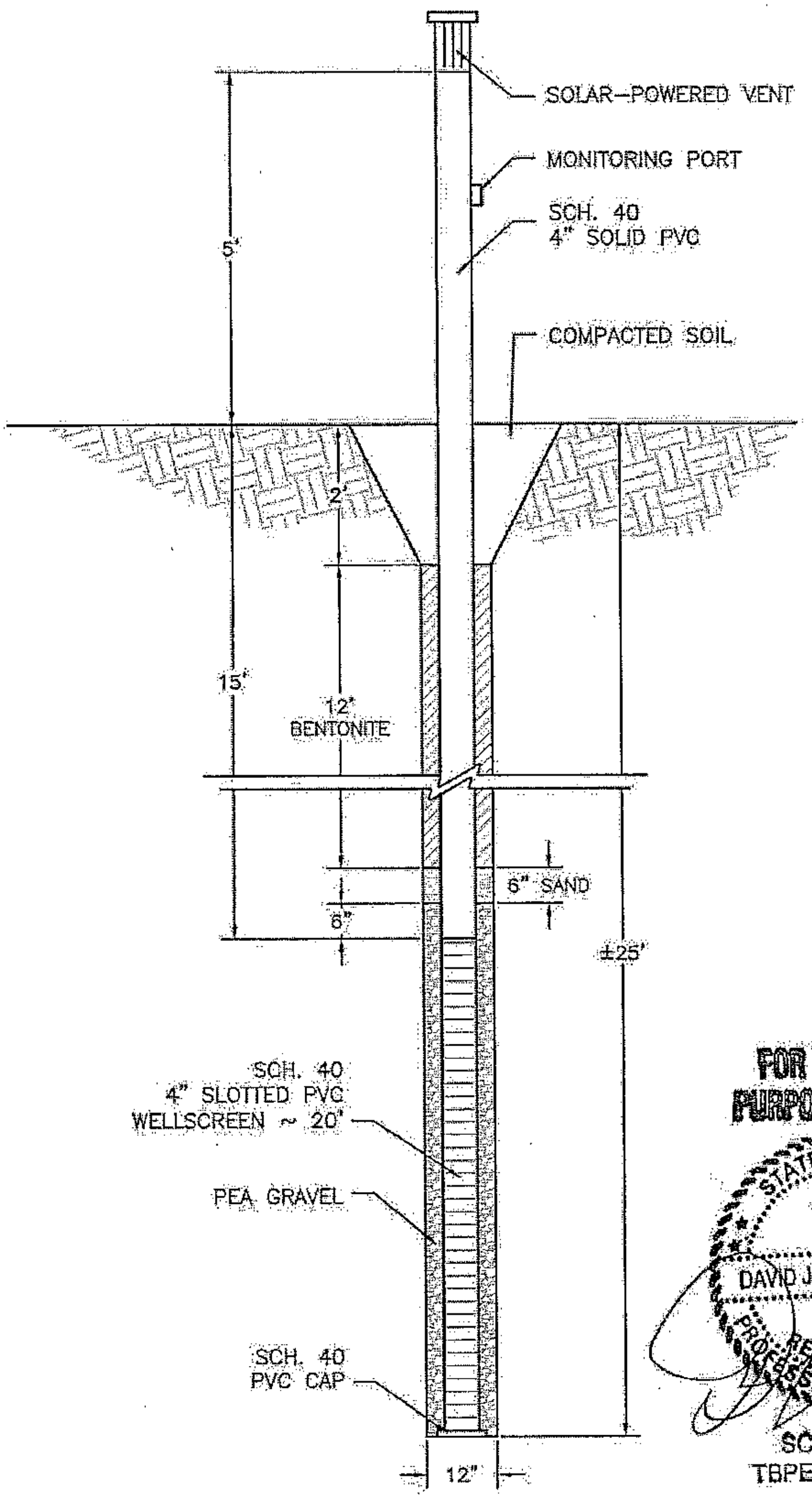
PROJECT TITLE:
HARDIN COUNTY LANDFILL
TCEQ MSW PERMIT NO. MSW-2214A
HARDIN COUNTY, TEXAS

CLIENT:
HARDIN COUNTY LANDFILL
IESI TX LANDFILL L.P.
2525 FM 770
KOUNTZE, TEXAS 77625

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO.: 16212058.00
DWN. BY: JLJ
Q/A RVW BY: AG
DSN. BY: AP
CHK. BY: AP
APP. BY: DJM

CADD FILE: SITE LAYOUT - ASBUILT(REV10-13)
DATE: 10/2013
SCALE: AS SHOWN
DRAWING NO.: **14C-1**



1. SIZES AND DIMENSIONS MAY BE FIELD ADJUSTED.

FOR PERMIT PURPOSES ONLY

10/29/13

DAVID J. MEZZACAPPA

82028

SCS Engineers
TBPE Reg. # F-3407

REV	DATE	DESCRIPTION	BY
△			
△			
△			
△			
△			

DRAWING TITLE:
PROPOSED SOIL VAPOR VENT DETAIL

PROJECT TITLE:
HARDIN COUNTY LANDFILL
TCEQ MSW PERMIT NO. MSW-2214A
HARDIN COUNTY, TEXAS

CLIENT
HARDIN COUNTY LANDFILL
IESI TX LANDFILL L.P.
2525 FM 770
KOUNTZE, TEXAS 77625

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO. 16212054.00
DWN. BY: JLJ
Q/A RVW BY: AP
DSN. BY: AP
CHK. BY: AP
APP. BY: DJM

CADD FILE: PROP VENT DETAIL-1

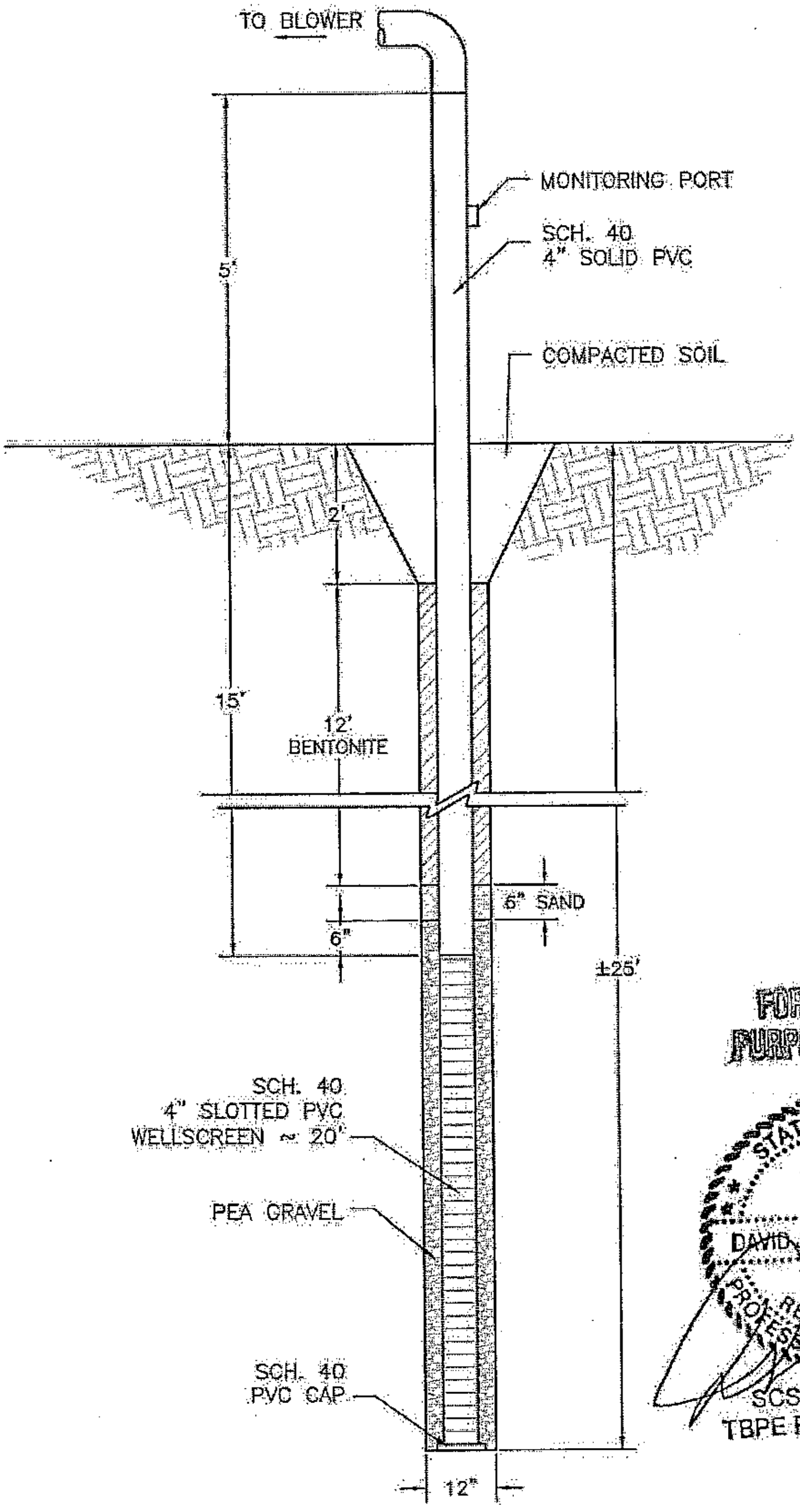
DATE: 10/2013

SCALE: AS SHOWN

DRAWING NO.
14C-2

G:\HARDIN COUNTY LANDFILL\16212054.00 T1 Permit Mod\PROP VENT DETAIL-1

10/29/2013 9:52 AM



1. SIZES AND DIMENSIONS MAY BE FIELD ADJUSTED.

FOR PERMIT PURPOSES ONLY

10/22/13

DAVID J. MEZZACAPPA
82028

SCS Engineers
TBPE Reg. # F-3407

REV	DATE	DESCRIPTION	BY
△			
△			
△			
△			
△			

DRAWING TITLE
SOIL VAPOR VENT DETAIL

PROJECT TITLE
HARDIN COUNTY LANDFILL
TCEQ MSW PERMIT NO. MSW-2214A
HARDIN COUNTY, TEXAS

CLIENT
HARDIN COUNTY LANDFILL
IESI TX LANDFILL L.P.
2525 FM 770
KOUNTZE, TEXAS 77625

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO.	16213054.00	DWN. BY:	JLJ	Q/A RWW BY:	AP
DSN. BY:	AP	CHK. BY:	AP	APP. BY:	DJM

CADD FILE:
PROP VENT DETAIL-2

DATE:
10/2013

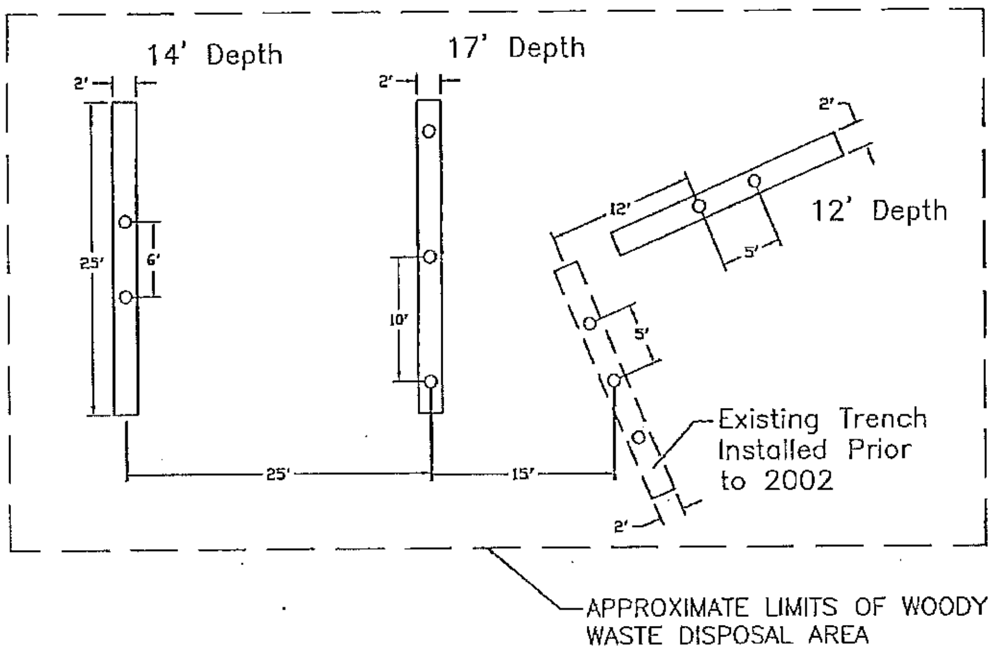
SCALE:
AS SHOWN

DRAWING NO.
14C-3

10/29/2013 9:55 AM G:\HARDIN COUNTY LANDFILL\16213054.00 T1 Permit Mod\PROP VENT DETAIL-2

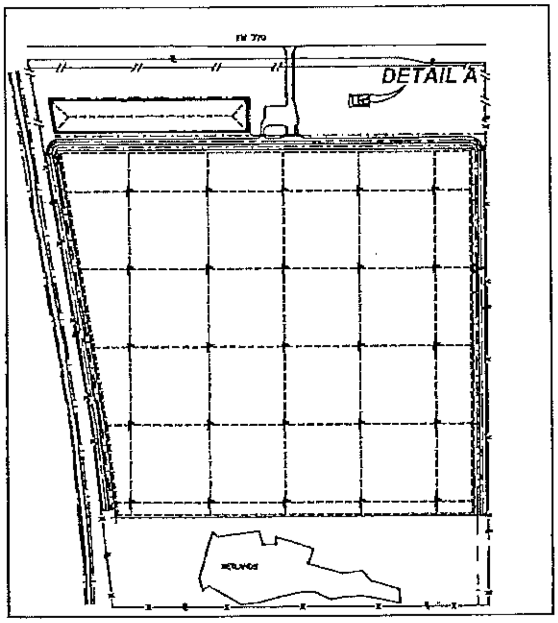
DETAIL A

Scale 1"=15'

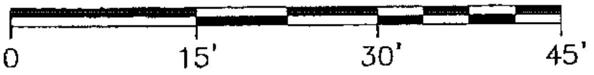


INDEX MAP

Not to Scale



GRAPHIC SCALE



J. FLETCHER KELLY
61816

FOR AS-BUILTS ONLY
2-19-08

NOTE:
1. WILL INSTALL TURBINE VENTS IF NEEDED.
2. DESIGNATION OF TRENCH DEPTHS FROM INSTALLATION PER PAUL SCHELSTRATE, SITE MANAGER.

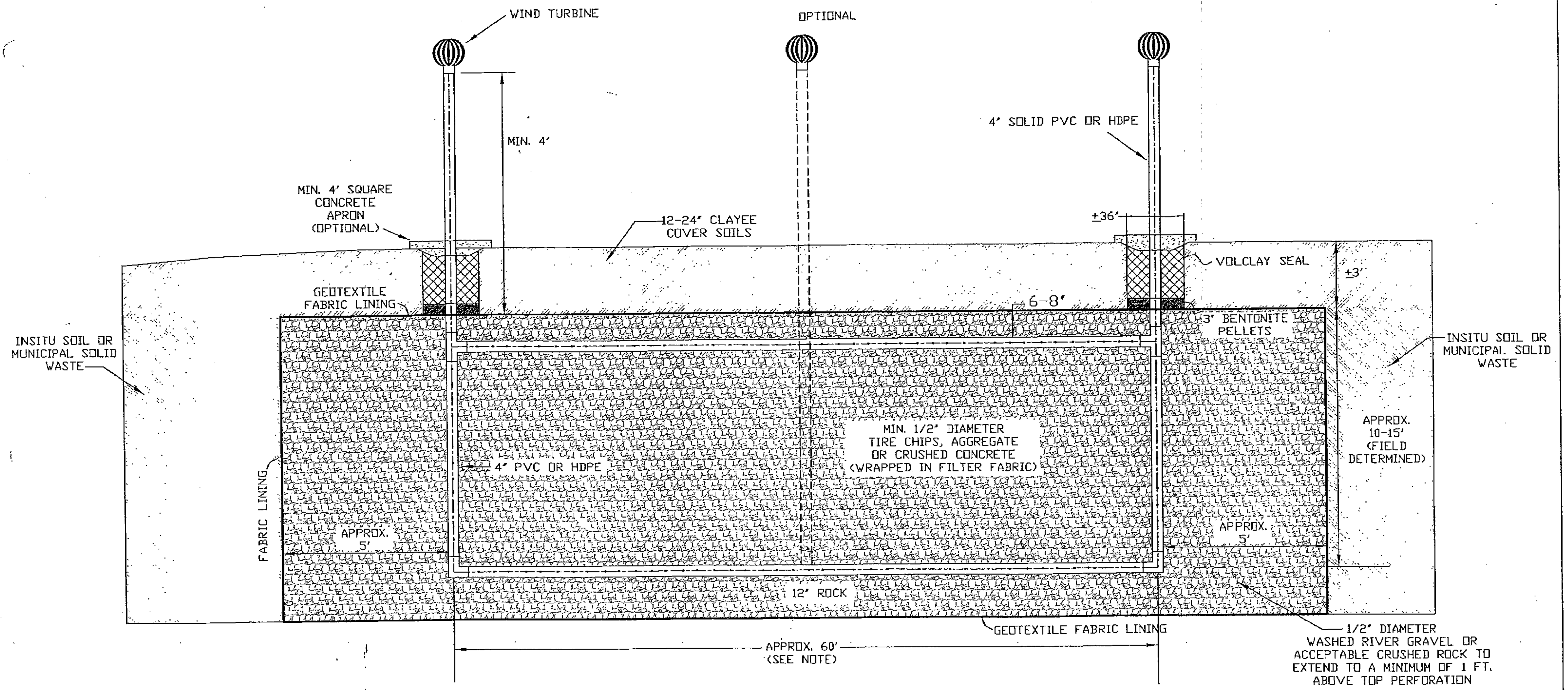
ATTACHMENT 2
SDP APPENDIX 14B
GAS EXTRACTION TRENCH AS-BUILTS
FOR RELIEF OF 3D
IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
HARDIN COUNTY, TEXAS

JFK GROUP, INC.

201 EAST SINTON STREET P.O. BOX 460, SINTON, TEXAS 78387
PHONE: (361) 364-1294 FAX: (361) 364-2656

DRAWN BY: JM	SCALE AS SHOWN	SHEET NO.
APPV'D. BY: JFK	DATE: 02/19/08	1 OF 1
02-505\MOD4 LGRP\GASPLANasbuilt.dwg		

F:\JOBS\02-505\MOD4-SPLANasbuilt.dwg, 2/19/2008 1:59:54 PM, 1:100



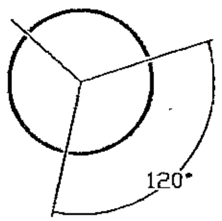
PASSIVE GAS EXTRACTION SYSTEM
(TO BE PLACED IN 24" MIN. WIDE TRENCH)

NOTE:
1. DIMENSIONS ARE APPROXIMATE FROM FIELD MEASUREMENTS.

GEOTEXTILE FABRIC LINING ENCASES ENTIRE TRENCH.

3. FIELD VERIFY LOCATION OF LINER.

PERFORATION DETAIL



J. FLETCHER KELLY
61815

2-19-09
FOR PERMITTING PURPOSES ONLY

LEGEND

▭	PERFORATED HDPE PIPE
▭	SOLID PVC PIPE
—	FABRIC LINING

ATTACHMENT 1
SDP APPENDIX 14B
GAS VENT SYSTEM CROSS SECTION
IESI HARDIN COUNTY LANDFILL
TCEQ PERMIT NO. MSW-2214A
HARDIN COUNTY, TEXAS

JFK GROUP, INC.
201 EAST SINTON STREET P.O. BOX 460, SINTON, TEXAS 78387
PHONE: (361) 364-1294 FAX: (361) 364-2656

DRAWN BY: JM	NOT TO SCALE	SHEET NO.
APPV'D. BY: JFK	DATE: 02/19/08	1
02-505\MOD4-LGRP\ventprobe2.dwg		

F:\JOBS\02-505\MOD 4 - LGRP\ventprobe2.dwg, 3/14/2008 10:10:29 AM, 1:6.61442

APPENDIX III I-H

LFG GENERATION MODEL

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

12-5-2017

Includes page III I-H-1 and Table III I-H-1

LANDFILL GAS GENERATION MODEL

Table 14-G-1 presents the results of an LFG generation rate estimate prepared for the Hardin County Landfill. The estimate was generated using the U.S. Environmental Protection Agency (EPA) Landfill Gas Emission Model (LandGEM), Version 3.02. The modeling results reflect the estimated waste quantities accepted over the operating life of the site, including the proposed landfill expansion.

The gas generation established by the EPA in AP-42, Compilation of Air Pollutant Emission Factors, recommends a methane generation potential (L_o) of 100 cubic meters per megagram of solid waste, and a methane generation constant (k) of 0.04 year^{-1}. For converting methane to LFG, a methane content of 50 percent was assumed.

The results suggest the LFG generation rate will continue to increase with time as more waste is placed in the landfill. Based on site life calculations using landfill projections to be conservative, peak LFG generation is expected to be achieved in year 2048 with a maximum generation rate of approximately 649 standard cubic feet per minute. As noted in Section 6, the proposed GCCS may be installed to collect generated gas to protect the integrity of the cover system and control greenhouse gas emissions.

Table III I-H-1
Estimated Landfill Gas Generation Rate
Hardin County Landfill

Year	Refuse In Place (Mg)	Landfill Gas Generation	
		m^3/yr	(scfm)
1999	0.00E+00	0.00E+00	0
2000	3.69E+04	3.19E+05	21
2001	7.37E+04	6.26E+05	42
2002	1.11E+05	9.21E+05	62
2003	1.47E+05	1.20E+06	81
2004	1.84E+05	1.48E+06	99
2005	2.21E+05	1.74E+06	117
2006	2.58E+05	1.99E+06	134
2007	2.95E+05	2.23E+06	150
2008	3.32E+05	2.46E+06	165
2009	3.69E+05	2.68E+06	180
2010	4.05E+05	2.90E+06	195
2011	4.49E+05	3.17E+06	213
2012	4.95E+05	3.44E+06	231
2013	5.52E+05	3.80E+06	255
2014	6.23E+05	4.27E+06	287
2015	6.79E+05	4.58E+06	307
2016	7.25E+05	4.80E+06	322
2017	7.71E+05	5.01E+06	337
2018	8.18E+05	5.22E+06	351
2019	8.65E+05	5.42E+06	364
2020	9.13E+05	5.62E+06	378
2021	9.61E+05	5.82E+06	391
2022	1.01E+06	6.01E+06	404
2023	1.06E+06	6.20E+06	417
2024	1.11E+06	6.38E+06	429
2025	1.16E+06	6.56E+06	441
2026	1.21E+06	6.74E+06	453
2027	1.26E+06	6.91E+06	464
2028	1.31E+06	7.07E+06	475
2029	1.36E+06	7.24E+06	486
2030	1.41E+06	7.40E+06	497
2031	1.46E+06	7.56E+06	508
2032	1.51E+06	7.71E+06	518
2033	1.57E+06	7.86E+06	528
2034	1.62E+06	8.01E+06	538
2035	1.67E+06	8.15E+06	548
2036	1.72E+06	8.29E+06	557
2037	1.78E+06	8.43E+06	566
2038	1.83E+06	8.56E+06	575
2039	1.88E+06	8.69E+06	584
2040	1.94E+06	8.82E+06	593
2041	1.99E+06	8.94E+06	601
2042	2.05E+06	9.07E+06	609
2043	2.10E+06	9.18E+06	617
2044	2.16E+06	9.30E+06	625

P:\LFG\Projects\Allied-BFI\Hardin County\Expansion LGMP\LFG Model\Hardin LFG Generation.xls
Hardin LFG Generation.xls

Table III I-H-1
Estimated Landfill Gas Generation Rate
Hardin County Landfill

Year	Refuse In Place (Mg)	Landfill Gas Generation	
		m^3/yr	(scfm)
2045	2.21E+06	9.41E+06	632
2046	2.27E+06	9.52E+06	640
2047	2.32E+06	9.63E+06	647
2048	**2.37E+06**	**9.66E+06**	**649**
2049	2.37E+06	9.28E+06	624
2050	2.37E+06	8.92E+06	599
2051	2.37E+06	8.57E+06	576
2052	2.37E+06	8.23E+06	553
2053	2.37E+06	7.91E+06	531
2054	2.37E+06	7.60E+06	511
2055	2.37E+06	7.30E+06	491
2056	2.37E+06	7.01E+06	471
2057	2.37E+06	6.74E+06	453
2058	2.37E+06	6.48E+06	435
2059	2.37E+06	6.22E+06	418
2060	2.37E+06	5.98E+06	402

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ
CLOSURE PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

1 INTRODUCTION

This appendix addresses §330.63(h) and §330.451 through §330.461.

This Final Closure Plan has been prepared for the Hardin County Landfill (landfill) consistent with Title 30 Texas Administrative Code (30 TAC) Chapter 330, Subchapter K, §330.451 through §330.461, as well as §330.63(h). The landfill completion plan for this site consists of final contours and drainage features for the completed landfill, including both the Type I MSW landfill area and Type IV C&D landfill area. The landfill completion plan is shown in Appendix IIIA-A on Figure IIIA-A-2. In addition, Figure IIIA-A-9 – Final Cover Details shows the type of final cover system that is applicable for each area (Type I and Type IV).

2 FINAL COVER SYSTEM

2.1 Introduction

The final cover system for the landfill has been developed to incorporate the requirements of 30 TAC §330.457(a) (for closure of Type I MSW waste units). As specified in 30 TAC 330.457(f)(4), the owner will complete the installation of a final cover system within 180 days following the initiation of closure activities as described in §330.457(f)(3), and the final cover system will be designed and constructed to minimize infiltration and erosion. Such a system will include installation of a final cover system and a storm water runoff control system. The storm water runoff controls are addressed in Appendix IIIF – Surface Water Drainage Report. The surface drainage and erosion control measures included in Appendix IIIF are applicable to all final cover options. The final cover system designs are discussed below and are also detailed in Appendix IIIA-A.

2.2 Cover System Design

The final cover system will consist of a composite cover. The final cover system will provide a low maintenance cover, protect against erosion, reduce rainfall percolation through the cover system and subsequently minimize leachate generation within the landfill. As depicted in Appendix IIIA-A, Figure IIIA-A-2 Landfill Completion Plan, a slope of 5 percent is provided for the top deck surface and 4 horizontal to 1 vertical (4H:1V) sideslopes are provided to minimize erosion and facilitate stormwater drainage on the landfill. A summary of the components of the final cover system is provided below.

Subtitle D Composite Final Cover System

The following final cover system is applicable to dedicated Type I MSW disposal units (from top to bottom):

- An erosion layer consisting of 24-inch-thick earthen material capable of sustaining vegetative growth. The vegetation will consist of native or introduced grasses capable of providing 90 percent coverage over the cover system.

- A drainage geocomposite drainage layer (200-mil-thick geonet with 6 oz/sy geotextile(s) heat bonded to the top for top slopes and heat bonded to both sides for side slopes).
- A 40-mil, smooth (topslope) and textured (sideslope), linear low-density polyethylene (LLDPE), or other equivalent material.
- An 18-inch-thick compacted clay infiltration layer with a coefficient of permeability of less than or equal to $1x10^{-5}$ cm/s.

C&D (Type IV) Landfill Final Cover System

The following final cover system is applicable to dedicated Type IV C&D disposal units (from top to bottom):

- An erosion layer consisting of 12-inch thick earthen material capable of sustaining vegetative growth. The vegetation will consist of native or introduced grasses capable of providing 90 percent coverage over the cover system.
- An 18-inch-thick compacted clay infiltration layer with a coefficient of permeability of less than or equal to $1x10^{-5}$ cm/s.

Material specifications, construction, and testing procedures are provided in Appendix IIIJ-A –Final Cover System Quality Control Plan (FCSQCP).

Vegetation will be established over each of the installed final cover systems to minimize the erosion potential of the cover slopes. This layer was evaluated using the universal soil loss equation (USLE) developed by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The evaluation is presented in Appendix IIIF.

Landfill gas generated in the Type I MSW landfill will be managed as discussed in Appendix IIII– Landfill Gas Management Plan. If required, the landfill gas system will collect the gas generated by deposited waste and control gas emissions from the landfill.

2.3 Installation Methods and Procedures

The final cover system will be constructed in accordance with the requirements listed on the permit drawings in Appendix IIIA-A and the FCSQCPs presented in Appendix IIIJ-A. Testing and evaluation of the final cover system during construction will be in accordance with Appendix IIIJ-A – FCSQCP.

3 CLOSURE PROCEDURES

3.1 Sequence of Final Cover Placement

BFI may install final cover as the landfill develops throughout the active life of the landfill. The final cover placement procedure listed below will be followed for each construction event until the entire waste footprint is closed:

- Survey controls will be implemented to control the filling of solid waste to the top of the daily/intermediate cover layer elevation.
- The final cover system layers will be constructed over areas that have reached the bottom of final cover grades. Testing of the various components of the final cover system will be performed in accordance with this closure plan (see Section 2.3).
- A final cover certification report, complete with an as-built survey, will be prepared by an independent professional engineer and submitted to the TCEQ for approval.
- The TCEQ-approved final cover certification report will be maintained in the site operating record, and the final cover log (see Part IV – Section 4.18.5) will be updated to reflect the area where final cover has been placed. The TCEQ Regional Office will also be notified that final cover placement has occurred at the site.

Note that the placement of final cover does not represent closure of the site, and the facility will be closed in accordance with Section 4 of this appendix. Closure of each landfill unit is discussed in Section 3.2. Requirements for final closure of the landfill are discussed in Section 4. Postclosure care activities will commence once the entire landfill has been closed as discussed in Section 4.

3.2 Landfill Unit Closure During Active Life

Should closure of the landfill become necessary at any time during the active life of the landfill, the following steps will be taken:

- Engineering plans will be developed to address site closure at the time of discontinued waste filling.

- The final waste received will be placed and properly compacted.
- Excavations will be filled with suitable material, and the site will be graded to promote runoff and prevent ponding.
- The final cover system will be constructed according to specifications.
- The top of the landfill will be regraded and reshaped as needed to provide the proper slope for positive drainage.
- As noted above (first bullet), a revised final closure plan will be developed and submitted to the TCEQ for approval.
- Following application of final cover, the site will be vegetated with appropriate grasses to minimize erosion. The established grasses will provide a minimum of 90 percent coverage of the final cover system.
- A surface water management system will be constructed to minimize erosion.
- A closure certification will be prepared by an independent professional engineer and submitted to TCEQ for approval.
- All proper notices and documentation will be filed with the appropriate agencies.

3.2.1 Estimate of Largest Open MSW Fill Area

Consistent with 30 TAC §330.503(a), the largest area that could be open within the next year is presented in Appendix IIIJ. Consistent with this rule and TCEQ guidelines for financial assurance to complete closure and postclosure activities, financial assurance will be posted for the 33.4-acre current active area as discussed in Appendix IIIL – Closure and Postclosure Care Cost Estimate. The entire 79-acre site will also need to be administratively closed. There has been no final cover constructed at the site, and there are no inactive areas.

Supporting calculations are presented in Appendix IIIL – Closure and Postclosure Care Cost Estimate.

3.2.2 Estimate of Maximum Inventory of Waste Ever On Site

The estimate of maximum inventory of waste (defined as waste and daily cover) ever on site over the active life of the facility is approximately 5.745 million cubic yards. The site life calculations (Appendix IIIB) show that approximately 3.63 million cubic yards of airspace remain (using the 2016 topographic map). Supporting calculations are included in the Site Development Plan, Appendix IIIB – Site Life Calculations.

3.3 Other Related Structures Closure

The other related structures, such as the citizens convenience area, landfill office, LFG probes, etc., will likely operate throughout the active life of the facility. Closure activities will include a general cleanup of the area. In addition, all structures to remain will be secured.

4 SCHEDULE OF UNIT CLOSURE AND FACILITY FINAL CLOSURE

4.1 Final Closure Requirements

The site will be closed in an orderly fashion, consistent with 30 TAC §330.457 and §330.461, implementing the following steps:

- No later than 45 days prior to initiation of final closure activities for the municipal solid waste landfill (MSWLF) unit, the executive director will be notified of the intent to close the unit and that a notice of the intent to close the unit has been placed in the operating record.
- No later than 90 days prior to initiation of a final facility closure, a public notice of facility closure which contains the name, address, and physical location of the facility, the permit number, and the last date of intended receipt of waste, will be provided in the newspaper of the largest circulation in the vicinity of the facility. BFI will also make available a copy of the approved final closure and postclosure plan at the landfill office for public access and review.
- Consistent with 30 TAC §330.461(b) and following notification of the executive director, a minimum of one sign will be posted at the main entrance and all other frequently used points of access for the facility notifying all persons utilizing the facility of the closure date or date after which further receipt of waste is prohibited. In addition, barriers or gates will be installed at access points following the closure date to prevent unauthorized disposal or dumping of solid waste at the facility.
- Final closure activities will commence for the MSWLF unit no later than 30 days after the date the MSWLF unit receives the known final receipt of wastes. If the MSWLF unit has remaining capacity and there is a reasonable likelihood that the MSWLF unit will receive additional wastes, final closure activities will commence no later than 1 year after the most recent receipt of wastes.
- Final closure activities of the MSWLF unit will be completed in accordance with the Closure Plan (this appendix) within 180 days following the initiation of closure activities as specified in 30 TAC §330.457(f)(3). If necessary, as noted in 30 TAC §330.457(f)(4), a request for an extension of the completion of final closure activities may be submitted and granted by the executive director. This request will include all applicable documentation necessary to

demonstrate that final closure will take longer than 180 days and all steps have been taken and will continue to be taken to prevent threats to human health and the environment from the unclosed site.

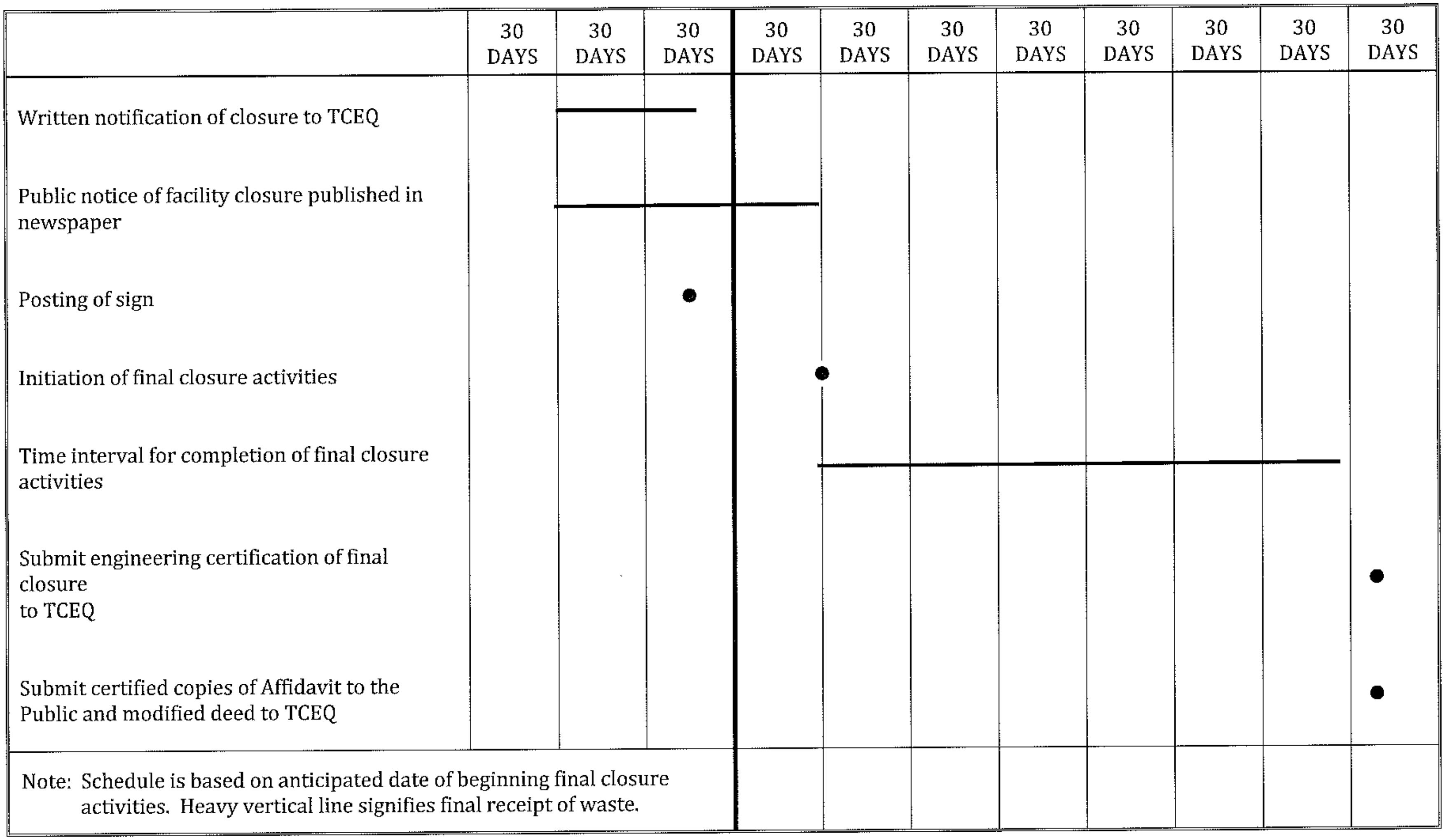
- Following completion of final closure activities, a documented certification, signed by an independent professional engineer, will be submitted to the executive director for review and approval. This certification will verify that final closure has been completed in accordance with the approved final closure plan and will include all applicable documentation necessary for certification of final closure. Once approved, this certification will be placed in the site operating record.
- Within 10 days after completion of final closure activities of all MSWLF units, a certified copy of an Affidavit to the Public (most current format provided by the TCEQ will be used) will be submitted to the executive director of the TCEQ by registered mail and placed in the facility's site operating record. In addition, a certified notation will be recorded on the deed to the facility that will in perpetuity notify any potential purchaser of the property that the land has been used as a landfill facility and the use of the land is restricted according to the provisions specified in 30 TAC §330.465. Within 10 days after completion of final closure activities of the facility, a certified copy of the modified deed will be submitted to the executive director and placed in the site operating record.

Following receipt of the required final closure documents and an inspection report from the TCEQ Regional Office verifying proper closure of the MSWLF according to this Closure Plan (this appendix), the executive director may acknowledge the termination of operation and closure of the facility and deem it properly closed. The steps in the closure process are depicted on Figure IIIJ.1 – Final Closure Schedule. In accordance with 30 TAC §330.463(b), the postclosure care period begins immediately upon the date of final closure, as approved by the executive director.

4.2 Provisions for Extending Closure Period

If the landfill has remaining capacity at the time of its closure, final closure activities will begin no later than one year after the most recent receipt of wastes. A request for an extension beyond the one-year deadline for the initiation of final closure may be submitted to the executive director for review and approval and will include all applicable documentation to demonstrate that the unit or site has the capacity to receive additional waste, and that the landfill has taken all steps necessary to prevent threats to human health and the environment.

