THE CITY OF KINGSVILLE LANDFILL TCEQ PERMIT MSW 235-C

PERMIT AMENDMENT APPLICATION Volume 3 of 6



CITY OF KINGSVILLE, TEXAS

September 2018 Revision 0

Prepared by





HANSON PROJECT NO. 16L0438-0003

FOR PERMIT PURPOSES ONLY	Part III
	- 4 - L - 1
ATTACHMENT J	
ATTACHMENT J	

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

APPENDIX J

WATER WELL SURVEY

Agency	Information Consultants Water	Well Survey				 J-1
· ·	D 10					 0-4
	**					
	MALLI Caladada Mall No DD 83	2-24-501		out of the same of		
	Wall Cabadula Mall No DR 83	3-34-502				 0 10
	O D-forence Choot Mell N	In HH 83-34	1-5003			
	W-1 Well Donort 02 24-20			02/202/04/2		 0 17
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City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

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November 1997

J-0a

AIC

AGENCY INFORMATION CONSULTANTS

an ERIIS Company 800 Brazos Street, Suite 740 Austin, TX 78701 Tel (800) 945-9509; (512) 478-8991 Fax (512) 478-5215

WATER WELL SURVEY

SUBJECT PROPERTY:

Kingsville Landfill FM 2130 & FM 2619 Kingsville, Texas

Client Project # AIC #02-0049190

> Submitted July 30, 1997

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WATER WELL SURVEY

J.

Research Protocol

Agency Information Consultants (AIC) reviews records at the Texas Water Development Board (TWDB) and the Texas Natural Resource Conservation Commission (TNRCC) to obtain information concerning public and private water wells within the requested Area of Review (AOR). As documentation, AIC locates identified wells on a color copy of a USGS 7.5 Minute Topographic Map and provides copies of Drillers' Logs.

AIC cannot guarantee the accuracy of the information provided by state agencies. This report is intended to provide the user with a "working approximation" of reported well locations. Following are the specific research procedures utilized to produce the results in this report.

- Identify all Located Wells within the AOR according to the TWDB files, county highway maps and topographic maps.
- Identify all Plotted Wells within the AOR according to the TWDB county highway maps.
- Identify all Partially Numbered Wells within the AOR according to the TNRCC files containing records submitted by the well driller.
- Identify all Unnumbered Wells within the AOR according to the TNRCC files containing records submitted by the well driller.

As part of the standard Water Well Survey Protocol, AIC does not review Plugged & Abandoned or Unplotted Well files. These files can be reviewed upon special request by the client.

Description of Terms

Located Water Well:

Well locations that have been field checked by a TWDB or USGS staff member, spotted on a USGS 7.5' topographical or county highway map, assigned an unique identification number, and filed at the TWDB.

Plotted Water Well:

Approximate well locations spotted on county highway maps by the TWDB staff members according to information submitted on the Driller's Log. The state assigned unique identification numbers to these wells, but in high density areas, a single identification number may represent multiple well locations. The TWDB eliminated this plotting activity in June 1986.

Partially Numbered Water Well: Well locations established to within a 2.5 minute topographic quadrangle by the TNRCC according to maps submitted with the Driller's Log. The TNRCC assigned a State ID Number corresponding to this generalized location. This procedure for records processing has been in effect since June 1986.

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WATER WELL SURVEY

J.

Unnumbered Water Well:

Well locations are not assigned by either the TWDB or the TNRCC. The Driller's Log and any corresponding maps are filed by county at the TNRCC. This procedure for records processing has been in effect since June 1991.

Thank you for your order. If you have any questions or comments regarding this report, please call AIC at (800)945-9509 or locally at (512)478-8991.

DISCLAIMER

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WATER WELL SURVEY

REPORT SUMMARY

Submitted July 30, 1997

Subject Property:

Kingsville Landfill

FM 2130 & FM 2619 Kingsville, Texas

Client Project #

AIC #02-0049190

Area of Review:

1 Mile Radius

WELL TYPE	TOTAL NUMBER FOUND
Located Water Wells	2
Plotted Water Wells	14
Partially Numbered Water Wells	17
Unnumbered Water Wells	0
TOTAL NUMBER FOUND	33

NOTE: When well drillers do not submit a locational map or when maps are misplaced in state files, AIC may not be able to determine the exact well location. When the exact location of a well can not be determined, it is still included in the above totals. Any available records are labeled "LU" for Location Unknown and are included in the Records Section of the report.

WATER WELL SURVEY REPORT DETAIL

Submitted July 30, 1997

Subject Property:

Kingsville Landfill FM 2130 & FM 2619 Kingsville, Texas

Client Project #

AIC #02-0049190

Area of Review:

1 Mile Radius

Wells are listed in this table by state identification number. On the map, wells are referenced by only the final digits of these

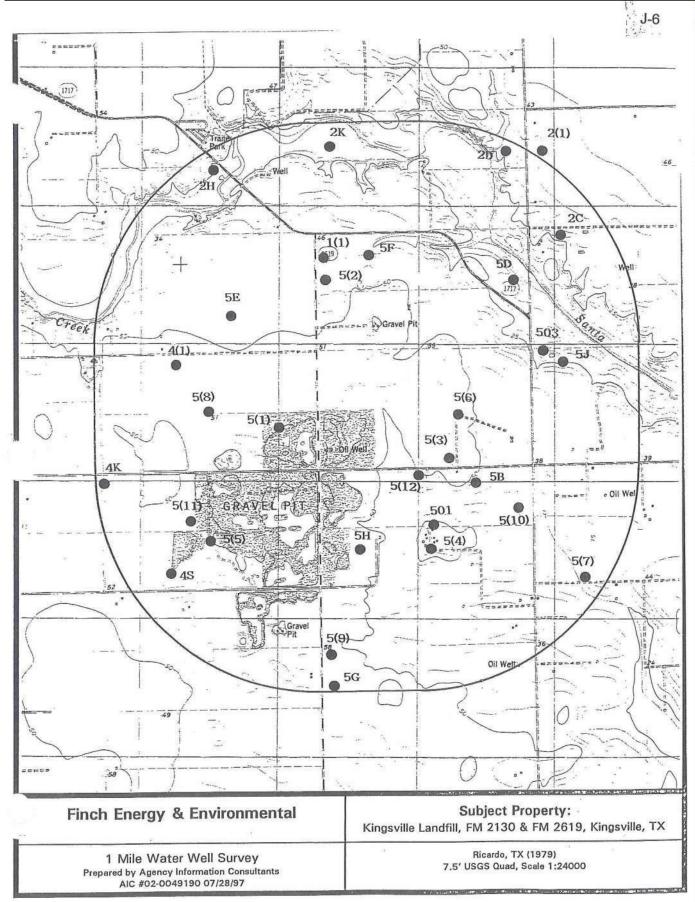
numbers. AIC assigned unique number for Partial and Unnumbered wells ()

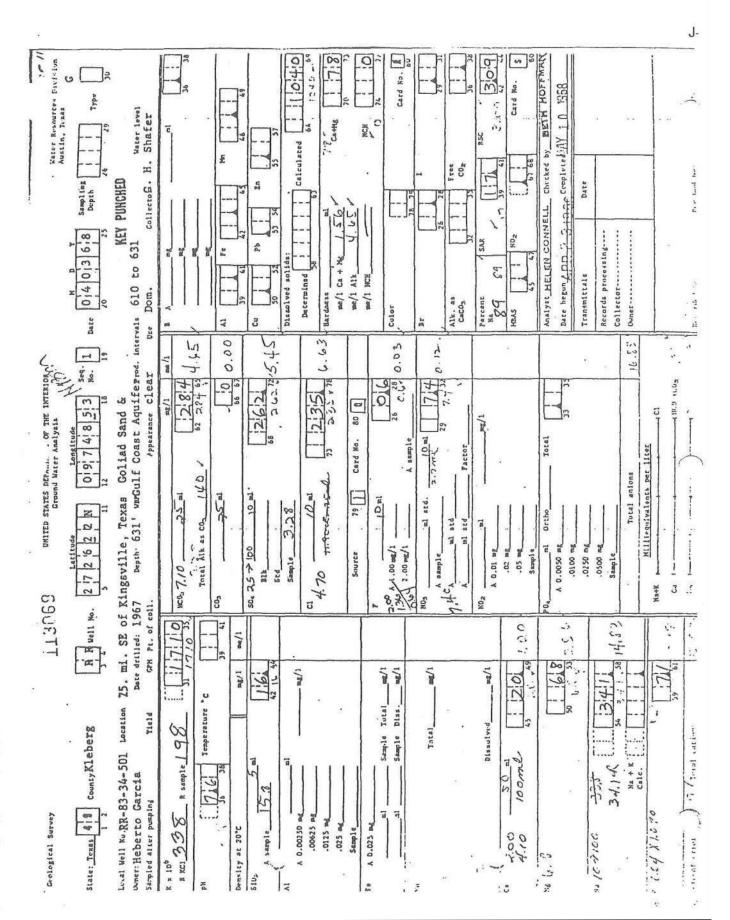
Total Plotted wells at a single location []

LOCATED	PLOTTED	PARTIAL	UNNUMBERED
83-34-501	83-34-2C	83-34-1(1)	
503	2D	2(1)	
	2H	4(1)	
	[2] 2K	5(1)	
	4K	[2] 5(2)	
	45	5(3)	
2	5B	[2] 5(4)	
	5D	5(5)	
	5E	5(6)	2
	5F	5(7)	
	5G	5(8)	
	5H	5(9)	
	5J	5(10)	
		5(11)	
		5(12)	

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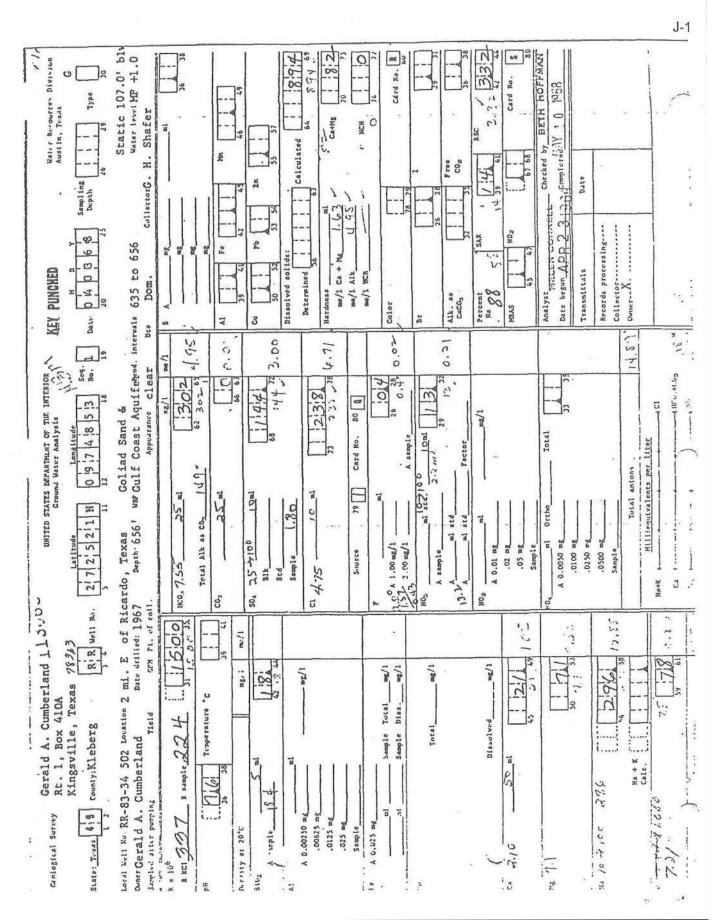




製	Well No. BR -34-50/		
	*		
*	Latitude-longitude S S S S S S S S S S S S S S S S S S S		
	SANE AS ON HASTER CARD Physiographic Province: Codsta Plain 0:3 Section: West		
s	10 11 10 10		
	DUIT Basin: 121 225 Subbasin: L24-		
	Topo of depression, stream channel, dunes, flat, billtop, sink, swamp, well site: (A) (F) (G) (T) (U) (V)		
	offshore, pediment, hillside, terrace, undulating, valley flat		
	AQUIFER: Jernisty, Phocene T.P. Golida Sana aquifer, formation, group 30 31		
	Lithology: Origin: Thickness: ft		
	MINOR 37 well open to: Z/ ft 31 Z/40 Top of: 4t 41 43		œ.
	AQUIFER: system series 44 45 aquifer, formation, group 46 47		
	Lithology:		•
	well open to:		
	Screened: 0/0 63/47	92	
	Depth to ft Source of data:		
	Dascusent: Surficial Surficial: Surfici		
	Coefficient Trans: gpd/ft gpd/ft Trans: Tr		
	Coefficient gpd/ft; Spec cap: gpm/ft; Number of geologic cards:		
	21 screen sections		
0	ept'd: kutar is undosirable (?) from		
Tiep	epi A. Water is undosirus (e() from		
di	Ill sends from 19 to 506.	E	
		Well No.	
	P Kingsulve A	4	
		3	4
	Way 772	(%	
		A	
	elami > whohe pet pl.	. I 강	
	0 3	2	
**	Well		
	9		
-	- GPO 857-700		
	1		
	The second secon		F !

A.t W.L.

	_J-1
-55 (1918)	
MED Exp. (GH) April 1966	
WELL SCHEDULE Z E RICARDO	
U. S. DEPT, OF THE INTERIOR GEOLOGICAL SURVEY WATER RESOURCES DIVISION	
MASTER CARD Source Drillers log & Riviera Aux de	
Record by Cap. H. Stater of data 035. Date 12-21-67 Hap 1: 62500	
State 181ds 4:9 (or town) Niebera Wik	
Latitude: 2.72.52.1 NN Longitude: 0.9.74.85.3 Sequential / number: 12 degrees 13 min Sec 18 number: 18 degrees 13 min Sec 18 t, t, t, t	
Local well number: 8 8 8 8 3 3 4 5 0 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
110 Owner C (C C / /	
Demer or name: 61 A . CVMBERY HVD. Address: Kingsville, 1875	23
Ownership: County, Fed Gov't, City, Corp or Cd. Private, State Agency, Mater Disc	
(A) (B) (C) (D) (E) (F) (H) (I) (N) (P) (R) Use of Air cond, Bottling, Comm, Dawater, Power, Fire Dom, Irr, Find, Ind, P S, Rac,	
wetar: (8) (7) (U) (V) (M) (X) (Y) (#) Stock, Instit, Unused, Repressure, Recharge, Desel-P S, Desel-other, Other	
Use of (A) (D) (G) (H) (\$\phi\$) (F) (R) (T) (D) (W) (X) (3) well: Anoda, Drain, Seismic, Heat Res, Obs, Oil-gas, Recharge, Test, Unused Withdraw, Waste, Destroyed	
DATA AVAILABLE: Well data 70 Freq. W/L mess.: Yield squifer char. 72	
Hyd. lab. data:	
Qual, water data; type:	
Freq. sampling: Pumpage inventory: no, period: 76	
Aperture cards: yes 77	
LOS data: Drillers log in file	
WELL-DESCRIPTION CARD	
SAME AS ON MASTER CARD Depth well: 656 ft 656 FED Dolga 24 3	
Depth cased; 635 ft 656 type: Diam. 4/2 in 4	
(C) (H) (O) (P) (S) (W) (X) (W) (X) (B) (P) (P) (P) (P) (P) (P) (P) (P) (P) (P	ž.
Mathod (A) (B) (C) (D) (R) (J) (P) (R) (T) (V) (H) (B) (D) (D) (D) (H) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D	
Date Drilled: 1967 967 pump intake setting: 168 ft 168 34 28	
Driller: R.C. Cuser W. Forker Drin Co. Kingsville Told's	
Lift (A) (B) (C) (J) multiple, multiple, (N) (P) (R) (S) (T) (E) (S) (T) (D) (S) (T) (D) (S) (T) (D) (S) (T) (D) (S) (T) (T) (T) (T) (T) (T) (T) (T) (T) (T	3
Power Irane. or Irane. or (type): diesel, elec gas, gasoline, hand, gas, wind; H.P.	Ľ.
Descrip, MP Long in Carer 11) ft below LSD. Alt. MP	
Alt. LSD: 52 ± 0 0 0 5 2 Accuracy: Tono map 47 3 - A	
Date meas 4 - 3 - 6 9 ss 4 ss 1 si 1 sp	
Drawdown: ft Accuracy: Pumping period hre	
QUALITY OF Sulfate Chloride Hard.	
Sp. Conduct K x 106 Temp. Ppm 70 Date sampled 4-3-18 Ppm 4:5 5	
Taste, color, etc.	
W.L. 1957 = 104	
	r. 1



CROSS REFERENCE SHEET

Name or Subject

CR-GWTD KLEBERG

Located Well Data RR 83-34-503 Date

Regarding

Electric Log

SEE

Name or Subject

GW-SC

ELECTRIC LOG FILE

Q-18

TWDBS-M-3

Revision: 0

Send original copy by certified mail to the	State o	f Texas		Well No.	use only 83-34-26
Peras Water Development Board P. O. Box 12386 Austin, Texas 78711	WATER WEL	L REPORT		Received	on map
CONTRACTOR TO THE CONTRACTOR TO THE PROPERTY OF THE CONTRACTOR TO	-			.,,	,
1) OWNER: Person having well drilled W.G	Zimmer man	Address RT	1 King	Suille (City)	Texas (State)
Landowner Same (Name		Address(Street	or RFD)	(City)	(State)
2) LOCATION OF WELL: berg	. 6 mil	es in <u>S-E</u>	direction from	Kings	ille
		(N.E., S.W., etc.	ation with distan	ces and directio	ns from
Locate by sketch map showing landmar hiway number, etc.*	rks, rosos, creeks,	Falor 1-0	ons or survey lin	3Zeague	35
	North	Block KT	11	Survey	
	4	Abstract No			
(Use reverse side if necessa	ary)	(NWE NEE SWE S	SEŁ) of Section_		
3) TYPE OF WORK (Check): XNew Well . Deepening	4) PROPOSED USE (Check) X Domestic Indust		5) TYPE OF WE	ELL (Check): Driven	* Dug.
Reconditioning Plugging	Irrigation Test	Well Other	Cable	Jetted	Bored
6) WELL LOG: 97/2	× 36.55	Depth of completed w	/19	for Person dud 11	4-77
Diameter of hole / // intil	Depth drilled 670 It.	,		rc. Date drill	ed 1-/-/
	All measurements made from	•	ground level.		
	ption and color of mation material	9) Casing: Type: Old	X New Stee	el Plastic	Other
0-77 Jand + Cla	4	Cemented from	200	ft. to	ft
27-37 Zamel & Calu	ilia	Diameter	Setti		Cons
37 91. Clay	The state of the s	(inches)	From (ft.)	To (ft.)	2600 H
91-10 20 20		7.0.0	0	288.	26.00
IAC 152 Church			3-4-01		
152 167 5000		10) SCREEN: /	., , .		
167 201 Plan		Туре_5 70 1	Hed pip	Basin St. 67	E-
101 222 3000		Perforated		Slotted	
227 1/13 0/11		Diameter (inches)	From (ft.)	To (ft.)	Slot Size
1/3 787 5000		7"0.D.	588-	618	1/2"x1"
787 - 369 clay			+	553-40Weil	, , , ,
	necessary)				
7) COMPLETION (Check):	necegsary)	11) WELL TESTS:	***************************************		
λ Straight wall Gravel packed	Other	Was a pump tos	Smade Les Lin	No If ye	es, by whom?
Under reamed Open Ho	10	Yield: 50	gpm with_	ft. drawdown	afterhrs
8) WATER LEVEL: 129 ft. below la	nd surface Date 4-11-70	Bailer test	gpm with	ft.drawdown	afterhr
	quare inch Date	Artesian flow_	gpm		
Depth to pump bowls, cylinder, jet	, etc.,ft.	. Temperature of	water		
below land surface.		12) WATER QUALITY:	analysis made?	Yes	No
			contain undesira	ble water?	Yes No
		Type of water?		depth of strate	A .
				ew 27-	410
I hereby c	ertify that this well was dril.	e true to the best of	my knowledge and	belief.	
NAME X.C. Custer		Water Well Drillers Re	gistration No	728	
(Type or Print)	a Vincanil	1		texas	
ADDRESS (Street or REO)	Cit	9) 00 0 0	4	(State)	11.0
(Signed) A.C. Custa (Water Well Dr	iller)	R.C. Custo	Compa ny N	Well Bon	Mento.
Please attach electric log, chemical	analysis, and other pertinent	information, if avails	ble.		<u> </u>
*Additional instructions on reverse s)/
				()	1/
TWDBE-GW-53				1 (8

				21			*		(4)	J-,
Texas Wa P. O. Bo		the opment Board			For TVDB use only Well No. 22-31/2. Located on map—ye Received: 1/0 Form GN 8					
1) OWNE	R: on having	well drilled_	King Ra	nch Incorporated	l .	Addr	ess. D. Drat	wer 1418 Ki	ngsville,	Texa
Land	owner	King Rar	nch Incorpo			Addr		as above	City)	(Store)
2) LOCA Cour	TION OF WE	u: eberg	Labor		League		288.70	Abstract No		
Circ	le as many as	are known)	on	ngsville Naval A		ion		survey	uch [NORTH
				map of well location w r survey lines, and to					x	Sh Band
	OF WORK (Check): Deepening	; 0	4) PROPOSED USE (CD Domestic In		□ Munio	cipal	5) TYPE OF Rotary 1	WELL (Check):	Dug 🖂
Reco	CONTRACTOR OF THE PARTY OF THE	□ Plugging	0	· Irrigation □	Test Well	Othe	er 🛣	Cable	Jetted 🗆	Bored C
Diam	eter of ho	le 9 7/8		surements made from	t. Depth		eted well 619		e drilled 11	-24-7C
From (ft.)	To (ft.)		Description and	color of	From (ft.)	To (ft.)	700	scription and c		
0	15	surface			227	238	sand .			
15	68	shale			238	365	shale with sand streaks			
68	70	sand shale			<u>365</u> 372	372 398	sand shale with sand streaks			
71	138	sand			398	447	pink shal		aks	
138	206		ith sand st	reaks	447	471	sand			
206	21, 2	sand			471	556		e with sand		
Under 9) CASIN	reamed C	☐ Gravel pac ☐ Open hole	ked Other X	15 A 20 A 2	Ar	tesian pr	-	per square inch	Date 11-27	7-70
Семел	ted from _		ft. to	ft.	Pe	rforated	0	Slotted 1		
Diamete (inches		From (ft.)	To (ft.)	Gage	Diamete (inches		From (ft.)	ing To (ft.)	Slot	
6 5/8		0	556	std. wt.	117/		519	575	blank	
					4 1/	2	575	617	-	
		3						16		
Was a		made? C Y	s X No	If yes by whom?		P DATA:	r's Name	M 100 M 400	*	
	r test	gpm wi	th ft. dra	awdown afterhrs	Der	igned pu	mpriig tate	A Continue of	P	gph 🗀
Tempe Was a Did a	chemical	watergpm water analysis made contain undes	rable water?	Œ No □ Yes Œ No of strata	Des	th to bo	wls, cylinder, j		RECER	ft.
NАМЕ	Joe Vic	kers	thereby certify the and all of the	that this well was drill ne statements herein are	e true to	the best	r my supervision, of my knowledge ers Registration	and belief.	3	
Address_		ilson Tow	Viele	Corpus Ch		Vicker	rs Water Wel	Texas	(\$1016)	
Please a	ttach elect	tric log, chem		and other pertinent in	formation,	if avai		ony Hames)

J--

Send original copy by certified mail to the	State o	f Texas		For The	DB use only
Texas Water Development Board P. O. Box 13087 Austin, Texas 78711	WATER WEL			Locate	No. 83-311-3 H ad on map 110 red: 73
1) onem			. –	d	4
Person having well drilled W. Ba	BNES me)	Address (Str	105E	HUISAC (City)	he (State)
Landowner 2G191C (Name)		Address(Str	reet or RFD)	(City)	(0
2) LOCATION OF WELL:	3 ====	r		V. (6229)	(State)
county /Flo harg		(N.E., S.W., e	direction	from NINGSU	(Town)
Locate by aketch map showing landmarks, roads hiway number stee.	R#1717	Give legal adjacent se	location with discriminations or survey	stances and direct lines.	ions from
	North F	AS & Block		Survey	
(Use reverse side if necessary)	of creek	150 Abe Fract No	k SEŁ) of Section	n	
	PROPOSED USE (Check); Domestic Industr			OF WELL (Check): Driven	Dug
Property and the Contraction of	Irrigation Test W	viese (2000	Cable	Jetted	Bored
6)WELL LOG: 57/8 in. Depth drille	d 618 ft.		well 6/8	7	11-25-
	ments made from	Depth of completedft.abov	ve ground level.		lled // 23-
From To Description and co (ft.) (ft.) formation mater		9) Casing: Type: Old	New	Steel Plastic	Other
5-19 Sand+ Clay		Cemented from		ft. to	ft.
19-31 Sand		Diameter	Se	tting	
31-247 Chay		(inches)	From (ft.)	5 80	Cage
247-259 Sand				000	24,00
259-381 cly			V		
381-399 Dand		10) SCREEN: BOK	· Lug à	5.S.	
409 500 500		Perforated		Slotted	
509 594 P-151.		Diameter		ting	Slot
594-1018 Same		(inches)	From (ft.)	To (ft.)	Size
The way suns		112	07/	410	.012
(Use reverse side if necessary)) COMPLETION (Check):		11) WELL TESTS:			
	Other	Was a pump te	st made? Y	es (Ng) If y	es, by whom?
Under reamed Open Hole		Yield:	gpm with	ft draudour	n afterhrs.
) WATER LEVEL: Static levelft. below land surface D	late	Bailer test	gpm with	ft.drawdown	
Artesian pressurelbs. per square inch D	ate	Artesian flow			
Depth to pump bowls, cylinder, jet, etc.,	ft.	Temperature of	f water		20
below land surface,		12) WATER QUALITY: Was a chemical	l analysis made?	Yes	(6)
	-		s contain undesi	rable water?	No.
		Type of water?	Sait,	depth of strate	<u> </u>
I hereby certify that the	his well was drilled	by me (or under my	supervision) a	nd that	489
NAME_RC, CUSTER		rue to the best of er Well Drillers Re		belief. 72	8
Resultan KA	P. V de	nA V.	0.16	1	
(Streets on RFD)	Bey (City)	DO AL	gsuille	(State)	0'
igned) X.C. (Water Well Driller)		B.C. Ciu	ter Wa	ter Well	Mulling
ease attach electric log, chemical analysis, and	other pertinent info	rmation, if availa	8/ 1/4	- 100	
dditional instructions on reverse side.			mark57-0		
iE-WD-0		(8)		. (9
					. /

	*		12	(^C					J-	
rexas W	iginal cop ed mail to later Devel ox 12386 Texas 787	the lopment Board	*		ate of Tex				For TWDB use only Well No. 12 11 1 Located on map 12 12 1 Received: 12 12 12 12 12 12 12 12 12 12 12 12 12	
1) OWN	ER: son having	well drilled	Charlie	Plough		Addı	703 5	. 6th Kin	igsville texa	
Lan	downer			(Navie)		Addı	(Street or I	RFD)	(City) (State	
		// /		Name)			(Street or I	RFD)	(Gily) (State)	
2) LOC Cou	nty	PEDERG	Labor	ots 12-	13 agye	1	1 + 0	Abstract No		
	NET SWE	SE of Secti	on_28_	Block	No. A	7,5	+1 Co	_ Survey		
11//	es in	SE dir	well	ese (Town) inty Rds. 11/2 mile 2					NORTH	
	1	-	Sketch m	ap of well location survey lines, and to	with dista landmarks	nces from , roads,	adjacent sect and creeks.	ion		
	OF WORK	(Check): Deepenin	8 🗆	4) PROPOSED USE Domestic DK		☐ Muri	cipal [5) TYPE OF	WELL (Check):	
Reconditioning Plugging Irrigation								D Jetted D Bored C		
6) WELL Diam	LOG: seter of ho	ole_778'	in. Depth dr		ft. Depth		eted well 59		te drilled 10-11-7:	
From	То	1	All meas	rements made from	From	ft. ab	ove ground leve		7)	
(ft.)	(ft.)		formation mate		(ft.)	(ft.)		Description and formation mat		
19	19	Sarel	+ clay		-					
31	251	day								
251	273	Takel	-							
701	301	2 dec			_	-				
326	543	Clay	2							
563	591	Sand	2				(Use revers	e side if necessa	iry)	
Under 9) CASIN	reamed [☐ Gravel pac ☐ Open hole New ☐ Steel	Plastic C	Other 🗆	8) WATER LEVEL:/6/ ft. below land surface Date 10-8- Artesian pressure lbs. per square inch Date 10) SCREEN: 5/offed 5/2"Casing Perforated D Slotted &					
Diamete			ting		Diamet		- av-	tting	Slot	
(inches		From (ft.)	To (ft.)	Gage	(inche	1)	From (ft.)	To (ft.)	size	
3/2		0	568	11-	5/2	-	568	59/	1/6 X 1	
11) WELL Was a	TESTS: pump test	made? 🗆 Y	es Xno II	yes by whom?	33	P DATA:	r's Name			
Yield	1-4:	gpm with	ft. drawe	lown after hrs	Туј	e		н	i.P	
	r test	gpm wi	th ft. drawd	own afterhrs	Des	igned pur	sping rate	g	pm □ gph □	
	ian flow_	gpm gpm	Date	***************************************	1.714.5	e power 1		all the second second		
- 60	chemical	analysis madel	☐ Yes	此No			vls, cylinder,	jet, etc.,	ft.	
Did a		contain undesi		Yes I No	<u>←</u>	ow land 1	urface.			
VINE Z	20.0	Puste &	ereby certify thath and all of the	t this well was dril statements herein ar	e true to	the best	of my knowledge	e and belief.	8	
name	TH	10	Type or Print)	1/.	Water We	/ Drille	rs Registration	n No.	+ 2000	
Address	51.	preel or REO)	14501	18ing	SUILE	n A	100	1 2 1	1 exas	
(Signed)	Kel	- Cues	r Well Driller)		K.C	· Cu	ila Ul	re we	Wall.	
		1 #416	Dillery				1 1 1 1 1 1 1	pany Name)		
Please at	tach elec	tric log, chem	ical analysis, and	d other pertinent in	formation,	if avail	able.			

			124		Ln			Day	-1
end original copy by ertified mail to the exas Department of Water Resources . O. Box 13087 kustin, Texas 78711	j	State of				FEB 22 1979 DEPT. OF	Located or Received:	93-34-2 n map 1422	
1) OWNER BOD RE (No 2) LOCATION OF WELL: County Le Dero	egan . 3	Address T	_ <	- 8 eet or SE E., S.W	55	ATER RESOURCES KINGSUILLE (City) direction from	(State) (State) (Town)	14	<u>5</u>
Oriller must complete the legal descript with distance and direction from two in ion or survey lines, or he must locate ar well on an official Quarter- or Half-Scale Seneral Highway Map and attach the m	torrocting roc-	Legal descri Section N Abstract N Distance a	o No and dir	ection	from two	Survey NameTowns intersecting section or surv			=
3) TYPE OF WORK (Check): New Well					5) DR	IILLING METHOD (Check and Rotary	☐ Driven ☐		
6) WELL LOG: Date drilled 9-15-78	DIAMETER OF Dia. (in.) From (ft.							Underreamed	ft.
From To (ft.)	Description and color of f material	ormation	Dia.	B) CA	Steel,	ANK PIPE, AND WELL SC	1	ing (ft.)	Gage
219-231 Fines	sand		(in.)	Or Used	Perf., Screen	Slotted, etc. Mgf., if commercial	From		Casir Scret
263-212 Fine's 192-328 Clay 228-388 Fine S	and .		7	N	Her:	Ý.	653	1	
88-413 Clay 113-428 Fine 128-446 Clay	Sand					CEMENTING D	ATA	1	
146-460 Fine 160-520 Clay 520-530 Fine	sand		,	Metho	ted from , d used ted by	ft.		f	t.
560-570 Fine 570-602 Clay 502-668 Sand	sand			Sta Art	TER LEV tic level _ esian flow	ft. below land su	rface Date _	-15-78	3
			10) PAI	CKERS:		Depth 497 597		_
(Lise reverse c	ide if necessary)		11) TYPE PUMP: Turbin Did Jet Submersible Cylinder Softher Did Set his pump.						
(Use reverse side if necessary) 3) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable water?				Depth to pump bowls, cylinder, jet; etc.,ft. 12) WELL TESTS: Type Test: Pump Bailer Defetted Estimated Yield: gpm with ft. drawdown after hrs.					
VAME Amos Mar-	I hereby certify that this each and all of the stateme	well was drilled ents herein are tr		18403		11-1-9		- 227	_
ADDRESS P.O. Kor IV	mathin	Ro Icity	ps	ar	4n	Water U	Jells	5380	_
(Water)	2 128	nformation, if av	ailable		18	(Company Name	ľ	M.	
 Additional instructions on reverse side 	E40								

riginal copy by ied mail to the water Development Board	State (of Texas	15	For TWDB was only 410 Well No 83 34 410 Located on map
P. v. Box 12386 Austin, Texas 78711	WATER WEI	LL REPORT		Received: 7-27
1) OWNER: Person having well drilled That	1 K Suce line	Address 504	alexander	Kingsville (Gity) (State)
Landowner Daine (Name)	Address(Street	or RFD)	(City) (State)
County Steberg	,	es in 5 (N.E., S.W., etc.)	_direction from	ingsuille
Locate by Mich map showing landmar hivay number, 18419 of Mil. L.W. #77 Mil.	le V wellloca	Give legal local	Res s	arvey
3) TYPE OF WORK (Check): New Well Deepening	4) PROPOSED USE (Check) Domestic Indust	rial Municipal	5) TYPE OF WELL (CI Rotary	neck): Driven Dug
Reconditioning Plugging	Irrigation Test	Well Other	Cable .	etted Bored
989	epth drilled 692 ft.	Depth of completed wel		Date drilled 4-20-72
	tion and color of ation material -468 Sand	9) Casing: Type: Old Cemented from	New Steel	Plastic Other
21-29 efft San 468- 21 Clay 663- 72 Sand.	-663 Red Shele - 692 Sand	Diameter (inches)	Setting From (ft.) To	(ft.) Gage
7-127 Cley				
27-136 Sand		10) SCREEN:/ _//	1	
36-191 cly	4	Туре 270776	0	
91-213 Sleel,		Perforated		Slotted
113-355 Clay	₽	Diameter (inches)	Setting From (ft.) To	(ft.) Size
355-376 Sand		7'0,0. 6	71 - 69	92 /8"X1"
376-428 clay				
(Use reverse side if ne	cessary)		Distance of	
() COMPLETION (Check): Straight wall Gravel packed	Other	II) WELL TESTS: Was a pump test m	ade? Yes	If yes, by whom?
Under reamed Open Hole		Yield:	gpm with ft	. drawdown after hrs.
Static level 87 ft. below land	surface Date 4-28-72	Bailer test	ACTIVATION AND ACTIVA	drawdown afterhrs.
	are inch Date	Artesian flow	gpm	
Depth to pump bowls, cylinder, jet,	etc., 147 ft.	Temperature of wa	ter	
below land surface.		12) WATER QUALITY: Was a chemical an	alysis made? Yo	es (No
	92	Did any strata co	ntain undesirable water	12 (1es) No 1016221-468
I hereby cert cach and all NAME Rype or Pring Pring Ar TSS ROX	of the statements herein are Wa 777 Kingsu	d by me (or under my su true to the best of my ter Well Drillers Regis	knowledge and belief.	28
(Water Well Drill	(City)	P.C. Cus	tu Water (Company Name)	Well Del.
lease attach electric log, chemical ana	alysis, and other pertinent in	formation, if available		
Additional instructions on reverse side	le.			
VDBE-CW-53				\ /

Please use black ink.	State	of Texas				-
Send original copy by certified mail to the	MATER M				Texas Water Well Drillers P. O. Box 13087	Board
Texas Department of Water Resource P. O. Box 13087 Texas 78711	ATTENTION OWNER: Confiden				Austin, Texas 78711	
700 0	70- +.	1 0				50 00
. ER Manuel	Marlines Address L	D. B.	x 1771, 1	Kings in	lle Dey 78:	363
LOCATION OF WELLS	. 2	n	6	2	· (State) (Z	ip)
County	miles in _	(N.E., S.W	direction direction	from/I	(Town)	
	☐ Legal des	crintion:			W. C.	-
Driller must complete the legal descrip with distance and direction from two i			Block No	Town	ship	
ion or survey lines, or he must locate vell on an official Quarter- or Half-Sca	and identify the Abstrac	t No	Survey N	ame	500 Miles	
General Highway Map and attach the r	nap to this form. Distance	e and directi	on from two intersect	ing section or sur	vey lines	
	83-34-45 D See attac	hed map.	Well no	71- 4	Dolus C.	71
3) TYPE OF WORK (Check):	4) PROPOSED USE (Check):		5) DRILLING ME		and y	
New Well Deepening	Ø Domestic ☐ Industrial ☐ Public S	Supply	Mud Rotary [Driven Bored	
☐ Reconditioning ☐ Plugging	☐ Irrigation ☐ Test Well ☐ Other				Jetted DOther	
WELL LOG:	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.)	100000000000000000000000000000000000000	HOLE COMPLETION	/		
9524 NGS	Surface Surface	1000000		Straight Wall	☐ Underreamed	
Date drilled Det. 3-84	63/4 0 640		ravel Packed give inte	Other	ft to	ft.
ALEKOA TARANIA AND AND AND AND AND AND AND AND AND AN		1	and give little		11, 10	
From To (ft.) (ft.)	Description and color of formation material	B) CASII	NG, BLANK PIPE, AN	ND WELL SCREE	N DATA:	
0-32	2250	Dia. New	Steel, Plastic, et		Setting (ft.)	Gage
3 - 151 111	hite clay	(in.) Or Used	Perf., Slotted, e Screen Mgf., if	tc. commercial	From To	Casing Sareen
51 - 179 fi	ne red sand	4 ne	w Golvani	gel Steel	2'abore - 640	40
79 - 402	" Clay	111	00 . 01			
02-421 1	1 11 same	4 11	Scottles Sto	inless Ste	ef 627-637	-016
75 - 496	u ceay	119	(1) noting	111000	l. 4 00 . C	
- 548	" clay	9) CEME	NTING DATA [Ru	le 319.44(b)]	are c	ν.
- 581 n	red 4 sand	Cemen	ted from	ft. to	15	_ft.
00 - 638	varse 1 sand	Matha	d used	ft. to		_ft.
38 - 640	u Clay T.D		ted by			271 5
	The state of the s	-				
			ACE COMPLETION cified Surface Slab Ins	etallad (Dula 240	441-13	
			ess Adapter Used [Ru		.44(C)1	
f	D) EQEINED	Z App	proved Alternative Pro	cedure Used (Ru	le 319,71]	
		11) WATE	R LEVEL:			
L	NOV-51004				011	2 -
	140A - 2 TABM		ic level <u>135</u>			E8K
	DEPT. OF.		338773283	gpm.	Date	
	WATER RESOURCES	12) PACK	halo tran	Type 15	Depth /	-
			11 "	59		
		13) TYPE	PUMP:			-
		☐ Turbi	ne 🛘 Jet	☐ Submersible	☐ Cylinder	
(Use reverse side	if narassarul	☐ Other	ALCOHOLD BY THE PARTY OF THE PA			
WATER QUALITY:	in necessary/	Depth to	pump bowls, cylinde	r, jet, etc.,	ft.	
Did you knowingly penetrate any st	rata which contained undesirable	14) WELL	TESTS:			
water? Yes PNo If yes, submit "REPORT OF UMDE	SIDABLE WATER"	Type		☐ Bailer 2	Jetted Estimated	
, so, sommit ner worl or only	Depth of strata	Yield:	_60_gpm with		awdown after hrs.	
	Yes PNo					
		and that a	sch and all of the state	ments herein are	true to the best of my	
Was a chemical analysis made?	vas drilled by me (or under my supervision	40				
Was a chemical analysis made?	vas drilled by me (or under my supervision tend that feilure to complete Items 1 thru	12 will resul	t in the log(s) being re	turned for compl	etion and resubmittal.	
Was a chemical analysis made?	tend that failure to complete Items 1 thru	12 will resul		2 15	etion and resubmittal.	
Was a chemical analysis made?	tend that failure to complete Items 1 thru	12 will resul		2 15	etion and resubmittal.	
Was a chemical analysis made?	tend that failure to complete Items 1 thru	12 will resul		2 15	78368	_
Was a chemical analysis made? I here by certify that this well well well well and belief. I understand the second of the second	int) Solution in the second complete learns 1 thru Solution in the second complete learns 1 thru Water We learn was 1 thru 1	Il Driller's Li		2/5 (State)	78368	
Was a chemical analysis made? I here by certify that this well v knowledge and belief. I understand the latestand	tend that failure to complete Items 1 thru	12 will resul Il Driller's Li H18 A18		215 (AS (State) Water	78368 (Zip)	<u></u>

1	_'
U	-4

Sketch map of well ionation with distances from edgesent faction or enterly line, and to landmark, reads, and creeks are many are harmounded in the second control of the second		ginal copy			Sta	te of Texa	a			For TWDB use only Well No. 23-34
1) DOWNER Person having well defiled Heberto Garcia (1994) Landowson Heberto Garcia (1994) Landowson Heberto Garcia (1994) Landowson Heberto Garcia (1994) Downey Higher Heberto Garcia (1994)	P. O. Box	ter Develo k 12386	pment Board		WATE	R WELL REP	ORT		/*	Received: / 1: 7
The property of the property	1) OWNER	R:		Heberto G	arcia				14 V 15 CHI N 17 V 15 A	3
Landouver Heberto Garcia Discourts Eagure Discourt Discou	Perso	on having	well drilled_				Addr	(Street or R		
Shetch map of wall location with distances from adjacents of the wall wall location with distances from adjacents of the wall location with distances from adjacents of the wall wall location with distances from adjacents of the wall location with distances from adjacents wall location wall	Lando	wner_He	berto Ga		ome)		Addr		as abov	e
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Sketch map of wall idention with distances from adjacents from the content of the				7	= 50	000	42		K	
Sketch map of well location with distances from adjuscent species or survey lines, and to landmarks, roads, and creeks several between the several location with distances from adjuscent species or survey lines, and to landmarks, roads, and creeks several become or survey lines, and to landmarks, roads, and creeks several become or survey lines, and to landmarks, roads, and creeks several become of the several becom	(Circle	e as many as	are known)		# m.m.			r D. B	Survey Singsvil	11
Shetch map of well location with distances from adjacent section or energy lines, and to heminates, reads, and creeks provided to the location with distances from a control lines, and to heminates, reads, and creeks provided to the land and the location of the land lines and to heminates. The land creeks provided the land lines	miles	in 72	Mi SE dire	ction from Kin	gsville, Te:	xas •		172 Par 18	12 () () () () () () () () () (1/2 mile NOR
3) TYPE OF WORK (Check): New Well & Despending A PROPOSED SUE Check): New Well & Despending A PROPOSED SUE Check): New Well & Despending A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending A PROPOSED SUE Check): New Well & Despending Flugging A PROPOSED SUE Check): New Well & Despending A PROPOSED SUE Check): New Well & Description and color of the Constitution material of the Constitution of the Constitution material of the C								My ool -	- K	Calichie
3) Time or Wilk (Check): A) PROCESU USE (Check): Source of Endutrial Manicipal Source of Endutrial Endutrial Source of			206							6 Hm
All measurements made from tr. bepth of completed will 631 ft. Date drilled 5.5.6 All measurements made from tr. above ground lawel. Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 All measurements made from tr. above ground lawel. Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 All measurements made from tr. above ground lawel. Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. To. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Description and color of ft. (t.) ft.) The drilled 5.5.6 Proc. Custer ft. The drilled 5.5. Proc. Custer ft. The drilled 5.5. Proc. Custer ft. The drilled	New W	ell 👸	Deepening	5797	Domestic CX I	ndustrial		0008	5) TYPE	
Diameter of hole 9.7/8 fm. hepth drilled 531 ft. Depth of completed wall 536 ft. Above ground leval.	000000000000000000000000000000000000000		□ Plugging	0	Irrigation [Test Well	□ Othe	r 🗆	Cable	☐ Jetted ☐ Bore
Description and color of formation material From (ft.) Clay and callohe 241, 439 clay 19 35 sand 430, 451 sand 430,			le 9 7/8							Date drilled 5-5-
(ft.) fermation material (ft.) formation material (ft.) formation material (ft.) (ft.) formation material (ft.) (ft.) formation material (ft.) (ft.)	Paten	To				P			15/	
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108 171 C.Lay Sand Sand System Stating S								The second secon		
171 186 Sand 186 233 clay 601 609 red sand with strks. of Shale 609 631 (MadewSAndide if nocessary)		10075700							th red	shole
136 233 Clay 601 609 red shale 609 631 (randwarandide if necessary) 600 60	171						-			
3) COMPLETION (Check): Straight wall NO Gravel packed Other Straight wall No Gravel packed Straight wall No Gravel packed Other Straight wall No Grave	186		clay							outhor of bi
Under reamed Open hole Artesian pressure ibs. per square inch Date	233	241	sand			609	631	(radesa)	idde if neces	ssary)
Ocasino: Type: old New XD Steel Plastic Other	Straig	tht wall B	O Gravel pack							
Diameter Setting (Anches) From (ft.) To (ft.) Gage (Anches) From (ft.) To (ft.) To (ft.) Slot (Anches) From (ft.) To (ft.) To (ft.) Size (Anches) From (ft.) Size (Anches) From (ft.) To (ft.) Size (Anches) From (ft.) To (ft.) Size (Anches) From (ft.) Size (Anches)	Under	reamed	Open hole				, V		The second second	
Diameter Setting (Anches) From (ft.) To (ft.) Gage (Anches) From (ft.) To (ft.) To (ft.) Slot (Anches) From (ft.) To (ft.) To (ft.) Size (Anches) From (ft.) Size (Anches) From (ft.) To (ft.) Size (Anches) From (ft.) To (ft.) Size (Anches) From (ft.) Size (Anches)	9) CASING	old 🖂 1	New X) Steel	□ Plastfc □ 0	ther 🗆	10) SCI	EES1ot	ted with	plastic	cloth sock
Diameter (inches) From (ft.) To (ft.) Gage 7" 0 606 26 lbs. 4 1/2" 610 631 WELL TESTS: Was a pump test made? A Yes No If yes by whom? R. C. Custer Yield: 75 gpm with ft. drawdown after hrs Bailer test gpm bate Sepm Date Designed pumping rate 1700 gpm gph Artesian flow gpm Date Depth to howls, cylinder, jet, atc., 168 ft below land surface. I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. R. C. Custer Water Wall Driller) I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. Water Well Drillers Registration No. 728 Texas (Company Name) (Company Name)	0000000000									COLOR DE LA COLOR
(inches) From (ft.) To (ft.) Gage 7	Variety N. W.			t. to		2000		77-7		ed CA
O 606 26 lbs. 4 1/2 1 610 631 WELL TESTS: Has a pump test made? X yes No 16 yes by whom? R. C. Custer Yield; 75 gpm with ft. drawdown after hrs Bailer test gpm with ft. drawdown after hrs Artesian flow gpm Date Temperature of water. Was a chemical analysis made? Yes No Did any strata contain undesirable water? X yes No Type of water; All sands frowhile? Stata 506.* I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. Water Well Drillers Registration No. 728 Water Well Drillers Registration No. 728 Kingsville Texas Water Well Drillers Registration No. 728		-	Sett From (ft.)	ing To (ft.)	Gage			From (fr.)	ting To (fr)	
WELL TESTS: Has a pump test made?					26 lbs.					
Has a pump test made? Tyes No If yes by whom? R. C. Custer Yield: 75 gpm with ft. drawdown after hrs Bailer test gpm with ft. drawdown after hrs Artesian flow gpm Date Designed pumping rate 1700 gpm pm pm pm Date Type power unit Electric Was a chemical analysis made? Yes No Did any strata contain undesirable water? Yes No Type of water? All sands from this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. R. C. Custer Water Well Drillers Registration No. 728 Water Well Drillers Registration No. 728 Signed) Water Well Drillers Registration No. 1600 ft. 1600 ft									3.7.1	
Has a pump test made? Tyes No If yes by whom? R. C. Custer Yield: 75 gpm with ft. drawdown after hrs Bailer test gpm with ft. drawdown after hrs Artesian flow gpm Date Designed pumping rate 1700 gpm pm pm pm Date Type power unit Electric Was a chemical analysis made? Yes No Did any strata contain undesirable water? Yes No Type of water? All sands from this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. R. C. Custer Water Well Drillers Registration No. 728 Water Well Drillers Registration No. 728 Signed) Water Well Drillers Registration No. 1600 ft. 1600 ft							-			
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Type Submersible H.F. 2 Bailer testgpm withft. drawdown afterhrs Artesian flowgpm Datehrs Artesian flowgpm Date	Was a	pump test		s 🗆 No If	yes by whom?	Communication		r's Name Aer	omotor	
Bailer testgpm withft. drawdown after hrs Artesian flowgpm DateType power unitElectric	-		OHROCEUSE			_	S	hmersibl		2
Artesian flow gpm Date Type power unit Electric Temperature of water Was a chemical analysis made? Yes No below land surface. Depth to bowls, cylinder, jet, etc., 168 ft below land surface. Depth to bowls, cylinder, jet, etc., 168 ft below land surface. I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. R. C. Custer Water Well Drillers Registration No. 728 Mater Well Drillers Registration No. 728 Georgian Signed) Water Well Drillers Registration Mater Well Drillers Registration No. (Company Name)	Yield:	_0_	gpm with	ft. drawdo	wn after hrs	Typ	e	= V/. V/==;	Disconstruction of the Control of th	H.P. Z
Was a chemical analysis made? Yes No below land surface. Did any strata contain undesirable water? Xes No Type of water? All sands from the strate 506. I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. Water Well Drillers Registration No. 728 Texas (Cony) Water Well Drillers (Cony)					own afterhrs			ET.	The state of the s	.gpm 🗀 gph 🕽
Was a chemical analysis made? Yes No below land surface. Did any strata contain undesirable water? Xes No Type of water? All sands from that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. R. C. Custer (Type or Print) Water Well Drillers Registration No. 728 Water Well Drillers Registration No. 728 (Cary) Water Well Drillers Registration No. 728	Temper	ature of w	vater			Dep	th to box	ols, cylinder,	jet, stc.,	168
I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. Rt. C. Custer (Type or Print) Water Well Drillers Registration No. 728 Water Well Drillers Registration No. 728 (Cony) Rt. 1. Box 450A Kingsville. Texas (Company Nome) (Company Nome)	Did any	y strata c	ontain undesi	rable water? C	X Yes □ No	bel	ow land s	urface.		
R. C. Custer (Type or Print) Water Well Drillers Registration No. 728 (Cary) (Cary) (Cary) (Company Nome) (Company Nome)	Type o	f water?_	All sand	s framehla's	trtα 506°					
ddress Rt. 1. Box 450A Kingsville. Texas (Cony) R. Cewsty Wall Mell Sulling (Company Nome) (Company Nome)	R.	C. C	eacl	ereby certify that and all of the s	this well was dril tatements herein ar	e true to	the best	of my knowledge	and belief.	
Signed) F. Celatico (Cony) F. Ceuste Wall Mulling (Company Nome)	NAME		(1		Kingsvill	Water We	ll Drille	Tevoc	No	
(Kvater Well Driller)	nduress	PX	7 01 701	11.5	(City)	PP	Q	A. 11/2 to	Well	On This
lease attach electric log, chemical analysis, and other pertinent information, if available.	(Signed)_	11.0	(Water	Wall Driller)		-pri	eve	(Com	pany Name)	- Comming
	lease att	tach elect	ric log, chemi	cal analysis, and	other pertinent in	formation,	if avail	able.		

Texas Water Development Board	State of Texas	For TWDB use only Well No. 83-34-51 Located on map 1/4 C Received: 00
Austin, Texas 78711 WAT	TER WELL REPORT	_ dir
1) OWNER: Person having well drilled H. B. Goode (Name)	Address 429 Ke Ned XI	Vingsville Tex
Landowner S D M & (Name)	Address SAME (Street or RFD)	(City) (State)
2) LOCATION OF WELL: County KIR BRIG	miles in S.W. direction from Art (N.E., S.W., etc.)	ingsville
Locate by sketch map showing landmarks, roads, creeks, hiway number, etc. * F.M. Rol. X North 5- Mi. (Use reverse side if necessary) NAS VIII 2	Give legal location with distances adjacent sections or survey lines. Labor Block Abstract No. (NH' NE' SW' SE') of Section	and directions from
3) TYPE OF WORK (Check): 4) PROPOSED USE (New Well Deepening Domestic		(Check): Driven Dug
Reconditioning Plugging Irrigation	Test Well Other Cable	Jetted Bored
6)WELL LOG: Diameter of hole 6 // in. Depth drilled 6 4 2 All measurements made fro From To Description and color of formation material	ft, above ground level.	t. Date drilled 4-6,76
0 20 TOP SOIL		ft. toft.
20 150 Blue Clay	Diameter Setting	
150 185 Grey Stale	(inches) From (ft.)	To (ft.) Gage
185 210 Red SOND		
210 373 PINK CIDY		
373 528 Blue Clay	10) SCREEN: Type STAIN/CSS STE	0.1
528 568 WHIT SOND	Perforated	Slotted
568 605 Grey Clay		Slot
605 642 Grey Sond.	(inches) & From (ft.) & 30	To (ft.) 64/261200 18
(Use reverse side if necessary) 7) COMPLETION (Check): Straight wall Gravel packed Other Under reamed Open Hole 8) WATER LEVEL: Starte level 140 ft. below land surface Date 166	11) WELL TESTS: AIY JETTE Of Was a pump test made? Yes Well Driller Yield: gpm with To Bailer test gpm with	No If yes, by whom? ft. drawdown afterhrs.
Artesian pressure 1bs. per square inch Date	Artesian flowgpm ft. Temperature of water	
Depth to pump bowls, cylinder, jet, etc., 270	12) WATER QUALITY: Was a chemical analysis made? Did any strata contain undesirable w	Yes No vater? Yes No oth of strata & 4 Z
NAME (134 de A. Martin) (Type or Print) ADDRESS PD Bax 1162 Ro	drilled by me (or under my supervision) and that in are true to the best of my knowledge and belie water Well Drillers Registration No. / 5 (City) Marrin Water (Company Name)	of.
Please attach electric log, chemical analysis, and other perti-	nent information, if available.	
*Additional instructions on reverse side.		
TWDBE-CN-53		

Send original copy by				83-3	4-50
certified mail to the Texas Water Development Board P. O. Box 13087	State	of Texas		Well No.	83-34-
Austin, Texas 78711	WATER W	ELL REPORT		Received	on map ye r
1) OWNER: Person having well drilled Carl	Woelfel.	Address Rt	1/	Vinision	lle Ze sa
Landowner imme (Name)	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Address	or RFD)	(City)	(State
2)LOCATION OF WELL:)	214	(Street	or RFD)	(City)	(State
County K/E/OFY		(N.E., S.W., etc.	direction from	Singsi	i'lle
H.W	ville County K	Give legal loc adjacent secti	ation with distant ons or survey line	ses and direction	ns from
F.M.R. 7727 1	North North	les Abstract No.	4/ 80	Survey	
(Userreverse side if necessar)	" East of #1	es se	Ek) of Section_		
3) TYPE OF WORK (Check): New Well Deepening	4) PROPOSED USE (Check Domestic Indus		5) TYPE OF WELL Rotary	L (Check): Driven	Dug
Reconditioning Plugging	Irrigation Test	Well Other	Cable	Jetted	Bored
6)WELL LOG: Diameter of hole 97/8 in. Dep	th drilled 6/2 ft.	Depth of completed wel	1 612	ft. Date drille	7-2-7
	measurements made from	11	ground level.		
From To Descripti (ft.) (ft.) format	on and color of ion material	9) Casing: Type: Old.	New Steel	Plastic	Other
0-23 Sand + Cli	ey.	Cemented from		_ft. to	ft
23-22/ (clay		Diameter (inches)	Setting		and the same
131- 241 Dand		711	From (ft.)	To (ft.)	Gage
741- 361 Clay	2		0	201	Martici
379 - 479 Plus			12		
479- 491 Serla		10) SCREEN: Bac	Lug .	5,5,	
491-593 Ked S	hele.	Perforated	0	Slotted	
593-612 San	rd)	Diameter (inches)	Setting From (ft.)	To (ft.)	Slot
		41/2	591 6	1 1-	0/2
(Use reverse side if nece	ssarv)				
COMPLETION (Check):	(A)	11) WELL TESTS:			
Straight wall Gravel packed Under reamed Open Hole	Other	Was a pump test m	ade? Yes	No If yes,	by whom?
WATER LEVEL.		Yield:	gpm with	ft. drawdown a	fterhrs.
Static level 161 ft. below land st		Bailer test	gpm with	_ft.drawdown af	terhrs.
Artesian pressurelbs. per square		Artesian flow	gpm		
Depth to pump bowls, cylinder, jet, etc below land surface.	ft,ft,	Temperature of wa	ter	0	
below land surface.		12) WATER QUALITY: Was a chemical and	alysis made?	Yes ((E)
		Did any strata con	ntain undesirable 1	water? (Yes) No.
		Type of water?		oth of strata_	
I hereby certif	y that this well was drilled the statements herein are t	by me (or under my superue to the best of my k	pervision) and that mowledge and belie	23- 4 et.	65
(Type or Print)		er Well Drillers Regist		728	
DRESS K. C. CUSTER	Kt. /Box	1450A	Cing Soil	lle Te	Xas
gned) F.C. Custin	(City)	R.C. Cust	tu Water	(State) (State)	ulling
ase attach electric log, chemical analys		ormation, if available	(Compa ny Name)		0
ditional instructions on reverse side.				((-))-	9
WO-8)		*
500765				6.00	

1.

Send original copy by	State of 1	Texas		For TWDB well No.	83-34-5F
certified mail to the Texas Water Development Board	(10)			Located or Received:	n map 1/es
P. O. Box 13087 Austin, Texas 78711	WATER WELL 1	REPORT		11-	
1) OWNER: Person having well drilled Thon. /	(Name) Same	Address 5/	or RFD)	Clery St.	(State) 78363 (State)
2)LOCATION OF VELL: . The first of the country of t	. 6 miles	in S. S. (N.E., S.W., etc.	direction from	7 (lle) Town)
Locate by sketch map showing landmarks, rehivay number, etc.* (Use reverse side if necessary)	AIR D A	Adjacent secti	Et) of Section	League Survey	
3) TYPE OF WORK (Check): New Well Deepening	4) PROPOSED USE (Check): Domestic Industri		5) TYPE OF WEI	LL (Check): Driven Jetted	Dug
15.70000 Acres 1600 Acres 2000 Acres 1500 Ac	Irrigation Test We	Depth of completed w			ed 8-26-7:
	and color of	9) Casing: Type: Old Cemented from Diameter (inches) 4//2 vA		1 Plasticft. to	Other ft Gage
30 480 Shales 480 490 Rand 490 500 Shales 500 515 Rand 515 590 Shales		10) SCREEN: Type_ Perforated Diameter	Settir	Slotted To (ft.)	Slot Size
590 612 Rande 612 679 Rhall		4/2 od	679	727	.016
(Use reverse side if necess 7) COMPLETION (Check): VStraight wall Gravel packed Under reamed Open Hole 8) WATER LEVEL: Static level /33 ft. below land su	Other	1.0000000000000000000000000000000000000	t made? Yes 'gpm with gpm with	ft. drawdown	es, by whom? n afterhre
Artesian pressurelbs. per square Depth to pump bowls, cylinder, jet, etc below land surface.	inch Date	Artesian flow Temperature o 12) WATER QUALITY: Was a chemica Did any strat	f water	Yes ible water? depth of strat	No Yes No
I hereby certification in the search and all of the search and all	sling (City)	ohatou	y supervision) and my knowledge and egistration No	that	543 0
*Additional instructions on reverse side.	or control of the con				
TWD8E-WD-8					

						**			
end original copy by ertified mail to the exas Department of Water Resources . 0 13087		W	State of			DRT	Located or	use only	Y
NNER D. N. 7/11	brink	,	Address X	Stre	Bret or F	ON 4492 King		VIII 1000	_
2) LOCATION OF WELL: Klely	11-4					direction from \mathcal{L}			_
iriller must complete the legal description with distance and direction from two into on or survey lines, or he must locate an well on an official Quarter- or Half-Scale eneral Highway Map and attach the ma	ersecting sec- d identify the Texas County		Abstract N	o lo nd dire	ection f	Block NoTown:Survey Namefrom two intersecting section or surv	*****		
3) TYPE OF WORK (Check):	4) PROPOSED	□ Industr	rial Public			5) DRILLING METHOD (Check b Mud Rotary	□ Driven □		
☐ Reconditioning ☐ Plugging	☐ Irrigation					STORAGE PART STORAGE	D Jetted D	Other	
6) WELL LOG: Date drilled 7-7-78	Dia. (in.) Fr	ER OF H om (ft.) Surface	To (ft.)		□ Оре	REHOLE COMPLETION: on Hole Dr Straight Wall vel Packed O Other		Inderreamed	
					If G	vel Packed Other oravel Packed give Interval from	ft.	to	ft.
From To (ft.)	Description and co mater	lor of for rial	mation	8	B) CAS	SING, BLANK PIPE, AND WELL SO	REEN DATA	6	
3 100 Calic	he & sh	1.10	,	Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial	Setti From	ng (ft.) To	Gage Casing Screen
180 240 shall	e + an	n Le		41/2	n	P. Y. C.	0	763	40
240 260 sans	U			4/2	21	Statted	726	763	.014
411 480 sans	'e								
646 661 shale	U U & BAM U	d			Cement	CEMENTING D		1	, ft.
701 711 sans	10			1		ed by(Company or	Individual)		
763 Rank					Stat	TER LEVEL: ic levelft, below land su sian flowgpm,	rface Date _	7-10-78	
			8	-	las	tic shirtfail.	Depth 72	6 ft.	
(lice reverse si	de if necessary)		- 17		□ Tur	er		□ Cylinder	
3) WATER QUALITY: Did you knowingly penetrate any s water?	trata which contain	R"	sirable	12) WEL	to pump bowls, cylinder, jet, etc.,	Jetted ft. drawdown	□ Estima	ted hrs.
BEN H.V	ach and all of the	hat this w statement	_ Water Well	ue to 1	the bes s Regis	der my supervision) and that t of my knowledge and belief. tration No.		543	
DURESS 3/9 (Street or RFD) Signed) 22 2 4	155L)	ty	City	21	57	ty Water Me	18380 (Zip	o)	
(Water V	veil Driller) sis, and other pert	inent info				(Company Name	"		

rt	П	I
LL.	ш.	