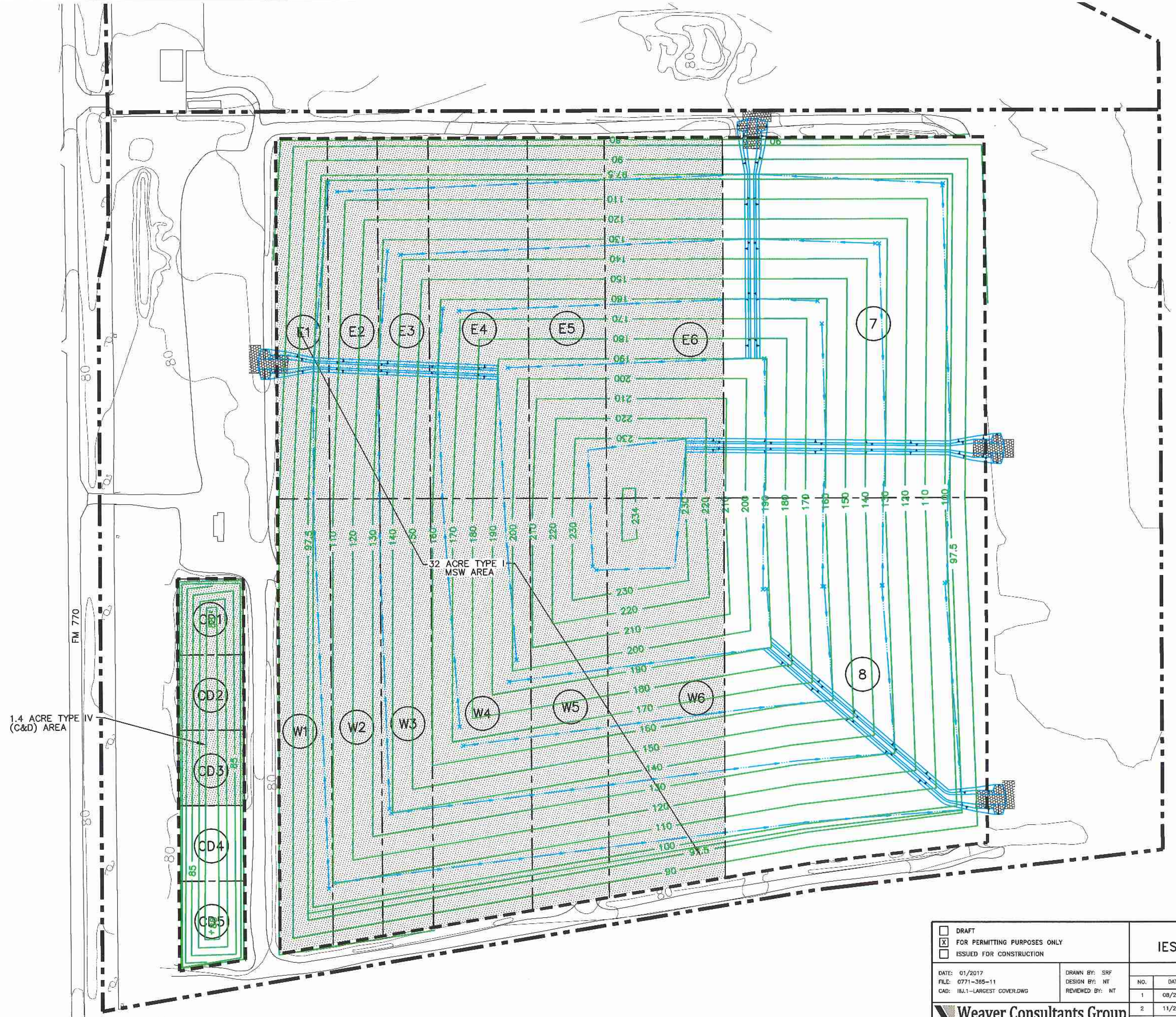
Figure IIIJ.1
Hardin County Landfill
Final Closure Schedule



Note: Schedule is based on anticipated date of beginning final closure activities. Heavy vertical line signifies final receipt of waste.

5 CLOSURE COST ESTIMATE

A detailed written cost estimate, in current dollars, showing the cost of hiring a third party to close the largest area of the landfill ever requiring a final cover at any time during the active life of the unit is provided in Part III, Appendix IIIL – Closure and Postclosure Care Cost Estimate. During the active life of the site, closure cost estimate will be adjusted on an annual basis as discussed in Appendix IIIL and will be updated upon construction of new liner areas to ensure that the closure cost estimate accounts for the entire developed liner area.



LEGEND

— · — · —	PERMIT BOUNDARY
— — — —	WASTE FOOTPRINT
— — — —	CELL BOUNDARY
········70········	EXISTING GROUND CONTOUR
——234——	PROPOSED FINAL CONTOUR (SEE NOTE 3)
—·—·—·—	PROPOSED DRAINAGE SWALE
═══	PROPOSED DRAINAGE CHUTE
▨	LARGEST AREA REQUIRING FINAL COVER
(E7)	SECTOR DESIGNATION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.
2. ELEVATIONS IN FEET REFERENCED TO MEAN SEA LEVEL (MSL).
3. APPROXIMATELY 32 ACRES ARE DEDICATED TO THE ACTIVE TYPE I WASTE DISPOSAL AREA.
4. APPROXIMATELY 1.4 ACRES ARE DEDICATED TO THE ACTIVE TYPE IV WASTE DISPOSAL AREA.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 01/2017
FILE: 0771-365-11
CAD: IIIJ.1-LARGEST COVER.DWG

DRAWN BY: SRF
DESIGN BY: NT
REVIEWED BY: NT

PREPARED FOR
IESI TX LANDFILL LP

REVISIONS

NO.	DATE	DESCRIPTION
1	08/2017	FIRST NOD RESPONSE
2	11/2017	OWNERSHIP CHANGE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

MAJOR PERMIT AMENDMENT
LARGEST AREA REQUIRING FINAL COVER

IESI HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING IIIJ.1

O:\0120\758\2214B EXPANSION\IIIJ\IIIJ.1-LARGEST CLOSURE.dwg, jwilson, 1:2

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ-A
SUBTITLE D FINAL COVER SYSTEM QUALITY CONTROL PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017

Revised December 2017

NEVZAT TURAN
84059

12-5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

CONTENTS (Continued)

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

TABLES

1 INTRODUCTION

1.1 Purpose

This Final Cover System Quality Control Plan (FCSQCP) has been prepared for the Hardin County Landfill (landfill) to provide the owner, operator, design engineer, construction quality assurance professional of record, and the contractor the means to govern the construction quality and to satisfy the environmental protection requirements under current Texas Commission on Environmental Quality (TCEQ) Municipal Solid Waste Regulations (MSWR). More specifically, the FCSQCP addresses the soil and geosynthetic components of the final cover system.

This FCSQCP is divided into the following parts:

Section 1 – Introduction
Section 2 – Construction Quality Assurance for Soil Infiltration Layer
Section 3 – Construction Quality Assurance for Geosynthetics
Section 4 – Construction Quality Assurance for Erosion Layer
Section 5 – Documentation

1.2 Definitions

Whenever the terms listed below are used, the intent and meaning will be interpreted as indicated.

ASTM

American Society for Testing and Materials

Atterberg Limits

Atterberg limits testing is a measure of a soil's physical boundaries dealing with its liquidity and plasticity characteristics. Atterberg limits also provide the engineer with preliminary information regarding swell capacity and shear strength, specifically for clay soils. The Atterberg limits used most frequently in geotechnical engineering include the Plastic Limit (PL) and Liquid Limit (LL), and the index value (Plasticity Index, or PI), as defined below:

Liquid Limit (LL) – The percentage of moisture in a soil, subjected to a prescribed test, that defines the upper point at which the soil's consistency changes from the plastic to the liquid state, and the soil being susceptible to viscous flow when jarred or impacted.

Plastic Limit (PL) – The percentage of moisture in a soil, subjected to a prescribed test, that defines the lower point at which the soil's consistency changes from the plastic to the semi-solid state. For soils, the plastic phase is defined as a soil being malleable or moldable, having the ability to be shaped (by rolling for instance) with the soil retaining the shape.

Plasticity Index (PI) – The numerical difference between the LL and the PL of a fine-grained soil that denotes the soils plastic range. The larger the PI the greater a soil's plasticity range and the greater it's plasticity characteristics for a wider range of moisture contents.

Compactive Effort

The amount of compaction energy transferred into a soil sample with a compaction hammer device, used on soil samples in various laboratory test procedures, to establish a soil's moisture-density relationship. Test method ASTM D 698, referred to as the Standard Proctor test, is used to correlate laboratory and field compactive effort.

Construction Quality Assurance (CQA)

A planned system of activities that provides the operator and permitting agency assurance that the facility was constructed as specified in the design. Construction quality assurance includes observations and evaluations of materials, and workmanship necessary to determine and document the quality of the constructed facility. Construction quality assurance (CQA) refers to measures taken by the CQA organization to assess if the installer or contractor is in compliance with the construction plans and specifications for a project. CQA may also be referred to as Quality Assurance.

Construction Quality Assurance Professional of Record (POR)

The POR is an authorized representative of the operator and has overall responsibility for construction quality assurance that confirms the facility was constructed in general accordance with plans and specifications approved by the permitting agency. The POR must be licensed as a professional engineer in Texas and experienced in geotechnical testing and its interpretations. Experience and education should include geotechnical engineering, engineering geology, soil mechanics, geotechnical laboratory testing, construction quality assurance, and quality control testing, and hydrogeology. The POR must show competency and experience in certifying like installations, and be approved by the permitting agency, and be presently employed by or practicing as a geotechnical engineer in a recognized geotechnical/environmental engineering organization. The credentials of the POR must meet or exceed the minimum requirements of the permitting agency. Any references to monitoring, testing, or observations to be performed by the POR should be interpreted to mean the POR or CQA monitors working under the POR's direction. The POR or his designated representative will be on-site during all final cover system construction.

The POR may also be known in applicable regulations and guidelines as the CQA Engineer, Resident Project Representative, or the Geotechnical Professional (GP).

Construction Quality Assurance (CQA) Monitors

These are representatives of the POR who work under direct supervision of the POR. The CQA monitor is responsible for quality assurance monitoring and performing onsite tests and observations. The CQA monitor is on site full-time during construction and reports directly to the POR. The CQA monitor performing daily QA/QC observation and testing shall be NICET-certified in geotechnical engineering technology at level two or higher for soils and FML testing; a CQA monitor with a minimum of four years of directly related experience; or a graduate engineer or geologist with one year of directly related experience. Field observations, testing, or other activities associated with CQA may be performed by the CQA monitor(s) under the direction of the POR.

Additional CQA monitors may be used if they work under the direction of a qualified CQA monitor who is onsite full-time.

Construction Quality Control (CQC)

Construction Quality Control (CQC) provides a means to measure and regulate the characteristics of an item or service to comply with the requirements of the contract documents during construction. CQC will generally be performed by the contractor. CQC may also be referred to as Quality Control.

Contract Documents

These are the official set of documents issued by the operator. The documents include bidding requirements, contract forms, contract conditions, specifications, contract drawings, addenda, and contract modifications.

Contractor

This is the person or persons, firm, partnership, corporation, or any combination, private or public, who, as an independent contractor, has entered into a contract with the operator and who is referred to throughout the contract documents by singular number and masculine gender.

Design Engineer

These individuals or firms are responsible for the design and preparation of the project construction drawings and specifications. Also referred to as "designer" or "engineer."

Earthwork

This is a construction activity involving the use of soil materials as defined in the construction drawings and specifications and Section 2 of this plan.

Film Tear Bond (FTB)

A failure in the geomembrane sheet material on either side of the seam and not within the seam itself.

Final Cover System Evaluation Report (FCSER)

Certification report for the final cover system, prepared and sealed by the POR that is submitted to the TCEQ for approval, and will include all the documentation necessary for certification of the closure.

Fish Mouth

A semi-conical opening of the seam that is formed by an edge wrinkle in one sheet of the geomembrane.

Geomembrane Liner (GM)

This is a synthetic lining material, also referred to as geomembrane, membrane liner, or sheet. The term Flexible Membrane Liner (FML) is also used for GM.

Geosynthetics Contractor

This individual is also referred to as the "contractor" or "installer", and is the person or firm responsible for geosynthetic construction. This definition applies to any person installing FML or other geosynthetic materials, even if not his primary function.

Independent Testing Laboratory

A laboratory that is independent of ownership or control by the permittee or any party to the construction of the final cover or the manufacturer of the final cover products used.

Manufacturing Quality Assurance (MQA)

A planned system of activities that provides assurance that the raw materials were constructed (manufactured) as specified.

Manufacturing Quality Control (MQC)

A planned system of inspection that is used to directly monitor and control the manufacture of a material.

Nonconformance

This is a deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. Examples of nonconformances include, but are not limited to, physical defects, test failures, and inadequate documentation.

Operator

The organization that will operate the disposal unit. For this FCSQCP, the term "Operator" also designates the party legally responsible for the construction of a project in accordance with the permit and the permitted designs, and may mean the Operator, Owner, or the Owner/Operator.

Operator's Representative

This is the person that is an official representative of the operator responsible for planning, organizing, and controlling the design and construction activities.

Panel

This is a unit area of the GM or FML, which will be seamed in the field.

Representative Sample

A representative sample of FML material consists of 1 or more specimens (commonly referred to as coupons) from the same rectangular portion of FML material, oriented along a seam, that is removed for field or laboratory testing purposes.

Slip Direction

The direction in which translational slip will occur (i.e., the direction oriented parallel to the sideslope or top slope of the landfill).

Soil Borrow Source

Soils in which the Liquid Limit (LL) and Plasticity Index (PI) do not vary by 10 points. A soil that varies by 10 or more points from the originally established LL or PI is considered as a separate soil source for the purpose of this FCSQCP and requires a separate soils test series. Minor deviations in this requirement may be accepted at the POR's discretion, based on the physical characteristics (color, texture, visual sand or silt content), proximity, or other observed characteristics of the borrow soils.

Soil Test Series

Tests performed to determine a soil's physical characteristics and to document its ability to satisfy the soil infiltration layer regulatory requirements. These tests include sieve analysis (gradation), Atterberg Limits, moisture/density, and coefficient of permeability (also referred to in this plan as hydraulic conductivity).

Specimen

(With respect to FML destructive testing) – A specimen is the individual test strip (sometimes called coupon) from a sample location. A sample location usually consists of many specimens.

2 CONSTRUCTION QUALITY ASSURANCE FOR SOIL INFILTRATION LAYER

2.1 Introduction

This section of the FCSQCP addresses the construction of the soil infiltration layer component of the final cover system and outlines the FCSQCP program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

The scope of soil infiltration layer related construction quality assurance includes the following elements:

- Subgrade preparation
- Soil infiltration layer stockpile
- Soil infiltration layer placement
- General fill

2.2 Final Cover

The final cover system is designed to minimize the amount of precipitation that enters the landfill, thus minimizing the amount of leachate generated, and to convey stormwater to the detention pond via final cover erosion control structures and perimeter channels.

2.3 Soil Infiltration Layer Construction

Sections 2.3.1 and 2.3.2 describe general construction procedures to be used for the soil infiltration layer and the preparation of the intermediate cover layer.

2.3.1 Intermediate Cover

The surface of the intermediate cover will be compacted to prepare the working surface for the first lift of infiltration layer soil. The CQA monitor will visually inspect and approve the prepared intermediate cover prior to the placement of the soil infiltration layer or structural fill. Approval will be based on a review of test information, if applicable, and CQA monitoring of the intermediate cover preparation. Pumping or excessively soft or wet areas will be repaired prior to placement of the soil infiltration layer.

Surveying will be performed to verify that the finished intermediate cover is completed consistent with the lines and grades specified in the design.

2.3.2 Soil Infiltration Layer

Soil Infiltration Layer Borrow Soils

Adequate clayey soil material should be available from proposed landfill excavations and/or onsite borrow sources. The CQA monitor, earthwork contractor, and/or operator will identify the clay material during excavation, and the clay material will be stockpiled separately, if stockpiling is required. If deemed necessary, an off-site borrow source can be used to obtain clay soils for soil infiltration layer construction.

The infiltration layer soil will be free of debris, rock greater than 1 inch in diameter, vegetative matter, frozen materials, foreign objects, and organics. Soils used in infiltration layer construction will have the following minimum properties as verified by testing in a geotechnical laboratory prior to construction.

Table 2-1
Required Borrow Soil Properties

Test[1]	Specification
Coefficient of Permeability (Remolded Sample)[2]	1.0×10^{-5} cm/s or less
Plasticity Index	15 minimum
Liquid Limit, percent	30 minimum
Percent Passing No. 200 Mesh Sieve	30 minimum
Percent Passing 1-inch Sieve	100

[1] Testing will be performed in accordance with the test methods included in Section 2.4.

[2] The coefficient of permeability for remolded sample is run at a minimum of 90% of the maximum dry density at or above the optimum moisture content.

Preliminary sampling and testing will be performed of representative stockpiled soils or off-site borrow sources to be used as infiltration layer material. Prior to cover construction, the conformance tests listed in Table 2-1 will be performed for each borrow source proposed for each cover construction sequence. The coefficient of permeability test specimens will be prepared by laboratory compaction to a dry density of approximately 90 percent of the Standard Proctor maximum dry density at or above the optimum moisture content. One Standard Proctor moisture-density relationship and remolded coefficient of permeability test will be required for each borrow source. In the event the maximum permeability value in Table 2-1 is not met, the dry density will be increased to 95 percent of Standard Proctor density.

The soil is considered as being from a separate borrow source if the liquid limit or plasticity index is determined to vary by more than 10 points. Minor deviations to this requirement for soils excavated from a single borrow source may be accepted at the POR's discretion, based on the physical characteristics (color, texture, visual sand or silt content) or other observed characteristics of the borrow soils. Additional conformance tests will be conducted if there are visual changes (color, texture, etc.) in borrow material or as determined necessary by the POR. Atterberg limits testing will be performed on separate borrow sources as an initial determination. If the liquid limit or plasticity index varies by more than 10 points from previously analyzed borrow soils, or if other differences in physical characteristics of the soils are observed by the POR or geotechnical laboratory, then all remaining tests listed in Table 2-1 will be performed on the separate borrow source.

The physical characteristics of the soil infiltration layer will be evaluated through visual observation before and during construction. To adjust moisture of the material properly, any clod sizes will first be reduced into manageable sizes of 4 inches in diameter or less. Rocks and clods within the compacted liner must be less than 1 inch in diameter. Soil clod size will be reduced to the smallest size necessary to achieve the coefficient of permeability reported by the testing laboratory. Additionally, the rock content of the soil liner will not be more than 10 percent by weight.

The clay soil to be used for soil infiltration layer may require processing to achieve the required moisture content for compaction. Water will be applied as necessary to the material and worked into the material with the processing or compacting equipment. If necessary to achieve even moisture distribution or break down clods, the material will be watered and processed in the stockpile prior to placing in the liner to allow the soil adequate time to hydrate. Water used for the soil liner moisture adjustment must be clean and not contaminated by waste or any objectionable material. Collected onsite stormwater may be utilized if it has not come into contact with solid waste.

Soil Infiltration Layer Installation

The soil infiltration layer must be compacted with a pad/tamping-foot (preferable) or prong-foot (sheepsfoot) roller. The lift thickness will be controlled so that there is total penetration through the loose lift under compaction into the top of the previously compacted lift; therefore, the lift thickness must not be greater than the pad or prong length. The top of intermediate cover will be scarified a minimum of two inches prior to placement of the first lift of soil infiltration layer. Use of pad/tamping foot or prong-foot rollers will provide sufficient roughening of soil infiltration layer lift's surface for bonding between lifts.

These procedures are necessary to achieve adequate bonding between lifts and reduce seepage pathways. Adequate cleaning devices must be in place and maintained on the compaction roller so that the prongs or pad feet do not become clogged with clay soils to the point that they cannot achieve full penetration during initial compaction. The footed roller is necessary to achieve this bonding and to reduce the individual clods and achieve a blending of the soil matrix through its kneading action.

In addition to the kneading action, the weight of the compaction equipment is important. The minimum weight of the compactor should be 40,000 pounds. The Caterpillar 815B and 825C are examples of equipment typically used to achieve satisfactory results.

The soil infiltration layer will not be compacted with a bulldozer or any track-mobilized equipment unless it is used to pull a pad-footed roller.

CQA testing of the soil infiltration layer will be performed as the infiltration layer is being constructed. Testing procedures, frequency, and acceptance criteria will be in accordance with Section 2.4.

Soil infiltration layer construction and testing will be conducted in a systematic and timely fashion on each lift. In general, delays will be avoided in infiltration layer construction (typically no more than 14 days). Reasons for any delays in infiltration layer construction (greater than 14 days) should be fully explained in the FCSER submittal.

The finished top surface of the soil infiltration layer must be rolled with a smooth steel-drum roller to obtain a hard, uniform, and smooth surface prior to geomembrane placement. The surface of the soil infiltration layer will then be carefully inspected by the CQA monitor for any gravel, rock pieces, and deleterious materials which might impact the integrity of the geomembrane to be placed upon it. All voids created by removing gravel, rock pieces, or other deleterious materials will be backfilled with infiltration layer material to the density specifications outlined for soil infiltration layer construction and tested at the discretion of the CQA monitor.

Surveying (thickness verification) will be performed to document that the finished soil infiltration layer has been constructed to a minimum thickness of 18 inches. Thickness verification may be performed by using traditional surveying methods (i.e., surveying the pre-infiltration layer surface and comparing with the final infiltration layer surface), or by using settlement plates (i.e., plywood sheet or similar material) on a 100-foot grid. The infiltration layer will be surveyed as indicated in Table 2-1 to verify that a minimum 18-inch-thick soil layer is present at each location.

A typical settlement plate diagram is shown on Figure IIIJ-A.1. The location of the settlement plates will be established by a Texas registered surveyor on a 100-foot grid. The shaft extending upward from the base will be marked to indicate the minimum required thickness of the infiltration layer. The infiltration layer will be constructed to the minimum thickness marked on the shaft of the settlement plate. The CQA monitor will verify that the infiltration layer is placed uniformly between each settlement plate.

An infiltration layer thickness drawing at each of the survey measurement grid points will be provided. Coordinates defining the perimeter of the final cover system will be called out on the final drawings. The infiltration layer thickness drawing will represent either the pre- and post-placement thicknesses (for traditional survey method) or the observed thicknesses from the markings on the settlement plate shafts, and will be sealed by a Texas registered surveyor. After the construction of the infiltration layer is complete, the Texas registered surveyor will survey the final elevation of the infiltration layer. The infiltration layer certification drawing will be included in the FCSER. In addition to providing thickness certification, the elevations obtained for the top of the infiltration layer will be used to verify that the as-built slopes are consistent with the approved landfill completion plan (Drawing IIIA.2 in Appendix IIIA-A). A statement that confirms that the as-built slopes are consistent with the approved landfill completion plan will be included in the FCSER.

Once the survey is complete, the individual settlement plate shafts will be removed and the resulting holes will be backfilled with bentonite or a bentonite/infiltration layer soil mixture consisting of at least 20 percent bentonite.

Testing and evaluation of the soil infiltration layer during construction will be in accordance with this FCSQCP. The construction methods and test procedures documented in the FCSER will be consistent with the FCSQCP.

The soil infiltration layer will be prevented from losing moisture prior to placement of the geomembrane. Preserving the moisture content of the installed soil infiltration layer will be dependent on the earthwork contractor's means and methods and is subject to POR approval.

Sections of the soil infiltration layer which do not pass both the density and moisture requirements will be reworked by moisture conditioning (as required to meet the moisture content criterion), and with additional passes of the compactor until the section in question meets the acceptance criterion. All field density and moisture test results will be incorporated into the FCSER.

Hydraulic conductivity (permeability) test samples will be obtained by pushing a tube sampler through the constructed infiltration layer. The sample from each test location will be sealed and transported to the laboratory. Two samples may be collected at each sample location and labeled the "A" and "B" sample. The sampling holes will be backfilled with bentonite or a bentonite/infiltration layer soil material mixture consisting of at least 20 percent bentonite.

If the integrity of the "A" sample appears to have been compromised during the collection or transportation of the sample prior to testing, the "B" sample may be tested. In addition, if an "A" sample hydraulic conductivity test does not comply with the minimum allowable value, the "B" sample collected at the same location may be tested to determine compliance with the hydraulic conductivity requirements if during testing of the "A" sample the ASTM D5084 or EM 1110-2-1906 procedure was not followed or the permeameter malfunctioned.

The POR will provide a detailed justification of the use of the "B" sample, if applicable, in the FCSER.

If the "B" sample passes, the area will be considered in compliance. If the "B" sample fails (or sample "A" fails in such a way that there is not an option to use the "B" sample), the test interval will be considered unsatisfactory for the area bounded by passing test locations (but not extending past a satisfactory test location). Additional tests may be taken to further define the unsatisfactory area. The area defined unsatisfactory will be reworked and retested in accordance with this section.

Furthermore, if it is determined that the "B" sample may not be used to replace the "A" sample result, then the test interval will be considered unsatisfactory for the area bounded by passing test locations (but not extending past a satisfactory test location).

Once the exact area represented by the failing test is determined, the constructed soil infiltration layer lifts will be removed to the bottom of the lift that did not pass the hydraulic conductivity test, and reconstructed until all the samples obtained from the failed area meet the hydraulic conductivity requirements. At a minimum, one hydraulic conductivity test will be performed for each repair area, given that the reconstructed area is not larger than one acre. For reconstructed areas greater than one acre in size, hydraulic conductivity testing shall be performed at a minimum frequency of 1 test per acre. The reconstructed soil infiltration layer will be tied into the currently constructed soil infiltration layer with a 5H:1V transition slope. The reconstructed soil infiltration layer area is also subject to field density and moisture content testing per Table 2-1 (at least one field density and one moisture content test is required for each lift regardless of the size of the area that is reconstructed).

Reconstruction activities, including additional testing and surveying, will be incorporated into the FCSER.

2.3.3 Structural Fill

Structural fill material placed below the final cover (e.g., compacted backfill in liner anchor trench) will be placed in uniform lifts which do not exceed 12 inches in loose thickness and are compacted to at least 90 percent of maximum dry density (standard Proctor, ASTM D698) at a moisture content ranging from 2 percentage points below optimum to 3 percentage points above optimum (-2 to +3).

2.3.4 Surface Water Removal

The prepared intermediate cover and soil infiltration layer which is under construction may encounter water from storm events. Prior to placement of soil infiltration layer, intermediate cover will be graded to provide positive drainage for the base grades of the soil infiltration layer. The soil infiltration layer will not be placed in standing water and water will not be allowed to accumulate over constructed soil infiltration layer. The construction area will be graded to provide for positive drainage. Temporary diversion berms will be constructed as needed to divert surface runoff away from the construction area.

2.3.5 Infiltration Layer Tie-In Construction

Newly constructed infiltration layer will be tied in with any adjoining existing infiltration layers. Additionally, terminations will be constructed for future tie-ins along edges where the infiltration soil layer will be extended in the future. During the construction of continuous infiltration layers, the new infiltration layer segment will not be constructed by "butting" the entire thickness of the new infiltration layer directly against the edge of the old infiltration layer. The tie-in will be constructed either by a sloped transition (typically 5 horizontal to 1 vertical) or a stair-stepped transition (typically 1 lift thickness per step). The length of the tie-in will typically be 5 feet per foot of infiltration layer thickness. In general, terminations for future tie-ins will be constructed by extending the infiltration layer approximately 7.5 feet past the limits for the final cover area under construction.

2.4 Construction Testing

2.4.1 Procedures

CQA monitors will perform field and laboratory tests in accordance with applicable standards specified in this FCSQCP. Sampling will be performed by using standard ASTM practices for recovering samples (e.g., ASTM D 1587). Penetrations in the soil infiltration layer created by hydraulic conductivity sampling or nuclear density testing will be backfilled and tamped bentonite or bentonite/infiltration layer soil mixture have a minimum 20 percent bentonite.

2.4.2 Test Frequencies

The test frequencies for the infiltration layer are listed in Table 2-1. Additional testing will be conducted whenever work or materials are suspect, marginal, or of poor quality. Additional testing may also be performed to provide additional data for engineering evaluation. The minimum number of tests is interpreted to mean minimum number of passing tests, and any tests that do not meet the requirements will not contribute to the total number of tests performed to satisfy the minimum test frequency.

2.5 Reporting

The POR, on behalf of the operator, will submit to the TCEQ a FCSER for approval of each final cover area. Section 5 describes the documentation requirements.

Table 2-1
Standard Tests on Infiltration Layer Soils

Soil Test Category	Type of Test	Standard Test Method	Frequency of Testing
Quality Control Testing of Source Borrow Materials	Unified Soil Classification	ASTM D 2487	Once per soil type
	Moisture/Density Relationship	ASTM D 698 or D 1557	
	Grain Size	ASTM D 422 or D 1140	
	Atterberg Limits	ASTM D 4318	
	Coefficient of Permeability	ASTM D 5084 or CoE Em1110-2-1906	1/Moisture/Density Relationship
Constructed Soil Infiltration Layer	Field Density	ASTM D 6938 and D 2216[1]	1/8,000 ft^2 per 6-inch lift[2]
	Grain Size	ASTM D 422 or D 1140	1/100,000 ft^2 per 6-inch lift[2]
	Atterberg Limits	ASTM D 4318	
	Coefficient of Permeability	ASTM D 5084 or CoE EM1110-2-1906	1/surface acre (evenly distributed through all lifts)[2]
	Thickness Survey[3]	Texas Licensed Surveyor	1/10,000 ft^2

[1] This method is not applicable if the field measuring device (i.e., nuclear gauge) also measures moisture.

[2] A minimum of 1 of each of the designated tests must be conducted for each lift, regardless of cover area.

[3] If the option to use settlement plates to verify the thickness of the final cover is utilized, the procedure outlined in Section 2.3.2 will be followed.

3 CONSTRUCTION QUALITY ASSURANCE FOR GEOSYNTHETICS

3.1 Introduction

This section describes CQA (as defined in Section 1.2, above) procedures for the installation of geosynthetic components. The scope of geosynthetic-related CQA includes the following elements:

- Geomembrane Liner
    - 40-mil LLDPE – smooth on the top slopes and textured on both sides for the side slopes. Minimum required material properties for the geomembrane are listed in Table 3-2.
- Drainage Layer
    - Drainage geocomposite (single-sided on the top slopes and double-sided on the side slopes). Minimum required material properties for the drainage layer are listed in Table 3-2.

The overall goal of the geosynthetics CQA program is to assure that proper construction techniques and procedures are used, the geosynthetic contractor implements his CQC (as defined in Section 1.2, above) plan in accordance with this FCSQCP, the construction and testing of all elements of the final cover are performed in accordance with this FCSQCP and the Closure Plan (Appendix IIIJ), and that the project is built in accordance with the project construction drawings and specifications. The CQA program is intended to identify and define problems that may occur during construction and to assure that these problems are avoided and/or corrected before construction is complete. The FCSER, prepared after project completion, will document that the constructed facility meets design intent and specifications and that all final cover construction and QA/QC testing were performed in accordance with this FCSQCP.

3.2 Geosynthetics Quality Assurance

3.2.1 General

A geomembrane and a drainage geocomposite are the geosynthetic components of the composite final cover system. All testing requirements and minimum required properties are listed in Tables 3.1, 3.2, and 3.3. Construction quality control for the geosynthetic installation will be performed by the geosynthetic installation contractor. Construction quality assurance for the geosynthetic installation will be performed by the POR to assure the geosynthetic is constructed as specified in the design. Construction must be conducted in accordance with the project construction drawings, which will be developed in accordance with the specifications outlined in this FCSQCP and the Closure Plan (Appendix IIIJ) at the time of each final cover construction. To monitor compliance, the CQA program will include the following:

- Review of the manufacturer's quality control submittals
- Material conformance testing
- Field and construction testing
- Construction monitoring

The manufacturer's quality control submittals will include resin and physical material testing. The required tests for material properties are included in Section 3.3.

Conformance testing refers to verification tests conducted by an independent third party laboratory to confirm the material meets the required specification prior to acceptance of the geosynthetic from the manufacturer. Field and construction testing includes testing that occurs during geosynthetics installation.

CQA testing will be conducted in accordance with this FCSQCP. Field testing will be observed by the CQA monitor. Documentation must meet the requirements of this FCSQCP.

3.3 Geomembrane

3.3.1 General

This section describes material types, handling, installation, and testing of geomembrane. Smooth geomembrane will be used on top slopes (e.g., 5 percent slopes) and textured geomembrane will be used on sideslopes (e.g., 25 percent slopes).

3.3.2 Delivery

Upon delivery of the geomembrane, the CQA monitor will observe that:

- The geomembrane is delivered in rolls and is not folded. Folded geomembrane is not acceptable because the highly crystalline structure of the geomembrane will be damaged if it is folded. Any evidence of folding (other than from the manufacturing process) or other shipping damage is cause for rejection of the material.

- Equipment used to unload and store the rolls or pallets does not damage the geomembrane.
- The geomembrane is stored in an acceptable location in accordance with the specifications and stacked not more than five rolls high. The geomembrane is protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat, or other damage.
- Manufacturing documentation required by the specifications has been received and reviewed for compliance with the specifications. This documentation will be included in the FCSER.
- The geosynthetics receipt log form has been completed for materials received.

Damaged geomembrane may be rejected and removed from the site or stored at a location separate from accepted geomembrane. Geomembrane that does not have proper manufacturer's documentation must be stored at a separate location until documentation has been received, reviewed, and accepted.

3.3.3 Conformance Testing

Tests. One geomembrane sample will be obtained for every resin lot of material supplied and for each 100,000 square feet of geomembrane installed. The material will be sampled at the site by the CQA monitor. The samples will be forwarded to the third-party laboratory for the following conformance tests:

- Specific gravity/Density (ASTM D 1505 or alternate ASTM D 792, Method A if approved by the POR)
- Carbon black content (ASTM D 1603)
- Carbon black dispersion (ASTM D 5596)
- Thickness (ASTM D 5199 for smooth geomembrane and ASTM D 5994 for textured geomembrane)
- Tensile properties (ASTM D 6693, ASTM D 638/Type IV Specimen

The density of the geomembrane must be less than 0.94 g/cc; the carbon black content must be between 2 percent and 3 percent; and recycled or reclaimed material must not be used in the manufacturing process.

The design engineer may require additional test procedures and will inform the third party laboratory in writing. The POR must review all test results and report any nonconformance to the design engineer prior to product installation. In addition to the conformance thickness tests shown above, field thickness measurements must be taken at maximum 5-foot intervals along the leading edge of each geomembrane panel. No single measurement may be less than 10 percent below the required nominal thickness for the panel to be accepted (i.e., for 40-mil geomembrane a minimum thickness of 36 mils is required), and the average must be at least 40 mils.

Sampling Procedure. Samples will be taken across the entire roll width. Unless otherwise specified, samples should be approximately 15 inches long by the roll width. The CQA monitor must mark the machine direction and the manufacturer's roll identification number on the sample. The CQA monitor must also assign a conformance test number to the sample and mark the sample with that number.

Table 3-1
Required Testing for Geomembranes

Responsible Party	Type of Test		Standard Test Method	Frequency of Testing
Resin Manufacturer	Resin	Density	ASTM D 1505 / D 792	Per 100,000 ft^2 and every resin lot
		Melt Flow Index	ASTM D 1238 (Condition E)	
	Resin/Compound Evaluation		Per manufacturer's quality control specifications	Per manufacturer's quality control specifications
Geomembrane Manufacturer	Manufacturer's Quality Control		Testing per GRI Standard, GRI Test Method GM17 for 40 mil LLDPE[1]	
Conformance Testing by 3rd Party Independent Laboratory	Thickness[2]		ASTM D 5199 (smooth LLDPE), or D 5994 (textured LLDPE)	Per 100,000 ft^2 and every resin lot
	Specific Gravity/Density		ASTM D 1505/D 792	
	Carbon Black Content		ASTM D 1603	
	Carbon Black Dispersion		ASTM D 5596	
	Tensile Properties		ASTM D 6693, ASTM D 638/Type IV Specimen	
3rd Party CQA	Destructive Seam Field Testing[4]	Shear & Peel	ASTM D 6392	Various for field, lab, and archive
3rd Party CQA	Non-Destructive Seam Field Testing	Air Pressure	ASTM D 5820	All dual-track fusion weld seams
		Vacuum	ASTM D 5641	All non-air pressure tested seams when possible

[1] UV Resistance testing not required for geomembrane, which is to be immediately covered.

[2] Field thickness measurements for each panel must be conducted. Use ASTM D 5199/D 5994 and perform 1 series of measurements among the leading edge of each panel, with individual measurements no greater than 5 feet apart. No single measurement will be less than 10% below the required nominal thickness in order for the panel to be acceptable.

[3] Break elongation calculated using 2-inch initial gauge length at 2 inches per minute.

[4] Passing criteria for seams are listed in Table 3-2.

Table 3-2
Minimum Required Properties of 40-mil-thick Smooth and Textured (Both Sides) LLDPE Geomembrane

Property	Test Method	Minimum Required Property[6]	
		Smooth	Textured
Thickness, mils Minimum average Lowest individual reading Lowest individual of 8 of 10 readings	ASTM D 5199 (smooth) ASTM D 5994 (textured)	40 36 NA	38 34 36
Density, g/cc (maximum)	ASTM D 1505/D 792	0.939	0.939
Asperity Height, mils	GRI GM12	NA	10
Tensile Properties[1] Break Strength, lb/in Break Elongation, %	ASTM D 6693, ASTM D 638/Type IV Specimen	152 800	60 250
Tear Resistance, lb	ASTM D 1004	22	22
Puncture Resistance, lb	ASTM D 4833	56	44
Break Resistance Strain, % (min)	ASTM D 5617	30	30
Carbon Black Content[2], %	ASTM D 1603	2.0-3.0	2.0 – 3.0
Carbon Black Dispersion[3], Category	ASTM D 5596	1 or 2 and 3	1 or 2 and 3
Oxidative Induction Time (OIT), minimum average Standard OIT (minutes) or High Pressure OIT (minutes)	ASTM D 3895 ASTM D 5885	100 400	100 400
Oven Aging at 85ºC, minimum average Standard OIT – % retained after 90 days or High Pressure OIT – % retained after 90 days	ASTM D 5721 ASTM D 3895 ASTM D 5885	35 60	35 60
UV Resistance[4], minimum average High Pressure OIT[5] – % retained after 1600 hrs	GRI GM 11 ASTM D 5885	35	35
Seam Properties Shear Strength, lb/in Peel Strength, lb/in	ASTM D 6392	60 50 (44, Extrusion Weld)	60 50 (44, Extrusion Weld)

[1] Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 2.0 inches.

[2] Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.

[3] Carbon black dispersion for 10 different views; 9 in Categories 1 or 2 and 1 in Category 3.

[4] The condition of the test should be 20 hr UV cycle at 75ºC followed by 4 hr. condensation at 60ºC.

[5] UV resistance is based on percent retained value regardless of the original HP-OIT value.

[6] Minimum Required Property values are based on GRI GM17, except for Seam Properties, which are based on GRI GM19. Current values described in GM17 and GM19 will be used for each construction event.

3.3.4 Anchor Trench Backfill

General fill material placed in anchor trenches will be placed in uniform lifts, which do not exceed 12 inches in loose thickness and are compacted. In-place moisture/density tests may be taken at the discretion of the CQA monitor to evaluate the quality of the backfill. The test results will not be required as part of the FCSER. Slightly rounded corners will be provided in anchor trenches where the geomembrane enters the trench so as to avoid sharp bends in the geomembrane. No loose soil (e.g., excessive water content) will be allowed to underlie the anchored components of final cover system.

3.3.5 Geomembrane Installation

Surface Preparation. Prior to any geomembrane installation, the subgrade (e.g., soil infiltration layer) should be inspected by the CQA and geosynthetics contractor. The POR or CQA monitor must observe the following:

- Lines and grades for the infiltration layer have been verified by the contractor and surveying of top of soil infiltration grades has been completed in accordance with Section 2 of this FCSQCP.
- Soil infiltration layer construction has been completed in areas with no ponded water.
- The infiltration layer has been placed in accordance with the specification.
- No signs of desiccation exist, and the moisture content of the infiltration layer surface was controlled. A smooth drum roller will be used, as necessary, to minimize desiccation.
- The infiltration layer is free of surface irregularities and protrusions.
- The infiltration layer surface does not contain stones or other objects that could damage the geomembrane and underlain infiltration layer. The surface will be smooth and free of foreign and organic material, sharp objects, stones greater than 3/8 inches (or less if recommended by the geosynthetic manufacturer), or other deleterious material.
- The anchor trench dimensions have been checked, and the trenches are free of sharp objects and stones.
- The geomembrane will not be placed during inclement weather such as rain or high winds.
- Construction stakes and hubs have been removed and the resultant holes have been backfilled. There are no rocks, debris, or any other objects on the infiltration layer surface.