Send original copy by certified mail to the Texas Department of Water Resources P. O. Box 13087 Austin, Texas 78711		W	State of			DRT	For TDWR Well No Located or Received:	83-34-	511
1) OWNER J. W. Men. (No. 2) LOCATION OF WELL: County & lekerg.	me)	.3	Address 90	(Stre	et or F	le horg Kingsell (City) direction from 9			3_
County & territy					., S.W.	, etc.)	O(Town)		
Driller must complete the legal descripti with distance and direction from two in tion or survey lines, or he must locate ar well on an official Quarter- or Half-Scale General Highway Map and attach the ma	tersecting sec- nd identify the Texas County	•		o No and dire	ction	Block NoTown Survey Name_ from two intersecting section or sur	vey lines		=
3) TYPE OF WORK (Check):	4) PROPO	SED USE (CI	neck):			5) DRILLING METHOD (Check	d:		
☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging			rial Public			Mud Rotary			
6) WELL LOG:	DIA Dia. (in.)	METER OF From (ft.) Surface	HOLE To (ft.)		□ Оре	REHOLE COMPLETION: en Hole & Straight Wall		Jnderreamed	i
Date drilled <u>7-17-78</u>					☐ Gra	vel Packed	ft.	to	_ft.
	Description an		rmation	8	_	SING, BLANK PIPE, AND WELL S		:	
(ft.) (ft.)	- 4	naterial	XII - III	-	New	Steel, Plastic, etc.		ing (ft.)	Gage
3 Jop s		. ,		Dia. (in.)	or Used	Perf., Slotted, etc. Screen Mgf., if commercial	From	То	Casii
	y v cal	iche		41/2	2	P.7.C.		1/20	10 has
38 45 Rand				412	71_	7.7.6.	-	1	4
45 318 shale	,			4/2	21	alotto di	649	1/07	.0.
318 322 cand				70	11	weine.	677	1	10,
HOD HOD CONT	1.				10000			1	
480 580 Rhal	0,							1 -	8
58x 599 Dane	1				72-05	CEMENTING D	ATA		
599 618 shall	'e				ement	ed fromft	. to		_ft.
618 645 sans	U				/lethoc	used			
645 649 Shal	e_				Cement	ed by(Company o	or Individual)		
649 687 sand				-					
		50-11		9	Stat	TER LEVEL: ic levelft, below land s esian flowgpm.		7-20-7	8
				10) PAC	CKERS: Type	Depth		
				R	ast	ic shirtfail	649	St.	
·				11	I) TY	PE PUMP:			
(Use reverse s	side if necessar	y) .			□ Tur		QS/ACERCOSCIO	□ Cylinder	
13) WATER QUALITY: Did you knowingly penetrate any	strata which co	ontained und	esirable	12	_	LL TESTS:			
water? □ Yes ☑ No If yes, submit "REPORT OF UND Type of water? Was a chemical analysis made?	Depth of st					pe Test: ☐ Pump ☐ Bailer	Jetted _ft. drawdown	☐ Estima	
	I hereby cert each and all of	ify that this v	well was drilled nts herein are t	by me	(or u	nder my supervision) and that it of my knowledge and belief.			
NAME BEN	H. WE	LTY	Water Well	Driller	s Regis	tration No.		54	(3
ADDRESS 318 K	1,55	LING	Ro	65	TOI	VN TX. 7	8380	-1	
(Street or RFD)	41.71	ety	(Cit	B5	Ot	Hater Well	(Zi	p)	
(Water	Well Driller	//			000	(Company Nam	ne)		
(Water Please attach electric log, chemical anal	Well Driller) ysis, and other	pertinent in	formation, if a	vailable	1.	(Company Nam	ne)		

Please use black ink. Send original copy by certified mail to the		· ·	State of	C. BIG	7.07070	PT	Texas Water Well Drillers P. O. Box 13087	Board
exas Department of Water Resources O. Box 13087 Texas 78711	ATTE	50.00			150	Notice on Reverse Side	Austin, Texas 78711	
INER JACKL. E	Rah	haul	Address /	20	5- :	SANTA CECIL	in Kingsinta 78	365/
County KAEBERG		3	_ miles in	(N.E.	. s.w.,	etc.)	(Town)	
			☐ Legal descr	ription	;			
riller must complete the legal descrip ith distance and direction from two i	ntersecting so					Block No	Township	
on or survey lines, or he must locate ell on an official Quarter- or Half-Sca eneral Highway Map and attach the n	le Texas Cour	ity				from two intersecting section	or survey lines	
(9)			See attach	ed maj	· #	47		
TYPE OF WORK (Check):		SED USE (Che			1	5) DRILLING METHOD (Che		
☑ New Well ☐ Deepening			ial Public Su	pply		☐ Mind Rotary ☐ Air Hamm		
☐ Reconditioning ☐ Plugging	Sec. (11) (2) (2)	METER OF H	OLE	71 1	POREL	OLE COMPLETION:	or Dietted Cother	
) WELL LOG:	Dia. (in.)	From (ft.)	To (ft.)	9.2 %	Open	Hole Straight W		
7 /	6/2	Surface	640		Grave	el Packed Other	omft. to	
Date drilled 7-1-85					If Gra	avel Packed give interval fro	omit. to	11.
From To	Description a	nd color of fo material	rmation	8)	CASING	G, BLANK PIPE, AND WELL	SCREEN DATA:	
(ft.) (ft.)		material		Dia.	New	Steel Plastie, etc. Perl. Slotted etc.	Setting (ft.)	Gage Casin Scree
0 3 Topsou			11/2		Used	Screen Mgf., if commercia	1 From To 640	-
3 10 shale			45	od	17	Sch 40	0 70	
10 20 CALICA			415	e di	N	SLOTTEN	570 640	Oil
100 220 3rnd								-
120 280 shrit	.,			337	\Box		/h17	-
300 sand				9)	CEMEN	NTING DATA Rule 319.44	10	ft.
570 Shalt						ft. t	0	ft.
576 - 476 3444					Method	used		
	-				Cement	ed by		_
	-	100.000		100000		ACE COMPLETION		
				4 7 9		cified Surface Slab Installed [R ess Adapter Used [Rule 319.44		
			_			roved Alternative Procedure U		
				44)	WATE	R LEVEL:		
				1 '''			land surface Date 7-6-	-95
							r land surface Date 7 - 0	
	DI	in in	Da	12)	PACK	-	1911 - 1911	-
	D)	S W G H	VEIN	1	1 Aut	ShICTTAIL		
	пп (ED .	000			- Sept. 11 - 11 - 1		
		EP - 41	985	13)	TYPE	PUMP:		
		DEPT. OF		1 1	Turbi		omersible	
no comment	WATE	RESOL	IRCES		Other	pump bowls, cylinder, jet, etc	700 ft.	
5) WATER QUALITY:	ide ii iiecusui			1	eptn to	pump nowis, cylinder, jec, ex	ory aller	
Did you knowingly penetrate any	strata which	contained und	esirable	14)	WELL	TESTS:		
water? ☐ Yes ☐ No If yes, submit "REPORT OF UNI					Type	Test: Pump Bail		
Type of water?	Depth of	strata			Yield	: gpm with	ft. drawdown afterf	nrs.
	Yes	w ma lar und	er my supervisi	on) an	d that e	each and all of the statements h	nerein are true to the best of my	,
Was a chemical analysis made?	annual of the said	mure to comp	dutter 1 fill	are local				
Was a chemical analysis made?	erstand that f	80		Vell De	iller's I	irense No. 1474		
Was a chemical analysis made?	erstand that f	FREUE	CC Water V			icense No. 1434		
Was a chemical analysis made? I here by certify that this we knowledge and belief. I und "Y NAME UT IT. (Typy o	Punt	ERTUE	Robsta Robsta			icense No. 1434 TEXAS (State	73830 (Zip)	
Was a chemical analysis made?	Punt	FREUE	Robsta Robsta	(V)	á	icense No. 1939 TEXAS (State	7383C) (Zip)	

Part III

nd original copy by certified mail to: Texa		42007 Attet			187					DIGGIT IT IT
(Investment)	as Water Commission, P.O. Box	13087, Aust	n, 1 × 1	78711-3				Texas Wate	Please use i r Well Drille	rs Board
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side		State o WELL F	REPO	RT				P.C Austin 51	. Box 13087 , TX 78711-3 2-371-6299	7 3087
owner Arturo Men	ndietia	ADDRES	s	140	1 Bre	nda,Ki	ngsvil	lle, T	x 7836 (State)	63 (Zip)
	3	miles in _	(N	SE E.SW.	dotc)	lirection from	King	gsvill (Town	e	
Driller must complete the legal description Ouarter- or Half-Scale Texas County Ger LEGAL DESCRIPTION: Section No Block No Distance and direction from two Inter-	neral Highway Map and attach the	map to this i	Abst							official
X SEE ATTACHED MAP 3) TYPE OF WORK (Check): X New Well □ Deepening □ Reconditioning □ Plugging	4) PROPOSED USE (Check) □ Domestic □ Industria ⊠ Irrigation □ Test We	al 🗆 Moni			lic Supply Watering	⊠ Mi		DD (Check): Air Hamme Cable Tool		
6) WELL LOG: Date Drilling: 2 11 94	DIAMETER OF HOLE Dia. (in.) From (ft.)	To (ft.)	7		pen Hole		raight Wall	0.000	derreamed	
Started 3-11 19-4 Completed 3-14 199-4	6 3/4 Surface (642		If Gr	avel Packet	ed / Ot d give interval	ner	ft	. to	ft.
From (ft.) To (ft.) D	Description and color of formation r	material	8) CAS	ING, BLAN	IK PIPE, AND	WELL SCR	EEN DATA:		
	hale		D'	New		lastic, etc.		Settin	g (ft.)	Gage Castin
0-177 Clay, St 177-197 Fine sar			Dia. (in.)	or Used		lotted, etc. Mfg., if comm	ercial	From	То	Screen
197-304 Shale			5	N	PVC	Casino	7	0	250	
320-534 Shale			41/5	_		Casino		250	602	0
534-546 Fine san	nd		435		PVC	Screen	n	602	642	
546-578 Shale										
E70 (10 Cama					15216-11					
578-642 Sand				Cer	nented from		. to	ft. No. of S	acks Used _	2
	e side if necessary)			Cer	nented from	ft	. to	ft. No. of S	acks Used _	11000
(Use reverse (Use reverse Turbine	X Submersible E Commercial Commer	1994		Mel Cer	hod used Nented by Paragraph Specified Specified SPecified SPitless Ada Approved A	MPLETION Surface Slab I Steel Sleeve In apter Used [Alternative Pre	. to Water Installed [Ru Installed [Ru Rule 287.44(3	Wells Wells le 287.44(2)(4 le 287.44(3)(4)(8)(B)]	A)]	1792
(Use reverse (U	Submersible E CONSERVATION C	1994 快きないF COMMISS		Mel Cer 10) SU X 11) WA Sta	hod used hented by RFACE CO Specified S Specified S Pitless Ada Approved A	MARTIN MPLETION Surface Slab I Steel Sleeve In apter Used [Alternative Pro-	water water Installed [Ru In	Mells Wells Wells Research Res	A)]	
(Use reverse (U	Bailer Settled Set	1994 RESOUR	CEN	Mei Cen 10) SU 11) WA Sta	hod used hod used hented by MRFACE CO Specified S Specified S Pitless Ada Approved A	MARTIN MPLETION Surface Slab I Steel Sleeve Is spler Used [Alternative Pro-	water Water Installed [Ruinstalled [Ruinst	Mells Wells Wells Repeated the service of the servi	A)] A)] Date 3- Dept	-14-9
(Use reverse (U	Bailer Settled Set	1994 SEESCUE COMMISS	CE (ION	Met Cer Met Cer 10) SU 11) WA Sta Art 12) PA	hod used hod used hented by Market CO Specified S Specified S Specified S Pitless Ada Approved A TER LEVE tic level sian flow CKERS:	Martin Martin Martin MPLETION Surface Slab I Steel Sleeve In apter Used [Alternative Pro	water Water Installed [Ru In	## No. of S Wells le 287.44(2)(le 287.44(3)(3)(B)] f [Rule 287. surface m. pe	A)] A)] Date 3- Dept	-14-9 h 575
(Use reverse (U	Bailer Settled Set	1994 SEESCUE COMMISS	CE (ION)	Met Cer Met Cer 10) SU 11) WA Sta Art 12) PA	hod used hod used hented by hented hented by hented he	MARTIN MPLETION Surface Slab I Steel Sleeve In apter Used [I Alternative Pro- IL: 125 fr Ceme	water Water Installed [Ru In	## No. of S Wells le 287.44(2)(le 287.44(3)(3)(B)] I [Rule 287. surface m. pe sket ny knowledge	A)] A)] Date 3- Dept	- 14-9 h o 75
(Use reverse (U	Bailer Detted Bailer Detted Bailer Detted Bailer Ba	1994 SEESCUE COMMISS	CE (ION)	Mel Cer Mel Cer 10) SU X 11) WA Sta Art 12) PA	hod used hod used hented by hented hented by hented he	MARTIN MPLETION Surface Slab I Steel Sleeve In apter Used [I Alternative Pro- IL: 125 fr Ceme	water Water Installed [Ruinstalled [Ruinst	## No. of S Wells le 287.44(2)(le 287.44(3)(3)(B)] I [Rule 287. surface m. pe sket ny knowledge	A)] A)] Date 3- Date Dept	-14-9 h 775
(Use reverse (U	Bailer Jetted Bailer Detted CONSERVATION CON	1994 SEESCUE COMMISS	CE NON WE RO	Mel Cer Mel Cer 10) SU X 11) WA Sta Art 12) PA	hod used hod used hented by hented hented by hented he	Martin Martin Martin MPLETION Surface Slab I Steel Sleeve I sapter Used [Alternative Pro L: 125 f	water Water Installed [Ruinstalled [Ruinst	## No. of S Wells le 287.44(2)(le 287.44(3)(3)(B)] f [Rule 287. surface m. pe Ket ny knowledge	A)] A)] Date 3- Date Dept and belief.	-14-9 h 775

*					127			520
Please use black ink. Send original copy by certified mail to the Texas Water Commission Po Box 13087 ATTENTION OWNER: Confidentia							Texas Water Well Drillers I P. O. Box 13087 Austin, Texas 78711	Board
Texas 78711			_	_		W 189		2 /2
WNER ANDY GOY	Name)	Address 🗸	IStri	est or R	(FD)	57 M1280, Lee (City)	(State) (Zi	5 A.3
County CAR BER	varne)	R miles in _	S IN.E.	, s.w.,	etc.)	direction from	(Town)	
Driller must complete the legal descrip with distance and direction from two tion or survey lines, or he must locate well on an official Quarter- or Half-Sc General Highway Map and attach the	and identify the	Abstract	No No and di	irection	from two	Survey Name	nship	
3) TYPE OF WORK (Check):	4) PROPOSED USE (Chr		Publi	c Suppl	ly	5) DRILLING METHO	D (Check):	Oriven Bored
□ New Well □ Deepening □ Reconditioning □ Plugging	☐ Irrigation ☐ Test Wel		The state of the s					
6) WELL LOG:	DIAMETER OF	FHOLE			IOLE CO	MPLETION:		
Date Drilling:	Dia. (in.) From (ft.		☐ Open Hole ☐ Straight Wall ☐ Underreamed					
Started 4- 4- 19 93		540	1	_ Grave	el Packed	Other	ft. to	ft.
Completed <u> </u>				11 01	Svei racke	to give interval 1111000 2	- All Walking	
From To	Description and color of material	f formation	8)	CASIN	G, BLAN	K PIPE, AND WELL SCR	EEN DATA:	
(ft.) (ft.)	Hideria		Dia.	New	Steel	I, Plastic, etc. , Slotted, etc.	Setting (ft.)	Gage
			(in.)	or Used	Perf. Scre	., Slotted, etc. en Mgf., if commercial	From To	- Casing Screen
			od	N	5	chuo	0 240	
			od	N	Şc	440	240 540	-
		44	od	4		iattel	524 540	0.16
590 300 sand			-	-				
300 360 shall			m	CEME	NITING D	ATA [Rule 319.44(b)]		-1-100
390 3And 495 5hate			91	Cement	ted from	0 ft. to _/O	ft. No. of Sacks Used_	2
5 520 Shele	sand]			ft, to	ft. No. of Sacks Used_	
210 540 3AM	REd			Method	d used			
			9	Cemen	ted by		ver en wegen	
						MPLETION		
						face Slab Installed [Rule		
						er Used [Rule 319.44(d)] ternative Procedure Used		
				Ц Арр	proved At	ternative Procedure Osco	(1100 0 701 77	-
			111		R LEVE			
			1	Sta	tic level _	/3 4 ft. below land	d surface Date 4-1-	58
(n) E	R B 1 V 13 11	•	1	Art	esian flow	gpm,	Date-	
121	11	1	12	PACK	ERS:	Type	Depth	_
- Litt nu	12 82 (033					ShirtZaic	520	-
H	JQ 1111 100		-			11 11	500	-
			11555		E PUMP:	□ Jet □ Submer	rsible 🗆 Cylinder	
TEXAS	WATER COMMISSION			Turb		☐ Jet ☐ Submer	rsidie Li Cylinder	
(Use reverse side if necessary)			Depth to pump bowls, cylinder, jet, etc.,ft.					
15) WATER QUALITY:					an Pacina			
Did you knowingly penetrate ar	strata which contained	undesirable	14)	WEL	L TESTS:			62050E
water? Yes ING If yes, submit "REPORT OF UNDESIRABLE WATER"					e Test:	☐ Pump ☐ Bailer	□ Jetted □ Estima	
Type of water?	Depth of strata		-	Yield	1:_80	gpm with	ft, drawdown after	111.01
Was a chemical analysis made? I here by certify that this w knowledge and belief. I un		under my supervis	ion) ar	nd that	each and ult in the	all of the statements here log(s) being returned for a	in are true to the best of m completion and resubmitte	ny al.
82401VIII - 35 - 50-	- 4 - 0	JECC SWater						
INY NAME WELTY	or Print)	-			anas nilikebis			
	Ling	1065	TOCE	.11		7FX.4S (State)	78380 (Zip)	
4	10 1.1 h		ned)_					
(Signed) dawners	d water Well Driker)		a constant		(Register	ed Driller Trainee)	For TWC use only 3 4 -	2
Please attach electric log, chemical a	nalysis, and other pertinen	nt information, if a	evailab	le.			Located on map	

Hanson Professional Services Inc. Submittal Date: September 2018

Revision: 0

TEXAS WATER COMMISSION COPY

WWD-012 (Rev.01-28-87)

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J-3

Please use black ink. Send original copy by certified mail to the Texas Department of Water Resource 7 ox 13087 Texas 78711	ATTE	ENTION OWN	of the second second	ELL tiality	REP Privile _l	e Notice on Reverse Side	Texas Water Well Drille P. O. Box 13087 Austin, Texas 78711	ers Board		
WER Lupe B Alva	arez		Address _	1626	5 An	nette Kingsvil	le, TX 78363	(Zip)		
2) LOCATION OF WELL: countyKleberg				3_Mi		E direction from				
							1101111			
Driller must complete the legal descrip with distance and direction from two tion or survey lines, or he must locate well on an official Quarters or Half-Sc General Highway Map and attach the	intersecting se and identify to ale Texas Cour	c- he nty	Abstrac	No t No e and d	directio	Block No 7Survey Name n from two intersecting section o				
B) TYPE OF WORK (Check):	4) PROPOS	SED USE (Ch	eck);			5) DRILLING METHOD (Chec	:k):	C1		
☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging	⊠ Domest	tic 🗆 Industr	rial □ Public S ell □ Other _	Supply Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored						
WELL LOG:	DIA	METER OF H	HOLE	7)	BORE	HOLE COMPLETION:				
	6 3/4	From (ft.) Surface	630		Gra	n Hole ⊠ Straight Wa vel Packed □ Other	9.5 (E.S.5.4.99.95.11.95			
Date drilled 6-23-85				1	If G	ravel Packed give interval from	nft. to	ft.		
From To (ft.) (ft.)	Description a	nd color of fo material	ormation	8)	CASIN	IG, BLANK PIPE, AND WELL S	CREEN DATA:			
0- 82 Top soil		le		Dia.	New	. Steel, Plastic, etc. Perf., Slotted, etc.	Setting (ft.)	Gage Casing		
82- 90 Sand				NAME OF THE PARTY	Used	Screen Mgf., if commercial		Screen		
90-340 Shale & C				4	N	11 Lb galv casir				
340-370 Fine Sand				4	N	Stainless steel	scr 610 630			
370-562 Shale 562-630 Sand				+	-					
302-030 Sanu				1				1		
				ft. toft.						
						ic level 151ft, below la		<u>8–8</u> 5		
				121	PACK		Date————————————————————————————————————			
						Cement B	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1			
(Use reverse sale if necessary)				13) TYPE PUMP: N/A Turbine Jet Submersible Cylinder Other Depth to pump bowls, cylinder, jet, etc., ft.						
5) WATER QUALITY: Did you knowingly penetrate any water? ☐ Yes S No If yes, submit "REPORT OF UND Type of water? Was a chemical analysis made?	ESIRABLE W	ATER"	esirable	14)	WELL Type Yield:		☑ Jetted ☐ Estima			
						ach and all of the statements here It in the log(s) being returned for				
NAME Martin W	ater We	lls		elle ril	Jer V/L	1669				
DDRESS Hwy 77 N (Street or RFD)	orth		obsigno	13	498	8380 (State)	(Zip)			
igned) Amo	min	m	TEVAC IMA		0	BOOLONE Deller Territoria	- 0-	7.1 1		
ease attach electric log, chemical analy	sis, and other	pertinent info			UMN	ISSION Driller Trainee)	Well No.	34-4C		

		State of Texa	25		Texas Wate		
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side WELL I). Box 13087 n, Texas 787	
OWNER Juventino	Garcia	ADDRESS R	oute 1, (Street or RF	Box 488-E,K	ingsvil	lle, T	exas (Zip)
LOCATION OF WELL: County Kleberg	4½	V	, SW, etc.)	lirection from	(Town)	
riller must complete the legal description under- or Half-Scale Texas County Ger LEGAL DESCRIPTION: Section No Block Not Distance and direction from two Integrals SEE ATTACHED MAP	neral Highway Map and attach the r	map to this form. Abstra	act No.	Survey Name			ficial
TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check): ☑ Domestic ☐ Industrial ☐ Irrigation ☐ Test Well	☐ Monitor	☐ Public Supply	5) DRILLING METH	Air Hamme		
WELL LOG: ate Drilling: 2 – 2 2 19 9 3		To (ft.)	BOREHOLE CO	Straight Wall ed □ Other ———	***************************************	derreamed	
Completed 2-26 19 9 3				give interval from		. to	n.
From (ft.) To (ft.)	escription and color of formation ma	aterial 8)		K PIPE, AND WELL SCR			•
0- 69 Clay, s	hale	Dla.	or Perf., Si	astic, etc. otted, etc.	Settin	100.00	Gage Castin
69- 74 Fine sa	ınd			Mfg., If commercial	From	To	Screen
74-217 Shale	13 63 63 13 13 13 13 13 13 13 13 13 13 13 13 13			asing	533	533 573	
117-248 Fine sa 248-457 Shale		1 1 1 1 1 1 1	N PVC S	creen	333	313	
457-472 Fine sa	ind D	Jan J.					
472-534 Shale	JUL 0 8 19	393					
534-573 Sand	TEXAS WATER COM	(e POISSIM	CEMENTING D Cemented from	ATA [Rule 287.44(1)] 10 ft. to 0			
// lea reverse		1	Method used _				
(030 1010130	side if necessary)	-		Martin Wat	er Wel	ls	
3) TYPE PUMP:	Submersible □ Cylinder	10	Cemented by . SURFACE COI Specified Si		e 287.44(2)(A)]	
3) TYPE PUMP: Turbine	Submersible Cylinder etc., 160 ft. Baller Detted Estle	mated	Surface col Specified Si Specified Si Pitless Adap	MPLETION urface Slab Installed [Rul	e 287.44(2)(A e 287.44(3)(A e)(B)])])]	
3) TYPE PUMP: Turbine Jet Other Depth to pump bowls, cylinder, jet, 4) WELL TESTS: Type Test: Pump Spm with Spm WATER QUALITY: Did you knowingly penetrate any si	Submersible Cylinder etc., 160 tt. Baller Ø Jetted Esth	matedhrs.	Surface col Specified Si Specified Si Pitless Adap	MPLETION urface Slab Installed [Ruileel Sleeve Installed [Ruileter Used [Ruile 287.44(3)] Itemative Procedure Used	e 287.44(2)(A e 287.44(3)(A s)(B)] [Rule 287.7)])] 1]	-26-9
3) TYPE PUMP: Turbine Jet Other Depth to pump bowls, cylinder, jet, or other WELL TESTS: Type Test: Pump	Submersible Cylinder etc., 160 tt. Baller Ø Jetted Esth	mated hrs 11	Cemented by SURFACE COI Specified Si Specified Si Pitiess Ada Approved A WATER LEVEL Static level	MPLETION urface Slab Installed [Rule eel Sleeve Installed [Rule 187.44(\$ lternative Procedure Used	ie 287.44(2)(A e 287.44(3)(A b)(B)] [Rule 287.7 surface m.)]] 1] Date2-	
3) TYPE PUMP: Turbine Jet	Submersible Cylinder etc., 160 ft. Baller Detted Estricted ft. drawdown after trata which contained undesirable in trace which contained undesirable in trace which of strata Peep No The Contained undesirable with the contained undesirable under the contained undesirable with the contained undesirable under the contained undesirable under the contained undesirable under the contained undesirable under the contained undenter the contained under the contained under the contained under	mated hrs. 11 /ATER* 12 nat each and all of the completion and resu	Cemented by SURFACE COI Specified Si Specified Si Pitless Ada; Approved A WATER LEVEL Static level Artesian flow PACKERS:	MPLETION urface Slab Installed [Rule el Sieeve Installed [Rule et Sieeve Installed [Rule ter Used [Rule 287.44(3 itemative Procedure Used to the best of my are true to the best of my	e 287.44(2)(A e 287.44(3)(A e)(B)] [Rule 287.7 surface m. pe	Date 2- Date Depth	
3) TYPE PUMP: Turbine Jet S Other	Submersible Cylinder etc., 160 ft. Baller Ø Jetted Esth ft. drawdown after trata which contained undesirable hit "REPORT OF UNDESIRABLE W Depth of strata Ves Ø No me (or under my supervision) and the result in the log(s) being returned for after Wells pe or print)	matedhrs	Cemented by SURFACE COI Specified Si Pitiess Ada; Approved A WATER LEVEL Static level Artesian flow PACKERS:	MPLETION urface Slab Installed [Rule el Sieeve Installed [Rule et Sieeve Installed [Rule ter Used [Rule 287.44(3 itemative Procedure Used to the best of my are true to the best of my	e 287.44(2)(A e 287.44(3)(A e)(B)] [Rule 287.7 gurface m. pe basket y knowledge a 1669	Date 2- Date Depth	nderstand
3) TYPE PUMP: Turbine Jet Me Cother Depth to pump bowls, cylinder, jet, 4) 4) WELL TESTS: Type Test: Pump Meld: gpm with Street Stree	Submersible Cylinder etc., 160 ft. Baller Detted Estricted ft. drawdown after trata which contained undesirable in trace which contained undesirable in trace which of strata Peep No The Contained undesirable with the contained undesirable under the contained undesirable with the contained undesirable under the contained undesirable under the contained undesirable under the contained undesirable under the contained undenter the contained under the contained under the contained under	matedhrs	Cemented by SURFACE COI Specified Si Specified Si Pitiess Ada Approved A WATER LEVEL Static level Artesian flow PACKERS: Statements herel similital. DRILLER'S LICH STOWN	MPLETION urface Slab Installed [Rule eel Sleeve Installed [Rule ter Used [Rule 287.44(3 lternative Procedure Used in the Installed [Rule 287.44(3 lternative Procedure Used in the Installed Instal	e 287.44(2)(A e 287.44(3)(A e)(B)] [Rule 287.7 gurface m. pe basket y knowledge a 1669	Date 2-Date Depth 530	nderstand
3) TYPE PUMP: Turbine Jet Depth to Depth to pump bowls, cylinder, jet, 4) WELL TESTS: Type Test: Pump Jet, 1964: gpm with 1975 Sometiments? Water QUALITY: Did you knowingly penetrate any siconstituents? Yes No if yes, submit yes a chemical analysis made? Was a chemical analysis made? PANY NAME Martin Waters Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Was a chemical analysis made? Type of water? Was a chemical analysis made? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made? Sometiment of the pump Interpretate any siconstituents? Was a chemical analysis made?	Submersible Cylinder etc., 160 ft. Baller Detted Estricted ft. drawdown after trata which contained undesirable in the record of the record of the result in the log(s) being returned for the resu	mated hrs. 11 VATER* 12 mat each and all of the completion and resure WELI Rob (City)	Cemented by SURFACE COI Specified Si Specified Si Pitiess Ada Approved A WATER LEVEL Static level Artesian flow PACKERS: Statements herel similital. DRILLER'S LICH STOWN	MPLETION urface Slab Installed [Rule eel Sleeve Installed [Rule ter Used [Rule 287.44(3 lternative Procedure Used in the Installed [Rule 287.44(3 lternative Procedure Used in the Installed Instal	e 287.44(2)(A e 287.44(3)(A e)(B)] I [Rule 287.7 surface m. pe basket y knowledge a 1669	Date 2-Date Depth 530	nderstand

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e:d original copy by certified mail to: Texas Water Commission, P.O. Bo					Please use	black ink.		
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	State o	of Texas REPORT		P.	er Well Drille O. Box 1308 In, Texas 78	7		
OWNER Enrique Trevino (Name) 2) LOCATION OF WELL: County Kleberg . 2			Box 317-S, F (City) direction from Kings			Texas		
Driller must complete the legal description below with distance and direct Quarter- or Half-Scale Texas County General Highway Map and attach the LEGAL DESCRIPTION: Section No Block No Township Distance and direction from two intersecting section or survey lines	tion from two in he map to this f	tersecting section or survey orm. Abstract No.	lines, or he must locate ar	nd identify the	well on an o			
3) TYPE OF WORK (Check): X New Well Deepening Domestic Industrial Plugging Irrigation Test W	trial Moni		5) DRILLING METHO X Mud Rotary C Air Rotary C		r 🗆 Jetted			
6) WELL LOG: DIAMETER OF HOLD Date Drilling: 6-15 19 9 0 6 3 / 4 Surface Completed 19 0 0 6 3 / 4 Surface	To (ft.)	7) BOREHOLE Co	Straight Wall Other	1-000	derreamed			
			d give interval from		. to	ft.		
From (ft.) To (ft.) Description and color of formation	n material		IK PIPE, AND WELL SCR		- (h)	Cons		
0-198 Clay, shale 198-230 Fine sand		Dia. or Perf., S	lastic, etc. otted, etc. Mfg., if commercial	Settin	g (it.)	Gage Casting Screen		
230-238 Shale		5 N PVC C	asing	0	300			
238-283 Caliche		4 N PVC C	asing	300	600			
283-570 Shale		4 N PVC S	creen	600	630			
13) TYPE PUMP: Turbine Jet Submersible Cylinder TEXAS WATER CC Depth to pump bowls, cylinder, jet, etc., 220 ft.	1990 DMMISSIC	Method used Cemented by N 10) SURFACE CO Specified S	MARTA [Rule 287.44(1)] 10 ft. to 0 ft. to 0 Martin Wate MPLETION urface Slab Installed [Rule 287.44(3)] Alternative Procedure Used	er Wel e 287.44(2)(A	ls	2		
Yield:gpm withft. drawdown after 15) WATER QUALITY: Did the drilling penetrate any strata which contained undesirable cor Yes	nstituents?	DATE BOOK OF THE SECOND CONTROL	150 ft. below land s	m.	Date			
Type of water? Depth of strata Was a chemical analysis made? ☐ Yes ☒ No		Cement basket 560						
ereby certify that this well was drilled by me (or under my supervision) and at failure to complete Items 1 thru 15 will result in the log(s) being returned PANY NAME Martin Water Wells (Type or print) SS HWY 77 North	1 for completion	well driller's lic	ENSENO. 16	69	78380			
Igned) (Street or RFD) (Street or RFD) (Street or RFD) (Street or RFD) (Clicensed Well Driller)		(City) (Signed)	(Siz	ate) iller Trainee)	(Zip)			
	a if quallable	For TWC in	se only: Well No. 83.	34-5 Loca	ted on map			
ease attach electric log, chemical analysis, and other pertinent information								

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J-33

Sand original copy by certified mail to the Texas Water Commission P.O. Box 13087 Austin, Texas 78711		WATER WE		ORT Notice on Reverse Side	P. C	xas Water Well Drillers B O. Box 13087 stin, Texas 78711	oard
1) OWNER Gary Powe	R-S	Address	719 E.	miller	Kingsvi (City)	LLe f k 7.83 (State) (Zip	62
2) LOCATION OF WELL:	<u>C</u> 6	miles in	S € (N.E., S.W.,	etc.) direction fro	m _ Ki)	(Town)	_
		☐ Legal descr	vietient			/	_
Driller must complete the legal descr with distance and direction from two tion or survey lines, or he must locat well on an official Quarter- or Half-S General Highway Map and attach the	e and identify the icale Texas County	Section Abstract Distance	No No and direction	Block NoSurvey Name from two intersecting:	section or surve		_
	No. of the supply of the suppl	10.7	ed map,		NG METHOD (riven
3) TYPE OF WORK (Check):	4) PROPOSED USE (Che		Ja	(127A 2003 2003 2003 2003 2003 2003 2003 200		lammer Detted DB	
☑ New Well ☐ Deepening	☑ Domestic ☐ Industria					Tool Other	21.00
☐ Reconditioning ☐ Plugging	☐ Irrigation ☐ Test Well				tary Li Cabie	1001 LIOther	
6) WELL LOG: Date Drilling: Started 4-20 19 57			□ Ope	rel Packed DOt	raight Wall her	Underreamed	ft.
Completed 4-,34 195/			1 "	nover racked give interva			
From To (ft.) (ft.)	Description and color of material	formation	8) CASIN	IG, BLANK PIPE, AND	WELL SCREE	N DATA:	_
	Top soil		Dia. New	- Steel, Plastic, etc. Perf., Slotted, etc.		Setting (ft.)	Gage
3 65	Share		(in.) Used	Screen Mgf., if cor	mmercial	From To	Scree
65 67	Saw 8		1/-	SCH.41	71.6.	0 587	-
67 580	shale					537 607	01/
5×0 607 50	and Pal		14'	31.075	-/>	3.37 001	, - / ,
			+				
			- □ Sp	EACE COMPLETION ecified Surface Slab Inst less Adapter Used (Rule aproved Alternative Proc	319.44(d)]		
			11) WAT	***************************************	edule Oseo (III	31. 313.71	
1	O E GET	1987	St. Ar	atic level 12.Pf tesian flow	Type	Date Depth 5-70	5.7
	in)	W IS III	Sti Ar	atic level _/ 2 P f tesian flow KERS:	Type	Date	<u>17</u>
	IDI SED "	W IS III	Sti Ar	atic level / 2 / f tesian flow KERS: E PUMP: bine	gpm. Type	Date Depth 5-770	5.7
	<u>(10)</u>	1987	Sti Ar	atic level / 2 / f tesian flow KERS: E PUMP: bine	gpm. Type	Depth 5-70	5.7.
15) WATER QUALITY: Did you knowingly penetrate a water? ☐ Yes ☑ No If yes, submit "REPORT OF L Type of water? Was a chemical analysis made?	se side if necessary) any strata which contained understrata which contained understrata — Depth of strata — Per No	1987	St. Ar	atic level / 2 / f tesian flow	gpm. Type Submersit Fr, jet, etc.,	Date Depth 5-70 Depth 5-70 Depth 5-70 Depth 6-10 Depth	rted hrs.
15) WATER QUALITY: Did you knowingly penetrate a water? Yes PNo If yes, submit "REPORT OF L Type of water? Was a chemical analysis made?	se side if necessary) any strata which contained to understand that failure to co	1087	13) TYP 13) TYP 14) WEI Tys Yie sion) and tha	atic level / 2 / f tesian flow / f tesian flow / f tesian flow / f tesian flow / f E PUMP: bine	gpm. Type Submersib Bailer th Sort ft.	Date Depth 5-776 Dele Cylinder ft. Detted Estimater drawdown after are true to the best of m	oted hrs.
15) WATER QUALITY: Did you knowingly penetrate a water? Yes PNo If yes, submit "REPORT OF L Type of water? Was a chemical analysis made?	se side if necessary) any strata which contained to UNDESIRABLE WATER" Depth of strata Yes No well was drilled by me (or understand that failure to co	1087 1087 undesirable under my supervisimplete items 1 th	12) PAC 13) TYP 13) TYP Oth Depth 14) Well Tys Yie Well Driller's	atic level 2 2 for tesian flow CERS: E PUMP: bine	gpm. Type Submersib Bailer th Sort ft.	Date Depth 5-776 Dele Cylinder ft. Detted Estimater drawdown after are true to the best of m	oted hrs.
Did you knowingly penetrate a water? Yes PNo If yes, submit "REPORT OF L Type of water? I here by certify that this knowledge and belief. To COMPANY NAME WELTY ADDRESS 2/S Kisset or B	se side if necessary) any strata which contained to UNDESIRABLE WATER" Depth of strata Tyes Depth of strata Tyes Well was drilled by me (or understand that failure to co Water to co	1087	12) PAC 13) TYP 13) TYP Oth Depth 14) Well Tys Yie Well Driller's	atic level 2 2 for tesian flow CERS: E PUMP: bine	gpm. Type Submersib Bailer th Sort ft.	Date Depth 5-776 Dele Cylinder ft. Detted Estimater drawdown after are true to the best of m	oted hrs.
15) WATER QUALITY: Did you knowingly penetrate a water? Yes PNo If yes, submit "REPORT OF L Type of water? Was a chemical analysis made? I here by certify that this knowledge and belief. Tu COMPANY NAME WELTY Type ADDRESS 2/8 Kisset or B	se side if necessary) any strata which contained to UNDESIRABLE WATER" Depth of strata Yes No well was drilled by me (or understand that failure to co UA 1 P LU e or Print) Li NJ IFD)	1987 undesirable under my supervis mplete items 1 th **LLS Water** R obs. (Signature)	13) TYP 13) TYP 13) TYP Oth Depth 14) WEI Tyy Yie Well Driller's	atic level 2 2 for tesian flow CERS: E PUMP: bine	gpm. Type Submersit Submersit For, jet, etc., Bailer th ft. (State) For We	Date Depth 5-776 Dele Cylinder ft. Detted Estimater drawdown after are true to the best of m	oted hrs.

TWC-0199 (Rev. 05-18-90)

Send original copy by certified mail to: Tex	as Water Commissi	on, P.O. Bo	c 13087, Aus	itin, TX	78711-	3087	L	S(3)	Please use	J- black ink.	
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side			State WELL	of Tex	cas			Texas Water Well Drillers Board P.O. Box 13087 Austin, TX 78711-3087 512-371-6299			
Robert Si	lguero		ADDRE	ss			ohnston,				
, - (Name)					(Street or RFI		(City)	(State)	(Zip)	
			miles in	(N	N IE, SW,	, etc.)	rection fromRi	(low	0.60		
Driller must complete the legal description of the country of the	o Town	ship	e map to this	_ Absi				±.		official	
3) TYPE OF WORK (Check): X New Well Deepening Reconditioning Plugging	4) PROPOSED Domestic Irrigation	USE (Check	al Mor		_	ublic Supply	Mud Rota	ry Air Hamme	er 🗆 Jetted		
6) WELL LOG: Date Drilling: 10-11.94	Dia. (in.) Fro	m (ft.)	To (ft.)	7		REHOLE CO Open Hole Gravel Packe	Straight W		derreamed		
Started	6 3/4 Su	rface	662		II G	ravel Packed	give interval from		t. to	ft.	
From (ft.) To (ft.)	Description and color	of formation	material	8) CA	SING, BLAN	K PIPE, AND WELL	SCREEN DATA:			
0- 10 Top soil				Die	New		astic, etc.	Settir	ng (ft.)	Gage Casting	
10- 30 Caliche		<u> </u>		Dia. (in.)	or Used		otted, etc. Mg., if commercial	From	То	Screen	
30- 96 Shale				41/2	N	PVC C	Casing	0	300		
6-106 Fine sand	l			4	N		Casing	300	622		
6-408 Shale				4	N	PVC S	Screen	622	662		
J8-430 Fine sand	l			_							
430-567 Shale 567-590 Sand 590-600 Shale 600-662 Sand (Use revers.	e side if necessary)	111	nec i	199	Ce	mented from		10 ft. No. of S	acks Used _		
13) TYPE PUMP: ☐ Turbine ☐ Jet 전	Submersible (☐ Cylinder			10) SL	IRFACE COM	Martin W				
Depth to pump bowls, cylinder, jet, 14) WELL TESTS:	etc., 180	tt.	stimated			Specified St Pitless, Adap	urface Slab Installed leel Sleeve Installed oter Used [Rule 28] Itemative Procedure	[Rule 287.44(3)(7.44(3)(B)]	A)]	8	
Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any	ft. drawdown	ES INDIFFERENCE	hrs.		St	ATER LEVEL	1') 5	land surface	Date 10-	-14-94	
constituents?	nit "REPORT OF UN	+:				ACKERS:		Туре	Depti	h	
☐ Yes ※ No If yes, subr	Depth of strata .				-π *	Rubl	per		595		
Was a chemical analysis made?	☐ Yes 🏚 No									- d-sale and	
I hereby certify that this well was drilled by that failure to complete items 1 thru 15 will	me (or under my sup result in the log(s) be a Water We	ang returned	d that each a for completi	on and i	0000111		in are true to the bes		and belief. I	understand	
COMPANY NAME MATTI	pe or print)	.110		- 114			nowarten (100) Telefore (100)	V		concernation.	
ESS E (Street	or AFD)	t.h		(Cit	y)	stown		Texas (State)	(Zip)	8380	
(Signed) (Licens	ed Well Driller)			_ (Sig	gned)		(Register	ed Driller Trainee)		7	
Please attach electric log, chemical analys	sis, and other pertine	nt information	n, if available			For TWC us	se only: Well No	Loc	ated on map	83-34-5	

TEXAS WATER COMMISSION COPY

Part III

d original copy by certified mail to: Texas W.		State of Texa					Well Driller	
TTENTION OWNER: Confidentiality trivilege Notice on Reverse Side		WELL REPO	-		and they be also	Austin,	TX 78711-3 2-371-6299	
OWNERTomas Garza		ADDRESS		treet or RFD)	(State)	53 (Zip)
LOCATION OF WELL: County Kleberg .			SE, sw, e	itc.)	ection from Kings	(Town		
riller must complete the legal description be learner or Half-Scale Texas County General LEGAL DESCRIPTION: Section No Block No Distance and direction from two intersec	Township	Abstr						official
X SEE ATTACHED MAP TYPE OF WORK (Check): New Well □ Deepening □ Reconditioning □ Plugging	PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☐ Irrigation ☐ Test Well	☐ Monitor ☐ Injection		lic Supply Watering	5) DRILLING METHO	Air Hamme	r ☐ Jetted	☐ Driver
ate Dining.	a. (iii.)	7) (ft.)		EHOLE COI Open Hole Gravel Packe	X Straight Wall		derreamed	
Started 6-13 194 6 Completed 194 194	3/4 Surface	652	If Gr	avel Packed	give interval from	ft.	to	ft.
From (ft.) To (ft.) Descr	ription and color of formation ma	aterial 8	CAS	ING, BLAN	PIPE, AND WELL SCR			I .
0- 6 Clay		Dia.	New	Steel, Pla Perf., Slo		Settin	g (ft.)	Gage Castin
6- 22 Caliche		(in.)	Used	Screen M	Ifg., if commercial	From	То	Scree
22-227 Shale		5	N	-	asing	0	240	-
227-237 Fine sand	0	4½	N		asing	612	612	
237-386 Shale	DIE GE	TIME	N	PVC S	creen	012	032	
386-408 Fine sand	<u> U</u>	- 9 PH	-			-		COLUMN TO THE
408-520 Shale	M aucos	200 0 1115) CF	MENTING D	ATA [Rule 287.44(1)]			
520-537 Sand 537-600 Shale	11/1 ADA S	1994 []]		nented from	0 ft. to10	ft. No. of S		
600-652 Sand	TEVACALLE				ft. to	ft. No. of S	acks Used _	_
(Use reverse sid	TEXAS NATURA HOLDON SERVATION	LRESOURCE	Me	hod used _	Martin Wate	er Wel	ls	
13) TYPE PUMP:	- THON	COMMISSIO	N Ce	mented by _	PIGE CEIT MGC	-		
	ubmersible		10) SU	RFACE COM	PLETION			
Other	180 ft.	_	M	Specified St	urface Slab Installed [Ru			
Depth to pump bowls, cylinder, jet, etc.					eel Sleeve Installed [Ru		A)]	
14) WELL TESTS:	Service and the service and th			Pitless Adap	oter Used [Rule 287.44(3)(B)]	711	
Type Test: ☐ Pump ☐ Bail		protest i		Approved A	Itemative Procedure Use	u (nuie zor.	* 11	
Yield: gpm with	ft. drawdown after	hrs.	11) W	TER LEVEL	i 24			15-9
15) WATER QUALITY:			Sta	tic level	ft. below land		Date	
Did you knowingly penetrate any strat	a which contained undesirable		Art	esian flow .	91	om.	Date	
constituents?	REPORT OF UNDESIRABLE V	VATER*	12) PA	CKERS:		уре	Dep	th
Type of water?	Depth of strata				Cement bas	ket	590	
W toward analysis made?	Vas DXNo							
ereby certify that this well was drilled by me t failure to complete items 1 thru 15 will res Martin Wa	all ill the leg(e)	300 31		tements here ttal. LLER'S LIC	1	my knowledge	e and belief.	1 understa
(Type	or print)	1000				2.5	783	80
ORESS HWY	77 North	(Ci		town	Tex	as late)	(Zip)	-
(Street or F	RFD)	(23:23	23					
(Licensed)	Well Driller	(SI	gned)		(Registered D	riller Trainee))	
			r		se only: Well No	Lor	rated on mar	63.3
lease attach electric log, chemical analysis,								

nd original copy by certified mail to: Texas Water Commission, P.O. Box	Text	Please use black ink.
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	State of Texas WELL REPORT	P.O. Box 13087 Austin, TX 78711-3087 512-371-6299
OWNER Paul H. Sanchez (Name)	ADDRESS Route 2, Box 318, Kings (Street or RFD) (City)	sville, Tx (State) (Zip)
2) LOCATION OF WELL: County Kleberg . 4	miles inSEdirection fromKings	ville (Town)
Driller must complete the legal description below with distance and direction		entify the well on an official
Quarter- or Half-Scale Texas County General Highway Map and attach the LEGAL DESCRIPTION: Section No Block No Township Distance and direction from two Intersecting section or survey lines	map to this form. Abstract No Survey Name	
X SEE ATTACHED MAP		
3) TYPE OF WORK (Check): A) PROPOSED USE (Check): New Well Deepening Domestic Industrial Industri	☐ Monitor ☐ Public Supply	Hammer D Jetted D Bore
6) WELL LOG: DIAMETER OF HOLE	7) BOREHOLE COMPLETION: ☐ Open Hole	Underreamed
Started 6-13 1994 63/4 Surface Completed 6-15 1994	If Gravel Packed give interval from	
From (ft.) To (ft.) Description and color of formation in	naterial 8) CASING, BLANK PIPE, AND WELL SCREEN I	DATA:
0- 6 Clay	New Steel, Plastic, etc. Dia, or Perf., Slotted, etc.	Setting (ft.) Gage Castin
6- 20 Hard caliche		From To Scree
20-229 Shale	4½ N PVC Casing	0 240
229-246 Fine sand \\ \(\sigma\)	4 N PVC Casing 24 N PVC Screen 61	
246-378 Shale 378-400 Fine sand	N PVC Screen 61	1 631
400 E20 Chale		
530-54/ Fine sand III AUG 29	1994 9) CEMENTING DATA [Rule 287.44(1)]	2
547-597 Shale TEXAS NATURAL		lo. of Sacks Used
597-651 Sand CONSERVATION (Use reverse side if necessary)	RESOURCE Method used	
13) TYPE PUMP:	Commission Cemented by Martin Water V	Vells
☐ Turbine ☐ Jet	10) SURFACE COMPLETION	
□ Other180	Specified Surface Slab Installed [Rule 287	.44(2)(A)]
Depth to pump bowls, cylinder, jet, etc.,ft.	☐ Specified Steel Sleeve Installed [Rule 287	.44(3)(A)]
14) WELL TESTS:	☐ Pitless Adapter Used [Rule 287.44(3)(B)]	
type root. — romp	imated Approved Alternative Procedure Used [Ru	le 287.71]
Yield: gpm with ft. drawdown after	hrs. 11) WATER LEVEL:	e Date 6-15-9
15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents?	Static level ft. below land surface Artesian flow gpm.	Date
☐ Yes ☑ No If yes, submit *REPORT OF UNDESIRABLE \		Depth
Type of water? Depth of strata	Rubber Shale trap	595
Was a chemical analysis made? ☐ Yes ☐ No ereby certify that this well was drilled by me (or under my supervision) and	that and all of the eletermonic barries are to be to the best of my know	wiedge and helief Lundersta
at failure to complete items 1 thru 15 will result in the log(s) being returned	or completion and resubmittal.	94
(Type or print)	Control of the Contro	T C C C C
Hwy 77 North (Street or BED) 1	Robstown Texas (State)	78380 (Zip)
	(0)	
Igned)	(Signed) (Registered Driller Tr	ainee)
ease attach electric log, chemical analysis, and other pertinent information,	(Registered Driller Tr	

Part	Ш
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ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side			State WELL						r Well Drille b. Box 1308 n, Texas 78	7
OWNER _ Joe M. Cave	azos lame)		ADDRE	ss _	Box (964, K Street or RFI	(ingsville,	Tx 783	64 (State)	(Zip)
countyKleberg							9			
Oriller must complete the legal description Quarter- or Half-Scale Texas County Ger LEGAL DESCRIPTION: Section No Block Not Distance and direction from two Inte	neral Highway	Map and attach the	ne map to this	form. Abs					well on an o	fficial
) TYPE OF WORK (Check): Mew Well Deepening Reconditioning Plugging	4) PROP	Loss Carron de la constante de	rial Mor			blic Supply -Watering	5) DRILLING METHO Mud Rotary Air Rotary	Air Hammer		
) WELL LOG:	DIA	METER OF HOL	E				MPLETION:			
Date Drilling: 8-18 93	Dia. (in.)	From (ft.)	To (ft.)	-	200	Open Hole Gravel Packe	Straight Wall Other		lerreamed	
Started 8-18 19 93 Completed 8-25 19 93	6 3/4	Surface	001				give interval from		to	ft.
From (ft.) To (ft.) D	escription and	color of formation	material		B) CAS	SING, BLAN	K PIPE, AND WELL SCR	EEN DATA:		
0- 8 Top soil				Dia.	New	Steel, Pla Perf., Slo	astic, etc.	Setting	(ft.)	Gage Casting
8- 56 Caliche				(in.)	Used	Screen N	Afg., If commercial	From	To	Screen
56-228 Shale				5	N		Casing .	300	300 621	*
'8-247 Fine san				4	N		Casing Screen	621	661	
	F N 1			4	14	TVC L	ocreen	021	001	
The state of the s										
598-661 Sand) CEI	MENTING DA	ATA [Rule 287.44(1)] 0ft. to		*0	2
	-1	· · · ·		-	Cen	nented from ,	ft. to	ft. No. of Sa	cks Used _	
// les esuama	side If necess		-	1	Mot	hod used				
3) TYPE PUMP:	Side II riecess	a))		1		nented by	Martin Water	Wells	i	
☐ Turbine ☐ Jet 🎵	Submersible	☐ Cylinder			10) SUR	RFACE COM	PLETION	+		
☐ Other	180) ft.					rface Slab Installed [Rule			
				1			eel Sleeve Installed [Rule ter Used [Rule 287.44(3)			
4) WELL TESTS: Type Test: □ Pump □ E	Baller 🔀	Jetted □ E	stimated				terrosed [Rule 207.44(5)] ternative Procedure Used]	
Yield: gpm with	ft. draw	down after	hrs.	-	11) WA	TER LEVEL:			255	POW 195
5) WATER QUALITY: Did you knowingly penetrate any st	rata which con	tained undestrable	9		Stat	dc level	126_ ft. below land s		pate	-25-9
constituents?				_	m DA	CKERS:	Тур	Ne .	Depth	y
☐ Yes ☐ No If yes, submi	_ Depth of st	F UNDESIRABLE	HAIEN		A) PA	e. 160 150		sket	596	
		No								
eby certify that this well was drilled by n failure to complete Items 1 thru 15 will re	sult in the log	s) being returned	that each and for completion	d all of t n and re	he state submitta	ments herein I.	are true to the best of my	knowledge ar	nd bellef. I u	nderstand
MPANY NAME Martin Wa	ter We.	LIS		WE	LL DRIL	LER'S LICE	NSE NO.	1009		
2000	77 No:	cth		Rol	osto	wn	Texa			8380
(Street o		4		(Cit	y)		(Sta	ite)	(Zip)	
ned) (lmoss	Mall Della	rlin		(SIg	ned) _	-	(Registered Dri	ller Trainee)		
II loen se	d Well Driller)						(g			
use attach electric log, chemical analysis							e only: Well No	- Anna Carlo		62.71

TWC-0392 (Rev. 06-10-85)

Part	Ш

ACTION AND ADMINISTRATION OF THE PARTY OF TH			0.00		e de la constante de la consta					SHLOOGHAN:
lease use black ink. end original copy by		200	State of						Water Well Drillers 30x 13087	Board
ertified mail to the fexas Water Commission			ATER WE				**************************************		, Texas 78711	
.O. Box 13087 tin, Texas 78711							on Reverse Side	-		
JWNER Judith Lorf	ing		_ Address	P.	O. I	Box 1	825, Kingsv	rille,	Tx 78363	ip)
			_ miles in	SE (N.E.	, S.W.,	etc.)	_ direction from	Kings	ville (Town)	
		-	☐ Legal desc	ala tina						
riller must complete the legal descri	ption to the right		Section	No		8	ock No1	Township _		
ith distance and direction from two	intersecting sec-						_ Survey Name	-		
ell on an official Quarter- or Half-Sc eneral Highway Map and attach the	cale Texas County	t //	Distance	and d	rection	from tw	o intersecting section o	or survey lin	nes	
Character (mg/mm)	- 2		See attach	ad ma						_
To a second				ed ma	J.		5) DRILLING MET	HOD (Che	ck)· □	Driven
TYPE OF WORK (Check):	4) PROPOSED DyDomestic			Toubli	a Sunn	lv	Mud Rotary		214.	
New Well Deepening	SECTION OF THE PROPERTY OF THE					i y	☐ Air Rotary [
Reconditioning Plugging	☐ Irrigation ☐	DC IDWALLAND CO.	The state of the s			101 5 05) PS=2704441524421626 = 2		0. 2002	
WELL LOG:		ETER OF H From (ft.)	OLE To (ft.)	100/75	Oper		MPLETION: Straight Wa	alt.	Underreamed	
te Drilling: 10-26_19.87	63/4	Surface	729	1 8	Grav	el Packed	Other	0.50	1271/10/10/10/10/10	
Completed 11-2 19 87				1	If Gr	avel Pack	ed give interval fro	m	ft. to	ft.
				-						
From To (ft.) (ft.)	Description and	d color of for aterial	rmation	8)	CASIN	G, BLAN	IK PIPE, AND WELL S	CREEN D	ATA:	
0.300	1, shale			Dia.	New	Stee	el, Plastic, etc.		Setting (ft.)	Gage
0-248 Top soi 248-266 Fine sa				(in.)	or Used	Perf	., Slotted, etc. een Mgf., if commercial	1 7	From To	- Casing Screen
266-338 Shale				4	N	PVC	Casing		0-709	
338-356 Fine sa	and			4	N	PVC	Screen	70	9-729	
356-368 Shale										
368-390 Sand		2711		R.						
390-431 Shale										
431-448 Fine sa 148-472 Shale	and	4240		9)	CEME	NTING D	ATA [Rule 319.44(b)]		2
				+ 1	Cemen	ted from	ft, to0	ft. No	o, of Sacks Used o. of Sacks Used	
472-493 Fine sa 493-508 Shale	and			-		d used		100.000 000	7.75.75 an 7.10 at 371 (1995)	11 <u>2</u> 4
493-300	ock	3.00		1	Cemen	ted by_I	Martin Water	r Well	s	
508-514 Hard ro 514-709 Shale	JCK			-	77,					
508-514 Hard ro 514-709 Shale							MPLETION			
508-514 Hard ro					X Spe	cified Su	rface Slab Installed [Ru		(c)]	
508-514 Hard ro 514-709 Shale					Spe Pitl	cified Su ess Adap	rface Slab Installed [Ru ter Used [Rule 319.44(d)]		
508-514 Hard ro 514-709 Shale					Spe Pitl	cified Su ess Adap proved A	rface Slab Installed [Ro ter Used [Rule 319.44(Iternative Procedure Us	d)]		
508-514 Hard ro 514-709 Shale					Spe Pitl	cified Su ess Adap	rface Slab Installed [Ro ter Used [Rule 319.44(Iternative Procedure Us	d)]	19.711	
508-514 Hard ro 514-709 Shale					Spe Pitl App	cified Su ess Adap proved A R LEVE	rface Slab Installed [Ro ter Used [Rule 319.44(Iternative Procedure Us	d)] ed [Rule 3	19.711	-87_
508-514 Hard ro 514-709 Shale					Spe Pitt App WATE	cified Su ess Adap proved A R LEVE	rface Slab Installed [Ru ter Used [Rule 319.440 Iternative Procedure Us L:	d)] ed [Rule 3 land surfac	19.711	-87
508-514 Hard ro 514-709 Shale				111)	Spe Pitt App WATE	cified Su ess Adap proved A R LEVE tic level _ esian flov	rface Slab Installed [Ruter Used [Rule 319.44] Internative Procedure Uses L: 109ft. below	d)] ed [Rule 3 land surfac	19.711 Date 11-2-	-87
508-514 Hard ro 514-709 Shale				111)	X Spec	cified Su ess Adap proved Al R LEVE tic level _ esian flow ERS:	rface Slab Installed [Auter Used [Rule 319.44(Iternative Procedure Us L: 109ft. below vgpi	d]] sed [Rule 3 land surfac	19.711 • Date 11-2- Date	-87
508-514 Hard ro 514-709 Shale				111)	X Spec	cified Su ess Adap proved Al R LEVE tic level _ esian flow ERS:	rface Slab Installed [Ricter Used [Rule 319.44(Iternative Procedure Us L: 109ft. below vgpi	d]] sed [Rule 3 land surfac	19.711 e Date 11-2- Date	-87
508-514 Hard ro 514-709 Shale				11)	X Spe	cified Su ess Adap proved Al R LEVE tic level _ essian flov ERS: (rface Slab Installed [Ruter Used [Rule 319.44(Iternative Procedure Used	d)] sed [Rule 3 land surfac m.	19.711 * Date 11-2- Date Depth	-87
508-514 Hard ro 514-709 Shale				111)	Stall Art PACK TYPE	cified Su ess Adap proved Al R LEVE tic level _ essian flow ERS: (PUMP:	rface Slab Installed [Auter Used [Rule 319.44(Iternative Procedure Used	d]] sed [Rule 3 land surfac	19.711 e Date 11-2- Date	-87
508-514 Hard ro 514-709 Shale 709-729 Fine sa	and			11)	Spee Pittl Approximately Appro	cified Su ess Adap proved Al R LEVE tic level _ esian flov ERS: (PUMP: ine	rface Slab Installed [Riter Used [Rule 319.44(Iternative Procedure Use L: 109	d]] land surfac m. ≥t mersible	Date 11-2-Date Depth 690	-87
508-514 Hard ro 514-709 Shale 709-729 Fine sa				11)	Spee Pittl Approximately Appro	cified Su ess Adap proved Al R LEVE tic level _ esian flov ERS: (PUMP: ine	rface Slab Installed [Ruter Used [Rule 319.44(Iternative Procedure Used	d]] land surfac m. ≥t mersible	19.711 * Date 11-2- Date Depth	-87
508-514 Hard ro 514-709 Shale 709-729 Fine sa (Use reverse	and		esirable	11)	Stan Art PACK TYPE Turb Other	cified Su ess Adap proved Al R LEVE tic level _ esian flov ERS: (PUMP: ine	rface Slab Installed [Reter Used [Rule 319.44()] Iternative Procedure Us L: 109	d]] land surfac m. ≥t mersible	Date 11-2-Date Depth 690	-87
508-514 Hard ro 514-709 Shale 709-729 Fine sa (Use reverse 5) WATER QUALITY: Did you knowingly penetrate an water? Yes XNo	and side if necessary) sy strata which co	ntained und	esirable	11)	Spee Pittl Pittl Approximate State Art PACK TYPE Turb Othe Well	cified Su ess Adap proved Al ER LEVE tic level _ estian flov ERS: (PUMP: tine r _ o pump t	rface Slab Installed [Reter Used [Rule 319.44()] Iternative Procedure Us L: 109	d]] and [Rule 3 land surfac m. et	Date 11-2-Date Depth 690	
(Use reverse WATER QUALITY: Did you knowingly penetrate an water?	and side if necessary) sy strata which co	ntained und	esirable	11)	Spee Pittl Pittl Approximate State Art PACK TYPE Turb Othe Well	cified Su ess Adap proved Al R LEVE tic level _ estan flov ERS: (PUMP: ine r o pump t _ TESTS:	rface Slab Installed [Reter Used [Rule 319.44()] Iternative Procedure Us L: 109	d)] land surfac bt mersible	Date 11-2-Date Depth 690	ted
Use reverse	side if necessary) sy strata which co NDESIRABLE W. Depth of ste	ntained und ATER" rata {No		11)	X Speed State of Application of Appl	cified Suess Adap proved Al R LEVE tic level _ essian flov ERS: (PUMP: ine o pump t _ TESTS: Test:	rface Slab Installed [Reter Used [Rule 319.44(Iternative Procedure Used	d)] land surfac m. et mersible er XI Ja	Date 11-2-Date Depth 690 Cylinder ft.	ted hrs.
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(Use reverse Value	side if necessary) sy strata which co NDESIRABLE W. Depth of str Yes Water Tin Water Printi	ATER" ata No me (or under ure to comp r Well	er my supervision of the supervi	11) 12) 13) [[[14] 14]	Speed	cified Su ess Adap proved A R LEVE tic level _ essian flov ERS: (F PUMP: ine r o pump b TESTS: Test: :	rface Slab Installed [Refer Used [Rule 319.44(Iternative Procedure Used Internative Procedure Used International Inter	d)] land surfac mersible er	Date 11-2-Date Depth 690 Cylinder ft.	ated hrs.