- The geosynthetics contractor, POR or his representative, and the permittee or his representative has certified in writing that the surface on which the geomembrane will be installed is acceptable.

Panel Placement. The CQA monitor must maintain an up-to-date panel layout drawing showing panel numbers that are keyed to roll numbers on the placement log. The panel layout drawing will also include seam numbers and destructive test locations.

During panel placement, the POR or CQA monitor must:

- Observe that the geomembrane is placed in uniform contact with underlying soil infiltration layer.
- Record roll numbers, panel numbers, and dimensions on the panel or seam logs.
- Observe the sheet surface as it is deployed and record panel defects and repair of the defects (panel rejected, patch installed, extradite placed over the defect, etc.) on the repair sheet. Repairs must be made in accordance with the specifications and located on a repair drawing.
- Observe that support equipment is not allowed on the geomembrane during handling (see Section 3.5 also).
- Observe that the surface beneath the geomembrane has not deteriorated since previous acceptance.
- Observe that there are no stones, construction debris, or other items beneath the geomembrane that could cause damage to the geomembrane.
- Observe that the geomembrane is not dragged across a surface that could damage the material. If the geomembrane is dragged across an unprotected surface, the geomembrane must be inspected for scratches and repaired or rejected, as necessary.
- Record weather conditions including temperature, wind, and humidity. The geomembrane must not be deployed in the presence of excess moisture (fog, dew, mist, etc.). In addition, geomembrane seaming operation should not be performed when the air temperature is less than 41°F or greater than 104°F, or when standing water or frost is on the ground, unless these requirements are waived by the design engineer. Excessive wind is that which can lift and move the geomembrane panels.
- Observe that people working on the geomembrane do not smoke, wear shoes that could damage the liner, or engage in activities that could damage the liner.
- Observe that the method used to deploy the sheet minimizes wrinkles but does not cause bridging and that the sheets are anchored to prevent movement by the wind (the contractor is responsible for any damage to or

from windblown geomembrane). Excessive wrinkles should be walked-out or removed at the discretion of the CQA monitor.

- Observe that no more panels are deployed than can be seamed on the same day.
- Observe that seams are oriented parallel to the slip direction, and the textured material extends a minimum of approximately 5 feet out past the side slope.

The CQA monitor must inform both the contractor and the POR of the above conditions.

Field Seaming. A seam numbering system must provide a unique number for each seam and be agreed to by the POR and contractor prior to the start of seaming operations. One procedure is to identify the seam by adjacent panels. For example, the seam located between Panels 306 and 401 would be Seam No. 306/401.

Prior to geomembrane welding, each welder and welding apparatus (both wedge and extrusion welder) must be tested to determine if the equipment is functioning properly, at a minimum, at daily start-up and immediately after any break, and/or anytime the machine is turned off for more than 30 minutes. The FCSER will include the names for each seamer and the time and the temperatures for each seaming apparatus used each day. One trial weld will be taken prior to the start of work and when the type of geomembrane seam (e.g., smooth to smooth, smooth to textured, etc.) is changed. In addition, a trial weld will also be obtained prior to seaming the tie-in. The trial weld sample must be 3 feet long and 12 inches wide, with the seam centered lengthwise. The minimum number of specimens per trial weld test must be two coupons for shear and two coupons for peel. Both the inner and outer welds of dual track fusion welds must be tested for each peel test coupon (or additional coupons will be required). Trial weld samples must comply with "Passing Criteria for Welds" included in Section 3.3.6 – Construction Testing. The CQA monitor must observe all welding operations, quantitative testing of each trial weld for peel and shear, and recording of the results on the trial weld form. The trial weld will be completed under conditions similar to those under which the panels will be welded. Regarding the locus-of-break patterns of the different seaming methods in shear and peel, the following are unacceptable break codes per their description in ASTM D 6392 and GRI-GM19:

Hot Wedge:	AD and AD-Brk>25%
Extrusion Fillet:	AD1, AD2, AD-WLD (unless strength is achieved)

Additionally, there should be no apparent weld separation (i.e., greater than 1/8 inch). The third party strength tests must meet the manufacturer's specifications for the sample sheets, or percentage of the manufacturer's parent sheet strength as determined by the manufacturer. For dual-track fusion welds, both sides (the inner and outer weld) must meet the minimum requirements for a satisfactory peel test.

If, at any time, the CQA monitor believes that an operator or welding apparatus is not functioning properly, a weld test must be performed. If there are wide changes in temperature (±30° Fahrenheit), humidity, or wind speed, the test weld should be repeated. The test weld must be allowed to cool to ambient temperature before testing. If a welded seam fails the shear or peel test, the length of the non-passing weld will be identified at a 10-foot interval, and the failed seam will be patched. Patching will be performed by placing additional geomembrane material over the failed seam or removing the failed seam weld and patching it with additional geomembrane per the POR's direction. Welding for patches must comply with the extrusion weld acceptance criteria outlined in this section.

Construction quality assurance documentation of trial seam procedures will include, at a minimum, the following:

- Documentation that trial seams are performed by each welder and welding apparatus prior to commencement of welding and prior to commencement of the second half of the workday.
- The welder, the welding apparatus number, time, date, ambient air temperature, and welding machine temperatures.

During geomembrane welding operations, the CQA monitor must observe the following:

- The contractor has the number of welding apparatuses and spare parts necessary to perform the work.
- Equipment used for welding will not damage the geomembrane.
- The extrusion welder is purged prior to beginning a weld until the heat-degraded extradite is removed (extrusion welding only).
- Seam grinding has been completed less than one hour before seam welding, and the upper sheet is beveled (extrusion welding only).
- The ambient temperature, measured 6 inches above the geomembrane surface, is between 41°F and 104°F, or manufacturer's recommended temperature limits if they are more stringent.
- The end of old welds, more than five minutes old, are ground to expose new material before restarting a weld (extrusion welding only).
- The contact surfaces of the sheets are clean, free of dust, grease, dirt, debris, and moisture prior to welding.
- The weld is free of dust, rocks, and other debris.
- The seams are overlapped a minimum of 3 inches for extrusion and hot-wedge welding, or in accordance with manufacturer's recommendations, whichever is more stringent. Panels should be overlapped (shingled) in the downgrade direction.

- No solvents or adhesives are present in the seam area.
- The procedure used to temporarily hold the panels together does not damage the panels and does not preclude CQA testing.
- The panels are being welded in accordance with the plans and specifications.
- Seams will be oriented parallel to the line of maximum slope with no horizontal seams (no flatter than 45 degrees) on side slopes or top slopes. In corners and odd-shaped geometric locations, the number of field seams should be minimized.
- There is no free moisture in the weld area.
- Measure surface sheet temperature every two hours.
- Observe that at the end of each day or installation segment, unseamed edges are anchored with sandbags or other approved device. Penetration anchors will not be used to secure the geomembrane.

3.3.6 Construction Testing

Nondestructive Seam Testing. The purpose of nondestructive testing is to detect discontinuities or holes in the seam. It also indicates whether a seam is continuous and non-leaking. Nondestructive tests for geomembrane include vacuum testing for extrusion welds and air pressure testing for dual-track fusion welds. Nondestructive testing must be performed over the entire length of the seam.

Nondestructive testing is performed entirely by the contractor. The CQA monitor's responsibility is to observe and document that testing performance is in compliance with the specifications and document any seam defects and their repairs.

Nondestructive testing procedures are described below.

- For welds tested by vacuum method, the weld is placed under suction utilizing a vacuum box made of rigid housing with a transparent viewing window, a soft neoprene rubber gasket attached to the open bottom perimeter, a vacuum gauge on the inside, and a valve assembly attached to the vacuum hose connection. The box is placed over a seam section that has been thoroughly saturated with a soapy water solution (1 oz. soap to 1 gallon water). The rubber gasket on the bottom perimeter of the box must fit snugly against the soaped seam section of the liner, to ensure a leak-tight seal. The vacuum pump is energized, and the vacuum box pressure is reduced to approximately 3 to 5 psi gauge. Any pinholes, porosity, or non-bonded areas are detected by the appearance of soap bubbles in the vicinity of the defect. Dwell time (i.e., the time the vacuum box is held over each section of extrusion weld) must not be less than ten seconds.
- Air pressure testing is used to test double seams with an enclosed air space. Both ends of the air channel should be sealed. The pressure feed device,

usually a needle equipped with a pressure gauge, is inserted into the channel. Air is then pumped into the channel to a minimum pressure of 30 psi. The air chamber must sustain the pressure for five minutes without losing more than 4 psi. Following a passed pressure test, the opposite end of the tested seam must be punctured to release the air. The pressure gauge must return to zero; if not, a blockage is most likely present in the seam channel. Locate the blockage and test the seam on both sides of the blockage. The penetration holes must be sealed after testing.

During nondestructive testing, the CQA monitor must perform the following work:

- Review project specifications regarding test procedures.
- Observe that equipment operators are fully trained and qualified to perform their work.
- Observe that test equipment meets project specifications.
- Observe that the entire length of each seam is tested in accordance with the project specifications.
- Observe all continuity testing and record results on the appropriate log.
- Observe that testing is completed in accordance with the project specifications.
- Identify the failed areas by marking the area with a waterproof marker compatible with the geomembrane and inform the contractor of any required repairs, then record the repair area on the repair log.
- Observe that repairs are completed and tested in accordance with the project specifications.
- Record completed and tested repairs on the repair log and the repair drawing.

Destructive Seam Testing. Destructive seam tests for geomembrane seams will be performed at a frequency of at least one test for each 500 linear feet of fusion seam length. At a minimum, a destructive test will be completed for each welding machine used for seaming. A destructive test will also be completed for individual repairs (or additional seaming for the failed welds) of more than 10 feet of seam length. The CQA monitor must perform additional tests if he suspects a seam does not meet specification requirements. Reasons for performing additional tests may include, but are not limited to the following:

- Wrinkling in seam area
- Non-uniform weld
- Excess crystallinity
- Suspect seaming equipment or techniques

- Weld contamination
- Insufficient overlap
- Adverse weather conditions
- Possibility of moisture, dust, dirt, debris, and other foreign material in the seam
- Failing tests

There are two types of destructive testing required for the geomembrane installation: peel adhesion (peel) and bonded seam strength (shear) in accordance with ASTM D 6392. The purpose of peel and shear tests is to evaluate seam strength and to evaluate long-term performance. Shear strength measures the continuity of tensile strength through the seam and into the parent material. Peel strength determines weld quality. Test welds must be allowed to cool naturally to ambient temperature prior to testing.

The CQA monitor selects locations where seam samples will be cut for laboratory testing. Select these locations as follows:

- A minimum of one random location for every 500 feet of field fusion seam length or major fraction thereof.
- Sample locations should not be disclosed to the contractor prior to completion of the seam.
- A maximum frequency must be agreed to by the contractor, POR, and the operator at the preconstruction meeting. However, if the number of failed samples exceeds 5 percent of the tested samples, this frequency may be increased at the discretion of the POR. Samples taken as the result of failed tests do not count toward the total number of required tests.

Sampling Procedures. The contractor will remove samples at locations identified by the CQA monitor. The CQA monitor must:

- Observe sample cutting.
- Mark each sample with an identifying number that contains the seam number and destructive test number.
- Record sample location on the panel layout drawing and destructive seam log.
- Record the sample location, weather conditions, and reason sample was taken (e.g., random sample, visual appearance, result of a previous failure, etc.).

For each destructive test obtain one sample approximately 45 inches long by 12 inches wide, with the weld centered along the length. Cut two 1-inch-wide coupons from each end of the sample (a total of 4 coupons). The contractor must test two of these coupons in shear and two in peel (one shear and one peel from each end) using a tensiometer capable of quantitatively measuring the seam strengths. For double wedge welding, both sides of the air channel will be tested in peel. The CQA monitor must observe the tests and record the results on the destructive seam test log. A geomembrane seam sample passes the field testing when the break is a film tear bond (FTB) and the seam strength meets the required strength values for peel and shear given previously in Table 3-2 and below in the subsection "Passing Criteria for Welds" for both field testing and third party laboratory testing. As previously discussed, both welds have to pass for dual-track welds. Also, it is recommended that additional samples be obtained as discussed in the following paragraph if there is apparent separation of the weld (i.e., greater than 1/8 inch) during peel testing.

If one or both of the 1-inch specimens fail in either peel or shear, the contractor can, at his discretion: (1) reconstruct the entire seam between passed test locations, or (2) take two additional test samples 10 feet or more in either direction from the point of the failed test and repeat this procedure. For tracking purposes the additional samples should be identified by assigning an identifying letter to the initial destructive test sample number (e.g., DS-6A and B). Only satisfactory tests count toward the required minimum number, and additional tests (i.e., A and B) count as one test, if passing. If the second set of tests passes, the contractor can reconstruct or cap-strip the seam between the two passed test locations. If subsequent tests fail, the sampling and testing procedure is repeated until the length of the poor quality seam is established. Repeated failures indicate that either the seaming equipment or the operator is not performing properly, and appropriate corrective action must be taken immediately.

If the field test coupons are satisfactory, divide the remaining sample into three parts: one 12-inch by 12-inch section for the contractor, one 12-inch by 16-inch section for the third party laboratory for testing, and one 12-inch by 12-inch section for the operator to archive. The laboratory sample will be shipped to the third party laboratory for delivery and subsequent testing.

If the laboratory test fails in either peel or shear, the contractor must either reconstruct the entire seam between passing test locations or recover additional samples at least 10 feet on either side of the failed sample for retesting. Sample size and disposition must be as described in the preceding paragraph. This process is repeated until passed tests bracket the failed seam section. Seams must be bounded by locations from which passing laboratory tests have been taken. Laboratory testing governs seam acceptance. In no case can field testing of repaired seams be used for final acceptance.

Third Party Laboratory Testing. Destructive samples must be shipped to the third party laboratory for seam testing. Testing for each sample will include five bonded seam shear strength tests and five peel adhesion tests (ten for dual-track welds).

For dual-track welds each peel test specimen (coupon) will be tested on both sides of the air channel (i.e., the inner and outer welds). At least four of the five specimens tested in peel and shear will meet the minimum strength requirements. The minimum peel strength and the minimum shear strength values must meet the manufacturer's specifications. Additionally, 4 of 5 of the peel test coupons must have no greater than 25 percent seam separation. For dual-track welds if either weld exhibits greater than 25 percent separation or does not meet the required strength, that coupon is considered out of compliance and two out of compliance coupons cause the weld to fail. The third party laboratory must provide test results in timely manner, in writing or via telephone, to the POR. Certified test results are to be provided within five days. The CQA monitor must immediately notify the POR in the event of a calibration discrepancy or failed test results.

Passing Criteria for Welds. Passing criteria are established by Geosynthetic Institute GRI Test Method GM19 for geomembrane seams (most recent version of GM19 will be used at the time of each cover construction). A passing extrusion or fusion welded seam will be achieved when the following values are tested. The following values listed for shear and peel strengths are for 4 out of 5 test specimens (the 5th specimen can be as low as 80 percent of the listed values) for 40-mil smooth and textured LLDPE. Elongation measurements should be omitted for field testing.

• Shear strength (lb/in)	60
• Shear elongation at break (%)	50
• Peel strength (lb/in)	44
• Peel separation (%)	25

3.3.7 Repairs

Any portion of the geomembrane with a detected flaw, or which fails a nondestructive or destructive test, or where destructive tests were cut, or where nondestructive tests left cuts or holes, must be repaired in accordance with the specifications developed for each phase of final cover construction and consistent with application parts (e.g., material requirements, installation, testing, etc.) of Section 3 of this FCSQCP. The CQA monitor must locate and record all repairs on the repair sheet and panel layout drawing. Repair techniques include the following:

- Patching – used to repair large holes, tears, large panel defects, undispersed raw materials, contamination by foreign matter, and destructive sample locations.
- Extrusion – used to repair small defects in the panels and seams. In general, this procedure should be used for defects less than 3/8-inch in the largest dimension.
- Capping – used to repair failed welds or to cover seams where welds or bonded sections cannot be nondestructively tested.

- Removal – used to replace areas with large defects where the preceding methods are not appropriate. Also used to remove excess material (wrinkles, fishmouths, intersections, etc.) from the installed geomembrane. Areas of removal will be patched or capped.

Repair procedures include the following:

- Abrade geomembrane surfaces to be repaired (extrusion welds only) no more than one hour prior to the repair.
- Clean and dry surfaces at the time of repair.
- Extend patches or caps at least 6 inches beyond the edge of the defect, and round corners of material to be patched and the patches to a radius of at least 3 inches. Bevel the top edges of patches prior to extrusion welding.
- Perform testing on repair seams consistent with Section 3.3.6 – Construction Testing.

3.3.8 Wrinkles

Wrinkles must be walked-out or removed as much as possible prior to field seaming. Any wrinkles which can fold over must be repaired either by cutting out excess material or, if possible, by allowing the liner to contract by temperature reduction. In no case can material be placed over the geomembrane which could result in the geomembrane folding. The CQA monitor must monitor geomembrane for wrinkles and notify the contractor if wrinkles are being covered by soil. The CQA monitor is then responsible for documenting corrective action to remove the wrinkles.

3.3.9 Folded Material

Folded geomembrane must be removed. Remnant folds evident after deployment of the roll that are due to manufacturing process are acceptable.

3.3.10 Geomembrane Anchor Trench

The geomembrane anchor trench will be left open until seaming is completed. Expansion and contraction of the geomembrane should be accounted for in the geomembrane placement. Prior to backfilling, the depth of penetration of the geomembrane into the anchor trench must be verified by the CQA monitor at a minimum of 100-foot spacing along the anchor trench. The anchor trench should be filled in the morning when temperatures are coolest to reduce bridging of the geomembrane.

3.3.11 Geomembrane Acceptance

The contractor retains all ownership and responsibility for the geomembrane until acceptance by the operator. In the event the contractor is responsible for placing cover over the geomembrane, the contractor retains all ownership and responsibility for the geomembrane until all required documentation is complete, and the cover material is placed. After panels are placed, seamed, tested successfully, and any repairs are made, the completed installation will be walked by the operator's and contractor's representatives. Any damage or defect found during this inspection will be repaired properly by the installer. The installation will not be accepted until it meets the requirements of both representatives. In addition, the geomembrane will be accepted by the POR only when the following has been completed:

- The installation is finished.
- Seams have been inspected and verified to be acceptable.
- Required laboratory and field tests have been completed and reviewed.
- Required contractor-supplied documentation has been received and reviewed.
- As-built record drawings have been completed and verified by the POR. The as-built drawings show the true panel dimensions, the location of seams, trenches, pipes, appurtenances, and repairs.
- Acceptance of the FCSER by the TCEQ.

3.3.12 Bridging

Bridging refers to geomembrane being stretched or supported in a manner that prevents contact of the geomembrane with the underlying soil infiltration layer. Bridging must be repaired or removed prior to acceptance.

3.4 Drainage Layer – Geonet/Geotextile Composite (Geocomposite) Geonet and Geotextile

3.4.1 General

The drainage layer consists of a composite of HDPE geonet and non-woven geotextile (referred to as a geocomposite) overlying the geomembrane and infiltration layer on the topslopes and sideslopes of the final cover. The CQA monitor will provide on-site observation of drainage layer installation. The POR will make sufficient site visits during the drainage layer installation to document the installation in the FCSER.

Double-sided drainage geocomposite (geotextile bonded to the top and bottom of HDPE drainage net) will be installed on the sideslopes and single-sided drainage geocomposite (geotextile bonded to the top of the geonet) will be installed on the top slope. The drainage geocomposite will have the minimum properties listed in Table 3-3.

Manufacturer quality control testing procedures and frequencies for drainage geocomposite are listed in Section 3.4.3.

The drainage layer has been designed to include a network of drainage pipes that will convey flow from the drainage geocomposite to either the final cover drainage letdowns or the perimeter drainage system. The final cover drainage layer component designs, including the design and specifications of the pipes, are included in Appendix IIIJ-A-A.

3.4.2 Delivery

Upon delivery of the drainage geocomposite the CQA monitor must observe the following:

- The drainage geocomposite is wrapped in rolls with protective covering.
- The rolls are not damaged during unloading.
- Protect the drainage geocomposite from mud, soil, dirt, dust, debris, cutting, or impact forces.
- Each roll must be marked or tagged with proper identification.

Any damaged rolls will be rejected and removed from the site or stored at a location separate from accepted rolls, as designated by the operator. Rolls that do not have proper manufacturer's documentation will also be stored at a separate location until documentation has been received, reviewed, and approved. The references herein to drainage geocomposite also apply to geonet and geotextile as applicable.

3.4.3 Testing

The drainage geocomposite manufacturer (or supplier) will conduct quality control testing and certify that materials delivered to the site comply with project specifications for each phase of final cover construction. The minimum testing frequency will be one test sample per 100,000 square feet of drainage geocomposite (or geonet/geotextile). The material certifications will be reviewed by the POR to verify that the drainage geocomposite meets the values given in the FCSQCP or specifications. Third party laboratory testing will be required for drainage layer geocomposite transmissivity. Additionally, material strength parameters used for geotechnical analysis in Appendix IIIE will be verified by a third party laboratory prior to construction, and the slope stability analysis will be updated as necessary based on site-specific material data.

Geonet will be tested by the manufacturer for thickness, tensile strength, and carbon black content. Geotextile will be tested for mass per unit area, grab tensile strength, and Apparent Opening Size (AOS). The finished drainage geocomposite will be tested for peel adhesion and transmissivity. Table 3-3 summarizes testing requirements for drainage geocomposite and geotextile.

Where optional procedures are noted in the test method, the specification requirements will prevail. The CQA monitor will review test results and will report any nonconformance to the POR and to the contractor.

3.4.4 Installation

Surface Preparation. Prior to drainage geocomposite installation, the CQA monitor must observe the following:

- Lines and grades have been verified by the surveyor (where required).
- The subgrade has been prepared in accordance with the specifications and the geomembrane has been installed as outlined in Section 3.3.5.
- The geomembrane installation, including required documentation, has been completed.
- The supporting surface (i.e., the geomembrane) does not contain stones that could damage the drainage geocomposite or the geomembrane.

Drainage Geocomposite Placement. During placement, the CQA monitor must:

- Observe the drainage geocomposite as it is deployed and record defects and disposition of the defects (panel rejected, patch installed, etc.). Repairs are to be made in accordance with the specifications.
- Verify that equipment used does not damage the drainage geocomposite or underlying geomembrane by handling, trafficking, leakage of hydrocarbons, or by other means.
- Verify that people working on the drainage geocomposite do not smoke, wear shoes that could damage the geocomposite, or engage in activities that could damage the geocomposite or underlying geomembrane.
- Verify that the drainage geocomposite is anchored to prevent movement by the wind (the contractor is responsible for any damage resulting to or from windblown geocomposite).

Table 3-3

Geotextile and Drainage Geocomposite Required Testing and Properties[1]

Property	Test Method	Frequency	Value
Geocomposite			
Transmissivity[1], m^2/sec (single-sided geocomposite) (double-sided geocomposite)	ASTM D 4716 ASTM D 4716	1/540,000 ft^2 1/540,000 ft^2	1.0x10^{-3} 1.0x10^{-4}
Ply Adhesion, lb/in	ASTM D 7005	1/50,000 ft^2	1.0
Geonet (prior to lamination)			
Geonet Core Thickness, mil	ASTM D 5199	1/50,000 ft^2	200
Transmissivity[1], m^2/sec	ASTM D 4716	1/540,000 ft^2	2x10^{-3}
Density, g/cm3	ASTM D 1505	1/50,000 ft^2	0.94
Tensile Strength (MD), lb/in	ASTM D 5035/D 7179	1/50,000 ft^2	45
Carbon Black Content, %	ASTM D 4218	1/50,000 ft^2	2.0
Top/Bottom Geotextile[2] (nonwoven, prior to lamination)			
Mass per Unit Area, oz/yd^2	ASTM D 5261	1/90,000 ft^2	6
Grab Tensile Strength, lb	ASTM D 4632	1/90,000 ft^2	160
Grab Elongation, percent	ASTM D 4632	1/90,000 ft^2	50
CBR Puncture Strength	ASTM D 6241	1/90,000 ft^2	435
Trapezoidal Tear Strength	ASTM D 4533	1/90,000 ft^2	65
AOS, US Sieve	ASTM D 4751	1/540,000 ft^2	70
Permittivity, sec^{-1}	ASTM D 4491	1/540,000 ft^2	1.1
Water Flow Rate, gpm/ft^2	ASTM D 4491	1/540,000 ft^2	80
UV Resistance, % retained	ASTM D 4355 (after 500 hours)	Per formulation	70

[1] The minimum testing frequency will be one test sample per 100,000 square feet.

[2] As noted in Appendix IIIJ-A-A, the transmissivity of the single-sided geocomposite will be measured at a minimum gradient of 0.05 ft/ft (consistent with top deck slopes) under a minimum normal pressure of 232 psf, boundary conditions consisting of soil/geocomposite/geomembrane with minimum seating time of 100 hours. The transmissivity of the double-sided geocomposite will be measured at a minimum gradient of 0.25 ft/ft (consistent with sideslopes for both units) under a minimum normal pressure of 239 psf, boundary conditions consisting of soil/geocomposite/geomembrane with a minimum seating time of 100 hours.

[3] The adhesion and interface friction angle of the geocomposite components will be determined to verify they meet the values used in the slope stability analysis of Appendix IIIE-A. This test may be performed using stack testing (i.e., performing a single test combining all components of the final cover system). The slope stability analysis may be repeated to demonstrate that the actual materials used for the construction will result in an acceptable factor of safety.

[4] Different testing gradients for the geocomposite may be specified in the project specifications if the specified gradients are not applicable or no longer conservative in view of existing or expected slope conditions.

- Verify that the drainage geocomposite remains free of contaminants such as soil, grease, fuel, etc.
- Observe that the drainage geocomposite is laid smooth and free of tension, stress, folds, wrinkles, or creases.
- Observe that on slopes the drainage geocomposite is secured with sand bag anchoring at the top of the slope and then rolled down the slope.
- Observe that adjacent rolls of drainage geocomposite are overlapped, tied, and seamed in accordance with the specifications and manufacturer's recommendations.
- Observe that tying is with plastic fasteners in accordance with the manufactures recommendations. In the absence of other specifications the geonet panels will be tied approximately every 5 feet along the roll length (edges) and every 1 foot along the roll width (ends).
- Observe that geotextile component is overlapped and either heat bonded or sewn together.

3.4.5 Repairs

Repair procedures include:

- Holes or tears in the drainage geocomposite will be repaired by placing a patch extending 2 feet beyond the edges of the hole or tear.
- Secure patch to the originally installed drainage geocomposite by tying every 6 inches.
- Where the hole or tear width across the roll is more than 50 percent of the roll width, the damaged area will be cut out across the entire roll, and the two portions of the drainage geocomposite will be jointed.
- Patches will be installed in accordance with "Drainage Geocomposite Placement" under Section 3.4.4.

3.5 Equipment on Geosynthetic Materials

Construction equipment on the composite final cover system will be minimized to reduce the potential for geosynthetic material puncture. The CQA monitor will verify that small equipment such as generators are placed on scrap geomembrane material (rub sheets) above geosynthetic materials in the final cover system. The erosion layer will be placed using low ground pressure equipment. The CQA monitor will verify that the geosynthetics are not displaced while the soil layers (e.g., erosion layer) are being placed.

Unless otherwise specified by the POR, lifts of soil material placed over geosynthetics will conform to the following guidelines:

Equipment Ground Pressure (psi)	Minimum Lift Thickness (in.)
< 5.0	12 and under
5.1 - 8.0	18
8.1 - 16.0	24
>16.0	36

No equipment will be left running and unattended over the constructed geosynthetics.

3.6 Reporting

The POR, on behalf of the operator, will submit to the TCEQ a FCSER for approval of the constructed final cover system. Section 5 describes the documentation requirements.

4 CONSTRUCTION QUALITY ASSURANCE FOR EROSION LAYER

The erosion layer for the Subtitle D final cover areas will consist of a minimum of 24 inches of earthen material and erosion layer. The erosion layer will be capable of sustaining native and introduced vegetative growth and must be seeded immediately after completion of the final cover. Temporary or permanent erosion control materials may be used to minimize erosion and aid establishment of vegetation. The physical characteristics of the erosion layer will be evaluated through visual observation (and laboratory testing if deemed necessary by the POR) before construction and visual observation during construction. Additional testing during construction will be at the discretion of the POR.

The erosion layer may be placed using any appropriate equipment capable of completing the work and should only receive minimal compaction required for stability. Under no circumstances will the construction equipment come in direct contact with the installed geosynthetics. Equipment used to install the erosion layer must meet the requirement of Section 3.5.

The thickness of the erosion layer will be verified with surveying procedures at a minimum of one survey point per 10,000 square feet of constructed area by a licensed Texas surveyor with a minimum of one reference point. The survey results for the erosion layer will be included in the FCSER.

During construction the CQA monitor will:

- Verify that grade control is performed prior to work.
- Verify that underlying geosynthetic installations are not damaged during placement operations or by survey grade controls. Mark damaged geosynthetics and verify that damage is repaired.
- Monitor haul road thickness over installed geosynthetics and verify that equipment hauling and material placement meet equipment specifications. (See Section 3.5).
- The POR will coordinate with the project surveyor to perform a thickness verification survey of the erosion layer materials upon completion of placement operations. Verify corrective action measures as determined by the verification survey. Surveying to confirm the minimum 2-foot erosion layer thickness will be performed similar to the infiltration layer thickness verification surveying shown in Table 2-1.

5 DOCUMENTATION

The CQA plan depends on thorough monitoring and documentation of construction activities. Therefore, the POR and CQA monitor will document that quality assurance requirements have been addressed and satisfied. Documentation will consist of daily recordkeeping, testing and installation reports, non-conformance reports, progress reports, photographic records, and design and specification revisions. The appropriate documentation will be included in the FCSER. Standard report forms will be provided by the POR prior to construction.

5.1 Preparation of FCSER

The POR, on behalf of the operator, will submit to the TCEQ a FCSER for approval of each portion of final cover system constructed.

Testing, evaluation, and submission of the FCSER for the final cover system during construction will be in accordance with this FCSQCP. The construction methods and test procedures documented in the FCSER will be consistent with this FCSQCP.

At a minimum, the FCSER will contain:

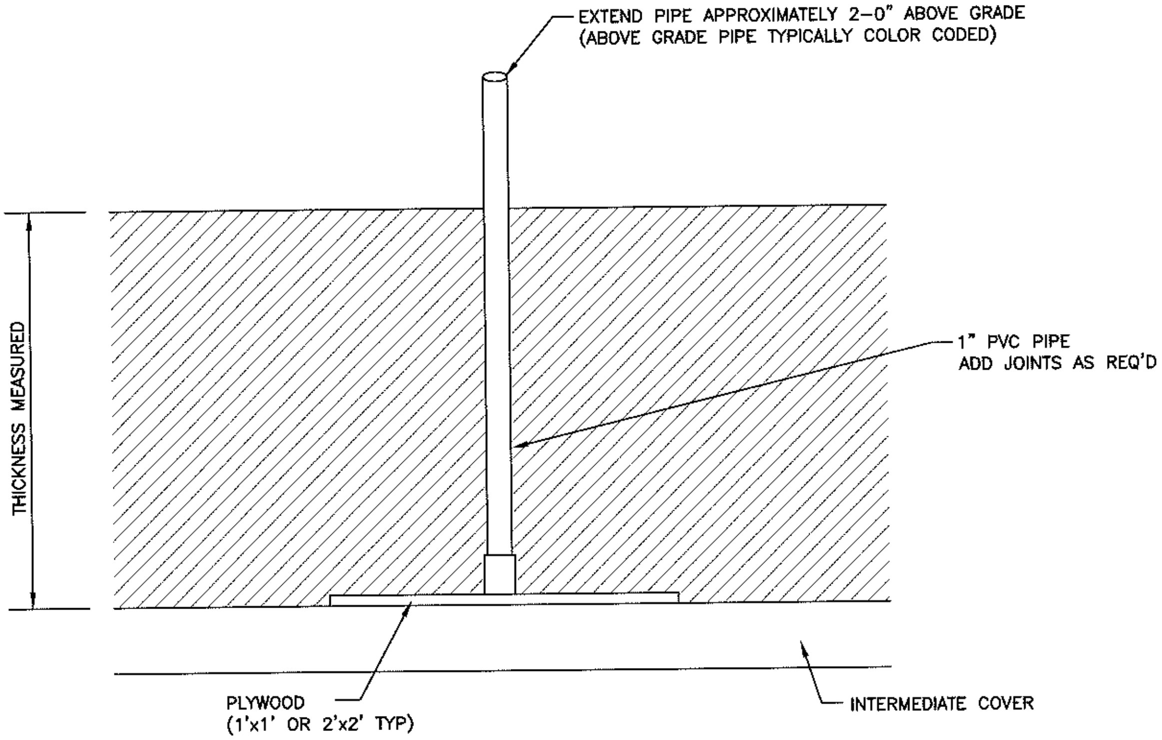
- A summary of all construction activities.
- All laboratory and field test results.
- Third party conformance test results for geocomposite transmissivity and strength parameters.
- Manufacturer's certifications for all geosynthetics.
- Documentation of thickness of the subgrade and erosion layers by a licensed Texas surveyor.
- Sampling and testing location drawings.
- A description of significant construction problems and the resolution of these problems.
- As-built record drawings, including all previous FCSER submittals and dates of TCEQ approval.
- A statement of compliance with the permit FCSQCP and construction plans.

- The reports will be signed and sealed by a professional engineer(s) licensed in the State of Texas.

The as-built record drawings will accurately present the location of constructed work items, including the anchor trenches. The POR will review and verify that as-built drawings are correct. As-built drawings will be included in the FCSER.

5.2 Reporting Requirements

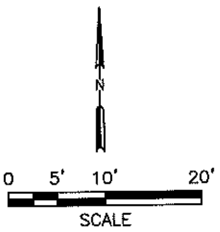
The FCSER will be signed and sealed by the POR, signed by the site operator, and submitted to the MSW Permits Section of the Waste Permits Division of the TCEQ for approval.



SETTLEMENT PLATE (TYP)
NTS

DAVID E. POE
81734

12-5-2017



TYPICAL SETTLEMENT PLATE

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS

Weaver Consultants Group
REGISTRATION NO. F-3727

DRAWN BY: VRS	DATE: 05/2012	FILE:
REVIEWED BY: NT	CAD: FIG IIIJ-A.1.DWG	FIGURE IIIJ-A.1

O:\0120\758\2214B EXPANSION\IIIJ\IIIJ-A.1 SETTLEMENT PLATE.dwg, rsellers, 1:1

APPENDIX IIIJ-A-A

COMPOSITE FINAL COVER DRAINAGE LAYER DESIGN

Includes pages IIIJ-A-A-1 through IIIJ-A-A-10

STATE OF TEXAS
DAVID E. POE
81734
LICENSED
PROFESSIONAL ENGINEER

12-5-2017

Required:

The purpose of this appendix is to design the drainage layer that is located between the geomembrane and erosion layer for the composite final cover. As shown on Drawing IIIA-A.8 in Appendix IIIA-A, the drainage layer will consist of a single-sided drainage geocomposite on the topslope and a double-sided geocomposite on the sideslope. In addition, a network of drainage pipes will convey flow from the drainage geocomposite to either a drainage letdown structure or to the perimeter drainage system. A detail of the drainage pipe in the final cover is provided on Drawing A.8. The following design criteria are used to design the geocomposite drainage layers.

Due to the limited area of topslope (approximately 1 acre) and short drainage lengths of topslope drainage layer (100 to 110 feet in length maximum, with the estimated effective drainage length being 50 to 70 feet, based on the triangular dimensions and small size of the topslope contributing area), it was assumed that all topslope drainage would be addressed by a single pipe installed at the topslope/sideslope transition (within the uppermost sideslope drainage pipe). Calculations below are for pipe placed at the topslope/sideslope transition (the uppermost sideslope drainage pipe) and sideslopes only.

Note: The following calculations are provided as example only. Actual pipe spacing required for drainage of final cover geocomposite will be designed during final design of the cover system, based on selected geocomposite drainage characteristics, and hydraulic conductivity testing of on-site soils to be used as protective cover.

1. Sideslope. The sideslope drainage layer is designed to prevent uplift forces from occurring on the erosion layer. This will ensure the stability of the erosion layer.
2. Topslope. The topslope drainage layer is designed so that the erosion layer located on the topslope does not become completely saturated and is designed to withstand potential estimated hydrostatic uplift forces. Demonstration of topslope drainage layer stability (from HELP model) is presented in Appendix IIIE.
3. Topslope/Sideslope Transition. This drainage layer is designed to prevent uplift forces from occurring on the erosion layer along the grade break. This will ensure the stability of the erosion layer.

Method:

1. Sideslope

1. Estimate the percolation into the drainage geocomposite from the erosion layer. To provide for a conservative analysis, it is assumed that the permeability of the cover soils equates to the percolation rate into the drainage geocomposite.
2. Determine the transmissivity of the specified drainage geocomposite. The laboratory transmissivity is reduced to simulate the actual transmissivity after strength and environmental factors are taken into consideration.
3. Determine the pipe capacity, spacing, and size to ensure that no uplift forces on the erosion layer will occur (i.e., demonstrate that the flow depth within the drainage geocomposite is less that the drainage geocomposite thickness).

2. Topslope/Sideslope Transition

1. Estimate the percolation into the drainage geocomposite from the erosion layer. To provide for a conservative analysis, it is assumed that the permeability of the cover soils equates to the percolation rate into the drainage geocomposite.

2. Determine the transmissivity of the specified drainage geocomposite. The laboratory transmissivity is reduced to simulate the actual transmissivity after strength and environmental factors are taken into consideration.

3. Determine the pipe capacity, spacing, and size to ensure that no uplift forces on the erosion layer will occur (i.e., demonstrate that the flow depth within the drainage geocomposite is less that the drainage geocomposite thickness).

References:

1. Koerner, R.M., *Designing With Geosynthetics*, third edition, 1994.
2. Maidment, David R., *Handbook of Hydrology*. McGraw-Hill, Inc. 1993.
3. *The Hydrologic Evaluation of Landfill Performance (HELP) Model, User's Guide for Version 3.* EPA/600/R-94/168a, September 1994.
4. Giroud, J.P., Zornberg, J.G., Zhao, A., Hydraulic Design of Geosynthetic and Granular Liquid Collection Layer, 2000.
5. Gray, Donald H., Koerner, Robert M., Qian, Xuede, Geotechnical Aspects of Landfill Design and Construction, 2002.
6. Geosynthetic Institute, GRI Standard GC-8, 2001.
7. GSE Drainage Design Manual, May 2004.

Solution:

1. Sideslope

1.1 Estimate the percolation into the drainage geocomposite from the erosion layer.

Calculate the flow entering the geocomposite from unit area of erosion layer (q_f):

k_{cover} = 1.2E-04 cm/s

$q_f = k_{cover} * i$ (i is the gradient of water percolating within the drainage layer, and it is equal to 1 for vertical percolation.)

q_f = 1.2E-4 cm/s * 1 / (30.48 cm/ 1 ft)

q_f = 3.94E-06 cfs/sf

Calculate the maximum flow in drainage geocomposite on 4H:1V sideslope:

a. For flow length between 0 - 120 feet

L = 120 ft, longest flow length between two drain pipes on sideslope.

$q_p = q_f * L$

q_p = 0.00047 sf/s

b. For flow length between 120 - 230 feet

L = 230 ft, longest flow length between two drain pipes on sideslope.

$q_p = q_f * L$

q_p = 0.00091 sf/s

1.2 Determine the transmissivity of the specified drainage geocomposite.

Final Cover Drainage Layer Thickness:

Specified Design:
Drainage layer consists of geocomposite drainage layer - double-sided 250 mil and 6 oz/sy geotextiles on sideslopes.

Assume the final cover drainage layer will undergo compression due to the weight of soil (erosion layer).

Unloaded Geocomposite Drainage Layer Thickness =	0.250	in
Unit Weight of Erosion Layer Soil =	116	pcf
Thickness of Erosion Layer=	2	ft

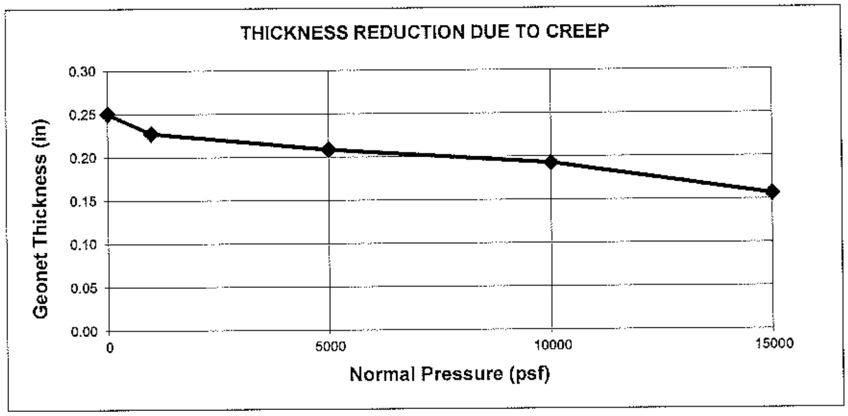
Table 1.1 - Final Cover Drainage Layer Thickness

Fill Condition	Slope %	d_S[1] (ft)	P[2] (psf)	t[3] (in)	t[3] (m)
Closed (sideslope)	25	2.064	239	0.245	0.006

[1] d_S is the vertical thickness of soil above the final cover drainage layer.

[2] P is the pressure on the final cover drainage layer due to the weight of the erosion layer soil.

[3] t is the thickness of the final cover drainage layer after being subjected to compression based on the chart in the next page adapted from Reference 7.



Reduction Factors for Strength and Environmental Conditions:

Table 1.2 - Reduction Factors

Reduction Factors		Closed Condition
RF_{IN}	Delayed Intrusion	1.1
RF_{CC}	Chemical Clogging	2.0
RF_{BC}	Biological Clogging	1.3
Total Reduction Factor[2]		2.86

Overall Factor of Safety to Account For Uncertainties	2.0
Overall Reduction Factor (ORF)[3]	5.72

[1] Values are obtained from References 1, 5, and 6.

[2] The Total Reduction Factor is the product of all the reduction factors.

[3] The Overall Reduction Factor is the product of the Total Reduction Factor and Overall Factor of Safety to Account For Uncertainties.

Manufacturer's Transmissivity Data:

The required minimum transmissivity for the 250-mil-thick double-sided geocomposite is shown on Sheet IIIJ-A-A-10.

Compute the Design Transmissivity (T_{DES}) of the final cover geocomposite drainage layer:

Table 1.3 - Transmissivity of the Specified Geocomposite Material

Fill Condition	P^1 (psf)	t^2 (in)	T^3 (m^2/s)	ORF^4	$T_{DES}{}^5$ (m^2/s)	$T_{DES}{}^5$ (sf/s)
Closed (sideslope)	239	0.245	5.15E-04	5.72	9.00E-05	9.69E-04

[1] P is the pressure on the final cover drainage layer due to the weight of erosion layer from Table 1.1.

[2] t is the drainage layer thickness from Table 1.1.

[3] T is obtained from the specified transmissivity values for a representative geocomposite leachate collection layer (6 oz/sy double-sided polypropylene geotextile with 250-mil-thick geonet) as shown on Sheet IIIJ-A-A-10.

[4] ORF is the Overall Reduction Factor obtained from Table 1.2.

[5] T_{DES} is the design transmissivity value calculated using the following equation:

$$T_{DES} = T / ORF$$

Determine the capacity of the drainage geocomposite based on the estimated transmissivity and compare to the estimated flow rate that occurs due to infiltration.

T_{DES}	>	q_p
(flow capacity of the drainage geocomposite per unit width)		(estimated flow in the drainage geocomposite per unit width)

a.	0.00097 sf/s	>	0.00047 sf/s	Flow length between 0 -120 feet
b.	0.00097 sf/s	>	0.00091 sf/s	Flow length between 120 - 230 feet

Since the capacity of the drainage geocomposite is greater than the estimated flow in the geocomposite for both cases, the actual flow depth is contained within the geocomposite and the design is acceptable. The maximum spacing between the drain pipes located on the 4H:1V sideslopes maybe up to 230 feet. Actual pipe spacing will be determined at the time of closure design based on k values determined from geotechnical laboratory testing of on-site soils to be used as protective cover and selected drainage layer transmissivity values.

1.3 Determine pipe size required to convey the design flow for the specified pipe length and pipe outlet spacing.

Maximum Flow to Collection Pipe for Various Pipe Lengths:

$$Q_{max} = L_{p\text{-}max} \times q_p$$

a. For flow length between 0 -120 feet

Pipe Length, $L_{p\text{-}max}$ (ft)	Flow per Unit Length of Pipe, q_p (cfs/ft)	Maximum Pipe Flow, $Q_{max}{}^1$ (cfs)
< 300	0.00047	0.142
300-1000	0.00047	0.472
1000-1400	0.00047	0.661

[1] Maximum pipe flow is calculated using the maximum pipe length in each range.

b. For flow length between 120 -230 feet

Pipe Length, $L_{p\text{-}max}$ (ft)	Flow per Unit Length of Pipe, q_p (cfs/ft)	Maximum Pipe Flow, $Q_{max}{}^1$ (cfs)
< 500	0.00091	0.453
500-1100	0.00091	0.996

[1] Maximum pipe flow is calculated using the maximum pipe length in each range.

Capacity of collection pipe:

Use Manning Equation to determine the pipe capacity.

Pipe Capacity (Q_{pc}):

$$Q_{pc}=\frac{1.49AR^{2/3}S^{1/2}}{n}$$

(from Chapter 10 of Ref 2)

where:

Q_{pc}: Full flow pipe capacity (cfs)
d: Diameter (inches), HDPE ADS collection pipe
A: Flow area (sf), Cross section of pipe
P: Perimeter (ft)
R: Hydraulic radius (ft) = Cross section (A) / Perimeter (P)
S: Pipe slope (ft/ft)
n: Manning roughness coefficient

Pipe Capacity for Different Pipe Sizes						
d (inches)	A (sf)	P (ft)	R (ft)	S (ft/ft)	n	Q_{pc} (cfs)
4	0.09	1.05	0.08	0.005	0.010	0.175
6	0.20	1.57	0.13	0.005	0.010	0.517
8	0.35	2.09	0.17	0.005	0.010	1.114

Fullness Ratio of Pipe (f):

$f = Q_{max}/Q_{pc}$

a. For flow length between 0 -120 feet

Fullness Ratio of Pipe (f)					
Fill Condition	Pipe Length (ft)	d (inches)	Q_{max} (cfs)	Q_{pc} (cfs)	f
Closed (sideslope)	< 300	4	0.142	0.175	0.81
	300-1000	6	0.472	0.517	0.91
	1000-1400	8	0.661	1.114	0.59

b. For flow length between 120 -230 feet

Fullness Ratio of Pipe (f)					
Fill Condition	Pipe Length (ft)	d (inches)	Q_{max} (cfs)	Q_{pc} (cfs)	f
Closed (sideslope)	< 500	6	0.453	0.517	0.88
	500-1100	8	0.996	1.114	0.89

Conclusion: A pipe size of 4, 6 or 8 inches is acceptable for the sideslope area when the flow length is between 0-120 feet. A pipe size of 6 or 8 inches is acceptable for the sideslope area when the flow length is between 120 - 230 feet.

2. Topslope/Sideslope Transition

2.1 Estimate the percolation into the drainage geocomposite from the erosion layer.

Calculate the flow entering the geocomposite from unit area of erosion layer (q_f):

k_{cover} = 1.2E-04 cm/s

$q_f = k_{cover} * i$ (i is the gradient of water percolating within the drainage layer, and it is equal to 1 for vertical percolation.)

q_f = 1.2E-4 cm/s * 1 / (30.48 cm/ 1 ft)

q_f = 3.94E-06 cfs/sf

Calculate the maximum flow in drainage geocomposite on 4H:1V sideslope.
Consider the flow coming from the topdeck:

L (4H:1V)= 130 ft
L (5%)= 100 ft (see Note 1, below)
L (total)= 230 ft (see Note 2, below)
$q_p = q_f$ * L (total)
q_p = 0.00091 sf/s

Notes

1. Actual effective drainage length of topslope less due to triangular shape and small area of contributing area.
2. Assumed to be the uppermost sideslope swale.

2.2 Determine the transmissivity of the specified drainage geocomposite.

Final Cover Drainage Layer Thickness:

Specified Design:
Drainage layer consists of geocomposite drainage layer - double-sided 250 mil and 6 oz/sy geotextile on sideslopes and single-sided on topslopes. Analysis performed for double-sided drainage layer, as the sideslope drainage layer will be subject to the criticial flow for the topslope/sideslope transition.

Assume the final cover drainage layer will undergo compression due to the weight of soil (erosion layer).

Unloaded Geocomposite Drainage Layer Thickness =	0.250	in
Unit Weight of Erosion Layer Soil =	116	pcf
Thickness of Erosion Layer =	2	ft

Table 2.1 - Final Cover Drainage Layer Thickness

Fill Condition	Slope %	d_S[1] (ft)	P[2] (psf)	t[3] (in)	t[3] (m)
Closed (sideslope)	25	2.06	239	0.245	0.006

[1] d_S is the vertical thickness of soil above the final cover drainage layer.

[2] P is the pressure on the final cover drainage layers due to the weight of the erosion layer soil.

[3] t is the thickness of the final cover drainage layer after being subjected to compression based on the chart shown above in Step 1.2 adapted from Reference 7.

Reduction Factors for Strength and Environmental Conditions:

Table 2.2 - Reduction Factors

Reduction Factors		Closed Condition
RF_{IN}	Delayed Intrusion	1.1
RF_{CC}	Chemical Clogging	2.0
RF_{BC}	Biological Clogging	1.3
Total Reduction Factor[2]		2.86

Overall Factor of Safety to Account For Uncertainties	2.0
Overall Reduction Factor (ORF)[3]	5.72

[1] Values are obtained from References 1, 5, and 6.

[2] The Total Reduction Factor is the product of all the reduction factors.

[3] The Overall Reduction Factor is the product of the Total Reduction Factor and Overall Factor of Safety to Account For Uncertainties.

Manufacturer's Transmissivity Data:

The required minimum transmissivity for the 250-mil-thick double-sided geocomposite is shown on Sheet IIIJ-A-A-10.

Compute the Design Transmissivity (T_{DES}) of the final cover geocomposite drainage layer:

Table 2.3 - Transmissivity of the Specified Geocomposite Material

Fill Condition	P[1] (psf)	t[2] (in)	T[3] (m^2/s)	FS Factor[4]	T_{DES}[5] (m^2/s)	T_{DES}[5] (sf/s)
Closed (sideslope)	239	0.245	5.15E-04	5.72	9.00E-05	9.69E-04

[1] P is the pressure on the final cover drainage layer due to the weight of erosion layer from Table 2.1.

[2] t is the drainage layer thickness from Table 2.1.

[3] T is obtained from the specified transmissivity values for a representative geocomposite leachate collection layer (6 oz/sy polypropylene geotextile with 250-mil-thick geonet) as shown on Sheets IIIJ-A-A-10 (double sided).

[4] ORF is the Overall Reduction Factor obtained from Table 2.2.

[5] T_{DES} is the design transmissivity value calculated using the following equation:

$$T_{DES} = T / (\text{FS Factor})$$

Determine the capacity of the drainage geocomposite based on the estimated transmissivity and compare to the estimated flow rate that occurs due to infiltration.

$$T_{DES} > q_p$$

(flow capacity of the drainage geocomposite per unit width) 0.00097 sf/s > (estimated flow in the drainage geocomposite per unit width) 0.00091 sf/s

Since the capacity of the drainage geocomposite is greater than the estimated flow in the geocomposite, the actual flow depth is contained within the geocomposite and the design is acceptable. Therefore, the maximum spacing between the pipe located just below the grade break on the 4H:1V slope and the grade break (crest) of the landfill is approximately 130 feet.

2.3 Verify that a 6-inch diameter pipe will convey the design flow for the specified pipe spacing.

Maximum Flow to Collection Pipe:

Maximum pipe length ($L_{p\text{-}max}$) specified
Topslope/Sideslope Transition: 500 ft

Flow per unit length of collection pipe (q_p):
$q_p =$ 0.00091 cfs/ft

Maximum pipe flow (Q_{max}):

$Q_{max} = L_{p\text{-}max} \times q_p$

$Q_{max} = L_{p\text{-}max} \times q_p =$ 0.453 cfs

Capacity of the 6-inch diameter collection pipe:

Use Manning Equation to determine the pipe capacity.

Pipe Capacity (Q_{pc}):

$$Q_{pc} = \frac{1.49AR^{2/3}S^{1/2}}{n}$$

(from Chapter 10 of Ref 2)

where:

Q_{pc}: Full Flow Pipe Capacity (cfs)
d: Diameter (inches), HDPE ADS collection pipe
A: Flow area (sf), Cross section of pipe
P: Perimeter (ft)
R: Hydraulic radius (ft) = Cross section (A) / Perimeter (P)
S: Pipe slope (ft/ft)
n: Manning roughness coefficient

Pipe Capacity						
d (inches)	A (sf)	P (ft)	R (ft)	S (ft/ft)	n	Q_{pc} (cfs)
6	0.20	1.57	0.13	0.005	0.010	0.517

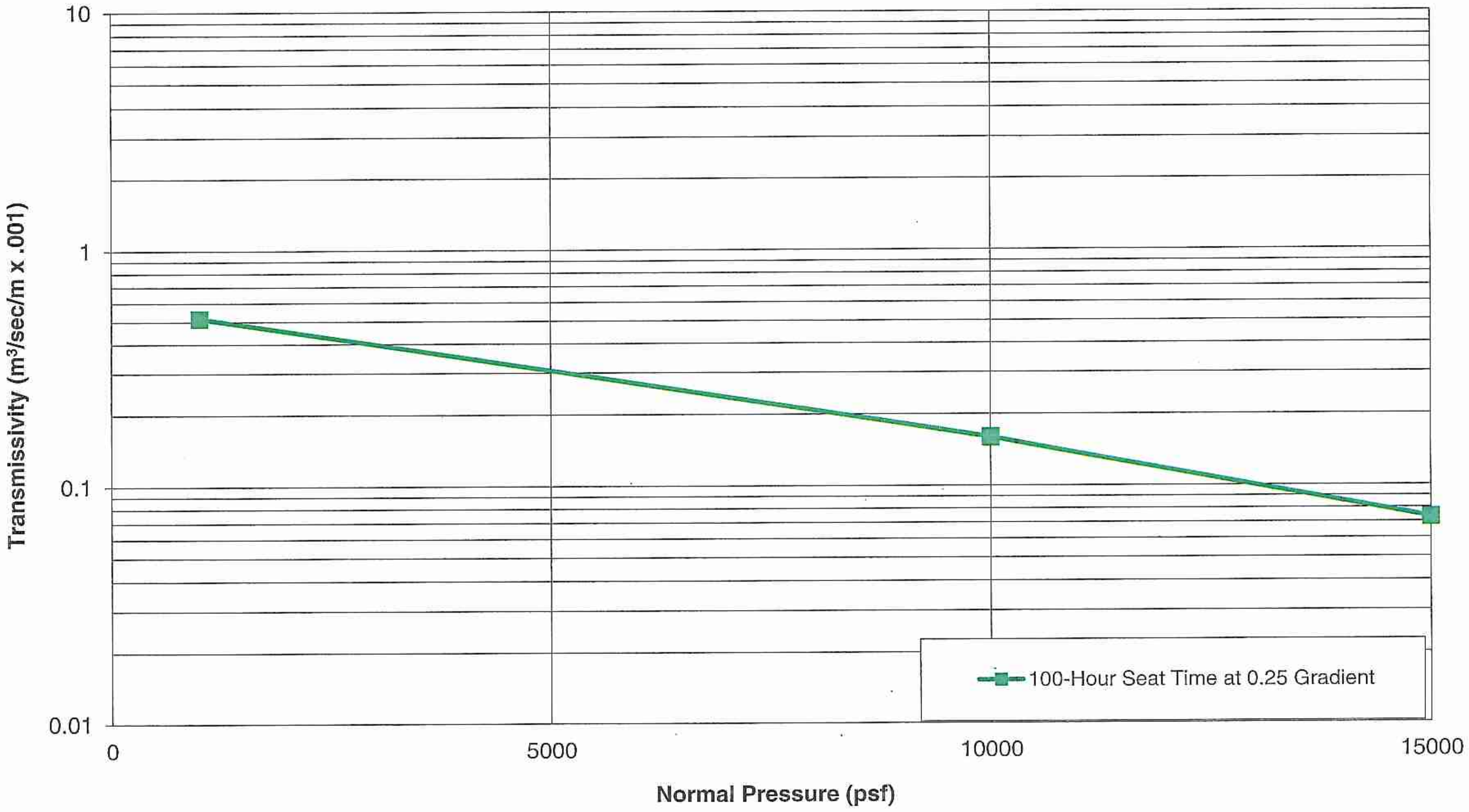
Fullness Ratio of Pipe (f):

$f = Q_{max}/Q_{pc}$

Fullness ratio of pipe (f)				
Fill Condition	d (inches)	Q_{max} (cfs)	Q_{pc} (cfs)	f
Closed Sideslope	6	0.453	0.517	0.88

Conclusion: A pipe size of 6 inches is acceptable for pipe lengths up to approximately 500 feet. In the event a longer pipe is needed an 8-inch pipe will be required.

TRANSMISSIVITY OF DOUBLE-SIDED GEOCOMPOSITE
6 oz/sy Polypropylene Geotextile with 250 mil Drainage Net
(Soil/Geocomposite/Geomembrane)



HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIK
POSTCLOSURE CARE PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

NEVZAT TURAN
84059

12-5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9970

WCG Project No.0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

12-5-2017

1 INTRODUCTION

This appendix addresses §330.463 and §330.465.

This Postclosure Care Plan has been prepared for the Hardin County Landfill (landfill) consistent with Title 30 Texas Administrative Code (30 TAC) Section 330-363-365, Subchapter K. The landfill completion plan for this site consists of final contours and drainage features as depicted on Figure IIIA-A.2 – Landfill Completion Plan.

2 POSTCLOSURE ACTIVITIES

2.1 Monitoring and Maintenance

In accordance with 30 TAC §330.463(b), postclosure care maintenance will commence immediately upon completion of final closure requirements set forth in the Final Closure Plan (Appendix IIIJ). There are no on-site permanent enclosed structures located within the limits of waste, therefore, the requirements in 30 TAC §330.957(m)(1)(D-F) do not apply. Postclosure care maintenance will continue for a period of 30 years unless the TCEQ approves a postclosure period of a different duration. Postclosure care maintenance will consist, at a minimum, of the following requirements carried out by BFI or its designee. The minimum frequencies for monitoring and maintenance activities will be consistent with Section 8.24 of the Part IV – SOP, unless otherwise noted below.

- Retain the right of entry and maintain all rights-of-way to the closed landfill. Access controls will be inspected on a monthly basis.
- Conduct site inspections a minimum of semi-annually after closure.
- Conduct maintenance and/or remediation activities, as needed, in order to maintain the integrity and effectiveness of the final cover, site vegetation, and drainage control systems. Vegetation will be maintained on the final cover to provide a minimum of 95 percent coverage.
- Manage surface run-on and run-off, as needed, in order to minimize the erosion of the final cover system.
- The outlets of the final cover drainage pipes will be inspected. During wet weather conditions when flow is expected, the pipe outlets will be inspected to verify that flow is occurring. If there is no flow, the pipe will be checked for clogging and flushed or replaced as necessary. Inspections will occur semi-annually after closure.
- Correct the effects of settlement, subsidence, ponded water, erosion, or other events or failures, as needed, in-as-much as these situations are detrimental to the integrity of the closed landfill.
- Maintain and operate the leachate collection system in accordance with 30 TAC §330.331 and §330.333 and the EPA's Design Criteria (i.e., less than 12 inches of leachate over the liner, or approved equivalent design). During postclosure, leachate collection sump levels will be measured on a quarterly basis. Site personnel will verify that the leachate level is less than 12 inches

above the lip of each sump. The leachate collection system will be operated consistent with Appendix IIIC – Leachate and Contaminated Water Management Plan, which includes procedures for the operation of the leachate collection sump and storage tanks (if applicable) and the disposal of leachate. BFI may submit a demonstration to the TCEQ that leachate will no longer pose a threat to human health and the environment. If the demonstration is approved by the TCEQ, BFI will be allowed to discontinue the maintenance and operation of the leachate collection system.

- Maintain the groundwater monitoring system in accordance with 30 TAC 330, Subchapter J and monitor groundwater in accordance with an approved Groundwater Sampling and Analysis Plan (refer to Appendix IIIH for the minimum monitoring frequency requirements). However, BFI may request TCEQ approval of (1) an alternative monitoring frequency, and (2) an alternative list of parameters to be monitored.
- Maintain and operate the perimeter landfill gas monitoring system in accordance with 30 TAC 330, Subchapter I. In accordance with 30 TAC §330.371(b)(2), the minimum monitoring frequency will be quarterly. However, BFI may request TCEQ approval of an alternate monitoring frequency.
- Maintain and operate the landfill gas collection and/or control system in accordance with applicable regulations.

2.2 Decreasing Postclosure Period

The length of the postclosure care maintenance period may be decreased by the TCEQ if BFI submits certified documentation signed by an independent professional engineer demonstrating that the reduced period is sufficient to protect human health and the environment. Applicable documentation may include data from monitoring of groundwater, surface water, leachate levels, and landfill gas. The certified documentation must be reviewed and approved by the TCEQ prior to decreasing the length of the postclosure care maintenance period.

2.3 Increasing Postclosure Period

The length of the postclosure care maintenance period may be increased by the TCEQ if it is determined that the increased duration is necessary to protect human health and the environment. It is understood that BFI will receive appropriate notification of any such proposed changes prior to the TCEQ's final determination.

2.4 Completion of Postclosure Period

Upon completion of the postclosure care maintenance period, BFI will submit to the TCEQ certified documentation signed by an independent professional engineer verifying that postclosure care maintenance has been completed in accordance with the approved Postclosure Care Plan. The submittal will include all documentation necessary for certification of completion of postclosure care maintenance. The certification will be placed in the site operating record upon approval. In addition, BFI will submit to the executive director a request for voluntary revocation of the facility permit. Approval of voluntary revocation will be placed in the site operating record.

3 PERSON RESPONSIBLE FOR CONDUCTING POSTCLOSURE ACTIVITIES

At the time of development of this plan, the following person is responsible for overseeing and/or conducting the postclosure care activities at the closed unit of the facility:

BFI Waste Systems of North America, LLC
Forrest Hunter
2525 FM 770
Kountze, TX 77625
409-246-4023

The person responsible for conducting postclosure activities is subject to change. However, as part of the closure notification to TCEQ, as required by 30 TAC §330.463(b)(3)(B), BFI will notify the TCEQ regarding the responsible person.

4 POSTCLOSURE LAND USE

4.1 Intended Use

There are no current planned uses for the landfill after closure. Should use of the closed landfill be considered, plans will be prepared and submitted to the TCEQ for review and approval.

4.2 Constraints on Postclosure Construction

There are no current plans to construct buildings or other structures on the closed landfill. Nevertheless, any future construction activities on the closed landfill will be subject to the provisions of 30 TAC §330.955(b), §330.957(b)(2)(A-D), §330.957(d-e), and §330.957(m)(l)(D-F), which require, among other things, prior approval of the TCEQ.

5 POSTCLOSURE COST ESTIMATE

A detailed written cost estimate, in current dollars, of the cost of hiring a third party to conduct postclosure care activities for the municipal solid waste unit, in accordance with the Postclosure Care Plan, is provided in Appendix IIIL – Cost Estimate for Closure and Postclosure Care, and will be updated upon construction of new liner areas to ensure that the post closure cost estimate accounts for the entire developed liner area.

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2214B

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIL

CLOSURE AND POSTCLOSURE CARE COST ESTIMATES

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

NEVZAT TURAN
84059

12. 5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9970

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

12-5-2017

1 INTRODUCTION

This cost estimate for closure and postclosure care has been prepared for the Hardin County Landfill (landfill) consistent with Title 30 Texas Administrative Code (30 TAC) Chapter 330, Subchapter L. The financial assurance documentation for the currently approved site is included in Appendix IIIL-1. Financial assurance documentation will be updated on an annual basis and maintained in the site operating record.

This appendix addresses §330.63(j), §330.501, §330.503, §330.505, and §330.507.

2 CLOSURE COST ESTIMATE

This cost estimate shows the cost of hiring a third party to close the largest waste fill area that could potentially be open in the year to follow and those areas that have not received final cover. As shown on Figure IIIL.1, the areas to be closed include the 32-acre active Type I municipal solid waste area (Cells 1-6 (partial)), and the 1.4-acre Type IV C&D area, for a combined area of 33.4 acres. There are no inactive areas at the site. The closure cost estimate includes (1) engineering costs required to administratively close the facility; (2) construction costs involved with the construction of the final cover systems (Type I and Type IV), the landfill gas system, and other activities required to close the facility; and (3) contingencies and other administrative costs that may be incurred during closure activities. A summary of the estimated closure costs is presented in Table IIIL-1. The costs will be adjusted annually as indicated in Section 4.

An assessment will be completed each year to verify that the closure cost estimate shown in Table IIIL-1 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the closure costs are based on the current active and inactive areas and that all other permit conditions are addressed by the closure cost estimate, which includes confirming the number of groundwater monitor wells and landfill gas probes in the estimate match the wells and probes that are either in-place or need to be installed to match the number of wells and probes listed in the permit for the current phase of development.

The estimates will be updated, as needed, consistent with the procedures noted in Section 4. Continuous financial assurance coverage for closure of the facility will be provided until the facility reaches postclosure status and the requirements of the facility's final closure plan have been approved by the executive director. Approval documentation will be placed in the site operating record. Additional information regarding the closure cost estimate is summarized below.

2.1 Engineering Costs

The cost estimate for hiring a third party is based on closing the largest area scheduled to receive final cover, which is 33.4 acres (32-acre Type I area and 1.4-acre Type IV area). Separate estimates are provided for covering of the two areas and the cost combined for the closure estimate. These areas are illustrated on

Appendix IIIJ, Figure IIIJ.1. A boundary survey will be required for the filing of the affidavit of closure, deed recording of any area of the site that has received waste, and publishing the public notice of closure activities. A topographic survey will be required to determine the existing height and top slope of the landfill areas so that permit compliance can be evaluated and the final closure system, drainage system, and final grading can be engineered. An inspection of the site is included to identify any disposal areas requiring closure, drainage and erosion protection improvements, and identify any potential regulatory deficiencies. The site evaluation also includes the costs for a third party consultant to develop a preliminary engineering report that identifies the status of the site. The report will identify all areas of work necessary to close the landfill. The engineering costs include the cost to develop construction plans and closure schedules, closure testing and inspections, and TPDES permit document preparation. In addition, administration costs (e.g., construction contracts and contract administration) have been included.

2.2 Construction Costs

As shown on Figure IIIL.1, construction costs include construction of the final cover system drainage improvements and an LFG system for the 32-acre Type I area and final covering of the 1.4-acre Type IV area. The final cover systems are detailed in Appendix IIIA-A. The construction costs include site grading and drainage including the final grading of the site, site fencing and security (installation, repairs, and improvements), drainage improvements, and erosion and sedimentation controls for proper closure of the site.

Prepd by: DEP
Date: 12/5/2017

Revd by: NT
Date: 12/5/2017

HARDIN COUNTY LANDFILL
CLOSURE COST ESTIMATE
0120-758-11-02

Required: Estimate the cost to hire a third party to conduct final closure activities.

References:
1. Texas Natural Resources Conservation Commission, *Cost Estimate Handbook for Closure and Post Closure Care*, Version 1, August 1993.
2. *2010 RS Means Heavy Construction Cost Data*, 24th Annual Edition
3. Construction costs from recent similar construction projects and cost estimates from heavy construction contractors.

Solution:

Final closure will require construction of final cover over	33.4 acres[1]
Final closure will require administrative closure of	79 acres
Final closure will require the installation of	0 monitor wells
Final closure will require the installation of	0 gas probes
Final closure will require the installation of	32 LFG Passive Vents acres

NO.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1.0	**Engineering Costs**				
1.1	Topographic Survey	79	ac	$32.91	$2,600
1.2	Boundary Survey	79	ac	$22.15	$1,750
1.3	Site Evaluation	79	ac	$32.91	$2,600
1.4	Development of Plans	33.4	ac	$958.10	$32,001
1.5	Administration	1	LS	$11,000.00	$11,000
1.6	Inspection and Testing	33.4	ac	$6,287.42	$210,000
1.7	Groundwater Consultant	-	LS		
1.8	Permits	1	LS	$10,000.00	$10,000
	Engineering Total				**$269,950**
2.0	**Construction Costs**				
2.1	Final Cover System				
2.1.1	Infiltration Layer	33.4	ac	$7,865.00	$262,691
2.1.2	Erosion Layer	33.4	ac	$6,600.00	$220,440
2.1.3	Flexible Membrane Layer	32	ac	$18,500.00	$592,000
2.2	Landfill Gas Passive Vent System	32	ac	$1,365.00	$43,680
2.3	Vegetation	33.4	ac	$2,800.00	$93,520
2.4	Site Grading and Drainage	33.4	ac	$5,700.00	$190,380
2.5	Site Fencing and Security		ac		
2.6	Leachate Collection System	-	lf		
2.7	Monitor Wells	-	ea		
2.8	Gas Probes	-	ea		
2.9	Site Clean Up	1	LS	$10,000.00	$10,000
	Construction Total				**$1,412,711**
	Engineering and Construction Total				**$1,682,661**
	Contingency	10	%		$168,266
3.0	**Administrative Costs**				
3.1	Contract Performance Bond	1.5	%		$2,524
3.2	TCEQ Contract Admin/Legal Fees		LS		$54,600
	TOTAL				$1,908,051

***This closure cost estimate was developed in 2017 dollars. It incorporates the closure of all storage and processing units and the facility.**

[1]The largest area requiring final cover includes 1.4 acres of Type IV waste disposal area and 32 acres of Type I waste disposal area resulting in the 33.4-acre total.

3 POSTCLOSURE CARE COST ESTIMATE

The postclosure care period has been established by TCEQ regulations to be 30 years. This detailed cost estimate shows the cost of hiring a third party to conduct routine maintenance and monitoring during the postclosure period. During this period, continuous maintenance must be ongoing to assure the integrity and effectiveness of the final cover system, monitoring systems, leachate collection system, drainage system, and landfill gas system. A summary of the postclosure care cost estimate is presented in Table IIIL-2. The costs will be adjusted annually as indicated in Section 4. An assessment will be completed each year to verify that the postclosure care cost estimate shown in Table IIIL-2 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the postclosure costs are based on the current active area and that all other permit conditions are addressed by the postclosure care cost estimate (for instance, verifying the LFG O&M cost estimate is updated to match the number of wells that will need to be maintained during the postclosure period). Continuous financial assurance coverage for the postclosure care period of the facility will be provided until the facility is released from the postclosure care period by the executive director, in accordance with the requirements of the facility's postclosure care plan. The estimates will be adjusted, as needed, consistent with the procedures noted in Section 4.

As shown in Table IIIL-2, the postclosure care cost estimate includes the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. The estimates are based on the largest area with waste in-place to be closed which is 33.4 acres. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for a professional engineer to prepare construction plans and specifications to correct problems identified during the site inspections. Gas monitoring and groundwater sampling and analysis will be performed as outlined in the Postclosure Care Plan (Appendix IIIK).

Postclosure construction/maintenance estimates include the costs to correct problems identified during the engineering site inspections and as specified by the engineer's corrective action plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the postclosure period.

These costs include cover and drainage maintenance and annual reseeding and mowing costs.

The leachate disposal costs include leachate removal from the portion of the landfill with a leachate collection system (32 acres). Postclosure landfill gas control system O&M costs include regular calibration and maintenance of regulatory equipment, such as valves and flow meters, associated system components of the active collection system and condensate disposal for the developed site.

Prepd by: DEP
Date: 12/5/2017

Revd by: NT
Date: 12/5/2017

HARDIN COUNTY LANDFILL
POSTCLOSURE COST ESTIMATE
0120-758-11-02

Required: Estimate the cost to hire a third party to conduct postclosure care activities.

References: 1. Texas Natural Resources Conservation Commission, *Cost Estimate Handbook for Closure and Postclosure Care* , Version 1, August 1993.

Solution:
Postclosure care period = 30 years
Permit area = 79 acres
Waste footprint[1] = 33.4 acres
Number of monitor wells = 8 wells
Number of gas probes = 8 probes

NO.	ITEM	ANNUAL QTY	UNIT	UNIT COST	TOTAL COST
1.0	**Engineering Costs**				
1.1	Postclosure Plan	NA	LS	-	-
1.2	Site Inspections	79	ac	40.00	$3,160
1.3	Correctional Plan and Specifications	33.4	ac	110.00	$3,674
1.4.1	Groundwater Monitoring	16	event	1,120.00	$17,920
1.4.2	Landfill Gas Monitoring	32	event	80.00	$2,560
2.0	**Construction / Maintenance Costs**	33.4	ac	175.00	$5,845
3.0	**Leachate Disposal**	59,660	gal	0.06	$3,281
4.0	**Landfill Gas Management**		ac	-	
	Subtotal				**$36,440**
	Contingency	10	%		$3,644
5.0	**Administration**	10	%		$3,644
	Annual Postclosure Cost				$43,728
	Total Postclosure Cost				$1,311,851

***This postclosure cost estimate was developed in 2017 dollars.**

[1]The waste footprint includes the existing waste disposal footprint of 32 acres of Type I waste and 1.4 acres of Type IV waste.

4 COST ESTIMATE ADJUSTMENTS

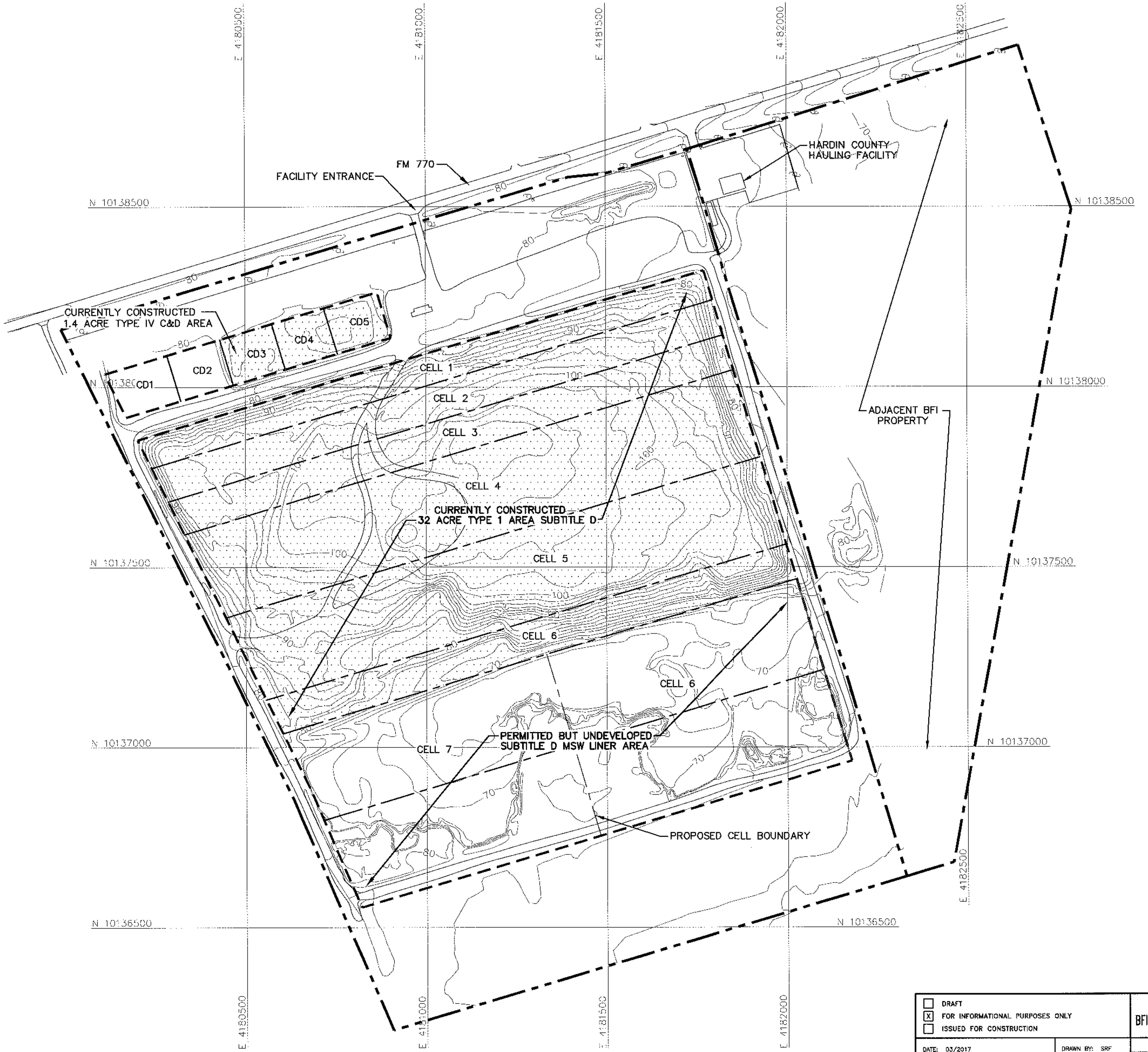
During the active life of the site, BFI Waste Systems of North America, LLC will annually adjust the cost estimates for inflation within 60 days prior to the anniversary date of the establishment of the financial instrument(s). The adjustment may be made by recalculating the maximum costs of closure and postclosure in current dollars by using the inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the United States Department of Commence in its Survey of Current Business, or as published by the TCEQ for determining the increase of required financial assurance. The inflation factor is the result of dividing the latest published annual deflator by the deflator for the previous year. The first adjustment is made by multiplying the closure and postclosure care cost estimates by the inflation factor. The result is the adjusted closure and postclosure care cost estimates. Subsequent adjustments are made by multiplying the latest adjusted closure and postclosure estimates by the latest inflation factor.

An increase in the closure or postclosure care cost estimate and the amount of financial assurance will be made if changes to the final closure or postclosure care plan or the landfill conditions increase the maximum cost. If the landfill area requiring closure under the plan changes (for instance, increases due to liner construction), then financial assurance will be adjusted within 60 days prior to the anniversary date of the establishment of the financial assurance (a permit modification will be approved by the TCEQ prior to making the adjustment).

A reduction in the closure or postclosure care cost estimate and the amount of financial assurance may be submitted if the cost estimate exceeds the maximum costs of closure at any time during the remaining life of the unit or postclosure care remaining over the postclosure care period. BFI Waste Systems of North America, LLC will submit written notice to the executive director of the detailed justification for the reduction of the cost estimates and the amount of financial assurance. A reduction in the cost estimate and financial assurance will be considered a permit modification.

In the event that the facility were to enter into corrective action during the postclosure period, BFI Waste Systems of North America, LLC will submit a corrective action cost estimate to the TCEQ in accordance with 30 TAC §330.509.

In accordance with 30 TAC §330.503(a) and §330.463(b)(3)(D), evidence of any additional financial assurance resulting from the annual revision of cost estimates will be provided to the TCEQ within 30 days after the annual anniversary date.



N

0 150 300
SCALE IN FEET

LEGEND

— · — · —	BFI ADJACENT PROPERTY BOUNDARY
— · —	PERMIT BOUNDARY
— — —	CURRENTLY PERMITTED LIMITS OF WASTE
— — —	CELL BOUNDARY (SEE NOTE 5)
——70——	EXISTING CONTOUR
N 10137500	STATE PLANE COORDINATE GRID
▨	EXISTING TYPE 1 SUBTITLE D LINER AREA
▨	EXISTING TYPE IV C&D AREA

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS DEVELOPED BY WEAVER CONSULTANTS GROUP FROM AERIAL PHOTOGRAPHY FLOWN 05-17-2016.