J-38

		1.2/n: N/	SL IF.L	567)
Please use black ink. Send original copy by certified mail to the Texas Water Commission P.O. Box 13087	WATE	State of Texas R WELL REPORT onfidentiality Privilege Notice of	3274 277 1144 2000 2	Texas Water Well Drillers B P. O. Box 13087 Austin, Texas 78711	oard
WHER Mal Bane	Dil Co Add	dress 200 /7 th St, (Street or RFD)	- Denies	Colorado 80	1203
21 LOCATION OF WELL:		s inS (N.E., S.W., etc.)	_ direction from <u>Kus</u>	igoville (Town)	
Driller must complete the legal desc with distance and direction from tw tion or survey lines, or he must loca well on an official Quarter or Half-t General Highway Map and attach th	ription to the right o intersecting sec- te and identify the A Scale Texas County e map to this form.	agal description: Section NoBI Abstract No Distance and direction from twee attached map.	ock No Tow _ Survey Name o intersecting section or su		_
3) TYPE OF WORK (Check):	4) PROPOSED USE (Check):	The state of the s	5) DRILLING METHO	D (Check):	riven
New Well Despening	□ Domestic □ Industrial □ Moni	/ - 1	Mud Rotary DA	r Hammer	red
G) WELL LOG: Date Drilling: Started 1-31 198 Completed 3-1 198	7 63/4 Surface 73	7) BOREHOLE CO Open Hole Gravel Packed If Gravel Packet	Straight Wall	Underreamed	
From To (ft.)	Description and color of formation material	Chicago operation and	K PIPE, AND WELL SCRE		
0 5	Black dist	fin or Pert.	, Plastic, etc. , Slotted, etc.	Setting (ft.)	Gage Casing
5 50 50 85	clay	4 V Plan	en Mgf., if commercial	O 680	Screen
85 110	clay,	4 N Place	tie-Per	680 730	-016
140 180	clair				
180 210	sand				
210 25 270 2270 - 290 2 320 20 360 360 375	sand olay panti clay	Cemented from .	17 (Rule 319.44(b)) 18 (t. to //) 19 (t. to //) 10 + C Water	t. No. of Sacks Used	<u></u>
\$15 405 \$05 500 500 530 \$30 \$35	olay Dama Clay Sama	☐ Pitless Adapte	PLETION face Slab Installed [Rule 3 fr Used [Rule 319.44(d)] ernative Procedure Used [f		
600 650 650 780	sara.	11) WATER LEVEL Static level Artesian flow.	140 ft. below land	surface Date 2-1-8	<u> </u>
15	FREIMET	12) PACKERS:	Туре	Depth	
- P		411	Bulger	640	
LIL.	FEB 17 1937		☐ Jet ☐ Submersi	ble Cylinder	2
(Use reverse	PROPERTY COMMISS:0	Other Depth to pump bo	wls, cylinder, jet, etc.,	ft.	
15) WATER QUALITY: Did you knowingly penetrated water? □ Yes ☑ No If yes, submit "REPORT OF UN Type of water? Was a chemical analysis made?	y strata which contained undesirable IDESIRABLE WATER" Depth of strata	14) WELL TESTS: Type Test: Yield:	□ Pump □ Bailer gpm with <u>////</u> ft.	Ø Jetted ☐ Estimated drawdown after	8
I here by certify that this was knowledge and belief. I und	ell was drilled by me (or under my sus derstand that failure to complete Item or terwell DL/9 w	pervision) and that each and all is 1 thru 12 will result in the lo	g(s) being returned for con	ere true to the best of my appletion and resubmittal.	
SS P.O. BOX	r Print)	Pattus (City)	TK (State)	18146 (Zip)	
(Signed) (Licensed	Water Well Driller) alysis, and other pertinent information	Management and the second seco	Driller Trainee) Fo	TWC we only 3 4 - 5	_

Hanson Professional Services Inc. Submittal Date: September 2018 Revision: 0

TEXAS WATER COMMISSION COPY

TWC-0392 (Rev. 06-10-85)

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TWC-0392 (Rev. 06-10-85)

Please use black ink. State of Texas Toyas Water Wall Dr	
Please use black int. State of Tayon	
Please use black life. State of Texas Texas Water Well Dr. Send original copy by certified mail to the WATER WELL REPORT P.O. Box 13087 Texas Water Commission Austin, Texas 7871	
P.O. Box 13087 ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side Austin, Texas 7071	
NER KIEEN INC Address	100.0
2) LOCATION QE WELL: (Street or HPD) (City) (State)	(Zip)
Red ford #1 (N.E., S.W., atc.) Greetion from (Town)	
Legal description: Driller must complete the legal description to the right Section NoBlock NoTownship	
tion or survey lines, or he must locate and identify the Abstract NoSurvey Name	*2. 50
General Highway Map and attach the map to this form.	
See attached map. /4~//." 3) TYPE OF WORK (Check): 4) PROPOSED USE (Check): 5) DRILLING METHOD (Check):	Driven
3) TYPE OF WORK (Check): 4) PROPOSED USE (Check): 5) DRILLING METHOD (Check):	
Reconditioning Plugging Irrigation Test Well Injection Other Air Rotary Cable Tool Other	
6) WELL LOG: DIAMETER OF HOLE To (ft.) Dia. (in.) From (ft.) To (ft.) Dia. (in.) From (ft.) To (ft.)	amed
Started 2/22 / 1956 Surface Gravel Packed Other	
Completed 2/23 1 1956 63/4 0 80/ If Gravel Packed give interval fromft. to	ft.
From To Description and color of formation (ft.) (ft.) Description and color of formation material 8) CASING, BLANK PIPE, AND WELL SCREEN DATA:	
M. 71) To Soil Cal. Dia. New Steel Plastic, etc. Setting (It.)	Gage
20-200 Shalk giky Used Screen Mgf., if commercial From	To Screen
200-200 Sandy Shale tid-Brown to Kry Slot 733-8	<i>G7</i>
180-500 Sand M/F Blu	
SCC - 540 SANDY Shale	
540 -660 SANG M/C B/W. 600 -660 SANGU ShALC 9) CEMENTING DATA [Rule 319.44(b)]	
7 - 7/10 Saud (F.NE) Cemented from ft. to ft. No. of Sacks U	sed
- 7250 SAND M/C ft. No. of Sacks U	sed
8-80/ Shale Sindy Method used V	
10) SURFACE COMPLETION	
☐ Specified Sufface (Rule 319.44(c))	
Pitless Adupter (Used [Rule 319.44(d)]	
☐ Approved Atternative Procedure Used [Rule 319.71]	
11) WATER LEVEL:	228/
Static level	05-06
Artesian flowgpm. Date	
0 86 4/2 Kuhler 73	
001 2	
13) TYPE PUMP:	der
Other With	
(Use reverse side if necessary) Depth to pump bowls, cylinder, jet, etc.,	_ft.
15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable 14) WELL TESTS:	
Water? ☐ Yes ☐ No Type Test: ☐ Pump ☐ Bailer ☑ Jetted ☐ Es	timated
Type of water? Depth of strata Yield: C_ gpm with 25tt. drawdown after Was a chemical analysis made? Yes No	hrs.
I here by certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of	of my
I here by certify that this well was drilled by me (or under my supervision) and that each and all of the tatterned for completion and resubmit knowledge and belief. I upderstand that failure to complete items 1 thru 12 will result in the log(s) being returned for completion and resubm	nittal.
C ANY NAME 3AGR THE WATER WEIL Water Well Driller's License No. 1418	
(Type ox/Print) (Type ox/Print) (TSY 4 (7)	1332
(State) (Signature RED)	302
(Signed) Signed (Signed) (Icon In Osuque	7.
(Liconsed Wafer Well-Pfillef) Please attach electric log, chemical analysis, and other pertinent information, if available. (Registered Drillor Trainee) For TWC use bollyg. Well No. Located on map	1.34.5
TEXAS WATER COMMISSION COPY	

Part III, Attachment 4, Appendix 1, p.g. 625

Hanson Professional Services Inc. Submittal Date: September 2018

Revision: 0

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Please use "Mack init." Send original copy Uy certilied mail to the T=vas Department of Water Resources 70x 13087 T=xas 78711		State o TER WE	LL I	REP	1000 11010
1, ./NER K/TMIN (N 2) LOCATION DE VIELD: County Delicity	ame) 1 3/	Address £	(Str	et or	act direction from Ricardo: (Town)
Driller must complete the legal descrip with distance and direction from two i tion or survey lines, or he must locate well on an official Quarter- or Half-Sca General Highway Map and attach the n	tion to the right intersecting sec- and identify the le Texas County hap to this form.	Legal descr Section N Abstract Distance	No and di	rectio	Block NoTownshipSurvey Name tion from two intersecting section or survey lines
3) TYPE OF WORK (Check): A New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check) Domestic Industrial	☐ Public Su	pply		5) DRILLING METHOD (Check): Mud Rotary
6) WELL LOG: Date drilled Meg. 10 - 85	DIAMETER OF HOL Dia. (in.) From (ft.) Surface	E To (ft.)	C	Ope Gra	REHOLE COMPLETION: pen Hole □Stráight Wall □ Underreamed ravel Packed □ Other □ Gravel Packed give interval from □ ft. to □ ft.
From To	Description and color of forma	ation	D1 (ACIA	ING, BLANK PIPE, AND WELL SCREEN DATA:
0 - 3 Jag	material soil		Dia. (in.)	New or Used	w Steel, Plastic, etc. Setting (ft.) Gage Perf., Slotted, etc. Casing
3 - 150 Wh	ita chay		4	no	lever Dain. Lited 3 alone - 645 th
376-376	· · · · · · · · · · · · · · · · · · ·	·c	4	1: m.	12 the State 630-640 014
314 - 380	11 Dans	đ.		17.0	Millestern Wood screen Co.
529 - 605 605 - 643 Cs 643 - 645	arre , sa Red clay	Ti)	10) C	Metho Cemen SURF	ft. to / 3 ft. ft. to / 3 ft. ft. to / 5 ft. ft. to / 5 ft. ft. to / 6 ft. ft. ft. to / 7 ft. ft. ft. ft. ft. ft. ft. ft.
Гп	TEGELVE			WATE	TER LEVEL: Static level
J	DEC - 9 1986		12)	-7	hile trep 15
	EXAS WATER COMMISS	SION			PE PUMP: Irbine
The action of the second secon	de if necessary)		D	epth t	h to pump bowls, cylinder, jet, etc., 17.3 ft.
Did you knowingly penetrate any water? ☐ Yes ☐ No If yes, submit "REPORT OF UNE Type of water? Was a chemical analysis made?	ESIRABLE WATER"	38 '	14)		Pump Bailer Detted Estimated Bailer Detted Estimated Bailer Detted hrs.
I here by certify that this welknowledge and belief. I under NY NAME 3. T (Type or ADDRESS 7. 2 (Street or RED)	was drilled by me (or under me stand that failure to complete stand	items 1 thru	12 w	ill resu	st each and all of the statements herein are true to the best of my esult in the log(s) being returned for completion and resubmittal. Sticense No. 2/5 TEXAS 78368 (State) (Zip) J. Likus Water Wale Pala.
(Licensed W	vater Well Driller) ysis, and other pertinent inform				(Registered Driller-Trainee) For TDWR us 601y 34-5 Well No. Located on map

Part	Ш
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			1.	30.	WIEL	54	2)		J-4
Please use black ink. Send original copy by certified mail to the Texas Water Commission P.O. Box 13087	WATE	State o	of Te	xas REPO	ORT		Texas Water Wi P. O. Box 1308 Austin, Texas	7	Board
Austin, Texas 78711	ATTENTION OWNER: C	-8	7	- 2		n Reverse Side	Austin, Texas	70711	
	Flores Ad	idress	Boy	4 pet or	12 E	Sishop, Tex	CAS 78	343 (e) (Zi) —
2) LOCATION OF WELLY COUNTY NEEDED	9 6 mile	es in	E.S.	5.W.,	etc.)	direction from R1c	- had	0	
	Dı	egal desc	ription		H-				
Driller must complete the legal descri with distance and direction from two	iption to the right				BI	ock NoTown	ship		
tion or survey lines, or he must locate well on an official Quarter- or Half-Si	e and identify the cale Texas County	Abstract	are a second			Survey Name			
General Highway Map and attach the	map to this form.	Distance	and di	rection	from two	intersecting section or sur	vey lines		
	ID's	ee attach	ed map	.3	21	map on 83.	34-4		
3) TYPE OF WORK (Check):	4) PROPOSED USE (Check):					5) DRILKING METHOD			riven
Deepening	Bomestic OIndustrial OMor				ly	@Mud Rotary □ Air			ored
☐ Reconditioning ☐ Plugging 6) WELL LOG:	☐ Irrigation ☐ Test Well ☐ Inje	ction L	-	_	101 5 00	☐ Air Rotary ☐ Cal	ole Tool LIO	ther	
Date Drilling: 10 - 3 1981	Dia, (in.) From (ft.) To	56	Ε	Oper	Hole Hole el Packed	MPLETION: Distraight Wall		derreamed	
Completed 6-7 19 976						d give interval from		0	ft.
From To (ft.)	Description and color of formatio material	ın	8) (ASIN	G, BLAN	(PIPE, AND WELL SCRE	EN DATA:		
0 3 to	enscil		Dia.	New	Steel,	, Plastic, etc. Slotted, etc.	Setting	(ft.)	Gage Casing
3 95 1	rales		(in.)	Used	Scree	n Mgf., if commercial	From	To	Screen
95 100 00	nd	4/5	od	14		3ch 40	0	650	
200 200 20	ale	419	00	N		Slotte	620	656	ONE
240 200 00	ele.							W21	
300 320 Das	ed.								100
320 480 ph	ele					TA [Rule 319.44(b)] ft. to 15 ft			1
404 580 000	g.		٠	ement	ad from _	ft. toft	. No. of Saci	cs Used	_
580 595 Das	d		N	lethod	used				
595 616 Shp	le Red		C	ement	ed by			_	-
616 656 AR	a		10)	SURF	ACE COM	PLETION			
						ace Slab Installed [Rule 31	9.44(c)]		
		7220000			531	r Used [Rule 319.44(d)] rnative Procedure Used [R	ule 319 711		
			-		CONTRACTOR NO.	AND SECURITION OF SECURITIONS	0.6 0 (3.71)		
			11) V		R LEVEL:				
						35_ft. below land so			
					sian flow_	-	Date-		-
<u>n</u> [2	BEIVE D		12) P	ACKE	RS:	Type	De	pth	
n	- (U)-	-				Shinitaic	620		
SI	EP - 3 1986		13)	TYPE	PUMP:				
				Turbir	ne l	☐ Jet ☐ 80 bmersib	le 🗆 C	ylinder	
2.26.K2.Letu	MATTER PROPERTY AND STORY			Other		2	C -		
5) WATER QUALITY:	ideal fiecessaly/	-	De	pth to	pump boy	wls, cylinder, jet, etc.,/	80	ft.	
	strata which contained undesirable	t	14) V	VELL	TESTS:	2			
water? Yes No If yes, submit "REPORT OF UND Type of water?	DESIRABLE WATER"			Type T	,		drawdown after	Estimated	
	□ Yes □ No	7					oravvoovvii artei		
	I was drilled by me (or under my surrestand that failure to complete item								
COMPANY NAME Welty	Water Wells	Water Wel	II Drille	er's Lic	cense No.	1934			
ADDRESS 3/8	155/1Ng	Ro	65	tou	de)	TEAS	78.	880	
Signed) Lawner Signed	2 zepoler fr	(City)	d)	9.		(State)	(Zip)		
Licensed W lease attach electric log, chemical anal	vater Well Driller) ysis, and other pertinent informatio			(F	egistered	Driller Trainee) For Well	No. 83	34.5	
C.0303 (Rev. 05-10-85)	TEXAS WAT	TER CO	343416	CLON	00004	Loca	area on map _		

Part	Ш

		1,100	000000	. E.	COLUMN TO THE PARTY OF THE PART	3(11) J.	-4
Please use black ink. Send original copy by certified mail to the Texas Department of Water Resources P. O. Box 13087 Austin, Texas 78711		State of	f Te	exas REPO		Texas Water Well Drillers Boar P. O. Box 13087 Austin, Texas 78711	rd
1) OWNER GLENN M	2 BRYAR	Address 3	23	32/	King Kingui	LLIC TEX	
1) OWNER GLEDD (N 2) LOCATION OF WELL: COUNTY KAF BERG	ame) /	milas In	(N.E.	3 T	etc.)	(Town)	_
		Legal descri	ption	ı:			
Driller must complete the legal descrip with distance and direction from two it tion or survey lines, or he must locate it well on an official Quarter- or Half-Sca General Highway Map and attach the n	ntersecting sec- and identify the le Texas County nap to this form.	Abstract I	No	irection	Survey Name n from two intersecting section o		
			d map		18 mapon 83- 5) DRILLING METHOD (Chec		-
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check Domestic Industrial Irrigation Test Well	Public Sup	oply		Mud Rotary Air Hamm	er Driven DBored	
6) WELL LOG:	DIAMETER OF HO Dia. (in.) From (ft.)	LE To (ft.)	0	Oper		Underreamed	
Date drilled 1-6-86	6 2	063				nft. to	
From To	Description and color of form	ation	8) (CASIN	G, BLANK PIPE, AND WELL S	CREEN DATA:	
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3 60 5hale	16			N	111 sch 40	0 663	
			700	N	Shotted	620 663	c/:
450 440 5AM	700			JV	Skott F.d.	620 00)	
Make Balling San San Co.	-5		0) (CEME	NTING DATA [Rule 319.44(t	3))	-
570 598 5AM	1000		5) (Cemen	ted from ft. to	15 n	t.
618 661 5Ami	-		1	Method	ft. to		-
667 667 3205	1		. (Cemen	ted by		2
			0	Spe	ACE COMPLETION cified Surface Slab Installed [Ru ass Adapter Used [Rule 319.44] croved Alternative Procedure Use	i)]	
			11)	Stat	R LEVEL: tic level <u>/36</u> ft. below I		-
D) [E	GEIVEIN		12)	PACK	ERS: Type	Depth	
			_		ShINTTAIL	620	
	VATER COMMISSION de if necessary)			Turb Othe			
15) WATER QUALITY: Did you knowingly penetrate approximate? Yes STO If yes, submit "REPORT OF UND Type of water? Was a chemical analysis made?		rable	14)		TESTS: Test: Pump Baile : 60 gpm with	r	
I here by certify that this wel knowledge and belief. I unde	I was drilled by me (or under or erstand that failure to complete	my supervision e items 1 thru	n) and 12 w	that o	each and all of the statements he lit in the log(s) being returned fo	rein are true to the best of my r completion and resubmittal.	
COMPANY NAME WELTY	QUATET WEL	Water We	II Dri	ller's L	icense No. <u>1934</u>		-
ADDRESS 3/9 KISSON	Ling 1	(City	ou.	111	TEXAS (State)	75/38/D	177
(Signed) Jaulassel (Licensed W	vater Well Dyriler) vsis, and other pertinent inform	d)		(Registered Driller Trainee)	For TOWR use only Well No. 83 -34 -5	-	
armen electric and electrical grad	DEPARTMEN		_	_	JRCES COPY	Located on map	=

Part III

Please use black ink, Send original copy by certified mail to the Texas Water Commission P.O. Box 13087	W. ATTENTION OWN	VATER W		REPO		n Reverse Side	P. 0	xas Water Wel O. Box 13087 stin, Texas 7		oard
Austin, Texas 78711				_				71. FV	77	117
OWNER MARVIN	Hamilton	Address _	1130	E	Jeh	NSUN K	(City)	(State) (Zip	1
LOCATION OF WELL:	8	the fe	5	, E		direction from	Kins	SuiLLe	2,,	
County 1/1/15/5 RA		mues m _	(N.E.,	s.w.,	atc.)	- direction in the contract of		(Town)		
		☐ Legal de	scription	17		VA.180	0 <u>4</u> 00	22		
Oriller must complete the legal descr with distance and direction from two	o intersecting sec-					ock No.		ıp		
ion or survey lines, or he must locat	te and identify the Scale Texas County					_Survey Name o intersecting section		y lines		
General Highway Map and attach the	e map to this form.									
			ched map	.77	70	on 83			□pr	riwan
3) TYPE OF WORK (Check):	4) PROPOSED USE (Check Monthstrial		Приы	e Sunni	lv	Mud Rotary			C 2010	
☐New Well ☐ Deepening	□ Irrigation □ Test Well					☐ Air Rotary	☐ Cable	Tool Do	ther	
☐ Reconditioning ☐ Plugging 5) WELL LOG:	DIAMETER OF I		2113 1 22 2 2 2 2 2 2		HOLE CO	MPLETION:				
Date Drilling:	Dia. (in.) From (ft.)	To (ft.)	100	Oper		☐ Straigh			lerreamed	
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Completed 4-28 19.4				II Gr	averracke	en dise mireisas			Mis .	, seattle
From To	Description and color of fo	ormation	8)	CASIN	G, BLAN	K PIPE, AND WEL	L SCREE	N DATA:		
(ft.) (ft.)			Dia.	New	Stee	I, Plastic, etc.		Setting	(ft.)	Gage
	op soil		(in.)	or Used	Perf. Scre	., Slotted, etc. en Mgf., if comme	rcial	From	To	Scree
	und		4		SC	14. lec		()	592	
12	AcL e.			_	P. /	OTTEI		592	-/.15	Ol
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FOR PERMIT PURPOSES ONLY	Part III
ATTACHMENT K	

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

APPENDIX K

SOIL BORINGS SB-12 through SB-18, SB-21, SB-23, SB-24 & SB-25

Well Report	MW-12								٠					٠				٠			•	•	3.					N-
Well Report	MW-13								**	*		***	0.00				٠											K-2
Well Report	M\M-14					90	7/7				30		974															1/
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Wall Report	M\M-23							976	-			Ш	36												*	×.9		1/-11
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Well Report	MM-25																						 					K-1.

November 1997 Revision 1 - June 1998

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ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)	WELL F			Austi 5	MC 177 O. Box 13087 n, TX 78711-3087 i12-239-0530	
OWNER THY OF THE CONTROL	ADDRES	ss <u>f. C</u>	Sor 1458 8. (Street or RFD)	(City)	(State)	(Zip) V-V
(Name) ADDRESS OF WELL: County	(Street, RFD or other) ROPOSED USE (Check):	(City)	(State) (Z	(ip) Domestic	5) 1776	12
New Well Deepening Reconditioning Plugging If	Industrial Irrigation Inju Public Supply well, were plans sut	ection	lic Supply	g Testwell	186-	
WELL LOG: Date Drilling: Started		, 🗆 Air F	NG METHOD (Check): Rotary	☐ Driven ☐ Bored ☐ Jetted		
From (ft.) To (ft.) Description and o	color of formation material	☐ Unc	derreamed Gravel P el Packed give interval fr		er 16 / 3	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
•		CASING, B	LANK PIPE, AND WELL S	CREEN DATA:		
		Dia. New	Steel, Plastic, etc. Perf., Slotted, etc.		Setting (ft.)	Gage Castin Scree
		(in.) Used	Screen Mfg., if comme	, i Oitai	From To	- 1 MARKETON
19		in Re	7 2 / 2 2 C		5 2.5	
(Use reverse side of Well Owner's co	py, if necessary)	Ceme				
☐ Turbine ☐ Jet ☐ Submersible ☐ Other	: 20 99 == 1		ACE COMPLETION ecified Surface Slab Installe	ed [Rule 338.44(2)(A)]	
Depth to pump bowls, cylinder, jet, etc.,		□ Pit	ecified Steel Sleeve Installe less Adapter Used [Rule : proved Alternative Procedu	338.44(3)(b)]		
Type test: Pump Baller De	etted Estimated wdown after hrs.	11) WATE	ER LEVEL: A A ft. belo		Date	
15) WATER QUALITY: Did you knowingly penetrate any strata which of	ontained undesirable		an flow		Date	7 Vice
constituents? ☐ Yes ☑ 'Ño If yes, submit *REPORT O	F UNDESIRABLE WATER" of strata	12) PACH	CERS:	Type		Pepth
I hereby certify that this well was drilled by me (or u understand that failure to complete items 1 thru 15 v	All Legatic in the reality and a	100	statements herein are true on and resubmittal. DRILLER'S LICENSE NO	1	knowledge and be	elief. I
COMPANY NAME (Type or pri	-43		G (HZGT)		2 7	
	her	(City)		(Sta	ite) ller Trainee)	(Zip)
(Licensed Well I						

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)	State o			P.O. Bo Austin, TX	Orillers Advisory Council MC 177 Box 13087 TX 78711-3087 -239-0530					
) OWNER 17 1 1 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Succió		ADDRE	ss :	0 3	Street or RFD)	J 1-4-150	er CC-C	7.2 -7. (State)	(Zip)
2) ADDRESS OF WELL: County	#100 (St	Secret (E	2.2 ± 2.62 other)	(0	All r City)	CS-WIE (Sta	te) (Zip)	GRID#	R3-34	1-4
TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	☐ Ind	ustrial Irr	heck): 📴 igation 🔲 Inj were plans su	ection	☐ Publ	cSupply 🗆	De-watering Tes		5) MW- 156-	
s) WELL LOG:	DIAI	METER OF H	OLE	7)	DRILLIN	G METHOD (Check): Drive	n		
Date Drilling: Started	Dia. (in.)	From (ft.) Surface	To (ft.) ラク・ク	3	Air H Othe	otary Mu ammer C	Cable Tool Jette	ed		ń
tom (the	material	8)	Boreho	e Completion erreamed [(Check): Op GravelPacked Interval from	en Hole	Straight Wall	6.00.4		
	(1)				If Grave	Packed give in	nterval from	, II.	10_+	IL
			-	CAS	ING, BL	ANK PIPE, AN	D WELL SCREEN D			
				Dia.	New	Steel, Plast Perf., Slotte		From	ng (ft.)	Gage Castin Scree
				(in.)	Used	- Carrier and Carr	1.76 W 1256	7757775750	200	.00
				4	101	72	12000	200	to 5	
						Last of the				
(Use reverse side of Well O	wner's copy, if	necessary)			Method Cemen Distance	used ed by e to septic syst	ft. to	ft. No. of s	acks used	
☐ Turbine ☐ Jet ☐ Submer. ☐ Other Depth to pump bowls, cylinder, jet, etc			-	1,03=#1/	⊆ Spe	cified Steel Sle	Slab Installed [Rule eve Installed [Rule	338.44(3)(A)]		
14) WELLTESTS: ۖ Pump ☐ Baller		☐ Estima			☐ App	roved Alternati	ed [Rule 338.44(3)(ve Procedure Used [Rule 338.71]		
Yield:gpm with 15) WATER QUALITY: Did you knowingly penetrate any strat.				11)	Static le		ft. below land sur	11320000	9	
constituents? ☐ Yes ☑ No If yes, submit "RE				11/2/2018	PACKE		PECCETS	Туре	Dept	200
Type of water?	Depth of stra	ata No			* 64 Y		1 7 (64 72			
I hereby certify that this well was drilled by understand that failure to complete items 1	Thru 15 will res	euit in the logi	s) being return	30 101 00	WELL	RII LER'S LIC	ENSE NO.	4694	- , 17	
COMPANY NAME	/pe or print)		¥.		Pos	CHE	571	72	784	(G
ADDRESS (Street	or RED)				(City)			(State)	(2	4P)

111	
	K-:

lease use black ink. ille WHITE COPY with: NRCC		State of PLUGGING (This form must be completed within 30 days following the required by currer	REPORT d and filed with the TNRCC date the well is plugged as it statutory law.)	Texas Water Well Drillers Advisory Council P.O. Box 13087 Austin, TX 78711-3087 512-239-0530
2-255 8817		A. WELL IDENTIFICATION	N AND LOCATION DATA	
OWNER OF WELL:	(Name)	Simil (Au) Fill	(Street or RFD) ***Control (State) (State)	(City) (State) (Zip) (Zip) (Zip)
A CONTRACT CONTRACT	nw-13	4) WELLTYPE (Check):	Water ⊡ Monitor ☐ Inje	ection De-watering 5)
Oriller, Pump Installer, or Land	lowner performing the plu	gging operations must locate and	identify the location of the well well well ocation of the well should be de-	ithin a specific grid on a full 1
cale-gridded County map ava lacing a corresponding dot in	the grid to the right. The	legal description section below is o	optional.	
Section NoAbstract No	Block No	meTownship		
Distance and direction fro	om two			
intersecting section lines		B. HISTORICAL DATA ON WEL	I TO BE PLUGGED (if available	le)
r- 1- 1	112113	3. HISTOHICAL DATA ON WEL	1694-177	City
5) Driller	01	License No.	inches: 9) Total d	City
r) Drilled	19;			
	- c	C. CURRENT P	LUGGING DATA	
Date well plugged	1.76	19 9-7		
., out the finally Using sp	ace at right, show method		120 1 176 K 12	in a supply a secured
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ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)		State WELL			т		er Well Drill MC P.O. Bo Austin, TX 512-23	177 (13087 (8711-3087	1/2
PHY 5 Food	Care 6	4000	-nn /	0.5	DY 14.59	1. 2/5016	1 7	2 7	Y56 3
1) OWNER (Nar	ne)	ADDH	ESS /	((Street or RFD)	(City)	(State)	(Zip)
1) OWNER 11 / (Nar 2) ADDRESS OF WELL: County	/ Street, RFI	(A, LOT) (O or other)	L (0	Kin (SULLIE TE	(Zip)	GRID#C	53-3	:4.4
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED US	SE (Check): [3	Monitor njection	☐ Pub	Environmental Soil Bo lic Supply	ring ☐ Dom ering ☐ Testw	estic	152	14
6) WELL LOG: Date Drilling: Started 19 19 77 Completed 7 8 19 77	DIAMETER C	(ft.) To (ft.)		☐ Air B	NG METHOD (Check) lotary	ry Bored			9
Completed1919									1
114111/11/	ion and color of form	ation material	4	□ Lind	le Completion (Chec erreamed	elPacked F	Other 4	Straight Wa	16:17-7
			CAS	ING, BL	ANK PIPE, AND WEI	L SCREEN DA	TA:		2.
			Dia.	New or Used	Steel, Plastic, etc. Perl., Slotted, etc. Screen Mfg., if cor		Setti	ng (ft.)	Gage Casti Scree
			sing.	N	-110 State	d prile.	£\$ 6	A5.0	67
			Ų	12	PUC 4.5	1.18	750	40 5	
(Use reverse side of Well Ov	vner's copy, if necessai	יעי		Method Cement Distance	ted from used used be to septic system field of verification of abovi	ft. toft. to	ft. No. of so	acks used _	
	ible Cylinder			© Spe	CE COMPLETION cified Surface Slab Ins cified Steel Sleeve Ins				6
14) WELLTESTS: Upage Bailer		timated		Company of the Parket	ess Adapter Used [Ru roved Alternative Prod				
Yield:gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata	ft. drawdown after which contained under		11)	Static le	R LEVEL: / / / / ft. b n flow ft. b		e Date		
constituents? ☐ Yes ☐ No If yes, submit "REF Type of water? Was a chemical analysis made? ☐	PORT OF UNDESIRAB Depth of strata Yes	LE WATER*	1000000	PACKE 5.477	ERS: BUTTE PE	U- I - I	Type 76		pth C = ox!
ADDRESS 8/0	oe or print)	log(s) being return		WELL D	tatements herein are to and resubmittal. ORILLER'S LICENSE	NO	694-		
(Strept,o	Then-			(Signed			Driller Train		

	1	<
y Co	ouncil	
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	(Zip)	
1-	4	
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	Ŋ	
ا خ خ	. 7.3	
<i>(</i> ·	ft.	
-	Gage Casting	g
+	Screen	1
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ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)			State o			Γ		Texas Wa	ter Well Drille MC 1 P.O. Box Austin, TX 7 512-239	13087 8711-3087	Council
1) OWNER HAY HE WALLS (Name of WELL: County FOR THE	WILLE WILLS Willes	v /t_/ ન્ et, RFD or o	ADDRE	ss <u>c</u>	C E (Stree	/055 t or RFD) /// (4 72 (State)	(Zip)	GRID#	73 (State) ドジ・ラ〉	(Zip) /- Y
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	☐ Indus	strial 🗌 Irr	igation Inj	ection	☐ Publ	ic Sup	onmental Soil Borin oply	ing 🗌 Testv		1. 1. W. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
6) WELL LOG: Date Drilling: Started	DIAM Dia. (in.) // · C	From (ft.) Surface	OLE To (ft.) ミ?で		☐ Air R ☐ Air H	otary amme	ETHOD (Check): Mud Rotary Cable Too				1
From (ft.) To (ft.) Description	on and color o	of formation	material		☐ Unde	errear I Pack	red give interval	Packed from	Other // ft. t	Straight Wall	6.10
4				Dia.	New or Used	St	PIPE, AND WELL teel, Plastic, etc. erf., Slotted, etc. creen Mfg., if comr		7	ng (ft.)	Gage Castir Scree
				4	N	76	16 28 144 21- 200 16 × 150	v ,176.	380	75.8 53.8	·c* 1
(Use reverse side of Well Own	ner's copy, if no	ecessary)			Method Cement Distanc	used ed by e to se	DATA (Rule 33) mftftftftinition of above of	T 7 c	ft. No. of sa	icks used	
□ Turbine □ Jet □ Submersib □ Other □ Depth to pump bowls, cylinder, jet, etc., 14) WELLTESTS: A A Type test: □ Pump □ Bailer	9/35 SX	Estima			© Spe □ Spe □ Pitle □ App	cified cified ss Ad roved	OMPLETION Surface Slab Insta Steel Sleeve Insta lapter Used [Rule Alternative Proces	lled [Rule 33 338.44(3)(b)	8.44(3)(A)]]		
Yield:gpm with				11)	Static le	vel_	EL: 1/1/19 ft. bel				
constituents? ☐ Yes ☐ No If yes, submit "REPO	ORT OF UNDE	ESIRABLE V	VATER"	10000	PACKE		7# P#	CKES	Type	Dep 	th - /1/- i
I hereby certify that this well was drilled by munderstand that failure to complete items 1 th DMPANY NAME	ru 15 will resul	it in the log(s) being returne	a for co	WELL D	RILL	ents herein are tru esubmittal. ER'S LICENSE No.	o	4694	127	
(Streetor (Signed)	RFD)				(City))			(State)	(Z	ip)

PERMIT PURPOSES ONL	Y	remit Amei	ndment Application	Part 1	
		ň			ŀ
original copy by certified return receipt r	equested mail to: TNRCC, MC 177, P.O. B	ox 13087, Austin, TX 78711-3087			
TTENTION OWNER: Confidentiality tivilege Notice on on reverse side f Well Owner's copy (pink)		of Texas REPORT	P.O. Austin, 1	Orillers Advisory (MC 177 Box 13087 FX 78711-3087 -239-0530	Council
OWNER THY OF KIN	ASULLIA ADDRI	ESS 1 . 0 . Box 1458 /	KLANSVILLE TZ	78363 (State)	(Zip)
10000	(Street, RFD or other)			<u>83-3</u>	
TYPE OF WORK (Check):	☐ Industrial ☐ Irrigation ☐ Ir	Monitor	tering Testwell	5) price 1	
WELL LOG: Date Drilling: Started 7-10 19 27 Completed 7-10 19 77	DIAMETER OF HOLE Dia. (in.) From (it.) To (it.) // (*) Surface 4*/-(*)	7) DRILLING METHOD (Check Air Rotary Mud Rota Air Hammer Cable Other	ary Bored		۸
rom (ft.) To (ft.) Descri	ption and color of formation material	Borehole Completion (Chec Underreamed Gra If Gravel Packed give interval	velPacked Other_	Straight Wall	ft.
		CASING, BLANK PIPE, AND WE New Steel, Plastic, etc Dia. or Perf., Slotted, etc (in.) Used Screen Mfg., if co	S	etting (ft.)	Gage Casting Screen
		4 N JUL BLUE	.00	1.16	45.
		4 m 100 MISA	R EE	75. 2	
(Use reverse side of Well C	Owner's copy, if necessary)	9) CEMENTING DATA [Rule: Cemented from x 4 0 Method used Cemented by Distance to septic system fiel Method of verification of above	ft. toft. No. c ft. toft. No. c ft. toft. No. c ft. toft. No. c ft. oc. c	of sacks used	
	rsible Cylinder	10) SURFACE COMPLETION Specified Surface Slab In:	stalled [Rule 338.44(2)(A)		
☐ Turbine ☐ Jet ☐ Submer ☐ Other ☐ Depth to pump bowls, cylinder, jet, etc		☐ Specified Steel Sleeve Ins	ule 338.44(3)(b)]		
☐ Other Depth to pump bowls, cylinder, jet, etc 4) WELL TESTS: N/A Type test: ☐ Pump ☐ Bailer		☐ Pitless Adapter Used [R	cedure Used [Hule 338.71]		
Other	ft. drawdown after hrs.		pelow land surface D	ateate	_

E Rew Hou	☐ Injection	☐ Publ	Supply De-watering Te	omestic stwell	5) prilled.	
Reconditioning Plugging Public Supply Well, Were public Supply Well, Were public Supply Well, Were public Supply Well, Well Public Supply Well, Were public Supply Well, Were public Supply Well, Well Public Supply Well Public Supply Well, Well Public Supply We	7)	DRILLIN	G METHOD (Check): Drive otary Mud Rotary Bore ammer Cable Tool Jett	d		ń
From (ft.) To (ft.) Description and color of formation materia	al 8)	□ Hode	e Completion (Check): Op rreamed Gravel Packed Packed give interval from	E-Other /	Straight Wall	£1 <i>()A</i> ft.
	CA	SING, BL	ANK PIPE, AND WELL SCREEN D	DATA:		
	Dia (in.		Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setti	ng (ft.)	Gage Casting Screen
	-/	A	TICL ECGEN POPE	72000000	5,00	illir f
	Łį	240	TUE NISHR	20	42. 2	
(Use reverse side of Well Owner's copy, If necessary) 13) TYPE PUMP: // /	11)	Method Cement Distance Method SURFA Spec Pitte: Appr WATER Static le Artesian	rING DATA [Rule 338.44(1)] ad from	ft. No. of si 	contamination	ft.
constituents? ☐ Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"	1 233	PACKE		Туре	Depti	
Type of water? Depth of strata Was a chemical analysis made? Yes No		ENT	DNITE FILETS	12	- X{	- 36-6
I hereby certify that this well was drilled by me (or under my supervision) and the understand that failure to complete items 1 thru 15 will result in the log(s) being r	at each and a eturned for c	ompletion	atements herein are true to the best and resubmittal. RILLER'S LICENSE NO.	of my knowled		1
(Type or print)	Cr 8		CH.21511	12	7841	16
ADDRESS (Street or RFD)		(City) (Signed)		(State)	(Zip	0)
(Signed) (Licensed Well Driller)				red Driller Train	ee)	
Please attach electric log, chemical	analysis an	d other ne	rtinent information if available			

PERMIT PURPOSES ONL	Y		endment Applic	_	t III
Para Assert 12.			6	•	3
original copy by certified return receipt	equested mail to: TNRCC, MC 177, P.O. I	Box 13087, Austin, TX 78711-3087			
TENTION OWNER: Confidentiality ivilege Notice on on reverse side Well Owner's copy (pink)		of Texas REPORT		Well Drillers Adviso MC 177 P.O. Box 13087 ustin, TX 78711-3087 512-239-0530	
OWNER CITY OF HOW IN	ADDR ame) **TALES VICCE CAND (Street, RFD or other)	STAL MINUS VIIIA	Kint Stiller (City)	(State)	タ 56 ; (Zip) ミリービ
TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check):	(City) (State) 'Monitor Environmental Soi njection Public Supply De- submitted to the TNRCC? Yes	Boring Domes	tic 5)	
WELL LOG: Date Drilling: Started 19 7 Completed 19 7	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) Surface 3 3 0	7) DRILLING METHOD (Che	Rotary Bored		,
om (ft.) To (ft.) Descri	ption and color of formation material	CASING, BLANK PIPE, AND V Dia. Or Perl., Slotted, (in.) Used Screen Mfg., if	etc. etc. f commercial	ft. to	Gage Castin Screen
(Use reverse side of Well of TYPE PUMP:	rsible Cylinder	Method used Cermented by Distance to septic system Method of verification of at 10) SURFACE COMPLETION Specified Surface Slab	ft. toft. ft. toft. fteld lines or other conduction distance	No. of sacks used	
) WELL TESTS: N A Type test: □ Pump □ Baile	f Jetted Estimated ft. drawdown after hrs.	Specified Steel Sleeve Pitless Adapter Used Approved Alternative F 11) WATER LEVEL: N Static level Artesian flow	[Rule 338.44(3)(b)] Procedure Used [Rule 3		
yield:gpm with; WATER QUALITY: Did you knowingly penetrate any stra	ta which contained undesirable				epth

5) WATER QUALITY:	Artesian flow	gpm. Date	е
Did you knowingly penetrate any strata which contained undesirable constituents? Yes 'P' No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? Depth of strata Was a chemical analysis made? Yes No	12) PACKERS: EENTON:TE EEL	Type	Depth in . c - 2°
	1	SEL SWEET	
nderstand that failure to complete items 1 thru 15 will result in the log(s) being return OMPANY NAME	ch and all of the statements herein are true led for completion and resubmittal. WELL DRILLER'S LICENSE NO.	1116	dge and belief. I
OMPANY NAME (Type or print)	ed for completion and resubmittal.	- 469. TZ	78416
OMPANY NAME	WELL DRILLER'S LICENSE NO.	1116	1. 77
DDRESS (Type or print)	WELL DRILLER'S LICENSE NO. (City) (Signed)	(State)	78416 (Zip)

and the second s		14		III
37, Austin, TX 78711-3087		eti i		ŀ
exas PORT		er Well Drill MC P.O. Bo Austin, TX 7 512-23	x 13087 78711-3087	Council
(Street or RFD) (Krussuus (State)				
r	ring Testw	estic !	5) /E 63-1 15B-18	81
DRILLING METHOD (Check): Air Rotary Mud Rotary Air Hammer Cable To Other	Bored			Ŋ
Borehole Completion (Check) Underreamed Grave If Gravel Packed give interval): □ Open	Hole 🗆	Straight Wall	/C2_ft.
The Later Court of the Court of			00	- ""
ING, BLANK PIPE, AND WELL		A:		Gage
Marian di Marian	SCREEN DAT	A:	ng (ft.)	
New Steel, Plastic, etc. or Perf., Slotted, etc. Used Screen Mfg., if com	SCREEN DAT	A: Settir	ig (ft.)	Gage Casting
New Steel, Plastic, etc. or Perl., Slotted, etc. Used Screen Mfg., if com	SCREEN DAT	Settir	ng (ft.)	Gage Casting Screen
New Steel, Plastic, etc. or Perf., Slotted, etc. Screen Mfg., if com	mercial	From From C. C. Settir From R. C. Settir Se	To T	Gage Casting Screen
New Steel, Plastic, etc. or Perf., Slotted, etc. Screen Mfg., if community of the community	mercial / - / 6 (8.44(1)) to	It. No. of salt. No. of salt. No. of salt. A44(2)(A)]	To T	Gage Casting Screen
SING, BLANK PIPE, AND WELL New Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if communication of the perf. Steel Ste	mercial A A A A A A A A A A A A A A A A A A A	It. No. of salt. N	To T	Gage Casting Screen
SING, BLANK PIPE, AND WELL New Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if communication of the perf. Steel Ste	mercial A A A A A A A A A A A A A A A A A A A	It. No. of salt. N	To	Gage Casting Screen

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)	State WELL			т		er Well Dril MC P.O. Bo Austin, TX 512-23	x 13087 78711-3087	Council
OWNER CHY OF KINGS (Nat 2) ADDRESS OF WELL: EARL County KINE EARL	MILLE ADDRE	oss ?	-() - E (City)	CX 1458 A (Street or RFD) KrwlSUILIÆ (State)	(Zip)	1/ 1/ 1/2) GRID#	(State)	(Zip)
TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging		'Monito jection	Pub	Environmental Soil Borid lic Supply De-water	ng □ Dom ing □ Testw	estic	5) 18 W-1 15B-18	8
Started 7 - 9 19 77 Completed 7 - 9 19 77	DIAMETER OF HOLE Dia. (in.) From (it.) To (it.) Surface Prof. (C)		☐ Air F	NG METHOD (Check): Rotary				ı
	ion and color of formation material	8)	Boreho	le Completion (Check) erreamed	: □ Open Packed ⊡ from 4/2	Hole Other ft.	Straight Wall	/C# ft.
		CAS	ING, BI	ANK PIPE, AND WELL	SCREEN DAT	TA:		
		Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if comr		From	To	Gage Castin Scree
		<i>j</i> ₂ '	N	, n 7 . TR.	1-100 S48			
(Use reverse side of Well Ow	rner's copy, if necessary)	9)	Method Cemen Distance	ted from 17-0 ft. used fted by ft. et oseptic system field I of verification of above of	to = -O to S_TT ines or other co	ft. No. of si	acks used	
☐ Turbine ☐ Jet ☐ Submers☐ ☐ Other ☐ Depth to pump bowls, cylinder, jet, etc.,	ft.	10)	© Špe □ Spe □ Pitle	CE COMPLETION cified Surface Slab Insta cified Steel Sleeve Instal ass Adapter Used [Rule roved Alternative Proces	led [Rule 338 338.44(3)(b)]	.44(3)(A)]		
Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata	hrs. hrs. which contained undesirable	11)	WATER Static le	RLEVEL: AJA	ow land surface			
constituents? ☐ Yes ☐ No If yes, submit "REF Type of water?	PORT OF UNDESIRABLE WATER* Depth of strata Yes	-	PACKE	Williams.	1(57)	Type ,	, Depth 29-0	-17
hereby certify that this well was drilled by munderstand that failure to complete items 1 the COMPANY NAME	hru 15 will result in the log(s) being returne	d for co	mpletion	and resubmittal.	11	my knowled G 94 Z		<i>(</i>
ADDRESS (Street or	(RFD)		City) Signed	CH181571	(State)	(Zip)

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)			State of T		Т		er Well Drille MC 17 P.O. Box Austin, TX 78 512-239-	77 13087 1711-3087	Council
74.00	e ame)		ADDRESS 1	,0, Bo	0x 1458 (Street or RFD)	Cingsville (City)		5 7536 (State)	(Zip)
2) ADDRESS OF WELL: County Kleberg	-	le Landfi RFD or other	11 King	(City)	(State)	(Zip)	GRID #	83-34-4	
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	☐ Industria	I 🗌 Irrigatio	on 🗌 Injection	☐ Pub	Environmental Soil Bori licSupply	ering Testwe	22		
6) WELL LOG:	DIAMETE	ER OF HOLE	7)	DRILLIN	NG METHOD (Check):	☐ Driven			
Date Drilling: Started 4-27 19 98 Completed 4-27 19 93			To (ft.) 84 . G	☐ Air B	otary	y 🔝 Bored.			
Completed 7 2: 19 20									1
From (ft.) To (ft.) Descrip sec attached log MW-21	otion and color of fo	rmation mat	terial 8)	☐ Und	le Completion (Check erreamed	elPacked 💭	Other gro	u+	ft.
			CA	SING. BL	ANK PIPE, AND WELI	L SCREEN DAT	A: 1↓/A		
				New	Steel, Plastic, etc.		Setting	(ft.)	Gage
			Dia.	or	Perf., Slotted, etc. Screen Mfg., if com	mercial	From	То	Castin
(Use reverse side of Well On 13) TYPE PUMP: N/A Turbine	sible		9)	Method Cement Distance Method SURFA	used mixed edby PS1 a to septic system field to verification of above CE COMPLETION iffied Surface Slab Instatisfield Steel Sleeve Instat	to 6.0 ft to ft with 5% ber fine. lines or other cor distance	No. of sac ntonite ncentrated co	ks used	
14) WELLTESTS: N/A Type test: □ Pump □ Bailer Yield:gpm with		Estimated h	rs.	☐ Appr	ss Adapter Used [Rule oved Alternative Proce		338.71]		-11
15) WATER QUALITY: Did you knowingly penetrate any strata	000000 0000 000		11)	Static le	LEVEL: N/AS vel ft. bel		Date Date		
constituents? Yes No If yes, submit "REI Type of water? Was a chemical analysis made?	Depth of strata			PACKE	RS: N/A	T	уре	Depth	
		ervision) and	that each and all	of the sta	and resubmittal.				(Y
hereby certify that this well was drilled by nunderstand that failure to complete items 1 inc. OMPANY NAME FS! inc.	thru 15 will result in th	he log(s) beir		WELL DI	RILLER'S LICENSE NO	J	4694-1	1	
OMPANY NAME PS! Inc.	thru 15 will result in th	he log(s) beir			RILLER'S LICENSE NO rpus Christi		Texas		78416

1/ 1	4	1/
N-1	-	n

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)		exas POR	Γ	Texas	Texas Water Well Drillers Advisory Council MC 177 P.O. Box 13087 Austin, TX 78711-3087 512-239-0530									
1) OWNER Kingswille City	of	ADDRE	22	P.0.	Box 1458	Kingsvijje	Texas 78	363						
(Na	me)			(Street or RFD)		(City)	(State)	(Zip)					
2) ADDRESS OF WELL: County Kleberg	ADDRESS OF WELL: County Kleberg Kingsville Landfill (Street, RFD or other)						GRID#	83-34-4						
3) TYPE OF WORK (Check): The New Well Deepening Reconditioning Despening	4) PROPOSED USE (C	igation Inje	ection	☐ Publi		-watering T	Domestic estwell	5)						
6) WELL LOG: Date Drilling: Started 4-24 19 95 Completed 4-24 19 95	DIAMETER OF HO Dia. (in.) From (ft.) E. (! Surface	To (ft.)	7)	☐ Air Ro	otary Mud Fammer Cab	Rotary 🔁 Bor		1						
				50 W/W					,					
From (ft.) To (ft.) Descript see attached lag Mw=23	material	8)	☐ Unde	e Completion (C rreamed [] (Packed give inte	Gravel Packed	Ď Other_								
			CAS	ING, BL	ANK PIPE, AND	WELL SCREEN	DATA: N/A							
	Dia. or Perf., Si (In.) Used Screen						Se	etting (ft.)	Gage Casting Screen					
			(,,,,	0000	Cardon mig., i									
(Use reverse side of Well Owner's copy, if necessary) 13) TYPEPUMP: N/A				9) CEMENTING DATA [Rule 338.44(1)] Cemented from 86.0 ft. to ft. No. of sacks use ft. No. of										
☐ Turbine ☐ Jet ☐ Submersi ☐ Other Depth to pump bowls, cylinder, jet, etc.,	-	10) SURFACE COMPLETION N/A Specified Surface Slab Installed [Rule 338.44(2)(A)]												
14) WELLTESTS: Type test: Pump Bailer	ed		☐ Pitles	fied Steel Sleeve s Adapter Used oved Alternative F	(b)]									
Yield:gprn with 15) WATER QUALITY: Did you knowingly penetrate any strata		11)	Static lev	LEVEL: N/A el flow			Date							
constituents? Yes No If yes, submit "REP Type of water? Was a chemical analysis made?		12)	PACKER	s: N/A		Туре	Depti	1						
I hereby certify that this well was drilled by m understand that failure to complete items 1 th	e (or under my supervision) a ru 15 will result in the log(s)	and that each a being returned	ind all for cor	of the stat	tements herein a	re true to the bes		edge and belief.	I					
COMPANY NAME	PSI_INc. e or print)		— ·	WELL DR	ILLER'S LICENS	SE NO	4694-M							
ADDRESS 810 SPID (Street or	So hem			Cor City) Signed)	pus Christi		(State)	Kas (Zip	7341G					
(Licensed	Well Driller) ase attach electric log, che	mical analysis		8 B 650	tinent informati		red Driller Tra	inee)						

						Texas Wat	er Well Drille	rs Advisory	/ Council			
ATTENTION OWNER: Confidentiality rivilege Notice on on reverse side of Well Owner's copy (pink)	State of WELL I			Т		MC 1 P.O. Box Austin, TX 7 512-239	77 13087 8711-3087					
) OWNER City of Kingsvill (N	(e ame)	ADDRES	ss <u>F</u>	.oe	ille Texa	Texas 78363 (State) (Zip						
county Kleberg		Kingsville Eandfill Kingsville Texas GRID# (Street, RFD or other) (City) (State) (Zip)										
TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (C	rigation Inje		☐ Pub	Environmental Soil Boring lic Supply De-waterin NRCC? Yes 1	g 🗌 Testw	-00)				
Date Drilling:	7)	DRILLI										
Started 4-28 19 98 Completed 19 98	6.0 Surface	72.0			dammer	Jetted			Ñ			
From (ft.) To (ft.) Descrip see attached log the 24	n material	8)	☐ Und	le Completion (Check): erreamed	acked A		Straight Wall 0 silica 16.0					
			CAS	ING, BL	ANK PIPE, AND WELL S	CREEN DAT	A:					
	**************************************		Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if comme	ercial	Setting	g (ft.) To	Gage Castin Screen			
			4	N	Pvc screen Mfg. I Wells#Supply Pvc risedr	atronaí	35.0 18.0.	16.0	.010			
			á;	N	rvc r:sear		10.0,					
(Use reverse side of Well O		9)	Method Cement Distance	ed by PS1 let to septic system field line	0.0 1 Ch 5% bei	t. No. of sac ntonite	ks used1	5.0 1.5 ft.				
☐ Turbine ☐ Jet ☐ Submer		_		SURFA	of verification of above dis CE COMPLETION cified Surface Slab Installe		44(2)(A)1					
Depth to pump bowls, cylinder, jet, etc 4) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with	ed		☐ Spe	cified Steel Sleeve Installe ss Adapter Used [Rule 3 roved Alternative Procedu	[Rule 338.44(3)(A)] 88.44(3)(b)]							
5) WATER QUALITY: Did you knowingly penetrate any strate			1.00 0 0	Static le	velft. below							
constituents? Yes & No If yes, submit "RE Type of water? Was a chemical analysis made?		12)	PACKE	RS: tonite pellets		ype	Depth 6141	100				
hereby certify that this well was drilled by inderstand that failure to complete items 1 OMPANY NAMEF	thru 15 will result in the log(s)	and that each a being returned	for cor	npletion	atements herein are true to and resubmittal.		1272/27		ľ.			
DDRESS 810 SPID	pe or print)	2		Co	rpus Chritei		Texas	(Zip	78416			
	or RFD)		- (City)		10	outo)	/2-11	100			

Part III, Attachment 4, Appendix 1, p.g. 642

Please attach electric log, chemical analysis, and other pertinent information, if available.

Hanson Professional Services Inc. Submittal Date: September 2018

Revision: 0

1/	4
n.	-

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side If Well Owner's copy (pink) State WELL						Γ	Texas Water Well Drillers Advisory Counci MC 177 P.O. Box 13087 Austin, TX 78711-3087 512-239-0530										
1) OWNER City of Kingsvil	īe		ADDRE	ss F	.o. B	ox 1458	Kingsville Texas 76363										
1) OWNER, CITY OF WINGS	ame)	1.00		MISOC 13	(Street or RFD)	(City	/)	(State)	(Zip)							
2) ADDRESS OF WELL: County Kleberg	County Kleberg Kingsville Landitti K						(Zip)	GRID#	83-34-4								
	(Str	eet, RFD or o			City)	(State)			5 \								
TYPE OF WORK (Check): New Well Deepening Reconditioning E Plugging	4) PROPO	strial 🗌 Irr	igation Inj	jection	☐ Publ	Environmental Soi ic Supply	watering Testv		5)								
	DIAN	ETER OF H	OLE	7)	DRILLIN	IG METHOD (Ch	ck): Driven										
6) WELL LOG: Date Drilling:	Die /in \ From /ft \ To /ft \						Rotary Dored										
Started 4-29 19 98	6.0	Surface	0,38			ammer Cat											
Completed 4629 1998					☐ Othe	r				1							
From (ft.) To (ft.) Descri	ption and color	of formation	material	8)	Boreho	le Completion (C	heck):		Straight Wall								
sec attached log hw-25		PERSONAL PROPERTY AND ADVIOUS	1000-0000000		☐ Und	erreamed 🔲	GravelPacked *	Other are	out	ft.							
					If Grave	Packed give inte	rval from	11.	10	- 11.							
				CAS	ING, BL	ANK PIPE, AND	WELL SCREEN DA	TA: N/A									
				-	New	Steel, Plastic,	etc.	Setti	ng (ft.)	Gage							
		Dia.	or	Perf., Slotted, Screen Mfg., i		From	То	Casting Screen									
				(in.)	Used	Screen wig., i	Cultimercial	110111	100								
				-				-	-	-							
				-	-			-									
				-	-		-										
(Use reverse side of Well Owner's copy, if necessary)					Cemented from 86.0 ft. to 6.0 ft. No. of sacks used 13.0 ft. to ft. No. of sacks used ft. to ft. No. of sacks used ft. S% bentonite Method used FS1 Inc. Distance to septic system field lines or other concentrated contamination												
13) TYPE PUMP: N/A				1		of verification of a		and the second									
☐ Turbine ☐ Jet ☐ Subme	rsible Cyl	inder		10)	SURFA	CE COMPLETIO	N/A										
☐ Other Depth to pump bowls, cylinder, jet, et	c t		NAME OF THE PARTY	1	☐ Spe	cified Surface Slal	Installed [Rule 33	38.44(2)(A)]									
Depth to pump bowls, cylinder, jet, ex-	· · · · · · · · · · · · · · · · · · ·	***		1	☐ Spe	cified Steel Sleeve	Installed [Rule 33	88.44(3)(A)]									
14) WELLTESTS: N/A							[Rule 338.44(3)(b) Procedure Used [Ru										
Type test: Pump Daile		☐ Estima			☐ wbb	IOVED AITEITIALIVE	Toccario cosa (-							
Yield:gpm with	ft. drawdowr	after	hrs.	11)		R LEVEL: N/A	ft, below land surfa	ce Date		18							
15) WATER QUALITY:							gpm.										
Did you knowingly penetrate any stra				12)	PACKE	RS: N/A		Туре	Dep	th							
constituents?	EPORT OF LIND		VATER"	,	16.70.00.00	musile 1945											
constituents? ☐ Yes 집 No If yes, submit "R		a		-	100												
constituents? ☐ Yes 집 No If yes, submit "R Type of water?	_ Depth of strat			1	-												
constituents? ☐ Yes 집 No If yes, submit "R Type of water?																	
constituents? Yes No If yes, submit *R Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items	Depth of strat	y supervision	s) being returne	au 101 cc	inpietioi	and resubilinian		2722		.1							
constituents? Yes No If yes, submit *R Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items.	Depth of strat Yes N y me (or under m 1 thru 15 will resu	y supervision	i) and that eacl i) being returns	au 101 cc	inpietioi	and resubilinian	are true to the best o	2722	dge and belief	.1							
constituents? Yes No If yes, submit *R Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items. COMPANY NAME (T	Depth of strat	y supervision	s) being returne	au 101 cc	WELL D	RILLER'S LICEN		469 Yex	4-M as	7811							
constituents? Yes No If yes, submit *R Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items. COMPANY NAME The standard of the standard o	Depth of strat Yes N y me (or under m 1 thru 15 will resu	y supervision	s) being returne		WELL D	RILLER'S LICEN	SE NO	469	4-M as	78+1:							
constituents? Yes No If yes, submit *R Type of water? Was a chemical analysis made? Thereby certify that this well was drilled by understand that failure to complete items COMPANY NAME Thereby certify that this well was drilled by understand that failure to complete items COMPANY NAME Thereby certify that this well was drilled by understand that failure to complete items.	Depth of strat Yes N yes N	o y supervision ilt in the log(s	s) being returne		WELL C	PRILLER'S LICEN	it	469 Yex	ų∽M as (Z	7811							

FOR PERMIT PURPOSES ONLY		Part III
	ATTACHMENT L	
	THE THE PARTY OF T	

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

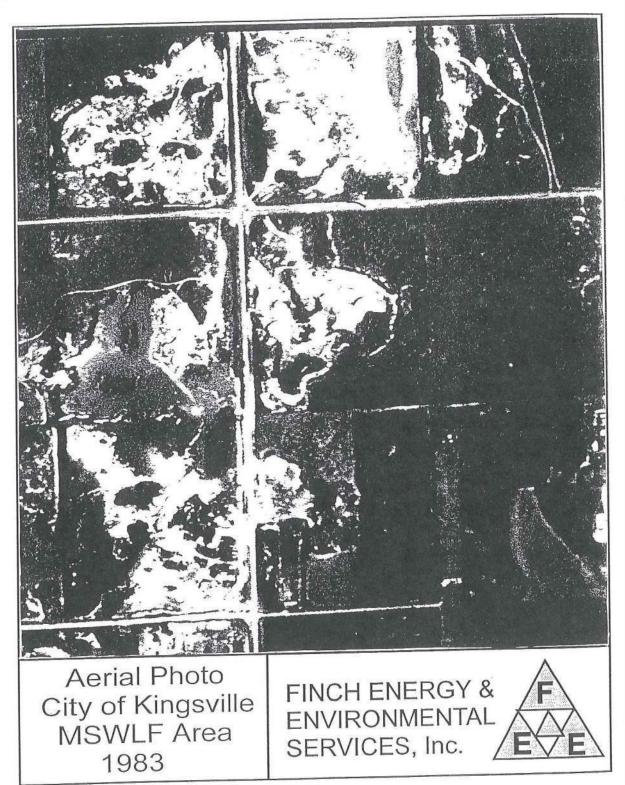
APPENDIX L

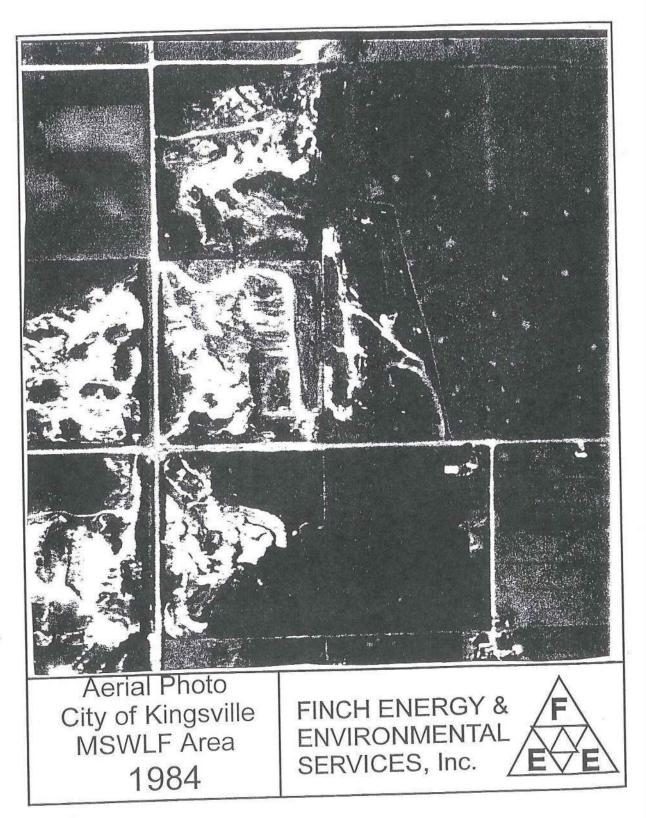
HISTORIC AERIAL PHOTOS of SITE

City	of Kingsville	MSWI F	Area -	1983																					L-1
City	of Kingsville	MSWLE	Area -	1984				3.												•					L-2
City	of Kingsville	MOWL	Area -	1985																					L-3
City	of Kingsville	MOME	Area	1000	•	٠.	•			•													200		L-4
City	of Kingsville	MSWLF	Area -	1900								•	 •	•	•		•	•				٠	8//9	-	1.5
City	of Kingsville	MSWLF	Area -	1988				•		*	٠,					٠.									L-0
City	of Kingsville	MSWLF	Area -	1989																					L-0
City	of Kingsville	MSWLF.	Area -	1990																					L-/
City	of Kingsville	MSWI F	Area -	1991									 			***						,			L-8
City	of Kingsville	MSWIF	Area -	1992																					L-9
City	of Kingsville	MOVALI	Aica	1001	•	•	0.5				0500	biote:												I	-10
City	of Kingsville	MSWLF	Area -	1994	•			٠.	•			٠.									•			7	44
City	of Kingsville	MSWI F	Area -	1995			51.65														٠.			-	-11
City	of Kingsville	MSWI F	Area -	1996																				L	-12
City	of Kingsville	MOVIE	Aroa	1007				-													370		47.	L	-13
(lity	of Kingsville	MOVILE	Area -	1997															•						

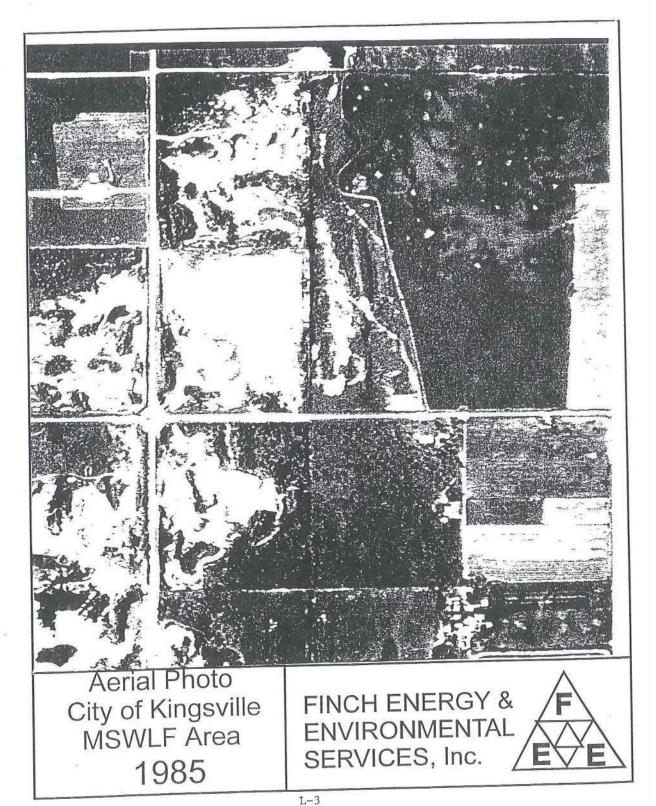
November 1997

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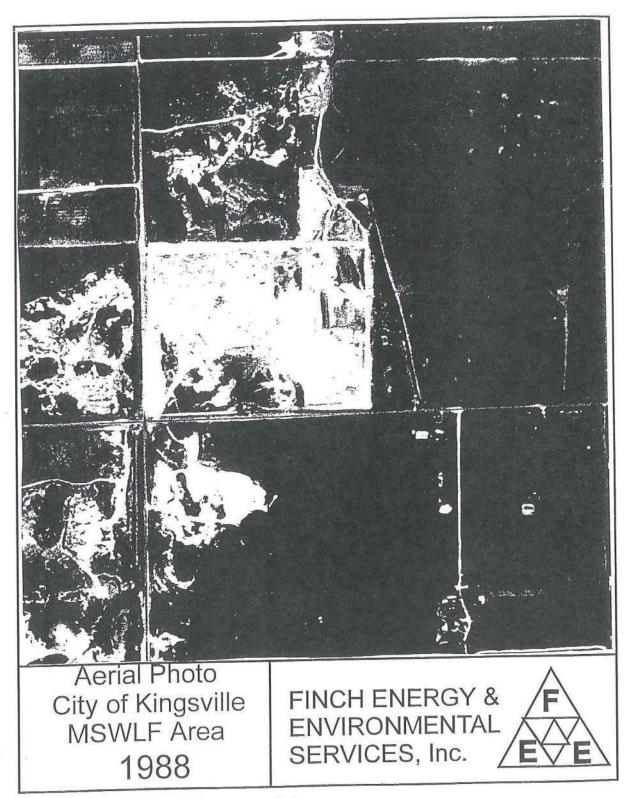


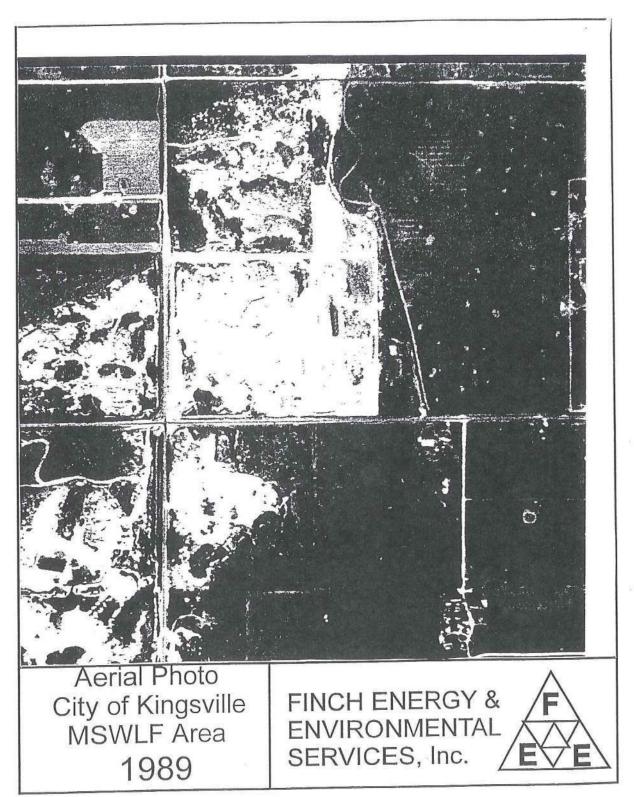


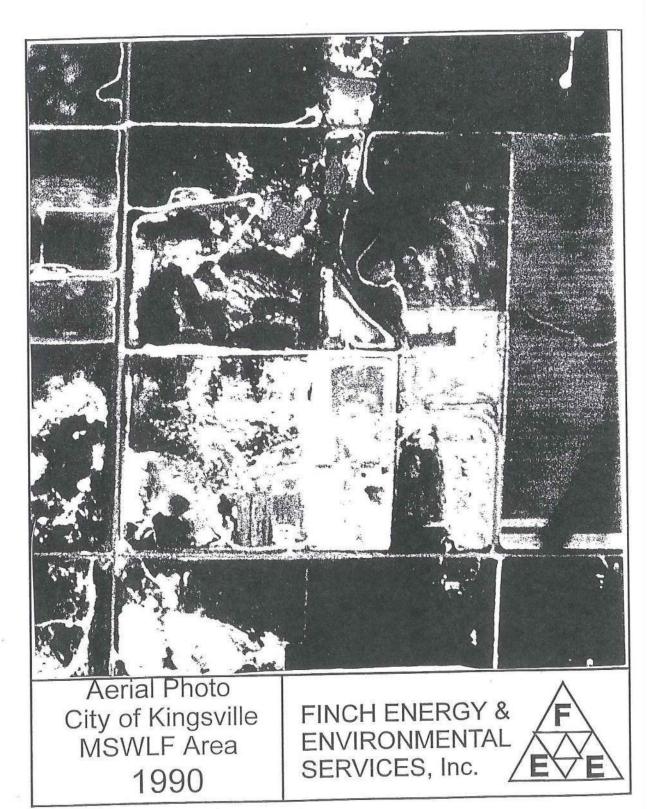
Revision: 0



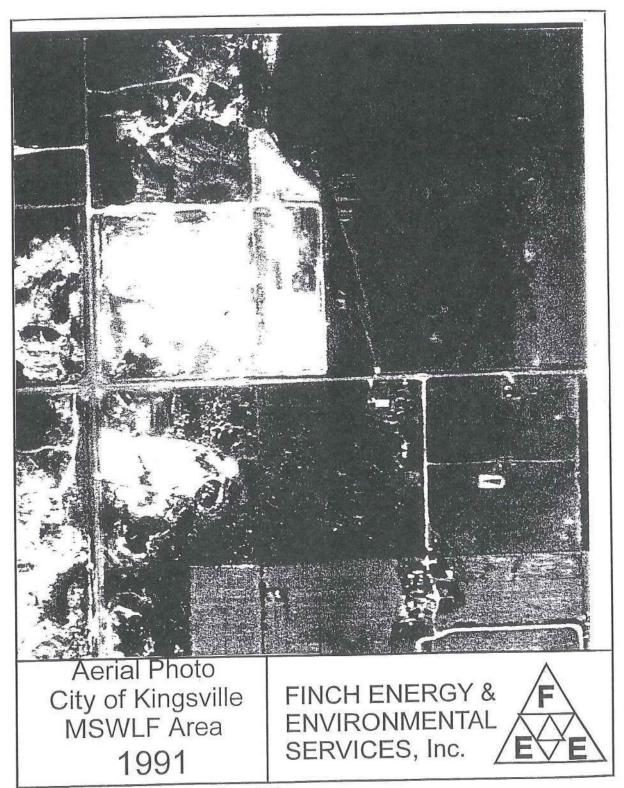
L-4

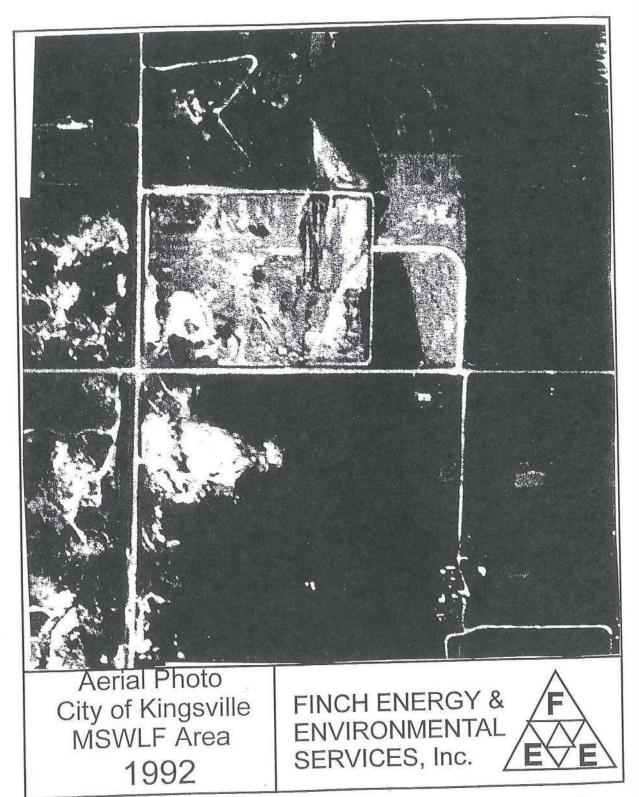


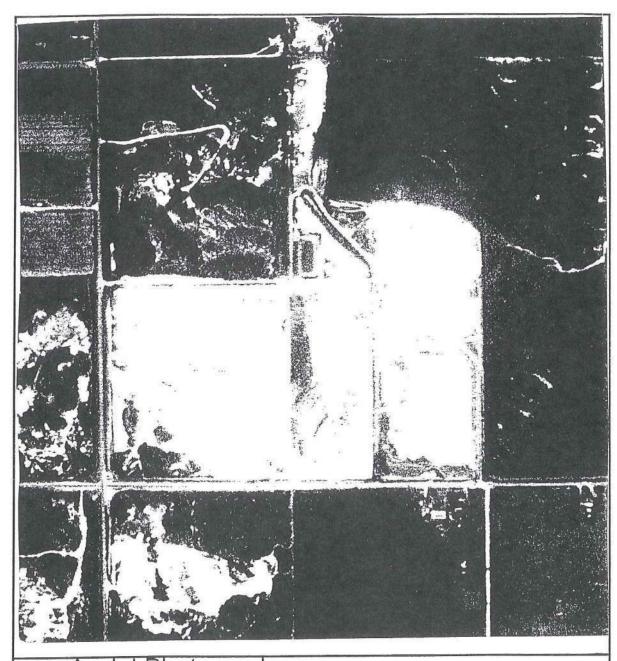




L-7

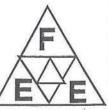


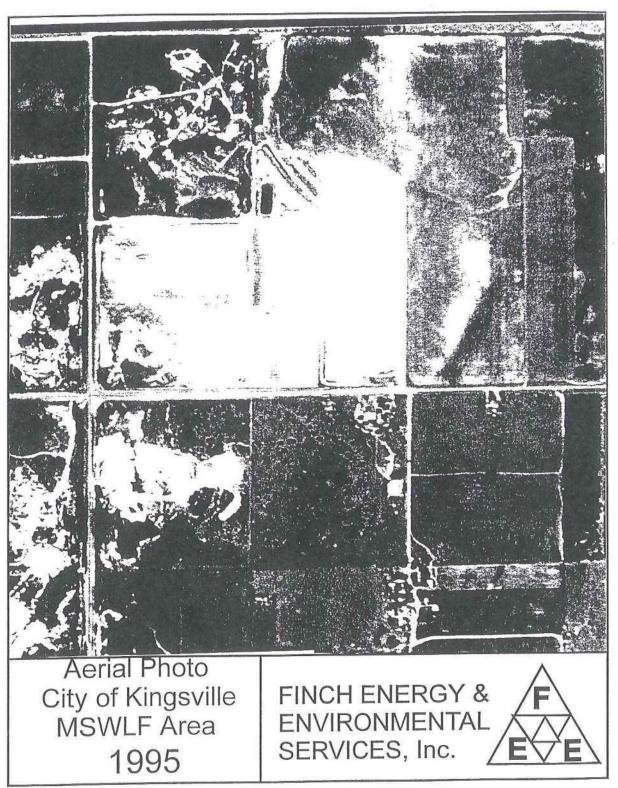


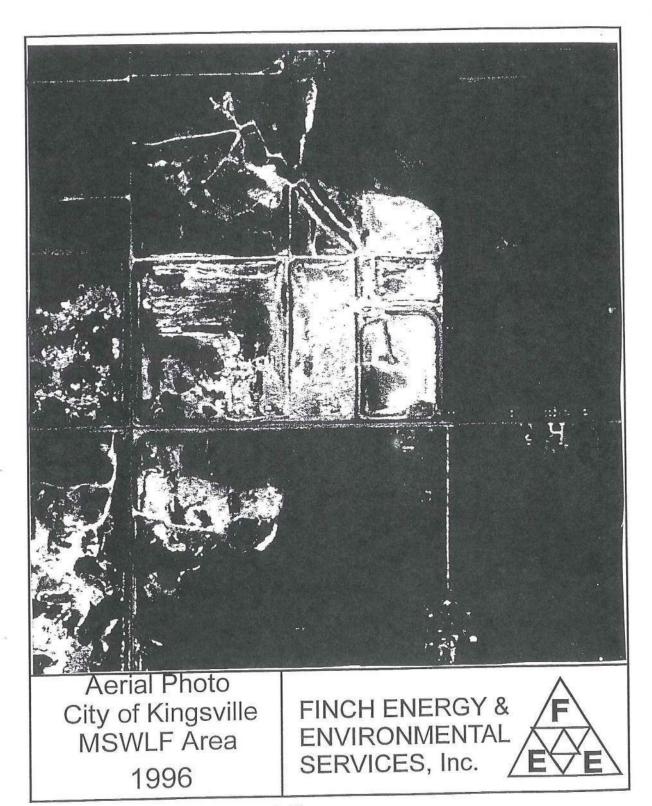


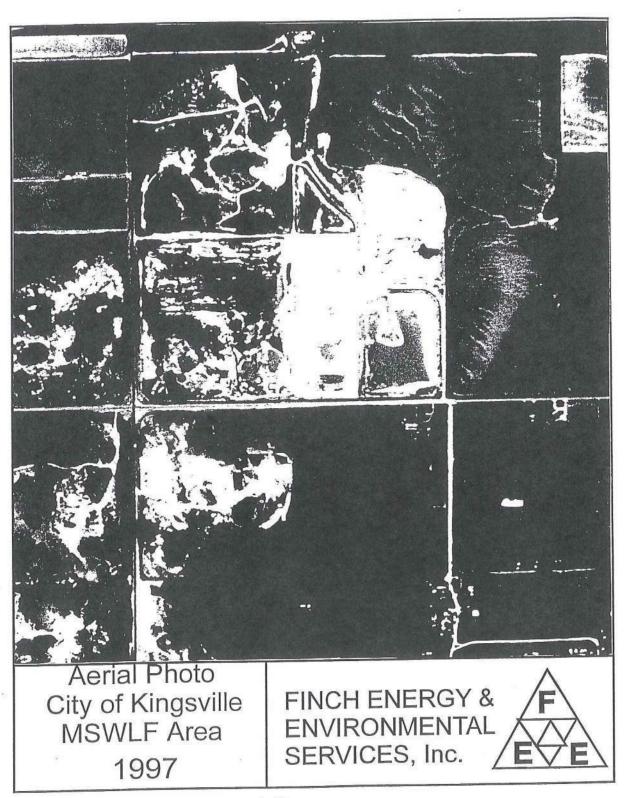
Aerial Photo
City of Kingsville
MSWLF Area
1994

FINCH ENERGY & ENVIRONMENTAL SERVICES, Inc.









APPENDIX M

DESIGN GROUNDWATER SYSTEM CERTIFICATION

Cartification (with Sequencing)	M-1
Ground Water Monitoring System Certification (with Sequencing)	(a-a)
Monitor Well Location Maps	M-3
Boring/Well 1	M-5
Boring/Well 3	M-7
D = -!= = AA/=11 44	M-16
	M 1Q
Dissert Bonort MM/12	1000
MAT II D MAN AT 4 E	141
	111
W UD MM 10	
14/ U D + MAN/ O1	100
W II D A MM 00	
	111
Summary of Site Survey Data	M-36
Guillinary of Oile Sairty	



November 1997 Revision 2 - September 1998

THIS DOCUMENT IS ISSUED FOR PERMITTING PURPOSES ONLY, INCLUDES PAGES $\underline{\textit{M-}}$ THROUGH $\underline{\textit{M-}}$ 36.

June 25, 1998

F.E.E., Inc. Mailing Address: P.O. Box 73 512-592-9810 1204 W. King Kingsville, TX 78364-0073 Fax 512-592-5552

Mrs. Ada Lichaa TNRCC, MSW Division, MC-124 P.O. Box 13087 Austin, Texas 78711-3087

Re: Ground Water Monitoring System Certification

Dear Mrs. Lichaa:

The ground water monitoring system required to effectively monitor the ground water in the uppermost aquifer below the Kingsville, Texas MSWLF expansion (235-B) will be composed of 24 GW monitor wells over the life of this site. The sequence of installation and removal of GW monitor wells listed by permit # and sector # is attached.

This system will monitor the ground water confined below by the clay layer described in Attachment 4, Geology Report (Section 9.2). Eleven new soil borings have been made as a portion of the permit application (235-B). Six of these borings have been converted into Ground Water Monitor Wells, and will be used as piezometer points until needed in the active site monitoring well system. Two of these borings were completed as piezometer points. The Soil Borings which have been converted into Ground Water Monitor Wells are MW-12, MW-13, MW-14, MW-15, MW-16, and MW-24. The Borings used as Piezometer points are B-17 and B-18. Boring Plan, Boring Elevations, Boring Logs and Texas Water Well Drillers reports are attached. A table with surveyed elevations and locations is also attached.

I (we) certify that these wells were designed and installed to meet the minimum requirements of the municipal solid waste regulations in 30 Texas Administrative Code §330.231(d) & §330.242.

A. Wade Nollkamper, B.S., Geologist

Ray N. Finch, Ph. D., P.E., D.E.E

Attachments

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TABLE 5.7 City of Kingsville, TX - MSWLF

		Monito	irWell Inst	allaition and	HRemoval S	sequence.		
但可以由于在1000年的	10000000000000000000000000000000000000	Control of the Contro		製造のファーコック	理能別のストミロを登場し	物に対していくなる場合	金融 とつつ・ロックル	製造している。
VV-INO.	Old	Line Sector 13	Sector 2	Second.	Sector 4	Sector 5	Sector 6	Sector 7
	1024	X	X	x	- x	x	x	×
1	×	P&A	P&A	P&A	P&A	P&A	P&A	P&A
2	Х		X	P&A	P&A	P&A	P&A	· P&A
3	Х	X	×	×	P&A	P&A	P&A	P&A
4	×	X	The second secon	P&A	P&A	P&A	P&A	P&A
5	P&A	P&A	P&A	0	×	- x	x	Χ.
6	×	0	0		×	x	x	x
8	×	0	X	P&A	P&A	P&A	P&A	P&A
9	×	P&A	P&A		0	0	0	P&A
9R	х	0	0	0		×	×	P&A
10	×	x	X	_ ^	X	x	P&A	P&A
11	ND .	x	X	x ×	X		x	x
12	ND	ND	X	. x	X	X		×
13	ND	ND	х	×	Х	×	X	×
14	ND	ND	0	0	×	×	×	×
15	ND	ND :	0	0	0	0	0	×
16	ND	ND	o o	0	0	0	0	P&A
17	ND	ND	o	0	0	X	X	
18	ND	ND	o	х	х	P&A	P&A	P&A
19	ND	ND	, , , x	x	×	×	×	×
20	ND	ND	ND	ND	. х	×	х	×
21	ND		ND	DD		. х	×	×
22	ND	- ND	- ND ···	ND	0	х	X	×
23	ND	ND -	· ND	ND ND	0	. 0	0	X
24	ND	ND	. x	· ×	х	х	х	х
25	ND	ND	P&A	P&A	P&A	P&A	P&A	P&A
26	ND	ND	- ND	ND	x	x	P&A	P&A
	I ND	ND	ND	·ND	ND	×	×	х
27	ND		x	×	x	×	X	х

TABLE 5.7 City of Kingsville, TX - MSWLF Symbol Definition

Symbol	Identification
X	An operating ground water monitor well which is in the current MW system.
0	An operating ground water monitor well which is not in the current MW system.
P&A	A ground water monitor well which has been plugged and abandoned.
ND	A ground water monitor well which has not been drilled yet.

THIS PAGE LEFT BLANK INTENTIONALLY

"SEE FIGURES 4.17 THROUGH 4.30 IN SECTION 6.2 OF ATTACHMENT 4, PAGES 47 THROUGH 60 FOR GEOLOGY CROSS SECTIONS, ISOPACH AND PLANS OF MSWLF SUBSURFACE"

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client: Project Name: Project Location: LAT: 27° 26: 42.2" MSWLF ID:	City of Kingsville Kingsville Landfill 5 mi SE of City LONG: 97° 49° 10.6" Permit #235-B NILERVAL (bbm) PD Reading (ppm)	Date Drilled:
N O	5 - 10 - 15 - 20 - 25 - 25 - 25 - 25 - 25 - 25 - 2	SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE, CLAY & SAND (I) SILTY CLAY
	Water depth on Drilling = 30.19	9ft. BGS TOTAL DEPTH = 42 feet

M-4

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Location: 5.mi SE of City MSWLF ID: Permit #235-B			Boring Method: Hollow_Stem Auger Sample Method: SHELBY TUBE & SPLIT SPOON Surface Elevation: 52.64' MSL Depth to Water: 19.9' BGS
Construction	DEPTH (feet)	SAMPLE INTERVAL.	Depth to Water: 19.9' BGS Total Depth: 27' BGS Casing: 2" S-40 PVC - 0-22' BGS Screen: 5' of 2" S-40 PVC - 22' BGS Borehole Dia.: 6 inch Driller ID: TETCO - Younger SOIL CLASSIFICATION
	۰		SANDY CLAY
	- 10 -		CALICHE
			SILTY CLAY
	— so -		
	— 35 ·		
	- 45		
	_ 50		

M-5

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Name: - Project Location:	of Kingsville Kingsville Landfil 5 mi.SE of City ONG: 97- 49 03.9" Permit #235-B	SAMPLE INTERVAL PID Reading (ppm)	Boring/Well No.: 3	
	19 - 19 - 25 - 25 -		SANDY CLAY, TOP SOIL & DARK BROWN CLAY CALICHE (I)	
	- 50 45 50		SILTY CLAY, TAN	
	Water dept	th on Drilling = 29.24	ift. BGS TOTAL DEPTH = 37 feet	

M-6

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Name: Project Location:	y of Kingsville Kingsville Landfill 5 mi SE of City LONG: 97° 49′ 03.9″ Permit #235-B		Boring/Well No.:		
Monitor Well Construction	DEPTH (feet)	SAMPLE INTERVAL PID Reading (ppm)	Borehole Dia.:6 in	5' of 2" S-40 PVC - 34' BGS 6 inch TETCO - Younger SSIFICATION	
			TOPSOIL & DARK BR	OWN SANDY CLAY	
	10 15 20 25		CALICHE (I)		
	- 35 - 40 - 45 - 50 - 50 -		SANDY CLAY		
	Water depth	n on Drilling = 27.98	ft. BGS	TOTAL DEPTH = 39 feet	

M-7

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

- F	City of Kingsville		Boring/Well No.:	5	
Client: —			Date Drilled:	October 5, 1984	
Project Name			Boring Method:	Hollow Stem Auger	
Project Locati	ion:5 mi SE of City		Sample Method:	SHELBY TUBE & SPLIT SPOON	
			Surface Elevation:	60.54' MSL	
MSWLF ID:	Permit #235-B	- 175 - FA	Depth to Water:	31.5' BGS	
			Total Depth: —	48' BGS	
		Ê	Casing:		
		NTERVAL PID Reading (ppm)	Screen:		
ion dell	feet	AL	Borehole Dia.:	_6 inch	
for V	DEPTH (feet)	INTERVAL	Driller ID:	TETCO - Younger	
Monitor Well Construction	SAN	FN G	The state of the s	SSIFICATION	
			-	SSII TOATTON	
Boring Grouted 10-6-84		CALL DE LA CALLES	SANDY CLAY		
3.		50			
			CALICHE		
	15			8	
16	20 _	STORY.			
	25				
	50				
*					
	- 35		SILTY CLAY		
		SANCES AND ADDRESS OF THE PARTY.	O.Z. T. G.Z. T.		
	40				
	- 45 -	100 MAN			
	50	TDH			
No.				*	
},		<u></u>	1	TOTAL DEPTH = 48 feet	
				TOTAL DEPTH = 46 feet	

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Location:5.n LAT: 27° 27' 09.2" LONG:	ngsville Landfill ni SE of City 97- 49' 09.9" nit #235-B	PID Reading (ppm)	Boring/Well No.: 6 Date Drilled:
	5	g = 27.92	SANDY CLAY Seft. BGS TOTAL DEPTH = 38 feet

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client:	City of Kingsville Kingsville Landfill		gust 1990
Project Location:	5 mi_SE of City	Boring Method:	
LAT: 27* 26' 43.9" MSWLF ID:	LONG: 97• 49' 23.3" Permit #235-B	Sample Method: Surface Elevation:	61.05 ' MSL
Monitor Well Construction	DEPTH (feet) SAMPLE INTERVAL	Casing:	
	15 — 15 — 20 — 25 — 25 — 25 — 25 — 25 — 25 — 2	Monitor Well was P&A on 7-23-	TOTAL DEPTH = 36 feet

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Part III, Attachment 4, Appendix 1, p.g. 672

Hanson Professional Services Inc.
Submittal Date: September 2018

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc.
P.O. Box 73, Kingsville, Texas 78364-0073
(512) 592-9810 (512) 592-5552 FAX

SUBSURFACE EXPLORATION RECORD

Client: _	City o	f Kingsville				Boring/Well No.:	8	
Project Nan		Kingsville				Date Drilled:	July 23, 1991	
	Project Location: 5 mi. SE of City.				Boring Method: Hollow Stem Auger			
LAT: 27- 26' 43.9" LONG: 97- 49' 23.3"						Sample Method: Split Spoon		
MSWLF ID:		Permit #23				Surface Elevation: 59.79 'MSL		
IVISVVLF ID.		I GITTIE II ZO			- TES E	Depth to Water:	32,02' BGS	
						Total Depth:	43' BGS	
					Ê	Casing:	4"S-40 PVC - 0-33" BGS	
			€	SAMPLE INTERVAL PID Reading (ppm)	dd) f	Screen:	10' of 4"S-40 PVC - 33' BGS	
Well			(fee	E A	ading	Borehole Dia.:	10 inches	
Monitor Well Construction	<u>-</u> -	7	DEPTH (feet)	SAMPLE) Re	Driller:	Martin Water Wells, Larry Martin	
Co	1		B	SA FI	PIC		SSIFICATION	
1	130	**************************************	đ			Caliche Bearing Char	nnel (I)	
		4.3				(Caliche Clay & Sand	to TD)	
	24		5 -					
				San San	L			
			10					
\$		_	15 —		_			
				Maria I			*1	
			20 —		-			
	opphonon							
			25 —		-		20	
				us Alko			(8)	
			30 —					
			35 —	5.47 04				
			40 —		_			
		_	45 —		-		75	
		RED .	1					
			-					
				1				
		W	ater deni	h on Drillin	 g = 28.0 ft.	BGS	TOTAL DEPTH = 43 ft.	

M-11

PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

Client: City of Kings	sville	Boring/Well No.;
	sville Landfill	Date Drilled: March 24, 1992
Manual Control Control Control	mi. SE of City	Boring Method: Hollow-Stem Auger
LAT: 27° 27' 54 " LONG: 97		Sample Method: 5 foot core barrel
	#235-B	Surface Elevation: 62.51' MSL
MOVVLI ID		Depth to Water: 26' BGS
		Total Depth: 44' BGS
	Ê	Casing: 4" S-40 PVC - 0-34' BGS
	dd) (Screen: 10' of 4" S-40 PVC - 34' BGS
Monitor Well	DEPTH (feet) SAMPLE INTERVAL PID Reading (ppm)	Borehole Dia.: 10 inch
Monitor Well	DEPTH (fe SAMPLE INTERVAL	Driller: JEDI, Charles L. Jones
Mon	SA SA	SOIL CLASSIFICATION
	W-100	SOIL CLASSIFICATION
		Monitor Well was P&A on 07-12-96
		Caliche, Dark Clay
	5	Road Fill
	10	Caliche, Fine Sand
		Callere, Fire Series
	15	
	- 00 -	
	20	Very Fine Silty Sand
	- 25 - ▼	
1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A	30 -	Very Fine Sandy Silt
	100000	w/Clay Stringers
	- 35	
		Very Fine Sandy Silt
	- 40	Wet, Soft w/Clay Stringers
	- 45 -	
		*
自由		
Market		
	Water depth on Drilling = 36.0 ft	t. BGS TOTAL DEPTH: 44 feet

M-12

PAGE _1_ OF _1_



SUBSURFACE EXPLORATION RECORD

Client:Cit	ty of Kingsville	Boring/Well No.:	9R
Project Name:	Kingsville Landfill		July 11, 1996
Project Location:	5 mi. SE of City	Boring Method:	Hollow Stern Auger
	LONG: 97• 49' 20.1 "	Sample Method:	Split spoon
MSWLF ID:	Permit #235-B	Surface Elevation:	41.41' MSL
MOVYLI ID.	- AniMAN (ANICONE)	Depth to Water:	9.6' BGS
		Total Depth:	17' BGS
	Ē	Casing:	4" S-40 PVC - 0-7' BGS
	DEPTH (feet) SAMPLE INTERVAL	Screen:	10' of 4" S-40 PVC - 7' BGS
Well	(fee	Borehole Dia.:	10"
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Driller:	PSI - Craig Schena
Co	S SA	SOIL CLASS	SIFICATION
		Total action of the second sections	SILIDATION
		Sand Filled Channel (II)	
		1	
	_	į	
	- 5 -		
		i	
		-	
	10	Sandy Clay	
	- 15 -		
	10	İ	
	_ 20 _		
			536
		790	
100 mg	_ 25 _		
	_ 30 _		
1000			
		L	
	Water depth on Drilling = 9' 6 3	3/4"	TOTAL DEPTH: 17 feet

M-13

PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

Client: City of Kingsville Project Name: Kingsville Landfill Project Location: 5 mi_SE of City LAT: 27° 26' 55.2" LONG: 97° 49' 15.3." MSWLF ID: Permit #235-B	Boring/Well No.:
Monitor Well Construction DEPTH (feet) SAMPLE INTERVAL	Screen:
0	Sandy Clay
	Sand Filled Channel (II)
15	Clayey Sand
- 15	
Water depth on Drilling = 19.	5 ft. BGS TOTAL DEPTH = 29 ft.

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FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073 (512) 592-9810 (512) 592-5552 FAX



SUBSURFACE EXPLORATION RECORD

	Client:	Cit	y of Kingsvil	le			Boring/Well No.:	11	-
	Project N				fill		Date Drilled:	July 11, 1996	-
		ocation:			City		Boring Method:	Hollow-Stem Auger	-
							Sample Method:	Split-Spoon	
							Surface Elevation:	60.20' MSL	-
	WOTTE	10.					Depth to Water:	26.3' BGS	31
							Total Depth:	33' BGS	-
						Œ	Casing:	4" S-40 PVC - 0-18' BGS	-
	- 22			()		PID Reading (ppm)	Screen:	10' of 4" S-40 PVC - 18' BGS	-
Well	cţio			(fee	E M	ading	Borehole Dia.:	10 inches	_
Monitor Well	Construction	-	7	DEPTH (feet)	SAMPLE	Reg	Driller:	PSI - Craig Schena	22
Mor	S	İ		DE	SAI	뮵	Similarian se	SSIFICATION	
			1		Tonos and a second		SOIL CLA	SSIFICATION	_
				0		į	DARK BROWN SAM	NDY CLAY - TOPSOIL	
					ne ve	- 1		15	
				8		į			
7	*			10		-	CALICHE BEARING	CHANNEL (I)	
			2000						
			_	15	#19155.B2	- 1		ŧ	
					THE ST	w			
				20		- *	SAND FILLED CHA	NNEL (II)	
					a and				
				25	SHIP OF	-			
					THE WA				
				30		-			
				- 687		_			
				23	BT. AREY				
				- 40 -		_	SANDY CLAY		
					A STATE OF THE STA			-	
						- 1			
				9	-				
				-	-	-			
				-	i i				
		SPASS.							
			The state of the s	later den	th on Drilling :	= 18.0 ft 1	BGS (est'd)	TOTAL DEPTH = 33 ft.	
			V	ator ucp	o,, D,,,,,,		X		

PAGE_1_OF_1_



SUBSURFACE EXPLORATION RECORD

Client: _		Kingsville	De la la control de la control		-	Boring/well no.	12 July 7, 1997
Project Nan	ne:					Date Drilled:	Hollow Stem Auger
Project Loc						Boring Method:	5 foot core barrel
LAT: 27° 26	6' 41.9"_L(ONG: 97° 4	8' 55.9"			Sample Method:	5.100t core parter
MSWLF ID	Pe	ermit #235-I	3			Surface Elevation:	
						Depth to Water:	17.3' BGS
					•	Total Depth:	48' BGS
					PID Reading (ppm)	Casing:	4" S-40 PVC - 0-25' BGS
E CO		*	(tet)	**) Bu	Screen:	10' of 4" S-40 PVC - 25' BGS
Construction		_	DEPTH (feet)	SAMPLE	eadi	Borehole Dia.:	10 inches
onst	T	Г	EPTI	SAMPLE	DR	Driller:	PSI - Craig Schena
ž ö				SZ		SOIL CLAS	SSIFICATION
- To	20.00	P595.3	0	S14/100	1	Topsoil	
					1		
- 2					-	Clay sandy, silty	
				(0.50)	i		
		(48 d) L	- 10 -		- 1		
		4.38					
1			15 -	AND DESCRIPTION OF THE PERSON	- 1		*
						Clay silty, calcified,	
	No.	2.50	- 20 —		- 🔻	15	d nodules, sandy lenses
						Callerie Sarrigers are	
		-	25 -		-		
				基础	i		
			- 30 -		-		
					1	18	
			35 -	DATE OF THE OWNER, THE	-		
			- 40 -	DE SELECTION	- 1		
		-	- 45 -		-		
Į.				Section 1			
1		1	- 50 -	i f	-9		
				*			
			- 55	. 1	-		
1				m 9			
			- 60 -		70		120
							40
1		STATE OF THE PARTY	-> -	n on drilling =		00	TOTAL DEPTH = 48 ft.

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PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

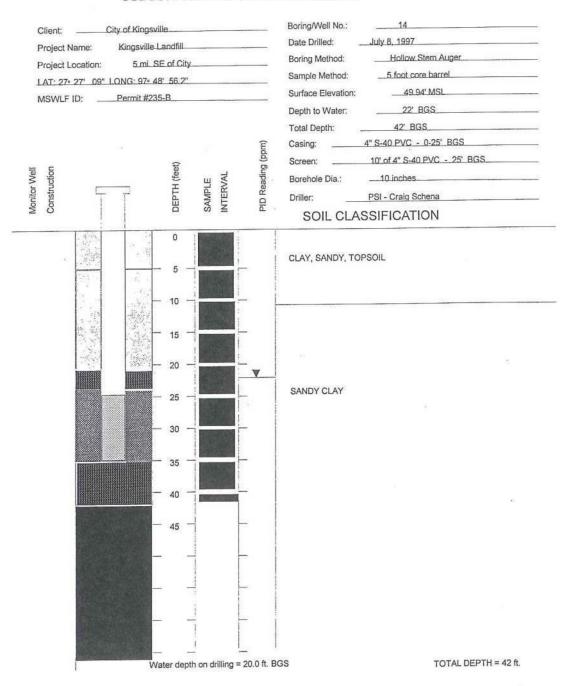
STANDARD CORP. S						Boring/Well No.:	13
						Date Drilled:	July 28, 1997
Project N				īII		Boring Method:	Hollow Stem Auger
Project Lo				ity		Sample Method:	5 foot core barrel
	26' 55.7 " L					Surface Elevation:	59.13' MSL
MSWLF I	ID:	Permit	#235-B	-		Depth to Water:	24' BGS
						Total Depth:	50' BGS
					6	Casing:	4" S-40 PVC - 0-30' BGS
				*	udd)	Screen:	10' of 4" S-40 PVC - 30' BGS
lion lion			DEPTH (feet)	7	PID Reading (ppm)	Borehole Dia.:	10 inches
tor V struc		7	F	SAMPLE	Rea	Driller:	PSI - Craig Schena
Monitor Well Construction			DEP	SAN	PID		SSIFICATION
				1006 1000		SOIL CLA	SSIFICATION
			0	CHOTTES			
4		1 5 5		1			
			- 5 -			CLAY, SANDY TOP	SOIL
		200	10				
	3.						
	43	1	15			SANDY CLAY	
			- 20 -	REDAM:		OAND FOOT	
		47.7	20		~		
	× .	3.0	25				
		_	- 30 -		-		
			- 35 -		-		
						CLAYEY SAND (III) (CLAY DUNE)	
			- 40	2000	_	(ODAT DONE)	
			45	100000			
							意
			50				
			_	_			
							100
				4	_		
		de die					
			-	-			TOTAL DEPTH = 50 ft.
	100 SS 152	4 1000	Water de	pth on drilling	= 25.0 ft.	BGS	TOTAL DEPTH - 50 IL

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SUBSURFACE EXPLORATION RECORD



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PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

Client:		9	
Project Nam		andfill	Bullow Stem Auger
Project Loca		SE of City	SI- Mathed: 5 foot core barrel
LAT: 27. 27	08.7" LONG: 97.	19' 23.7"	
MSWLF ID:	Permit #23	5-B	Corido Martin
			Depth to Water: 12' BGS
			Total Depth: 37' BGS
			Casing:
E 5		()	Screen: 10' of 4" S-40 PVC - 23' BGS
nctio	-	H (fe	Borehole Dia.:10_inches
Construction	TT	DEPTH (feet) SAMPLE INTERVAL	Driller: PSI - Craig Schena
ŏ		o	SOIL CLASSIFICATION
	-14 1-12-28	.	
1		- 5 -	
		- 10	⊢ ▼
			SANDY CLAY
		15	BRN-LT BRN CLAY WITH SAND TO TOTAL DEPTH
		- 20	
-		- 25 -	
		30	
T T			
		35	
		- International	
		40	
		- 45	
			L
	建构成为		
100			

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SUBSURFACE EXPLORATION RECORD

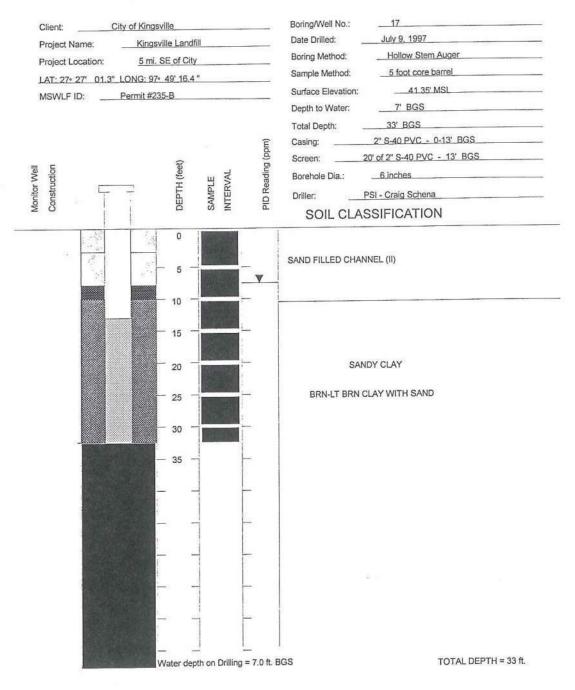
Client: City of Kingsville Project Name: Kingsville Landfill Project Location: 5 mi_SE of City LAT: 27* 26' 55.3" LONG: 97* 49' 23.5" MSWLF ID: Permit #235-B (udd) (udd) (udd) (udd)	Date Drilled: July 10, 1997 Boring Method: Hollow Stem Auger Sample Method: 5 foot core barrel Surface Elevation: 55.96' MSL Depth to Water: 19' BGS Total Depth: 47' BGS Casing: 4" S-40 PVC - 0-30' BGS Screen: 10' of 4" S-40 PVC - 30' BGS Borehole Dia.: 10 inches Driller: PSI - Craig Schena SOIL CLASSIFICATION
5 — 10 — 15 — 20 — 25 — 30 — 35 — 40 — 45 — 50 —	SANDY CLAY SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) (IV)
Water Depth on Drilling = 24.7 ft.	BGS TOTAL DEPTH = 47 ft.

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PAGE_1_OF_1_

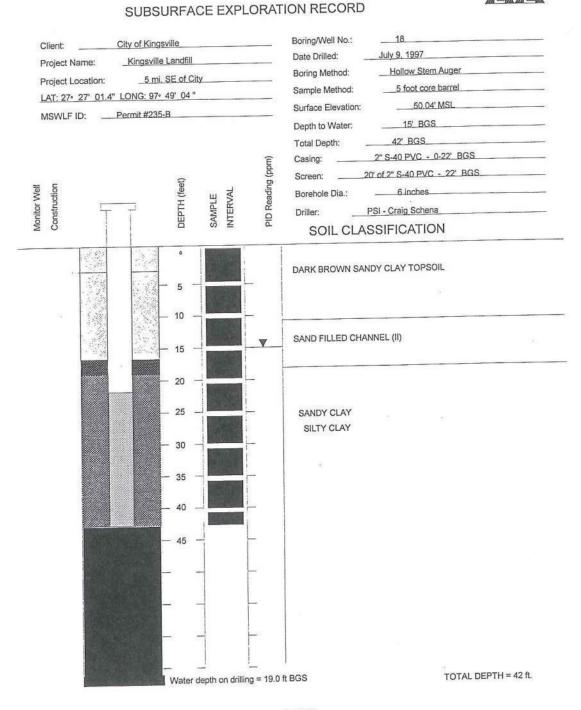


SUBSURFACE EXPLORATION RECORD



FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073 (512) 592-9810 (512) 592-5552 FAX





FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client: C	City of Kingsville	Boring/Well No.: 24
Project Name:	Kingsville Landfill	Date Drilled:April 30, 1998
Project Location:	5 mi SE of City	Boring Method:HOLLOW STEM AUGER
	LONG: 97° 48' 48.9 "	Sample Method: Shelby Tube
MSWLF ID:		Surface Elevation: 47.38' MSL
		Depth to Water: 12.58' BGS
		Total Depth: 33' BGS
	Ē	Casing:4" S-40 PVC - 0-18'
= c	DEPTH (feet) SAMPLE INTERVAL	Screen: 15' of 4" S-40 PVC - 18' BGS
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Borehole Dia,: 10 inches
nnstru	DEPTH (fe	Driller ID: PSI - Craig Schena
8 8	3 S N N	SOIL CLASSIFICATION
		TOP SOIL & DARK BROWN CLAY
		CALICHE BEARING CHANNEL (I)
	10	
	- 15 -	
	25000	SILTY CLAY TAN
	- x -	
	- x -	LT OLIVE GREEN CLAY
	— 40 ¬ ⊢	
	_ so _	6
	10/- No. 10 - 10 - 10 0 0	A DOD
	Water depth on Drilling = 12.0	ft. BGS TOTAL DEPTH = 33 feet

M-23

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)		State o	f Te	xas	TX 78711-308	Texas Wate	r Well Driller MC 17 P.O. Box 1 Austin, TX 78 512-239-	7 13087 711-3087	Council
1) OWNER (114 OF KILLS) (Nar 2) ADDRESS OF WELL: County	MULLICA MAN MAN MAN MAN MAN MAN MAN MAN MAN MA	ADDRES	(C	0 E	Street or RFD)	58 KIUSUIC (City)	14 72 GRID#	(State)	263 (Zip)
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Ch Industrial Irrig If Public Supply well,	heck): [] gation [] Inju were plans sul	Monitor ection omitted	□ Publi to the TN	cSupply D	e-watering Testwe	isuc 3)	rnle-1. 158-12	and a
6) WELL LOG: Date Drilling: Started 7 - 7 19 97 Completed 7 - 7 19 97	DIAMETER OF HO Dia. (in.) From (ft.) CO Surface	To (ft.)	ħ	☐ Air R	IG METHOD (Cotary Muchammer Cotary Co	Rotary Bored			ı
From (ft.) To (ft.) Descrip	tion and color of formation	material		☐ Und	l Packed give in	Gravel Packed	Other 16/	Straight Wall	<i>(15)</i> 2fL
			CAS	ING, BL		D WELL SCREEN DAT	FA: Settin	n /ft \	Gage
			Dia. (in.)	New or Used		d, etc. ., if commercial	From	To	Casti
4			U	N	781	1650 1116. - LOC	.54	250	-6"1
			Ų	iV	PUC X		., 5 v		
(Use reverse side of Well C			9)	Method Cemer Distan	dused	Rule 338.44(1)] Oft. to Oft.	ft. No. of sa	icks used	
Turbine Jet Subme Other Depth to pump bowls, cylinder, jet, et	o., ft.		10)	□ Sp	ecified Steel Sle	Slab Installed [Rule 33] eve Installed [Rule 33] ed [Rule 338.44(3)(b) ve Procedure Used [Ru	8.44(3)(A)]]		
Type test: Pump Baile: Yield: gpm with 15) WATER QUALITY:	r ☐ Jetted ☐ Estima ft. drawdown after	ated hrs.	11) WATE	R LEVEL:		ce Date		
Did you knowingly penetrate any stra) PACK	ERS:		Туре	Dep	
∵	Depth of strata		5	7 5 TO	DW.TE	77(17:05	7-2 '		· - 47
I hereby certify that this well was drilled bunderstand that failure to complete items	Title 15 till					(16274	7	
COMPANY NAME 7 22	Type or print)		Ti.	2%	5 PH.	2500	/Z_ (State)	JE V	7 /- Zip)
ADDRESS (Street	etor RFD);		-24	(City)	ed)	(Register	ad Driller Train	nee)	e state

· 772

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side 'Well Owner's copy (pink)	÷ē		State o				38,449,763,3390	ter Well Drille MC 1 P.O. Box Austin, TX 78 512-239	77 13087 3711-3087	Council
OWNER (177 0= KILL)	SVIL (-ž		ADDRES	ss . <u>-</u> 2.	0 3	0 ★ / 4 5 8 Street or RFD)	KINCS (City	105	72 7 (State)	7363 (Zip)
2) ADDRESS OF WELL: County				(0	₹⁄-£ lity)	(State)	77	GRID#	23-34	1-4
New Well Deepening Reconditioning Plugging	4) PROPO	strial Irr	rigation Inje	ection	☐ Publ	Environmental Soil E cSupply	atering Testv	10000000	158-1	
6) WELL LOG:	DIAM	ETER OF H	OLE	7)	DRILLIN	G METHOD (Chec		1	•	
Date Drilling: 1-25	Dia. (in.)	From (ft.)	To (ft.)			otary Mud Ro				
Started 19 19 19 19 19	17.0	Surface	51.0			ammer 🗌 Cable	Tool Jetted			
From (ft.) To (ft.) Descrip	tion and color	of formation	n material	8)	Boreho	e Completion (Ch	eck): Oper	Hole 5	Straight Wall	
riom (iii)	065				Und	e Completion (Cherreamed Great	avelPacked [Other ft. t	36 38 7.2.1	ft.
L						ANK PIPE, AND W				
				CAS				Settin	in (ft.)	Gage
				Dia.	New	Steel, Plastic, e Perf., Slotted, e	ic.	From	То	Cast
				(in.)	Used	Screen Mfg., if o		(6)(0)(0)(0)(0)(0)	20.0	
g (a) a (b) (b)	He	H				721-				
				-4	N	FUC RIS		20.0	71.5	
(Use reverse side of Well C	Owner's copy, if	necessary)	2		Method Cemen Distance	used ted by te to septic system to of verification of ab	ft. to	_ft. No. of sa	icks used	
13) TYPE PUMP: ∪ A □ Turbine □ Jet □ Submer	rsible 🔲 Cy		···	10)	SURFA	CE COMPLETION	Ţ.			
Depth to pump bowls, cylinder, jet, etc	c.,	ft.				cified Surface Slab cified Steel Sleeve				
14) WELLTESTS: U/A	3				☐ Pitle	ess Adapter Used	[Rule 338.44(3)(b))]		
Type test: Pump Bailer	Jetted	☐ Estima	ated		☐ App	roved Alternative P	rocedure Used [R	ule 338.71]		
Yield:gpm with	ft. drawdow	n after	hrs.	11)	Static I	R LEVEL: NA	t, below land surfa	STORY MEMORY		
15) WATER QUALITY: Did you knowingly penetrate any stra	ta which contair	ned undesiral	ble		_	n flow	gpm.	1002000	Dep	-
constituents? ☐ Yes ☐ No If yes, submit "RI	EPORT OF UNI	DESIRABLE	WATER*		PACK			Type	- 13 F 13 -	RM
Type of water?	_ Depth of stra	ıta			9 000	NUTE 1	((4/)			
Was a chemical analysis made?					Il of the :	statements herein a	re true to the best	of my knowled	ge and belief	.1
I hereby certify that this well was drilled by understand that failure to complete items	1 thru 15 will res	out in the log	(a) being return		WELL	DRILLER'S LICEN	SENO.	4694.	·,n	
	1 thru 15 will res	out in the log	(a) being return		WELL		SENO.	4694.	·,n	

Part III

Please use black ink. File WHITE COPY with:

State of Texas PLUGGING REPORT

Texas Water Well Drillers Advisory Council P.O. Box 13087

		3800 • 500-7056-110 <u>4</u> 0 - 5000	rent statutory law.)	512-239-0530
		A. WELL IDENTIFICAT	ION AND LOCATION DATA	
			a = 11/ 1/.	103/2
PILL DE	W.NISDICE.	€ ADDRE	ss P.O. BOX 1458 KI	Ulsuice TZ 18363 (City) (State) (Zi
OWNER 1779 07	(Name)	ADDITE	(Street or RFD)	(City) (State) (Zi
. TERRESCO OF WELL.		11 1	(City) (State) (2	GRID# _£3-34-1
ADDRESS OF WELL 34	26 KINES	VICU CANDINC	KINGSVICE 15	GRID# _/
County	(Str	reet, RFD or other)	(City) (State) (4	cip)
14	111 12			De-watering 5)
OWNER'S WELL NO:	10-13) WELLTYPE (Check): [
	wner performing the pluggi		nd identify the location of the well within a s The location of the well should be denoted is optional.	specific grid on a full within the grid by
The second secon	1 .			
LEGAL DESCRIPTION:	VIN			
Section No.	Block No	1 ownsi	nip	
Abeleast No	Survey Name			
Distance and direction from	n two			
intersecting section lines of	or survey lines:			
	В.	HISTORICAL DATA ON W	ELL TO BE PLUGGED (If available)	Ban DIIs T.
COATI	SCHEWA	License No	Gity_ inches; 9) Total depth of	(CRIO) (HRISTI
Driller 1 /C/12 6	20	LICENSE IVO.	()	well 40-0 feet
Drilled 7-8	19_97;	8) Diameter of hole 10	inches; 9) Total depth of	Wellleet.
Dillios				
0 0 0	- 00		PLUGGING DATA	
Date well plugged	7-28	.19 97		
i) Date well plugged		at racing the well	1 1	
1) Sketch of well: Using space	ce at right, show method of	plugging the well	MONITOR WAL	C WAS PULLED
including all casing and ce	mented intervals.			
			1 0	
 Name of Driller/Pump Instantal 	aller actually performing the	plugging operations	AND WELL	PRESSURE GROUTES
2) Name of Driller/Pump Inst. RATG	aller actually performing the	plugging operations	AND WELL	L WAS PULLED PRESSURE GROUTES
Name of Driller/Pump Inst.	SCHENA 4694-M	plugging operations	AND WELL	PRASSUPA GROUTAS n to Surface.
License number	4694-m		AND WELL !	PRESSURE GROUTES
2) Name of Driller/Pump Insta (RATC) License number	4694-m		AND WELL !	PRESSURE GROUTES
License number	4694 - M	perations:	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	4694 - M La relative to the plugging of CASING LEFT	perations:	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet)	perations: TIN WELL TO (feet)	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	4694 - M La relative to the plugging of CASING LEFT	perations:	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet)	perations: TIN WELL TO (feet)	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet)	perations: TIN WELL TO (feet)	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF	AND WELL !	PRESSUPE GROUTES
License number	CASING LEFT FROM (feet)	perations: TIN WELL TO (feet) C · C	AND WELL !	PRESSUPE GROUTES
License number	CASING LEFT FROM (feet) O COSING LEFT O COSING LEFT O COSING LEFT	perations: TIN WELL TO (feet) C · C SACK(S) OF	AND WELL !	PRESSUPE GROUTES
License number	CASING LEFT FROM (feet) (S) PLACED IN WELL TO (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED	AND WELL !	PRESSUPE GROUTES
License number	CASING LEFT FROM (feet) (S) PLACED IN WELL TO (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet) (S) PLACED IN WELL TO (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED	AND WELL !	PRASSUPA GROUTAS M TO SURFACE.
License number	CASING LEFT FROM (feet) (S) PLACED IN WELL TO (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED	AND WELL !	PRASSUPA GROUTAS
License number	CASING LEFT FROM (feet) (S) PLACED IN WELL TO (feet)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED	AND WELL !	PRASSUPA GROUTAS
License number	CASING LEFT FROM (feet) () - C S) PLACED IN WELL TO (feet) D - O	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED 10 · D	FROM BOTTON	PRASSUPA GROUTAS
CEMENT PLUG(S	CASING LEFT FROM (feet) CO S) PLACED IN WELL TO (feet) D: O	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	FROM BOTTON	n TO SURFACE.
License number	CASING LEFT FROM (feet) CONTROL TO (feet) CONTROL TO (feet) CONTROL TO (feet)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	FROM BOTTON DRMATION INCLUDED IN FORM ach and all of the statements herein are true	n TO SURFACE.
License number	CASING LEFT FROM (feet) CONTROL TO (feet) CONTROL TO (feet) CONTROL TO (feet)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	FROM BOTTON DRMATION INCLUDED IN FORM ach and all of the statements herein are true	PRASSUPA GROUTIES TO SURFACIE.
License number	CASING LEFT FROM (feet) CONTROL TO (feet) CONTROL TO (feet) CONTROL TO (feet)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	FROM BOTTON	n TO SURFACE.
CEMENT PLUG(S FROM (feet) 40.0	CASING LEFT FROM (feet) S) PLACED IN WELL TO (feet) D: O as plugged by me (or under plete items 1 thru 13 will reserved)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	n TO SURFACE.
License number	CASING LEFT FROM (feet) S) PLACED IN WELL TO (feet) D: O as plugged by me (or under plete items 1 thru 13 will reserved)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	n TO SURFACE.
CEMENT PLUG(S FROM (feet) 40.0	CASING LEFT FROM (feet) S) PLACED IN WELL TO (feet) D: O as plugged by me (or under plete items 1 thru 13 will reserved)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	ue to the best of my knowledge and belief. I
DIAMETER (Inches) CEMENT PLUG(S FROM (feet) 4000 Company or Individual's Name	CASING LEFT FROM (feet) S) PLACED IN WELL TO (feet) D: O as plugged by me (or under plete items 1 thru 13 will reserved)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	ue to the best of my knowledge and belief. I
CEMENT PLUG(FROM (feet) 40.00 Company or Individual's Name	CASING LEFT FROM (feet) S) PLACED IN WELL TO (feet) D: O as plugged by me (or under plete items 1 thru 13 will reserved)	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	ue to the best of my knowledge and belief. I
DIAMETER (Inches) CEMENT PLUG(SEROM (Icet) CEMENT PLUG(SEROM (Icet) COMPANY or Individual's Name (Address: Street or RFD) Signatures:	as plugged by me (or unde plete items 1 thru 13 will reserved by the control of t	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal. JC. (SLPUS CHRIST) St	ue to the best of my knowledge and belief. I
DIAMETER (Inches) CEMENT PLUG(S FROM (feet) 4000 Company or Individual's Name	as plugged by me (or unde plete items 1 thru 13 will reserved by the control of t	D. VALIDATION OF INForm my supervision) and that e sult in the report(s) being retroported.	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal.	ue to the best of my knowledge and belief. I
DIAMETER (Inches) CEMENT PLUG(SEROM (Icet) CEMENT PLUG(SEROM (Icet) COMPANY or Individual's Name (Address: Street or RFD) Signatures:	as plugged by me (or unde plete items 1 thru 13 will reserved by the control of t	Perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal. JC. (SLPUS CHRIST) St	ue to the best of my knowledge and belief. I
DIAMETER (Inches) DIAMETER (Inches) CEMENT PLUG(SERIES) FROM (feet) 40.0 Company or Individual's Name Address: Street or RFD Licensed Driller	as plugged by me (or unde plete items 1 thru 13 will response to type or print)	perations: TIN WELL TO (feet) C · C SACK(S) OF CEMENT USED /O · D D. VALIDATION OF INFO or my supervision) and that e sult in the report(s) being retr City Date	DRMATION INCLUDED IN FORM ach and all of the statements herein are truined for completion and resubmittal. JC. (SLPUS CHRIST) St	ue to the best of my knowledge and belief. I

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side * Well Owner's copy (pink)		State o	of Texas REPORT	Texas Wate	MC 17 P.O. Box Justin, TX 78 512-239-	13087 3711-3087 0530	
1) OWNER PITY OF KIND	SUICIÁ	ADDRE	ss PO. BOX 145	R KILLSVILL	1 7×	(State)	363 (Zip)
2) ADDRESS OF WELL: County County	K1.65 V'' L14 (Street, RFD)	CANDERC or other)	(City) (State)	7-2 G	IRID#_8	3-34	1.4
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE	E(Check):	Monitor ☐ Environmental So ection ☐ Public Supply ☐ De bmilted to the TNRCC? ☐ Yes	il Boring Dome: -watering Testwe	stic 5)	MW-1 (53-1	4
6) WELL LOG: Date Drilling: Started 7-8 19 977 Completed 7-8 19 977	DIAMETER OF Dia. (in.) From (it	t.) To (ft.)	7) DRILLING METHOD (Ch	Rotary Bored		04	
From (ft.) To (ft.) Descri	iption and color of format	lion material	8) Borehole Completion (C Underreamed If Gravel Packed give Inte	Gravel Packed E	Other 16/	Straight Wall	
V 100 410 10			CASING, BLANK PIPE, AND	WELL SCREEN DATA	A:		de
Bix			Dia. or Perf., Slotted, (in.) Used Screen Mfg.,	, etc. if commercial	Setting	То	Gage Casti Scre
**************************************		A Lie	7 N FUC SCH		350	750 +25	.01
Was covered side of Well	Owner's copy, if necessary	0	9) CEMENTING DATA R Cemented from Method used Cemented by Distance to septic syster Method of verification of	ft. to O · C · ft ft. to · ft ft. to · ft	t. No. of sa	cks used	
*	1.0 4.0.0.0						7.00
TYPE PUMP: N/A Turbine Jet Subme Other Depth to pump bowls, cylinder, jet, e	etc.,ft.	timated	10) SURFACE COMPLETION Specified Surface Size Specified Steel Sleev Pitless Adapter Used Approved Alternative	ab Installed [Rule 338 re Installed [Rule 338 I [Rule 338.44(3)(b)]	.44(3)(A)]		
-13) TYPE PUMP:	er Jetted Est	timated hrs.	10) SURFACE COMPLETION Specified Surface Slam Specified Steel Sleev Pitless Adapter Used	ab Installed [Rule 338 re Installed [Rule 338.44(3)(b)] a Procedure Used [Rule 4] A _ft. below land surface	.44(3)(A)] = 338.71] Date		
TYPE PUMP: Jet Subme Other Depth to pump bowls, cylinder, jet, e 14) WELL TESTS: Jet Type test: Pump Baile Pump Baile Pump Did you knowingly penetrate any stractoristic Yes No If yes, submit "For Type of water?	er Jetted Est ft. drawdown after ata which contained undes REPORT OF UNDESIRABI Depth of strata	hrs. hrs.	10) SURFACE COMPLETION Specified Surface Slave Specified Steel Sleev Pitless Adapter Used Approved Alternative 11) WATER LEVEL: Static level	ab Installed [Rule 338 ve Installed [Rule 338.44(3)(b)] a Procedure Used [Rule 4/4] _ft. below land surfacegpm.	.44(3)(A)] = 338.71] Date		n
TYPE PUMP:	er	hrs. hrs. LE WATER* ision) and that eaclog(s) being return	10) SURFACE COMPLETION Specified Surface Slace Specified Steel Sleev Pitless Adapter Used Approved Alternative 11) WATER LEVEL: Static level Artesian flow 12) PACKERS: He and all of the statements herein ed for completion and resubmittal WELL DRILLER'S LICE	ab Installed [Rule 338 re Installed [Rule 338.44(3)(b)] Procedure Used [Rule 4] A	.44(3)(A)] a 338.71] a Date Date Type // 2	Depti 2.7. C ge and belief.	h - بَحَن ا
Type PUMP: Jet Submo Turbine Jet Submo Other Depth to pump bowls, cylinder, jet, e 14) WELL TESTS: Pump Baile Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any structoristituents? Yes No If yes, submit From the properties of the properties of the properties of the properties of the properties of the properties of the pump Was a chemical analysis made? I hereby certify that this well was drilled bunderstand that failure to complete items COMPANY NAME Submo Type of water? Type of water? Type of water? Type of water? Type of water? Type of water? Type of water? Type of water? Type o	ata which contained undes REPORT OF UNDESIRABLE Depth of strata Yes No No No No No No No No No No	hrs. hrs. LE WATER* ision) and that eaclog(s) being return	10) SURFACE COMPLETION [Uspecified Surface Slate	ab Installed [Rule 338 re Installed [Rule 338.44(3)(b)] Procedure Used [Rule 4] A	.44(3)(A)] a 338.71] a Date Date Type // 2	Depti 2.7. C ge and belief.	h - آبخو ا

	y Council	77 13087 8711-3087	P.O. Box Austin, TX 78 512-239-		r.		te of Te L REF				erse side	ENTION OWNER: Confi ilege Notice on on reversi Yell Owner's copy (pink)	Privi
3) TYPE OF WORK (Check):	78 36 3 (Zip) Y-Y	72 7 (State) F3-34	101 7 7	7458 KIN(SU: RFD) (City) CLL 72 (State) (Zip)	Street or	O E	OFFICE	othe	vill (SUILLE ne) KILCS	DF KING (Na	OWNER OHY DE	1)
Date Drilling: Dia. (in.) From (ft.) To (ft.) Air Rotary Mod Rotary Bored Air Hammer Cable Tool Jetted Dia. Dia. Air Hammer Cable Tool Jetted Dia. Dia	15.	1-83) (53)	stic 5)	nental Soil Boring Dome	Environn ic Supply	☐ ☐ Pub	☐ Monito ☐ Injection	Che	OSED USE (4) PROP	heck):	TYPE OF WORK (Chec	3)
Underreamed Gravel Packed	ń	3	÷	☐ Mud Rotary ☐ Bored ☐ Cable Tool ☐ Jetted	otary ammer	□ AirF	.)	T	From (ft.)	Dia. (in.)	8 19 <u>97</u>	Date Drilling: Started 7-8	6)
Dia. New Other Stell, Plastic, etc. From To	1111.4	130 51	Other /6/	d GravelPacked P	arroama		8)	on m	of formatio				From
Substitution Subs	Gage Castin	1	Setting	I, Plastic, etc. , Slotted, etc.	Stee Perf.	New or	. Dia.	-					
Cemented from Comented from Comented fro	.670	x36		208440 jof6.	7V(N	4				8	4 4 5 4 4	
Depth to pump bowls, cylinder, jet, etc.,		scks used	t. No. of sa	ft. toft. to	used _ ted by _ e to sept	Method Cemen Distand Method	100		Tres and a		4	(Use reverse	
Yield:gpm withft. drawdown afterhrs. 11) WATER LEVEL: U/A Static levelft. below land surface Date Artesian flowgpm. Date 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? Yes No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? Depth of strata Was a chemical analysis made? Yes No			.44(3)(A)]	rface Slab Installed [Rule 338 eel Sleeve Installed [Rule 338 ster Used [Rule 338.44(3)(b)]	cified Su cified Ste ess Adap	Spe		ated		10 10 10 10 10 10 10 10 10 10 10 10 10 1	1.4	Depth to pump bowls, o	14)
constituents? Yes No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? Depth of strata Was a chemical analysis made? Yes No				ft. below land surfac	evel	Static I	_ 11)				pm with	Yield:gpm	15)
	pth 0 - 19-6		Type						DESIRABLE	PORT OF UNI	If yes, submit "RE	constituents? Yes No If y Type of water?	8
thereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and be derstand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal. COMPANY NAME WELL DRILLER'S LICENSE NO	ef. I			N. C.	i dila ioc	mpierio	stuffied for C	on) a (s) b	uit in the log	T,UC	complete items 1	derstand that failure to co	10
ADDRESS (Street or RFD) (City) (State)	Zip)	78°	(State)	CHESTI .		(City)	Co		J	5.23	810 (Street	DDRESS	

Privilege Notice on on reverse side of Well Owner's copy (pink)	9 4	WELL	of Texas REPORT	P.O. B Austin, T 512-2	Hilers Advisory C 177 Rox 13087 X 78711-3087 239-0530	Council
1) OWNER CHY OF KIND	SUILIK me)	ADDRE	ss 12.0. 30× 1458 M	(City)	78363 (State)	(Zip)
2) ADDRESS OF WELL: County KLIEFIEL					83-3	
3) TYPE OF WORK (Check): Wew Well Deepening Reconditioning Plugging		Irrigation Inj	Monitor ☐ Environmental Soil Bo ection ☐ Public Supply ☐ De-wa bmitted to the TNRCC? ☐ Yes	tering Testwell	5), nW-1	
6) WELL LOG:	DIAMETER OF I	HOLE	7) DRILLING METHOD (Check): 🗆 Driven		
6) WELL LOG: Date Drilling:	Dia. (in.) From (ft.)	To (ft.)	☐ Air Rotary ☐ Mud Rota			
Started 7-10 19 71	/C D Surface	4.1.0	☐ Air Hammer ☐ Cable 1			
Completed 7-10 1997			Other			Ń
* * * - # - # * * * * * * * * * * * * *			8) Borehole Completion (Chec	ck):	Straight Wall	- 70.4
110111/111/	tion and color of formation	on material	☐ Underreamed ☐ Gra	vel Packed Pother	6/30 51	4167
SUR ATTACHED	1001		If Gravel Packed give interval	from 40 0 f	t. to 78.0	ft.
			CASING, BLANK PIPE, AND WE	LL SCREEN DATA:		
			New Steel, Plastic, etc		etting (ft.)	Gage
			Dia. or Perf., Slotted, etc (in.) Used Screen Mfg., if co	mmercial From	т То	Scree
		,	4 N 100 800		0 50 C	101
***************************************			TICI- U			
			4 2 40 KISA	R CO	+21.5	
			Website Control Services	ft. to ft. No. of		
(Use reverse side of Well O	wner's copy, if necessary)		Method used Cemented by Distance to septic system fle Method of verification of above	ld lines or other concentrate	ed contamination	ft
(Use reverse side of Well O	rsible Cylinder		Distance to septic system fie Method of verification of above 10) SURFACE COMPLETION	ld lines or other concentrate ve distance	ed contamination	f1
(Use reverse side of Well O	rsible Cylinder		Cemented by Distance to septic system fle Method of verification of abov 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used [F	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] Rule 338.44(3)(b)]	ed contamination	f
(Use reverse side of Well O	rsible Cylinder	-	Cemented by Distance to septic system fle Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] Rule 338.44(3)(b)]	ed contamination	ft
(Use reverse side of Well O	rsible Cylinder, ft.	nated	Cemented by Distance to septic system file Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used (F Approved Alternative Pro 11) WATER LEVEL:	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.471] cedure Used [Rule 338.71] below land surface	d contamination	
(Use reverse side of Well O	csible Cylinder .,ft. Jetted Estim ft. drawdown after	nated hrs.	Cemented by Distance to septic system file Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used [F Approved Alternative Pro	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.471] cedure Used [Rule 338.71] below land surface	ed contamination	
(Use reverse side of Well O	crible Cylinder ,ft. Jetted Estim ft. drawdown after	nated hrs.	Cemented by Distance to septic system file Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used (F Approved Alternative Pro 11) WATER LEVEL:	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.471] cedure Used [Rule 338.71] below land surface	I I I I I I I I I I I I I I I I I I I	h
(Use reverse side of Well Of 13) TYPE PUMP:	crible Cylinder .,ft. Jetted Estim ft. drawdown after ta which contained undesira	nated hrs.	Cemented by Distance to septic system fle Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pittless Adapter Used [F Approved Alternative Pro 11) WATER LEVEL: Static levelft. Artesian flow	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] Rule 338.44(3)(b)] scedure Used [Rule 338.71] below land surfacegpm. Da Type	I I I I I I I I I I I I I I I I I I I	h
(Use reverse side of Well O	crible Cylinder ,ft. Jetted Estim ft. drawdown after	nated hrs.	Cemented by Distance to septic system fle Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used [F Approved Alternative Pro 11) WATER LEVEL: Static levelft. Artesian flow 12) PACKERS:	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] Rule 338.44(3)(b)] scedure Used [Rule 338.71] below land surfacegpm. Da Type	I I I I I I I I I I I I I I I I I I I	h
(Use reverse side of Well O	Sible Cylinder C	hrs. able E WATER*	Cemented by Distance to septic system file Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used [F Approved Alternative Pro 11) WATER LEVEL: Static level	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.44(3)(b)] cedure Used [Rule 338.71] below land surface gpm. Da Type Type True to the best of my know	I l l l l l l l l l l l l l l l l l l l	h - 16
(Use reverse side of Well Of 13) TYPE PUMP:	grible Cylinder In the stime of the stime of the strain o	nated hrs. able EWATER* on) and that eac g(s) being returns	Cemented by Distance to septic system fle Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pittless Adapter Used (F Approved Alternative Pro 11) WATER LEVEL: Static level ft. Artesian flow 12) PACKERS: WELL DRILLER'S LICENSE	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.44(3)(A)] cedure Used [Rule 338.71] below land surface gpm. Type Type True to the best of my know	Dept	h - 16-
(Use reverse side of Well Of 13) TYPE PUMP: Turbine	grible Cylinder In the stime of the stime of the strain o	nated hrs. able EWATER* on) and that eac g(s) being returns	Cemented by Distance to septic system fle Method of verification of above 10) SURFACE COMPLETION Specified Surface Slab In Specified Steel Sleeve In Pitless Adapter Used (F Approved Alternative Pro 11) WATER LEVEL: Static level ft. Artesian flow 12) PACKERS: 110 PACKERS: 110 PACKERS: 111 WELL DRILLER'S LICENSE (City)	Id lines or other concentrate ve distance stalled [Rule 338.44(2)(A) stalled [Rule 338.44(3)(A)] stalled [Rule 338.44(3)(A)] cedure Used [Rule 338.71] below land surface gpm. Type Type True to the best of my know	Dept	h - 16.