NEVZAT TURAN
84059

12-5-2017

☐ DRAFT
☒ FOR INFORMATIONAL PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2017
FILE: 0120-758-11
CAD: IIIL.1 LARGEST COVER.DWG

DRAWN BY: SRF
DESIGN BY: NT
REVIEWED BY: NT

PREPARED FOR
BFI WASTE SYSTEMS OF NORTH AMERICA, LLC

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2017	OWNERSHIP CHANGE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

MAJOR PERMIT AMENDMENT LARGEST AREA TO REQUIRE FINAL COVER

HARDIN COUNTY LANDFILL
KOUNTZE COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING IIIL.1

O:\0120\758\2214B EXPANSION\IIIL\IIIL.1 - 1 LARGEST CLOSURE.dwg, 11/15/2017 2:26:36 PM, rsellers, 1:2

APPENDIX IIIL-1

FINANCIAL ASSURANCE DOCUMENTATION FOR THE CURRENTLY APPROVED SITE

REPUBLIC
SERVICES

September 26, 2017

Ms. Deborah Wisneski
Financial Assurance Section
Texas Commission on Environmental Quality
12100 Park 35 Circle, Bldg. A, MC 184
Austin, Texas, 78753

2017 Financial Assurance Renewal for Hardin County Landfill, Permit No. 2214A

Dear Ms. Wisneski:

On behalf of Hardin County Landfill please find attached the renewed financial assurance mechanism covering the estimated closure and post-closure for the Hardin County Landfill.

Attached is Bond No. 401074, executed by Ohio Indemmity Company, in the amount of Three Million Two Hundred Sixty Two Thousand Two Hundred and Eighty Two Dollars and 57/100 ($3,262,282.57).

If you have any questions or require additional information, please contact me at 619-344-1862.

Sincerely,

Ruby Teague

Ruby Teague
Environmental Manager
Cc: Bill Voightman

WELLS FARGO INSURANCE

Wells Fargo
Insurance Services USA, Inc.
CA DOI # 0D08408
999 Third Avenue
Suite 4100
Seattle, WA 98104

Tel: 206 731 1200
Fax: 206 731 1209

September 22, 2017 **FedEx Priority Overnight**

MEMORANDUM

Ruby Teague
Republic Services
5757 Oats Rd Suite A
Houston, TX 77078

Principal	Obligee	Bond #	Bond Amount	Description
BFI Waste Systems of North America, LLC	TCEQ	401074	$3,262,282.57	Closure/Post Closure Bond

Ruby;

Please find enclosed your executed renewal bond as noted above. Please have bond signed before you have it filed with the Obligee at your earliest convenience.

Should you have any questions or need anything further regarding these items, please give me a call @ 206-731-1243.

Have a great day!

Brandi Heinbaugh

Brandi Heinbaugh
Account Representative
Surety Services

Direct: (206) 731-1243
Fax: (206) 731-1209
E-mail: Brandi.heinbaugh@wellsfargo.com

REPLACES AND SUPERSEDES PRIOR OHIO INDEMNITY COMPANY BOND #300114

Figure: 30 TAC §37.321

PERFORMANCE BOND

Date bond executed September 19, 2017

Effective date: September 10, 2017

Principal:

BFI Waste Systems of North America, LLC
2525 FM 770 RD
Kountz TX 77625

Type of organization: Limited Liability Company

State of incorporation: N/A

Surety:

Ohio Indemnity Company
250 East Broad Street, 10th Floor
Columbus OH 43215

MSW Permit No. 2214A

(Name and Address of Facility)

Hardin County Landfill
2525 FM 770
Kountz, TX 77625

Closure: $ 1,832,444.32

Post Closure: $ 1,429,838.25

Corrective Action: $

Total penal sum of bond: $ 3,262,282.57

Surety's bond number: 401074

Know All Persons By These Presents, That We, the Principal and Surety hereto are firmly bound to the Texas Commission on Environmental Quality, hereinafter called TCEQ, in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said Principal is required, under the appropriate program area, to comply with permit requirements in order to own or operate each facility identified above, and

Whereas said Principal is required to provide financial assurance for closure, post closure, or corrective action as a condition of the permit or other applicable requirements, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance;

Now, therefore, the conditions of this obligation are such that if the Principal shall faithfully perform closure, post closure, or corrective action, whenever required to do so, of each facility for which this bond guarantees closure or post closure in accordance with the closure plan or post closure plan and other applicable requirements of the permit, or perform corrective action in accordance with the permit or other applicable requirements as may be amended, pursuant to all applicable laws, statutes, rules and regulations, as such laws, statutes, rules, and regulations may be amended,

Or, if the Principal shall provide alternate financial assurance, as specified in 30 Texas Administrative Code, Chapter 37 (relating to Financial Assurance) and obtain the TCEQ executive director's written approval of such assurance, within 90 days after the date of notice of cancellation is received by both the Principal and the TCEQ executive director from the Surety, then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The Surety shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by the TCEQ executive director that the Principal has been found in violation of the closure, post closure, or corrective action requirements for a facility for which this bond guarantees performance of closure, post closure, or corrective action, the Surety shall either perform closure, post closure, or corrective action in accordance with the closure plan or post closure plan and other applicable requirements of the permit, or perform corrective action in accordance with the permit or other applicable requirements, or place the amount guaranteed for the facility in the standby trust fund as directed by the TCEQ executive director.

Upon notification by the TCEQ executive director that the Principal has failed to provide alternate financial assurance, as specified in 30 Texas Administrative Code, Chapter 37, and obtain written approval of such assurance from the TCEQ executive director during the 90 days following receipt by both the Principal and the TCEQ executive director of a notice of cancellation of the bond, the Surety shall place funds in the amount guaranteed for the facility into the standby trust fund.

The surety hereby waive(s) notification of amendments to closure plans or post closure plans and other applicable requirements of the permit, or permits requiring corrective action or other applicable requirements for corrective action, applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety hereunder exceed the amount of said penal sum.

The Surety may cancel the bond by sending notice of cancellation by certified mail to the owner and operator and to the TCEQ executive director provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the Principal and the TCEQ executive director, as evidenced by the return receipts.

The principal may terminate this bond by sending written notice to the Surety, provided, however, that no such notice shall become effective until the Surety receive(s) written authorization for termination of the bond by the TCEQ executive director.

In Witness Whereof, The Principal and Surety have executed this Performance Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording on this surety bond is identical to the wording specified in 30 Texas Administrative Code §37.321 as such regulation was constituted on the date this bond was executed.

BFI Waste Systems of North America, LLC

Principal

(Signature)

(Name) Debbie Lindstrom

(Title) Attorney-in-Fact

(Corporate seal)

Corporate Surety:

Ohio Indemnity Company

State of Incorporation: OH

Liability limit: 4000000

Signature

Timothy S. Buhite , Attorney-in-Fact

(Corporate seal)

Bond premium: $ 11,418.00

POWER OF ATTORNEY

Republic Services, Inc., a Delaware corporation having its principal place of business at 18500 N. Allied Way, Phoenix, Arizona 85054, hereby makes, constitutes and appoints WELLS FARGO INSURANCE SERVICES USA, INC., acting through and by any one of Debbie Lindstrom, John Drummey, Jr., Timothy S. Buhite, Kathleen M. Mitchell, Scott C. Alderman, Peggy A. Firth, Simone Rae Frederick, or Brandi Heinbaugh, its true and lawful attorney to sign and seal any and all surety bonds, bid bonds, performance bonds and payment bonds at or below the monetary threshold of Five Million Dollars ($5,000,000.00) on behalf of REPUBLIC SERVICES, INC. and its subsidiaries, relating to the provision of solid waste collection, transportation, transfer, recycling, disposal and/or energy services by REPUBLIC SERVICES, INC. and its subsidiaries and affix its corporate seal to and deliver for and on behalf as surety thereon or otherwise, bonds of any of the following classes, to wit:

1. Surety bonds, bid bonds, performance bonds and payment bonds to the United States of America or agency thereof, including those required or permitted under the laws or regulations relating to Customs or Internal Revenue; license and permit bonds or other indemnity bonds under the laws, ordinances or regulations of any state, city, town, village, board, other body organization, public or private; bonds to transportation companies; lost instrument bonds; lease bonds; worker's compensation bonds; miscellaneous surety bonds; and bonds on behalf of notaries public; sheriffs, deputy sheriffs and similar public officials.

2. Surety bonds, bid bonds performance bonds and payment bonds on behalf of REPUBLIC SERVICES, INC. and its subsidiaries in connection with bids, proposals or contracts.

REPUBLIC SERVICES, INC. hereby agrees to ratify and confirm whatsoever WELLS FARGO INSURANCE SERVICES USA, INC. shall lawfully do pursuant to this power of attorney, and until notice or revocation has been given by REPUBLIC SERVICES, INC., the acts of said attorney shall be binding on the undersigned.

IN WITNESS WHEREOF, this Power of Attorney has been signed this 9 day of January, 2017 on behalf of REPUBLIC SERVICES, INC. by its Assistant Secretary Eileen B. Schuler.

REPUBLIC SERVICES, INC.,
a Delaware Corporation

Eileen B. Schuler

STATE OF ARIZONA

COUNTY OF MARICOPA

Subscribed and sworn to before me this 9TH day of JANUARY, 2017 by Eileen B. Schuler, Assistant Secretary.

OFFICIAL SEAL
MATTHEW NORDQUIST
Notary Public - Arizona
MARICOPA COUNTY
My Commission Expires
MAY 31, 2019

Notary Public

OHIO INDEMNITY COMPANY
COLUMBUS, OHIO
POWER OF ATTORNEY

POWER NO. 401074

KNOW ALL MEN BY THESE PRESENTS, that Ohio Indemnity Company, a corporation organized and existing under the laws of the State of Ohio with its principal office at 250 East Broad Street, 7th Floor, Columbus Ohio 43215, by and through the undersigned, its President, does hereby nominate, constitute and appoint:

Timothy S. Buhite

as its true and lawful Attorneys-in-Fact to make, execute, attest, seal, acknowledge and deliver for and on its behalf, as Surety, and as its act and deed, where required, any and all bonds, undertakings, recognizances and written obligations in the nature thereof, PROVIDED, however, that the obligation of the Company under this Power of Attorney shall not exceed Five Million Dollars ($5,000,000).

IN WITNESS WHEREOF, the Ohio Indemnity Company has caused its corporate seal to be affixed hereunto, and these presents to be signed by its duly authorized officers this 21st day of April, 2016.

OHIO INDEMNITY COMPANY

BY: ______________________
John S. Sokol, President

BY: ______________________
Stephen J. Toth, Vice President

Notary Public)
State of Ohio) SS:

On this 21st day of April, 2016, before the subscriber, a Notary for the State of Ohio, duly commissioned and qualified, personally came John S. Sokol and Stephen J. Toth of the Ohio Indemnity Company, to me personally known to be the individuals and officers described herein, and who executed the preceding instrument and acknowledged the execution of the same and being by me duly sworn, deposed and said that they are the officers of said Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and the said Corporate Seal and signatures as officers were duly affixed and subscribed to the said instrument by the authority and direction of said Corporation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at Columbus, Ohio, the day and year above written.

SHERRY E. BIXLER
Notary Public, State of Ohio
RECORDED IN PICKAWAY COUNTY
MY COMMISSION EXPIRES
01-06-2020

BY: Sherry E Bixler
Sherry E. Bixler, Notary Public
My Commission Expires 01/06/2020

State of Ohio) SS:

I, the undersigned, Secretary of the Ohio Indemnity Company, a stock corporation of the State of Ohio, DO HEREBY CERTIFY that the foregoing Power of Attorney remains in full force.

Signed and sealed in Columbus, Ohio this 19th day of September, 2017.

BY: ______________________
Matthew C. Nolan, Secretary

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2214B
PERMIT AMENDMENT APPLICATION

PART IV – SITE OPERATING PLAN

DAVID E. POE
81734
12-5-2017

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

NEVZAT TURAN
84059
12-5-2017

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS
DAVID E. POE
81734
LICENSED PROFESSIONAL ENGINEER
12-5-2017

CONTENTS (Continued)

STATE OF TEXAS
DAVID E. POE
81734
LICENSED PROFESSIONAL ENGINEER

12-5-2017

CONTENTS (Continued)

STATE OF TEXAS
DAVID E. POE
81734
LICENSED PROFESSIONAL ENGINEER

12-5-2017

LIST OF ACRONYMS

ADC – Alternative Daily Cover

ADCOP – Alternative Daily Cover Operating Plan

CFR – Code of Federal Regulations

DOT – Department of Transportation

EPA – U.S. Environmental Protection Agency

FMLER – flexible membrane liner evaluation report

FWS – U.S. Fish and Wildlife Service

GLER – geomembrane liner evaluation report

LCS – leachate collection system

LFG – landfill gas

MSDS – Material Safety Data Sheets

msl – mean sea level

MSW – Municipal Solid Waste

NRACM – nonregulated asbestos-containing material

OSHA – Occupational Health and Safety Administration

PCBs – polychlorinated biphenyls

RACM – regulated asbestos-containing material

RCRA – Resource Conservation Recovery Act

SDP – site development plan

SLER – soils and liner evaluation report

SOP – site operating plan

TAC – Texas Administrative Code

TCEQ – Texas Commission on Environmental Quality

TxDOT – Texas Department of Transportation

WWTP – wastewater treatment plant

TABLES AND FIGURES

Tables

Figures

1 INTRODUCTION

1.1 Background

This Site Operating Plan (SOP) has been prepared for the Hardin County Landfill consistent with Title 30 Texas Administrative Code (TAC) §330.65 and contains the information required by 30 TAC §330.127. This SOP includes provisions for site management and site operating personnel to meet the general and site-specific requirements included in 30 TAC Subchapter D – Operational Standards for Municipal Solid Waste Landfill Facilities for the day-to-day operation of the facility. This SOP will be retained on-site in the site operating record throughout the active life of the facility and through the postclosure care maintenance period.

The Hardin County Landfill is an existing 79-acre, Municipal Solid Waste (MSW) Disposal Facility (TCEQ Permit No. MSW-2214B) owned and operated by BFI Waste Systems of North America, LLC, a subsidiary of Republic Services, Inc. (RSI). The facility includes a 49.6-acre Type I disposal area and a 2.4-acre Type IV disposal area.

The Hardin County Landfill is located in Hardin County, Texas and provides waste disposal capacity for residences and businesses of Hardin County, and surrounding counties. The facility is located approximately 3 miles southwest of the City of Kountze on FM 770. The facility is located outside the city limits of Kountze, within unincorporated Hardin County. The property upon which the facility is located is not zoned.

The primary function of the facility is MSW disposal. Support facilities are provided including a citizen's collection center, gatehouse, equipment maintenance and storage area, and a site entrance road.

The type of wastes accepted by the facility are described in Section 8.3 of this SOP.

Wastes which will not be accepted for disposal at the Hardin County Landfill include regulated hazardous waste, medical waste, radioactive waste, liquid wastes that do not pass the paint filter test, and waste prohibited by the TCEQ (30 TAC §330.15(e)).

The facility provides waste disposal for individuals and communities within Hardin County, and surrounding counties. The Hardin County Landfill is currently accepting approximately 152 tons per day or 55,579 tons per year, which is projected to increase to 181 tons per day or 66,151 tons per year over the permitted life of the facility, based on population growth projections developed from Texas Water Development Board – 2016 Regional Water Plan data. These rates include both Type I and Type IV waste received at the facility. However, in the event BFI Waste Systems of America, LLC or Republic Services, Inc. (RSI) identify other available waste streams and markets within the State that can be disposed at the Hardin County Landfill, the facility may accept up to 3,000 tons per day, or 1,095,000 tons per year based on the increased rates of disposal.

This SOP provides guidance for site management and site operating personnel for the daily operation of the Hardin County Landfill. This SOP also includes provisions for site management and site operating personnel to meet the general and site-specific requirements for the waste acceptance rate established in the permit.

1.2 General

The operational requirements for the Hardin County Landfill are set forth in the approved Part III – Site Development Plan (SDP) and Part IV – Site Operating Plan (SOP). The following documents are operational requirements and are part of the site operating record of the Hardin County Landfill:

- Permit No. MSW-2214B
- Part III – Site Development Plan
    - Appendix IIIA – Landfill Unit Design Information
    - Appendix IIIB – Site Life Calculations
    - Appendix IIIC – Leachate and Contaminated Water Plan
    - Appendix IIID – Liner Quality Control Plan
    - Appendix IIIE – Geotechnical Report
    - Appendix IIIF – Surface Water Drainage Plan
    - Appendix IIIG – Geology Report
    - Appendix IIIH – Groundwater Monitoring, Sampling and Analysis Plan
    - Appendix IIII – Landfill Gas Management Plan
    - Appendix IIIJ – Closure Plan
    - Appendix IIIK – Post Closure Care Plan
    - Appendix IIIL – Closure and Postclosure Care Cost Estimates
- Part IV – Site Operating Plan
    - Appendix IIIA – Load Inspection Report
    - Appendix IVB – Special Waste Acceptance Plan
    - Appendix IVC – ADC Operating Plan

1.3 Pre-Operation Notice (30 TAC §330.123)

The facility will provide notice of construction of each new waste disposal cell in the form of a Soil Liner Evaluation Report (SLER) and a Geomembrane Liner Evaluation Report (GLER) to the Executive Director for review 14 days prior to the placement of waste within the cell. The Executive Director has 14 days to provide a verbal or written response. If no response has been received by the end of the fourteenth day following the Executive Director's receipt of the report, the operator may begin placing waste.

2 RECORDKEEPING REQUIREMENTS (30 TAC §330.125)

2.1 Documents (30 TAC §330.125(a))

The Hardin County Landfill will maintain the site operating record for the facility onsite. Copies of documents that are part of the approved permitting process that are considered part of the site operating record are listed in Table 2-1.

2.2 Analytical Data (30 TAC §330.125(b))

Within seven working days following completion or receipt of analytical data, the Hardin County Landfill will record and retain in the site operating record those items listed in Table 2-1.

2.3 Notification (30 TAC §330.125(c))

The Hardin County Landfill will place the items included in Table 2-1 into the site operating record within the specified time period. The facility will maintain the site operating record in an organized format, where information is easily locatable and retrievable. The site operating record will be furnished to the Executive Director upon request, and will be made available on site for inspection by the Executive Director.

2.4 Records Retention (30 TAC §330.125(d))

The Hardin County Landfill will retain all information contained within the site operating record of the facility and all plans required for the facility for the life of the facility including the postclosure care period, unless otherwise noted within this SOP.

2.5 Personnel Training Records and Licenses (30 TAC §330.125(e) and (f))

The Hardin County Landfill will maintain personnel training records in accordance with 30 TAC §335.586(d)-(e). Personnel training requirements will be consistent with Section 3 – Personnel and Training of this SOP. Training and notification procedures for the exclusion of prohibited wastes will be included as part of these records. A copy of this portion of the records will be made available for general reference by facility personnel. Where other training and notification procedures are developed, such as fire training, these will also be copied and made available to the facility personnel for their reference.

Training records for current facility personnel will be maintained until closure of the facility. Records of former employees will be maintained for three years from the date the employee last worked at the facility. Records for each facility personnel will include name, job title, job description, introductory training, continuing training, and documentation of training. In accordance with 30 TAC §330.125(f), the facility will maintain personnel operator licenses issued in accordance with 30 TAC 30, Subchapter F, relating to MSW facility supervisors. Personnel training records and personnel operator licenses will be maintained in the site operating record as listed in Table 2-1.

2.6 Alternative Schedules (30 TAC §330.125(g))

The Executive Director may set alternative schedules for recordkeeping and notification requirements as specified in 30 TAC §330.125(a)-(f), except for notification requirements contained in 30 TAC 330, Subchapter M, for any proposed lateral expansion located within a six-mile radius of any airport runway end used by turbojet or piston-type aircraft or notification relating to landowners whose property overlies any part of a plume of contamination if contaminants have migrated off-site as indicated by groundwater sampling.

2.7 Annual Waste Acceptance Rate (30 TAC §330.125(h))

The Hardin County Landfill will maintain as part of the site operating record, documentation of the annual waste acceptance rate for the facility in accordance with 30 TAC §330.125(h). Records will include maintaining the quarterly solid waste summary reports and the annual solid waste summary report as required by 30 TAC §330.675. The annual waste acceptance rate, as established by the sum of the previous four quarterly summary reports, will be evaluated by the facility to determine if the waste acceptance rate exceeds the rate estimated in the approved permit and SDP. Should an increase in waste acceptance be established, the facility will determine if the increase is due to a temporary occurrence. If not due to a temporary occurence, a permit modification would be prepared in accordance with then applicable TCEQ regulations to propose any needed changes in the site operating plan to manage the increased waste acceptance rate. However, in the event that either BFI or RSI identifies other available waste streams and markets within the state that can be disposed at the Hardin County Landfill, the facility may accept up to 3,000 tons per day or 1,095,000 tons per year based on the increased rates of disposal.

This SOP includes provisions for site management and site operating personnel to meet the general and site-specific requirements for the waste acceptance rates established in the permit.

Table 2-1
Records to be Maintained in the Site Operating Record

Records to be Maintained in the Site Operating Record	Frequency	Rule Citation (30 TAC)
MSW Disposal Permit No. 2214B	Submittal of Permit Application	§330.125(a)
Part III – Site Development Plan	Submittal of Permit Application	§330.125(a)
Appendix IIIA – Landfill Unit Design Information	Submittal of Permit Application	§330.125(a)
Appendix IIIB – Site Life Calculations	Submittal of Permit Application	§330.125(a)
Appendix IIIC – Leachate and Contaminated Water Plan	Submittal of Permit Application	§330.125(a)
Appendix IIID – Liner Quality Control Plan	Submittal of Permit Application	§330.125(a)
Appendix IIIE – Geotechnical Report	Submittal of Permit Application	§330.125(a)
Appendix IIIF – Surface Water Drainage Plan	Submittal of Permit Application	§330.125(a)
Appendix IIIG – Geology Report	Submittal of Permit Application	§§330.125(a)
Appendix IIIH – Groundwater Monitoring, Sampling and Analysis Plan	Submittal of Permit Application	§330.125(a) and §330.125(b)(7)
Appendix IIII – Landfill Gas Management Plan	Submittal of Permit Application	§330.125(a)
Appendix IIIJ – Closure Plan	Submittal of Permit Application	§330.125(a) and 330.125(b)(6)
Appendix IIIK – Post Closure Care Plan	Submittal of Permit Application	§330.125(a) and 330.125(b)(6)
Appendix IIIL – Closure and Postclosure Care Cost Estimates	Submittal of Permit Application	§330.125(a) and §330.125(b)(7)
Part IV – Site Operating Plan	Submittal of Permit Application	§330.125(a)

Table 2-1 (Continued)
Records to be Maintained in the Site Operating Record

Records to be Maintained in the Site Operating Record	Frequency	Rule Citation (30 TAC)
State and Federal Regulations	Submittal of Permit Application	§330.125(a)
Location Restriction Demonstrations	Submittal of Permit Application	§330.125(b)(1)
Inspection records, training procedures and notification procedures relating to excluding the receipt of prohibited waste	Per occurrence	§330.125(b)(2)
Results from gas monitoring events	Quarterly	§330.125(b)(3) and §330.159
Remediation plans relating to explosive and other gases, if applicable	Per occurrence	§330.125(b)(3) and §330.159
Unit design documentation for the placement of leachate or gas condensate in the landfill	Per occurrence	§330.125(b)(4)
Groundwater monitoring and corrective action demonstrations, certifications, findings, monitoring, testing and analytical data, if applicable	As required	§330.125(b)(5)
Closure and postclosure monitoring, testing, and analytical data, if applicable	Groundwater monitoring – semi-annual inspections	§330.125(b)(6)
Cost estimates and financial assurance documentation for closure and postclosure	Annually	§330.125(b)(7)
Facility operation, permit modification, approvals, and technical assistance correspondence and responses	Per occurrence	§330.125(b)(9)
Special waste manifests, trip tickets, shipping documents, and all other documents relating to special waste	Per occurrence	§330.125(b)(10)
Other documents specified in the permit or by the Executive Director	As required	§330.125(b)(12)
Personnel training records in accordance with §335.586(d)-(e)	As needed	§330.125(e)
Personnel operator licenses	As needed	§330.125(f)
Records to document the annual waste acceptance rate including quarterly solid waste summary reports and annual solid waste summary reports	Quarterly and Annually	§330.125(h)
Load inspection records	Per occurrence	§330.127(5)(B)
Fire occurrence notices	Per occurrence	§330.129

Table 2-1 (Continued)
Records to be Maintained in the Site Operating Record

Records to be Maintained in the Site Operating Record	Frequency	Rule Citation (30 TAC)
Inspection records and training procedures relating to fire prevention and site safety	As needed	§330.129
Access control breach and repair notices	Per occurrence	§330.131
All site inspection and maintenance documentation noted in Section 8.24 – Site Inspection and Maintenance Schedule	As required	§330.131
A record of each unauthorized material removal event	Per occurrence	§330.133(b)
A record of alternate operating hours	As required	§330.135(d)
Water, crude oil and/or natural gas well location and plugging reports	Within 30 days of discovery	§330.161(a)-(c)
Cover inspection records	As required	§330.165(h)
Leachate and contaminated water disposal records	Per occurrence	§330.331(a)(3)

3 PERSONNEL AND TRAINING (30 TAC §330.127(1), (3), & (4))

3.1 Personnel (30 TAC §330.127(1))

The Hardin County Landfill will be staffed with qualified individuals experienced with MSW disposal operations and earthmoving construction projects. See Figure 3.1 – Organizational Chart for the personnel organization. Refer to Table 3-1 for a summary of job descriptions, minimum qualifications, and required training for landfill personnel.

The Site Manager (individual having managerial oversight of the facility, actual title may vary from the title stated in this SOP) is responsible for overall facility management and is designated as the contact person for regulatory compliance matters. This person is responsible for assuring that adequate personnel and equipment are available to provide facility operation in accordance with the SDP, SOP, and the TCEQ regulations. The Site Manager is responsible for daily operations and administers the facility's SOP, as well as being responsible for maintaining the site operating record and required site inspection logs and will coordinate with the regulatory entities to ensure regulatory compliance. The Site Manager will also serve as the emergency coordinator. The Site Manager may appoint a qualified designee that is authorized to act on behalf of the facility to fulfill the responsibility of facility operation and landfill management during the absence of the Site Manager. The appointed designee will have the same on-site training as required for the Site Manager. The Site Manager, at a minimum, will have a high school diploma or equivalent, experience in earthmoving operations, experience in MSW disposal operations, and obtain and maintain a license consistent with the requirements of 30 TAC §30.201, §30.207, §30.210, and §30.212.

The gate attendant(s) stationed at the site entrance is primarily responsible for maintaining complete and accurate records of vehicles and solid waste entering the facility. The gate attendant will be trained in site safety procedures, measure waste volumes, and to collect waste disposal fees. The gate attendant will be present all hours the Hardin County Landfill is open to the public. The gate attendant will report to the Site Manager. The gate attendant, at a minimum, will have a basic understanding of accounting principles, and basic communication skills.

Equipment operator(s) are responsible for the safe operation of the equipment. As the personnel most closely involved with the actual landfill operation, these employees are responsible for being alert for potentially dangerous conditions, or careless and improper actions on the part of non-employees and other persons while on the premises. Equipment operators monitor and direct unloading vehicles, perform random load inspections, visually check for unauthorized wastes, and are also responsible for maintenance, construction, litter abatement, and general site cleanup. The equipment operators will intervene as necessary to prevent accidents and report unsafe conditions immediately to the Site Manager. Equipment operators report to the Site Manager. Equipment operators, at a minimum, must be experienced in the operation of heavy equipment, experienced in earthmoving operations, and demonstrate the ability to be trained in MSW disposal operations. Equipment operators will have a minimum of six months experience in heavy equipment operation or on-the-job training by the Site Manager and training by the Site Manager in SOP requirements for daily cover and unauthorized waste.

Other site personnel or laborer(s) may be employed from time to time in categories such as maintenance, construction, litter abatement, and general site cleanup. Site personnel may be permanent or part-time.

In addition to the Site Manager, the minimum personnel required to adequately operate the facility will be one gate attendant and two equipment operators/laborers. As the waste acceptance rate increases the number of employees required to ensure proper operation of the facility will also increase. Personnel records will be maintained in the site operating record as prescribed in Section 2.5.

The Environmental Manager (or Region Engineer) is responsible for compliance with federal and state regulations and guidelines and is designated as the contact person for regulatory compliance matters. The Environmental Manager will provide support to the facility personnel for regulatory compliance and site planning.

3.2 General Instructions (30 TAC §330.127(3))

The Hardin County Landfill personnel should have a basic understanding of the contents of this SOP. The Site Manager should have a basic knowledge of the approved SDP. The Hardin County Landfill personnel will follow the general instructions provided in the SOP and SDP. Refer to Section 8.24 – Site Inspection and Maintenance Schedule for a listing of operational tasks required.

3.3 Training (30 TAC §330.127(4))

The Hardin County Landfill personnel will be trained consistent with the applicable training requirements as defined in 30 TAC §335.586(a) and (c). Training requirements are also included in Table 3-1 – Site Personnel Summary.

The Hardin County Landfill personnel will receive training through a combination of classroom instruction and on-the-job training. The training program will provide instruction to personnel to allow performance of their duties to ensure facility compliance. This training program will be directed by a senior staff member of the BFI or RSI organizations. Training will be conducted by the BFI or RSI staff or consultants that are experienced and trained in MSW management procedures. The facility personnel will be trained in procedures relevant to the position for which they are employed. In-house training will address the following topics:

- TCEQ Permit No. MSW-2214B
- Site Development Plan (applicable sections)
- Site Operating Plan
- Facility emergency monitoring equipment and plans
- Communication and alarm systems
- Customer notification and load inspection procedures
- Identification of prohibited wastes including hazardous wastes and PCB wastes
- Waste handling procedures (acceptable and prohibited wastes)
- Health and safety
- Fire Protection Plan
- Equipment operation and maintenance
- Stormwater Pollution Prevention Plan
- Recordkeeping

The training program will also incorporate the requirements of 30 TAC §335.586(a)(2) to train facility personnel to be able to respond effectively to emergencies by familiarizing personnel with emergency procedures, emergency equipment, and emergency systems, including:

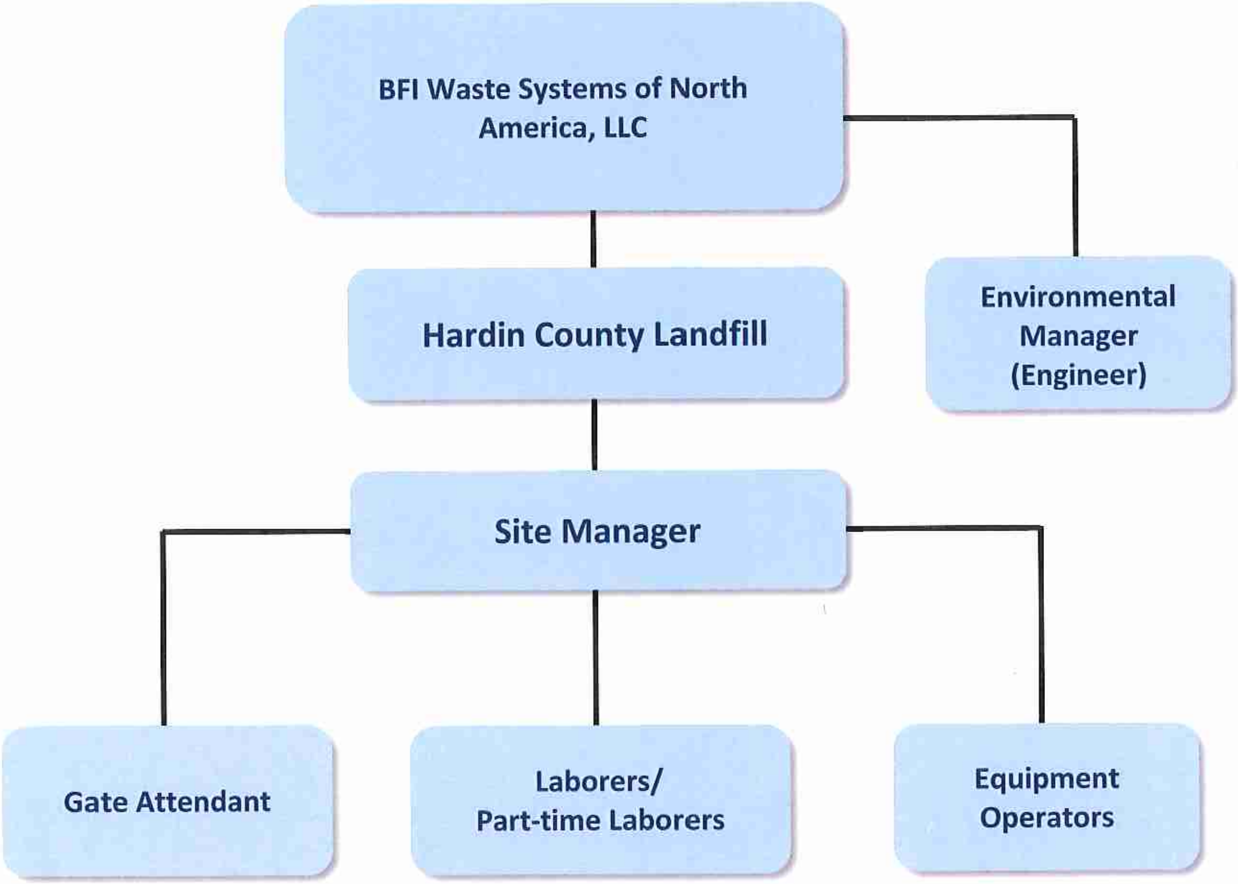
- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment
- Communications or alarm systems
- Response to fires or explosions
- Response to groundwater contamination incidents
- Shutdown of operations

The Hardin County Landfill personnel must successfully complete the in-house training program within six months of employment or assignment to this facility. The in-house training program consists of training and safety meetings conducted at least once per month. The topics addressed are the topics identified as part of the training program above. Personnel will be trained on topics relevant to their position. On-going regular training and safety meetings are scheduled monthly. Should a monthly meeting be cancelled it will be rescheduled or combined with the next regular meeting.

Documentation of training will be placed in the site operating record as required by Section 2 – Recordkeeping Requirements. The Site Manager, equipment operators, gate attendant, and other personnel will receive training at TCEQ-sponsored or approved training courses, as deemed appropriate by BFI or RSI management.

Figure 3.1

Organizational Chart



Note: Site Manager will coordinate with Republic Services, Inc. for internal approval of special waste acceptance.

Table 3-1

Site Personnel Summary[1]

Position	Summary of Job Description	Minimum Qualifications	Required Training
Site Manager	The Site Manager is responsible for: • Assuring that adequate personnel and equipment are available to provide facility operation in accordance with this SOP, the SDP, TCEQ regulations, and other applicable local, state or federal regulations • The hiring and terminating of other facility personnel • Daily operations, administration of facility's SDP, SOP, and serving as the emergency coordinator • Maintaining the site operating record and required logs • Actual landfill operations • Directing the equipment operators on a daily basis regarding waste disposal operations including the working face, excavation operations, and placement of daily and intermediate cover • Personnel safety during waste and cover constructions	• A high school diploma or equivalent • Experience in MSW disposal operations • Endangered Species • Hazardous Waste Identification • Experience in earthmoving operations • One year of landfill operation experience • Will maintain a Class A license as defined in 30 TAC §30.210	• Site Orientation • Site Operations • Safety • Fire Prevention • Load Inspection • Prohibited Wastes • Emergency Response • SPCC • SWPPP • Litter Control • Random Inspections
Gate Attendant	The Gate Attendant is responsible for: • Being stationed at the site entrance • Maintaining complete and accurate records of vehicles and solid waste entering the facility • Measuring waste volumes (if necessary) • Collecting waste disposal fees • Directing vehicles to the working face • Controlling site access • Providing general customer direction and information • Reviewing manifests and other shipping documents • Reviewing and confirming special waste documents • Other tasks as required by the Site Manager	• Basic understanding of accounting principles • Basic communication skills	• Site Orientation • Endangered Species • Hazardous Waste Identification • Safety • Fire Prevention • Load Inspection • Prohibited Wastes • Emergency Response • SPCC • Random Inspections

Table 3-1 (Continued)
Site Personnel Summary[1]

Position	Summary of Job Description	Minimum Qualifications	Required Training
Equipment Operator	The equipment operator is responsible for: • The safe operation of equipment • Being alert for potentially dangerous conditions, or careless and improper actions on the part of non-employees and other persons while on the premises • Monitoring and directing unloading vehicles • Performing random load inspections • Visually checking for unauthorized wastes • Maintenance, construction, litter abatement, and general site cleanup • Intervening as necessary to prevent accidents and report unsafe conditions immediately to the Site Manager • Other tasks as required by the Site Manager	• Minimum six months experience in heavy equipment operation • Training by the Site Manager in SOP requirements for daily cover and unauthorized waste	• Site Orientation • Endangered Species • Hazardous Waste Identification • Safety • Fire Prevention • Load Inspection • Prohibited Wastes • Emergency Response • Random Inspections
Laborers/ Part-time Laborers	The laborers are responsible for: • Collecting litter • Directing vehicles at the working face • Other tasks as needed including but not limited to maintenance, construction, litter abatement, and general site cleanup	• Ability to be trained in completing the assigned tasks	• Site Orientation • Endangered Species • Safety • Fire Prevention • Emergency Response • Litter Control
Region Engineer (he/she may office offsite but visits the site frequently)	The Region Engineer is responsible for: • Site compliance • Reporting • Record maintenance • Site planning	• Ability to be trained in completing the assigned tasks	• Site Orientation • Safety

---

[1] More detailed job descriptions along with written description of the type and amount of introductory and continued training provided to each employee will be maintained in the site.

4 EQUIPMENT (30 TAC §330.127(2))

Sufficient equipment will be provided to conduct site operations in accordance with the design and permit conditions.

The following list of equipment is expected to be routinely available for use at the facility. Equipment requirements may vary in accordance with the method of landfill operations or the waste acceptance rate at any given time. Additional equipment will be provided as required for increasing volumes of incoming solid waste. Other equivalent types of equipment by other manufacturers may be substituted on an as-needed basis. The minimum number of pieces of equipment to be provided for daily operations is listed in Table 4-1.

The permitted waste acceptance rate for the Hardin County Landfill is described in Section 2.7 of this SOP. The size, number, types, and equipment manufacturers will vary during site operations based on operational practices and on the annual waste acceptance rate.

Compactors are typically used for spreading and compacting the refuse and also for compacting the cover material. Dozers are typically used for soil movement and placement and for emergency waste compaction. Scrapers or excavators and haul trucks are typically used for excavating both the cover material used in site operations and the future disposal areas. The landfill will use either scrapers or an excavator and haul trucks for soil excavation and movement. The motor grader is typically used for road maintenance, ditching, surface water control, and final grading of the completed fill areas. The water truck will be used for fire control, dust control, and moisture conditioning of soil materials as necessary. A farm tractor and pickup truck(s) will be used as needed for miscellaneous maintenance, litter control, and personnel use. Backup equipment will be provided from other (BFI) facilities, contractors, or local rental companies to obtain equipment in the event of a breakdown or maintenance to avoid interruption of waste services.

Equipment operators may perform routine cleaning of landfill equipment, using low-volume, high-pressure, spray equipment at the active area of the landfill. The equipment spraying consists of blowing landfill equipment radiators clear of dust and debris - a manufacturer's recommendation - allowing the equipment to continue operating through the day without accumulated dust and material creating overheating problems. Because the landfill is operating on a lined Subtitle D cell, liquids contacting refuse will be handled in the same manner as landfill leachate is handled (see Section 8.23).