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Part III

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side 'Well Owner's copy (pink)	State of WELL I			Т		Texas Wa	P.O. Bo Austin, TX	Illers Advisory 2 177 0x 13087 (78711-3087 39-0530	Council
1) OWNER CITY OF KINL	SVICIA ADDRE	ss 📒	0	Box 1	458	Kindsvill	tá 7	2 78	363
	(Street, RFD or other)							F 5 - 3	
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check): Industrial Irrigation Inj If Public Supply well, were plans su	ection	☐ Pub		☐ De-wat	ering 🗌 Testv	825 Trace	5),11W- (SS-	100
6) WELL LOG: Date Drilling: 9 Started 7-9 19 97 Completed 7-9 19 97	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) 8-0 Surface 33-0		☐ Air F	NG METHO Rotary Rammer	Mud Rota	ry Bored		54	ก็
From (ft.) To (ft.) Descript 344 ATTICITAD	ion and color of formation material			ile Complet erreamed Il Packed gi	C Gray	k): ☐ Open relPacked ⓒ from 33	>Other '	Straight Wall 6/50 5	1611.4
		CAS	ING, BI	ANK PIPE,	, AND WEL	L SCREEN DA	TA:		
		Dia. (in:)	New or Used	Perf., S Screen	Plastic, etc. lotted, etc. Mfg., if con		From		Gage Casting Screen
2014 21 2		20 20	N	mF6	SCK.	51- FOC	13.0	+2.0	.010
(Use reverse side of Well Ow	vner's copy, if necessary)	27.0	Method Cemen Distance	used ted by	i system field	d lines or other o	ft. No. of	sacks used	
Turbine Jet Submers Other Depth to pump bowls, cylinder, jet, etc.,	ible Cylinderft	10)	SURFA	CE COMPI cified Surfa	LETION ce Slab Ins Sleeve Ins	talled [Rule 33	8.44(3)(A)]	9	
14) WELLTESTS: VA Type test: Pump Baller	☐ Jetted ☐ Estimated		☐ App	roved Alter	native Proc	edure Used [Ru			
Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata	_ft. drawdown after hrs.	11)	Static I		ft. b	elow land surface		te	_
	PORT OF UNDESIRABLE WATER* Depth of strata	1 200	F.V		7 -	ELLATS	Type ,	Dep ン で・	th <i>ローネ・</i> に
ADDRESS 710	thru 15 will result in the log(s) being returned to the or print)		WELL I	RILLER'S	LICENSE		469		(ip)
	When	30	(Signed				d Driller Tra	inee)	

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)		of Texas REPORT	Texas Water Well Drillers Advisory Council MC 177 P.O. Box 13087 Austin, TX 78711-3087 512-239-0530
1) OWNER CHY DE KINGS (Na 2) ADDRESS OF WELL: EARL County Kling Shall	WICLE ADD MINUSUILLE [A. (Street, RFD or other)	(Street or RFD) NOFIL KINSULL (City) (State)	(City) (State) (Zip) 4 72 GRID# 83-34-4
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Check): Industrial Irrigation	☐ Environmental Soil Bo Injection ☐ Public Supply ☐ De-wal	oring Domestic 5); 11 W-18
6) WELL LOG: Date Drilling: Started 7 - 9 19 9-7 Completed 7 - 9 19 27	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) Surface 40.0	7) DRILLING METHOD (Check) Air Rotary Mud Rota Air Hammer Cable T Other	ary Bored
From (ft.) To (ft.) Descrip	LOGS	8) Borehole Completion (Chec Underreamed Grav If Gravel Packed give interval	sk): Open Hole Straight Wall vel Packed FOther 14/30 S10004 from 42.0 ft. to 19.0 ft.
		CASING, BLANK PIPE, AND WEI Dia. New Steel, Plastic, etc. Perf., Slotted, etc. (in.) Used Screen Mfg., if col 2 M MC SCLAR ; NFG. TS	Setting (ft.) Gage Castir Scree
(Use reverse side of Well O		Methodused	ft. to 3.0 ft. No. of sacks used 5.0 ft. toft. No. of sacks used
☐ Turbine ☐ Jet ☐ Submers ☐ Other Depth to pump bowls, cylinder, jet, etc. 14) WELL TESTS: WA		10) SURFACE COMPLETION Specified Surface Slab Ins Specified Steel Sleeve Ins Pitless Adapter Used [Ri	stalled [Rule 338.44(3)(A)] ule 338.44(3)(b)]
Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate	ft. drawdown after hrs.	11) WATER LEVEL: U/A Static levelft. b	
constituents? Yes No If yes, submit "RE Type of water? Was a chemical analysis made?	PORT OF UNDESIRABLE WATER* Depth of strata	12) PACKERS: BENTONITH	Type , , Depth F1(973 /2 /7-0-17-
understand that failure to complete items 1	me (or under my supervision) and that ei thru 15 will result in the log(s) being retu	ach and all of the statements herein are t med for completion and resubmittal. WELL DRILLER'S LICENSE	true to the best of my knowledge and belief. I
ADDRESS (Street	pe or print) (PTD) or RED)	ORPUS (1-191571	
(License	Cohe.	/I-31 (Signed)	(Registered Driller Trainee)

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ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)	#1 H *	1.4.5	State of WELL I			ŗ		P.O. Bo	x 13087 78711-3087	Council
1) OWNER City of Kingsvill			ADDRE	ss P.	0. Bo	x 1458 Street or RFD)	(ingsville (City)		(State)	
2) ADDRESS OF WELL: County Kleberg	_	fille Lar		Kingsv (Cit	ville	Texas	20000EX		83-34-	(Zip)
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging	\$ 37 00 -25000	strial 🗆 In	rigation Inje	ection [] Publ	Environmental Soil Bor ic Supply	ring Testwe	395380	5)	
6) WELL LOG:	DIAM	ETER OF H	IOLE	7) D	RILLIN	IG METHOD (Check):	☐ Driven			
Date Drilling:	Dia. (in.)	From (ft.)	To (ft.)] Air R	otary Mud Rotar	y 🗑 Bored		•11	
Started 4-27 19 98 Completed 4-27 19 95	6.0	Surface	84.0	200	5318	ammer Cable To				
. Completed 1 21 15 55					, 00					1
From (ft.) To (ft.) Descrip	tion and color	of formation	n material		Unde	e Completion (Check erreamed Grave Packed give interval.	elPacked 🖈	Other gr		
	1					ANK PIPE, AND WEL		ALCA		
				1.000000000	New	Steel, Plastic, etc.	JONELIVEA		ng (ft.)	Gage
	527	1,12		Dia.	or Used	Perf., Slotted, etc. Screen Mfg., if com	mercial	From	To	Castin
		288			-	3,		NAME OF TAXABLE PARTY.	1.00	
40										
(Use reverse side of Well O		-AV		M C D	ement lethod ement istance		to 0.0 ft to fill with 5% ber	. No. of santonite	acks used	
☐ Turbine ☐ Jet ☐ Submers	sible	nder		10) S	URFA	CE COMPLETION 1	I/A			
	,ft.		_		Spec	ified Surface Slab Insta	illed [Rule 338.			
Depth to pump bowls, cylinder, jet, etc.				20		ified Steel Sleeve Insta s Adapter Used [Rul oved Alternative Proce	e 338.44(3)(b)]			
14) WELLTESTS: N/A	☐ Jetted	☐ Estimat	ted		Appr	oved Alternative Proce	aure Usea (Hule			-
	M. Therenes	☐ Estimat		. [ACORDO ANDRO MORROS VILLOS	aure Osea (Ruie			
14) WELLTESTS: N/Ä Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY:	ft. drawdown	after	hrs.	11) W	ATER	LEVEL: N/AS /elft. be	low land surface	Date		
14) WELL TESTS: N/Ä Type test: Pump Bailer Yield: gpm with	ft. drawdown	after	hrs.	11) W	/ATER tatic le	LEVEL: N/AS /el ft. be	low land surface	Date		_
14) WELLTESTS: N/Ä Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate constituents?	tt. drawdown which contained PORT OF UNDE	d undesirabl	hrs. e /ATER*	11) W	/ATER tatic le	LEVEL: N/AS /el ft. be	low land surface	Date Date		_
14) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate constituents? Yes X No If yes, submit "RE Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items 1	tt. drawdown a which contained PORT OF UNDE Depth of strate Yes No	d undesirables SIRABLE Wasservision; tin the log(s	e VATER*	11) W S A 12) P	/ATER tatic le rtesian	LEVEL: N/AS /el ft. be flow RS: N/A	low land surface gpm.	Date Date	Depti	· · · · · · · · · · · · · · · · · · ·
14) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate constituents? Yes X No If yes, submit "RE Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items 1	tt. drawdown a which contained PORT OF UNDE Depth of strate Yes No	d undesirables SIRABLE Wasservision; tin the log(s	e VATER*	11) W S A	/ATER tatic ler rtesian ACKE	LEVEL: N/AS /el ft. be flow RS: N/A	ow land surface gpm. T	Date Date ype	Depti	<u> </u>
14) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate constituents? Yes X No If yes, submit "RE Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by understand that failure to complete items 1 COMPANY NAME PSI Inc.	tt. drawdown which container PORT OF UNDE Depth of strate Yes No ne (or under my thru 15 will result	d undesirables SIRABLE Wasservision; in the log(s	e VATER*) and that each being returned	11) W S A	/ATER tatic ler rtesian ACKEI	LEVEL: N/AS /elft. be flow RS: N/A attements herein are tru and resubmittal. RILLER'S LICENSE No.	ow land surface gpm. T	Date Date ype ny knowled 694	Depti ge and belief.	· · · · · · · · · · · · · · · · · · ·
14) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strate constituents? Yes & No If yes, submit "RE Type of water? Was a chemical analysis made? I hereby certify that this well was drilled by runderstand that failure to complete items 1 COMPANY NAME PS! Inc. (Ty ADDRESS 810 SPID	tt. drawdown which container PORT OF UNDE Depth of strate Yes No ne (or under my thru 15 will result	after	e VATER*) and that each being returned	11) W S A 12) P and all of for comp	/ATER tatic ler rtesian ACKEI	LEVEL: N/AS /el ft. be flow	ow land surface gpm. The eto the best of modern controls.	Date Date ype	Depti ge and belief.	78416

Part III

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)			State of WELL R			Texas W	P.O. Bo Austin, TX	llers Advisor 177 ox 13087 78711-3087 99-0530	y Council
1) OWNER Kingswille City	of		ADDRESS	P.0.	Box 1458	Kingsville 1		53	
(Nan	ne)				(Street or RFD)	(Ci	ty)	(State)	(Zip)
2) ADDRESS OF WELL: County Kleberg	Kilgsvi	lle Land	dfill Kir	ngsville	Texas		GRID#	83-34-4	
	(Stree	et, RFD or o	ther)	(City)	- (State	e) (Zip)			
3) TYPE OF WORK (Check): ** New Well	☐ Indust	West District		ion 🗆 Pub		e-watering Test	W. S. O. S.	5)	
6) WELL LOG:	DIAME	TER OF HO	DLE :	7) DRILLI	NG METHOD (CI	neck): Driven			
Date Drilling:		From (ft.)	To (ft.)	☐ Air F	Rotary Mud	Rotary ₹ Bored			
Started 4-24 19 98	6.0	Surface	86.0	☐ Air F	lammer 🔲 Ca	ible Tool Jetter	d		
Completed 4-24 19 98				☐ Othe	er				Ń
		2.0		a) B L	1-01-1	Observation III Const	- Mala	Ctoriobt Well	-
From (ft.) To (ft.) Description see attached 100 Mw=23	on and color of	formation	material	☐ Und		Check): Open Gravel Packed [erval from	予 Other gi		
				0401110 01	ANIC DIDE AND	WELL SCREEN DA	TA. N/A		
								/fe \	C
3 4				New Dia. or	Steel, Plastic Perf., Slotted		Setti	ng (ft.)	Gage Castin
			(1	in.) Used	Screen Mfg.,	if commercial	From	То	Screen
				e) CEMEN	ITING DATA [F	[ule 338.44(1)]		1	2 5
15) WATER QUALITY: Did you knowingly penetrate any strata w	ft. Jetted [ft. drawdown af	□ Estimate	d .	Method Cement Distance Method 10) SURFA Spec Spec Pitle Appr Static le	used	21/A	_ft. No. of sebentonite concentrated concentrated (88.44(2)(A)] 8.44(3)(A)] ll le 338.71]	acks used	n.
(Use reverse side of Well Own 13) TYPE PUMP: N/A Turbine Jet Submersib Other Depth to pump bowls, cylinder, jet, etc., 14) WELL TESTS: Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata we constituents? Yes No If yes, submit "REPC Type of water?	ftftftftftftft. drawdown af	Estimate ter	d	Method Cement Distance Method 10) SURFA Spec Spec Pitle Appr Static le	used	ft. to	_ft. No. of sebentonite concentrated concentrated (88.44(2)(A)] 8.44(3)(A)] ll le 338.71]	contamination	n
(Use reverse side of Well Own 13) TYPE PUMP: N/A Turbine Jet Submersib Other Depth to pump bowls, cylinder, jet, etc., 14) WELL TESTS: Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata w. constituents? Yes No If yes, submit "REPOTYPE of water? Was a chemical analysis made? No If yes a chemical analysis made?	Jetted [tt. drawdown af which contained a DRT OF UNDES Depth of strata _ Yes No	Estimate terundesirable	d 1 ATER* 1	Method Cement Distance Method 10) SURFA Spect Pittle Appr 11) WATER Static le Artesian 12) PACKE	used	ft. to	_ft. No. of sebentonite concentrated of se.44(2)(A)] 8.44(3)(A)] le 338.71] ce Date Type	contamination	ft
(Use reverse side of Well Own 13) TYPE PUMP: N/A Turbine Jet Submersib Other Depth to pump bowls, cylinder, jet, etc., 14) WELL TESTS: Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata w. constituents? Yes No If yes, submit "REPO Type of water? Was a chemical analysis made? No It hereby certify that this well was drilled by me nderstand that failure to complete items 1 thr COMPANY NAME (Type	DRT OF UNDES Depth of strata Yes No e (or under my strata 15 will result in	Estimate terundesirable	d	Method Cement Distance Method 10) SURFA Spect Pittle Appr 11) WATER Static le Artesian 12) PACKE	used	ft. to	_ft. No. of sebenton it to be benton it to be be benton it to	Depti	ft.
(Use reverse side of Well Own 13) TYPE PUMP: N/A Turbine Jet Submersib Other Depth to pump bowls, cylinder, jet, etc., 14) WELL TESTS: Type test: Pump Bailer Yield: gpm with 15) WATER QUALITY: Did you knowingly penetrate any strata we constituents? Yes No If yes, submit "REPOTYPE of water? Was a chemical analysis made? No thereby certify that this well was drilled by menderstand that failure to complete items 1 thr COMPANY NAME (Type	Jetted [t. drawdown af which contained to DRT OF UNDES Depth of strata _ Yes	Estimate terundesirable	d	Method Cement Distance Method 10) SURFA Spect Pittle Appr 11) WATER Static le Artesian 12) PACKE	used	ft. to	_ft. No. of sebenton it to be benton it to be be benton it to	Depti	-78\$16

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side 'Well Owner's copy (pink)		9	State o			Γ,		er Well Drille MC 1 P.O. Box Austin, TX 78 512-239	77 13087 3711-3087	Council
1) OWNER City of Kingsvil	1e		ADDRE	ss P	.0B	ox 1458 (Street or RFD)	Kingsvi (City)	SxeT eff	s 78363 (State)	(Zip)
2) ADDRESS OF WELL: County Kleberg		ingsville treet, RFD or o	Eandfill other)			e Texas			3-34-4	
3) TYPE OF WORK (Check): * New Well Deepening Reconditioning Plugging	□ Ind		igation Inj		☐ Pub	Environmental Soil Borin lic Supply	ng 🗆 Testw			
6) WELL LOG:	DIA	METER OF H	OLE	7)	DRILLI	NG METHOD (Check):	☐ Driven			
6) WELL LOG: Date Drilling: Started 4-23 19 98 Completed 19	Dia. (in.) 6.0	From (ft.) Surface	To (ft.) 72.0 33.0		☐ Air H	otary				ĸ
Completed10								Uala D.	Straight Wall	,
From (ft.) To (ft.) Descr see attached log !hv=2	ption and colo	r of formation	material	N360	Und	le Completion (Check): erreamed	Packed 33 0	Other 16/3	0 silica 16.0	sand_ ft.
						ANK PIPE, AND WELL				
					New	Steel, Plastic, etc.		Setting	g (ft.)	Gage
				Dia. (in.)	or Used	Perf., Slotted, etc. Screen Mfg., if comm		From	То	Screen
	16.4		160	. 4	N	Pvc screen Mfg.	National	33.0	18.0	.010
				4	N	Wells@Supply Pvc risedr		18.0,	+2.5	-
(Use reverse side of Well	Owner's copy, if	necessary)			Method Cemen Distance	used	to 0.0 th 5% be		cks used	
13) TYPE PUMP: N/A Turbine Jet Subme Other Depth to pump bowls, cylinder, jet, e		ylinder ft.	-	.10)	SURFA	CE COMPLETION cified Surface Slab Instal	led [Rule 338			
14) WELLTESTS: N/A Type test: Pump Baile		☐ Estima			☐ Pitle	cified Steel Sleeve Instal ess Adapter Used [Rule roved Alternative Proced	338.44(3)(b)]			
Yield:gpm with 15) WATER QUALITY: Did you knowingly penetrate any stra				11)	Static le	R LEVEL: N/A evel ft. belan flow		111200000000000000000000000000000000000		
constituents?	4			12)	PACKE	:RS:		Туре	Dept	h
Yes Xx No If yes, submit "F Type of water? Was a chemical analysis made?	_ Depth of stra	ata			bei	ntonite pellets	3'		16'=14'	
hereby certify that this well was drilled be inderstand that failure to complete items	v me (or under r	ny supervision	and that each	n and all	of the s	tatements herein are true	e to the best of	my knowledg	e and belief.	I
COMPANY NAME						RILLER'S LICENSE NO)	4694	-11	
ADDRESS 810 SPID		7 -4 14 14				orpus Chritsi		Texa (State)	s (Z	78416
/Ctros	t or RFD				(City)			(Olare)	12	7.

ATTENTION OWNER: Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)	State WELL				P.O. Austin, 7	rillers Advisor IC 177 Box 13087 IX 78711-3087 239-0530	y Council
1) OWNER City of Kingsvill (Na	e ADDR	ESS _I		Box 1458 King (Street or RFD)	cille Texas	78363 (State)	(Zip)
.2) ADDRESS OF WELL: County Kleberg	(Street, RFD or other)		Dity)	Texas (State) (Zip)	GRID# .	83-34-4	
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Dlugging	4) PROPOSED USE (Check): Industrial Irrigation Irriga	jection	□ Pub	licSupply De-watering [☐ Domestic ☐ Testwell	5)	
6) WELL LOG: Date Drilling: Started 4-29 19 98 Completed 4629 1998	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) 6.0 Surface 86.0		☐ Air F	Rotary Mud Rotary 1	Driven Bored Jetted	*	×
From (ft.) To (ft.) Descrip	tion and color of fórmation material	1	☐ Und	1.12 전 1.15 전 1	d *☐ Other ☐		107
5 98 f. 5 5		CAS	ING, BL	ANK PIPE, AND WELL SCRE	EN DATA: N/A	ári	
. ** *	W	Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	-	etting (ft.)	Gage Castin Scree
(Use reverse side of Well Ov 13) TYPE PUMP: 11/A Turbine Jet Submers Other Depth to pump bowls, cylinder, jet, etc.	ible Cylinder	10)	Method Cement Distanc Method SURFA	usedft. to	ft. No. of ft. No. of	sacks used i te i te	
	☐ Jetted ☐ Estimated hrs.	11)	☐ App	ss Adapter Used [Rule 338.4 roved Alternative Procedure Use BLEVEL: ti/A rovelft, below land	ed [Rule 338.71]	te	
15) WATER QUALITY: Did you knowingly penetrate any strata constituents? No If yes, submit "REF" Type of water?	which contained undesirable ORT OF UNDESIRABLE WATER* Depth of strata	-		nflow	Type	teDep	th
I hereby certify that this well was drilled by moderstand that failure to complete items 1 to COMPANY NAME	Yes No ne (or under my supervision) and that each thru 15 will result in the log(s) being returned S! Inc. le or print)	d for cor	npletion	atements herein are true to the and resubmittal.	6.5	edge and belief 94-M	.1
ADDRESS 610 SPID (Street of Ama)	din		Co City) Signed	orpus Christit	(State)	,	78+16 (ip)

Y-Distance

X-Distance Coord.

Y-Distance

X-Distance

Stabilized GW Level ft, MSL

Current

Total Depth of Boring ft, BGS

Designation Top of PVC

Bottom Elevation

Ground

Elevation ft, MSL

Location Number

ft, MSL

ft, MSL

meters

meters

Coord.

Summary of Site Survey Data City of Kingsville, Texas Municipal Solid Waste Landfill, 235-B

Benchmark	MW-12	3		12		40,5	4.	2221994.103	646980.6224	0.104	1.5806
MW-1	MW	61.867	59.249	.: 43	16.249	Α	33.47	2220665.243	646999.5297	-1328.7561	20.4879
MW-2	MW			4		P&A		F (T =		40	
MW-3	MW	59.173	56.096	37.5	18.596	A	35:27	2221265.118	647820.8196	-728.8815	841.7778
MW-4	WW.	60.125	58.008	. 40	18.008	, A	35.53	2221259.953	648317.7851	-734.046	1338.7433
MW-5	MW					P&A					
MW-6	MW	56.604	55.456	. 40	15.456	V	32.12	2220718.485	649721.5091	-1275.5146	2742.4673
MW-7	MW			32	0	P&A					
≥ MW-8	MW	61.178	29.787	43	16.787	A	33.03	2219519.731	647166.5781	-2474.2682	187.5363
6-WW 36	MW				0	P&A					
MW-9R	MW	44.849	41:411	21.	24.411	A	:34.99	2219802.581	648511.0793	-2191.4181	1532.0375
MW-10	MW	52.684	49.78	29	20.78	Y	34.42	2220240.82	648308.7984	-1753.1797	1329.7566
MW-11	MW	62.401	60.197	33	27.197	A	35.4	2220718.664	648494.0559	-1275.3351	1515.0141
MW-12	B/MW	54.879	52.375	48	4.375	A	32.78	2221993.999	646979.0418	0	0
MW-13	B/MW	62.096	59.131	. 20	9.131	A	32.83	2221973.889	648365.0778	-20.1103	1386.036
MW-14	B/MW	52.677	49.938	42	7.938	A	26.9	2221949.041	649712.8948	-44.9587	2733.853
MW-15	B/MW	51.624	48.386	37	11.386	А	32.97	2219474.512	649668.9772	-2519.487	2689.9354
MW-16	B/MW	58.839	55.958	47	8.958	A	34.02	2219497.15	648312.4767	-2496.8494	1333.4349
BP-17	В	43.868	41.345	33	8.345	A	34.87	2220139.183	648928.7974	-1854.8164	1949.7556
BP-18	В	52.438	50.039	42	8.039	A	33.72	2221252.488	648943.6517	-741.5117	1964.6099
BP-21	В		52.41	84	-31.59	Α		2221237.99	649701.98		2722.9382
BP-23	В		49.5	98	-36.5	A		2219486.9	648937.78		1958.7382
BP-24	B/MW		47.38	72	-24.62	Α		2221358.12	646971.06		-7.9818
BP-25	В		61.12	88	-26.88	A		2220722.02	648314.56		1335.5182
S/W Corner	0.0							2219514.47	646930.27	-2479.5292	48.7718

Footnotes:

3, 4, 5, & 6 completed by REI: 6-19-84 to 10-3-84 Soil Borings 7 & 8 completed by Martin Water Well: 7-31-91 Soil Borings 1, 2,

Soil Borings 9 & 10 completed by JEDI: 3-20-92 to 3-24-92

Soil Borings 12 through 18 completed by PSI: 7-7-97 to 7-28-97 Soil Borings 9R & 11 completed by PSI: 7-11-96

P&A=Plugged & Abandoned

MW=Monitor Well

B=Boring A=Active

The deepest excavation elevation is +8.37 feet NGVD

Coordinates for deep soil borings (B-21 - B-25) are currently being verified

M-37

City of Kingsville, Texas

Municipal Solid Waste Landfill Permit 235-B

Summary of Site Survey Data South West Corner = 0,0

MW#	X" Coordinate (feet)	Y" Coordinate (feet)
Benchmark	2480.13	9.578676
MW-1	1151.76	50.33381
MW-2		
MW-3	1765.06	861.649
MW-4	1768.07	1358.632
MW-5		
MW-6	1249.75	2771.07
MW-7		05
MW-8	9.14996	236.1952
MW-9		
MW-9R	314.069	1575.864
MW-10	748.922	1366.404
MW-11	1229.75	1543.78
MW-12	2480	8
MW-13	2482.68	1394.179
MW-14	2480	2742.223
MW-15	5.08411	2739
MW-16	5.41377	1382.31
BP-17	657.494	1987.991
BP-18	1770.89	1984.537
BP-21	2524.77	2730.57
BP-23	2512.21	1966.473
BP-24	2479.87	0.019279
BP-25	2501.96	1343.338
S/W Corner	0.00407	0.005581

Revision 1

Revision: 0

ATTACHMENT N	FOR PERMIT PURPOSES ONLY	- common and a special common approximation	Part III
ATTACHMENT N		Take a data.	
ATTACHMENT N			
ATTACHMENT N	A TOTAL CANADA VI		
	ATTACHMENTN		

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

APPENDIX N

Local Ponding Study - Impact on Ground Water

Figure 1. Topographical Map of the COK MSWLF Area	N-1
rigure 1. Topographical map of the Continue	NIC
Figure 2. Ground Water Contour Map of COK MSWLF Area	11-2



November 1997

THIS DOCUMENT IS ISSUED FOR PERMITTING PURPOSES ONLY, INCLUDES PAGES N-1 THROUGH N-2.

N-0

Revision: 0

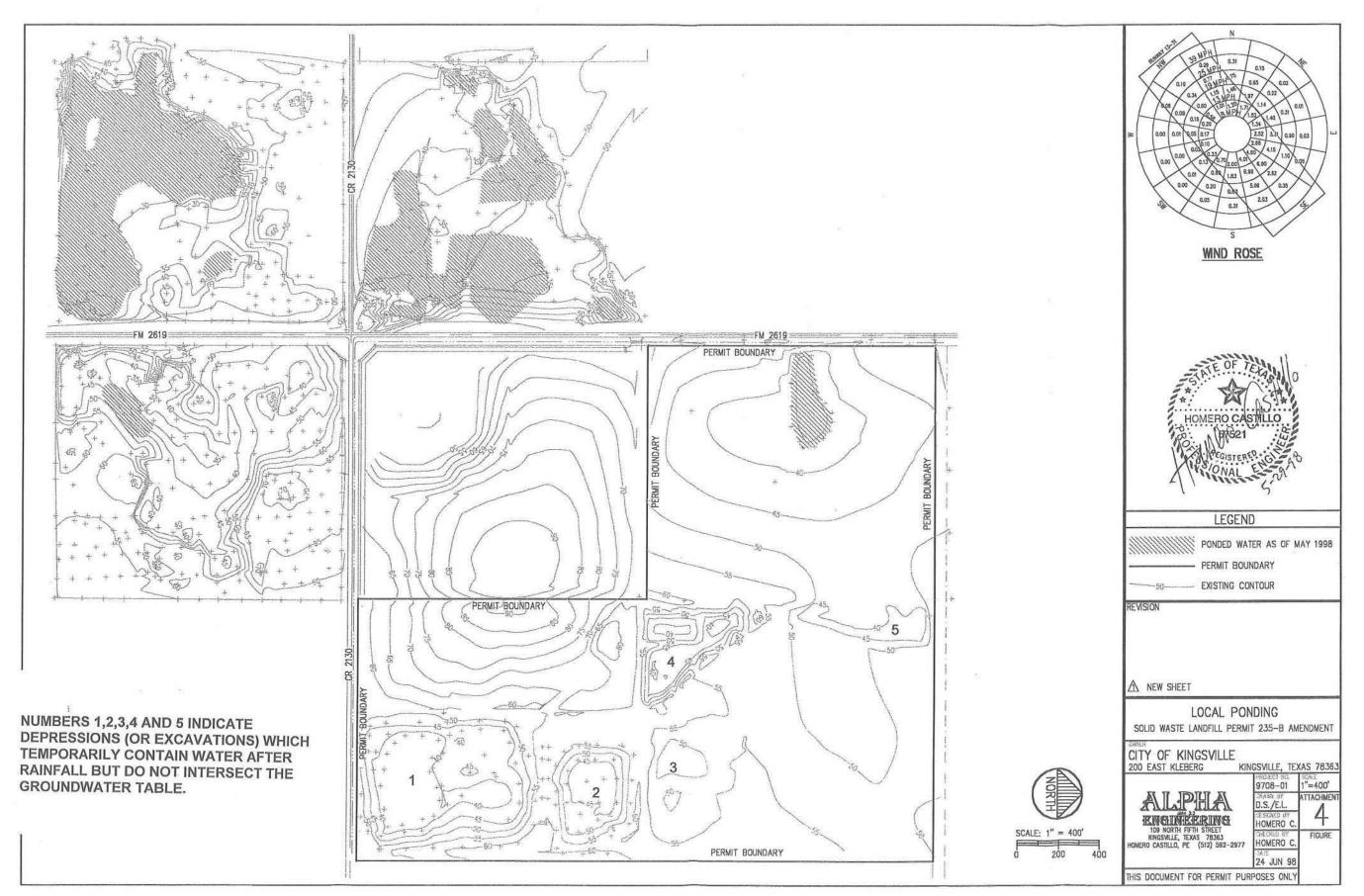
FOR PERMIT PURPOSES ONLY

FIGURE 1 Topographical Map of the COK MSWLF Area

REVISION 1 June 1998 N-1

FIGURE 1 Topographical Map of the COK MSWLF Area

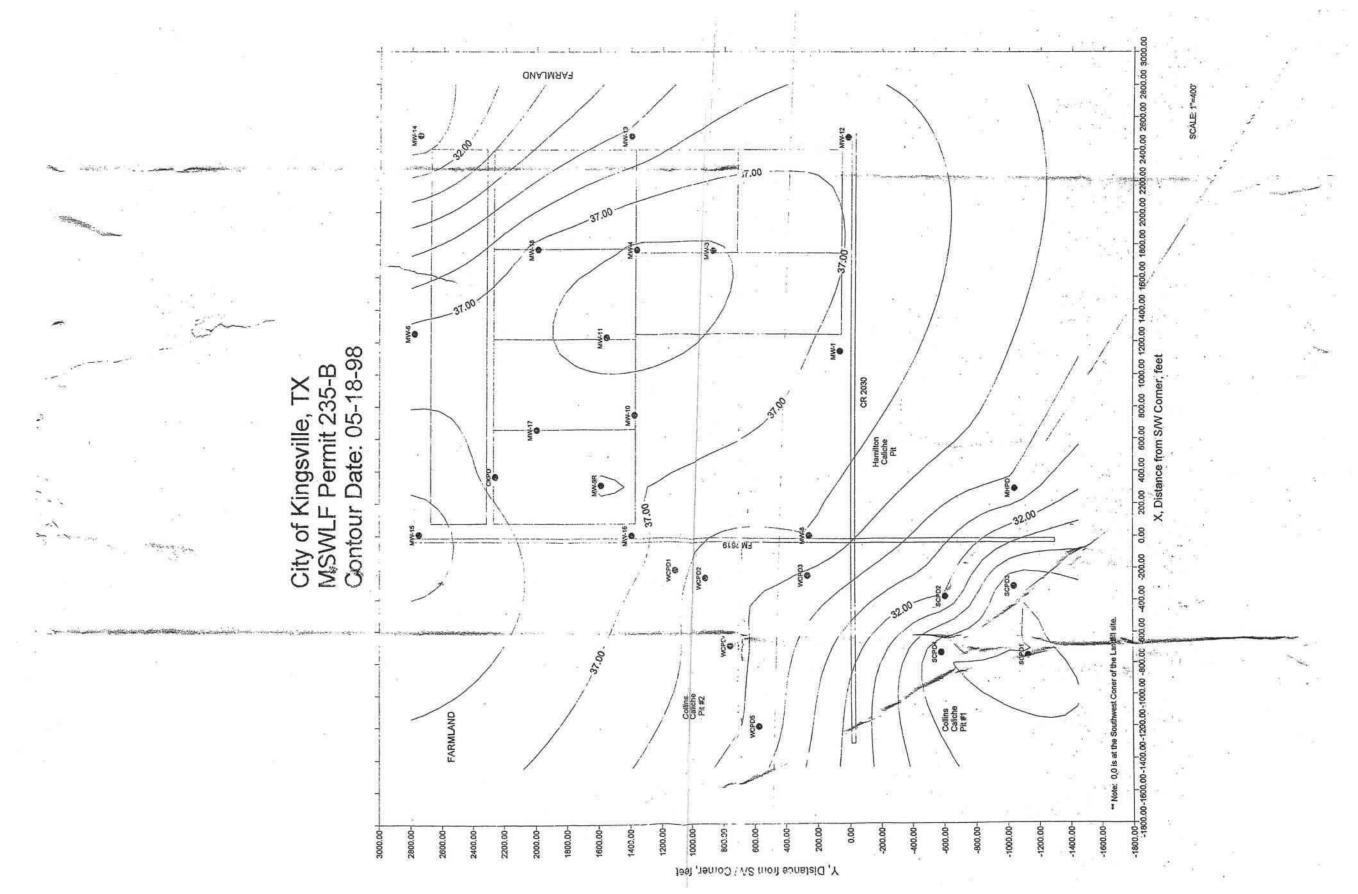
REVISION 1 June 1998 N-1



Part III, Attachment 4, Appendix 1, p.g. 705

FIGURE 2 Groundwater Contour Map of COK MSWLF Area

REVISION 1 June 1998 N-2



Part III, Attachment 4, Appendix 1, p.g. 707

Hanson Professional Services Inc. Submittal Date: September 2018 Revision: 0 ATTACHMENT O
APPENDIX O

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

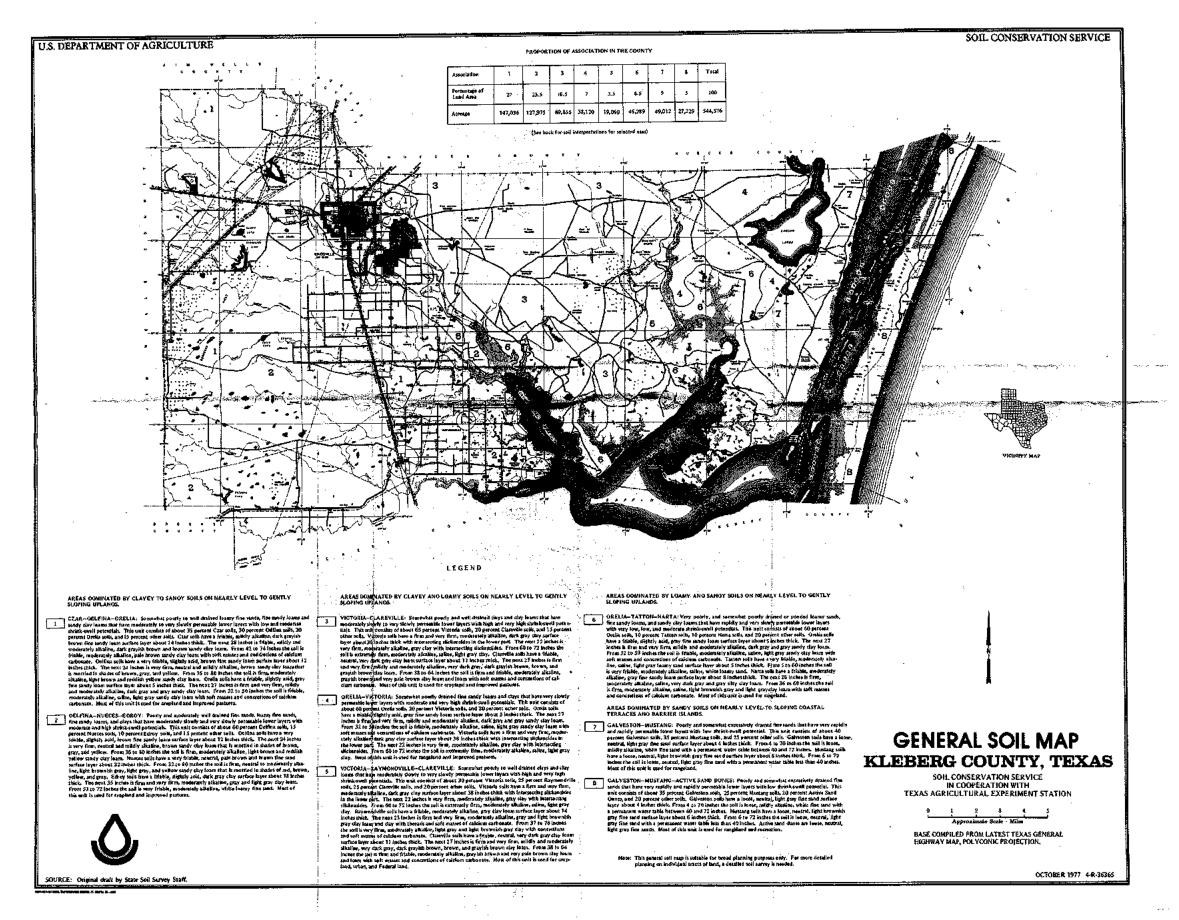
APPENDIX O

Soil Data for COK MSWLF Site

Figure 1	Kleberg County, Texas US-SCS Soils Map	0-1
Figure 2	US-SCS Aerial Soil Photograph COK MSWLF Area (& Soils Codes)	0-2
Figure 3	Hidalgo Series Soil Description	0-4
Figure 4.	Racombes Series Soil Description	0-8
Figure 5.	Willacy Series Soil Description	J-11
Figure 6.	Runge Series Soil Description	J-15
Figure 7.	Czar Series Soil Description	J-11
Figure 8.	Delfina Series Soil Description	J-20
Figure 9	Orelia Series Soil Description	J-23
Figure 10	Clareville Series Soil Description	J-26
Figure 11	Victoria Series Soil Description	D-29

November 1997 Revision 1 - June 1998

REVISION 1 June 1998 O-1



HOW TO USE THE GENERAL SOIL MAP AND INTERPRETATIONS

his deported Sail Sep shows the east units in Elebery County. A soil all is a leaderspe that his distinctive propertional patterns amont,

This may is useful to people, who meet a groupal idea of the soids in the coultry, who wast to compose different perions of the county, not who wast to determine satisfiely of the holls to curtain jusq ones for percent alternia. Here secrific interpresent can should be bear to a distilled soil survey and occurts assatisation. The roles within one unit may differ widely in allow. Catalage, carriers and these these

The interpretation table lists the soil himitations and the principal feepode affecting use for major soils within each unit. The cable fair and the principal advance fastors affecting mass. The walls T.THUSWYICHES

LUBY - Italiations are so minor they are soully overcome.

Children - Mainteins can be rescone or modified.

STYLES - Sintesto

On - Soils have properties inversels for resed was.

IN - Soils have properties understoly famoustle for taxed use.

HINES COVE Malks of cup ti Soil particle ESS FIMES Soil contitue

deals or cuts and related. And adminest startly doll manaches too book all and olay fee was as seed or graved to construction.

Seed to manaches too book all and olay fee was as seed or graved to construction.

Buchaspeoble codes impurity poor protected proposed to the teachers to see graved or seed that construct the protect of glands.

Buchaspeoble codes impurity poor protected proposed that the teachers the protect of glands.

Buchaspeoble codes impurity poor protected protected that the teachers that the protection of glands.

Buchaspeoble codes and plants.

Bucha

6011 has insequente strungth he support lands, intera moust whrough the soil slowly, attacting the specified cue, as existent to the formation of timestal or pipolita caretials by severa, water, they consuct through the soil too Yapiday. Soil support sower through the soil too Yapiday. Soil supposed on vertices and serious on drying, whit.

ne other attractives.

3100 see grants.

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500 \$other and matched to not thick arough for use as borrow matched to copecil.

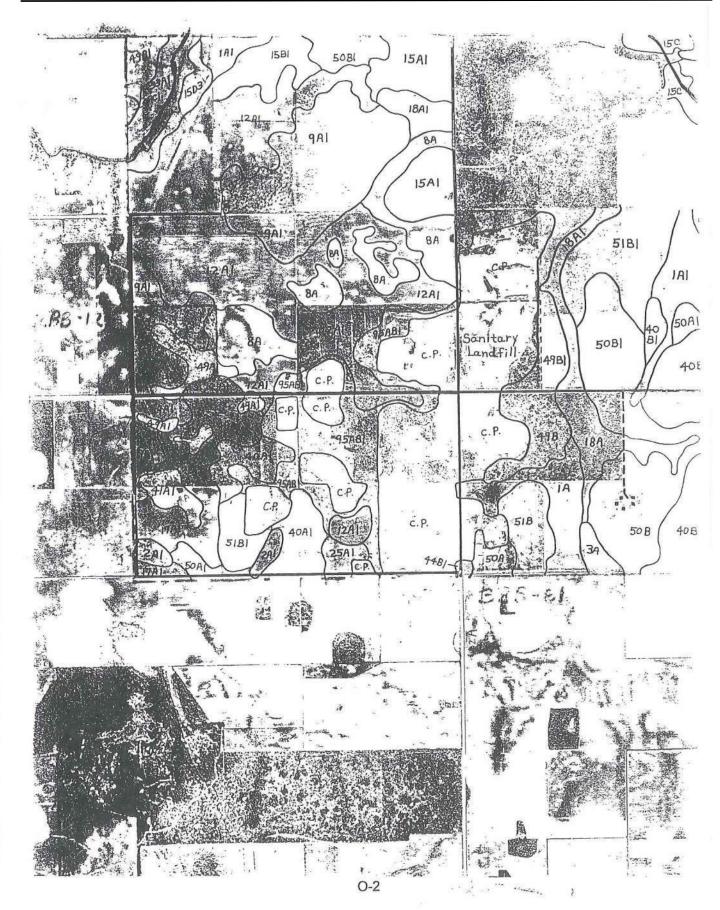
501 bitspary and stickly thus were and about to day.

SOIL LIMITATIONS AND SUITABILITY RATINGS FOR SELECTED USES

			PUTENT	AL ROEL			SANTTARY PACIFICATION	, " ' ' "]	COMMONTET SEVELOPHER	m		SOURCE WOOD	IYAL .	W/TER	HANACIDOTT :		BOOLEATICH.		POSTOCIAL A	S MURTHE FOR
1890GJACTORS	MATCH TO SECOND OF ASSOCIATION	20W	CEST (ART)	Paracett, arto	THE STATE OF THE S	SERGE LANSER JANAS	SASSANTA LANGGARA (TANGGARA)	SMITHY LAWFIL (ASPA T(FL)	TABLE DOWN NO. LAMOUS L	ENCANATIONS	DATALISMOS VILTRIPI BASINISTS*	TACAL TOATO AND STREETS	- 20049-1-TT	POPEOUL	SARO AND SHARIL	1965 1253300111 1881	DANAMENTS DERES AND LEVERS	CARD AFEM	PROFIC	FLAX CALIFORNIA	oting the	RANGELAND VILMANE
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VICTORIA RAVHONDVILLE	PICTORIA	302	ar d	K10a	SEVIRE 6/	STIGHT	SETTERE 15/	HITEBATE 9/	100k 15/	zanás řz, řel	SEVERAL \$/, 2/	stres 5/, 2/	20002 1/ ₂ 2/	2008. <u>15</u> /	1866ULTAD 4/	RIGH	HOLERTE 12/, 17/	SEPTOR LS/, S/	BETEMS 12/	184598 <u>15/</u> , <u>4/</u>	MEDICH	LOR
CLASSAMITE	BATHOROVILLE	858	RICK.	Hand	SENTAL 6/	SUTORT	SPVIEE 12/	STORE	MATE TO	38VIDE [3/, 16/	sketon My, 2/	SETENZ (1/ . 2/	POOR 2/, 3/	PASE 11/, 3/	resurtrab ≛/ .	R.COT.	HODDATE 32/ 1	HONDLITE (1), 25/	HOURATE 15/	10000016 &F, 13/	ਜ਼ਰ≡	нарти
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CORLEA TATTOH	OFFE SA	607	HESTUN 19/	ктэк	SECRET EL	SLIGHT	HODERATE B/	KORDATA 2/	PAZI. 10/	HEOSPATE 2/	MODELATE SI', III', IV	HOOSEAUTE of , 2/; 3/	Poct. <u>2</u> /	NOSE 101, 111	mentum #	St toat	HPDENTE 13/	HALDE P	HYCKAYS 9/, 13/	seriox <u>c</u> y	HEFTEN	REGE
В	TATION	1401	emes <u>9</u> /, 11/, <u>11/</u> 19/	Bo#8 <u>)1</u> /- <u>I</u> 6/	severe <u>16</u> /, <u>1</u> /	2 22 22 24 24 24 24 24 24 24 24 24 24 24	55VIRB 1/. 10/. 3/	omaż <i>II</i> , <u>14/</u> , <u>9</u> /	FORE 21, 22/, 3/	seme <u>14</u>), <u>≯</u> /, <u>16</u> /	4502AE 15/1.9/	s80000 <u>14</u> /, <u>9</u> /	FOOR g/	took <u>11,</u> 7, <u>1</u> 7, <u>2</u> 7	(0824874850 V-L	SEWELE 3.	Sermon 1/, 15/ 11/	791: STATUL 14/, 2/, 1/ 161: LS: 160: 2/	751 SETTLE 21, 37 1951 US: STREET 30	75: SITTEL 14/, 9/, 2/ 75: 15: STITEL 14/, 9/	LON	Leta
•	NARCA	202	1098 <u>10</u> /, <u>11</u> /	100 10/, 11/, 12/	\$electub <u>6</u> /	STORE	90000ATB 9/- 15/	HUDGHATE 91	Path 2/	SEMENT OF .	SEVENCE B/, 1/	serios (f . 2f lb. /)	2000x g/, 3/	POOR 15/, 10/, 3/	(CREATURE §/	SLICET.	100EN/TE 12/	1870 s (J, 1/	наташти эј	EDWERR SJ. SJ	LOM	1.0N
CALVESTON HASTANC	GALVESTOR	402	v# ¥. 1¥	HOLDH 1/. 19/	SEVERB 147, 9/	32.02 kg/, 9/, 1/	SEVERA 14/. 1/. 1/	SEPRE 10/, 1/. 1/	100k 2/, 9/	SEVERAL 14/, 9/, 10/	div9r3 <u>14</u> /. 9/	SEVERE 14/, 1/	Poor of	Potter, 3/	SENS: VATE 4/ PRAYEL: UNSUTED 4/	100 mg 2/	SEVENE IV. IV	SETEM 2/	market 2/	street If	ntoliva	HEDROX
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CALVESTON HUSTANC	CALVACTOR	357	I/N <u>7</u> /, <u>19</u> /	HEDIUM 2/, 12/	serent ja/, y/	SEVERE 16/, 1/, 1/	521008 14', 1/, 1/	500 (at 14), 9). LJ	2001 2/, 2/	88 /EN2 <u>14</u> /, <u>9</u> /, <u>16</u> /	ENVEYE 14/, 2/	strine <u>14</u>), g/	P008_9/	100E. 31	SAND: TAIK 6/ ORAVEL: VINUETE 4/	SPARINE TA	swinz 11/. 1/	35TBLE <u>?</u> /	EDWEL II	3870A\$ <u>3</u> f	PEDITIH	ник
ACTIVE SAND SAMES	SETALE	250	ı∆e <u>y,</u> ≱⁄	жолш <u>7</u> 7, <u>1</u> 7	354588 <u>10</u> /. <u>3</u> /	areau <u>20</u> 4, <u>3</u> 1. 3	samu£ <u>14</u> 7, <u>9</u> 7, <u>1</u> 7	янда <u>м</u> /. <u>у</u> /. <u>у</u>	rom <i>பு. மு</i>	seren 11/1 M , 16/	58988 365, 91 ·	SEVERE 14/, 9/	200k 3/	NXX 2/. 3/	SANGE MAIR A/	SENETE 3/	707000 <u>17</u> /, <u>1</u> /	2 57002 9 /, <u>34</u> /, 3/	607000 <u>1</u> /2, 1/	(BV)ma 2/, 14/, 1/	109	HEDIBA
8	METIVE SAND DISERS	2000	ник <u>V</u> . <u>12</u> , <u>14</u> /	100 <u>1</u> 1, <u>11</u> 7, <u>19</u> 7	жиленти <u>16</u>/	2002 <u>14</u> /. 1/	seetas (y. 2)	\$pymas 1/	1000A 2/	58V293-36/	SETTERS 16/	HOORENTE TEN	9000	PG29: 3/	SING: FALL 4/	Street 1/	marus 12/, 1/	severa <u>14</u> /, <u>1</u> /	SINTER II	satus V	LOW	LOG .

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Part III, Attachment 4, Appendix 1, p.g. 712



000		Slope	Dryland	Irrigat	edPastur	e &Range/	
Нар.	Cail Mann	(%)	Cap.	Cap.	Hayland	Wildlife	
ubol	Soil Name			Subclass		Site	O-3
						F-3	
101	Orelia fine sandy loam	0-1%	IIIw	IIIw	8A	Claypan Prairie	
191	Orelia fine sandy loam	1-3%	IIIe	IIIe	8A	Claypan Prairie	
		0-1%	IVW	IVW	7A	Claypan Prairie	
704	Edroy clay Edroy clay, depressional	0-1%	Vw	Vw	7E	Lakebed	
3A1		0-1%	IIs	IIs	7A	Blackland	
7A1	Victoria clay	0-1%	IIs	IIs	7C	Clay Loam	
9A1	Raywondville clay loam	1-3%	IIe	IIe	7C	Clay Loam	
9B1	Raymondville clay loam	0-1%	IIIw	IIIw	7C	Clay Loam	
11A1	Orelia sandy clay loam	0-1%	IIc	I	7C	Clay Loam	
12A1	Clareville clay loam	0-1%	IVs	IVs	7G	Salty Prairie	
14A1	Orelia fine sandy loam, saline	0-1%	Hc	I	7C	Gray Sandy Loam	
15A1	Hidalgo sandy clay loam	1-3%	IIe	IIe	7C	Gray Sandy Loam	
15B1	Hidalgo sandy clay loam	3-5%	IIIe	IIIe	7C	Gray Sandy Loam	
15C1	Hidalgo sandy clay loam	3-5%	IVe	22	7C	Gray Sandy Loam	
15C3	Hidalgo sandy clay loam, gullied	0-1%	IIc	I	7C	Clay Loan	
17A1	Willacy sandy clay loam	1-3%	IIe	IIe	70	Clay Loam	
17B1	Willary sandy clay loam	0-1%	IIw	IIw	7C	Clay Loam	
18A1	Racombes sandy clay loam	0-1%	IVs	IVs	7G	Salty Prairie	
20A1	Racombes sandy clay loam, saline	0-1%	IVw	(****)	7E	Lakebed	
21A1	Mercedes clay, depressional	2-8%	VIIe			Local Determination	
24BD	Gullied land, saline	0-1%	IIc	I	80	Sandy Loam	
25A1	Czar fine sandy loam	1-3%	IIe	Ile	80	Sandy Loam	
25B1	Czar fine sandy loam	0-1%	VIW	10 000	7F	Salty Bottomland	
28A1	Aransas clay, saline	0-1%	Vw	VW	2A	Loamy Bottomland	
33A1		0-1%	Vw	Vw	1A	Clayey Bottomland	
36A1	Aransas clay, freq. flooded	0-1%	IIs	IIw	8A	Tight Sandy Loam	
38A1	Papalote fine sandy loam	1-3%	IIe	IIe	88	Tight Sandy Loam	
\B1		3-5%	IVe	IVe	8A	Tight Sandy Loam	
. 71	7	3-5%	VIe		8A	Tight Sandy Loam	
38C3	Miguel fine sandy loam, gullied	0-1%	VIS		7F	Salty Prairie	
39A1	Narta fine sandy loam	0-1%	IIs	IIw	88	Tight Sandy Loam	
40A1	Delfina fine sandy loam	1-3%	IIIe	IIe	8A	Tight Sandy Loam	
40B1	Delfina fine sandy loam	0-1%	IVs		7F	Salty Prairie	
43A1	A STATE OF THE STA	0-1%	IIc	I	80	Gray Sandy Loas	
49A1	Hidalgo fine sandy loam	1-3%	Ile	IIe	8C	Gray Sandy Loam	
49B1	. Hidalgo fine sandy loam	3-5%	IIIe	IIIe	80	Gray Sandy Loam	0.7
4901		3-5%	IVe		8C	Gray Sandy Loam	
49C	Hidalgo fine sandy loam, gullied	0-1%	Ilc	1	80	Sandy Loam	
50A:	Willacy fine sandy loam	1-3%	IIe	IIe	8C	Sandy Loam	18
50B	Willacy fine sandy loam	1-5%	IIIe		8C	Sandy Loam	
50BI	Willacy fine sandy loam, gullied	3-5%	Ille	IIIe	8C	Sandy Loam	
50C		1-3%	IIe	Ile	BC.	Sandy Loam	
51B	1 Runge fine sandy loam	0-1%	IIIw	IIIw	7E	Rawadero	
59A	1 Papagua soils	0-3%	IIIe	IIIe	98	Loamy Sand	
68A	B1 Papalote loamy fine sand	0-3%	IVe		98	Loamy Sand	
68A	B3 Papalote loamy fine sand, gullied	3-5%	IIIe	IIIe	9A	Loamy Sand	
680		0 ,, 2x	; [[le·	. lile			
	B1 Delfina loamy fine sand	0−5×		. Ike	90	Loamy Sand	
74B		0-3%	. IIIn-	LAILLe	- 98	Sandy	
79F	B1 Leming loamy fine sand	0-5%	IVe	IVe	9A	Sandy	
80F	C1 Nueces fine sand	0-5%	VIIe		9B	Sand Hill	
	C1 Falfurrias fine sand	0-5×	IVe/V				
	C1 Nueces-Sarita fine sand		Vle	IVe IVe/I	9B	Sandy	
746	AC1 Sarita fine sand	0-5%			98/9		Sand
	AC1 Galveston-Mustang fine sand	0-5%	VIe/V	/IW	14A	Shallow Sandy Loam	
94	AB1 Lacoste fine sandy loam	0-3%	10222		170		
991	3D1 Psamments (Coastal Dunes)	1-8%	Contract March		7E	Claypan Prairie	
10	OA1 Orelia fine sandy loam, depressional	0-1%			75	Local Determination	
	01 Gullied Land	1-8%				LOCAL DEVELORISM	
	03 Tatton soils	0-1%			100	m ==	
92	- L- (CL-1 Darah)	D-1%	VIII	5			

http://www.statlab.iastate.edu/soils/osd/dat/H/HIDALGO.htm

LOCATION HIDALGO

TX

Established Series Rev. CLG:CMT:JLJ 12/78

HIDALGO SERIES

The Hidalgo series consists of deep, well drained, moderately permeable soils that formed in calcareous loamy sediments. These soils are on nearly level to gently sloping uplands. Slopes range from 0 to about 5 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Typic Calciustolls

TYPICAL PEDON: Hidalgo sandy clay loam--cropland. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 9 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak subangular blocky and granular structure; hard, friable; few small fragments of shell; calcareous; moderately alkaline; clear smooth boundary. (5 to 9 inches thick)

A1--9 to 17 inches; dark grayish brown (10YR 4/2) sandy clay loam; very dark grayish brown (10YR 3/2) moist; weak subangular blocky structure; hard, friable; many fine and very fine pores; few earthwormcasts; calcareous; moderately alkaline; diffuse

few earthwormcasts; calcareous; moderately alkaline; diffuse smooth boundary. (6 to 10 inches thick)

B2--17 to 28 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, friable; many fine and very fine pores; few threads and

films of segregated calcium carbonate; few earthwormcasts; few fragments of snail shell; calcareous; moderately alkaline; diffuse smooth boundary. (7 to 16 inches thick)

B2ca--28 to 38 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; weak subangular blocky structure; hard, friable; many fine and very fine pores; few fragments of snail

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shell; about 10 percent by volume of soft bodies of calcium carbonate; calcareous; moderately alkaline; diffuse smooth boundary. (8 to 16 inches thick)

Cca--38 to 85 inches; very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; massive; hard, friable; many fine and very fine pores; few fragments of snail shell; about 10 percent by volume of soft bodies of calcium carbonate.

TYPE LOCATION: Hidalgo County, Texas; 1.8 miles northwest of Donna, Texas; in a cultivated field, 300 feet west of county road and 1.3 miles north of its intersection with U. S. Highway 83; this intersection is 1.1 miles (via U. S. 83) west of Main Street in Donna.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 30 to 50 inches. Secondary lime in the form of films and threads or soft masses occur at depths ranging from 12 to 28 inches. Electrical conductivity in most pedons ranges from 1 to 4 millimhos per cm, but in some saline pedons the range is up to about 16 millimhos.

The A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3, 5/3). Moist values are less than 3.5. It is sandy clay loam or fine sandy loam.

The B horizon is brown (10YR 5/3; 7.5YR 5/4), pale brown (10YR 6/3), light brownish gray (10YR 6/2), light brown (7.5YR 6/4), or grayish brown (10YR 5/2). It is sandy clay loam or clay loam with clay range of 23 to 35 percent.

The C horizon is very pale brown (10YR 7/3), pale brown (10YR 6/3), light brownish gray (10YR 6/2), brown (7.5YR 5/4), light brown (7.5YR 6/4), or light gray (10YR 7/2). The C horizon is sandy clay loam or clay loam, with 5 to 35 percent of weakly cemented concretions and soft bodies of calcium carbonate.

COMPETING SERIES: These are the <u>Castroville</u>, <u>Engle</u>, <u>Raymondville</u>, <u>Uvalde</u>, and <u>Venus</u> series. Castroville and Uvalde soils have fine-silty 10 to 40 inch control sections. In addition, Uvalde soils are dry in the moisture control section for longer periods. Engle and Venus soils have mean annual soil temperatures less than

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72 degrees F. Raymondville soils have more than 35 percent clay in the 10 to 40 inch control section.

GEOGRAPHIC SETTING: Hidalgo soils are on nearly level to gently sloping deltas or coastal terraces. Slope gradients are mostly less than 2 percent, but range up to about 5 percent. The soil formed in moderately fine textured calcareous sediments. The climate is subtropical. The average annual precipitation range from 24 to 32 inches, the mean annual temperature about 74 degrees F., and Thornthwaite annual P-E indices range from 28 to 38.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the competing <u>Raymondville</u> series and the <u>Brennan</u> and <u>Willacy</u> series. Brennan and <u>Willacy</u> soils have Bt horizons and are noncalcareous in the upper part of the solum. These soils occur on similar surfaces.

DRAINAGE AND PERMEABILITY: Well drained; slow runoff; moderate permeability. When irrigated, water may accumulate at depths of 4 to 8 feet below the surface.

USE AND VEGETATION: Much of this soil is cleared, cultivated, and irrigated. Irrigated crops are cotton, grain sorghum, vegetables, sugar cane, and citrus. Dryland farming is practiced in some areas. Native grasses are four-flower trichloris, Arizona cottontop, lovegrass tridens, plains bristlegrass, and hooded windmillgrass, and there is an overstory of a wide variety of thorny shrubs and prickly pear.

DISTRIBUTION AND EXTENT: Rio Grande Plain of Texas and possibly Mexico. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Hidalgo County, Texas; 1925.

REMARKS: Formerly classified in the Calcisol great soil group.

National Cooperative Soil Survey U. S. A.

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http://www.statlab.iastate.edu/soils/osd/dat/H/HIDALGO.htm

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http://www.statlab.iastate.edu/soils/osd/dat/R/RACOMBES.html

LOCATION RACOMBES

TX

Established Series Rev. CLG:JLJ:FEM 9/82

RACOMBES SERIES

The Racombes series consists of deep, moderately well drained, moderately permeable soils that formed in thick alkaline sediments. These soils are on nearly level deltaic coastal terraces that have plane or concave surfaces. Water runs off the surface at a slow or medium rate. Slope is less than 1 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Pachic Argiustolls

TYPICAL PEDON: Racombes sandy clay loam--irrigated cropland. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 6 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable; many fine pores; mildly alkaline; clear smooth boundary. (5 to 9 inches thick)

A1--6 to 13 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; moderate fine subangular blocky structure; slightly hard, friable; many fine pores; mildly alkaline; clear smooth boundary. (5 to 18 inches thick)

Bt1--13 to 25 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium blocky structure; hard, friable; many fine pores; clay films on surfaces of peds; mildly alkaline; clear smooth boundary. (8 to 24 inches thick)

Bt2--25 to 37 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium blocky; very hard, firm; common pores; patchy clay films on surfaces of peds; mildly alkaline; clear smooth boundary. (10 to 17 inches thick)

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http://www.statlab.iastate.edu/soils/osd/dat/R/RACOMBES.htm

Bw--37 to 49 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; few faint strong brown (10YR 5/6) mottles; weak subangular blocky structure; hard, friable; calcareous; moderately alkaline; gradual smooth boundary. (12 to 24 inches thick)

Ck1--49 to 65 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; few faint strong brown (10YR 5/6) mottles; structureless; hard, friable; common soft bodies and concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (12 to 16 inches thick)

Ck2--65 to 72 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; structureless; common soft bodies and concretions of calcium carbonate; calcareous; moderately alkaline.

TYPE LOCATION: Hidalgo County, Texas; about 3.5 miles east of the intersection of Farm Road 107 and Farm Road 491 at La Villa, Texas, then 0.6 mile north on county road to field road, then 0.4 mile east on field road and 75 feet south of road in field.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to 60 inches. The mollic epipedon ranges from 20 to 44 inches thick. Depth to secondary carbonates ranges from 24 to 50 inches. Electrical conductivity is 1 to 4 mmhos/cm in most pedons, but ranges from 4 to 16 mmhos/cm in saline pedons.

The A horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or dark gray (10YR 4/1). It is loam or sandy clay loam with clay content ranging from 16 to about 28 percent. It is neutral or mildly alkaline.

Weighted average clay content of the Bt horizon ranges from 26 to 34 percent. Texture is sandy clay loam or clay loam. Clay films are thin and patchy to nearly continuous on both horizontal and vertical surfaces of peds. Structure is weak to moderate fine or medium blocky. Weak to moderate medium or coarse prisms occur in some pedons.

The Bt1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), very dark gray (10YR 3/1), dark gray (10YR 4/1), grayish brown (10YR 5/2), dark brown (10YR 4/3, 3/3), or brown (10YR 5/3). It ranges from neutral to moderately

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http://www.statlab.iastate.edu/soils/osd/dat/R/RACOMBES.htm

alkaline.

The Bt2 horizon is dark grayish brown (10YR 4/2), brown (10YR 5/3; 7.5YR 5/2, 5/4), grayish brown (10YR 5/2), pale brown (10YR 6/3), or yellowish brown (10YR 5/4). It is mildly alkaline or moderately alkaline.

The Bw is grayish brown (10YR 5/2), brown (10YR 5/3; 7.5YR 5/4), light brownish gray (10YR 6/2), light brown (7.5YR 6/4), or pale brown (10YR 6/3). In some pedons this horizon contains secondary calcium carbonate and is designated as a Bk horizon.

The C horizon is light brown (7.5YR 6/4), pink (7.5YR 7/4), reddish yellow (7.5YR 6/6, 7/6), very pale brown (10YR 7/3, 7/4, 8/4), or pale brown (10YR 6/3). It is sandy clay loam or clay loam. Weakly cemented concretions and soft bodies of calcium carbonate range from about 3 to 15 percent by volume.

COMPETING SERIES: These include <u>Altus</u>, <u>Bippus</u>, <u>Bosque</u>, <u>Christine</u>, <u>Clareville</u>, <u>Cuero</u>, <u>Czar</u>, <u>Medley</u>, <u>Ramadero</u>, <u>Rio</u>, <u>Sinton</u>,

<u>Smithville</u>, and <u>Tordia</u> series. Altus, Bippus, Bosque, Medley, and Smithville soils have mean annual soil temperatures less than 72 degrees F. Clareville, Rio, and Tordia soils have more than 35 percent clay in their control sections. Christine soils have < 4 mmhos/cm conductivity in the Bt horizons. Cuero soils are moist in the moisture control section for longer periods of time. Czar soils have from 18 to 26 percent clay in the B2t horizon.

Ramadero and Sinton soils lack Bt horizons.

GEOGRAPHIC SETTING: Racombes soils are on nearly level deltaic or coastal terraces with plane to concave surfaces having gradients less than 1 percent. The soil formed in alkaline sediments 8 to 10 feet thick. The climate is subtropical with a mean annual precipitation of 23 to about 30 inches. The mean annual temperature is 70 to 74 degrees F., and the Thornthwaite annual P-E index is 22 to about 40.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the competing Rio series, and Hidalgo, Lyford, Raymondville, and Willacy series which occur in the adjacent uplands. Hidalgo, Lyford, Raymondville, and Willacy soils have a mollic epipedon less than 20 inches thick; in addition, Raymondville soils have more than 35 percent clay in their

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http://www.statlab.iastate.edu/soils/osd/dat/R/RACOMBES.htm

control sections.

DRAINAGE AND PERMEABILITY: Moderately well drained; slow to medium runoff; moderate permeability. In irrigated areas a water table may occur at depths of 3 to 8 feet during the spring and fall. After cyclonic storms or periods of extremely heavy rainfall the soils may pond or flood for short periods.

USE AND VEGETATION: Used mostly for irrigated cropland. Main crops are cotton, grain sorghum, citrus, and winter vegetables. Native grasses consist of fourflower trichloris, plains bristlegrass, Arizona cottontop, windmillgrass, whorled dropseed, and threeawn. Woody vegetation is mesquite trees and other thorny brush.

DISTRIBUTION AND EXTENT: Eastern portion of the Rio Grande Plain of Texas, and probably in Mexico. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Cameron County, Texas; 1974.

REMARKS: These soils were formerly included with the Ramadero series.

National Cooperative Soil Survey U. S. A.

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Official Series Description - WILLACY Series

http://www.statlab.iastate.edu/soils/osd/dat/W/WILLACY.htm

LOCATION WILLACY

TX

Established Series Rev. CLG:JLJ 2/83

WILLACY SERIES

The Willacy series consists of deep, well drained, moderately permeable soils that formed in alkaline loamy sediments. The soils are on nearly level to moderately sloping uplands. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Udic Argiustolls

TYPICAL PEDON: Willacy fine sandy loam--cultivated. (Colors are for dry soil unless otherwise stated.)

Ap-=0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard; friable; mildly alkaline; abrupt smooth boundary. (5 to 9 inches thick)

A--7 to 14 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular and subangular blocky structure; slightly hard, friable; many fine and very fine pores and root channels; mildly alkaline; clear smooth boundary. (6 to 11 inches thick)

Bt1--14 to 19 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic breaking to weak fine subangular blocky structure; slightly hard, friable; many fine pores and root channels; patchy clay films on faces of prisms and in pores; many insect channels; mildly alkaline; clear wavy boundary. (4 to 9 inches thick)

Bt2--19 to 36 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic breaking to weak fine subangular blocky structure; hard, friable; many fine O-11

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Official Series Description - WILLACY Series

http://www.statlab.iastate.edu/soils/osd/dat/W/WILLACY.htm

pores and root channels; patchy clay films on faces of prisms and in pores; mildly alkaline; clear wavy boundary. (13 to 20 inches thick)

Bk--36 to 42 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable; few films and threads and few soft bodies of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (4 to 11 inches thick)

Ck1--42 to 52 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; structureless; hard, friable; common fine and very fine pores; 5 percent of soft bodies and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (8 ?o 16 inches thick)

Ck2--52 to 74 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; structureless; hard, friable; 4 percent of soft bodies and strongly cemented concretions of calcium carbonate; calcareous; moderately alkaline.

TYPE LOCATION: Cameron County, Texas; 11.0 miles north 30 degrees west of Harlingen. In a cultivated field 135 feet north and 215 feet west of the southeast corner of Block 16, Combes Subdivision, which is 1.0 mile east of U.S. Highway 77 on a county road. (Intersection of county road and U.S. Highway 77 is 1.0 mile south of Willacy-Cameron County line.)

RANGE IN CHARACTERISTICS: Solum thickness ranges from 39 to 60 inches, and secondary lime occurs at depths of 36 to 50 inches below the surface. Salinity ranges from none to as much as 8 mmhos/cm in areas irrigated with saline water.

The A horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). Moist values are less than 3.5. The A horizon is fine sandy loam, loam, or sandy clay loam, and the reaction is neutral or mildly alkaline.

The B horizons are dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), dark brown (10YR 4/3), or brown (10YR 5/3). Some pedons are light brownish gray (10YR 6/2) or pale brown (10YR

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Official Series Description - WILLACY Series

http://www.statlab.iastate.edu/soils/osd/dat/W/WILLACY.htm

6/3) in the lower part. They are fine sandy loam or sandy clay loam; clay content ranges from 18 to 33 percent. Structure of the B horizons ranges from weak to moderately prismatic and subangular blocky. Reaction is neutral or mildly alkaline in the upper part of the B horizon and moderately alkaline in the lower part.

The C horizon is pale brown (10YR 6/3) very pale brown (10YR 7/3) or light brownish gray (10YR 6/2). Visible accumulation of calcium carbonate in the C horizon ranges from 3 to 5 percent by volume and remains relatively constant with depth.

Competing Series: There are no series in the same family.

Similar soils include Brennan, Clareville, Cuero, Czar, Duval,

Klump, Parasol, Ramadero, Stoneburg, and Tela series. Brennan
and Duval soils contain less than 1 percent organic matter in the epipedon. Clareville,
Cuero, Czar, and Ramadero soils have
mollic epipedons thicker than 20 inches. Klump and Stoneburg
soils have mean annual soil temperatures less than 72 degrees F. Parasol soils have a
difference of less than 9 degrees F. between mean summer and mean winter soil
temperatures. Tela soils
contain secondary lime at depths less than 34 inches.

GEOGRAPHIC SETTING: Willacy soils occur in nearly level coastal terraces and deltas with slope gradients mostly less than 2 percent but range up to about 5 percent along local drainageways. The soil formed in alkaline, loamy sediments 10 feet or more deep. The climate is dry subhumid. Average annual precipitation ranges from 26 to 34 inches and the mean annual air temperature ranges from 72 to 74 degrees F. Annual Thornthwaite P-E index ranges from 28 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These include Hargill, Hidalgo, Racombes, and Raymondville series. Hargill soils have sola more than 60 inches thick. Hidalgo and Raymondville soils are calcareous throughout and in addition, Raymondville soils have more than 35 percent clay in the 10- to 40-inch control section. Racombes soils have mollic epipedons more than 20 inches thick.

All these soils occur on similar surfaces.

Drainage and Permeability: Well drained; medium runoff; moderate permeability. Under

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Official Series Description - WILLACY Series

http://www.statlab.iastate.edu/soils/osd/dat/W/WILLACY.html

irrigation, seasonal watertables accumulate 5 to 8 feet below the surface.

USE AND VEGETATION: Mostly cultivated and mostly irrigated. Few areas in native rangeland. Use for wide variety of vegetables, citrus, cotton, grain sorghums, and flax. In rangeland, the grasses are mostly fourflower trichloris, Arizona cottontop, lovegrass tridens, plains bristlegrass, hooded windmillgrass, and hairy grama. Woody vegetation consists of mesquite and Texas ebony trees, and spiny hackberry, blackbrush, catclaw, lote, brazil, and pricklypear.

DISTRIBUTION AND EXTENT: Mainly within the lower Rio Grande Plain and Gulf Coast Prairies in southern Texas. Possibly in Mexico. Series is of moderate extent comprising about 90,000 acres.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Hidalgo County, Texas; 1925.

REMARKS: Limited laboratory data available from ARS-SCS cooperative study.

National Cooperative Soil Survey U. S. A.

Part III, Attachment 4, Appendix 1, p.g. 726

Official Series Description - RUNGE Series

http://www.statlab.iastate.edu/soils/osd/dat/R/RUNGE.htr

LOCATION RUNGE

TX

Established Series Rev. CLG:GLL 10/79

RUNGE SERIES

The Runge series consists of deep, moderately permeable, well drained soils that have formed in loamy soil materials. These nearly level to gently sloping soils are on uplands and stream terraces. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Typic Argiustolls

TYPICAL PEDON: Runge fine sandy loam -- rangeland. (Colors are for dry soil unless otherwise stated.)

A1--0 to 14 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, very friable; many fine roots; few insect tunnels; neutral; gradual smooth boundary. (6 to 16 inches thick)

B21t--14 to 18 inches; reddish brown (5YR 5/3) sandy clay loam, reddish brown (5YR 4/3) moist; moderate medium prismatic parting + weak subangular blocky structure; slightly hard, friable; few fine roots; few fine pores; few worm casts; common clay films and dark coatings on prisms; neutral; gradual smooth boundary. (3 to 10 inches thick)

B22t--18 to 34 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic parting to weak fine subangular blocky structure; hard, friable; slightly sticky; common fine and medium pores; few patchy clay films and dark coatings on prisms and exteriors of peds; few fine soft masses and concretions of calcium carbonate below 30 inches; noncalcareous; mildly alkaline; gradual smooth boundary. (11 to 25 inches thick)

B3--34 to 55 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; hard, friable; slightly sticky; many fine and medium pores; few fine soft masses and concretions of calcium carbonate; matrix noncalcareous; moderately alkaline; gradual smooth boundary. (8 to 25 inches thick)

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Official Series Description - RUNGE Series

http://www.statlab.iastate.edu/soils/osd/dat/R/RUNGE.htm

Cca--55 to 72 inches; reddish yellow (7.5YR 8/6) sandy clay loam, reddish yellow (7.5YR 7/6) moist; structureless; slightly hard, friable; about 5 percent by volume of concretions and soft masses of calcium carbonate; calcareous; moderately alkaline.

TYPE LOCATION: Jim Wells County, Texas; 1 mile south of Ben Bolt on U. S. Highway 281, 1.7 miles west on a graded road, 1 mile south of road and 100 feet west of Hoffman ranch east boundary fence. This point is 2.7 miles southwest of Ben Bolt, Texas.

RANGE IN CHARACTERISTICS: Solum thickness is 40 to 60 inches. The mollic epipedon is 10 to 18 inches thick and includes the upper part of the argillic horizon in some pedons. Depth to secondary carbonates is 20 to 36 inches.

The A horizon has hue of 7.5YR and 10YR, value of 3 to 5, chroma of 2 or 3. It is fine sandy loam or loam and slightly acid through mildly alkaline.

The Bt horizon has hue of 5YR and 7.5YR, value of 4 to 7, chroma of 2 to 8. Colors as in the A horizon are included in the upper Bt horizon of some pedons. It is sandy clay loam or clay loam with clay content of 22 to 35 percent. Reaction is neutral through moderately alkaline.

The B3 and Cca horizons are yellowish or brownish sandy clay loam, clay loam, or loam and moderately alkaline. Threads, films, soft masses and concretions of calcium carbonate range from 0 to 5 percent in the B3 horizon and from 5 to 15 percent in the Cca horizon.

COMPETING SERIES: These include he <u>Bukreek</u>, <u>Cuero</u>, <u>Lyford</u>, <u>Ramadero</u> and <u>Tela</u> series. Bukreek soils have mean annual soil temperatures less than 72 degrees F. Cuero and Ramadero soils have mollic epipedons more than 20 inches thick. Lyford soils have an epipedon that is very hard when dry. Tela soils have hue of 10YR in the Bt horizon.

GEOGRAPHIC SETTING: Runge soils occur on nearly level to sloping uplands and streams terraces. Slope gradients are convex and dominantly less than 3 percent but range up to 5 percent in a few places. The soil formed in loamy calcareous materials derived from sandstone or alluvium. Average annual precipitation ranges from about 24 to 35 inches and mean annual temperature ranges from 70 degrees to 74 degrees F. Annual Thornthwaite P-E index is 30 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the <u>Clareville</u>, <u>Goliad</u>, <u>Hidalgo</u>, and <u>Willacy</u> soils. Clareville and Goliad soils have more than 35 percent clay in their control sections. Hidalgo soils lack Bt horizons. Willacy soils lack secondary calcium

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Official Series Description - RUNGE Series

http://www.statlab.iastate.edu/soils/osd/dat/R/RUNGE.html

carbonate within 36 inches.

DRAINAGE AND PERMEABILITY: Well drained; medium runoff; moderate permeability.

USE AND VEGETATION: Most of this soil is in cropland, but a few areas are in rangeland and improved pastures. Native grasses are mainly four-flower trichloris, Arizona cottontop, tanglehead, sideoats grama, plains bristlegrass, hooded windmillgrass, and pinhole bluestem. Woody vegetation consists of mesquite, spiny hackberry, desert yaupon, catclaw, elbowbush, limepricklyash, and pricklypear.

DISTRIBUTION AND EXTENT: Inner Coastal Bend in eastern part of Rio Grande Plain. Series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Wilson County, Texas; 1972.

REMARKS: The Runge soils were formerly classified in the Reddish Chestnut great soil group.

National Cooperative Soil Survey U. S. A.

Official Series Description - CZAR Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-!

LOCATION CZAR

TX

Established Series Rev. CLG:LCB 11/86

CZAR SERIES

The Czar series consists of deep, well drained moderately permeable soils that formed in loamy sediments. These soils are on nearly level to gently sloping uplands. Slopes range form 0 to 3 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Pachic Argiustolls

TYPICAL PEDON: Czar fine sandy loam--rangeland. (Colors are for dry soil unless otherwise stated.)

A1--0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many fine and medium roots; common horizontal streaks of brown (10YR 5/3) sand grains; neutral; abrupt smooth boundary. (0 to 5 inches thick)

A2--3 to 13 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular and weak fine subangular blocky structure; hard, friable; common fine roots; few fine pores; few wormcasts; neutral; clear smooth boundary. (6 to 15 inches thick)

Bt1--13 to 22 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; hard, friable, few fine roots and pores; thin patchy clay films on faces of peds; moderately alkaline; clear smooth boundary. (4 to 10 inches thick)

Bt2--22 to 34 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak medium prismatic parting to weak medium subangular blocky structure; hard, firm, few fine roots and pores; thin patchy clay films on vertical faces of prisms and on peds; few insect and animal burrows filled with dark brown (10YR 4/3) material; moderately alkaline; gradual smooth boundary. (8 to 22 inches thick)

Bk1--34 to 47 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, friable; few fine pores; 1 to 2 percent soft bodies of calcium carbonate; calcareous, moderately alkaline; gradual smooth boundary. (0 to 11 inches thick)

Bk2--47 to 68 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; massive; hard, friable; estimated 3 to 4 percent soft bodies and concretions of calcium carbonate; calcareous, moderately alkaline.

TYPE LOCATION: Jim Wells County, Texas; 1.6 miles south on U.S. Highway 281 from its intersection with State Highway 141, 0.3 mile west through ranch gate, 0.3 mile north along highline, 50 feet east into pasture. This site is about 16 miles south of Alice.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 40 to more than 60 inches. Depth to secondary carbonates ranges from 20 to 36 inches. Thickness of the mollic epipedon ranges

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Official Series Description - CZAR Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-]

from 20 to 30 inches.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. Texture is sandy clay loam or fine sandy loam. Clay content ranges from 18 to 28 percent. Reaction is mildly or moderately alkaline.

The Bk1 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. Texture is sandy clay loam or fine sandy loam. It is moderately alkaline and calcareous. Soft bodies and concretions of calcium carbonate range from 1 to 5 percent.

The Bk2 horizon has hue of 10YR or 7.5YR, value of 6 to 8, and chroma of 2 to 8. Texture is sandy clay loam or fine sandy loam. It is moderately alkaline and calcareous. Soft bodies and concretions of calcium carbonate range from 3 to 15 percent. Some pedons have a BC horizon below the Bk horizon.

COMPETING SERIES: These include the <u>Christine</u> and Racomes series in the same family and the similar <u>Bosque</u>, <u>Clareville</u>, <u>Cuero</u>, <u>Ramadero</u>, <u>Sinton</u>, and <u>Smithville</u> series. Christine soils have more than 4 percent exchangeable sodium and more than 4mmhos conductivity in the upper Bt horizon. Racomes soils have more than 25 percent clay in their control section and have secondary carbonates at depths greater than 36 inches. Bosque, Cuero and Smithville soils have mean annual temperatures less than 72 degrees F. Clareville soils are in a fine family. Ramadero and Sinton soils lack Bt horizons.

GEOGRAPHIC SETTING: Czar soils occupy nearly level to gently sloping uplands. Slope gradients range from 0 to 3 percent and surfaces are plane to convex. The soil formed in calcareous loamy sediments of Pleistocene and Holocene Age. Some areas flood during cyclonic storms. Mean annual temperature is 70 degrees to 74 degrees F., mean annual precipitation is 23 to 32 inches, and the Thornthwaite annual P-E index is 28 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing <u>Clareville</u>, <u>Racombes</u>, and <u>Sinton</u> series, and the <u>Delfina</u>, <u>Orelia</u>, <u>Papalote</u>, <u>Pharr</u>, and <u>Runge</u> series. Delfina, Orelia, and Papalote soils lack a mollic epipedon. Pharr and Runge soils have a mollic epipedon less than 20 inches thick.

DRAINAGE AND PERMEABILITY: Well drained; slow to medium surface runoff; moderate permeability.

USE AND VEGETATION: Used about equally as cropland, pastureland, and rangeland. The major crop is grain sorghum. Improved pastures are coastal bermuda and buffelgrass. Native grasses are mainly two and four-flower trichloris, hooded windmillgrass, Wrights threeawn, and plains bristlegrass. Woody vegetation includes scattered mesquite, spiny hackberry, and pricklypear.

DISTRIBUTION AND EXTENT: East central Rio Grande Plain and southern Gulf Coast Prairie of Texas. The series is moderately extensive.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Jim Wells County, Texas; 1976.

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Official Series Description - CZAR Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-I

REMARKS: Formerly classified in the Reddish Prairie great soil group and included in the Willacy series.

Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - 0 to 22 inches

Argillic horizon - 13 to 34 inches

Secondary Carbonates - at 34 inches

National Cooperative Soil Survey U. S. A.

Official Series Description - DELFINA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-]

LOCATION DELFINA

TX

Established Series Rev. CLG:JLJ:LCB 11/86

DELFINA SERIES

The Delfina series consists of deep, moderately well drained, moderately slowly permeable soils that formed in loamy sediments. The soils are on nearly level to gently sloping uplands. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Aquic Paleustalfs

TYPICAL PEDON: Delfina fine sandy loam--irrigated citrus. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable; common fine roots; neutral; abrupt wavy boundary. (5 to 9 inches thick)

A1--7 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist massive; hard, friable; few fine roots and pores; neutral; clear smooth boundary. (5 to 10 inches thick)

Bt1--15 to 20 inches; dark brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; dark yellowish brown (10YR 4/4) moist when crushed; common fine distinct yellowish red (5YR 4/6) grayish brown (5YR 5/2), and strong brown (7.5YR 5/6) mottles; strong fine and medium blocky structure; extremely hard, firm; few fine and medium roots; common very fine pores; thick continuous clay films and dark coatings on vertical and horizontal surface of peds; organic coatings are very dark brown (10YR 2/2) moist; few fine black and brown concretions; neutral; gradual wavy boundary. (3 to 10 inches thick)

Bt2-20 to 33 inches; brown (7.5YR 5/2) sandy clay loam, dark brown (7.5YR 4/2) moist; common medium distinct yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) mottles; moderate fine and medium blocky structure; extremely hard, firm; few fine roots; few fine pores; thick continuous clay films and very dark brown (10YR 2/2) coatings on vertical and horizontal surfaces of peds; common fine black and brown concretions; neutral; gradual wavy boundary. (10 to 15 inches thick)

Bt3--33 to 47 inches; light brown (7.5YR 6/4) sandy clay loam, dark brown (7.5YR 4/4) moist; few faint grayish brown mottles; weak fine subangular blocky structure; hard, friable; few very fine pores; thick patchy clay films; mildly alkaline; clear wavy boundary. (5 to 14 inches thick)

Btk--47 to 87 inches; reddish yellow (7.5YR 7/6) sandy clay loam, reddish yellow (7.5YR 6/6) moist; weak fine subangular blocky structure; hard, friable; few very fine pores; thin patchy clay films; 3 to 5 percent, by volume, soft bodies and hard concretions of calcium carbonate; few skeletons of clean sand in lower part; calcareous; moderately alkaline.

0-20

6/17/98 3:24 I

Official Series Description - DELFINA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-;

TYPE LOCATION: Willacy County, Texas; 8 miles west of Raymondville on Texas Hwy 186; 2.8 miles south on Farm Road 1015; 0.7 miles west on County Road; then 350 feet south and 100 feet east, in citrus orchard.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 60 to 90 inches. Secondary lime occurs at depths of 36 to 80 inches.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is fine sandy loam or loamy fine sand, and is slightly acid to mildly alkaline. Organic matter content is less than 1 percent.

The Bt or 2Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6 with few to common distinct and faint mottles of brown, gray, and red, chromas of 1 through 8. Peds with matrix chroma of 3 or more have mottles with chroma of 2 or less. The Bt horizon is sandy clay loam or clay loam with a clay content of 25 to 35 percent. It is neutral to moderately alkaline. Structure ranges from moderate to strong blocky and subangular blocky.

The Btk horizon has hue of 10YR to 5YR, value of 5 to 7, and chroma of 2 to 8. Most pedons have common coarse mottles with chromas of 6 or 8. It is fine sandy loam or sandy clay loam. calcium carbonate in the Btca horizon ranges from a few concretions to about 5 percent by volume, and the calcium carbonate equivalent ranges from 5 to 15 percent.

COMPETING SERIES: There are no competing series in the same family. Similar soils are the Brystal, Delmita, Leming, Miguel, Nueces, and Papalote series. Brystal soils lack mottles with chroma 2 or less and are dry in the moisture control section for longer periods. Delmita soils have petrocalcic horizons at depths of less than 40 inches. Leming, Miguel, and Papalote soils have B2t horizons with more than 35 percent clay in the upper 20 inches. Nueces soils have sandy epipedons more than 20 inches thick.

GEOGRAPHIC SETTING: Delfina soils occupy nearly level to gently sloping uplands or old stream terraces. The soils formed in calcareous and loamy sediments. Slopes range from 0 to 5 percent, mostly less than 2 percent, and the surface is plane or convex. The climate is warm dry subhumid to semiarid. Mean annual precipitation ranges from 20 to 30 inches, mean annual air temperature ranges from 72 to 75 degrees F., and Thornthwaite P-E index ranges from 31 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Delmita, Miguel, Nueces, and Papalote series, and the Rio, Tiocano, and Willacy series. Rio and Willacy soils have mollic epipedons. Tiocano soils are poorly drained clays with intersecting slickensides.

DRAINAGE AND PERMEABILITY: Moderately well drained, slow to medium runoff; moderately slow permeability.

USE AND VEGETATION: Used primarily for irrigated and dry land crops, such as citrus, cotton, grain sorghum, and a wide variety of cool season vegetables. A small acreage is used for watermelons and peanuts. Native vegetation consists of trichloris, Arizona cottontop, pink pappusgrass, and crinkleawn. In eastern range of occurrence, some seacoast bluestem and brownseed paspalum grasses occur. Mesquite, granjeno, catclaw, tassajillo, and prickly pear are the principal woody plants.

DISTRIBUTION AND EXTENT: Southern Rio Grande Plain and Gulf Coast Prairie of Texas. The series is moderate in extent, probably about 75,000 acres.

Part III, Attachment 4, Appendix 1, p.g. 734

0-21

Official Series Description - DELFINA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Jim Hogg County, Texas; 1970

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - 0 to 15 inches

Argillic horizon - 15 to 80 inches

ADDITIONAL DATA: Data from Type Location S78TX-489-1, and pedon in Jim Wells Co. 378TX-249-1.

National Cooperative Soil Survey U. S. A.

Revision: 0

Part III, Attachment 4, Appendix 1, p.g. 735

Official Series Description - ORELIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-1

LOCATION ORELIA

TX

Established Series Rev. CLG:WJG 5/84

ORELIA SERIES

The Orelia series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in thick marine sediments on coastal terraces. These soils are on nearly level to gently sloping uplands. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, hyperthermic Typic Ochraqualfs

TYPICAL PEDON: Orelia fine sandy loam--rangeland. (Colors are for dry soil unless otherwise stated.)

A--0 to 5 inches; gray (10YR 5/1) fine sandy loam, dark gray (10YR 4/1) moist; massive; hard, friable; common fine roots; few fine pores and insect tunnels; slightly acid; abrupt smooth boundary. (2 to 8 inches thick)

Btg1--5 to 10 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate medium blocky; very hard, firm; common roots between peds; few patchy clay films on peds; neutral; clear smooth boundary. (3 to 8 inches thick)

Btg2--10 to 25 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; few fine dark root stains; weak coarse prismatic structure parting to moderate medium blocky; extremely hard, very firm; roots between peds; nearly continuous clay films on surfaces of peds; few fine FeMn concretions; mildly alkaline; gradual smooth boundary. (9 to 20 inches thick)

Bkzg--25 to 32 inches; gray (10YR 6/1) sandy clay loam, gray (10YR 5/1) moist; weak fine subangular structure; friable, very hard, slightly sticky; about 5 percent fine calcium carbonate concretions; moderately saline; calcareous; moderately alkaline; gradual smooth boundary. (5 to 30 inches thick)

Ckz-32 to 50 inches; light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist with a few fine faint yellowish brown mottles; massive; hard, friable; about 5 percent concretions and soft bodies of calcium carbonate; calcareous; strongly saline; moderately alkaline.

TYPE LOCATION: San Patricio County, Texas; from the intersection of U.S. Highway 181 and Farm Road 3089, 8.0 miles west on Farm Road 3089, 5.4 miles north on Farm Road 796 and 50 feet east in pasture.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 28 to 50 inches.

The A horizon is dark gray (10YR 4/1), gray (10YR 5/1), or grayish brown (10YR 5/2). It is fine sandy loam, clay loam, or sandy clay loam. Structure ranges from massive to weak fine subangular blocky and is hard setting. Reaction is slightly acid through mildly alkaline, the exchangeable sodium percentage is 3 to

0-23

Official Series Description - ORELIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-

about 8, and the soil salinity ranges from 0.4 to 4.0 millimhos per centimeter.

The Btg horizon is gray (10R 5/1), dark gray (10YR 4/1) or very dark gray (10YR 3/1), or it may be mottled with these colors. Common brownish and yellowish mottles occur in some pedons. It is sandy clay loam or clay loam with a clay content of 28 to 35 percent. Structure is coarse to medium prismatic or moderate to strong medium blocky. Reaction is neutral to moderately alkaline. The exchangeable sodium percentage is 6 to 14 and soil salinity is 1 to 8 mmilimhos per centimeter.

The Bk horizon is gray (10YR 5/1), light gray (10YR 7/2, 6/2), grayish brown (10YR 5/2) or white (10YR 8/2). It is sandy clay loam containing from a few to 10 percent of weakly and strongly cemented calcium carbonate concretions and soft bodies. The exchangeable sodium percentage is 12 to about 20 percent with values exceeding 15 percent at depths of more than 16 inches below the top of the Bt horizon.

The C horizon is light gray (10YR 6/1, 7/1, 7/2), white (10YR 8/2; 2.5Y 8/2), or light brownish gray (10YR 6/2) sandy clay loam or loam containing from 5 to 10 percent of concretions and soft bodies of calcium carbonate. The exchangeable sodium percentage of the Bk and C horizons ranges from about 12 to 20 and soil salinity ranges from 1 to 12 millimhos per centimeter.

COMPETING SERIES: These are no other series in this family. Similar soils include the <u>Bradenton</u>, <u>Clodine</u>, <u>Edna</u>, <u>Miguel</u>, <u>Tuckerman</u>, <u>Waller</u>, and <u>Wilson</u> series. Bradenton soils have less than 18 percent clay in the upper 20 inches of the Btg horizon. Clodine, Tuckerman, and Waller soils have sola more than 50 inches thick and have mean annual soil temperatures less than 72 degrees F. Edna, Miguel, and Wilson soils have more than 35 percent clay in the upper 20 inches of the B horizon and in addition, Edna and Wilson soils have mean annual soil temperatures less than 72 degrees F.

GEOGRAPHIC SETTING: Orelia soils occur on nearly level or slightly concave to gently sloping uplands and coastal terraces. Slopes are dominantly less than 0.2 percent, but range up to 3 percent. The soil formed in loamy sediments of about Pleistocene age. The climate is dry subhumid. The mean annual precipitation range is 25 to 30 inches and mean annual air temperature of 70 to 74 degrees F. Thornthwaite annual P-E index ranges from 30 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing <u>Miguel</u> series and the <u>Clareville</u>, <u>Edroy</u>, <u>Raymondville</u>, and <u>Victoria</u> series. Clareville, Raymondville, and Victoria soils are on similar surfaces. Clareville and Raymondville soils, as well as, Edroy soils, have mollic epipedons. Edroy soils are in depressions. Miguel soils have steeper slopes and are at higher elevations. Victoria soils have intersecting slickensides.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; slow runoff, very slow permeability. A perched water table occurs in the A and upper Btg horizons for periods up to 30 days during September or May.

USE AND VEGETATION: Approximately half of Orelia soils are cultivated to cotton, grain sorghum, and vegetables. Small areas are used for pasture and the balance used for rangeland. Native vegetation consists of curlymesquite, feather bluestem, fourflower, trichloris, grassbur, threeawn, mesquite trees, blackbrush, spiny hackberry, pricklypear, and tasajillo. Gulf cordgrass is the dominant grass in saline areas.

DISTRIBUTION AND EXTENT: Rio Grande Plain of southern Texas. The series is extensive.

Part III, Attachment 4, Appendix 1, p.g. 737

0-24

Official Series Description - ORELIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Frio County, Texas; 1929.

REMARKS: Diagnostic horizons and features recognized in this pedon are: Ochric epipedon - the zone from the surface of the soil to a depth of approximately 5 inches (A horizon). Argillic horizon - the zone from approximately 5 to 25 inches (Btg1, Btg2 horizons).

ADDITIONAL DATA: Characterization data available from Lincoln Laboratory Sample Numbers 5048 through 5056.

National Cooperative Soil Survey U. S. A.

Official Series Description - CLAREVILLE Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-

LOCATION CLAREVILLE

TX

Established Series Rev. ACT-CLN 9/97

CLAREVILLE SERIES

The Clareville series consists of very deep, well drained, moderately slowly permeable soils. These loamy soils formed in alluvial and colluvial sediments of Pleistocene age. These soils are on nearly level to gently sloping stream terraces. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Fine, smectitic, hyperthermic Pachic Argiustolls

TYPICAL PEDON: Clareville loam--cropland. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 5 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; hard, friable; slightly sticky; few fine roots; neutral; abrupt smooth boundary. (3 to 8 inches thick)

A--5 to 11 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure; hard, friable; sticky; few fine roots; few fine pores; neutral; clear smooth boundary. (4 to 8 inches thick)

Bt1--11 to 18 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky; few fine roots; many fine pores; few distinct clay films; slightly alkaline; gradual smooth boundary. (0 to 25 inches thick)

Bt2--18 to 25 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, firm, sticky; few fine roots; many fine pores; common distinct clay films; few wormcasts; slightly alkaline; gradual wavy boundary. (6 to 12 inches thick)

Btk--25 to 33 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium blocky structure; very hard, very firm, sticky; few fine roots; many fine pores; common distinct clay films; few masses of calcium carbonate; few wormcasts; slightly effervescent; moderately alkaline; gradual wavy boundary. (4 to 12 inches thick)

Bk1--33 to 38 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium blocky structure; very hard, very firm, sticky; few fine roots; few fine pores; many wormcasts; few masses and concretions of calcium carbonate; slightly effervescent; moderately alkaline; clear wavy boundary. (3 to 10 inches thick)

Bk2--38 to 46 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky; few fine roots; few fine pores; about 20 percent masses and concretions of calcium carbonate; strongly effervescent; moderately alkaline; gradual smooth boundary. (4 to 12 inches thick)

0-26

Official Series Description - CLAREVILLE Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi'

BCk--46 to 80 inches; very pale brown (10YR 8/3) loam, very pale brown (10YR 7/3) moist; weak coarse subangular blocky structure; hard, friable; few masses and concretions of calcium carbonate; slightly effervescent; moderately alkaline.

TYPE LOCATION: Jim Wells County, Texas; From the intersection of U.S. Highway 281 and Texas Highway 359 in Alice, 16 miles northeast on Texas Highway 359; 130 yards east of gas pipeline marker and right-of-way marker in cropland; (this point is 1.55 miles southwest of the intersection of Texas Highway 359 and Farm Road 624 in Orange Grove).

RANGE IN CHARACTERISTICS: Solum thickness ranges from 60 to 80 inches. The mollic epipedon is 20 to 50 inches thick. Depth to secondary calcium carbonate is 24 to 36 inches. Weighted average clay content of the upper 20 inches of the argillic horizon ranges from 35 to 45 percent.

The A horizon has hue of 10YR, value of 2 or 4, and chroma of 1 to 3. Texture is loam, clay loam or sandy clay loam. Reaction is neutral or slightly alkaline.

The Bt horizons have hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2. Texture is sandy clay loam, clay loam, sandy clay, or clay. Reaction is neutral or slightly alkaline.

The Btk and Bk horizons have hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 1 to 4. Value and chroma increases with depth. Texture is clay loam, sandy clay, or clay. Calcium carbonate equivalent ranges from 5 to 30 percent. Reaction is moderately alkaline.

The BCk horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 6. Calcium carbonate equivalent is 15 to about 50 percent. Texture is loam, clay loam, or sandy clay loam. Reaction is moderately alkaline.

COMPETING SERIES: There are no other series in this family. Similar soils include Abilene, Blanket, Cuero, Ramadero, Runge, and Smithville series. Abilene, Blanket, and Smithville soils have mean annual soil temperature of less than 72 degrees F. Cuero, Ramadero, Runge, and Smithville soils have a fine-loamy particle-size control section. In addition, Runge soils have a mollic epipedon less than 20 inches thick.

GEOGRAPHIC SETTING: Clareville soils are on nearly level to gently sloping stream terraces or broad valley fill positions. Slope gradients are dominantly 0 to 2 percent but range up to 5 percent. The soil formed in alluvium or colluvium mainly of Pleistocene age. Mean annual precipitation ranges from 25 to 34 inches. Mean annual temperature is 70 to 74 degrees F. Frost free days range from 250 to 300. Elevation ranges form 100 to 400 feet. Thornthwaite P-E indices range from 31 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Runge series and the Edroy, Hidalgo, Lattas, Orelia, Raymondville, Victoria, Weesatche, and Willacy series. Hidalgo, Orelia, and Willacy soils occur on similar surfaces. Edroy, Lattas, Raymondville, and Victoria soils are slightly lower in the landscape. Weesatche soils are slightly higher in the landscape. Edroy, Hidalgo, Raymondville, and Victoria soils do not have a Bt horizon. In addition, Edroy and Raymondville soils have COLE of more than 0.07. Orelia soils have an ochric epipedon. In addition, Orelia soils as well as Willacy soils have fine-loamy control sections. Lattas and Victoria soils are Vertisols. Willacy soils have a mollic epipedon less than 20 inches thick.

DRAINAGE AND PERMEABILITY: Well drained. Moderately slow permeability. Runoff is

0 - 27

Official Series Description - CLAREVILLE Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi

negligible on slopes of less than 1 percent, very low on 1 to 3 percent slopes, and low on 3 to 5 percent slopes.

USE AND VEGETATION: Used mainly as cropland but some areas are in rangeland. Cultivated crops are cotton, grain sorghum, and corn. Native grasses include Arizona cottontop, little bluestem, sideoats grama, curlymesquite, and Texas bristlegrass. Woody invaders are whitebrush, spiny hackberry, and mesquite.

DISTRIBUTION AND EXTENT: Central and Eastern part of the Rio Grande Plain and Gulf Coast Prairies of southern Texas (MLRA 83A, 83B, 83C, 150A). The series is moderately extensive.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Bee County, Texas; 1932.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon -- 0 to 25 inches

Argillic horizon -- 11 to 33 inches

Calcic horizon -- 25 to 64 inches

ADDITIONAL DATA: NSSL Lincoln lab. sample numbers 71L843-71L845 and 71L846-71L848 for mineralogy and particle size analyses and samples T2L207-T2L214 for particle size analyses and water content at 15 bars.

National Cooperative Soil Survey U.S.A.

Official Series Description - VICTORIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi?-

LOCATION VICTORIA

TX

Established Series Rev. CLG 02/97

VICTORIA SERIES

The Victoria series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey marine sediments. These soils are on nearly level to gently sloping marine terraces. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine, smectitic, hyperthermic Udic Pellusterts

TYPICAL PEDON: Victoria clay--cropland. (Colors are for dry soil unless otherwised stated.)

Ap--0 to 6 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; mulch of fine discrete aggregates on the surface; hard; firm, very plastic, and very sticky; many fine roots; few fine strongly cemented calcium carbonate concretions and snail shell fragments; calcareous; moderately alkaline; abrupt smooth boundary. (4 to 7 inches thick)

A1--6 to 12 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine and very fine angular blocky structure; very hard, very firm, very plastic, and very sticky; many fine roots; shiny pressure faces on surfaces of peds; few very fine calcium carbonate concretions calcareous, moderately alkaline; gradual wavy boundary. (4 to 18 inches thick)

A2--12 to 38 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; parallelepipeds tilted about 30 degrees from horizontal axis, parting to moderate fine and very fine angular blocky structure; very hard, very firm, very plastic and sticky; many fine roots; many vertical cracks 0.4 to 2 inches wide extending through lower boundary; common intersecting slickensides up to 3 feet across; few thin seams of uncoated sand grains in old closed cracks; calcareous; moderately alkaline; gradual wavy boundary. (22 to 34 inches thick)

Bkyz--38 to 60 inches; gray (10YR 6/1) clay, gray (10YR 5/1) moist, common dark gray (10YR 4/1) streaks along partially closed cracks; distinct parallelepipeds tilted 30 to 40 degrees from horizontal, which part to moderate fine angular blocky structure; extremely hard, very firm; common interesecting slickensides up to 3 feet across; few fine snail shell fragments, and fine calcium carbonate concretions; few fine seams of gypsum and threads of other salts in lower part; calcareous; moderately alkaline; gradual wavy boundary. (18 to 30 inches thick)

Ckyz--60 to 72 inches; light gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; massive to weak angular blocky structure; extremely hard, extremely firm; few fine calcium carbonate concretions and few threads and pockets of gypsum and other salts; saline; calcareous; moderately alkaline.

TYPE LOCATION: Nueces County, Texas; 1.8 miles S-SW of the intersection of U. S. Highway 77 and Texas Highway 44 in the east part of Robstown to an intersection with a hard surfaced road; then 2 miles east on hard surfaced road; and 2,640 feet south into cultivated field.

0-29

Official Series Description - VICTORIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi;

RANGE IN CHARACTERISTICS: The A and B horizons are clay or silty clay with a combined thickness of about 50 to 72 inches. Thickness of the A horizon in individual pedons varies from the microknolls to the microbasins being thinnest in the microknolls and thickest in the microbasins. The amplitude of the boundary between the A and B horizons ranges from about 20 to 40 inches. When dry, these soils have cracks 0.4 inches to about 3 inches wide that extent from the surface or from the base of an Ap horizon to the C horizon. The soils are calcareous except the A horizon is noncalcareous in the matrix to depths of 18 inches in some pedons in the microbasins. Salinity increases with depth and electrical conductivity of the saturation extract ranges from 0.5 to 4 mmhos/cm in the A horizons and from 1 to 8 mmhos/cm in the B and 4 to 16 in the C horizons. The clay content of the 10- to 40-inch control section ranges from about 45 to 60 percent.

The A horizon is dark gray (10YR 4/1), black (10YR 2/1), or very dark gray (10YR 3/1). Thickness of the A horizon ranges from 30 to about 50 inches in more than half of a pedon.

The B horizon is grayish brown (10YR 5/2), pale brown (10YR 6/3), light brownish gray (10YR 6/2), or gray (10YR 6/1, 5/1). It is moderately alkaline or strongly alkaline.

Competing Series: These are the Buchel, Tiocano and Victine series in the same family and the Benito, Branyon, Houston Black, Lomalta, Mercedes, Monteola, Montell, and Santa Isabel series. Buchel soils are typically moist for longer periods of time and have amplitude of the boundary between the A and B horizon of less than 20 inches. Tiocano soils are ponded during portions of the growing season in most years. Victine soils have more than 40 percent exchangeable Na+Mg in the upper 10 inches. Benito and Lomalta soils have more than 60 percent clay in the 10- to 40-inch control section. In addition, Lomalta soils, as well as Mercedes and Montell soils have moist color values of more than 3.5. Branyon and Houston Black soils have mean annual soil temperatures less than 72 degrees F. Monteola soils have less than 14 inches amplitude in the boundary between the A and B horizons. Montell soils are dry for longer periods and have dark colors to shallower depths. Santa Isabel soils have less than 9 degrees F. variation between summer and winter soils temperatures at a depth of 20 inches.

GEOGRAPHIC SETTING: Victoria soils occupy nearly level marine terraces along the Coastal Bend area of southern Texas. Areas that have not been plowed or disturbed have distinct gilgai microrelief with the microknolls up to 18 inches higher than the microbasins. The soil formed in calcareous clayey Pleistocene marine sediments many feet thick. Slope gradients range from 0 to 3 percent. The climate in subhumid. The mean annual precipitation ranges from 28 to 38 inches. The mean annual air temperature ranges from 70 to 74 degrees F., and Thornthwaite P-E index ranges from 34 to 44.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the <u>Clareville</u>, <u>Orelia</u>, and <u>Raymondville</u> series. These soils occur on similar surfaces. Clareville and Orelia soils have agrillic horizons. Raymondville soils have clay loam A horizons, and lack intersecting slickensides.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; slow to very slow runoff and internal drainage; water enters the soil rapidly when it is dry and cracked and very slow when it is moist; very slow permeability.

USE AND VEGETATION: Most areas of Victoria clay are in cropland (dryland); supplemental irrigation is used in a few areas where suitable water is available. Crops are mainly grain sorghum and cotton but some vegetables and flax are also grown. Some of the soils are used as rangeland. Principal native grasses are little bluestem, seacoast bluestem, fourflower trichloris, vine-mesquite, and indiangrass. Native woody plants are invaders and consists mainly of mesquite trees, spiny hackberry, brazil, and

Official Series Description - VICTORIA Series

http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cg:

lotebush.

DISTRIBUTION AND EXTENT: Western Gulf Coast and Coastal Bend area in the Gulf Coast Prairie and Rio Grande Plain of southern Texas; series is extensive.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Nueces County, Texas; 1908

REMARKS: Diagnostic horizons and features recognized in this pedon are: Intersecting slickensides - the zone from approximately 12 to 60 inches. (A2, Bkyz horizons) Titled parallelepipeds - the zone from approximately 12 to 60 inches (A2, Bkyz horizons)

ADDITIONAL DATA: Characterization data by Lincoln Soil Survey Laboratory samples Nos. K393-397, K383-387, K388-392, 5032-5039, and 5018-5024. Grumusols of the Coast Prairie of Texas in Vol. 27 No. 4, July-August 1963, pages 412-421 of Soil Science Society of American Proceedings.

National Cooperative Soil Survey U. S. A.

ATTACHMENT P

Part III, Attachment 4, Appendix 1, p.g. 745

Hanson Professional Services Inc. Submittal Date: September 2018

City of Kingsville MSWLF - Permit 235 B Attachment 4 - Geology Report

APPENDIX P

QUALIFICATIONS OF GROUND WATER TECHNICAL STAFF

Table 1. A. Wade Nollkamper, Geologist	P-1
Table 2. Ray N. Finch, Ph.D., P.E., D.E.E.	P-2

Revision | June, 1998

Part III

RESUME
OF
A. WADE NOLLKAMPER
Rt. 2 Box 259-A
Kingsville, Texas 78363
Off: 512/592-0980

Date of Birth: 2/19/55 Height: 6' Wt: 210 lbs. Married with 1 child

EXPERIENCE

August 1979, Bachelor of Science, Geology, Texas A & I University, Kingsville, Texas

- 1979 1981, Geologist with Gillring Oil Co. & V. F. Neuhaus Properties, Inc., McAllen, Texas Responsibilities included wellsite geologist and drilling/workover supervision in South Texas Gulf Coast, Permian Basin and San Juan Basin.
- 1981 1985, Exploration Geologist with Risa Energy Corp., a small independent based in Corpus Christi, Texas. Responsibilities included prospect generation and evaluation of outside deals. Areas worked included Texas Gulf Coast, Central Texas and North Louisiana.
- 1985 1993, Independent Geologist with offices in Corpus Christi, Texas. Generated and turned prospects, with and without acreage, to various small to large independents. Areas worked include; Texas Gulf Coast, Permian Basin & Rockies. In addition, consulting, field studies, prospect evaluation, and well site supervision services provided to clients.
- 1993 Present, Retained by V. F. Neuhaus Properties, Inc.

Responsibilities include evaluation of outside deals, ongoing field development programs, and prospect generation. V. F. Neuhaus Properties is presently involved in exploration or development projects in Central and South Texas, Mississippi, New Mexico, Colorado, California and Nevada.

Experienced in the use of the following tools: subsurface & surface mapping, gravity, magnetics, 2-D and 3-D seismic.

Experience in horizontal drilling in Texas Gulf Coast and Rockies.

Experience in viability studies and development of coalbed methane.

Experience in Monitor Well grids, South Texas Uranium.

Professional Affiliations: American Association of Petroleum Geologists

Wyoming Geological Association Geological Society of America Corpus Christi Geological Library

References:

Mark Richards, President, V.F. Neuhaus Properties, Inc., McAllen, Texas Ken Boester, Kebo Oil & Gas, Inc., Corpus Christi, Texas Richard Wilschusen, W-2 & Associates, Corpus Christi, Texas Joe McMahon, McMahon-Bullington, Denver, Colorado Clayton Hoover, Hoover Oil & Gas, Inc., Corpus Christi, Texas Kent Denzing, Denzing Exploration Inc., Dallas, Texas James Strickler, Burlington Resources, Farmington, New Mexico Richard Horn, General American Oil Properties, Inc., Denver, Colorado Don Simpson, Shell Western E & P, Houston, Texas Phillip Cook, Cook Energy, Inc., Jackson, Mississisppi

RAY N. FINCH, PH.D., P.E. Consulting Engineer & President

EDUCATION

Bachelor of Science: Major in Chemical Engineering; Minors in Math and Chemistry, Texas A&M University, 1957.

Master of Science Degree: Major in Chemical Engineering; Minors in Math and Chemistry; Thesis titled "Vapor-Liquid Equilibrium". Texas University, 1961.

Doctor of Philosophy Degree: Major in Chemical Engineering; Minors in Math and Chemistry; Dissertation titled "Efficiency and Pressure Drop of Sieve Trays", Texas University, 1963.

SPECIAL TRAINING

Princeton Groundwater School, July 12 - 16, 1993, San Francisco, CA

REGISTRATION

Registered Professional Engineer in the states of Texas and Louisiana.

Diplomate - American Academy of Environmental Engineers (Hazardous Waste)

TNRCC registered Corrective Action Project Manager; CAPM01314

PROFESSIONAL SUMMARY

Over twenty (20) years of professional experience in the chemical industry. This includes both direct engineering and technical management. All phases of engineering have been encountered, i.e., plant process engineering, project process engineering, chemical plant management, research and development in chemical processes, technical evaluation of research and development work, process design and economics, research and development management, engineering and construction management, environmental affairs management. Major technical strengths are in the areas of phase equilibria, distillation, process design, economics, process development and environmental regulations (especially RCRA & TOSCA). However, my technical strengths are well balanced, and I function quite well as a general chemical engineering practitioner.

Part III

DETAILED MANAGEMENT AND PROFESSIONAL EXPERIENCE

Finch Energy & Environmental Services, Inc.- 1982 to date

Professional Engineering Consultant in Environmental and Energy fields. Certification of closures of RCRA hazardous waste facilities, RCRA permit applications, ground water monitoring, air permits, air permit exemptions, air emissions modeling, environmental assessments & auditing, storm water monitoring, SPCC plans, solids handling of organic materials, natural gas dehydration trouble shooting, oil reclamation from brine and muds.

Texas A&M University - Kingsville - August 1984 to August 1997

September 1991 to August 1997 - Chairman, Environmental Engineering Department and Associate Professor in Chemical and Natural Gas Engineering teaching courses in solid/hazardous waste design, environmental engineering, fluid flow, cryogenics, natural gas processing and distillation - phase equilibria. Research programs in environmental engineering, non-ideal phase equilibria and L.P.G. utilization

August 1984 to September 1991 - Chairman, Chemical and Natural Gas Engineering Department and Associate Professor in Chemical and Natural Gas Engineering teaching courses in fluid flow, cryogenics, environmental engineering, natural gas processing, and distillation - phase equilibria. Research programs in L.P.G. utilization, non-ideal phase, equilibria, and environmental engineering

El Paso Products Company - August 1972 to August 1984.

June 1982 to August 1984 - Director of Environmental Affairs. Four man department, \$380M budget. Permits reports and compliance for NEPA, CAA, DWA, SWDA, RCRA, CERCLA, TOSCA, FDA, USDA, CPSC and agencies - EPA, TACB, TWC (TDWR), TDH, RRC, FDA, etc. Natural gas liquids plants - air operating and construction permits - PSD NPDES water discharge permits, UIC permits injection wells, SWDA, RCRA facilities including Part A and Part B Permits - land farm, activated sludge process, land fills, waste piles, surface impoundments, incinerators, CERCLA - several compliance projects - successful, TOSCA - PCB's handling, disposal, PMN applications and compliance negotiated settlement, state - ground water cleanup.

June 1981 - June 1982 - Director of Engineering and Construction. Fifty-five man department, \$3.5MM budget. Natural gas liquids (expander) plants, energy recovery projects in petrochemicals plants, natural gas liquids amine treating plants, salt water storage tanks for natural gas liquids storage wells (Kansas), acetylene removal reactors relocation in Olefin plant.

August 1972 - June 1981 - Director of Research and Development. Fifty-eight man department, \$4MM budget. Process development and technical service for adipic acid, styrene, butadiene, ethylene, propylene, ammonia, nitric acid, hydrogen, utilities and pollution control, natural gas liquids processing, specialty chemicals, dibasic acid esters, pigment intermediates, specialty monomers.

Celanese Chemical Company - July 1962 to August 1972.

January 1971 - July 1972 - Development Associate. Process design and economics - vinyl acetate, polyvinyl alcohol, acetic acid, propionic acid.

June 1969 - December 1979 - Manager of Technical Evaluation. Corporate staff assignment - evaluation of overall technical expenditures and individual research and development projects. Participated in licensing negotiations (in and out).

June 1967 - May 1969 - **Group Leader Development.** Technical and administrative supervision of five to six development engineers on major fiber intermediates projects - terephthalic acid, bis-hydroxy ethyl terephthalate, ethylene oxide, reaction and purification in semi-works pilot plant.

June 1965 to May 1967 - Project Leader. Development - Technical supervision of three to four development engineers on initiation of major fiber intermediate project - terephthalic acid, bis-hydroxy ethyl terephthalate, ethylene oxide, reactor and purification. Responsible for design and economics for four bench scale pilot plants.

July 1964 - May 1965 - **Unit Superintendent, Adipic Acid plant.** 48 operators and shift supervisors - trained, started up and successfully operated new 50MM lbs/yr Adipic Acid Plant. Operating cost responsibility.

October 1963 - June 1964 - Process Engineer for major Nylon Intermediates Project.

Designed the Adipic Acid Plant completely and monitored through all phases of design, construction and startup. Responsible for process design for nylon salt plant, nitric acid plant - all utilities and pollution control and off sites for new nylon intermediates facility liaison with overseas companies in technology acquisitions and training of operators.

July 1962 - September 1963 - Plant Process Engineer for New Grass Roots Facility
Wacker 2 stage air oxidation of ethylene to acetaldehyde and aldol condensation and
hydrogenation of acetaldehyde to make 2-ethyl hexanol and n-butanol. Responsible for first
major debottlenecking expansion of acetaldehyde unit. Did experimental work for biological
waste disposals.

PROFESSIONAL ACTIVITIES

Air & Waste Management Association - 1994 to current

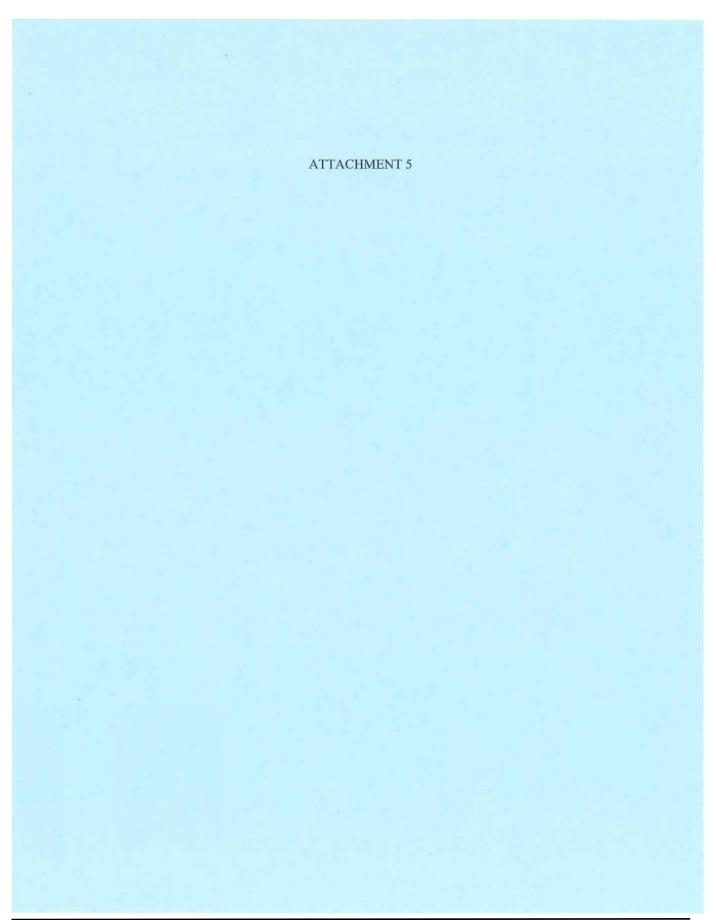
American Academy of Environmental Engineers - 1996 to current

National Ground Water Association - 1993 to current

South Texas Water Authority, Board of Directors - January 1997 to current

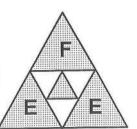
American Institute of Chemical Engineers - 1957 to current

American Chemical Society - 1957 to current



ATTACHMENT 5 Groundwater Characterization Report

Finch Energy & Environmental Services, Inc. P.O. Box 73/1204 W. King, Kingsville, TX 78364 Phone: (512) 592-9810 Fax: (512) 592-5552



ATTACHMENT 5

GROUNDWATER CHARACTERIZATION REPORT

City of Kingsville MSWLF

Permit 235B

Prepared by:

Finch Energy & Environmental Services, Inc.

November 1997

Revision 1 - June 1998

Revision 2 - September 1998



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GROUNDWATER CHARACTERIZATION CERTIFICATION

Finch Energy & Environmental Services, Inc. (F.E.E.) herein presents to the Texas Natural Resource Conservation Commission (TNRCC) the Groundwater Characterization Report for the City of Kingsville MSWLF Permit #235 B on behalf of the City of Kingsville, Tx. The report was prepared in accordance with §330.56(e) by Mr. A. Wade Nollkamper, an independent Geologist experienced in geological/hydrogeological investigations.

I herein certify that I am a staff Geologist experienced in hydrogeologic investigations, and was responsible for the management and completion of the project which the Groundwater Characterization Report summarizes. I certify that the activities completed during this investigation were done according to acceptable practices and standards. I certify that the information contained in this report and on any attachments is true, accurate, and complete to the best of my knowledge, information and belief.

A. Wade Nollkamper, B.S.

Geologist

Ray N. Finch, PH.D.,P.E.,D.E.E.



ATTACHMENT 5 - GROUNDWATER CHARACTERIZATION REPORT PERMIT AMENDMENT APPLICATION-CITY OF KINGSVILLE LANDFILL CITY OF KINGSVILLE, KLEBERG COUNTY, TEXAS

Permit Amendment No. MSW 235-B

Prepared for:

City of Kingsville P.O. Box 1458 Kingsville, Tx 78364 Prepared by:

F.E.E., Inc. P.O. Box 73 Kingsville, Tx 78364 (512)592-9810

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1.0 GROUNDWATER CHARACTERIZATION

1.0 GROUNDWATER CHARACTERIZATION

This section describes the historical groundwater conditions that have existed at the City of Kingsville MSWLF site as required in 30 TAC §330.56(e). A delineation of the waste management area, the property boundary, the proposed "point of compliance" and the proposed locations of all groundwater monitoring wells are shown on Figure 5.2.

1.1 Background

Currently, five (5) from a total of eight (8) active groundwater monitoring wells are being used to monitor quality in the uppermost aquifer sands along the perimeter of the currently permitted fill area. A series of sampling and analysis events to characterize the background quality of the groundwater occurred in the third and fourth quarters of 1996, and the first, second, third and fourth quarters of 1997. The detection monitoring program has been in place since 1985.