Table 4-1
Equipment Dedicated to the Hardin County Landfill [1, 6]

Equipment[3]	Typical Equipment[4]	Number[5]		Function
		Less than 1,500 tpd	1,501 tpd to 3,000 tpd	
Compactor(s)	CAT 816, 826	1	2	Trash compaction
Dozer(s)	CAT D6, D7, D8	1	2	Soil movement and placement, emergency trash compaction
Scraper(s)[2] or Excavator[2]	CAT 621F or Komatso PC150	1	1	Soil excavation and hauling Soil excavation
Haul Truck(s)[2]	10 to 40 ton	1	2	Soil hauling
Motor Grader	CAT 120, 12G	1	1	Roadway maintenance
Farm Tractor	35 HP	1	1	Miscellaneous maintenance
Water Truck(s)	2,000 to 4,000 gallons	1	1	Fire control, dust control, earthen' compaction
Pump(s)	10 to 500 gpm	1	1	Stormwater pumping

[1] The equipment manufacturers of the heavy equipment and miscellaneous vehicles and equipment may vary.

[2] Soil excavation will be conducted with scraper(s) or with an excavator and haul truck(s). The landfill will determine appropriate excavation equipment as landfill is developed.

[3] Backup equipment will be provided from other BFI facilities, contractors, or local rental companies to obtain equipment in the event of equipment breakdown or maintenance to avoid interruption of waste services.

[4] Typical equipment is minimum size to be provided.

[5] The number stated for each piece of equipment is the minimum number for each piece of equipment to be provided.

[6] Equipment included in this table may be used for both Type I waste disposal and Type IV waste disposal operations.

5 DETECTION AND PREVENTION OF DISPOSAL OF PROHIBITED WASTES (30 TAC §330.127(5))

5.1 General

The Hardin County Landfill, in accordance with 30 TAC §330.127(5), has established procedures for the detection and prevention of the disposal of prohibited wastes, including regulated hazardous waste, as defined in 40 Code of Federal Regulations (CFR) Part 261, and of regulated polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761, unless authorized by the United States Environmental Protection Agency. Wastes which will not be accepted for disposal at the Hardin County Landfill include regulated hazardous waste, medical waste, radioactive waste, liquid wastes that do not pass the paint filter test, and waste prohibited by the TCEQ (30 TAC §330.15(e)). The detection and prevention program will include training site personnel to know in detail what the regulated wastes are, how to perform a random inspection, how to control site access, what training will be provided for site personnel, and what procedures are required in the event of identification of prohibited wastes. The detection and prevention program includes the following steps:

- All haulers making use of the site will be informed that random inspections for prohibited waste occur at this facility and will be applied indiscriminately.
- Random inspections of incoming loads.
- Records of all inspections.
- Training for appropriate facility personnel to recognize prohibited waste, regulated hazardous waste, and PCB waste.
- Notification to the TCEQ Executive Director of any incident involving the receipt or disposal of regulated hazardous waste or regulated PCB waste at the landfill.
- Provisions for remediation of the incident.
- Identification and sampling to ensure no free liquids including unstabilized sludges will be accepted (as determined by the paint filter test).
- Signs prohibiting receipt of prohibited wastes including hazardous waste and PCB waste will be posted at the gatehouse.
- Haulers will be informed as to the types of wastes prohibited at the facility.

5.2 Load Inspection Procedure (30 TAC §330.127(5)(A))

A properly trained facility staff person at the working face will visually inspect all incoming waste loads. Delivery vehicles will be visually inspected as waste is discharged at the working face. Should any indication of prohibited waste be detected, appropriate facility personnel will stop unloading of the vehicle to allow facility personnel to conduct a thorough evaluation of the load. The driver will be directed to a load inspection area located near the working face over an approved lined area, where the load will be discharged from the vehicle. The load inspector will not inspect any vehicle that is obviously going to cause physical harm. The Site Manager or his designee will be contacted immediately if such a load enters the facility. The load inspector will break up the waste pile and inspect the material for any hazardous or prohibited waste. Known prohibited waste will be placed back into the vehicle and the driver will be instructed to depart the site. Should any regulated hazardous waste be detected, the entire load will be refused.

In addition to the above procedure, incoming loads will be inspected on a random basis. The Site Manager will be responsible for determining the random inspection schedule, with a minimum of four inspections per month. The driver of the randomly selected load will be notified at the gatehouse and instructed to proceed as above to a load inspection area located over an approved lined area. If the load inspection is performed at a location remote to the gatehouse, then a procedure will be in place to verify the vehicle flagged for inspection is actually inspected at the designated location. One of the following or equivalent measures will be incorporated into the landfill's random load inspection process to meet this objective: (1) a landfill employee will ride in the transport vehicle with the driver to the designated load inspection location; or (2) a landfill employee will follow, by vehicle, the transport vehicle to the designated load inspection location; or (3) a pass card will be issued to the driver of the transport vehicle to be inspected and the load inspector will be notified by radio of the incoming vehicle. There may be some situations where it is not feasible to view the entire contents of the load (e.g., baled waste). In these situations, the load inspector will make an effort to view as much as possible and note on the load inspection report the entire contents were not viewed and state the reason why. Additional waste screening will take place as described in Section 8.2 of this SOP.

Occurrences of prohibited waste detection will be dealt with on an individual basis with regards to the source. If the source is an individual hauler, written and verbal notice of the problem will be made to the hauler. If the problem with an individual hauler persists, the hauler will be reported to the TCEQ, notified of this action, and restricted from the site until such time as the hauler can demonstrate compliance with the restrictions listed in the site's permit. If the source is a number of haulers, all haulers will be informed of the problem by written and verbal notice. At this time, the TCEQ will be informed of the problem and the actions taken to date. If the problem persists up to 30 days after the notification was made, a meeting will be called to discuss the problem with the haulers. At least one representative from the TCEQ should be present at the meeting along with the Site Manager.

The load inspectors will wear personal protective equipment.

5.3 Recordkeeping (30 TAC §330.127(5)(B))

The Site Manager is required to maintain and include in the site operating record the following:

- Load inspection reports for randomly inspected loads
- Records of regulated hazardous or PCB waste notifications
- Personnel training records
- All remaining recordkeeping requirements as described in Table 2-1.

Load inspection reports, recorded on standardized forms, will be completed for each inspected load. The reports will include at a minimum, the date and time of inspection, the name and address of the hauling company and driver, the type of vehicle, the size and source of the load, contents of the load, indicators of prohibited waste, and results of the inspection. A copy of the load inspection report form is included in Appendix IVA of this SOP.

The TCEQ will be notified whenever regulated hazardous or PCB waste is detected. Records of the notification will be kept in the site operating record and will include the date and time of notification, the individual contacted, and the information reported.

Personnel training records will be maintained in the site operating record and will include evidence of successful completion of the training, type of training received, and the name of the instructor.

5.4 Training (30 TAC §330.127(5)(C))

The Site Manager, equipment operators, and gate attendant will maintain a thorough understanding of this SOP and will be trained in the following areas:

- Customer notification and load inspection procedures
- Identification of regulated hazardous, PCB, and prohibited waste
- Waste handling procedures
- Health and safety procedures
- Recordkeeping

Documentation of training will be placed in the site operating record.

5.5 Notification (30 TAC §330.127(5)(D))

The TCEQ Executive Director and any local pollution agency with jurisdiction that has requested to be notified will be notified of any incident involving the receipt or disposal of regulated hazardous waste or PCB waste at the landfill. Records of notifications will be maintained in the site operating record including date and time of notification, the individual contacted, and the information reported.

5.6 Managing Prohibited Wastes (30 TAC §330.127(5)(E))

Unknown wastes undergoing analysis must be properly segregated and protected against the elements, secured against unauthorized removal, and isolated from other waste and activities. Proper precautions will be taken to protect the environment from possible hazardous waste (e.g., storing unknown wastes over an approved liner, etc.).

Known prohibited wastes detected during the inspection will be returned immediately to the hauler. If the hauler is not available or cannot be identified, the waste will be safely stored until provisions for removal can be arranged. The waste will be safely stored by placing it over an approved lined area, surrounding it with soil berms, and/or placing the waste into a roll-off container.

All haulers who entered the site prior to the time of the detection and on the day the unaccounted prohibited waste was detected will be notified of the discovery, including the approximate quantity and type of waste encountered. Each of these haulers will be requested to provide any information as to the potential source of the waste. Until this request reveals the source of the prohibited waste, each of these haulers will be subject to closer review, up to and including complete load inspection with each load brought to the site.

If regulated hazardous or PCB wastes are detected, the TCEQ will be notified. As soon as is practical, the hauler will be required to remove the hazardous or PCB waste from the site. If the hauler of the prohibited waste cannot be identified, arrangements will be made to remove the prohibited waste from the site. Prior to removal, the hauler must obtain an EPA identification number, package the waste in accordance with TxDOT regulations, and properly manifest the waste designating a permitted facility to treat, store, or dispose of the hazardous waste.

Once an unknown source of hazardous waste is identified, that hauler will be held liable for costs incurred in the cleanup, transfer, and disposal of the hazardous waste. Additionally, the hauler will be restricted from the site until they can demonstrate that they no longer will attempt to dispose of hazardous waste at the Hardin County Landfill.

6 GENERAL INSTRUCTIONS (30 TAC §330.127(6))

6.1 General Site Safety

Site safety will be promoted by properly trained personnel using well-maintained equipment to perform standard work procedures. Site safety will be enhanced by limiting access to the active areas to only authorized personnel. In the event of an emergency, planned emergency response procedures will be followed.

All site personnel will receive site-specific training within the first six months of employment consisting of the following:

- Safe work practices
- Nature of anticipated hazards
- Equipment and vehicle safety
- Site access controls
- Hazardous material identification and communication
- Fire safety
- Emergency response
- Employee rights and responsibilities

A record of training will be maintained in each employee's personnel file to confirm that each employee has received the proper training.

Well-maintained equipment is vital to the safe conduct of daily landfilling operations. Therefore, all site equipment will be maintained in proper working order and all safety guards, backup alarms, and engine kill switches will be operational. Equipment operators will perform an equipment check at the beginning of each workday. Problems will be documented on the daily equipment inspection book and turned in to the Site Manager. Fire extinguishers and first aid kits will be inspected monthly by the equipment operators. Records of all inspections will be maintained as part of the site operating record.

Access to the site will be limited to authorized personnel as described in Section 8.1.1 of this SOP. Access is controlled by a combination of signs and physical barriers. Site personnel are responsible to be alert for the entrance of unauthorized personnel or the entrance of authorized personnel into prohibited areas.

In the event of an emergency, site personnel will assess the situation, notify the Site Manager or designated supervisor, and take appropriate actions such as rendering aid, calling for assistance, or closing access to the emergency scene. Emergency numbers will be posted beside the telephone in the gatehouse.

These include:

Office	Phone
Ambulance	911
Kountze Volunteer Fire Department	911 or 409-246-2565
Kountze Police Department	911 or 409-246-2119
Hardin County Sheriff Department	911 or 409-246-5100

6.2 Preparedness and Prevention Measures

Preparedness and prevention measures have been developed to minimize both frequency and severity of accidents and emergency situations threatening human health. Preparedness and prevention measures depend largely on the attentiveness and state of readiness of facility personnel. Preparedness and prevention measures have been developed for one general category and two specific areas of the site: the gatehouse and the onsite access routes. These preparedness and prevention measures are detailed in the following sections.

6.2.1 General

General preparedness and prevention measures that will be followed are:

- Employee breaks or rest periods will be provided to minimize fatigue, improve alertness, and thereby reduce accident potential.
- Access controls will provide for the safety of non-landfill personnel.
- Routine preventive maintenance of equipment will be provided.
- Daily and weekly site inspections of the working areas will be performed by the Site Manager or designated supervisor.
- Appropriate personnel safety equipment will be kept onsite and maintained in good repair.
- Adequate turning area for hauling vehicles will be provided.
- Scavenging and unauthorized salvaging will not be allowed.
- Waste unloading will be restricted to designated areas only.

- Site personnel will be alert for possible hazardous or other unauthorized wastes.
- Nonapproved wastes will be controlled or contained and removed as necessary.

6.2.2 Gatehouse

Preventative measures that will be followed in the gatehouse include the following:

- Visually screen all incoming waste loads for unauthorized wastes.
- Monitor to see that all wastes loads are adequately covered, or otherwise protected or contained.
- Visually observe incoming vehicles for evidence of improper operation, faulty equipment, or other conditions that could be hazardous to personnel or other persons onsite.
- Maintain access to appropriate emergency equipment and first-aid materials.
- Provide emergency telephone numbers that are conspicuously posted in the gatehouse.
- Display signs warning transporters that wastes including regulated hazardous wastes and other nonallowable special wastes are prohibited.

6.2.3 Landfill Entrance Road, Haul Road, and Access Road

Landfill haul road and access road preventative measures include the following:

- Display speed limit, directional, and other precautionary signs.
- Provide road passable for two-way traffic or display directional or other precautionary signs if only one-way traffic permitted.
- Maintain roadway free from obstructions.
- Enforce requirements for safe operation of vehicles onsite.

7 FIRE PROTECTION PLAN (30 TAC §330.129)

7.1 Fire Protection Training

Within 30 days of initial employment and thereafter at least annually, all employees will receive the following fire training and instruction.

1. Detailed review and discussion of the Fire Protection Plan.
2. Training on fire prevention and hazard awareness.
3. Specific instruction on operation of a portable fire extinguisher.
4. Instruction on the properties of methane gas and proper safety procedures.
5. Facility evacuation procedures.

Each training session will be documented and the training records will be maintained at the site.

7.2 Fire Protection Standards

7.2.1 Posted Information

The following fire protection information will be posted at the site:

1. Emergency contact phone number(s) for site personnel at the main entrance to the site.
2. "No Smoking" signs will be posted at designated areas.

7.2.2 Fire Safety Rules

The following fire safety rules may be posted at the scalehouse.

1. Be familiar with the use and limitations of fire-fighting equipment.
2. Alert other facility personnel in the area.
3. Assess extent of fire and likelihood that the fire will spread.
4. Immediately contact the scalehouse and Site Manager.
5. Contact the local fire department at 911, as necessary.

6. Attempt to contain or extinguish the fire until the fire department arrives if the fire can be safely fought with onsite fire-fighting equipment.
7. Do not attempt to fight the fire without adequate personal protective equipment.
8. Do not attempt to fight fire alone.

7.2.3 Burning Waste Loads (Hot Loads)

Steps will be taken to identify incoming "hot loads" prior to their being unloaded for disposal at the working face. The scale operators, equipment operators, and laborers must be alert for signs of hot loads, such as smoke, steam, or heat being released from incoming waste loads.

Fire-fighting methods include smothering with soil, separating burning material from other waste, or spraying with water from the water truck. A small fire may be controlled with a hand-held extinguisher.

In the event of a fire within a vehicle, if possible, the vehicle will be brought to a safe stop away from any fuel storage area or exposed waste. The vehicle will be driven away from the active area(s) and the load ejected in the hot load area, which is any space, preferably at least 50 feet away from a road, with either no waste deposited or waste with at least 6 inches of soil cover. A water truck, bulldozer, or other equipment will be used to extinguish the burning waste load. The waste will be covered with an adequate amount of soil to ensure it is extinguished. The load will be inspected by the Site Manager or his designee before disposal. During inspection, if the soil is removed, which would allow oxygen to contact the waste, the load will be observed for hot spots or flare-ups. No smoldering or smoking waste will be placed in the working face area for permanent burial until all hot spots or flare-ups have been extinguished.

If it is not possible to move a burning vehicle away from fuel storage or exposed waste, the local fire department will be called at 911, as necessary. While awaiting the arrival of the local fire department all reasonable measures should be employed to extinguish the fire and prevent it from spreading beyond the vehicle.

7.3 Accidental Fires

Open burning of waste at the site is not permissible. All fires will be extinguished using the protocols stated in this section. Proper compaction and earth cover will be used to minimize the potential for accidental fires.

7.4 Preventive Procedures

Fuel spills will be controlled immediately. Soil contaminated with spilled fuel will be excavated and, if authorized, disposed of at the active face. Contaminated soils may be excavated using a shovel for small areas or with heavy equipment as appropriate. Onsite brush and vegetation will be controlled through mowing on a regular basis (e.g., quarterly) to reduce the possibility of brush fires from spreading to the landfill or off-site.

The compaction of the waste as it is disposed, and the subsequent covering with soil cover, will reduce the potential for fires by reducing voids within the waste and the amount of oxygen available for combustion. The soil cover serves as a physical, non-combustible barrier to a fire.

In addition, equipment that is used at the working face may be routinely cleaned using high pressure water or steam (at the working face or in the maintenance building). The high pressure water or steam cleaning will remove combustible waste and caked material which can cause equipment overheating and increase fire potential. The amount of water used to clean the equipment will be minimized.

Each piece of heavy equipment at the site listed in Table 4-1 will carry a portable fire extinguisher. Fire extinguishers will be inspected and certified at least annually. Once any extinguisher has been used, it will be refilled or replaced as soon as possible. The piece of equipment will not be returned to normal service without a fire extinguisher installed. At a minimum, the scalehouse will also be equipped with fire extinguishers. Additionally, equipment operators will be equipped with two way radios or cell phones. Landfill equipment will not remain on the active face of the site overnight.

7.5 Vehicle or Equipment Fire

If equipment or other site vehicles experience a fire, the operator will attempt to bring the vehicle or equipment to a safe stop, away from fuel supplies, uncovered solid waste, and other vehicles. The operator will attempt to shut off the engine and engage the brake. Lowering of any implements should be attempted as a means to prevent subsequent movement of the vehicle.

7.6 Structure Fire

The local fire department will be called at 911 for all structure fires. No site personnel will enter a structure on fire.

7.7 Working Face(s) Fire Protection Plan

7.7.1 Working Face Fire Protection Requirements (§330.115)

§330.115 sets forth the following two methods for fire protection:

- Maintain a source of earthen material large enough to cover the working face with 6 inches of earth material within a 1-hour period, or
- An alternate method that is approved by the executive director of the TCEQ.

The plan set forth in this section provides an alternate method to the prescriptive fire protection plan included in the first bullet listed above. This plan utilizes both water and earthen material (as well as fire extinguishers for small fires) to provide fire protection for each working face.

7.7.2 Working Face Fire Fighting Plan

When a fire is detected within material at the working face, the landfill personnel will first redirect incoming loads away from the affected area. Working face fires will be extinguished by one of the following techniques.

- If the area of burning waste is small (e.g., an area of 10 feet by 10 feet or less), and is a surface fire, it will be extinguished using a fire extinguisher located on the equipment at the working face. After the fire is extinguished, the affected portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Inspection of the fire area will be conducted by the Site Manager or his designee.
- The burning waste material will be removed (i.e., "cut out" of the working face by a dozer or similar equipment) from the working face to an area where it can be covered with 6 inches of soil. The water truck may also be used to extinguish the burning waste. The working face area in which the burning waste was removed will be covered with 6 inches of soil. The affected portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Water that is used to fight the fire will be contained by the contaminated water containment berm. Contaminated water will be managed as specified in Appendix IIIC – Leachate and Contaminated Water Plan. Inspection of the fire area will be conducted by the Site Manager or his designee.
- The burning waste material within the working face will be sprayed with water from one of the water trucks (or tanks) stationed at the working face. The working face area which contained the burning waste will be covered with 6 inches of soil to smother the fire. Upon extinguishing a fire at the working face through smothering with soil, that portion of the working face will remain closed while the area is inspected to verify the fire is completely

extinguished. Inspection of the fire area will be conducted by the Site Manager or his designee. Water that is used to fight the fire will be contained by the contaminated water containment berm. Contaminated water will be managed as specified in Appendix IIIC – Leachate and Contaminated Water Plan.

- The burning waste material within the working face will be sprayed with water from one of the water trucks (or tanks) that will be located in an area adjacent to the working face. Then the burned (or burning) waste material will be removed from the working face to an area where it can be covered with 6 inches of soil. The working face area in which the burning waste was removed will be covered with 6 inches of soil. The affected portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Inspection of the fire area will be conducted by the Site Manager or his designee.

In each case listed above, after the Site Manager confirms that the fire has been extinguished waste filling operations in that area may resume.

7.7.3 Water Trucks or Storage Tank Requirements

As specified below, a water source will be maintained near each working face (either a water truck or storage tank). The water truck or tank will be equipped with a water cannon and positioned to assist with the fighting of any potential working face fire.

Maximum Working Face Size (width by length)	Minimum Capacity of Water Trucks or Tanks[1]
100 feet by 100 feet (or 10,000 sf)	2,000
150 feet by 150 feet (or 22,500 sf)	2,000
200 feet by 250 feet (or 50,000 sf)	2,000
250 feet by 350 feet (or 87,500 sf)	2,000

[1] At least one tanker truck with a minimum 2,000 gallon capacity will be available at the site.

The on-site stormwater detention ponds may be used as a source of water for fire control. In addition, the water level in the tank(s) will be verified once per day to ensure that each tank(s) contains at least 2,000 gallons of water. Also, during periods of freezing temperatures measures will be taken to ensure that the tank(s) remain operational.

7.7.4 Soil Stockpile Requirements

A soil stockpile will be maintained within 1,000 feet of each working face. The stockpile will be used to (1) smother burning waste material at the working face or (2) placed over burning waste material that has been cut out of the working face.

The stockpile will be sized to cover 25 percent of the size of each working face. In addition, enough earthen material (i.e., soil stockpiles and soil within borrow areas) will be maintained on-site to cover the entire working face within 24 hours. The earthen material and stockpile requirements are listed in the following table.

Size of Working Face	Approximate Earthen Material Volume and Stockpile Requirements		
Area of Working Face in Square Feet (SF)	Volume of Earthen Material Required to Cover the Working Face Area with 6 Inches of Soil (CF)	Volume of Earthen Material Required to Cover the Working Face Area with 6 Inches of Soil (CY)	Volume of Stockpile Required to be Maintained Within 1,000 feet of the Working Face (25%) (CY)
10,000	5,000*	185	46
22,500	11,250*	417	105
50,000	25,000*	925	231
87,500	43,750*	1,620	405

* Working Face x 0.5 ft (0.5 foot thickness is obtained by using a 6-inch thickness of cover for a 1-day period over the working face).

Along with the list of equipment, calculations that show how the specified equipment can cover the working face in one hour will also be maintained in the site operating record. The calculations will consider the following:

- Capacities of loading and unloading equipment
- Transportation route to the stockpile and working face
- Time needed to spread available soil on the working face

Note that the top 6 inches of areas adjacent to the working face that have 12 inches of intermediate cover may be used as a soil source.

An example calculation is listed below.

Largest stockpile to be located within 1,000 feet (refer to the table in Section 7.7.4).

Volume of Cover = V_c = 405 cy

Assume:

Truck Capacity = TR_c = 20 cy
Number of Trucks = N_{TR} = 1
Average Truck Velocity = v_A = 12 mph = 1,056 fpm
Time to Cover Working Face = t = 60 min

Total Number of Loads (L):

$L = V_c / TR_c = 405 \text{ cy} / 20 \text{ cy} = 21 \text{ loads}$

Number of Feet Traveled for Truck (D_{TR}) in t:

$$D_{TR} = v_A \times t = 1{,}056 \text{ fpm} \times 60 \text{ min} = 63{,}360 \text{ ft}$$

Distance of Stockpile from Working Face (D_s):

$$D_s = (D_{TR} / (L / N_{TR})) = 63{,}360 \text{ ft} / 21 = 3{,}017 \text{ ft (round trip)}$$

Therefore, in this case a 405 cy stockpile could be maintained as much as 1,500 feet from the working face. However, a maximum distance of 1,000 feet is specified.

The water truck will be parked near the working face. In inclement weather conditions (i.e., below freezing) the water truck will only be used as long as weather conditions allow. The amount of fire fighting water required will be stored in the tanker truck(s) at all times. Because of the quick response provided by this plan, working face fires will encompass no more than 10 percent to 15 percent of the working face. Therefore, by maintaining a soil stockpile within 1,000 feet of the working face, which is large enough to cover 25% of the working face, enough soil will be available to cover burning waste with soil, including a significant contingency. Any working face fire will be controlled quickly so that it will not spread.

Fire-fighting soil stockpiles may eventually be used as daily cover or intermediate cover. The Site Manager or his designee will evaluate the maximum anticipated working face area for the current conditions and will evaluate the available soil stockpile volume and location for sufficiency. The maximum anticipated size of the working face will be calculated and a minimum volume of earthen material (i.e., soil stockpiles) will be determined to cover the maximum anticipated working area for each working face, with at least a 1-day application of 6 inches of daily cover. The volume of earthen materials available will be estimated by determining the cubic yards of material hauled or placed during the creation of the stockpile or measuring the current stockpile or borrow area dimensions and applying appropriate geometric volume formulas. The minimum equipment listed in Table 4-1 will provide for sufficient equipment to transport and spread soil from the stockpile or borrow area to the working face.

7.8 RACM Area Fire

A soil stockpile of at least 50 cubic yards will be maintained within 100 feet of a designated RACM disposal area. This stockpile will cover the 50-foot by 50-foot maximum RACM disposal area size with 6 inches of soil in the event of a fire.

7.9 Contacting Fire Department and TCEQ

In the event of a fire at the facility that is not immediately extinguished, the Site Manager or his designee if needed will call 911, or the local fire department, and report the fire. If fire fighting assistance is needed from the local fire department, the Site Manager will also notify scale operators, who will direct the fire department personnel to the scene of the fire.

If a fire occurs that is not extinguished within 10 minutes of detection, the TCEQ's Regional Office will be contacted as soon as practicable but no later than 4 hours by telephone, and in writing within 14 days with a description of the fire and the resulting response.

8 OPERATIONAL PROCEDURES (30 TAC §330.127(3))

8.1 Access Control (30 TAC §330.131)

Public access to the landfill will be controlled by an existing perimeter fence located along the permit boundary. Public access to the landfill from FM 770 is limited to the gated site entrance road through the gatehouse area located along the northern permit boundary. The gate attendant controls access and monitors all vehicles entering and exiting the site. There is an additional construction/maintenance entrance located on the east side of the site that is locked and assessable only by site personnel.

8.1.1 Site Security

Site security measures are designed to prevent unauthorized persons from entering the site, to protect the facility and its equipment from possible damage caused by trespassers, and to prevent disruption of facility operations caused by unauthorized site entry.

Unauthorized entry into the site is minimized by controlling access to the landfill site with the perimeter fence and gate at the entrance. A minimum 6-foot-tall chain link fence will be installed across the northern property line and approximately 200 feet along the east and west sides from the northern property corners. The remainder of the perimeter fence will be enclosed with a minimum of a 4-foot-high, four-strand barbed wire fence. A gate constructed of suitable fencing materials is located across the entrance road. The gate will be locked when the landfill is not accepting waste.

The additional construction/maintenance entrance located on the east side of the site is gated. This entrance will be locked at all times when authorized personnel are not using it.

Entrance to the landfill is monitored by the gate attendant at the gatehouse during site operating hours. Outside of the operating hours, the gate to the site will be locked.

Entry to the active portion of the site will be restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by site management. Visitors may be allowed on the active area only when accompanied by landfill staff.

8.1.2 Traffic Control

Public access to the landfill site will be provided via the entrance road from FM 770. Signs will be located along the entrance road directing traffic to the gatehouse. The gate attendant will restrict site access to authorized vehicles and direct these vehicles appropriately. If a hauler does not stop at the gatehouse upon entrance to the site, the hauler will not be allowed to dump their load until after returning to the gatehouse for inspection and completion of all necessary paperwork (trip tickets, etc.).

Waste hauling vehicles will be directed to appropriate fill areas by signs located along the landfill haul road and access road. These vehicles will deposit their loads and depart the site. Private, commercial, or public solid waste vehicles will not be allowed access to any areas other than the appropriate active portion of the landfill. Site personnel will observe traffic and provide traffic directions as necessary to facilitate safe movement of vehicles.

Within the site, signs will be placed along the landfill haul road and access road at a frequency adequate for users to be able to understand where disposal areas are and which roads are to be used. Roads not being used for access to disposal areas will be blocked or otherwise marked for no entry.

8.1.3 Inspection and Maintenance

The perimeter fence and gates will be inspected monthly. Refer to Section 8.24 of this SOP for site inspection and maintenance schedule. Maintenance will be performed as necessary. Should a breach be detected during inspection or at any other time, every effort will be made to make repairs within 8 hours of detection. Notification of the TCEQ Region Office is not required if permanent repair is made within 8 hours. Should repair require more than 8 hours, the TCEQ region office and any local pollution agency with jurisdiction that has requested to be notified, will be notified of the breach within 24 hours of detection. Temporary repair will be performed within 24 hours of detection and permanently repaired within the time specified to the TCEQ region office following notification.

8.2 Unloading Wastes (30 TAC §330.133)

The Hardin County Landfill is authorized to receive and dispose of Type I and Type IV wastes at separate locations within the permit boundary. The Hardin County Landfill also maintains a citizen's convenience center. Wastes collected at the citizen's convenience center will be unloaded in accordance with the procedures in Section 8.2.1. Type I wastes will be unloaded in accordance with the procedures in Section 8.3.1 and Type IV wastes will be unloaded in accordance with the procedures in Section 8.3.2. Other waste unloading areas at the site are discussed in Section 8.2.2. The unloading of wastes in unauthorized areas is prohibited. Any prohibited waste must be returned immediately to the transporter or generator of the waste or otherwise properly managed by the landfill. Trained staff will observe each load that is disposed at the landfill. The staff involved with unloading or inspection of waste will have the authority and responsibility to reject unauthorized loads, have unauthorized material removed by the transporter, and/or assess appropriate surcharges, and have the unauthorized material removed by on-site personnel or otherwise properly managed by the facility. A record of unauthorized material removal will be maintained in the operating record.

The landfill is open to the general public. Typically the waste is transported to the landfill in solid waste collection trucks or individual citizen's vehicles. Vehicles with waste are directed to the working face and unloaded. An equipment operator or other trained attendant will be at the working face to monitor each load of waste as it is unloaded.

8.2.1 Citizen's Convenience Center

Individual citizen's vehicles or any other small commercial vehicles (non-compaction), upon discretion of the Site Manager or designee, may be directed to unload acceptable waste at the citizen's convenience center. The citizens convenience center uses watertight containers and is located over an all-weather area. Waste material is offloaded from the vehicles to roll-off containers. The size of the roll-off containers will range between 30 and 40 cubic yards. The containers and collection area will be monitored daily by facility personnel and unloaded at the working face no less than once a week to prevent a nuisance from occurring.

8.2.2 Other Waste Unloading Areas

In the future, the Hardin County Landfill may establish a brush and woody waste collection/chipping/mulching area. The authorization of this area will be accomplished via a permit modification. Brush, yard waste, and woody waste may also be disposed into the Type I and Type IV landfills.

Uncontaminated wood waste from residential and commercial sources such as, but not limited to, yard trimmings (leaves, grass clippings, yard and garden debris, and brush), wood and wood materials, including stumps, roots, or vegetation, sawdust, pallets, manufacturing rejects and other similar wood waste deemed suitable by the Site Manager may be placed in the landfill's brush collection/chipping/mulching area and ground or chipped for use to promote vegetation and control erosion on daily or intermediate cover areas. In the future, surveillance cameras may be installed to monitor the unloading of waste at the brush collection/ chipping/mulching area. Unloading will be monitored by the gate attendant in the gatehouse. Control will also be used to confine the waste area to a minimum width consistent with the rate of incoming woody waste, while allowing for safe and efficient operation. The maximum size of the wood waste unloading area will be 150 feet by 150 feet.

Signs with directional arrows and portable traffic barricades will help to restrict traffic to designated disposal locations. Signs will be placed along the access route to the current disposal area or other designated disposal areas that may be established. In addition, rules for waste disposal and prohibited waste will be prominently displayed on signs at the site entrance.

8.3 Waste Types

8.3.1 Type I Wastes

The landfill is authorized to receive MSW (Type I wastes) and those special solid wastes allowable under 30 TAC §330.171 and Class 2/3 industrial wastes under 30 TAC §330.173. Type IV waste may also be disposed into the Type I landfill. The categories of wastes that are prohibited at this site by state and federal regulations are discussed in Section 5.1 of this SOP. Special wastes will be handled at this landfill, in accordance with TCEQ regulations and Section 8.3.3 of this SOP.

Trained personnel will monitor the incoming waste vehicles at the gatehouse and at the unloading area/active working face. These personnel will be familiar with the regulations governing the various types of waste that can or cannot be accepted into the site, including knowledge of 30 TAC §330.171 and 30 TAC §330.173. The personnel will also have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. Trained personnel at the active working face will be on-duty during waste acceptance hours to observe waste unloading.

Trained personnel at the active working face will have the authority and responsibility to reject loads which contain prohibited wastes. These personnel will also have the authority to have prohibited waste removed by the waste hauler or transporter immediately upon discovery.

Trained personnel at the active working face will immediately notify the Site Manager of suspected prohibited waste. The Site Manager may assess appropriate surcharges to the waste hauler, transporter, or generator. The Site Manager will direct landfill staff to remove or manage prohibited waste appropriately.

Any prohibited waste that is not discovered by landfill personnel until after it is unloaded will be returned to the vehicle that delivered the waste, and the transporter or generator will be responsible for the proper disposal of the rejected waste. In the event the prohibited waste is not discovered until after the vehicle that delivered it has left the site, the waste will be segregated and controlled as necessary. An effort will first be made to identify the entity that deposited the prohibited waste and have them return to the site and properly dispose of the waste. In the event that identification is not possible, the Hardin County Landfill will notify the TCEQ and seek guidance on how to dispose of the waste. A record of unauthorized waste removal will be maintained in the site operating record.

Solid waste unloading will be controlled to prevent disposal in locations other than those specified by site management. Any waste deposited in an unauthorized area will be promptly removed and disposed of properly at the current working face. Control will also be used to confine the working face to a minimum width consistent with the rate of incoming waste, while allowing for safe and efficient operation. The maximum size of the unloading area will be 1/4 acre with a maximum length of approximately 150 feet. There will be one waste unloading area each day within the active working face.

8.3.2 Type IV Waste

The Hardin County Landfill has identified the "C & D" waste area to receive Type IV wastes only. The Hardin County Landfill will conduct unloading operations in this area in accordance with 30 TAC §330.133(e)-(h). Only wastes identified as Type IV waste consisting of brushy wastes, construction and demolition wastes, and rubbish (trash) that are free of putrescible and household waste will be allowed. Class 2 and Class 3 industrial wastes similar to Type IV wastes will also be accepted.

The operating requirement for Type IV MSW disposal will be followed for acceptance of Type IV waste disposal as follows:

- The Hardin County Landfill will not accept waste for disposal in the Type IV disposal area from enclosed containers. Should waste be received at the landfill in enclosed containers, the vehicle will be directed to the Type I disposal area. The landfill will not accept waste transporter certificates for disposal of Type IV waste from enclosed containers.
- Should putrescible wastes or other prohibited wastes be improperly disposed of in the Type IV disposal area, these wastes will be immediately removed from the active working face. These wastes will be removed from the Type IV area and transported to the Type I waste active working face.
- The Hardin County Landfill equipment operators will be trained in identification of wastes acceptable for disposal in the Type IV disposal area. The equipment operator will have the authority and responsibility to reject unauthorized loads.

The Hardin County Landfill will identify the wastes that are not allowed for disposal as Type IV wastes as required by Section 8.5 – Site Sign. Further, the landfill will include the requirements for transporters of Type IV waste, such as certificates, manifests, and surcharges or other penalties that may be imposed in the event that haulers or transporters do not meet the requirements for transporting Type IV wastes.

8.3.3 Special Wastes

Special wastes, as defined in 30 TAC §330.3, may be accepted at the facility in accordance with 30 TAC §330.171(b) and (c) and the Special Waste Acceptance Plan (SWAP) included in Appendix IVB. The SWAP outlines the acceptance requirements and review and approval process that will be used by the site to accept special and industrial waste as defined by the TCEQ for disposal at the Hardin County Landfill. Authorization to accept special waste may be granted case-by-case in accordance with 30 TAC §330.171 and §330.173, or may be established for a facility by a SWAP prepared in accordance with 30 TAC §330.171(b)(2). The SWAP included in Appendix IVB has been developed to meet these requirements. Wastes not expressly listed in the SWAP may be considered for disposal if a request with supporting documentation is submitted by the waste generator to the facility and evaluated for acceptance in accordance with SWAP protocols or the TCEQ for technical review, and the request granted.

The TCEQ rules specifically state that the receipt of treated medical waste, dead animals, asbestos and certain empty containers do not require prior written approval, if handled in accordance with the provisions stated in the rules. However, 30 TAC §330.171(b)(1) states that approvals for other special wastes will be waste specific and/or site specific. This SWAP addresses requirements of the TCEQ rules to allow site-specific authorization to accept special wastes.

Unless the special waste to be accepted at the facility can be classified as a waste that is expressly listed in the SWAP, specific approval must be obtained from TCEQ. As specified in 30 TAC §330.171(b)(2) and the SWAP, requests for approval to accept certain types of special wastes will be submitted by the generator to the facility or TCEQ (and maintained in the site operating record) and will include the following:

- A complete description of the chemical and physical characteristics of each waste and the quantity, a statement as to whether or not each waste is a Class 1 industrial waste as defined in 30 TAC §330.3, and the rate at which each waste is produced and/or the expected frequency of disposal. Class 1 industrial wastes (other than RACM) will not be accepted at the facility.
- If special handling instructions are required, they will be provided as part of the pre-approval process, including; the proposed procedures for handling waste, any required protective equipment for landfill staff, and onsite emergency equipment.
- Procedures and responsibilities for containment and cleanup of any accidental spills occurring during the delivery and/or disposal operation. Typically, this will include:
    - Landfill staff involved in cleanup should make use of their spill control kits which may include: respirators, disposable coveralls, shoe covers, gloves, and safety glasses or goggles.
    - Other landfill staff will be directed away from the area until cleanup is complete.

- Excavate the waste material and transport it to the working face.
- Wash any contaminated equipment or machinery.
- If applicable, wash all other personal protective equipment with soap and water.
- If applicable, check respirator, refit with new filter cartridges, and place into a resealable, air-tight container for future use.

When special wastes are to be disposed of at the facility, a completed generator profile will be required prior to acceptance of the special wastes. This profile includes:

- Description of the generator's special wastes (with supporting chemical analysis, where applicable) for which disposal is being requested.
- As appropriate, other supporting documents that further identify the character of those wastes.
- A written declaration by the generator that the waste stream is non-hazardous waste. In addition, the generator will also note if the waste stream is a Class 1 non-hazardous industrial solid waste. Class 1 waste will not be accepted at the facility with the exception of Class 1 RACM.
- An estimate of the anticipated quantity, rate, and frequency of disposal for each special waste.

The above-listed information will be maintained in the site operating record.

A waste discrepancy form or similar documentation will be placed in the site operating record when one or more of the following occurs:

1. A special waste arrives without a waste manifest or required shipping document.
2. An industrial or special waste arrives and the waste material does not match the description on the waste manifest or other shipping document.
3. An industrial or special waste arrives and the waste differs from the approved waste based upon QA/QC review or other monitoring.
4. The volume of the waste is not consistent with the information on the shipping documents.

The Site Manager will attempt to resolve any waste discrepancies. If the discrepancy can be resolved, the waste may be accepted and the discrepancy report will be filed with the shipping documents to document the resolution of the discrepancy in the site operating record. If the discrepancy cannot be resolved, the waste shipment will be rejected and a discrepancy report prepared and filed for the rejected waste shipment.

In addition, the special wastes identified in Sections 8.3.3.1 through 8.3.3.6 may be accepted at the facility without prior written authorization in accordance with 30 TAC §330.171(c) and (d).

8.3.3.1 Sludges

Sludges, grease trap waste, grit trap waste or liquid waste from municipal sources will be accepted if the material has been treated or processed, and has passed the paint filter test and is certified to contain no free liquids, as prescribed in 30 TAC §330.171(c)(7). The material will be required to have passed a paint filter test, as documented on the generator waste profile, prior to disposal at the working face of the landfill.

8.3.3.2 Dead Animals

The facility may receive dead animals or slaughterhouse wastes. Dead animals and slaughterhouse wastes will be buried at the working face and covered with a minimum of 3 feet of other solid waste or a minimum of 2 feet of soil immediately upon receipt. Additional waste or soil will be added over the materials if objectionable odors are created by the dead animals or slaughterhouse wastes.

8.3.3.3 Empty Containers

Empty containers, which have been used for pesticides, herbicides, fungicides, or rodenticides will be accepted and disposed of in accordance with 30 TAC §330.171(c)(5) and as outlined below.