Beginning in the third quarter of 1996, the groundwater monitoring requirements included the annual sampling of each well for nine (9) metals, forty seven (47) volatile organic compounds (VOCs), nine (9) water parmeters and three (3) field measured parameters. The metals analyzed were arsenic, barium, cadmium, chromium, lead, mercury, selenium, total organic carbon (TOC), iron, and manganese. The VOCs analyzed have been non-detectable. pH, specific conductance and temperature are field measured parameters. chloride, potassium, total dissolved solids, and a A groundwater elevation measurement is made at each sampling event. Following establishment of background values, The following additional water parameters were sampled: calcium, magnesium, sodium, carbonate, phenolphthalein alkalinity as CaCO₃, potassium, alkalinity as CaCO₃, hardness as CaCO₃, bicarbonate, sulphate, chloride, total dissolved solids (TDS) specific conductance, anion/cation balance, fluoride, and nitrate (as ammonia nitrogen). For a complete listing of the sampled parameters, please consult the Groundwater Sampling and Analysis Plan included as Attachment 11.

No known plumes of contamination have been identified as entering the groundwater from the facility. Levels of arsenic, barium, and selenium have been detected in the ground water at the MSWLF. The arsenic detected is most likely due to the past use of defoliant on the surrounding cotton fields. This should probably decrease with the cease of use of arsenic based defoliant and the rmoval of cotton fields for the site expansion. The barium levels can most likely be attributed to the past use of drilling muds present on the facility site (four plugged and abandoned wells). The barium levels should decrease with time and are well below the MCLs. Selenium is a naturally occurring metal most likely found in the soil present on the site. No other known reason for the levels of selenium found is apparent.

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

1.2 Relevant Groundwater Quality Data Tabulation

In order to compare with regional groundwater quality data, relevant analytes were selected from background groundwater samples collected from groundwater monitor wells screened within the uppermost aquifer sands at the City of Kingsville MSWLF site over a six quarter period. These analytes included pH, manganese (dissolved), iron (dissolved), chlorides, and total dissolved solids (TDS). Groundwater samples collected from the uppermost aquifer sand (MW-1 through MW-11) have reported pH values (field) ranging from 6.75 standard units (s.u.) from MW-1 to 8.20 s.u. also from MW-1. Dissolved manganese concentration have ranged from Non-Detect from MW-10 to 0.67 µg/l from MW-3. Dissolved iron concentration have ranged from non-detect (MW-4) to 0.68 µg/l (MW-4). Chloride values have ranged from 66 milligrams per liter (mg/l or parts per million - ppm) from MW-11 to 2600 mg/l from MW-4. TDS concentrations ranged from 1580 mg/l (MW-11) to 5,780 mg/l (MW-4). Table 5.1b includes all ground water analytical results by well since 1985 which were above the detectable limit for the constituent analyzed. No ground water analytical data was available from 1986 to 1990.

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

As part of the study performed by Shafer (1973), 272 groundwater samples were collected from water wells in the Kleberg, Kennedy, and Southern Jim Wells County area, ranging in depth from 25 feet below ground surface (ft bgs) to 1,206 ft bgs. Groundwater samples were collected from 1913 to 1969 in order to determine the quality of groundwater supplies in the area. The analyses consisted of dissolved mineral constituents, which determined the fitness of water for industrial, agricultural, and domestic use without reference to the sanitary quality of the sample. A summary list of chemical analyses of groundwater samples collected from the Goliad aquifer in North Central Kleberg County is included within Table 5.2a.

In general, the samples from the Goliad aquifer were fairly uniform throughout the northwestern portion of Kleberg County. Specific conductance and chloride content generally increased with depth, as a result of brackish or salt water intrusion. The Total Dissolved Solids contents were high and ranged from 894 ppm to 2,000 ppm. The Goliad aquifer is more than 500 feet below the ground surface (bgs) in the vicinity of the MSWLF.

A similar list of ground water analytical results from the Beaumont-Lissie undifferentiated (Q_{bl} , or Chicot) aquifer in Kleberg County is shown in Table 5.2b. This table shows the quality of ground water from wells in the much shallower (200' to 300' bgs) Chicot aquifer is generally of very poor quality. There are a few wells in the Chicot aquifer in Kleberg County, and the few of these are only used for stock wells. (None of these wells are shown in block 34 where the landfill is located.) Total dissolved solids for Chicot aquifer varies from 2,460 ppm to 21,200 ppm. Typical values for TDS from this formation range from 8,000 to 10,000 ppm. The Chlorides vary from 960 to 9,900 ppm. Sodium varies from 828 to 5,520 ppm. Water from the Chicot varies from moderately to extremely saline. It is sometimes low pH and can cause difficulty with water wells in the deeper Goliad which are not properly cemented through this aquifer.

The analytical results of the groundwater samples from the site reported values well within the regional values reported in the studies by Shafer (1973). The highest value for chloride has been reported at 2,600 mg/l, which was within the regional chloride values which ranged from 135 mg/l to 2,700 mg/l. The highest value for TDS has been 5,780 mg/l, well within range of the regional values of 175 mg/l to 21,200 mg/l.

2.0 HYDROGEOLOGIC CONDITIONS

2.0 HYDROGEOLOGIC CONDITIONS

2.1 Uppermost Aquifer

Eleven new borings were completed to obtain basic data necessary to complete a Soil Characterization. Six of these wells were subsequently completed as Monitor Wells. Nine other previous soil borings were available to assist in the subsurface investigation. The completions will be discussed in the Ground Water Characterization Section. The first seven borings were completed to a depth approximately 10 feet above Mean Sea Level (MSL). The second four borings were completed to depths varying from 72 feet to 88 feet below ground surface (bgs). A generalized description of the sediments encountered follows.

The section describes the characteristics of the soil samples collected and tested during the investigation. The locations of all subsurface boring explorations performed for the design of engineered cells, and for the Geological/Geotechnical investigation are shown on Figure 5.16. Subsurface geologic correlations showing stratigraphy and structure beneath the site are presented on the following exhibits included herein; Figures 5.3 through 5.15. These figures include a Cross Section Location Map, Geologic Cross sections A-A' through I-I' (9 total), [Note Maximum ground water levels.], A Structure Map of the Top "Light Olive Green Clay", Isopach Map Sand Units I & II, and Isopach Map Sand Units III & IV.

The primary geologic formations exposed at the surface of the site are recent Holocene South Texas Eolian Plain Deposits. The topsoil (approx 0 feet - 20 feet) consists of a clay which is black, silty and contains humic material. This soil is overlain in the extreme northeast corner with a veneer of loess. Sediments encountered in borings at the site are Holocene to Pleistocene in age and consist of clays, silts, sands, and caliches deposited in two (2) separate and distinct environments of deposition. Cross section A – A' serves to illustrate theses environments of deposition. The cross section traverses the MSWLF site using four (4) deep borings all deep enough to penetrate a minimum thickness of 38' of a massive, low permeability, light olive green clay ("Light Olive Green Clay") believed to have been deposited in a marine (estuarian) environment.

The "Light Olive Green Clay" is the aquiclude for the MSWLF facility. In turn, the "Light Olive Green Clay" is capped by a sheet sand ("Orange sand") possibly 2 to 10' thick across the site of the MSWLF. Stratigraphically above the "Orange sand", the environment of deposition changes to fluvial-deltaic for the remaining 40 to 50' of section, measured back to surface. These beds are comprised of sands, silts, caliches and clays deposited as superimposed channel sands and clayey dunes or bars. A detailed cross section net was constructed using all sample borings at the MSWLF and four significant sand bodies are believed to be present within the fluvial-deltaic sequence. Location of these sand bodies

are shown on isopach maps included herewith. Bodies I & II are superimposed, caliche or sand filled channels with Body I having the larger areal extent. Bodies III & IV are interpreted as dunes or bars of limited extent and are comprised of clayey sand. All of the above sand bodies are incised into, or embedded within, a tan, silty clay containing abundant mottles of organic matter.

Taken together, the marine clay section ("Light Olive Green Clay") overlain by fluvialdeltaics section represents a single regressive cycle, with respect to sea level, at the top of the Pleistocene Beaumont formation. It is believed that the entire fluvial-deltaic section is comprised of Holocene sediments with the Holocene - Pleistocene boundary represented by the top of the "Light Olive Green Clay" or "Orange sand".

The shallow subsurface geological structure at the Kingsville MSWLF site is shown by the Structure Map- Top "Light Olive Green Clay" to be monoclinal dip to the northeast at approximately 20 feet per mile. This horizon was chosen is most representative of structure affecting and underlying the MSWLF site. Any structural mapping on beds above the "Light Olive Green Clay" are less correlative and would reflect local scouring of channel sands causing structural inconsistencies due to stratigraphic variation within the fluvial-deltaic section. Correlations are excellent on the top of the "Light Olive Green Clay" and the surface is the most likely to be planar in nature. Some scouring of this surface probably occurs at the extreme southwest corner of the MSWLF site due to the incisement of the overlying Body I, caliche bearing channel.

Deposition of the above sediments postdates uplift of the Kingsville Dome.

2.2 Aquiclude

Detailed correlation of borings show that the Holocene sediments which will host the proposed City of Kingsville MSWLF were deposited in a fluvial-deltaic environment. The massive "Light Olive Green Clay" which is believed to be of Pleistocene age and deposited in a near shore marine environment underlies the section. As noted previously, the clay serves as the aquiclude between the Holocene sediments hosting the MSWLF and the underlying, saline, "Chicot" sand and the even deeper regional "Evangeline" (Goliad) aquifer.

Although excellent vertical separation exists between the Holocene sediments which will host the MSWLF and underlying Pleistocene beds, lateral migration of groundwater occurs within and through the host beds. From a potentiometric standpoint, it is evident from existing monitor well data that migration of groundwater within the Holocene host sediments is occurring in almost all directions away from the MSWLF site, the exception being to the northwest.

From a geologic perspective, it is evident that migration of groundwater should occur

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primarily away from the MSWLF site to the northeast and southwest. Controlling this trend is the presence of the incised channel containing sands, clays and caliche noted on cross sections and maps as Sand Body I. This body, which hosts the thin to massively bedded caliche deposits in the area, strikes northeast and is approximately ½ mile in width. Body I trends directly through both the existing and proposed landfill sites. Other sand bodies in the host section are noted on the cross sections as II, III, and IV. Sand body II is, again, an incised, sand filled channel with limited areal extent. Sand Body II is truncated along its strike on the northeast and southwest by the overlying Body I. Sand Bodies III and IV are interpreted as being clay dunes or bars of limited areal extent. It should be noted that the entire Holocene section which contains all of the above sand bodies is permeable and therefore all are in communication. Even so, the orientation of Sand Body I should exert an influence on preferential ground water migration to the northeast and southwest and away from the City of Kingsville's MSWLF site.

Note that ground water modeling using site specific data was performed using HELP3 and Multi-Media computer models. The results of these studies are given in Attachment 15, Appendices B & C, and in Attachment 10, Appendices C & D.

2.3 Groundwater Flow Direction and Rate

2.3.1 Basis

The local groundwater flow regime at the site was determined by the collection of physical data (such as the elevation of the potentiometric surface) and the completion of in-situ hydraulic conductivity (slug) testing from on-site groundwater monitoring points. Depth-to-water measurements were obtained from existing on-site monitor wells and piezometers on June 16, May 18, February 18, February 2, January 20, and January 5, 1998; December 22, December 8, November 24, November 10, October 24, October 16, September 29, September 15, August 15, and August 4, 1997; and December 23, 1996, May 10, 1995, March 14, 1994 and April 5, 1993. The depth-to-water measurements were subtracted from a surveyed reference datum (top of PVC casing) to establish a potentiometric surface relative to 1929 National Geodetic Vertical Datum (NGVD). The groundwater elevation data and resultant potentiometric contour maps for the uppermost permeable stratum are presented in Appendices A, B & C. The water level data measured from soil borings and monitoring well measurements are presented in Appendix B and in Table 5.4.

Analysis of the ground water level data over the period past ten months indicate that the ground water flow tends to leave the MSWLF site in all directions except to the northwest. However, prior to the major rainfall event ground water actually flowed toward the northwest also. The table below determined from the data referred to above gives the following summary of average values of ground water direction, gradient and flow rate.

Landfill	Direction	Gradient	Flow Rate	Well Used	Hydr. Cond.
Quadrant	degrees	ft/ft	ft/yr	No.	cm/sec
NE	36.0	0.00799	1.200	6,14,13	0.000127
S/E	257.3	0.00144	3.124	1,12,13	0.000724
S/W	204,3	0.00216	1.503	1,8,16	0.000674
N/W	202.6	0.00387	2.137	6,15,16	0.000531

From the above table it can be shown that the flow is predominantly away from the MSWLF along the axis of the caliche bearing channel (I). The flow from the Northeast quadrant flows on the average at 36 degrees or to the north-northeast with a relatively strong gradient of 0.008 ft/ft. However, the flow rate is fairly low (1.2 ft/yr) due to the relatively lower permeability. On the other hand, the direction from the southwest quadrant is at 204 degrees or south-southwest. The gradient is about 1/4 as large, but the flow rate is slightly larger (1.5 ft/yr) due to the higher permeability. The unexpected conclusion from this study is that, on the average, both the northwest quadrant and the southeast quadrant flow toward the southwest and along the caliche bearing channel axis. The Southwest quadrant average direction of flow is 257 degrees or west- southwest. The Northeast quadrant average direction is 203 degrees or south-southwest. In other words, both are being pulled into the flow along the Caliche bearing channel. At this point it is important to mention the ponding effect study of on-site and off-site ponds in the area. The off-site contour map shows that the gradient becomes much stronger to the southwest and the deeper caliche pits after it passes under the cross roads of CR-2030 and FM-2619. Thus, even though the strongest gradient on-site is to the northeast, the greatest rate of flow is to the southwest. The northwest and southeast quadrants actually change flow directions depending on the rate of recharge from the surface or from the loss of water through evapotranspiration during drouth periods. Even though these flows are relatively greater to the southwest, all of the flow rates are very low, i.e. a few feet per year. Graphs of daily versus average flow rates are given in Appendix G as are the tabulated calculations for directions, gradients and flow rates.

F.E.E., Inc prepared a hydrograph of existing monitor wells on site using data collected from previous ground water sampling events since March 1991, and data collected during this investigation. Based on the seasonal data from the site collected to date, the potentiometric surface was slightly lower during periods of low precipitation (summer and early fall) and slightly higher during periods of excess precipitation (winter and spring). Given the minimal seasonal fluctuations, the horizontal gradients and flow directions for the uppermost aquifer are more strongly influenced by excessive rainfall events (October 11 & 12, 1997 and September 14 & 15, 1967. The hydrograph indicated no significant changes in groundwater elevations since 1991 until recent excessive rainfall events during

the period of October 8 through 12, 1997. (Appendix D), [See Section 2.3.4]

2.3.2 Evaluation of Horizontal Hydraulic Gradients

Aquifer (bail) tests were performed in piezometers and monitor wells screened in the uppermost groundwater aquifer utilizing falling head methodology. Results of these tests are presented in Appendix E. Based upon these results, the average (geometric mean) horizontal hydraulic conductivity of the uppermost aquifer is approximately 4.12 x 10⁻⁴ cm/sec (1.17 ft/day). The In-Situ hydraulic conductivities for MW's 12,14 and 15 were used in the flow studies for the S/E, N/E and N/W quadrants, respectively. An average of MW-16 and MW-12 was used for the hydraulic conductivity for the S/W quadrant.

The horizontal flow velocity of ground water within each stratum can be estimated using an equation derived from Darcy's Law,

V=(Ki/n_e), where:

V=velocity (length/time);

K=Hydraulic conductivity (length/time);

i=hydraulic gradient (length/length); and,

n = effective porosity (decimal).

As calculated from the potentiometric maps of groundwater flow within each stratum (See Appendix G), the horizontal hydraulic gradient across the site ranges from 1.44×10^{-3} to 7.99×10^{-3} ft/ft horizontal hydraulic conductivity values within each stratum, which are stated above, were obtained from in-situ hydraulic conductivity tests (Appendix E). An effective porosity for a silty clay loam (the predominant lithology screened by piezometers in each stratum) is estimated to be 0.43 (Dean, et. al., 1989). Using these parameters, the horizontal velocity of ground water within uppermost aquifer deposits beneath the site is estimated to range from 0.0014 0.0033 ft/day to 0.0068 0.0086 ft/day, or 0.5 1.2 ft/year to 2.5 3.1 ft/year, respectively.

2.3.3 Evaluation of Vertical Hydraulic Gradients

No hydraulic connection was found between uppermost local aquifer (separated by the Light Olive Green Clay aquiclude) and the Chicot Aquifer. (Beaumont Clay, Beaumont Clay-Lissie Formation). The deepest borings did not reach the bottom of the Chicot aquifer. However, the deepest borings did locate the Light Olive Green Clay aquiclude which has a minimum thickness of 38' of low permeability clay (3.31x10-8cm/sec) below the uppermost local aquifer., Deeper information was obtained from deeper well logs (URI) and

from water well data in the vicinity (AIC Survey). These elevations show that the bottom of the Chicot aquifer is located approximately 200 feet below ground surface in the MSLWF vicinity. These elevations further show that there is at least 38' and probably 140' of a low permeability clay between the uppermost aquifer at the landfill site and the Chicot aquifer. Further there is 200' to 300' of shale/clay below the Chicot aquifer before reaching the Evangeline (Goliad) aquifer. The light Olive Green Clay described above and in Attachment 4 is the aquiclude for the MSWLF facility. There are no water wells in the area with screens set above 524 feet below ground surface. Further, TAC Rule 33.56(d)(S)(A)(ii) states that "Aquifers more than 300 feet below the lowest excavation and where the estimated travel for constituents to the aquifer are in excess of 30 years plus the estimated life of the site, need not be identified by borings." This is the case for the COK MSWLF.

2.3.4 Relationship of Ponded Water to Water Table

During the six day period from September 19 through September 25, 1967 massive amount of rainfall fell in South Texas which exceeded annual average rainfall (30 inches). This large rainfall resulted in numerous ponds of water in the relatively flat South Texas area. A joint study of the relationship of this ponded water to groundwater levels in the uppermost, unconfined aquifer was made jointly by the United States Geological Survey and the Texas Water Development Board, (TDWB, #138, December, 1971). This date is relevant to water levels below the City of Kingsville, Texas (COK) Municipal Solid Waste Landfill (MSWLF) site.

The King Ranch site was most representative of the COK MSWLF site. It had water in ponds well above the normal water level in the uppermost aquifer. The massive rainfall from Hurricane Beulah (15 inches) resulted in water table levels continuing to rise below and around the pond for a period of eight months after these above normal rainfall events. The COK MSWLF had a similar large rainfall event during the period October 8 through 12, 1997.

The COK MSWLF site has several excavations which are adjacent to the currently permitted MSWLF and on the same land for which MSWLF expansion is proposed. These excavations were prepared for two reasons: first to provide cover soil for the existing MSWLF; second, to prepare the excavations for future MSWLF cells. The net result of these excavations was to provide depressions in the earth's surface which collect ponded water from rainfall events. This ponded water provides recharge to the uppermost, confined aquifer by percolation through the unsaturated zone to the around water table. This recharge causes higher than normal water levels (mounding) below and near these ponds. This the same result as experienced in the 1968-69 TDWB studies of ponded water on the King Ranch.

The King Ranch study showed that water levels were influenced by recharge from ponded water as far as 500 feet from the pond. This was confirmed by both water levels and dilution of total dissolved solids (TDS) in the ground water. The COK MSWLF site experienced similar results after the excessive rainfall events of October 8-12, 1997. Unfortunately, this rainfall event was right in the middle of a six month study of water levels being made as part of the permitting process for the expansion of the COK MSWLF. This event requires that the design be modified to protect against such events so that groundwater levels will not rise into bottom liners of the expanded landfill. The proposed design change is to provide pumping capacity for non-active excavations such that ponded water is not allowed to accumulate in excavations after rainfall events. The rainfall in expanded active areas will be handled by the leachate collection system.

3.0 GROUNDWATER MONITORING PROGRAM

3.0 GROUNDWATER MONITORING PROGRAM

3.1 Proposed Monitoring Well Network

As previously discussed, the uppermost aquifer beneath the site is confined by the Light Olive Green Clay aquiclude located at 5 to 15 foot above MSL below the landfill. This clay extends at least 38 feet and probably 140 feet below the uppermost aquifer. It is, therefore, proposed that the groundwater monitoring system monitor the uppermost aquifer above the Light Olive Green Clay aquiclude. Proposed groundwater monitoring well locations, which comprise a network designed to monitor groundwater quality around the permitted landfill and expansion area, are shown on Figure 5.2. Monitor wells should have their screens located within one foot or less of the aquiclude clay. Recommended elevations for well screens along with approximate horizontal survey coordinates at each proposed location are summarized in Table 5.3. Table 5.6.

Based upon an understanding of the local ground water regime and site stratigraphy, the site groundwater monitoring network will monitor the uppermost aquifer separated from below by the Light Olive Green Clay aquiclude. The monitor well network completed within the uppermost aquifer will ultimately be comprised of a total of twenty four (24) monitor wells. Monitor well locations are illustrated on Figure 5.2. A ground water monitor well sequencing table showing required installation and removal times is shown in Table 5.7.

As required by TAC §330.231(e)(3), the Executive Director will be notified in writing of any changes in the direction and rate of groundwater flow that my require the installation of additional monitor wells. Any additional monitor wells installed will be addressed in a modification to the Site Development Plan.

3.2 Groundwater Sampling and Analysis

A detailed plan and engineering report describing the proposed groundwater monitoring program is presented in Attachment 11 of Part III, Groundwater Sampling and Analysis Plan (GWSAP). The goal of the GWSAP is to establish consistent sampling and analysis procedures that ensure monitoring results are representative of groundwater quality at the background and down gradient monitoring well locations. The procedures in the GWSAP are considered applicable for all groundwater wells included in the administratively approved monitoring network.

The site groundwater monitoring network will be sampled for constituents listed in the GWSAP. As discussed the GWSAP, semi-annual sampling of groundwater within the Chicot unit will ensure that samples are independent. The development of background values for each constituent, and the sampling, analysis and statistical comparison

procedures to be utilized in evaluation of groundwater monitoring data, are also addressed in the GWSAP.

TABLE 5.1 SUMMARY OF GROUND WATER QUALITY City of Kingsville, Texas Municipal Solid Waste Landfill

Monitor	Date	GW Elev	pH, fld	T.D.S.	Mn	Fe	CI
Well	Sampled	ft, +MSL	s.u.	mg/L	mg/L	mg/L	mg/L
1	07-11-96	33.89	7.25	2710	0.07	0.01	552
	12-23-96	33.04	7.10	2740	0.02	0.01	548
	03-20-97	32.36	7.22	2590	ND	0.01	483
	06-25-97	35.10	7.46	2500	0.01	0.25	312
	09-29-97	33.48	6.75	2520	<0.01	0.02	399
	12-09-97	35.50	8.20	2370	<0.01	0.03	355
3	07-11-96	39.64	7.22	2080	0.67	0.01	472
	12-23-96	35.61	7.32	2000	0.55	ND	336
	03-20-97	34.56	7.54	1810	ND	0.01	266
	06-25-97	39.53	7.46	1590	0.04	0.27	169
	09-29-97	35.27	6.91	1930	0.05	0.03	344
	12-09-97	38.81	7.60	1670	0.04	0.01	213
4	07-11-96	34.69	7.37	5760	0.03	ND	2600
	12-23-96	34.50	7.08	5780	0.05	ND	2590
	03-20-97	33.49	7.21	5720	ND	0.01	2570
	06-25-97	38.54	7.04	5620	0.01	0.68	2550
	09-29-97	35.53	7.33	5720	<0.01	0.02	2580
	12-09-97	39.60	7.70	5330	<0.01	0.05	2280
10	07-11-96	31.65	7.42	2370	0.01	0.02	174
	12-23-96	30.10	7.35	2260	0.09	ND	161
	03-20-97	29.68	7.41	1930	ND	0.01	179
	06-25-97	33.66	7.22	2140	ND	0.06	165
	09-29-97	34.42	7.22	2340	<0.01	0.01	157
	12-09-97	37.62	7.40	1700	<0.01	0.01	184
11	07-11-96 12-23-96 03-20-97 06-25-97 09-29-97 12-09-97	34.54 33.11 32.62 37.28 35.40 40.17	7.66 7.41 7.41 7.30 8.04 7.48	1630 1750 1680 1580 1760 1979	0.02 0.08 ND 0.01 <0.01	0.06 0.01 0.01 0.53 0.01 <0.01	98 85 82 66 73 299

Revision 1

Groundwater Quality City of Kingsville, TX - MSWLF

Table 5.1b

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の開発に関する		10-10-85	03-30-91	09-29-92	04-06-93	03-15-94	05-10-95	07-11-96	10-10-85 03-30-91 09-29-92 04-06-93 03-15-94 05-10-95 07-11-96 12-23-96 03-20-97 06-25-97 09-29-97 12-09-97	03-20-97	06-25-97	09-29-97	12-09-97
Component	Units												
Arsenic	ma/L	0.018						0.029	0.034	0.031	0.026	0.03	0.025
Barium	ma/L							0.02	0.02	0.03	0.01	0.03	0.01
Cadmium	mg/L	0.0061						0.0005	0.0015	0.0009	0.0014	0.0008	0.0007
Lead	mg/L	0.029											
Selenium	ma/L							0.009	0.007	0.008	0.009	0.007	0.008
Iron	ma/L	5.1	3	0.37	4.3	2.2	0.94		0.01	0.01	0.25	0.02	0.03
Manganese		0.61	0.09	0.01	0.15	90.0	0.02	0.07	0.02		0.01		
T. Alkalinity		430				454		865	928	946	1070	1030	1010
Calcium	mg/L	110				84		9	49	44	56	51	54
Magnesium	mg/L	236				140		95	95	96	81	85	80
Sodium	ma/L	965				975		795	775	790	735	730	695
Potassium	ma/L	23				22		18	18	21	18	18	17
Sulfate	mg/L	438				312		538	488	909	543	457	453
Chloride	mg/L	1720	1839	1657	1638	1547	1370	552	548	483	312	399	355
TDS	mg/L	3910	3590	3700	3750	3590	3440	2710	2740	2590	2500	2520	2370
TOC	mg/L	8.5	4.5	3.25	3.75	2	3.5						38
C. Disulfide								26					
M. Bromide	ng/L												

Groundwater Quality
City of Kingsville, TX -MSWLF

Table 5.1b

Revision 2

		10-10-85
Component	Units	
Arsenic	mg/L	0.175
Barium	mg/L	
Cadmium	mg/L	0.0059
ead	mg/L	0.013
Selenium	mg/L	
Iron	mg/L	1.7
Manganese	mg/L	0.32
F. Alkalinity	mg/L	1840
Salcium	mg/L	39
Magnesium	mg/L	52
Sodium	mg/L	1090
Potassium .	mg/L	19
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Note: Only constituents which were above the detectable limit were reported in this table.

Chloride TDS TOC

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Groundwater Quality
City of Kingsville, TX - MSWLF

STATE OF STREET	語激展	10-10-85	03-30-91	07-31-91	09-29-92	04-06-93	03-15-94	04-06-93 03-15-94 05-10-95 07-11-96 12-23-96 03-20-97 06-25-97 09-29-97 12-09-97	07-11-96	12-23-96	03-20-97	06-25-97	09-29-97	12-09-97
Component	Units													
Aropio	l/om	0.037							0.071	0.075	0.079	0.087	0.073	0.089
Alsemic	ma/l								0.11	0.08	0.07	0.05	0.09	0.05
Cadmirm	ma/l	0.0104							0.0001	0.0001	0.0006	0.0003	0.0015	0.0006
Lead	ma/L	0.009												
Selenium	ma/L				,					0.003	0.003	0.001	0.002	
Iron	ma/l	1.1	0.17	0.63	0.25	3.8	0.28	0.45			0.01	0.27	0.03	0.01
Managaga	l/pm	0.06			0.02	0.09	0.04	0.03	0.67	0.55		0.04	0.05	0.04
T Alkalinity	l/om	880					970		830	902	915	983	896	977
Colcium	I/om	130					13		44	30	26	24	45	26
Magazin	1/cm	248					16		25	41	37	. 28	53	31
Magilesium	1/64	1300					489		680	610	585	550	580	570
Sodium	119/1	2000					4.1		44	12		9	6.3	6.7
Ortonassium	mg/L	71					0		218		16	11	200	123
Sulfate	mg/L	674		27.0	200	88	22	0,1				169		213
Chloride	mg/L	2093		,				1	,				1930	1670
TDS	mg/L	2070	25/0	72200	1580	0001	1400							
TOC	mg/L	7.25	15	5 8.25	2.5	2	5.5	2.25						
C. Tet. Chloride	ng/L											9.9	10	
M Bromide	na/L	154							5.8					

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Groundwater Quality
City of Kingsville, Tx - MSWLF

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The sales	THE SECOND	10-10-85	03-30-91	09-29-92	10-10-85 03-30-91 09-29-92 04-06-93 03-15-94 05-10-95 07-11-96	03-15-94	05-10-95	07-11-96	12-23-96	03-20-97	06-25-97 09-29-97	09-29-97	12-09-97
onent	Units												
٥	l/um	0.052						0.054	0.054	0.055	0.055	0.055	0.064
2 2	I/om							0.04	0.04	0.04	0.04	0.04	0.03
E :	I/om	0 0 102						0.0017	0.0025	0.0011	0.0005	0.0006	0.0006
	ma/L	0.015											
mii	l/om	0.001		77				0.006	0.007		0.008	0.006	0.007
	ma/l	4.1	0.41	0.26	2.1		1.7			0.01	0.68	0.02	0.05
asaue	ma/l	0.26	0.01	0.01	0.05		0.03	0.03	0.05		0.01		
alinity	ma/l	458		-		551		595	580	570	541	565	522
E	ma/l	69				09		80	63	58	75	68	65
milia	ma/l	128				134		135	135	27	123	135	128
	l/om	1830				1950		1890	1930	1980	1860	1890	1730
ciim	l/om	. 29				21		22	22	22	25	22	21
5 0	l/pm	331				579		537	529	527	569	530	630
o do	l/om	2868	2700	2580	2566	2695	2610	2600	2590	2570	2550	2580	2280
2	mg/L	5670				5910	5750	5760	5780	5720	5620	5720	5330
	mg/L	2	5.5	3	2.5	2.5	3						
sulfide	ng/L										5.1		
omide	ng/L												

Pevision 2

Note: Only constituents which were above the detectable limit were reported in this table.

Revision 2

980 55 95 1500 21 1346 1010 4810 5.75 03-15-94 2098 6380 3.5 10-10-85 | 03-30-91 | 09-29-92 | 04-06-93 Groundwater Quality
City of Kingsville, TX - MSWLF 2390 0.37 4020 9280 5.25 1.4 MW-6 0.44 565 222 325 0.036 0.0102 Manganese Magnesium Component T. Alkalinity Potassium Selenium Cadmium Chloride Calcium Sodium Sulfate Arsenic Barium Lead

Groundwater Quality
City of Kingsville, TX - MSWLF

Table 5.1b

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	克爾斯斯	03-30-91
Component	Units	
Arsenic	mg/L	
Barium	mg/L	
Cadmium	mg/L	
Lead	mg/L	
Selenium	mg/L	*
Iron	mg/L	0.89
Manganese	mg/L	0.05
T. Alkalinity	mg/L	
Calcium	mg/L	
Magnesium	mg/L	
Sodium	mg/L	
Potassium	mg/L	
Sulfate	mg/L	
Chloride	mg/L	114
TDS	mg/L	833
TOC	ma/L	15.75

Table 5.1b

Groundwater Quality
City of Kingsville, Tx - MSWLF

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	07-31-91	06-10-92	09-29-92	03-30-93	12-22-93	03-15-94	07-31-91 06-10-92 09-29-92 03-30-93 12-22-93 03-15-94 05-10-95 07-23-96	07-23-96
Units								
mg/L		0.014	0.017	0.015	0.014			
mg/L		0.21	0.13	0.19	0.13			
mg/L					0.0003			
mg/L		0.003	0.002		0.002			
mg/L					0.001			
mg/L	0.24	2.7	0.34	4.1	0.32	0.94	7.6	0.83
mg/L	0.01	0.26	0.01	0.08	0.01	0.03	0.03	0.19
mg/L		388	379	369	358			
mg/L		35	33	28	39			
mg/L		23	24	24	33			
mg/L		305	300	306	382		55 40	
mg/L	3.45	9.4	9.1	8.8	13			
mg/L		71	62	09	98			
mg/L	873	274	276	309	414	305	351	315
mg/L	2330	1050	1080	1110	1270	1090	1110	1080
mg/L	15	2.25	2.75	3.25	2.5	-	-	2.5

Note: Only constituents which were above the detectable limit were reported in this table.

Table 5.1b

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		Gro City of K	Groundwater Quality City of Kingsville, TX - MSWLF	r Quality , TX - MS	SWLF		
			MW-9	6			
		06-10-92	09-29-92	03-30-93	12-22-93	03-15-94 05-10-95	05-10-95
Component	Units						
Arsenic	mg/L	0.11	0.04	0.114	0.104		
Barium	mg/L	0.1	0.15	0.21	0.14		
Cadmium	mg/L						
Lead	mg/L		0.003	0.001			
Selenium	mg/L			0.001			
Iron	mg/L	0.47	1.6	6.9	0.9	0.59	0.3
Manganese	mg/L	0.08	0.00	0.41	0.12	0.13	0.11
T. Alkalinity	mg/L	640	858	926	800		
Calcium	mg/L	8.4	14	14	1		
Magnesium	mg/L	7.2	14	18	14		
Sodium	mg/L	320	488	469	420		
Potassium	mg/L	. 5.6	7.8	7.7	6.7		
Sulfate	mg/L	55	43	64	63		
Chloride	mg/L	25	160	. 70	55	38	18
TDS	mg/L	206	1390	1370	1160	1020	096
TOC	mg/L	4	4.25	5.25	5.25	2.75	2.5

Gity of Kingsville, TX - MSWLF

Table 5.1b

Revision 1

		07-23-96
component	Units	
Arsenic	mg/L	
Barium	mg/L	
Sadmium	mg/L	23 12
Lead	mg/L	
Selenium	mg/L	
Iron	mg/L	3.6
Manganese	mg/L	0.38
 I. Alkalinity 	mg/L	
Calcium	mg/L	
Magnesium	mg/L	
Sodium	mg/L	
Potassium	mg/L	
Sulfate	mg/L	
Chloride	mg/L	89
TDS	mg/L	773
TOC	mg/L	2.25

Groundwater Quality City of Kingsville, TX - MSWLF

Table 5.1b

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						MW-10	10						
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. 西湖流江	福門或	06-10-92	09-29-92	03-30-93	12-22-93		03-15-94 05-10-95	07-11-96		12-23-96 03-20-97 06-25-97	06-25-97	09-29-97	12
nponent	Units												
anic	ma/L	0.041	0.037	0.038	0.031			0.025	0.025	0.029	0.027	0.027	
E	ma/l	0.1	0.16	0.21	0.29			0.31	0.32	0.25	0.28	0.31	
lminm	ma/L								0.0001	0.0002	0.0002		
p	mg/L		0.001								0.001		
enium	ma/L	0.001		0.002	0.001								- 1
	ma/l	0.06	1.5	2.4	0.66	0.28	0.21		***	0.01	90.0	0.01	
godden	l/om	0.01	0.07	0.05	0.03	0.01	0.01	0.01	0.09				
Ikalinity	l/om	999			-			1680	1600	1350	1530	1730	
cium	ma/L	14			19			26	38	17	23	14	
minisant	l/pm	9.3		18	27			43	42	33	38	43	
di m	l/om	410	4	512	657			820	740	680	755	810	
ninii ooc	1/00	67						11	11	8.8	9.5	10	
foto	ma/1	43				_		85	68	56	71	82	
orido	1/6	171	-		158	165	186	174	161	179	165	157	
S	ma/L	1250	-	-	-		2270	2370	2260	1930	2140	2340	
0	mg/L	5	5	6 4.25	6.75	3 4.75	5.75					W. 100	

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		Gro City of K	Groundwater Quality City of Kingsville, TX - MSWLF	r Quality	SWLF		
			MW-11	Ξ			
推动的影響		07-11-96	12-23-96	03-20-97	06-25-97	09-29-97	12-09-97
Component	Units						
Arsenic	mg/L	0.054	0.049	0.05	0.065	0.066	0.071
Barium	mg/L	0.05	0.05	0.06	0.04	0.00	0.06
Cadmium	mg/L		0.0006	0.0001	0.0002		
Lead	mg/L						
Selenium	mg/L	0.004	0.004	0.003	0.003	0.003	0.007
Iron	mg/L		0.01	0.01	0.53	0.01	0.02
Manganese	mg/L	0.02	0.08		0.01		
T. Alkalinity	mg/L	810	1000	1060	972	1070	1170
Calcium	mg/L	23	21	20	19	14	46
Magnesium	mg/L	27	30	30	- 25	28	46
Sodium	mg/L	510	535	555	510	580	745
Potassium	mg/L	8.3	7.5	7.6	6.8	6.9	12
Sulfate	mg/L	273	234	195	204	216	308
Chloride	mg/L	86	85	82	99	73	299
TDS	mg/L	1630	1750	1680	1580	1760	2330
TOC	mg/L						

Revision 1

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

TABLE 5.2a

Pestum sociulia potassium geraeponate (PPu) (PPu		SULFATE CHLORIDE FLLOR (PPM) (PPM)	247 269 0.8	243 272 0.8	250 264 0.7	
Vell		BICARBONATE (PPM)	283	288	288	
WELL CONDUCTAINCE TRAFFRATURE OFFICE PRIOR PRIOR (PPM) COLCOID (PPM) IMMERSINA (PPM) 884 2,046 NR 7.9 NR 0.02 33 11 884 2,000 NR 7.8 NR 0.06 33 11		POTASSIUM (PPM)	339	340	340	
WELL SPECIFIC TEMPERATURE CACCUM FR. (SPIA) CALCUM (SPIA) MAGRESIAN (SPIA) 884 2,046 NR 7.9 NR 0.02 33 12 884 1,391 NR 8 NR 0.06 33 11 884 2,000 NR 7.8 NR 0.17 34 11		SODIUM (PPM)	339	340	340	
WELL SPECIFIC TEMPERATURE PH (SPHG) CONCUCTANCE DEGREES F (PPHG) (PPHG) CONCUCTANCE DEGREES F (PPHG)	School of the second		12	11	11	
SPECIFIC TEMPERATURE PH SELCA			33	33	34	
WELL SPECIFIC TEMPERATURE FH. CONDUCTANCE CEGREES F. 1.991 NR 7.9 884 2,000 NR 7.8		(PPM)	0.02	90.0	0.17	
Vel. SPECIFIC TEMPERATURE CONDUCTANCE OUGREES F.			NR	N.	NR	
WELL SPECIFIC DEPTH(FT) CONDUCTANCE 884 2,046 884 1,991 884 2,000		¥	7.9	8	7.8	
WELL DEPTH(FD) 1 884 884		To be start	NR	NR	NR	
Total Control		SPECIFIC	2,046	1,991	2,000	
3-29-65 3-11-68		WELL DEPTH(FT)	884	884	884	
		DATE OF COLLECTION	3-29-65	2-26-68	3-11-68	

	DISSOLVED SOLIDS (PPM)	1.200	1,200	1,200	1,130	1,940	2,000	1,140	1,140	858	1,040	894	953	892	803	1,030	7
	FLUORIDE (ppm)	8.0	0.8	7.0	9.0	9.0	0.8	9.0	9.0	0.4	9.0	0.4	1.2	0.4	0.3	9.0	
	CHLORIDE (PPM)	269	272	264	250	376	399	292	310	210	235	238	265	214	175	200	
	SULFATE (PPM)	247	243	250	325	720	750	264	243	142	262	144	137	174	722	307	41,
	BICARBONATE (PPM)	283	288	288	238	192	189	276	288	318	284	302	352	304	306	264	C
	POTASSIUM (PPM)	339	340	340	8	560	920	7.6	6.7	8.3	7.1	7.8	3.2	8.8	8.7	9.3	
	(Mdd)	339	340	340	343	260	929	360	380	275	341	296	346	283	274	323	
fer)	MAGNESIUM (PPM)	12	11	11	11	21	21	11	7.8	8.9	6.8	7.1	3.3	10	10	11	ı
(Goliad Aquifer	CALCIUM	33	33	34	45	99	89	35	23	25	20	21	10	27	32	31	;
Golia	(PPM)	0.02	90.0	0.17	NR	0.02	90.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	
	SILICA (PPM)	N. N.	S.	NR	20	NR	NR	19	17	19	16	18	13	19	20	16	0
	*	7.9	8	7.8	7.4	8	8	7.6	8.2	7.7	7.6	7.6	8	7.8	7.7	7.7	0.0
	TEMPERATURE DEGREES F	NR	NR	NR	NR	NR	Ci.										
	SPECIFIC	2,046	1,991	2,000	1,830	3,472	3,614	1,920	1,890	1,420	1,710	1,500	1,640	1,480	1,450	1,650	020 7
	DEPTH(FT)	884	884	884	556-576	894	1,074	540-670	1,050	600-680	610-631	635-656	760	654-694	757-781	759-777	000 000
	COLLECTION	3-29-65	2-26-68	3-11-68	4-03-68	3-29-65	2-27-68	5-17-68	7-12-68	4-08-68	4-03-68	4-03-68	8-08-68	4-04-68	4-05-68	4-02-68	0000
	DESCRIPTION WELL	34-101	34-101	34-101	34-106	34-107	34-107	34-209	34-301	34-410	34-501	RR-83- 34-502	34-601	34-704	34-706	34-801	24 003

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

SUMMARY OF ANALYSES OF GROUND WATER IN KLEBERG COUNTY, TEXAS (Beaumont-Lissie undifferentiated (Chicot) Aquifer) TABLE 5.2b

DISSOLVED SOLIDS (PPM)	2,730	2,460	N.	6,950	5,240	056'6	10,600	N.	2,950	10,200	N.	N.	21,200	N.			
FLLORIDE (ppm)	NR	NR	NR.	NR	2.9	NR	1.6	NR	NR	0.8	NR	N.	1.9	NR			
CHLORIDE (PPM)	960	1,220	2,500	3,520	2,250	5,020	4,450	3,950	1,430	5,780	9,800	6,320	9,700	006'6			
SULFATE (PPM)	364	78	Ä	612	872	1,290	2,300	NR	412	1,050	N.	2,230	4,310	N.			
BICARBONATE (PPM)	704	392	236	426	424	77	376	574	22	NA	5	NA	24	46			
POTASSIUM (PPM)	10	W/Na	NR	W/Na	31	27	25	NR	15	24	NR	29	42	NR			
SODIUM (PPM)	976	831	NR	2,320	1,560	2,780	2,960	NR	828	2,160	NR	2,800	5,520	N.			
SELCA RICA GALCUM NAGNESIM SODUM PPM, PPM, PPM, PPM, SEMBASIMA SODUM PPM, PPM, PPM, PPM, PPM, PPM, PPM, PP	18	37	NR	130	138	252	240	222	14	235	620	308	670	675			
CALCIUM (PPM)	31	29	NR	146	148	540	428	308	226	006	1,050	775	930	940			
(PPM)	NR.	0.34	NR	0.1	NR	N N	51	NR	NR	999	NR	NR	214	NR			
SILICA	24	30	NR	14	16	5.3	13	N.	4.9	NR	NR	NR	NR	NR			
± 1000	8.0	8.0	6.8	7.8	7.4	5.8	6.4	6.7	5.9	3.3	5.0	2.5	5.6	5.5			
TEMPERATURE DEGREES F	NR	NR	NR	NR	NR	77	NR	75	79	NR	75	77	NR	75			
SPECIFIC	4,540	4,510	8,060	11,700	8,380	18,500	16,300	15,000	5,110	18,200	31,000	23,000	30,300	31,800			
WELL DEPTH(FT)	140	146	74	335-347	282	31	31	31	52	52	52	38	38	38			
DATE OF COLLECTION	7-17-68	5-8-69	10-2-69	6-13-69	3-11-68	5-14-68	9-16-68	12-10-68	5-14-68	9-16-68	12-10-68	5-14-68	9-16-68	12-10-68			
DESCRIPTION	29-603	30-702	37-602	38-301	40-503	42-402	42-402	42-402	42-403	42-403	42-403	42-404	42-404	42-404			

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Table 5.3

Summary of Site Survey Data City of Kingsville, Texas

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Location	Designation	Designation Top of PVC	Ground	Total Depth	Bottom	Current	Stabilized	X-Distance	Y-Distance	X-Distance	Y-Distance
Number		Elevation ft, MSL	Surface ft, MSL	of Boring ft, BGS	Elevation ft, MSL		GW Level ft, MSL	UTM meters	UTM meters	Coord.	Coord.
								985	- 844		
Benchmark	MW-12							2221994.103	646980.6224	0.104	1.5806
MW-1	MW	61.867	59.249	43	16.249	A	33.47	2220665.243	646999.5297	-1328.7561	20.4879
MW-2	MW					P&A					
MW-3	MW	59.173	56.096	37.5	18.596	A	35.27	2221265.118	647820.8196	-728.8815	841.7778
MW-4	MM	60.125	58.008	40	18.008	A	35.53	2221259.953	648317.7851	-734.046	1338.7433
MW-5	MM					P&A					
MW-6	MW	56.604	55.456	40	15.456	A	32.12	2220718.485	649721.5091	-1275.5146	2742.4673
MW-7	MW				0	P&A					
8-MM-8	MW	61.178	59.787	43	16.787	A	33.03	2219519.731	647166.5781	-2474.2682	187.5363
MW-9	MW				0	P&A					
MW-9R	MM	44.849	41.411	17	24.411	A	34.99	2219802.581	648511.0793	-2191.4181	1532.0375
MW-10	MW	52.684	49.78	29	20.78	Α	34.42	2220240.82	648308.7984	-1753.1797	1329.7566
MW-11	MM	62.401	60.197	33	27.197	A	35.4	2220718.664	648494.0559	-1275.3351	1515.0141
MW-12	B/MW	54.879	52.375	48	4.375	А	32.78	2221993.999	646979.0418	0	0
MW-13	B/MW	62.096	59.131	50	9.131	А	32.83	2221973.889	648365.0778	-20.1103	1386.036
MW-14	B/MW	52.677	49.938	42	7.938	A	26.9	2221949.041	649712.8948	-44.9587	2733.853
MW-15	B/MW	51.624	48.386	37	11.386	A	32.97	2219474.512	649668.9772	-2519.487	2689.9354
MW-16	B/MW	58.839	55.958	47	8.958	A	34.02	2219497.15	648312.4767	-2496.8494	1333.4349
BP-17	В	43.868	41.345	33	8.345	А	34.87	2220139.183	648928.7974	-1854.8164	1949.7556
BP-18	В	52.438	50.039	42	8.039	А	33.72	2221252.488	648943.6517	-741.5117	1964.6099
BP-21	В		52.41	84	-31.59	A		2221237.99	649701.98		2722.9382
BP-23	В		49.5	86	-36.5	А		2219486.9	648937.78		1958.7382
BP-24	B/MW		47.38	72	-24.62	Α		2221358.12	646971.06		-7.9818
BP-25	В		61.12	88	-26.88	А		2220722.02	648314.56		1335.5182
S/W Corner	0'0							2219514.47	646930.27	-2479.5292	-48.7718

Table 5.3 (cont'd)

Footnotes:

P&A=Plugged & Abandoned

A=Active B=Boring MW=Monitor Well

KEY:

The deepest excavation elevation is +8.37 feet NGVD

Coordinates for deep soil borings (B-21 - B-25) are currently being verified.

Table 5.3 (cont'd)

City of Kingsville, Texas

Municipal Solid Waste Landfill Permit 235-B

Summary of Site Survey Data South West Corner = 0,0

MW#	X" Coordinate (feet)	Y" Coordinate (feet)
Benchmark	2480.13	9.578676
MW-1	1151.76	50.33381
MW-2		
MW-3	1765.06	861.649
MW-4	1768.07	1358.632
MW-5		
MW-6	1249.75	2771.07
MW-7		
MW-8	9.14996	236.1952
MW-9		
MW-9R	314.069	1575.864
MW-10	748.922	1366.404
MW-11	1229.75	1543.78
MW-12	2480	8
MW-13	2482.68	1394.179
MW-14	2480	2742.223
MW-15	5.08411	2739
MW-16	5.41377	1382.31
BP-17	657.494	1987.991
BP-18	1770.89	1984.537
BP-21	2524.77	2730.57
BP-23	2512.21	1966.473
BP-24	2479.87	0.019279
BP-25	2501.96	1343.338
S/W Corner	0.00407	0.005581

Revision 1

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

TABLE 5.4 (cont'd.) Ground Water Level Elevations - 1991-1998

Piezometer	PVC Casing,	21.10		03-20-97	06-25-97	07-18-97	08-04-97	08-18-97	09-02-97	100 AF 07
NAME OF	TI INION	96-11-70			N. C. SCHILLE LET CONTINUE SCHOOL SCHOOL	2 000			AT A POSTER WAS LARGERED FOR STATE	03-10-2
IO-WW	61.87	32.87	32.02	31.34	34.08	Not Msd	34.19	38.92	26.22	33.59
MW-03	59.17	37.17	33.14	32.09	37.06	36.80	36.34	35.91	35.54	35.38
MW-04	60.13	33.00	32.81	31.80	36.85	36.55	35.88	35.36	35.08	35.29
MW-06	56.6	30.31	28.41	28.54	Not Msd	Not Msd	33.29	32.59	32.07	31.91
MW-08	61.18	31.78	30.80	30.96	Not Msd	Not Msd	33.80	25.81	25.41	32.76
60-WM	62.31					P&A				
MW-9R	44.85	32.28	30.83	31.09	Not Msd	Not Msd	34.35	34.28	34.39	34.42
MW-10	52.68	52.68	31.77	31.35	35.33	Not Msd	34.52	34.52	34.37	34.36
MW-11	62.4	33.63	32.20	31.71	36.37	34.74	35.30	35.09	34.95	35.05
MW-12	54.88			Not Drilled		Not Msd	33.90	33.45	33.05	32.87
MW-13	62.10			Not Drilled		Not Msd	33.23	32.84	32.93	32.77
MW-14	52.68			Not Drilled		Not Msd	27.02	26.79	26.62	26.73
MW-15	51.62			Not Drilled		Not Msd	34.15	33.45	33.15	32.94
MW-16	58.84			Not Drilled		Not Msd	34.62	34.20	33.89	33.89
MW-17	43.87			Not Drilled		Not Msd	34.53	34.17	33.94	34.19
MW-18	52.44			Not Drilled		Not Msd	33.82	33.96	33.51	33.66

Revision 1

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

TABLE 5.4 (cont'd.) Ground Water Level Elevations - 1991-1998

Piezometer No.	Elevation, PVC Casing, ft MSL	09-29-97	10-16-97	10-28-97	11-10-97	11-24-97	12-08-97	12-22-97	01-05-98	01-20-98
MW-01	61.87	33.47	33.29	34.86	34.76	35.17	35.50	35.67	35.81	35.98
MW-03	59.17	35.27	36.86	37.28	37.97	38.57	38.81	38.69	38.52	38.44
MW-04	60.13	35.53	36.96	38.31	37.93	39.47	39.60	39.39	39.13	38.88
MW-06	56.6	32.12	38.86	39.01	38.30	38.37	38.25	37.49	37.18	37.05
MW-08	61.18	33.03	38.43	39.10	38.44	38.11	37,34	36.79	36.45	36.26
MW-09	62.31				P&A					
MW-9R	44.85	34.99	38.42	38.13	38.60	38.74	38.49	38.24	37.91	37.49
MW-10	52.68	34.42	36.12	37.10	37.33	37.67	37.62	37.49	37.44	37.43
MW-11	62.4	35.40	38.64	40.15	40.48	40.68	40.17	39.71	39.41	39.18
MW-12	54.88	32.78	35.29	35.26	35.53	36.22	36.36	36.33	36.36	36.38
MW-13	62.10	32.83	33.56	34.54	34.97	35.41	35.60	35.48	35.38	35.28
MW-14	52.68	26.90	27.21	27.59	28.01	28.42	28.78	29.03	29.04	29.30
MW-15	51.62	32.97	41.43	41.46	43.48	43.43	44.00	42.57	41.73	41.08
MW-16	58.84	34.02	35.51	36.08	36.37	36.89	37.13	37.12	37.17	37.16
MW-17	43.87	34.87	39.58	39.42	40.22	39.85	39.41	38.95	38.28	37.73
MW-18	52.44	33.72	35.78	36.63	37.29	37.81	38.18	37.95	37.76	37.55

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

TABLE 5.4 (cont'd.) Ground Water Level Elevations - 1991 - 1998

Piezometer No.	Elevation, PVC Casing, ft MSL	02-18-98	05-18-98	8 06-16-98 xx98 xx98
MW-01	61.87	36.19	36.65	36.32
MW-03	59.17	38.74	38.13	37.59
MW-04	60.13	39.40	38.16	37.43
MW-06	56.6	37.96	37.30	36.22
MW-08	61.18	38.03	35.98	35.28
MW-09	62.31			P&A
MW-9R	44.85	38.61	36.91	36.19
MW-10	52.68	37.98	37.50	37.10
MW-11	62.4	40.18	38.38	37.50
MW-12	54.88	37.06	36.78	36.05
MW-13	62.10	35.47	35.47	34.99
MW-14	52.68	29.57	30.15	30.00
MW-15	51.62	42.71	39.64	38.46
MW-16	58.84	37.55	37.21	36.56
MW-17	43.87	39.49	37.46	36.46
MW-18	52.44	38.20	37.24	36.51

TABLE 5.5 SUMMARY OF IN-SITU HYDRAULIC CONDUCTIVITY TEST RESULTS Municipal Solid Waste Landfill Kingsville, Texas

Piezometer Number	Estima	ated Horizontal Hyd	draulic Conducti	vity (K)
	ft/sec	ft/min	ft/day	cm/sec
MW-11	6.6x10 ⁻⁶	3.96x10 ⁻⁴	0.57	2.01x10 ⁴
MW-12	2.4x10 ⁻⁵	1.43x10 ³	2.05	7.24x10 ⁻⁴
MW-13	8.9x10 ⁶	5.33x10 ⁻⁴	0.77	2.71x10 ⁻⁴
MW-14	4.2x10 ⁶	2.49x10 ⁻⁴	0.36	1.27x10 ⁻⁴
MW-15	1.7x10 ⁻⁵	1.05x10 ⁻³	1.51	5.31x10 ⁻⁴
MW-16	2.0x10 ⁵	1.22x10 ⁻³	1.75	6.18x10 ⁴
Averages	1.35×10 ⁻⁵	8.13x10 ⁴	1.17	4.12x10 ⁴

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

TABLE 5.6

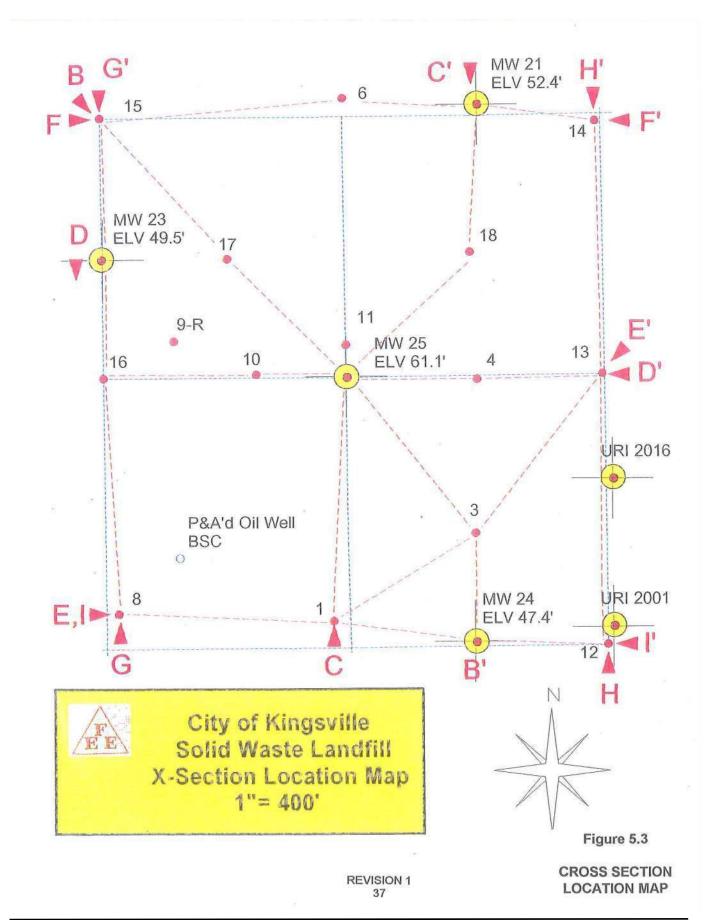
Status	A	P&A	A	A	P&A	A	P&A	A	P&A	A	A	A	4	4	A	A	K	<	4	4
Up/Down Gradient	D(POC)		D(POC)	Q		0		Q		Q	Q	D	D(POC)	D(POC)	D	O	O	0	O	0
Filler Pack (ff. bgs)	28.00		20.00	25.00		28.00		26.00		6.00	16.00	16.00	23.00	29	23.50	21.00	29.00	10.00	19.00	18.00
Screen Elev. (ff, MSL)	27.25		24.10	24.01		22.46		26.79		34.41	30.78	42.70	27.38	29.13	24.94	25.89	25.96	28.85	28.04	29.38
Screen Depth (ft, bgs)	32.00		32.00	34.00		33.00		33.00		7.00	19.00	17.50	25.00	30.00	25.00	22.50	30.00	12.50	22.00	18.00
Depth to GW (ft, bgs)	31.00		27.70	31.20		29.10	16	32.02		9.60	19.50	26.30	17.30	24.00	22.00	12.00	19.00	7.00	15.00	12.58
TOC Elevation (ft. MSL)	61.87		59.17	60.13		56.60		61.18		44.85	52.68	62.40	54.88	62.10	52.68	51.62	58.84	43.87	52.44	49.580
Ground Elev (ff, MSL)	59.249		960'99	58.008	•	55.456		59.787		41.411	49.78	60.197	52.375	59.131	49.938	48.386	55.958	41.345	50.039	MW-24 33.00 47.380 49.580
- Mojnitor Total Depth Ground Elev (ft. MSL)	42.00		37.00	39.00		38.00		43.00		17.00	29.00	33.00	48.00	20.00	42.00	37.00	47.00	33.00	42.00	33.00
Monitor #	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	8-MW 34	WW-9	MW-9R	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18	MW-24

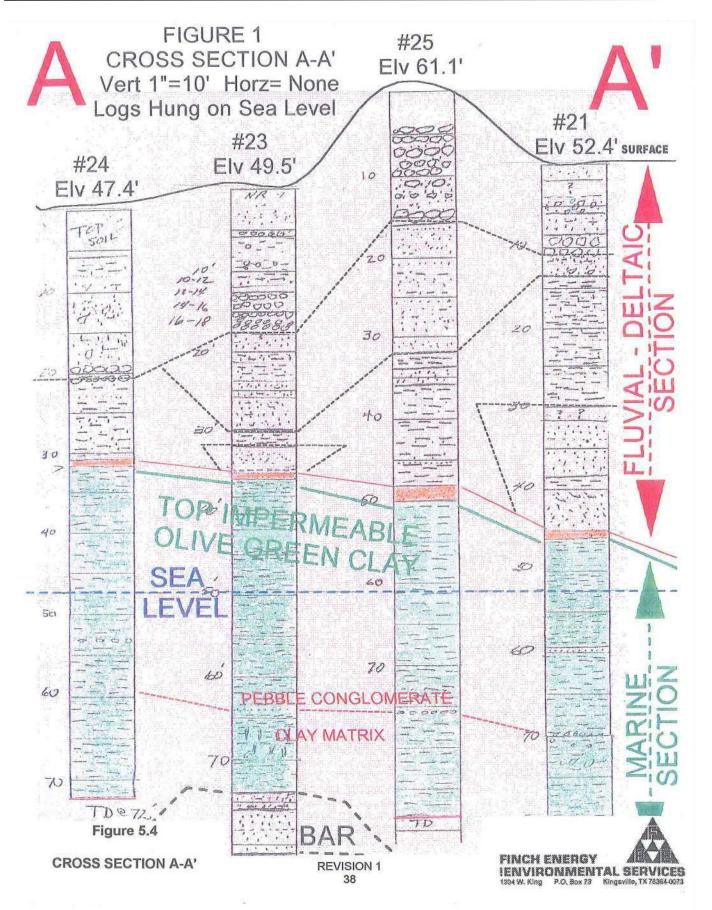
TABLE 5.7 City of Kingsville, TX - MSWLF

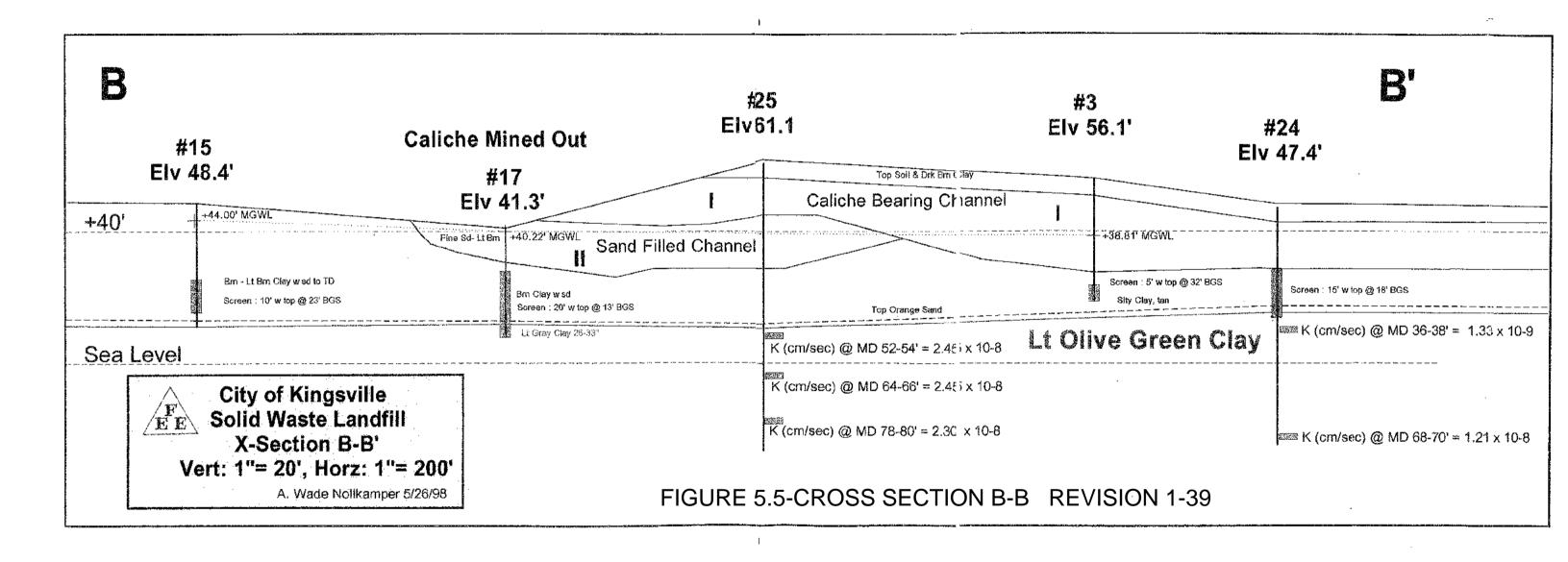
建筑和影响		Monite	or VVell Inst	allation and	d Removal	A recognition of the party of the same of the same	NAME OF THE OWNER OF THE PARTY.	Personal States
MW- No.	235	235-A	235-B	235-B	235-B	235-B	235-B	235-B
	Old	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7
1	х	×	x	x	×	x	x	x
2	х	P&A	P&A	P&A	P&A	P&A	P&A	P&A
3	х	х	x	P&A	P&A	P&A	P&A	P&A
4	х	х	x	x	P&A	P&A	P&A	P&A
5	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A
6	х	o	0	0	x	х	x	x
8	х	0	x	x	x	x	х	х
9	x	P&A	P&A	P&A	P&A	P&A	P&A	P&A
9R	х	o	0	0	0	0	0	P&A
10	х	x	x	×	x	x	х	P&A
11	ND	x	х	×	x	×	P&A	P&A
12	ND	ND	x	×	x	×	х	x
13	ND	ND	x	×	х	×	x	x
14	ND	ND	0	0	x	x	x	x
15	ND	ND ·	0	o	0	0	0	x
16	ND	ND	ō	0	0	o	o	x
17	ND	ND	0	0	0	x	х	P&A
18	ND	ND	0	х	х	P&A	P&A	P&A
19	ND	ND	×	х	x	×	x	x
20	ND	ND	ND	.ND	x	x	x	x
21	ND	ND	ND	ND	x	x	x	x
22	ND	ND	ND	ND	0	×	x	×
23	ND	ND	ND	ND	0	0	o	×
24	ND	ND	x	x	x	×	x	×
25	ND	ND	P&A	P&A	P&A	P&A	P&A	P&A
26	ND	ND	ND	ND	х	×	P&A	P&A
27	ND	ND	ND	ND	ND	×	×	×
28	ND	ND	x	x	x	x	×	x

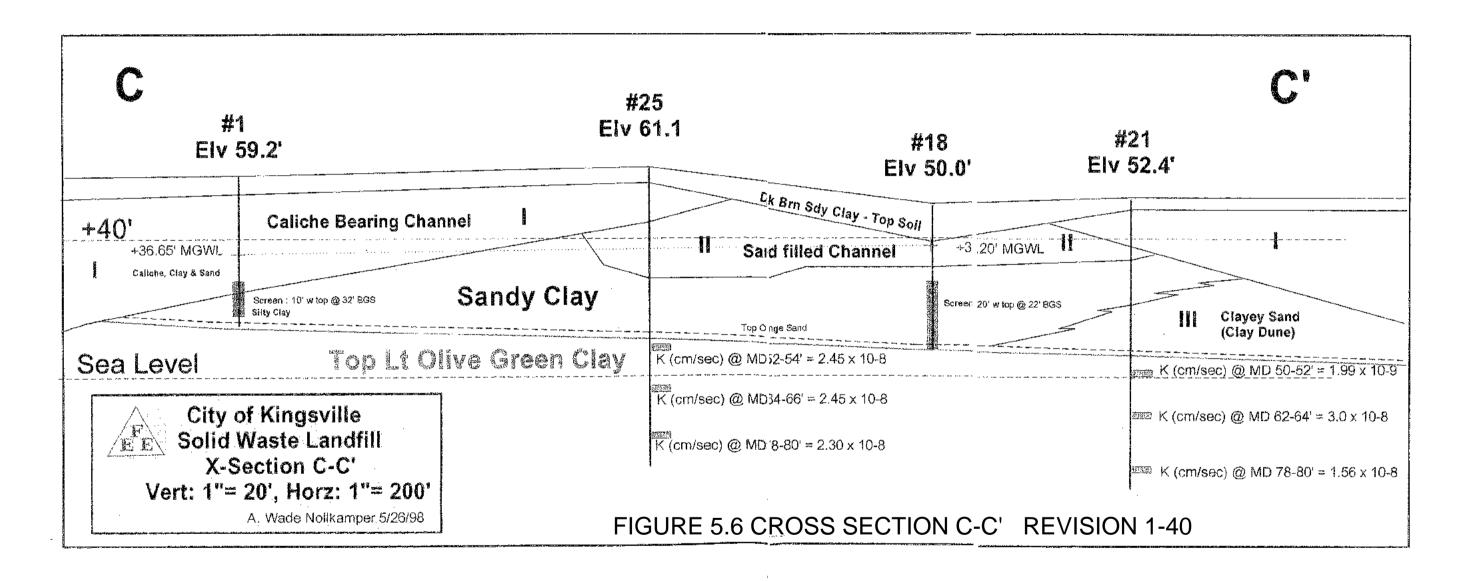
TABLE 5.7 City of Kingsville, TX - MSWLF Symbol Definition

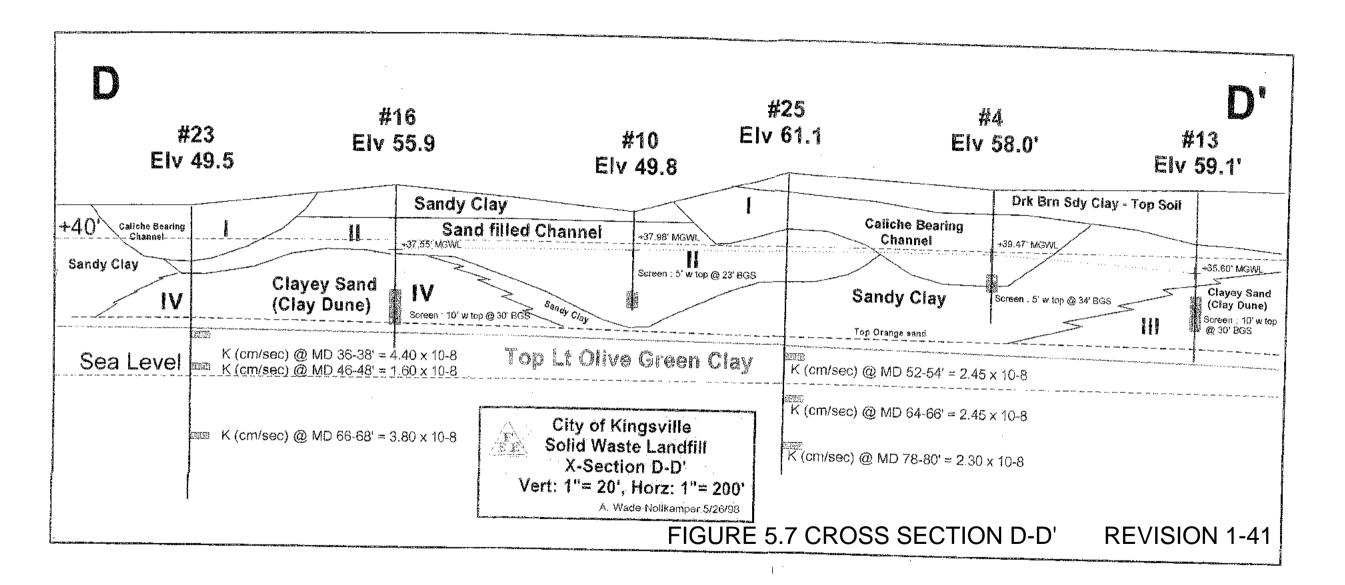
Symbol	Identification
х	An operating ground water monitor well which is in the current MW system.
0	An operating ground water monitor well which is not in the current MW system.
P&A	A ground water monitor well which has been plugged and abandoned.
ND	A ground water monitor well which has not been drilled yet.