1. These containers may be disposed of at the landfill working face provided that:
   - (i) the containers are triple-rinsed prior to receipt at the site; and
   - (ii) the containers are rendered unusable prior to or upon receipt at the site.
2. Empty containers accepted at the landfill will be covered by the end of the same working day they are received.
3. Those containers for which triple-rinsing is not feasible or practical (e.g., paper bags, cardboard containers) may be disposed of by placing them at the working face and covering them with three feet of waste by the end of the day they were received. Containers from industrial locations must be classified as a Class 2 or Class 3 waste.

8.3.3.4 Nonregulated Asbestos-Containing Materials

Non-regulated asbestos-containing materials (non-RACM) may be accepted for disposal provided the wastes are placed on the active working face and covered in accordance with Section 8.3.3.5 of this SOP. Construction and demolition wastes containing non-RACM may be disposed in either the MSW or Type IV Landfills. Under no circumstances will any material containing non-RACM be placed on any surface or roadway which is subject to vehicular traffic or disposed of by any other means by which the material could be crumbled into a friable state.

8.3.3.5 Regulated Asbestos-Containing Material (RACM)

RACM may be accepted at the facility in accordance with 30 TAC §330.171(c)(3). Prior to initial receipt of RACM at this facility, the Site Manager will dedicate a specific area of the site for receipt of RACM and notify the TCEQ in writing of the designated area. RACM disposal locations will be identified by surveying and marked on a current site drawing at the site. Each load of RACM that arrives on-site will be documented. This documentation will include the volume of material, and the location and depth of its disposal. As the operation continues, the Site Manager or his designee will notify the TCEQ in writing of any new dedicated areas for RACM. The RACM disposal area will not be larger than 50 feet by 50 feet.

Delivery of RACM will be coordinated by the Site Manager so that the waste will arrive during times that it can be properly managed by landfill staff.

RACM will be accepted at the site only if it is contained in tightly closed containers or bags, or wrapped as necessary with 6-mil-thick polyethylene.

RACM will be placed in Type I landfill sectors such that it will not be exposed as a result of erosion or weathering. At a minimum, the RACM will be placed at least 20 feet away from exterior final sideslopes, and at least 10 feet below final grade. During unloading and placement of RACM in the waste fill, care will be exercised to prevent breaking open the bags or containers. One foot of soil cover or 3 feet of asbestos-free municipal solid waste will be placed over the RACM immediately after it is placed in the landfill.

RACM that has been designated as Class 1 industrial solid waste, will be disposed of in accordance with 30 TAC §330.173(c) and in accordance with this section of the SOP.

Shipments of Class 1 RACM must be accompanied by a waste manifest document. The waste manifest is to be completed by the generator and transporter, and will accompany the driver of each waste load. The facility will then verify pre-authorization for disposal and complete the destination section of each manifest and return one copy of the completed manifest to the driver. One copy of the completed waste manifest will also be returned to the waste generator within 30 days after receipt of the waste. Manifests are prepared in quadruplicate and the remaining copy will be filed in the SOP. Acceptable manifests will include at least the following information:

1. Identity and telephone number of the generator;
2. Type and quantity of waste obtained from the generator;

3. TCEQ registration number and TCEQ waste code (if applicable);
4. Specific site for disposal.

A waste discrepancy report will be completed when:

1. Class 1 RACM arrives without a properly completed waste manifest;
2. Class 1 RACM arrives and the waste material does not match the description on the waste manifest;
3. Class 1 RACM arrives and the information on the manifest is determined to be incorrect; or
4. Class 1 RACM arrives which does not match the information given in the original approval submitted by the generator.

The Site Manager or his designee will attempt to resolve any waste discrepancies. If the discrepancy can be resolved, the waste may be accepted and the discrepancy report will be filed with the shipping documents to document the resolution of the discrepancy. If the discrepancy cannot be resolved, the waste shipment will be rejected and a discrepancy report prepared and filed for the rejected waste shipment.

The Site Manager or his designee will contact the transporter and/or generator and notify them of the identification of any unauthorized waste. The transporter and/or generator will be required to take all necessary steps to determine the origin and to assure that in the future such wastes are either not collected or are taken to a facility approved to accept such waste. The appropriate state agency will also be contacted to provide the name and contact information of the transporter and to report measures taken to resolve the arrival of unauthorized waste (e.g. returned to the transporter or disposed of by Hardin County Landfill at an approved facility). Repeated instances of unauthorized wastes found from the same transporter or generator may result in the Hardin County Landfill refusing to accept waste from that transporter or generator.

All information and documents pertaining to Class 1 RACM profiled for disposal and delivered to the landfill for disposal including but not limited to, all records concerning measurements and analyses performed at the site, will be retained in the Site Operating Record.

Additionally, the TCEQ Monthly Waste Receipt Summary will be prepared by the Site Manager or his designee and submitted to the TCEQ no later than the 25th of each month. This report will be submitted consistent with TCEQ requirements. Reports will be on forms provided by the TCEQ. The facility will file reports, including those months in which they receive no Class 1 RACM, at the facility unless the TCEQ grants an exception. The reports will summarize the quantity, character, generator identity, and the method of storage, processing and disposal of each Class

1 RACM shipment received, and itemizes by manifest document number as required by the TCEQ.

In addition and according to 30 TAC §330.675, a Quarterly Municipal Solid Waste Fee Report will be submitted to the TCEQ on a form provided by the TCEQ. In addition to a statement of the amount of Class 1 RACM received for processing or disposal, the report will contain other information requested on the form, typically including amount of other wastes received, the facility operator's name, address, and phone number, the permit number, and other information as requested. The required quarterly report will be submitted to the TCEQ within the timeframe required by the TCEQ.

In the event that bags or containers that contain RACM rupture, they will be immediately contained by spraying the area with water to prevent the spread of RACM. Also, earthen dikes, berms or by other appropriate measures will be constructed to contain the spill. The Site Manager, or designee, will be promptly notified of the spill and will coordinate the collection and disposal of the spilled RACM. The spilled RACM will be picked up mechanically or by employees wearing proper protective equipment and re-packaged for disposal.

Upon closure of the facility, a notation indicating that the site accepted RACM will be placed in the real property records of Hardin County. This notation will indicate where the RACM was disposed of on the property by showing its location on a site diagram. A copy of this documentation will be provided to the TCEQ.

8.3.3.6 Class 2 and 3 Non-Hazardous Industrial Waste

Class 2 and Class 3 industrial solid wastes will be accepted at the facility. Class 1 industrial waste (other than RACM) will not be accepted at the facility. Industrial waste (nonhazardous) is defined by 30 TAC §330.3 as solid waste resulting from or incidental to any process of industry or manufacturing, or mining or agricultural operations, classified as follows:

- Class 2 Industrial Solid Waste – any individual solid waste or combination of industrial solid wastes that cannot be described as Class 1 or Class 3, as defined in 30 TAC §335.506 (relating to Class 2 waste determination). Examples of Class 2 waste include "plant trash" or waste originating in the facility offices or plant production areas that are composed of paper and/or wooden packaging materials, glass, aluminum foil, aluminum cans, aluminum scrap, stainless steel, steel, iron scrap, plastics, styrofoam, rope, twine, uncontaminated rubber, uncontaminated wooden materials, equipment belts, wiring, uncontaminated cloth, metal buildings, empty containers with a holding capacity of five gallons or less, uncontaminated floor sweepings, or food packaging, that are produced as a result of plant production.
- Class 3 Industrial Solid Waste – any inert and essentially insoluble industrial solid waste, including materials such as rock, brick, glass, dirt, and certain

plastics and rubber, etc. that are not readily decomposable as defined in 30 TAC §335.507 (relating to Class 3 waste determination).

- Class 1 Industrial Solid Waste that is defined as Class 1 only because of its asbestos content (RACM) will be accepted and handled in accordance with the procedures listed in Section 8.3.3.5.

Out-of-state Class 2 and Class 3 industrial waste must receive written authorization from TCEQ before it can be accepted for disposal at the Hardin County Landfill.

8.4 Facility Hours of Operation (30 TAC §330.135)

The Hardin County Landfill is authorized for waste acceptance from 6:00 a.m. to 7:00 p.m., seven days per week. There is no hourly limitation on conducting waste acceptance, filling, construction, earthmoving, or other activities within the facility during waste acceptance hours. The Hardin County Landfill is authorized for site operations from 5:00 a.m. to 9:00 p.m., seven days per week. Site operations include construction, earthmoving, monitoring, and other non-waste acceptance operations including the transportation of materials and equipment to or from the property. The Hardin County Landfill will post on the entrance sign the hours for waste acceptance from private and public waste haulers. The public waste acceptance hours will be posted at the facility entrance. Although these hours cannot be outside 6:00 a.m. to 7:00 p.m., any delivery vehicle accessing the site gate before 7:00 p.m. will be processed.

8.5 Site Sign (30 TAC §330.137)

A sign will be visible from the gated entrance to the site. This sign will measure at least 4 feet by 4 feet, and have lettering of at least 3 inches in height. The sign will state the name of the site, type of site, hours and days of operation, and the TCEQ permit number. An emergency 24-hour contact phone number and the emergency fire department phone number will also be included. The emergency contact phone number will reach an individual with the authority to obligate the facility at all times the facility is closed. The site sign will be readable from the facility entrance.

Signs prohibiting receipt of prohibited wastes including hazardous waste and PCB waste, closed drums, smoking, scavenging and untarped loads will be posted at the gatehouse. In addition, a sign will be posted to keep all vehicles on the roadway and that anyone unloading waste in unauthorized areas will be prosecuted.

8.6 Control of Windblown Solid Waste and Litter (30 TAC §330.139)

The working face will be maintained and operated in a manner to control windblown solid waste. Windblown material and litter will be collected and properly managed to control unhealthy, unsafe, or unsightly conditions by the following methods:

- Waste transportation vehicles using this facility will be required to use adequate covers or other means of containment. The adequacy of covers or containment of incoming wastes will be checked at the gatehouse. A sign will be prominently displayed at the gatehouse stating that all loads are required to be properly covered.
- The active working face will be limited to as small an area as practical for the safe operation of the incoming waste hauling vehicles, and operation of compaction equipment, and delivery and placement of daily cover soils.
- Daily cover will be applied as frequently as needed, to assist with the control of windblown waste.
- The facility will provide portable and stationary litter control fences, as necessary, at appropriate locations near the working face and elsewhere. The litter control fences will be constructed of wire or plastic mesh screens attached to portable or permanent frames or temporary fences. The litter control fence will be of sufficient height and will be located as close as practical to the active area to control windblown waste and litter.
- Windblown waste and litter along the entrance road, the gatehouse area, and areas within the permit boundary will be collected once a day during facility operations and returned to the active working face.
- Should windblown waste or litter escape the facility control measures and cross the permit boundary onto adjacent property, the facility will contact the adjacent property owners to seek permission for litter pick-up. The facility is bounded by a public road to the north where mandatory litter pick-up will take place in accordance with 30 TAC §330.145 and Section 8.9.
- Adjacent filled areas will provide protection from the prevailing winds. Earth berms will be used to assist in control of windblown wastes by providing a windbreak against prevailing winds. Due to the variability of wind direction, the landfill staff will use their discretion in using any additional wind breaks.

8.7 Easements and Buffer Zones (30 TAC §330.141)

8.7.1 Easements (30 TAC §330.141(a))

Solid waste unloading, storage, disposal, or facility operations will not occur within any easement, buffer zone, or right-of-way that crosses the site. No solid waste disposal will occur within 25 feet of the centerline of any utility line or pipeline easement, unless otherwise specifically authorized by TCEQ. All easements will be clearly marked. Pipelines and utility easements will be marked with posts extending a minimum of 6 feet above ground surface at intervals that do not exceed 300 feet. There are currently no easements or right-of-ways located within the Hardin County Landfill permit boundary.

8.7.2 Buffer Zones (30 TAC §330.141(b))

The buffer zone is defined as the area between the permit boundary and the limit of waste disposal. The limit of waste is generally located along the inside edge of the perimeter road. No solid waste unloading, storage, disposal, or processing operations will occur within any buffer zone. The buffer zones vary around the perimeter of the site, but in no case are they less than 50 feet for waste cells constructed prior to issuance of Permit No. MSW-2214B and 125 feet for portions of cells vertically expanded under the authority of Permit No. MSW-2214B. Easements will be kept passable for fire-fighting and other emergency vehicles. All buffer zones will be clearly marked as specified.

8.8 Landfill Markers and Benchmark (30 TAC §330.143)

Landfill markers will be installed to clearly mark significant features as described in 30 TAC §330.143(b). The markers will be steel or wooden posts (or other TCEQ approved material) and will extend at least 6 feet above the ground surface. The markers will not be obscured by vegetation and will be placed in sufficient numbers to clearly show the required boundaries. The landfill markers will be maintained so that they are visible during operating hours. Markers that are removed or destroyed will be replaced within 15 days of their removal, completion of construction project, or destruction. Landfill markers will be inspected monthly and will be maintained and repaired within 15 days as necessary. Refer to Section 8.24 of this SOP for the site inspection and maintenance schedule. Inspection records will be maintained in the site operating record. Markers will be repainted as needed to retain visibility. Guidelines for type, placement, and color coding of markers are outlined below.

The required landfill markers are:

Marker	Color
Site Boundary	Black
Buffer Zone	Yellow
Grid System	White
SLER/GLER	Red
Easements or Right-of-Ways	Green

- Site Boundary – Site boundary markers will be painted black. The markers will be placed at each corner of the site and along each boundary line at intervals no greater than 300 feet. Fencing may be placed within these markers, as required. In areas where the fence is located on the permit boundary, the fence posts may be painted black and used as site boundary markers. Each of these site boundary markers are placed at 300-foot intervals on lines defined by the landfill grid system. As such, these markers will be labeled as to their grid location. Since the site boundary markers are painted black, the grid letters and numbers placed on the site boundary markers will be white and no smaller than 4 inches in height.

- Buffer Zone – Buffer zone markers will be painted yellow. The markers will be placed along each buffer zone boundary at intervals of 300 feet. Each of these buffer zone markers are placed at 300-foot intervals on lines defined by the landfill grid system. As such, these markers will be labeled as to their grid location when the marker is placed at a grid intersection point. The buffer zone distances vary along the permit boundary.

- Landfill Grid System – Grid markers will be painted white. The grid system will consist of lettered markers along two opposite sides, and numbered markers along the other two sides. Markers will be spaced no greater than 100 feet apart measured along perpendicular lines. Alternately, a 2-inch-diameter pipe placed over steel T-posts (or equivalent) may be used for grid markers. Grid markers lettering and numbering will be no smaller than 4 inches in height. At a minimum, grid markers will delineate the area expected to receive waste within the next 3 years. The grid markers will be maintained during the active life of the site and throughout the postclosure period.

- SLER/GLER Area – SLER/GLER markers will be painted red. The markers will be placed so that all areas for which a SLER/GLER has been submitted and approved by the TCEQ are readily determinable. Such markers are to provide site workers immediate knowledge of the extent of approved disposal areas. These markers will be located so that they are not destroyed during operations until operations extend into the next

SLER/GLER. The location of these markers will be tied into the landfill grid system and will be reported on each SLER/GLER submitted. SLER/GLER markers will not be placed inside the evaluated areas.

- Easements and Right-of-Ways – Easement and right-of-way markers will be painted green. The markers will be placed along the centerline of an easement, along the boundary right-of-way, at each corner within the site, and at the intersection with the permit boundary. Where it is impractical to place a marker, the marker will be offset from the easement right-of-way and the offset distance will be clearly painted on the marker.
- Floodplain Protection – Floodplain protection markers will be installed for areas within the facility that are within the 100-year floodplain. The site is not located within the 100-year floodplain.

Permanent benchmarks used for surveying controls have been set within the permit boundary at four locations in areas that are readily accessible and will not be used for disposal in accordance with §330.143(b)(8). The permanent benchmarks are United States Coast and Geodetic Survey benchmarks consisting of bronze survey markers stamped with elevation and survey date and set in concrete. The benchmarks will be maintained so that it is visible during operating hours.

8.9 Material Along the Route to the Site (30 TAC §330.145)

The Hardin County Landfill will take steps to ensure that vehicles hauling waste to the facility are enclosed or provided with a tarpaulin, net, or other means to properly secure the load. These steps are necessary to prevent the escape of any part of the load by blowing or spilling. The facility will post signs at the entrance gate and gatehouse notifying haulers of this requirement and enforcement measures (reporting offenders to the local law enforcement agency, restriction from the site, adding surcharges). The Hardin County Landfill will provide for the cleanup of waste materials spilled along and within the right-of-way of FM 770 and SH 326 for a distance of 2 miles in either direction from the entrance road connection to FM 770. Cleanup for the spilled materials will be performed once per day. The Site Manager will consult with TxDOT officials concerning cleanup of state highways and right-of-ways consistent with 30 TAC §330.145. The Hardin County Landfill will provide additional cleanup should TxDOT request an increased frequency for cleanup of spilled materials along FM 770.

8.10 Disposal of Large Items (30 TAC §330.147)

At the discretion of the Site Manager, a large item/white goods storage area may be provided near the gatehouse, as shown on Part III, Site Development Plan, Appendix IIIA – Landfill Unit Design Information. The large items and white goods include items such as ovens, dishwashers, freezers, air conditioners, and other large items. Automobiles will not be accepted. These items may be recycled to prevent a nuisance and to preclude discharge but will not be stored in excess of 360 days, or disposed at the working face.

Refrigerators, freezers, air conditioning units, or other items containing chlorinated fluorocarbon (CFC) refrigerant will be handled in accordance with 40 CFR §82.156(f), as amended. Refrigerators, freezers, air conditioning units, or other items containing CFC will not be accepted unless the CFC contained in the item has been captured and sent to an approved CFC disposal site or recycling facility and the generator or transporter provides written certification that the CFC has been evacuated from the unit. Items such as electrical equipment, which contains PCBs, will be excluded from waste fill. Procedures for detecting and excluding PCBs are provided in Section 5.

Large items that are not recycled will be disposed of at the working face. Care will be taken during disposal of large items to ensure that: (1) large items are excluded from the initial 5 feet of waste placed over the protective cover of the liner, (2) large items are placed such that they do not interfere with continued waste filling, and (3) that other smaller MSW is placed and compacted around them.

8.11 Air Criteria

Hardin County Landfill will obtain a Standard Air Permit under 30 TAC 330, Subchapter U upon approval of the expansion. Given that the site capacity with the proposed expansion will be less than 2.5 MM Megagrams and 2.5 MM cubic meters the site is not subject to Federal New Source Performance Standards (NSPS) requirements. Hardin County Landfill will comply with all state and federal requirements.

8.11.1 Odor Management Plan (30 TAC §330.149)

The Hardin County Landfill will manage odors associated with waste acceptance and disposal operations consistent with this Odor Management Plan. This plan addresses sources of odors and includes general instructions to control odors or sources of odors.

Measures to control odors and sources of odors may include, but are not limited to, the following:

- Wastes identified that are considered to generate significant odors are usually classified as special wastes. Refer to Section 8.3.3 – Special Wastes for waste disposal procedures for these wastes.
- The facility will accept wastes that may generate odors including municipal water and wastewater treatment plant sludges, grease trap waste, grit trap waste, other liquid waste from municipal sources, and dead animals. The sludges and other liquid wastes are required to pass a paint filter test prior to disposal. Refer to Section 5 – Detection and Prevention of Disposal of Prohibited Wastes, and Section 8.3.3 – Special Wastes.

- Other sources of odors may include ponded water, decomposition of wastes, leachate, contaminated water, and landfill gas.
- The gate attendant will identify and notify the Site Manager of those loads that contain wastes that generate significant odors and need special attention during waste disposal activities.
- Unloading of these wastes will be consistent with procedures established in Section 8.2 – Unloading of Waste, which limits the unloading areas to minimum widths, requiring prompt processing of wastes or placement of soil cover over wastes that may produce odors.
- Spills of these odor producing wastes will be managed by collecting and transporting these wastes to the active working face for prompt placement of soil cover.
- Daily cover consisting of a minimum of 6 inches of soil or approved alternate daily cover will be placed over these wastes disposed of at the active working face consistent with the procedures established in Section 8.19 – Landfill Cover. For potentially odorous wastes, ADC will not be used.
- Waste that is determined to require additional procedures, such as dead animals, will be isolated within the active working face and immediately covered with a minimum of 3 feet of other solid waste or a minimum of 2 feet of soil upon receipt at the active working face. Additional daily cover soil will be placed if needed.
- Ponded water at the site will be controlled as detailed in Section 8.20 of this SOP. Odors will be eliminated through removal of ponded water and regrading of areas consistent with Section 8.19 – Landfill Cover.
- Inspect the citizens convenience center to verify that odors are controlled. If odors become an issue, the stored material will be systematically removed until the odors are eliminated.
- Leachate and contaminated water will be managed in accordance with Appendix IIIC – Leachate and Contaminated Water Plan. Note that leachate will be transferred from the leachate collection system either directly to an enclosed liquid transfer vehicle or an onsite enclosed leachate storage tank. Leachate will then be transferred directly to a transfer vehicle. Leachate will be treated and disposed at an offsite treatment facility.
- Inspect and evaluate leachate recirculation procedures. Leachate recirculation will be temporarily suspended if the odor issue is a result of recirculation activities. Leachate recirculation procedures will be evaluated to determine the cause of the odors and to mitigate the odor issue before the leachate recirculation activities are resumed.

8.12 Disease Vector Control (30 TAC §330.151)

The need for vector control (control of rodents, flies, mosquitoes, etc.) will be minimized through daily site operations. Activities designed to control on-site populations of disease vectors include minimization of the size of the active working face; placement and compaction of daily, intermediate, and final cover; adherence to the ponded water plan; and following the detailed procedures described in this SOP. In addition, barbed wire and mesh fencing will be maintained to prevent access to the site by large animals. The Hardin County Landfill will conduct inspections as required by Section 8.24 – Site Inspection and Maintenance Schedule to observe waste disposal operations and to document placement of daily cover, intermediate cover, final cover, and removal of ponded water. Should daily operations not control vectors, a licensed professional will apply pesticides or rodenticides to ensure that proper chemicals are used and that they are properly applied.

8.13 Site Access Roads (30 TAC §330.153)

The Hardin County Landfill has constructed an asphalt paved entrance road from FM 770 to the gatehouse for waste hauling vehicles, operating personnel, and visitors. In addition, an all-weather access road will be constructed and maintained from the gatehouse to the active disposal area. Other internal landfill roads will be constructed with a crushed stone surface or other suitable material. The paved entrance and access road and the crushed stone internal roads will provide mud control for the waste hauling vehicles prior to exiting the site and returning to public access roads. During wet weather conditions the Site Manager will routinely inspect the site and implement measures to further minimize mud tracking onto public access roads, as necessary. It is not anticipated that mud or other debris will be tracked onto FM 770 given its crushed stone landfill haul road and paved entrance road. Should mud or other associated debris be tracked onto FM 770, the material will be removed daily by site personnel using available equipment.

The landfill haul roads and access roads will be maintained in a reasonably dust-free condition by periodic spraying from a water truck or other more permanent measures. Where possible, grass will be established to reduce the area of bare ground which could possibly contribute to dust problems. Grading equipment will be used weekly or as needed to control or remove mud accumulations on internal roads including the entrance road. Stockpiles of crushed stone, concrete rubble, masonry demolition debris, or other similar material will be available for use in maintaining passable internal access roads, including regrading to minimize depressions, ruts, and potholes. The site entrance road, landfill haul road, and access roads will be maintained in a clean and safe condition. Litter and debris will be picked up daily and returned to the active working face. Refer to Section 8.24 of this SOP for site inspection and maintenance schedule.

Direct access to the active disposal area will be accomplished through landfill haul roads and trench entry ramps. These trench entry ramps are detailed in Part III, Appendix IIIA – Landfill Unit Design Information. The cross section of the paving for the trench entry ramps will match that of the landfill road section is also shown in Appendix IIIA. To get to the trench entry ramps from the landfill permanent access roads, a landfill haul road will be constructed and maintained until development of future trenches requires that the road be relocated.

8.14 Salvaging and Scavenging (30 TAC §330.155)

Salvaging will not be allowed to interfere with prompt sanitary disposal of solid waste or to create public health nuisances. Salvaged materials will be considered as potential recycled materials and will be stored near the gatehouse. Salvaged items will be removed from the site often enough to prevent the items from becoming a nuisance, to preclude the discharge of pollutants from the area, and to prevent an excessive accumulation of the material at the site but will not be stored in excess of 360 days.

Class 1 industrial and other special wastes received at the site will not be salvaged. Pesticide, fungicide, rodenticide, or herbicide containers will not be salvaged unless they are salvaged through a state-approved recycling program. Scavenging will be prohibited at all times. Scavenging by wildlife will be precluded through maintenance for fencing and other measures to exclude or harass animals.

8.15 Endangered Species Protection (30 TAC §330.157)

No endangered or threatened species have been documented at the site nor has a critical habitat for such species been identified at the site. Neither the facility nor its operation will result in the destruction or adverse modification of the critical habitat of endangered or threatened species, or cause the taking of any endangered or threatened species.

8.16 Landfill Gas Control (30 TAC §330.159)

The control and monitoring of LFG for the Hardin County Landfill will be in accordance with the Landfill Gas Management Plan. The Landfill Gas Management Plan was developed in accordance with 30 TAC §330.371. The gas management plan provides for inclusion of applicable documentation in the site operating record, and for submittal to the Executive Director.

8.17 Oil, Gas, and Water Wells (30 TAC §330.161)

8.17.1. Water Wells (30 TAC §330.161(a))

There is one known water well within the permit boundary and outside the limits of waste disposal of the Hardin County Landfill. This water well has been abandoned, and a water line installed from the adjacent Hardin County hauling facility property onto the landfill property to provide potable water to the site. Dust control water is obtained from the on-site storm water pond.

The location of the previously installed non-potable water well on the Hardin County Landfill property is shown on Appendix IIIA – Landfill Unit Design Information. The water well was properly plugged and abandoned in accordance with the Texas Water Well Drillers Board requirements.

Should other water wells be discovered during the course of facility development, Hardin County Landfill will immediately provide written notification to the TCEQ Executive Director of their location.

Within 30 days of finding any water wells, the Site Manager will provide written certification to notify the Executive Director of the TCEQ that all such wells have been capped, plugged, and closed in accordance with all applicable rules and regulations of the TCEQ or other applicable state agency. A copy of the well plugging reports will be submitted to the appropriate state agency and Executive Director within 30 days after the wells are plugged. A permit modification will be submitted to the Executive Director if revisions to the liner installation plan are required as the result of well abandonment.

8.17.2 Oil and Gas Wells (30 TAC §330.161(b))

There are no abandoned or producing crude oil, natural gas, or other wells associated with mineral recovery known to exist within the permit boundary.

If any crude oil or natural gas well, or other well associated with mineral recovery are located, the Site Manager will, within 30 days of such a discovery, provide written notification to the Executive Director of the location of such well(s). Within 30 days after plugging of any such well, the Site Manager will provide the Executive Director with written certification that the well has been properly capped, plugged, and closed in accordance with all applicable rules and regulations of the Railroad Commission of Texas.

A copy of the well plugging report to be submitted to the appropriate state agency will also be submitted to the Executive Director of the TCEQ within 30 days after the well has been plugged. A permit modification will be submitted to the Executive Director if revisions to the liner installation plan are required as the result of well abandonment.

8.18 Compaction (30 TAC §330.163)

Compaction of incoming waste provides more efficient use of available space and reduces the amount of settling after the fill is complete. Compaction of the waste will be accomplished by a landfill compactor or similar equipment. The site dozer will be used to compact waste should the compactor be temporarily out of service for repairs. Adequate compaction will be accomplished to minimize future consolidation and settlement and provide for the proper application of intermediate and final cover. The incoming waste will be spread in layers and thoroughly compacted.

Landfill personnel will be onsite full time during the placement of the first 5 feet of waste over the liner system. They will verify and document that the initial 5 feet of waste does not contain large bulky items which could damage the liner system or which cannot be compacted to the required density. Waste ballast must be compacted to a density of not less than 1,000 Ib/cy or 37 pcf.

The landfill will document that the waste used for ballast has been compacted with multiple passes of a wheeled compactor that weighs in excess of 40,000 pounds. The form to be used by the landfill is included in Part III, Appendix IIID – Liner Quality Control Plan.

8.19 Landfill Cover (30 TAC §330.165)

8.19.1 Soil Management

Management of soil for use in and around the facility will be an ongoing process at the Hardin County Landfill. In general, soil for use as daily cover, intermediate cover, final cover, and other uses will be available adjacent to the active area. Soil will be obtained from excavation that is ongoing as part of the initial development of future landfill cells or from other suitable sources. This onsite material may be available near the working face (the exact distance varying daily, weekly, etc., depending on the exact stage of development).

In addition to this available material located on the landfill property, a stockpile of material will be kept available on site. The stockpile will consist of soil that has not previously come in contact with waste, and will be of sufficient volume to provide at least one day's application of 6 inches of daily cover over the working face. As this stockpile is used, it will be replenished in such a manner as to also be available to extinguish any fires. The soil may also be used in emergency situations for fire control.

8.19.2 Daily Cover (30 TAC §330.165(a))

Daily cover of MSW waste is necessary to control disease vectors, windblown waste, odors, fires, scavenging, and to promote runoff from the fill area. At least 6 inches of well-compacted soil cover material that has not been previously mixed with garbage, rubbish, or other solid waste will be placed over all solid waste received during that same day. Weekly cover for the separate Type IV disposal area will meet the requirements of 30 TAC §330.165(b) for Type IV facilities. The Type IV working face will not be covered with ADC unless it is covered with the ADC more often than once per week. The Type IV working face will be covered with well-compacted soil cover material that has not been previously mixed with garbage, rubbish, or other solid waste at the end of each week. The requirements of Section 8.19.2 will apply to the Type IV disposal area, except the rate of cover will be weekly.

To ensure that the daily cover soil will be adequate (i.e., minimize vectors, contaminated storm-water runoff, odors, etc.) the following procedures will be followed by the Site Manager or his designee:

- The daily cover will be sloped to drain.
- The daily cover will be compacted with a minimum of two passes with the dozer tracks to minimize infiltration of storm water, graded to drain, and will not have any waste visibly protruding through it.
- The Site Manager will document where daily cover has been placed and visually inspect during placement that a minimum of 6 inches (compacted thickness) of daily cover soil has been placed and that no waste is exposed. The Site Manager will document, on a daily basis, the daily cover placement area and indicate that he has visually verified the thickness and condition in the Cover Inspection Record, as discussed in Section 8.19.8.
- After each material rainfall event, the Site Manager will inspect all daily cover areas for erosion, exposed waste or other damage, and repair as necessary. Runoff from damaged or eroded areas will be handled as contaminated water until repairs are completed.
- The Site Manager will inspect for seeps from daily cover. Seepage areas will be excavated and backfilled with crushed stone or other suitable materials to provide a pathway for leachate to reach the leachate collection system. After backfilling, daily cover will be replaced over former seepage areas.
- ADC will be used as applicable. In accordance with 30 TAC §330.165(d)(5), ADC will not exceed constituent limitations imposed on waste authorized to be disposed at the facility. In accordance with 30 TAC §330.165(d)(6), runoff from areas utilizing ADC will be managed as contaminated water. See the ADC Operating Plan in Part IV, Appendix IVC.

Inactive areas with 6 inches of daily cover must be inspected daily for erosion, ponded water, seeps, protruding waste, or other detrimental conditions that may cause contaminated runoff from the daily cover. All areas that receive waste and then become inactive for longer than 180 days will receive intermediate or final cover. This 12-inch-thick layer of cover soil will be classified as "intermediate cover" as described in Section 8.19.3 of this SOP. Once the area becomes active again, the top 6 inches of the intermediate cover not previously mixed with solid waste may be stripped off for use as daily cover in other areas. Final cover is described in Section 8.19.6 of this SOP.

8.19.3 Intermediate Cover (30 TAC §330.165(c))

All areas that receive waste and then become inactive for longer than 180 days will be covered with an additional 6 inches of well compacted cover material, for a total cover thickness of at least 12 inches. The intermediate cover will be graded to prevent erosion and ponding of water. The additional 6 inches of earthen material will be capable of sustaining native plant growth and will be seeded or sodded following its application for erosion control. Plant growth and other erosion control features placed as part of the intermediate cover will be maintained. Runoff from areas that have received intermediate cover are considered to have not come into contact with the active working face or leachate and are considered uncontaminated stormwater runoff.

The sequence of intermediate cover placement with respect to waste placement and construction of new lined areas is included in detail in Part III, Appendix IIIA – Landfill Unit Design Information.

8.19.4 Alternate Material Daily Cover (30 TAC §330.165(d))

The Hardin County Landfill is authorized to use alternate material daily cover (ADC). The facility is authorized to use ADC in accordance with 30 TAC §330.165(d). The ADC is limited to a 24-hour period after which either waste or daily cover, as defined in 30 TAC §330.165(d) and applied as described in Section 8.19.2 of this SOP, must be placed. The ADC will be placed in accordance with the Alternative Daily Cover Operating Plan included in Appendix IVC.

8.19.5 Temporary Waiver (30 TAC §330.165(e))

The Hardin County Landfill does not anticipate requesting a waiver from the requirements from 30 TAC §330.165(a)-(d) (relating to daily and intermediate cover placement). Should the landfill decide to request a waiver due to extreme seasonal climatic conditions, the landfill will request a waiver in accordance with this section.

8.19.6 Final Cover (30 TAC §330.165(f))

Final cover placement will occur as areas of the site are filled to the design top-of-waste grades. Final cover placement over individual areas will be in accordance with Part III, Appendix IIIJ – Final Closure Plan and will permit ongoing landfilling operations to continue until the time of final closure. Surface water will be managed throughout the active life of the site to minimize infiltration into the filled areas and to minimize contact with solid waste. Erosion of final or intermediate cover will be repaired promptly by restoring the cover material, grading, compacting, and seeding it as necessary. Such periodic inspections and restorations are required during the entire operational life and for the postclosure maintenance period. Refer to Section 8.24 of this SOP for a site inspection and maintenance schedule.

In general, final cover placement over completed portions of the site will consist of the following steps:

- Survey controls will be implemented to control the filling of solid waste to the bottom level of the daily/intermediate cover layer elevation.

- The final cover system layers will be constructed. Testing of the various components of the final cover system will be performed in accordance with Part III, Appendix IIIJ – Closure Plan.
- A final cover certification report complete with an as-built survey will be prepared by an independent licensed professional engineer and submitted to the TCEQ for approval.
- The TCEQ-approved final cover certification report will be maintained in the site operating record and the cover inspection record, as described in Section 8.19.8, will be updated to reflect the area where final cover has been placed. The TCEQ region office will also be notified that final cover placement has occurred at the site.

8.19.7 Erosion of Cover (30 TAC §330.165(g))

The landfill staff will inspect intermediate cover at the site on a weekly basis. The final cover system including the erosion control structures will be maintained during and after construction. During the active life of the site, the Site Manager will inspect the final cover system on a weekly basis. Erosion gullies or washed-out areas of the intermediate or final cover which are deep enough to jeopardize the intermediate or final cover will be repaired within 5 days of detection. Repair of final cover includes restoring cover, grading, compacting, and seeding as required. An eroded area is considered to be deep enough to jeopardize the intermediate or final cover if it exceeds 4 inches in depth as measured perpendicular with the horizontal slope face or surface. Should additional time be required for repairs due to weather related delays, the landfill will request from the TCEQ region office approval of an alternate schedule. Documentation of weather delays for the repairs will be included in the cover inspection record. Weekly inspections and restorations are required for the active life of the landfill. Refer to Section 8.24 for site inspection and maintenance schedule. Documentation of dates of inspections, detection of erosion, and completion of repairs are required in accordance with Section 8.19.8 – Cover Inspection Record.

Postclosure care inspection and repair procedures of the final cover are outlined in Part III, Appendix IIIK – Postclosure Care Plan.

8.19.8 Cover Inspection Record (30 TAC §330.165(h))

Throughout the landfill operation, a cover inspection record will be maintained and be readily available for inspection in accordance with 30 TAC §330.165(h). For daily cover, intermediate cover, and alternate daily cover, the record will specify the date cover was accomplished (no exposed waste), area covered (by use of the grid system), how it was placed, and when it was completed. For final cover, the record will show the final cover area completed, date cover was applied and thickness of final cover. The final cover certification report for each area will be referenced in the record. Each entry in the record will be certified by the signature of the Site

Manager that the work was accomplished as stated in the record. The cover inspection record will document inspections required under Section 8.19.7 – Erosion of Cover, 30 TAC §330.165(g) including findings, and corrective actions taken.

8.20 Ponded Water (30 TAC §330.167)

The Hardin County Landfill will prevent ponding of water over areas that have received waste through site operations including grading and maintenance. The Ponded Water Plan provides direction to the landfill operations for the prevention and elimination of ponded water. The Ponded Water Plan is as follows:

- The landfill will place daily cover, intermediate cover, and final cover in accordance with requirements established in Section 8.19 – Landfill Cover. In addition, the landfill will regularly place toe and containment/diversion berms to prevent water from running onto waste.
- The landfill will inspect the surface of areas that have received waste and landfill cover consistent with Section 8.19 – Landfill Cover and Section 8.24 — Site Inspection and Maintenance Schedule.
- Beneficial site grading and maintenance as required by Section 8.19 will minimize the ponding of water over areas containing waste and facilitate drainage.
- Ponded water will be pumped from ponded areas to the appropriate containment area if contaminated and to free drainage if intercepted prior to contact with waste.
- Should ponding of water occur, the ponded water will be removed and the depressions filled within 7 days, weather permitting. Landfill cover will be repaired consistent with procedures specified in Section 8.19.
- If the ponded water has come into contact with waste, or waste-contaminated soils, it will be treated as leachate and handled in accordance with Part III, Appendix IIIC – Leachate and Contaminated Water Plan.

8.21 Waste in Enclosed Containers or Enclosed Vehicles Accepted at Type IV Landfills (30 TAC §330.169)

The Hardin County Landfill has a separate area for Type IV waste disposal only. Should the facility accept waste in enclosed containers or enclosed vehicles, those vehicles will be directed to the Type I waste disposal area only.

8.22 Visual Screening of Deposited Wastes (30 TAC §330.175)

The Hardin County Landfill is located in rural Hardin County. Existing topography and vegetation provide adequate/sufficient natural screening of deposited waste. Visual screening of deposited waste is provided as part of normal waste disposal operations and sequence of development.

During below-ground disposal operations, the landfill will not require visual screening of deposited waste. As the landfill is developed above ground, the landfill will construct final cover as the landfill reaches final contours. Screening of deposited waste materials at the landfill will be provided by the Site Manager if the TCEQ determines a need for such screening is necessary.

8.23 Contaminated Water Discharge

Hardin County Landfill will take all steps necessary to control and prevent the discharge of contaminated water from the facility. Should the discharge of contaminated water become necessary, the Site Manager will obtain specific written authorization from the TCEQ prior to discharge. All water coming in contact with waste, or contaminated soils will be treated as contaminated water. Run-on and runoff for the 25-year, 24-hour storm event will be controlled following the procedures set forth in Appendix IIIC – Leachate and Contaminated Water Plan. Temporary berms will be used to minimize the amount of water contaminated at the active working face. As discussed in Section 8.2.1, the citizens convenience center uses watertight containers and is located over an all-weather area. In addition, waste spilled at the working face will be picked up daily, thus eliminating the potential for contaminated water. The landfill will be operated consistent with 30 TAC §330.15(h)(1)-(4) regarding discharge of solid wastes or pollutants into waters of the United States.

8.24 Site Inspection and Maintenance Schedule

Item	Task	Frequency	Inspector	Type of Inspection
Fence/Gate	Inspect perimeter fence and gate for damage, gaps, intrusions and the like. Make repairs if necessary.	Monthly (an unofficial inspection of the perimeter fence and gate will also be conducted while policing for windblown waste, but the official detailed inspection of the perimeter fence and gate will be conducted monthly)	Site Manager or Designee	Document in the Site Operating Record
Windblown Waste	Police working face area, citizens convenience center, wind fences, access roads, entrance area, and perimeter fence for loose trash. Clean up as necessary.	Daily	Site Manager or Designee	Document in the Site Operating Record
Waste Spilled on Route to the Site	Police the entrance area and all roads at least 2 miles from the site entrance for loose trash. Clean up as necessary.	Daily	Site Manager or Designee	Document in the Site Operating Record
Landfill Markers	Inspect all landfill markers for damage, color coding, and general location. Correct or replace damaged markers within 15 days of discovery.	Monthly	Site Manager or Designee	Document in the Site Operating Record
Site Access Road	Inspect site access road for damage from vehicle traffic, erosion, or excessive mud accumulation. Maintain as needed with crushed rock or stone.	Weekly, more often during wet weather or extended dry weather periods.	Site Manager or Designee	Document in the Site Operating Record

8.24 Site Inspection and Maintenance Schedule (Continued)

Item	Task	Frequency	Inspector	Type of Inspection
Daily Cover	Inspect for proper placement, thickness, and compaction. Correct problems as needed.	Daily at the active face. All daily cover areas will be inspected daily and after each rainfall event.	Site Manager or Designee	Document in the Site Operating Record
Intermediate Cover	Inspect for proper placement, thickness, erosion, compaction, and for presence of waste or other contamination. Correct problems as needed.	Weekly and within 24 hours of a rainfall event of 0.5 inches or more. Repair erosion within five days of detection.	Site Manager or Designee	Document in the Site Operating Record
Final Cover	Inspect for proper placement, thickness, compaction, slope, settlement, and erosion. Maintenance will be ongoing throughout postclosure care period. Correct problems as needed.	Weekly and within 24 hours of a rainfall event of 0.5 inches or more (while the landfill is operational only. During post-closure inspect as set forth in Appendix IIIK – Postclosure Care Plan). Repair erosion within 5 days of detection.	Site Manager or Designee	Document in the Site Operating Record
Leachate	Record depth of leachate in sump, as required.	Monthly	Site Manager or Designee	Document in the Site Operating Record
Ponded Water	Inspect daily cover, intermediate cover, and final cover areas for potential areas that may pond water. Regrade as required. Remove ponded water over intermediate and final cover areas. Contaminated ponded water removed Leachate and Contaminated Water Plan.	Daily at active face and daily cover areas. Weekly for intermediate and final cover areas. Remove ponded water within 7 days of detection.	Site Manager or Designee	Document in the Site Operating Record

APPENDIX IVA

LOAD INSPECTION REPORT FORM

LOAD INSPECTION REPORT

Driver complete boxed section

Name of Hauling Company: ______________________ Driver's Name: ________________

Phone#: (____)__________ Address: ______________ City: __________ State: _____ Zip: _______

Type of Vehicle: ____________ (e.g., Roll-Off, Front Loader, Dump Truck, etc) License Plate#: ____________

Size of Load (Yds): ______ Sources of Wastes: ______________________________

DRIVER SIGNATURE: ____

LOAD CONTENTS

WASTE	ESTIMATED % BY VOLUME	WASTE	ESTIMATED % BY VOLUME
HOUSEHOLD WASTES		YARD WASTE,BRUSH,STUMPS	
WOOD		CONTAINERS	
METAL		BULK LIQUIDS	
PAPER, CARDBOARD		POWDERS, DUSTS	
PLASTIC,RUBBER,GLASS		SOIL	

PROHIBITED WASTE INDICATORS	YES	NO
LABELED HAZARDOUS WASTE		
BATTERIES		
OIL		
MEDICAL		
RADIOACTIVE		
ASHES		
SOILS		
ODORS, UNUSUAL		
COLORS, UNUSUAL		
HEAT, EXCEESSIVE		
SMOKE		

INSPECTION RESULTS

PROHIBITED WASTES IDENTIFIED? ______________________________

FURTHER ACTION REQUIRED? (e.g., none, lab tests, notification) ______________________

SAMPLES SENT TO LAB? ________ Lab Name: ______________________ Lab Phone: ____________

TESTS REQUESTED: ____

Date & Time of Inspection: ________________ Inspector's Name: ______________________

____

LOAD INSPECTOR SIGNATURE

APPENDIX IVB

SPECIAL WASTE ACCEPTANCE PLAN

HARDIN COUNTY LANDFILL
HARDIN COUNTY, TEXAS
PERMIT AMENDMENT APPLICATION

PART IV – SITE OPERATING PLAN

APPENDIX IVB
SPECIAL WASTE ACCEPTANCE PLAN

Prepared for

BFI Waste Systems of North America, LLC

March 2017
Revised August 2017

Revised December 2017

DAVID E. POE
81734

12-5-2017

Prepared by
Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-758-11-02

This document is intended for permitting purposes only.

CONTENTS

STATE OF TEXAS

DAVID E. POE

81734

LICENSED PROFESSIONAL ENGINEER

12-5-2017

1 SPECIAL WASTE ACCEPTANCE PLAN OVERVIEW

1.1 Purpose and Scope

The Texas Commission on Environmental Quality (TCEQ) solid waste regulations currently define a special waste as "any solid waste or combination of solid wastes that because of its quantity, concentration, physical or chemical characteristics, or biological properties requires special handling and disposal to protect the human health or the environment. If improperly handled, transported, stored, processed, or disposed of or otherwise managed, it may pose a present or potential danger to the human health or the environment." The TCEQ's regulatory definition also provides a listing of "special wastes" under Title 30 Texas Administrative Code (TAC) §330.3(148)(A)-(S).

Under the TCEQ's operational standards for municipal solid waste landfills, the acceptance and/or disposal of a "special waste" as defined above requires prior written approval from the Executive Director of the agency, unless the material is specifically identified in 30 TAC §330.171 (relating to Disposal of Special Wastes) or §330.173 (relating to Disposal of Industrial Wastes). By way of example, the receipt of properly treated medical waste, dead animals or slaughterhouse wastes, certain asbestos-containing material that is properly managed, empty containers that are properly rinsed, municipal hazardous waste from small quantity generators that are conditionally exempt, sludge, grease/grit trap waste and liquid wastes from municipal sources that are properly processed, and used oil filters from a household generator that are properly crushed or otherwise processed to remove all free-flowing used oil do not require waste-specific and/or site-specific written approval from the Executive Director prior to acceptance and/or disposal as noted in the regulations. Similarly, soils contaminated by petroleum products, crude oils or other chemicals may be accepted and/or disposed of subject to limitations set forth in 30 TAC §330.171; and certain industrial solid wastes, such as Class 1 asbestos-containing material and Class 2 or Class 3 non-hazardous industrial solid wastes that do not interfere with facility operations may be accepted and/or disposed of without a waste-specific and/or site-specific written approval from the Executive Director, subject to limitations set forth in 30 TAC §330.173. This Special Waste Acceptance Plan (Plan) sets forth the special wastes that may be accepted at the Hardin County Landfill by rule without the necessity for prior written approval from the Executive Director.

The acceptance and/or disposal of special wastes other than those described above requires prior written approval from the Executive Director. According to 30 TAC §330.171(b)(1), such special waste approvals from the Executive Director are to be waste-specific and/or site-specific. Section 2 (Site-Specific Authorizations) of this Plan has been developed consistent with 30 TAC §330.171(b)(2) in order to receive site-specific authorization to accept and dispose of such special wastes at the Hardin County Landfill without the necessity for each generator of special waste to secure a prior written authorization from the Executive Director.

This Plan further outlines specific operational and technical procedures and guidelines to be utilized at the facility for the proper classification, acceptance, and management of all special wastes.

To ensure proper classification, acceptance and management of all special waste, this Plan has been developed consistent with the following TCEQ guidance documents:

- "Guidance for the Classification and Coding of Industrial and Hazardous Wastes" (TCEQ Regulatory Guidance RG-022)
- "Special Waste Regulations in Texas" (TCEQ Regulatory Guidance RG-029)
- "Disposal of Special Wastes Associated with the Development of Oil, Gas, and Geothermal Resources" (TCEQ Regulatory Guidance RG-003)

2 SITE-SPECIFIC AUTHORIZATIONS

The acceptance and/or disposal of special wastes other than those authorized by rule and referenced in Section 1 (Special Waste Acceptance Plan Overview) of this Plan requires prior written approval from the Executive Director. According to 30 TAC §330.171(b)(1), special waste approvals from the Executive Director are to be waste-specific and/or site-specific. This section has been developed consistent with 30 TAC §330.171(b)(2), in order to receive site-specific authorization to accept and dispose of the special wastes identified below at the Hardin County Landfill without the necessity for each generator of special waste to secure a prior written authorization from the Executive Director. Wastes prohibited by the TCEQ (see 30 TAC §330.15(e)) will not be accepted at the site.

The following special wastes will be evaluated in accordance with Section 3 (Hazardous Waste Determination and Class 1 Industrial Waste Determination), Section 4 (Special Waste Evaluation Criteria), and Section 5 (Quality Assurance/Quality Control — Analytical Information) of this Plan prior to acceptance. Once the determinations are completed, the accepted special wastes will be handled and disposed of in accordance with the management provisions applicable to that waste. The special waste handling procedures and typical daily estimated rate of disposal for these special wastes are identified within Section 10 (Special Waste Handling Procedures) of this Plan.

A. Nonhazardous waste from commercial or industrial wastewater treatment plants; air pollution control facilities; and tanks, drums, or containers used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR Part 261, Appendix VIII but has not been listed as a commercial chemical product in 40 CFR §261.33(e) or (f) will be accepted and disposed of at this facility in accordance with this Plan, provided the waste is not a Class 1 industrial waste (other than RACM). Typical initial characterization data requirements for these wastes will include TCLP for Total Metals, Volatiles and Semi-Volatiles on a representative sample(s) unless generator's process knowledge is used in lieu of testing for some of these parameters, as described further in Section 5 of this Plan. These wastes will also be tested in accordance with Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), as amended, and certified to contain no free liquids prior to disposal.

B. Nonhazardous off-spec or contaminated drugs, foods, and beverages other than those contained in normal household waste will be accepted and disposed of at the facility, provided the waste is not a Class 1 industrial waste (other than RACM).

C. RCRA exempt nonhazardous incinerator ash will be accepted and disposed of in the facility under this Plan, provided the waste is not a Class 1 industrial waste. Typical initial characterization data requirements will include TCLP for Total Metals on a representative sample(s).

D. RCRA-exempt nonhazardous waste from oil, gas and geothermal activities and other substances subject to regulation by the Railroad Commission of Texas are, by definition, not solid wastes. However, because they are specifically identified as special waste in 30 TAC §330.3(148)(P), such waste will be accepted and disposed of in accordance with this Plan following a hazardous waste determination pursuant to 30 TAC §335.504 conducted on a representative sample(s) of these materials. These wastes will be accepted and disposed of in the facility under this Plan, provided the waste is not hazardous and does not exceed the concentration levels for a Class 1 industrial waste.

E. MSW waste generated outside the state boundaries that meets the definition of a special waste as defined in 30 TAC §330.3(148) will be accepted and disposed of in accordance with all the provisions and requirements of this Plan, including the typical initial characterization data applicable to the same types of waste generated in Texas. Out-of-state wastes that would be considered Class 2 or Class 3 industrial solid waste if generated within Texas will be handled in accordance with the requirements identified in 30 TAC §330.173.

F. Nonhazardous light ballasts and nonhazardous small capacitors containing polychlorinated biphenyl (PCB) compounds as defined in 40 CFR §761.3 (relating to federal PCB/TSCA regulations) will be accepted and disposed of at the facility only if the PCB-containing light ballasts and electrical capacitors are generated during routine maintenance and are not leaking, provided the total weight of such wastes does not exceed 3 pounds of ballast per day. Typical initial characterization data requirements will include PCB analysis on a representative sample(s). Regulated PCB wastes as defined in 30 TAC §330.3(111) are prohibited and will not be accepted.

G. Nonhazardous abrasive wastes (e.g., blasting grit, steel shot, etc.) will be accepted and disposed of at the facility under this Plan provided the waste is not a Class 1 industrial waste. Typical initial characterization data requirements for these abrasive wastes will include TCLP for Total Metals on a representative sample(s).

H. Nonhazardous demolition debris contaminated with lead, from structures which have received one or more coats of lead-based paint from household activities, will be accepted and disposed of at the facility under this Plan provided the waste is not a Class 1 industrial waste. Wastes containing lead-based paints will require TCLP or total analysis for lead on a representative sample(s) to determine that the concentration of lead in the waste does not exceed the requirements of the Hazardous/Class 1 industrial waste determination for lead, as demonstrated by the generator.

I. Certain types of medical wastes, defined as special wastes from health care related facilities that have been treated in accordance with the procedures specified in Subchapter Y of the TCEQ regulations (relating to Medical Waste Management), will be accepted and disposed at this facility in accordance with this Plan.

J. Dead animals (other than single household pets and other single small animals) and slaughterhouse waste will be accepted and disposed at this facility in accordance with this Plan.

K. Discarded materials containing asbestos (non-RACM)(e.g., shingles) will be accepted and disposed at this facility in accordance with this Plan.

L. Nonhazardous empty containers, defined as empty containers with a holding capacity greater than 5 gallons which have held either pesticides (e.g., insecticides, herbicides, fungicides, or rodenticides) or hazardous chemicals/constituents as defined in 40 CFR §261.7(b)(I)(2)(3), Appendix VIII, or listed in §26133(e) or (f) will be accepted and disposed at this facility in accordance with this Plan.

M. Municipal hazardous waste from conditionally exempt small quantity generators meeting the requirements of 30 TAC §330.3(148)(A) will be accepted and disposed at this facility in accordance with this Plan.

N. Grease and grit trap waste, defined as solidified grease and grit trap material, typically produced by restaurants will be accepted and disposed at this facility in accordance with this Plan.

O. Filter media, defined as paint filters, glycol filters, molecular sieves, and other types of filter media, but not including those contained in normal household waste or used in oil filters from internal combustion engines will be accepted and disposed at this facility in accordance with this Plan.

P. Municipal wastewater treatment plant sludges or other types of domestic sewage treatment plant sludges and septic pumping (as regulated under Chapter 312 relating to Sludge Use, Disposal and Transportation) will be accepted and disposed at the facility in accordance with this Plan.

Q. Any other nonhazardous solid waste or combination of solid wastes that, because of its quantity, concentration, physical or chemical characteristics, or biological properties, requires special handling prior to disposal to protect human health and/or the environment will be accepted and disposed at this facility in accordance with this Plan.

3 HAZARDOUS WASTE DETERMINATION AND CLASS 1 INDUSTRIAL WASTE DETERMINATION

The Hardin County Landfill will ensure that a Hazardous Waste Determination pursuant to 30 TAC §335.504 has been performed for all special wastes accepted for disposal at the landfill. The facility will ensure that a Class 1 industrial waste determination pursuant to 30 TAC §335.505 has been performed for all special wastes accepted for disposal at the landfill. Regulated hazardous wastes (except hazardous waste from conditionally exempt small quantity generators) and Class 1 industrial wastes (except wastes that are classified as Class 1 only because of their asbestos content) are prohibited for acceptance or disposal at the facility. The following Section 4 (Special Waste Evaluation Criteria) and Section 5 (Quality Assurance/Control – Analytical Information) of this Plan establish additional criteria for performing such hazardous and Class 1 industrial waste determinations.

4 SPECIAL WASTE EVALUATION CRITERIA

Special wastes will be evaluated under this Plan prior to acceptance by facility management. This proactive policy specifically provides for pre-acceptance screening procedures to assure that a particular solid waste is not a regulated hazardous or radioactive waste, does not contain regulated PCB levels, and is not otherwise prohibited or unacceptable for acceptance and/or disposal at the facility. This program is implemented in accordance with 30 TAC §§330.127(5)(A), §330.171 and §330.173, and assures the waste is acceptable pursuant to permit conditions, applicable regulations, and operating capabilities.

Prior to the acceptance of a special waste, the generator/customer is required to state and certify the characteristics, origin, and estimated quantity of the special waste proposed for disposal. In addition, if the waste is not readily identifiable, the generator/customer will be required to provide other pertinent information regarding the waste that might aid in its identification. The following process must be completed before a special waste is accepted.

A. The potential generator/customer must complete and certify a Waste Profile Record (Profile), and will be required to provide laboratory analyses data or documented generators process knowledge (described further in Section 5) for the waste stream intended for acceptance and disposal. Industrial solid waste generators will be required to identify that the special waste has been self-classified as Class 2 or Class 3 solid waste under 30 TAC §335, Subchapter R (relating to Waste Classification). The generator's waste characterization data may be reviewed to assess the proper waste classification. Out-of-state Class 2 or Class 3 industrial solid waste will be reviewed in accordance with all the provisions and requirements of this Plan for the same types of waste generated in Texas. All generators/customers must certify that the special waste is not a regulated hazardous waste (subject to the regulatory exception for conditionally exempt small quantity generators or "CESQGs").

B. The Waste Classification Checklist included in the "Guidance for the Classification and Coding of Industrial and Hazardous Wastes" (TCEQ Regulatory Guidance RG-022) may be required from industrial generators and may assist the BFI special waste approval staff with the hazardous waste and Class 1 industrial waste evaluation/determination. The Checklist, as one possible data source, may help determine that the special waste is (1) not a hazardous waste based on the EPA's listing ("F", "K", "P", or "U" listed wastes) of hazardous wastes or displays hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity) according to EPA regulations, and (2) that the special waste is not a Class 1 industrial waste based on the criteria found in 30 TAC §335.505. The review of this Checklist and its substantive data, if provided, would be a key element used to confirm the industrial generator has adequately self-classified its waste and that the landfill accepts only authorized wastes.

C. The Profile Record, Waste Classification Checklist (if applicable), and all information provided by the potential generator/customer will be reviewed by the Republic Services special waste approval personnel. This approval staff will have been given internal approval by Republic Services to implement the procedures identified within this Plan.

The approval staff ensures that any analytical information submitted meets the requirements as described in Section 5 (Quality Assurance/Quality Control – Analytical Information) of this Plan, assigns any necessary conditions/limitations on managing the waste, and makes the decision if the waste is eligible for acceptance and disposal at the facility. Once the approval staff determines the waste is eligible, all information is routed to the Site Manager or designated representative.

D. Onsite staff or offsite special waste approval staff reviews all information provided, assigns any additional conditions/limitations on managing the waste, and makes the final decision if the waste is acceptable at the facility in conformance with all applicable regulations, permit conditions, and operating capabilities.

E. If the waste is approved for acceptance, all information will be placed in the site operating record, and an expiration date not to exceed 12 months is assigned to the Profile Record.

F. Generators of special waste will be required to recertify their waste, at a minimum, every 12 months to ensure it is still in conformance. As appropriate, the waste characterization data will be reassessed by BFI and/or Republic Services personnel in response to identified changes in the composition of such solid waste or the processes generating such solid waste, or as otherwise deemed necessary by the Site Manager based on routine or random inspections and operational demands.

5 QUALITY ASSURANCE/QUALITY CONTROL – ANALYTICAL INFORMATION

The laboratory analyses required for review by BFI and/or Republic Services special waste approval personnel is dependent upon the type of waste stream to be accepted and disposed. Analyses must have been conducted by a TCEQ-approved laboratory in accordance with EPA test procedures as outlined in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020), American Society for Testing and Materials (ASTM) Standard Methods, or another regulatory approved method. These analytical methods will be performed on a representative sample(s) of the waste as described in Chapter 9 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), as amended, or Chapter 4 of EPA's "Ecological Assessment of Hazardous Waste Sites; a Field and Laboratory Reference (NTIS PB 89205967), as amended. Although generators may not be obligated by law to provide these analytical results, facility personnel must obtain proper analytical results or equivalent information (e.g., 40 CFR §262.11 allows generator's knowledge of the waste and process generating the waste) to ensure that the facility is not managing hazardous waste or other prohibited wastes.

Information about a waste as well as the process generating that waste may be used to evaluate or assist in the evaluation of a special waste. When used as the sole information source for characterizing a waste stream, the generator's knowledge must be documented and must be reliable and confirmable. Examples of such information include, but are not limited to, Material Safety Data Sheets (MSDS), manufacturers' literature, analytical results (e.g., an analysis may demonstrate that the potential constituents of concern are not present in the waste and therefore could not leach above the levels of concern), knowledge of how the waste was generated (e.g., a filter was used in painting operations and therefore does not contain any pesticides), and other such information generated in conjunction with a particular waste generation activity or process.

An industrial waste generator will follow the "Use of Process Knowledge" requirements of §335.511 and maintain the "Documentation Required" under 30 TAC §335.513. BFI and/or Republic Services will require verification of some or all of these requirements prior to approval of an industrial special waste for which the generator is using only process knowledge as the basis for their waste characterization and classification.

Analytical reports and/or sampling documentation must be from a laboratory accredited under the Texas Accreditation Program and must clearly identify the generator and/or customer, description of the material sampled and analyzed, sample collection date and location, and when analyses were conducted. The analytical data and/or sampling documentation must be less than 12 months old.

A generator must certify that the analysis provided was from a representative sample of the waste. The sampler should collect a representative sample(s) that provides accurate and precise measurements of the chemical and physical properties of the waste. Proper sampling techniques are described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication No. SW-846), which defines a "representative sample" as a sample that exhibits the average properties of the whole waste.

The reference of methods employed must accompany the analytical data and be EPA/TCEQ-approved method(s), as applicable. Laboratory QA/QC information must accompany the data submitted and may include sample handling, containerization and preservation techniques, chain of custody records, data on standards, duplicate analyses, spikes and blanks, the detection limits for each analysis, and other pertinent statistical information.

Special waste that is delivered to the facility for disposal will receive a visual QA/QC inspection to verify contents and nature of waste. Should a visual inspection detect unusual characteristics, additional QA/QC will be performed. Additional QA/QC may include random load inspections, paint filter liquids testing, pH testing, reactivity testing, and ignitability testing.

6 SPECIAL WASTE APPROVAL UPDATES

The Profile Record for all special wastes will be assigned an expiration date not to exceed 12 months. Republic Services also requires the generator/customer to provide notification and additional process and/or chemical analysis data in the event there are changes in the process from which the waste is produced. All special waste streams will be re-evaluated prior to the issuance of a new expiration date to allow continued acceptance and disposal.

In the event the physical characteristics of a waste being received at the facility differs from that of the approved waste stream, disposal will cease and the generator/customer will be required to provide additional process and/or chemical analyses data to determine the cause of the change in waste characteristics and any associated disposal requirements. Procedures for waste discrepancies and rejected loads are set forth in Section 8 (Waste Discrepancies and Rejected Loads) of this Plan. Special waste approval updates will be assigned a new expiration date on the Profile Record not to exceed 12 months.

7 DOCUMENTATION AND RECORDKEEPING

All required paperwork and documentation relating to the acceptance of special wastes will be maintained in the site operating record and available for review. The following forms and/or documentation will be required under this Plan:

Waste Profile Record

The Profile Record is required of all generators/customers of special waste. The generator/customer (or their duly authorized agent) completes a Profile Record, either in hard-copy paper form or via an electronic online system. The generator/customer then certifies the Profile Record by signature or by selecting a certification acknowledgment response, indicating that all information contained in the Profile Record is true and correct. An example hard-copy paper form and a printed out version of the online data collection form are provided within Exhibit IVC-A of this Appendix. As a result of potential future internal Republic Services revisions, the format and/or information contained on the Profile Record may change. Copies of the applicable Profile Record will be maintained in the site operating record.

Analytical and/or Process Knowledge Documentation

All analytical reports and/or sampling documentation as well as any documentation related to process knowledge evaluations will be maintained in the site operating record and will, at a minimum, fulfill the requirements of "Request for Authorization for Disposal of a Special Waste" (TCEQ Form-0152).

Waste Classification Checklist

The Waste Classification Checklist (Checklist), utilized by industrial generators of special waste, may be required to be submitted with the Profile Record and the analytical/process knowledge documentation. The Checklist will assist Republic Services special waste approval personnel in reviewing the hazardous and Class 1 industrial waste determinations. The Checklist can be found in the "Guidance for Classification and Coding of Industrial and Hazardous Wastes" (TCEQ Regulatory Guidance RG-022). Copies of the completed Checklist, if provided, will be maintained in the site operating record.

Waste Manifest

The manifest, required for all generators of special waste, is a document containing multiple copies of a single form. When completed, the form contains information on the type and quantity of the waste being transported, instructions for handling the waste, and signature lines for all parties involved in the transportation and disposal process. Each party that handles the waste signs the manifest and retains a copy for themselves. Once the waste reaches the facility, the facility returns a signed copy of the manifest to the generator, confirming that the waste has been received by the facility.

8 WASTE DISCREPANCIES AND REJECTED LOADS

Documentation for all profiled wastes that arrive for management will be reviewed at the facility. If the associated documentation is missing or incomplete, or the characteristics of the waste are questionable, all discrepancies must be resolved prior to acceptance of the waste. In the event the discrepancies cannot be resolved, the waste load will be rejected. Discrepancies that may cause a load to be rejected include but are not limited to:

- A special waste requiring a manifest arrives without a manifest;
- A special waste arrives and the waste material does not match the description on the waste manifest;
- A special waste arrives and the information on the manifest is not complete or is incorrect; or
- A special waste arrives that does not match the information provided on the WCD Sheet.

Should an incident occur where regulated hazardous, PCB or radioactive waste, or other prohibited waste is suspected or discovered, the waste will not be authorized for disposal but will instead be isolated in its present location until the material can be adequately identified to determine the proper disposition/remediation of the material and the appropriate handling procedures. During this identification process, the waste will be secured and the generator/customer will be contacted to determine the identity of the material and/or arrange for its removal and proper disposition. If the material is determined to be regulated hazardous or radioactive waste, contain regulated levels of PCBs, or other prohibited material, the TCEQ will be notified of the incident and the planned disposition/remediation/removal of the material. The proper removal/disposition/remediation of the prohibited waste will be specific to the waste and will be implemented upon TCEQ concurrence and approval.

9 TRAINING OF PERSONNEL AND WASTE SCREENING

Appropriate facility personnel will receive training on special waste identification and screening procedures as well as the containment and cleanup of accidental spills. Hardin County Landfill provides in-house, company-designed training to key facility operations personnel, appropriate gatehouse personnel, and field personnel on an annual basis at a minimum. Documentation and a record of all training provided to personnel will be maintained in the site operating record.

This required training allows for the monitoring of waste streams prior to disposal, as they enter the facility as well as during disposal, under the supervision of properly trained personnel. Upon arrival at the site, appropriate gatehouse personnel screen special waste loads to ensure proper identification of all wastes and that all required paperwork, approvals, and documentation is in place. Upon arrival at the working face and during the unloading of a special waste, field personnel will be alert for indications of any nonconforming waste.

10 SPECIAL WASTE HANDLING PROCEDURES

All special wastes accepted at the Hardin County Landfill will be handled and disposed of in accordance with the regulatory provisions and operational demands applicable to that waste. The special waste handling procedures set forth in this Section are for special wastes to be disposed of in the municipal solid waste disposal area unless otherwise noted. Because the acceptance and disposal of special waste is not continuous, the typical daily rate of disposal as listed below for each special waste is an estimate rather than limiting parameter, unless otherwise indicated. These estimated rates are not to be seen as cumulative as some special wastes may arrive on any given day while others may arrive infrequently.

A. Dead animals, other than single household pets and single small animals, and nonhazardous slaughterhouse wastes will be covered by 3 feet of other solid waste or at least 2 feet of soil immediately upon receipt. The typical daily rate of disposal of this special waste will be approximately 20 tons per day. Additional treatment and disposal requirements are listed below:

    1. Animal waste meeting the definition of "special waste from health care related facilities" (25 TAC §1.132 relating to Definitions) will be disposed of in accordance with 30 TAC §326.75(r) (relating to the treatment and disposal of medical waste). Refer to 25 TAC §1.136(a)(1) for approved treatment methods.

    2. Agricultural wastes will be accepted if they are determined to be Class 2 or 3 nonhazardous industrial wastes.

B. Nonhazardous special wastes from health care related facilities will be disposed of in accordance with 30 TAC §326.75(r). Refer to 25 TAC §1.136 for approved methods of treatment and disposition. The typical daily rate of disposal of this special waste will be approximately 2 tons per day. When a situation exists that requires disposal of untreated medical waste to protect human health or the environment from the effects of a natural or manmade disaster, a request for written authorization by the Executive Director will be submitted to the TCEQ. The daily rate of disposal for these special wastes will be as specified within the Executive Director's authorization.

C. Nonhazardous empty containers which have held pesticides (e.g., insecticides, herbicides, fungicides, or rodenticides) managed in accordance with 30 TAC §330.171(c)(5)(A) or (B) will be disposed of in accordance with subparagraphs 1 and 2 of this paragraph. The typical daily rate of disposal of this special waste will be approximately 10 tons per day.

1. These containers will be disposed of at the facility under this Plan provided that:
   a. The containers are triple-rinsed prior to receipt at the site.
   b. The containers are rendered unusable prior to or upon receipt at the site.
   c. The containers are covered by the end of the same working day that they are received.
2. Those containers for which triple-rinsing is not feasible or practical (e.g., paper bags and cardboard containers) may be disposed of under the provisions of 30 TAC §330.171(c)(6) or in accordance with 30 TAC §330.173, relating to disposal of industrial wastes, as applicable.

D. Hazardous waste from conditionally exempt small quantity generators (CESQG) that may be exempt from full controls under 30 TAC §335.8 (Special Requirements for Hazardous Waste Generated by Conditionally Exempt Small Quantity Generators) may be accepted at the facility, provided the facility is willing to accept the waste. Acceptance of this waste will be for very isolated cases, if at all, and is not anticipated to occur on a daily, weekly, or monthly basis. As such, the rate of disposal will not exceed 220 pounds per month per generator. When accepted for disposal, these wastes will be placed in a discreet portion of the active face, not spread across the active face and will be covered immediately with 1 foot of clean soil.

E. Nonhazardous off-spec or contaminated drugs, foods, and beverages other than those contained in normal household waste will be disposed of at the facility, provided the waste is not a Class 1 industrial waste, and a minimum of 1 foot of other municipal solid waste or 6 inches of dirt will be placed on the waste immediately upon disposal (in addition to daily cover placed on the working face) and additional precautionary measures are taken to prevent scavenging and salvaging. For waste that may contain free liquids, the provisions outlined in subparagraph 1 of item F below must also be followed. Non-regulated and non-illegal drugs received in volumes of less than 1 cubic foot need not be covered immediately upon receipt as long as scavenging and salvaging does not occur. The Drug Enforcement Agency will be contacted prior to the acceptance of controlled substances. The typical daily rate of disposal of this special waste will be approximately 8 tons per day.

F. Nonhazardous, containerized liquids will be disposed of at the facility under this Plan provided the waste is not a Class 1 industrial waste. The typical daily rate of disposal of this special waste will be approximately 20 tons per day, and:

1. The facility will not accept liquid waste.
2. Waste in small containers similar in size to those normally found in household waste, or in a container that is designed to hold liquids for use other than storage, that is not going to be solidified prior to placement at the active face, may be placed in the landfill provided:
    a. The landfill unit in which the containerized liquid waste is to be disposed of will have a minimum of 3 feet of waste in it prior to disposal of the liquid waste.
    b. The liquid waste will be mixed with soil or another absorbing material or waste in a 4:1 ratio of solid to liquid.
    c. If the liquid waste is an alcoholic beverage, it will be handled in accordance with specific conditions, if any, required by the Texas Alcoholic Beverage Commission (TABU).
    d. No ponded water should be visible at the working face where disposal will occur.
    e. e. A minimum of 1 foot of municipal solid waste or 6 inches of dirt will be placed on the waste immediately (not including daily cover).

G. Nonhazardous municipal wastewater treatment plant sludges, other types of domestic sewage treatment plant sludges, water-supply treatment plant sludges, and septic tank pumpings (e.g., materials regulated under Chapter 312 [relating to Sludge Use, Disposal and Transportation]) will be processed prior to acceptance at the site, and processed sludge will be tested in accordance with Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), as amended, and certified to contain no free liquids prior to disposal. These sludge and tank pumping wastes will be incorporated into solid waste at the active face and will be limited to that volume which can be fully mixed with the other solid waste by the end of each working day. The typical daily rate of disposal of this special waste will be approximately 60 tons per day.

H. Nonhazardous grease trap waste and nonhazardous grit trap waste will be accepted for disposal at the facility provided the waste is not a Class 1 industrial waste, the typical daily rate of disposal of this special waste will be approximately 10 tons per day, and:

1. The waste has been treated or processed prior to being accepted at the site.
2. The treated/processed material has been tested in accordance with Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), as amended, and is certified to contain no free liquids prior to disposal.

I. Nonhazardous light ballasts and nonhazardous small capacitors containing polychlorinated biphenyl (PCB) compounds as defined in 40 CFR §761.3 (relating to federal PCB/TSCA regulations) will be disposed of at the facility only if the PCB-containing light ballasts and electrical capacitors are generated during routine maintenance, and they are not leaking, provided the total weight of such wastes does not exceed 3 pounds of ballast per day. Regulated PCB wastes as defined in 30 TAC §330.3(111) are prohibited and will not be accepted.

J. Nonhazardous incinerator ash may be disposed of in the facility under this Plan provided the waste is not a Class 1 industrial waste and the ash is handled such that it does not cause operational problems or become a public health nuisance, such as becoming airborne. Nonhazardous incinerator ash will be placed in the active working face and mixed with other solid waste or used for solidification as described in the solidification plan. The typical daily rate of disposal of this special waste will be approximately 40 tons per day.

K. Nonhazardous filter media (e.g., paint filters, glycol filters, molecular sieves and other types of filter media), not including those contained in normal household waste or used oil filters from internal combustion engines, generated only from a household, will be disposed of in the facility under this Plan provided:

1. The waste is not a Class 1 waste.
2. The waste has been air dried at least 72 hours prior to disposal.
3. The air dried waste has been tested in accordance with Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA Publication Number SW-846), as amended, and is certified to contain no free liquids prior to disposal.

The typical daily rate of disposal will be approximately 15 tons per day.

L. Nonhazardous abrasive wastes (e.g., blasting grit, steel shot, etc.) may be accepted at the facility under this Plan provided the waste is not a Class 1 industrial waste and the waste is handled such that it does not cause operational problems or become a public health nuisance. Nonhazardous abrasive wastes will be placed in the active working face. The typical daily rate of disposal will be approximately 30 tons per day.

M. Nonhazardous demolition debris contaminated with lead from structures that have received one or more coats of lead-based paint from household activities, may be accepted for disposal at the facility under this Plan provided the waste is not a Class 1 industrial waste. This demolition debris will be incorporated into the active working face and covered with other solid waste prior to compaction to minimize any possible exposure to dust from the waste. The typical daily rate of disposal will be approximately 30 tons per day.

N. Class 2 and Class 3 industrial solid waste will be handled in accordance with 30 TAC §330.173 (relating to disposal of industrial wastes). These special wastes will be incorporated into the active working face with other solid waste. The typical daily rate of disposal will be approximately 30 tons per day.

0. Waste generated outside the state boundaries that meets the definition of a special waste as defined in 30 TAC §330.3(148) will be handled, as applicable, in accordance with the all the provisions and requirements of this Plan, for the same types of waste generated in Texas. Out-of-state wastes that would be considered Class 2 and Class 3 industrial solid waste, if generated within Texas, will be handled in accordance with the requirements identified in 30 TAC §330.173. These out-of-state wastes will be managed and disposed of at the facility in the same fashion that they would be if generated within Texas. The typical daily rate of disposal for these wastes will be approximately 20 tons per day.

P. Waste from oil, gas and geothermal activities and other substances subject to regulation by the Railroad Commission of Texas will be incorporated into solid waste at the active face and will be limited to that volume which can be fully mixed with the other solid waste by the end of each working day in accordance with this Plan. The typical daily rate of disposal will be approximately 25 tons per day.

Q. Nonhazardous waste from commercial or industrial wastewater treatment plants; air pollution control facilities; and tanks, drums, or containers used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR Part 261, Appendix VIII but has not been listed as a commercial chemical product in 40 CFR §261.33(e) or (f) will be disposed of at this facility in accordance with this Plan, provided the waste is not a Class 1 industrial waste. These wastes will be incorporated into solid waste at the active working face and will be limited to that volume which can be fully mixed with the other solid waste by the end of each working day. The typical daily rate of disposal of this special waste will be approximately 20 tons per day.

R. Regulated asbestos-containing material (RACM) and non-regulated asbestos containing material (Non-RACM) will be disposed of at the facility in accordance with the provisions and requirements of 30 TAC §330.171(c)(3)-(4). The typical daily rate of disposal will be approximately 10 tons per day.

11 CONTINGENCY PLAN

In the event of accidental spills (e.g., ruptured bags or containers) the following procedures will be followed:

1. Should the special waste bag or container be ruptured at the working face while in process of disposal, the material will be contained and incorporated into the working face as soon as possible.
2. Should a spill occur other than on the working face, the Site Manager or his designated representative will be notified.
3. Hardin County Landfill personnel will put on the appropriate personal protective equipment (PPE) prior to securing the spill area. Landfill personnel will be trained in special waste handling and PPE. Any other person in the immediate area will be removed from the area unless proper PPE is observed.
4. Emergency response (third party) personnel will be notified if facility personnel cannot clean up spilled materials.
5. The spilled material will be wetted as appropriate to control emissions prior to clean up, if required.
6. The special waste material will then be put in a plastic-lined transport vehicle or roll-off box. The material will be immediately transported to the working face of the landfill.
7. If temporary storage of the material is necessary, the waste will be covered and otherwise physically secured until the appropriate disposition of the waste is completed.

APPENDIX IVC

ADC OPERATING PLAN

HARDIN COUNTY LANDFILL
HARDING COUNTY, TEXAS

ATTACHMENT #16
ALTERNATE DAILY COVER OPERATING PLAN

Prepared for
Hardin County, Texas
January 1999

STATE OF TEXAS
BILLY D. SIMS
53016
REGISTERED PROFESSIONAL ENGINEER

Prepared by

KSA Engineers, Inc.
P.O. Box 15108
107 W. Lufkin Ave., Suite 200
Lufkin, Texas 75915-1508
(409) 637-6061
Fax: (409) 632-6239

ALTERNATE COVER MATERIALS OPERATING PLAN

1. INTRODUCTION

This plan provides details for the use of alternate daily cover materials during the operation of the landfill.

2. DESCRIPTION OF ALTERNATE MATERIALS

Alternate cover materials shall consist of wood chips, tire chips, or tarpaulins. Wood chips and tire chips shall be produced on site from materials designated to be disposed of in the landfill. Wood and tire chips shall be mixed with earthen materials prior to placement. Tarpaulins shall be of size and construction necessary to resist wind forces and prevent wind blown litter.

3. EFFECTS ON VECTORS, FIRES, ODORS, AND WINDBLOWN LITTER

Vectors, Odors, Fires and Wind blown litter will not be significantly effected by the use of alternate cover materials. Should a problem develop the use of alternate cover materials shall be discontinued until a solution to the problem is found. During droughts when fire risk is greatest, care shall be taken to minimize the fire hazard when utilizing combustible alternate cover. Earthen material shall be stockpiled to extinguish any fires due to combustible cover. The Kountze Volunteer Fire Department will respond to any significant fire. After 5 days of alternate cover material use a six inches of soil will be placed to provide a "fire break" within the waste.

4. OPERATIONAL METHODS

Alternate cover materials shall be stored on site in areas accessible to transport equipment. Alternate materials shall be stockpiled in sufficient quantities to be used as an entire day's cover. Storm water run-on and run-off control will be provided around the stockpiled area. Alternate cover materials shall be transported to the appropriate locations within the landfill immediately prior to placement of daily cover. Wood chips and tire chips shall be mixed with earthen materials and placed in the same manner as earthen material. Tarpaulins shall be stretched and staked in a manner to cover the entire area of work and prevent lifting due to wind. Alternate Daily Cover shall not be used when the landfill is closed for a period greater than 24 hours. A status report on the alternate daily cover shall be submitted on a quarterly basis to the executive director of the TNRCC describing the effectiveness of the alternative material, any problems that may have occurred, and corrective actions required as a result of such problems. If no problems occur within four consecutive quarters of use, status reports will no longer be required.