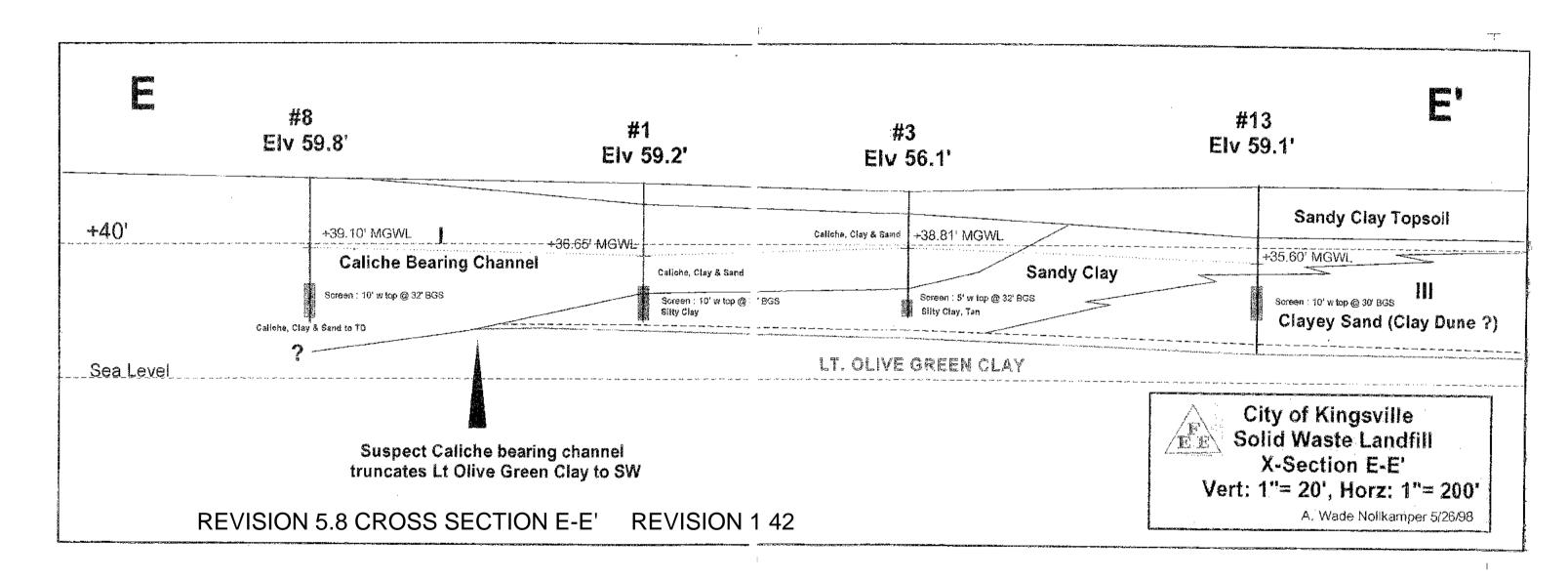


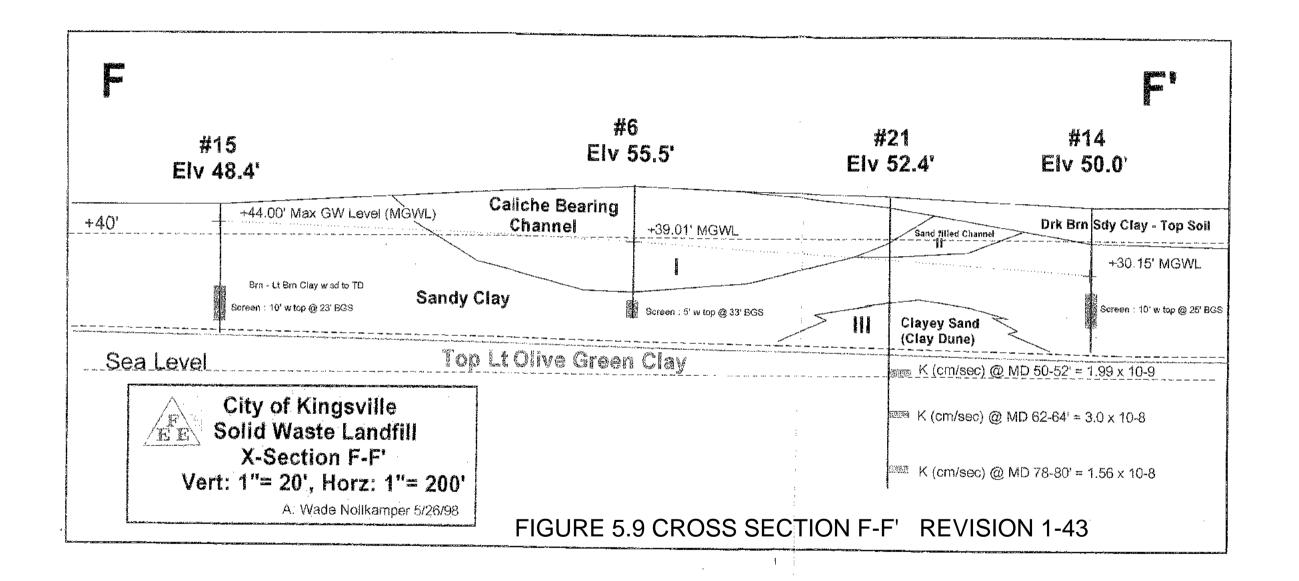


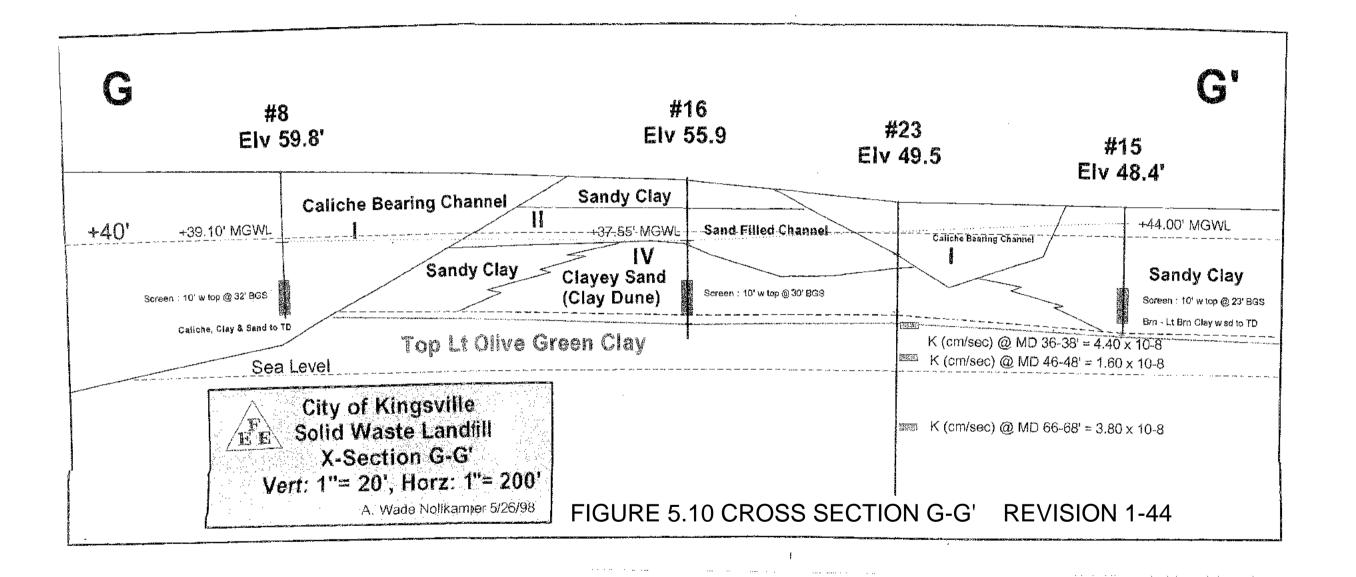


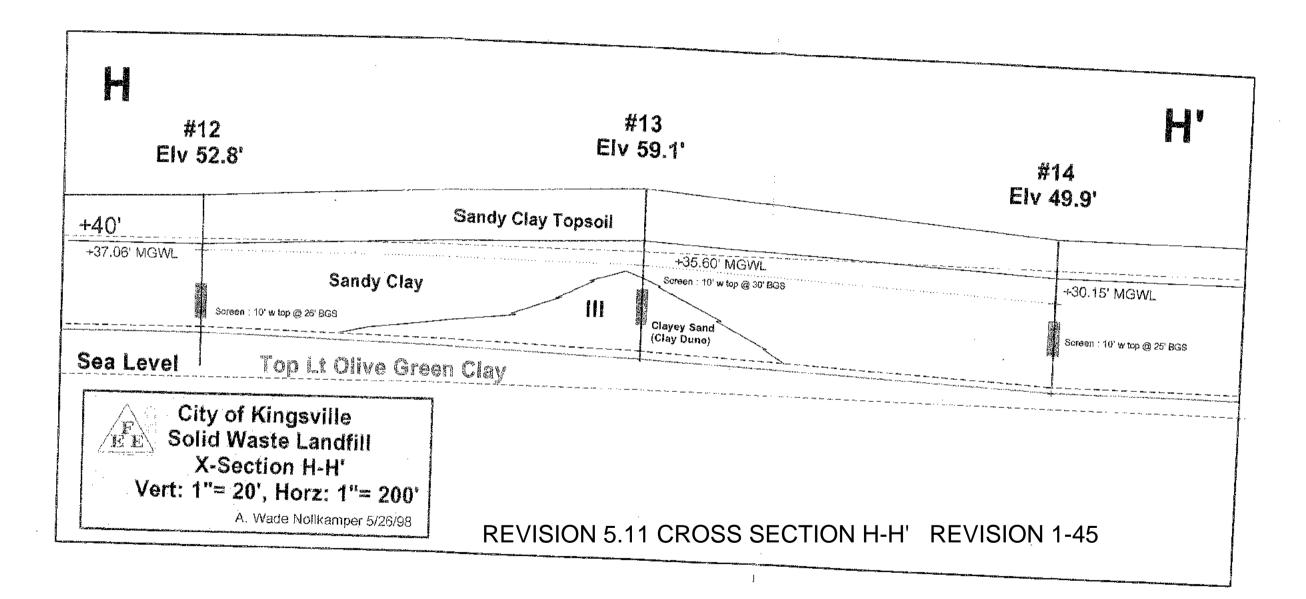


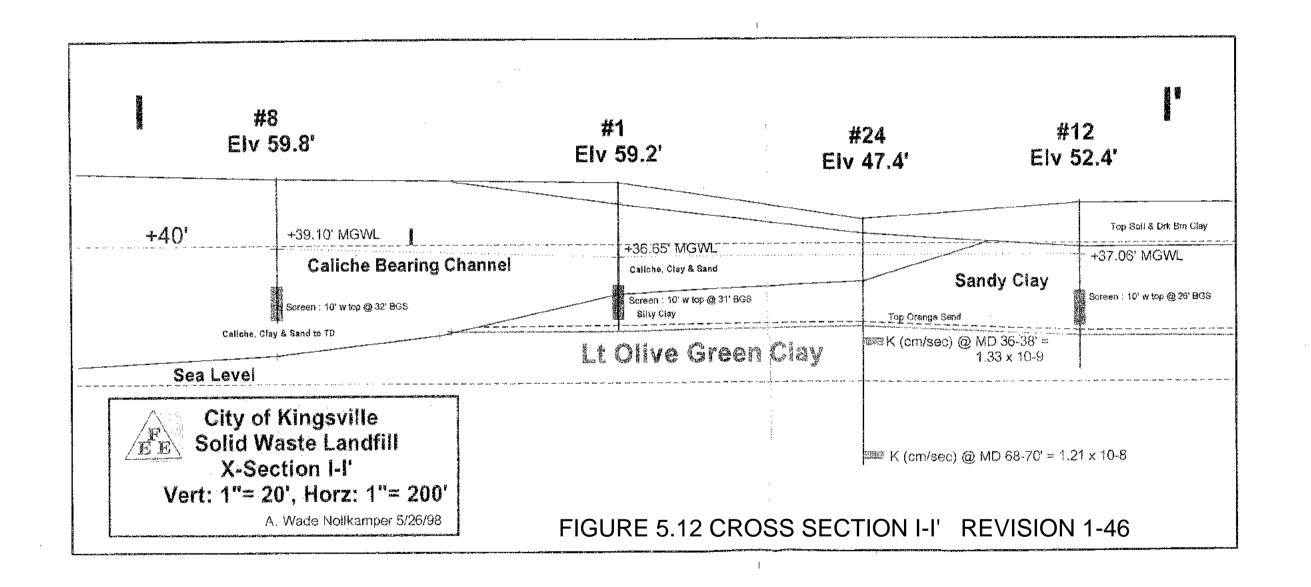


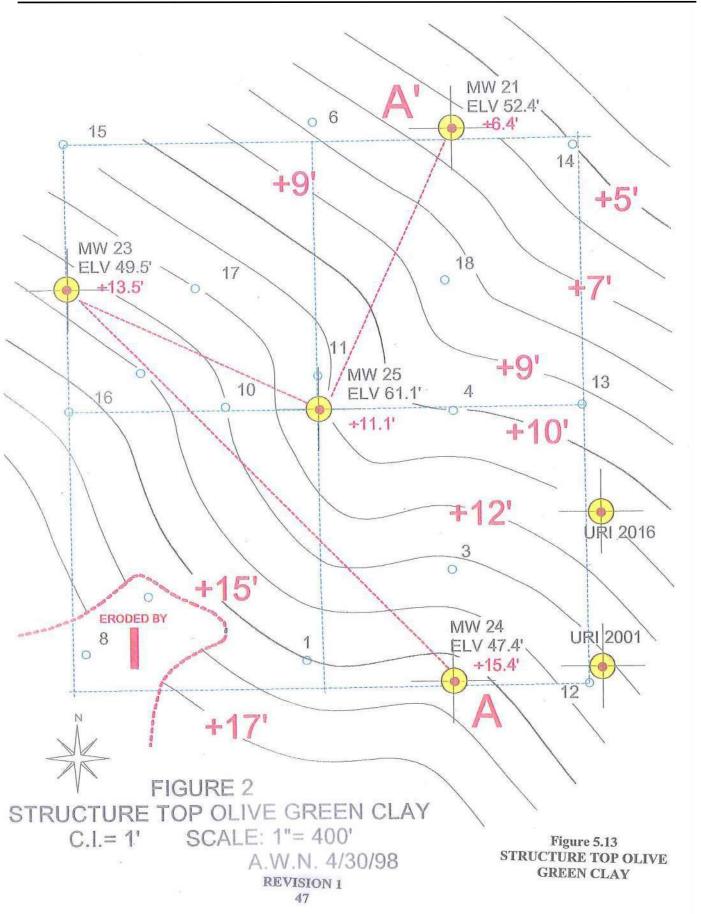


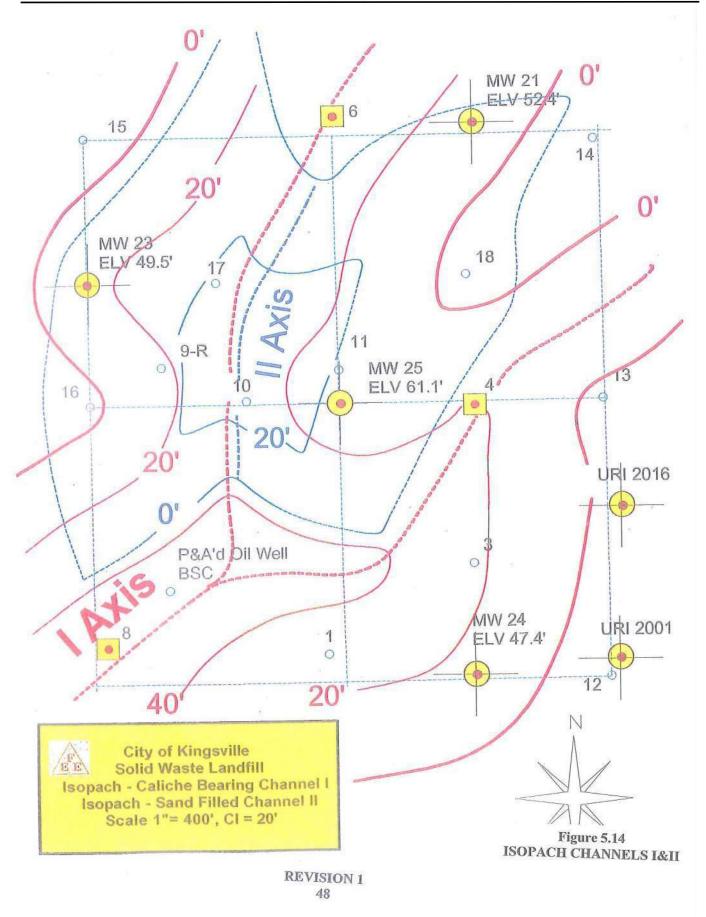


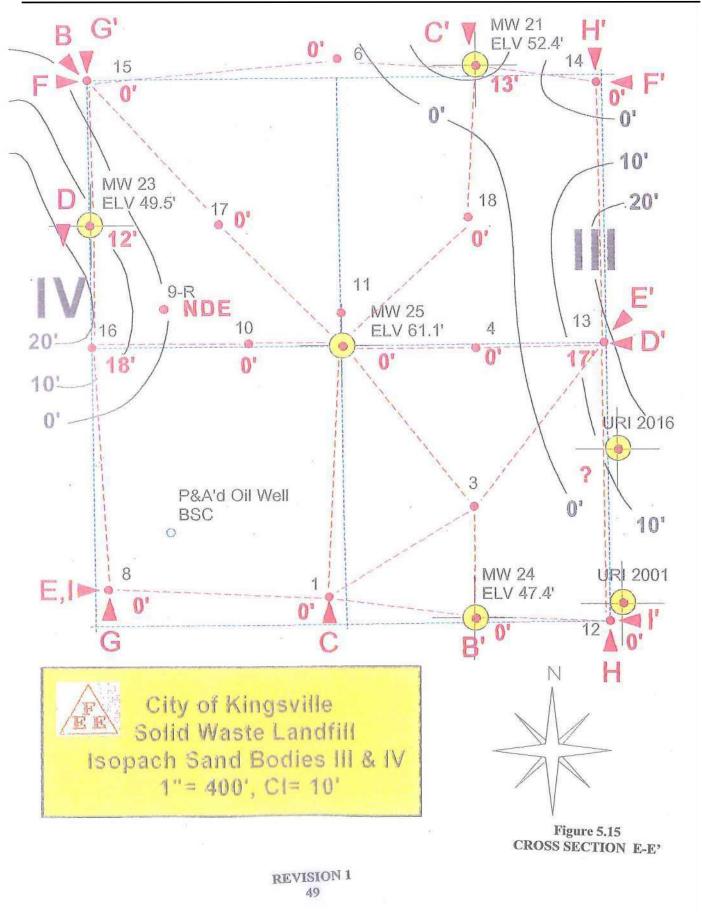


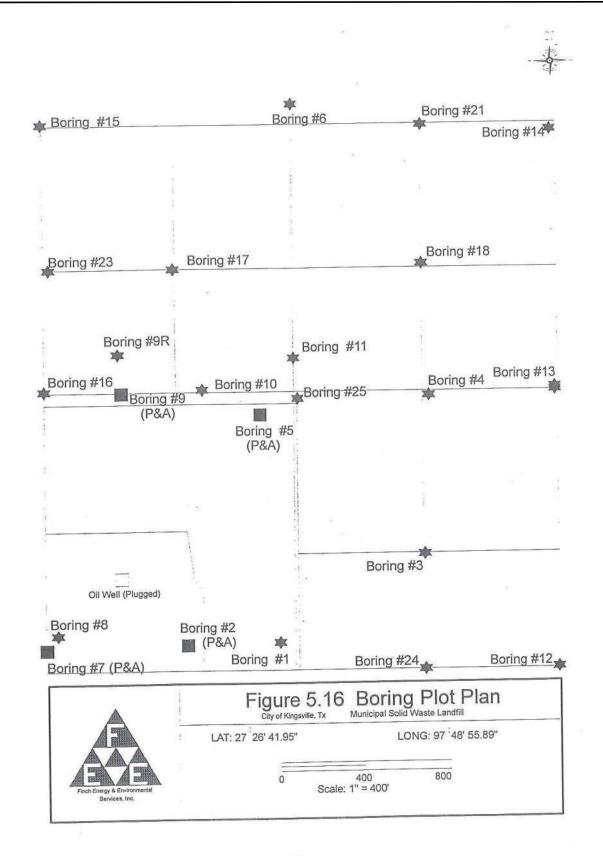












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Depth to Water Measurement Data Sheets

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CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: June 16, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	25.54	36.32	
MW3	59.17	21.58	37.59	
MW4	60.12	22.69	37.43	
MW6	56.60	20.38	36.22	
MW8	61.17	25.89	35.28	
MW9R	44.84	8.65	36.19	
MW10	52.68	15.58	37.10	
MW11	62.40	24.90	37.50	
MW12	54.87	18.82	36.05	
MW13	62.09	27.10	34.99	
MW14	52.67	22.67	30.00	
MW15	51.62	13.16	38.46	
MW16	58.83	22.27	36.56	
MW17	43.86	7.40	36.46	
MW18	52.43	15.92	36.51	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: May 18, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	25.21	36.65	
MW3	59.17	21.04	38.13	
MW4	60.12	21.96	38.16	
MW6	56.60	19.30	37.30	25
MW8	61.17	25.19	35.98	
MW9R	44.84	7.93	36.91	
MW10	52.68	15.18	37.50	
MW11	62.40	24.02	38.38	
MW12	54.87	18.09	36.78	
MW13	62.09	26.62	35.47	·
MW14	52.67	22.52	30.15	
MW15	51.62	11.98	39.64	
MW16	58.83	21.62	37.21	
MW17	43.86	6.40	37.46	
MW18	52.43	15.09	37.34	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: February 2, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	25.92	35.94	
MW3	59.17	21.00	38.17	
MW4	60.12	21.52	38.60	
MW6	56.60	19.11	37.49	<u> </u>
MW8	61.17	24.72	36.45	
MW9R	44.84	6.24	38.60	
MW10	52.68	15.23	37.45	
MW11	62.40	23.02	39.38	
MW12	54.87	18.42	36.45	
MW13	62.09	27.17	34.92	
MW14	52.67	23.51	29.16	
MW15	51.62	9.54	42.08	
MW16	58.83	21.74	37.09	
MW17	43.86	3.82	40.04	
MW18	52.43	15.16	37.27	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: February 18, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	25.67	36.19	
MW3	59.17	20.43	38.74	
MW4	60.12	20.72	39.40	
MW6	56.60	18.64	37.96	
MW8	61.17	23.14	38.03	
MW9R	44.84	6.23	38.61	
MW10	52.68	14.70	37.98	
MW11	62.40	22.22	40.18	
MW12	54.87	17.81	37.06	
MW13	62.09	26.62	35.47	
MW14	52.67	23.10	29.57	
MW15	51.62	8.91	42.71	
MW16	58.83	21.28	37.55	
MW17	43.86	4.37	39.49	
MW18	52.43	14.23	38.20	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: January 20, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	25.88	35.98	
MW3	59.17	20.73	38.44	
MW4	60.12	21.24	38.88	
MW6	56.60	19.55	37.05	
MW8	61.17	24.91	36.26	-
MW9R	44.84	7.35	37.49	
MW10	52.68	15.25	37.43	
MW11	62.40	23.22	39.18	
MW12	54.87	18.49	36.38	
MW13	62.09	26.81	35.28	
MW14	52.67	23.37	29.30	
MW15	51.62	10.54	41.08	
MW16	58.83	21.67	37.16	
MW17	43.86	6.13	37.73	
MW18	52.43	14.88	37.55	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: January 5, 1998

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	26.05	35.81	
MW3	59.17	20.65	38.52	
MW4	60.12	20.99	39.13	
MW6	56.60	19.42	37.18	
MW8	61.17	24.72	36.45	
MW9R	44.84	6.93	37.91	
MW10	52.68	15.24	37.44	
MW11	62.40	22.99	39.41	
MW12	54.87	18.51	36.36	
MW13	62.09	26.71	35.38	
MW14	52.67	23.63	29.04	
MW15	51.62	9.89	41.73	
MW16	58.83	21.66	37.17	
MW17	43.86	5.58	38.28	
MW18	52.43	14.67	37.76	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: December 22, 1997

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	26.19	35.67	
MW3	59.17	20.48	38.69	
MW4	60.12	20.73	39.39	
MW6	56.60	19.11	37.49	
MW8	61.17	24.38	36.79	
MW9R	44.84	6.60	38.24	
MW10	52.68	15.19	37.49	
MW11	62.40	22.69	39.71	
MW12	54.87	18.54	36.33	
MW13	62.09	26.61	35.48	
MW14	52.67	23.64	29.03	
MW15	51.62	9.05	42.57	
MW16	58.83	21.71	37.12	
MW17	43.86	4.91	38.95	
MW18	52.43	14.48	37.95	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: December 8, 1997

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet,MSL)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	26.36	35.50	
MW3	59.17	20.36	38.81	
MW4	60.12	20.52	39.60	
MW6	56.60	18.35	38.25	
MW8	61.17	23.83	37.34	
MW9R	44.84	6.35	38.49	
MW10	52.68	15.06	37.62	
MW11	62.40	22.23	40.17	
MW12	54.87	18.51	36.36	
MW13	62.09	26.49	35.60	
MW14	52.67	23.89	28.78	
MW15	51.62	7.62	44.00	
MW16	58.83	21.70	37.13	
MW17	43.86	4.45	39.41	
MW18	52.43	14.25	38.18	

CLIENT: City of Kingsville

F.E.E. Job #:K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: November 24, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	26.69	35.17	
MW3	59.17	20.60	38.57	
MW4	60.12	20.65	39.47	
MW6	56.60	18.23	38.37	
MW8	61.17	23.06	38.11	
MW9R	44.84	6.10	38.74	
MW10	52.68	15.01	37.67	
MW11	62.40	21.72	40.68	9
MW12	54.87	18.65	36.22	
MW13	62.09	26.68	35.41	
MW14	52.67	24.25	28.42	
MW15	51.62	8.19	43.43	
MW16	58.83	21.94	36.89	
MW17	43.86	4.01	39.85	
MW18	52.43	14.62	37.81	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE November 10, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	27.10	34.76	
MW3	59.17	21.20	37.97	
MW4	60.12	22.19	37.93	
MW6	56.60	18.30	38.30	
MW8	61.17	22.73	38.44	
MW9R	44.84	6.24	38.60	
MW10	52.68	15.35	37.33	
MW11	62.40	21.92	40.48	*
MW12	54.87	19.34	35.53	
MW13	62.09	27.12	34.97	
MW14	52.67	24.66	28.01	
MW15	51.62	8.14	43.48	
MW16	58.83	22.46	36.37	
MW17	43.86	3.64	40.22	
MW18	52.43	15.14	37.29	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: October 28, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	27.50	34.36	
МWЗ	59.17	21.89	37.28	
MW4	60.12	21.81	38.31	
MW6	56.60	17.59	39.01	
MW8	61.17	22.07	39.10	
MW9R	44.84	6.71	38.13	
MW10	52.68	15.58	37.10	
MW11	62.40	22.25	40.15	
MW12	54.87	19.61	35.26	
MW13	62.09	27.55	34.54	
MW14	52.67	25.08	27.59	
MW15	51.62	10.16	41.46	
MW16	58.83	22.75	36.08	
MW17	43.86	4.44	39.42	
MW18	52.43	15.80	36.63	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: October 20, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	27.79	34.07	
MW3	59.17	22.65	36.52	
MW4	60.12	22.47	37.65	
MW6	56.60	17.44	39.16	
MW8	61.17	21.69	39.48	
MW9R	44.84	6.64	38.20	
MW10	52.68	16.10	36.58	
MW11	62.40	22.83	39.57	
MW12	54.87	19.66	35.21	
MW13	62.09	28.20	33.89	The last of the la
MW14	52.67	25.19	27.48	
MW15	51.62	10.34	41.28	
MW16	58.83	22.98	35.85	
MW17	43.86	4.34	39.52	
MW18	52.43	16.11	36.32	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: October 16, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	28.57	33.29	
МWЗ	59.17	22.31	36.86	
MW4	60.12	23.16	36.96	- Day 201 -
MW6	56.60	17.74	38.86	
MW8	61.17	22.74	38.43	
MW9R	44.84	6.42	38.42	the state of the s
MW10	52.68	16.56	36.12	
MW11	62.40	23.76	38.64	
MW12	54.87	19.58	35.29	
MW13	62.09	28.53	33.56	
MW14	52.67	25.46	27.21	
MW15	51.62	10.19	41.43	
MW16	58.83	23.32	35.51	*
MW17	43.86	4.28	39.58	
MW18	52.43	16.65	35.78	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: September 29, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	28.39	33.47	
MW3	59.17	23.90	35.27	
MW4	60.12	24.60	35.53	
MW6	56.60	24.48	32.12	
MW8	61.17	28.14	33.03	
MW9R	44.84	9.85	34.99	
MW10	52.68	18.26	34.42	
MW11	62.40	27.00	35.40	
MW12	54.87	22.09	32.78	
MW13	62.09	29.26	32.83	
MW14	52.67	25.77	26.90	
MW15	51.62	18.65	32.97	<u></u>
MW16	58.83	24.81	34.02	
MW17	43.86	8.99	34.87	
MW18	52.43	18.71	33.72	rain times

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: September 15, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	28.28	33.59	
MW3	59.17	23.79	35.38	
MW4	60.12	23.84	35.29	
MW6	56.60	24.69	31.91	
MW8	61.17	28.42	32.76	
MW9R	44.84	10.43	34.42	
MW10	52.68	18.32	34.36	
MW11	62.40	27.35	35.05	
MW12	54.87	22.01	32.87	
MW13	62.09	29.33	32.77	
MW14	52.67	25.95	26.73	
MW15	51.62	18.68	32.94	
MW16	58.83	24.95	33.89	
MW17	43.86	9.68	34.19	
MW18	52.43	18.78	33.66	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: September 2, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	35.64	26.22	
МWЗ	59.17	23.63	35.54	
MW4	60.12	25.04	35.09	
MW6	56.60	24.53	32.07	
MW8	61.17	35.76	25.41	
MW9R	44.84	10.45	34.39	
MW10	52.68	18.31	34.37	
MW11	62.40	27.45	34.95	
MW12	54.87	21.82	33.05	
MW13	62.09	29.16	32.93	
MW14	52.67	26.05	26.62	
MW15	51.62	18.47	33.15	
MW16	58.83	24.94	33.89	
MW17	43.86	9.92	33.94	,
MW18	52.43	18.92	33.51	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: August 18, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	22.94	38.92	
MW3	59.17	23.26	35.91	
MW4	60.12	24.76	35.37	
MW6	56.60	24.01	32.59	
MW8	61.17	35.36	25.81	
MW9R	44.84	10.56	34.28	
MW10	52.68	18.16	34.52	
MW11	62.40	27.31	35.09	
MW12	54.87	21.42	33.45	
MW13	62.09	29.15	32.94	
MW14	52.67	25.88	26.79	
MW15	51.62	18.17	33.45	
MW16	58.83	24.63	34.20	
MW17	43.86	9.69	34.17	
MW18	52.43	18.47	33.96	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: August 4, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	27.67	34.19	
MW3	59.17	22.83	36.34	
MW4	60.12	24.24	35.89	
MW6	56.60	23.31	33.29	
MW8	61.17	27.37	33.80	
MW9R	44.84	10.49	34.35	
MW10	52.68	18.16	34.52	
MW11	62.40	27.10	35.30	
MW12	54.87	20.97	33.90	
MW13	62.09	28.86	33.23	
MW14	52.67	25.65	27.02	
MW15	51.62	17.47	34.15	
MW16	58.83	24.21	34.62	
MW17	43.86	9.33	34.53	
MW18	52.43	18.61	33.82	

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: June 25, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	27.79	34.08	
MW3	59.17	22.11	37.06	
MW4	60.12	22.28	36.85	
MW6	56.60	N/M	N/M	
MW8	61.17	N/M	N/M	
MW9R	44.84	N/M	N/M	
MW10	52.68	17.35	35.33	
MW11	62.40	26.03	36.37	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/M = Not Measured N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: March 20, 1997

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	30.53	31.34	
MW3	59.17	27.08	32.09	
MW4	60.12	27.33	31.80	
MW6	56.60	28.06	28.54	•
MW8	61.17	30.22	30.96	
MW9R	44.84	13.76	31.09	
MW10	52.68	21.33	31.35	
MW11	62.40	30.69	31.71	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: December 23, 1996

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	29.85	32.02	
MW3	59.17	26.03	33.14	
MW4	60.12	26.32	32.81	
MW6	56.60	28.19	28.41	
MW8	61.17	30.38	30.80	
MW9R	44.84	14.02	30.83	
MW10	52.68	20.91	31.77	
MW11	62.40	30.20	32.20	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: July 11, 1996

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	29.00	32.87	
MW3	59.17	22.00	37.17	
MW4	60.12	26.13	33.00	
MW6	56.60	26.29	30.31	
MW8	61.17	29.40	31.78	
MW9R	44.84	12.57	32.28	
MW10	52.68	19.36	33.32	
MW11	62.40	28.77	33.63	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: May 10, 1995 (K/P)

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	29.02	32.85	
МWЗ	59.17	22.98	36.19	
MW4	60.12	25.02	34.11	
MW6	56.60	N/M	N/M	And the second s
MW8	61.17	28.46	32.72	
MW9R	44.84	N/D	N/D	
MW10	52.68	N/D	N/D	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

K/P = Measured by City of Kingsville using a "Plopper".

N/M = Not Measured

N/D = Not Yet Drilled

Revision 1

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: March 14, 1994 (K/P)

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	31.40	30.47	
MW3	59.17	26.00	33.17	
MW4	60.12	28.00	31.13	
MW6	56.60	25.25	31.35	
MW8	61.17	28.10	33.08	
MW9R	44.84	N/D	N/D	
MW10	52.68	N/D	N/D	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

K/P = Measured by City of Kingsville using a "Plopper".

N/D = Not Yet Drilled

Revision 1

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: April 5, 1993

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	28.61	33.25	
мwз	59.17	27.02	32.15	
MW4	60.12	30.11	30.01	
MW6	56.6	27.11	29.49	
MW8	61.17	29.17	32.00	
MW9R	44.84	N/D	.N/D	
MW10	52.68	17.76	34.92	
MW11	62.40	N/D	N/D	1
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	Til Til Til Til Til Til Til Til Til Til
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: September 28, 1992

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	30.6	31.26	
MW3	59.17	25.7	33.47	
MW4	60.12	30.4	29.72	
MW6	56.60	27.0	29.60	
MW8	61.17	28.3	32.87	
MW9R	44.84	N/D	N/D	
MW10	52.68	18.9	33.78	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	- N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: August 11, 1992

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	30.02	31.84	
MW3	59.17	25.54	33.63	
MW4	60.12	26.79	33.33	
MW6	56.60	25.25	31.35	
MW8	61.17	27.52	33.65	
MW9R	44.84	N/D	N/D	
MW10	52.68	16.59	36.09	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: April 14, 1992

Well Number	(A) Casing Elevation (feet,MSL)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	36.88	24.98	
мwз	59.17	26.75	32.42	
MW4	60.12	27.39	32.73	
MW6	56.60	21.92	34.68	
MW8	61.17	26.77	34.40	
MW9R	44.84	N/D	N/D	
MW10	52.68	18.49	34.19	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	ARCOLO .

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: August 8, 1991

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet,MSL)	(A) - (B) Water Surface Elevation (feet,MSL)	Comments:
MW1	61.86	34.69	27.17	
MW3	59.17	26.86	32.31	
MW4	60.12	24.56	35.56	
MW6	56.60	21.44	35.16	
MW8	61.17	27.5	33.67	
MW9R	44.84	N/D	N/D	
MW10	52.68	N/D	N/D	
MW11	62.40	N/D	N/D	
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	9
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: July 30, 1991

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	34.5	27.36	***************************************
MW3	59.17	26.69	32.48	
MW4	60.12	23.77	36.35	
MW6	56.60	22.02	34.58	
MW8	61.17	27.67	33.50	
MW9R	44.84	N/D	N/D	
MW10	52.68	N/D	N/D	
MW11	62.40	N/D	N/D	¥
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	×
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

N/D = Not Yet Drilled

CLIENT: City of Kingsville

F.E.E. Job #: K01-01-R011

LOCATION: MSWLF - Kingsville, Tx

DATE: March 29, 1991

Well Number	(A) Casing Elevation (feet)	(B) Depth to Water (feet)	(A) - (B) Water Surface Elevation (feet)	Comments:
MW1	61.86	35.6	26.26	
мwз	59.17	25.59	33.58	
MW4	60.12	23.98	36.14	
MW6	56.60	21.35	35.25	
MW8	61.17	N/D	N/D	
MW9R	44.84	N/D	N/D	
MW10	52.68	N/D	N/D	
MW11	62.40	N/D	N/D	8
MW12	54.87	N/D	N/D	
MW13	62.09	N/D	N/D	
MW14	52.67	N/D	N/D	
MW15	51.62	N/D	N/D	
MW16	58.83	N/D	N/D	
MW17	43.86	N/D	N/D	
MW18	52.43	N/D	N/D	

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

APPENDIX B

Depth to Water Measurement Data by Well No.

		14/-11	444															u a				000			• •					D-1
Ground Water						٠.			• •	•	•	• •	•		•	•	•										nre Nre		92	B-2
Ground Water																	• •			• •	•	•		•	•					B-3
Ground Water	Monitor	Well	#4										•			•													•	
Ground Water										0140														•	. ,					
Ground Water													0.7									٠			•					B-5
						•		•	•		1700	188	(3)	22																B-6
Ground Water							• •				•				•					•										B-7
Ground Wate													٠			7.	•	•					•		•		•	•		
Ground Wate	r Monitor	Well	#11						٠		•																٠	•		
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					• •	•	•		•	•															•				•	B-11
Ground Wate	r Monitor	vveii	# 14		•	•						•			•	•	•	500	1189		5:115 		97-91 97-91						-	B-12
Ground Wate	r Monitor	Well	#15)		٠				٠.							٠		•							•		•	•	B-13
Ground Wate	r Monitor	Well	1#16	6			•																٠			•	• •		•	
Craund Mata	- Monitor	· Wel	1 #17	7				100	0											٠						*			*	D
Ground Wate	* Monitor	10/01	1 #15	2								-1200																	٠	B-15
Caround Wate	T IVICITION	VVCI	I TT I C	3																										

November 1997 Revision 1 - June 1998

B-0

Part III, Attachment 4, Appendix 1, p.g. 848

Ground Water Monitor Well #1 Measured Total Depth is 41.67 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation** Top PVC 61.867 Feet, MSL

Elevation**	Top PVC	61.867	Feet, MSL
	Depth	Elevation	Comments
<u>Date</u>	to Water	of water	*
	feet	feet,MSL	
	iect	10041=	
03-29-91	35.6	26.27	
07-30-91	34.5	27.37	
08-08-91	34.69	27.18	
	36.88	24.99	
04-14-92	30.02	31.85	
08-11-92	30.6	31.27	
09-28-92	28.61	33.26	
04-05-93	31.4	30.47	
03-14-94	29.02	32.85	
05-10-95	29.02	32.87	
07-11-96	29.85	32.02	
12-23-96	30.53	31.34	
03-20-97		34.08	
06-25-97	27.79	34.2	
08-04-97	27.67	38.93	
08-18-97	22.94		
09-02-97	35.64	26.23	
09-15-97	28.28	33.59	
09-29-97	28.39	33.48 33.3	
10-16-97	28.57	34.37	
10-28-97	27.5 27.1	34.77	
11-10-97	26.69	35.17	
11-24-97 12-08-97	26.36	35.5	
12-22-97	26.19	35.67	
01-05-98	26.05	35.81	
01-20-98	25.88	35.98	
02-02-98	25.92	35.94	
02-18-98	25.67	36.19	2075
(Haladalis)	9.5 (\$6 9.5 (\$6	3(8.89)	
J. 3. (16) A 151 (9) B	A Paris Paris	ible for the	

^{*} City of Kingsville was responsible for the measurements during this period. (used plopper)

^{**} All top of PVC casing elevation have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #3

Measured Total Depth is 37.75 ft from top of PVC

All Measures from Top of PVC Well Pipe

Elevation** Top PVC 59.173 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	25.59	33.58	
07-30-91	26.69	32.48	
08-08-91	26.86	32.31	
04-14-92	26.75	32.42	
08-11-92	25.54	33.63	
	25.7	33.47	
09-28-92	27.02	32.15	
04-05-93	26	33.17	
03-14-94	22.98	36.19	
05-10-95	(THE STATE OF THE	37.17	
07-11-96	22	33.14	
12-23-96	26.03		
03-20-97	27.08	32.09	
06-25-97	22.11	37.06	
08-04-97	22.83	36.34	
08-18-97	23.26	35.91	
09-02-97	23.63	35.54	
09-15-97	23.79	35.38	
09-29-97	23.9	35.27	
10-16-97	22.31	36.86	
10-28-97	21.89	37.28	
11-10-97	21.2	37.97	
11-24-97	20.6	38.57	
12-08-97	20.36	38.81	
12-22-97	20.48	38.69	
01-05-98	20.65	38.52	
01-20-98	20.73	- 38.44	
02-02-98	21	38.17	
02-22-98	20.43	38.74	N/OF
- (15-113-4213 ·	26.02	3(4),0150 27,758	
100-10-108	20158	11/2013	A CONTRACTOR OF THE PARTY OF TH

^{*}The City of Kingsville (COK) was responsible for depth measurements during this period. (used plopper)

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #4

Measured Total Depth is 40.32 ft from top of PVC

All Measures from Top of PVC Well Pipe

Elevation** Top PVC 60.125 Feet, MSL

Date	Depth	Elevation	Comments
-	to Water	of water	
	feet	feet***	
	1001	-	
03-29-91	23.98	35.15	
07-30-91	23.77	35.36	
08-08-91	24.56	34.57	
04-14-92	27.39	31.74	
INCESSION SOMEONING	26.79	32.34	
08-11-92	30.4	28.73	
09-28-92	30.4	29.02	
04-05-93		31.13	
03-14-94	28		
05-10-95	25.02	34.11	
07-11-96	26.13	33	
12-23-96	26.32	32.81	
03-20-97	27.33	31.8	
06-25-97	22.28	36.85	
08-04-97	24.24	35.89	
08-18-97	24.76	35.37	
09-02-97	25.04	35.09	
09-15-97	23.84	36.29	
09-29-97	24.6	35.53	
10-16-97	23.16	36.97	
10-28-97	21.81	38.32	
11-10-97	22.19	37.94 39.47	
11-24-97	20.65	39.47	
12-08-97	20.52	39.39	
12-22-97	20.73	39.13	
01-05-98	20.99 21.24	38.88	
01-20-98	21.24	38.60	
02-02-98	20.72	39.40	
02-18-98	21.96	318 116	14
/015-716±98	922 (619	(17,0%)	
*The City of k	Cingeville (COK)	was responsib	le for depth

^{*}The City of Kingsville (COK) was responsible for depth measurements during this period. (used plopper)

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

^{***} One foot has been subtracted from the calculated water depth for MW #4, due to the addition of a 12.00" extension to the top of the well casing between the time of measurement of depth to water and the time of the McCumber elevation survey.

Ground Water Monitor Well #6 Measured Total Depth is 39.15 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation** Top PVC 56.604 Feet, MSL

-				25
	<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
	03-29-91	21.35	35.25	
	07-30-91	22.02	34.58	
	08-08-91	21.44	35.16	
	04-14-92	21.92	34.68	
	08-11-92	25.25	31.35	
	09-28-92	27	29.6	
	04-05-93	27.11	29.49	
	03-14-94	25.25	31.35	
	05-14-94	Not	measured	
	07-11-96	26.29	30.31	
	12-23-96	28.19	28.41	
	03-20-97	28.06	28.54	
	06-25-97	Not	measured	
	08-04-97	23.31	33.29	
	08-04-97	24.01	32.59	
	09-02-97	24.53	32.07	
	09-15-97	24.69	31.91	
	09-29-97	24.48	32.12	
	10-16-97	17.74	38.86	
	10-28-97	17.59	39.01 38.3	
	11-10-97	18.3	38.37	
	11-24-97	18.23 18.35	38.25	
	12-08-97	19.11	37.49	
	12-22-97 01-05-98	19.42	. 37.18	
	01-20-98	19.55	37.05	
	02-02-98	19.11	37.49	
	02-18-98	18.64	37.96	aw/
	(क्षेत्रस्थितिक	(9) 5(0)	67:30	
	106-116: 981	20/48	\$(7 <i>9)</i> 2	a for donth

^{*}The City of Kingsville (COK) was responsible for depth measurements during this period. (used plopper)

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #8 Measured Total Depth is 43.65 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation** Top PVC 61.178 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
			7
03-29-91	Not	Drill'd	
07-30-91	27.67	33.51	
08-08-91	27.5	33.68	
04-14-92	26.77	34.41	12.
08-11-92	27.52	33.66	
	28.3	32.88	
09-28-92	29.17	32.01	
04-05-93	28.1	33.08	
03-14-94	28.46	32.72	
05-10-95	29.4	31.78	
07-11-96		30.8	
12-23-96	30.38	30.96	
03-20-97	30.22		
06-25-97	Not	Measured	
08-04-97	27.37	33.81	
08-18-97	35.36	25.82	
09-02-97	35.76	25.42	
09-15-97	28.42	32.76	
09-29-97	28.14	33.04	
10-16-97	22.07	39.11 38.44	
10-28-97	22.74	38.45	
11-10-97	22.73	38.11	
11-24-97	23.06	37.34	
12-08-97	23.83	36.79	
12-22-97	24.38 24.72	36.45	
01-05-98	24.72	36.26	
01-20-98	24.72	36.45	
02-02-98 02-18-98	23.14	38.03	
02-10-90	25.1年	de 98	
ଜ୍ଞାନ୍ୟ (କ୍ରିପ୍ର	27.30	45 21	
The state of the s		responsible	for denth

^{*}The City of Kingsville (COK) was responsible for depth measurements during this period. (used plopper)

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #9R Measured Total Depth is 18.29 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation** Top PVC 44.849 Feet, MSL

			1/2
<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
	Not	Drill'd	
03-29-91	1-327-59	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not		
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	12.57	32.28	
12-23-96	14.02	30.83	
03-20-97	13.76	31.09	
06-25-97	Not	Measured	
08-04-97	10.49	34.36	
08-18-97	10.56	34.29	
09-02-97	10.45	34.4	
09-15-97	10.43	34.42	
09-29-97	9.85	35	
10-16-97	9.85	35	
10-28-97	9.85	35	
11-10-97	9.85	35 38.74	2
11-24-97	6.10	38.49	
12-08-97	6.35	38.24	
12-22-97	6.60	. 37.91	
01-05-98	6.93 7.35	37.49	
01-20-98	6.24	38.60	
02-02-98 02-18-98	6.23	38.61	
02-10-90	0.20	(36.54)	12
		10.00	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor #10 Measured Total Depth is 31.48 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation*** Top PVC 52.684 Feet, MSL

				*
	<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
	03-29-91	Not	_ Drill'd	
	07-30-91	Not	Drill'd	
	08-08-91	Not	Drill'd	
	04-14-92	18.49	34.19	
	08-11-92	16.59	36.09	
	09-28-92	18.9	33.78	
	04-05-93	17.76	34.92	
ŀ	03-14-94	17.5	35.18	
ŀ	05-10-95	19.02	33.66	
	07-11-96	19.36	33.32	
	12-23-96	20.91	31.77	
	03-20-97	21.33	31.35	
	06-25-97	17.35	35.33	
	08-04-97	18.16	34.52	
	08-18-97	18.16	34.52	
	09-02-97	18.31	34.37	
	09-15-97	18.32	34.36	
	09-29-97	18.26	34.42	
	10-16-97	16.56	36.12	
	10-28-97	15.58	37.1	
	11-10-97	15.35	37.33	
	11-24-97	15.01	37.67	
	12-08-97	15.06	37.62	
	12-22-97	15.19	37.49	
	01-05-98	15.24	37.44	
	01-20-98	15.25	37.43 37.45	
	02-02-98 02-18-98	15.23 14.70	37.98	
	05-16-98	15.18	39/50	5
	กั(ลิสเทลเลียเลี	สมาติ	2007/2004	
	The state of the s		The second of th	Condonale

^{*}The City of Kingsville (COK) was responsible for depth measurements during this period. (used plopper)

^{**} Due to surface water infiltration, a riser was installed and a taller casing protector was added. Three (3) foot was added to the "Top of PVC" datum point.

^{***} All top of PVC casings have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #11 Measured Total Depth is 35.21 ft from top of PVC All Measures from Top of PVC Well Pipe Elevation** Top PVC 62.401 Feet, MSL

			((*)
<u>Date</u>	<u>Depth</u> to Water	Elevation of water	Comments
-	feet	<u>feet</u>	
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	28.77	33.63	
12-23-96	30.2	32.2	
03-20-97	30.69	31.71	
06-25-97	26.03	36.37	
08-04-97	27.1	35.3	
08-18-97	27.31	35.09	
09-02-97	27.45	34.95	
09-15-97	27.35	35.05	
09-29-97	27	35.4	
10-16-97	23.76	38.64	
10-18-97	22.25	40.15	
11-10-97	21.92	40.48	
11-24-97	21.72	40.68	
12-08-97	22.23	40.17	
12-22-97	22.69	39.71	
01-05-98	22.99	. 39.41	
01-20-98	23.22	39.18	
02-02-98	23.02	39.38	
02-18-98	22.22	40.18	red.
(015=1)(8=1918)	24.400 24.400	ัลฟุรเสีย สหรับเสีย	
0646598	ALCOHOL MANAGEMENT	Assessment to A section and	ISSUE IN CONTRACTOR OF THE PARTY OF THE PART

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #12 Elevation** Top PVC 54.879 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	at .
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	Not	Drill'd	
12-23-96	Not	Drill'd	
03-20-97	Not	Drill'd	
06-25-97	Not	Drill'd	
08-04-97	20.97	33.91	
08-18-97	21.42	33.46	
09-02-97	21.82	33.06	
09-15-97	22.01	32.87	
09-29-97	22.09	32.79	
10-16-97	19.58	35.3	
10-28-97	19.61	35.27	
11-10-97	19.34	35.54	
11-24-97	18.65	36.22	
12-08-97	18.51	36.36	
12-22-97	18.54	36.33	
01-05-98	18.51	36.36	
01-20-98	18.49	36.38	
02-02-98	18.42	36.45	
02-18-98	17.81	37.06	
0546.00	(1)(3)(1)	S(31.788)	i i
Tales_0 = 2012	以后,他们就是	হতি দিক	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #13 Elevation** Top PVC 62.096 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
DODONS SEXUALINGUIS	Not	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	Not	Drill'd	
12-23-96	Not	Drill'd	
03-20-97		Drill'd	
06-25-97	Not	33.24	
08-04-97	28.86	32.95	
08-18-97	29.15 29.16	32.94	
09-02-97	29.33	32.77	
09-15-97	29.26	32.84	
09-29-97	28.53	33.57	
10-16-97 10-28-98	27.55	34.55	
11-10-97	27.12	34.98	
11-10-97	26.68	35.41	
12-08-97	26.49	35.60	
12-22-97	26.61	35.48	
01-05-98	26.71	35.38	
01-20-98	26.81	35.28	
02-02-98	27.17	34.92	
02-18-98	26.62	35.47	
(95cH3) 9(3)	2/5 (3)2	1317447	4
06+16:98	277 1 (0)	রে গোটাই	第 -

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #14
Elevation** Top PVC 52.677 Feet, MSL

<u>Dat</u>	<u>e</u>	Depth to Water feet	Elevation of water feet	Comments
03-29	-91	Not	Drill'd	
07-30	-91	Not	Drill'd	
08-08		Not	Drill'd	
04-14		Not	Drill'd	
08-11		Not	Drill'd	
09-28		Not	Drill'd	
04-05		Not	Drill'd	
03-14	DAMINOS.	Not	Drill'd	
05-10		Not	Drill'd	-
07-1		Not	Drill'd	
12-23		Not	Drill'd	
03-20		Not	Drill'd	
06-2		Not	Drill'd	18
08-0		25.65	27.03	
08-1		25.88	26.8	
09-0		26.05	26.63	
09-1	5-97	25.95	26.73	
09-2	9-97	25.77	26.91	
10-1		25.46	27.22	
10-2		25.08	27.6 28.02	
	0-97	24.66 24.25	28.42	
	4-97 8-97	23.89	28.78	
1000000	2-97	23.64	29.03	
	5-98	23.63	29.04	
	0-98	23.37	29.30	
02-0	2-98	23.51	29.16	
	8-98	23.10	29.57	147.5
ं अह		72.5%	2(3)1160 2(3)16(0)	
66	1520日7600	2267	- Isitute	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #15
Elevation** Top PVC 51.624 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94		Drill'd	
05-10-95	Not		
07-11-96	Not	Drill'd	
12-23-96	Not	Drill'd	
03-20-97	Not	Drill'd	
06-25-97	Not	Drill'd	
08-04-97	17.47	34.15	
08-18-97	18.17	33.45	
09-02-97	18.47	33.15	
09-15-97	18.68	32.94	
09-29-97	18.65	32.97	
10-16-97	10.19	41.43	
10-28-97	10.16	41.46	
11-10-97	8.14	43.48	
11-24-97	8.19	43.43	
12-08-97	7.62	44.00	
12-22-97	9.05	42.57	
01-05-98	9.89	41.73	
01-20-98	10.54	41.08	
02-02-98	9.54	42.08	
02-18-98	8.91	42.91	n .
05-18-98	11.98	39.64 38.46	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #16 Elevation** Top PVC 58.839 Feet, MSL

<u>Date</u>	Depth to Water	Elevation of water	Comments
	<u>feet</u>	<u>feet</u>	
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
Carrier at the control of	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	95 NV	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	Not		
12-23-96	Not	Drill'd	
03-20-97	Not	Drill'd	
06-25-97	Not	Drill'd	
08-04-97	24.21	34.63	
08-18-97	24.63	34.21	
09-02-97	24.94	33.9	
09-15-97	24.95	33.89	
09-29-97	24.81	34.03	
10-16-97	23.32	35.52	(8)
10-28-97	22.75	36.09	
11-10-97	22.46	36.38	
11-24-97	21.94	36.89	
12-08-97	21.70	37.13	
12-22-97	21.71	37.12	
01-05-98	21.66	37.17	
01-20-98	21.67	37.16	
02-02-98	21.74	37.09	
02-18-98	21.28	37.55	1.64
0.5 (8-918)	24 62	277971 15-14-2	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Ground Water Monitor Well #17 Elevation** Top PVC 43.868 Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
A CONTRACTOR OF THE PARTY OF TH	Not	Drill'd	
05-10-95	Not	Drill'd	
07-11-96	Not	Drill'd	
12-23-96	1000000	Drill'd	
03-20-97	Not		
06-25-97	Not	Drill'd	
08-04-97	9.33	34.54	
08-18-97	9.69	34.18	
09-02-97	9.92	33.95	
09-15-97	9.68	34.19	
09-29-97	8.99	34.88	
10-16-97	4.28	39.59	
10-28-97	4.44	39.43	
11-10-97	3.64	40.23	
11-24-97	4.01	39.85	
12-08-97	4.45	39.41	
12-22-97	4.91	38.95	
01-05-98	5.58	38.28	
01-20-98	6.13	37.73	
02-02-98	3.82	40.04	
02-18-98	4.37	39.49	
1015-113-1255	G200	1947 APV	F
1016 - 116 - 115	7.40	ট্রেড এচি	31

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

Gro	und Water	Monitor Well	#18
Elevation**	Top PVC	52.438	Feet, MSL

<u>Date</u>	Depth to Water feet	Elevation of water feet	Comments
03-29-91	Not	Drill'd	
07-30-91	Not	Drill'd	
08-08-91	Not	Drill'd	
04-14-92	Not	Drill'd	
08-11-92	Not	Drill'd	
09-28-92	Not	Drill'd	
04-05-93	Not	Drill'd	
03-14-94	Not	Drill'd	
05-14-54	Not	Drill'd	
05-10-95	Not	Drill'd	
	Not	Drill'd	
12-23-96	Not	Drill'd	
03-20-97	100000	Drill'd	
06-25-97	Not		
08-04-97	18.61	33.83	
08-18-97	18.47	33.97	
09-02-97	18.92	33.52	
09-15-97	18.78	33.66	
09-29-97	18.71	33.73 35.79	
10-16-97	16.65	36.64	
10-28-97	15.8	37.3	
11-10-97	15.14	37.81	
11-24-97	14.62		
12-08-97	14.25	38.18	
12-22-97	14.48	37.95 37.76	
01-05-98	14.67		
01-20-98	14.88	37.55	
02-02-98	15.16	37.27	
02-18-98	14.23	38:20	
(0)524(32(3)3)	115 (04)	577-5 7 1	

^{**} All top of PVC casing elevations have been corrected to McCumber elevation survey of 07-29-97.

City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

APPENDIX C

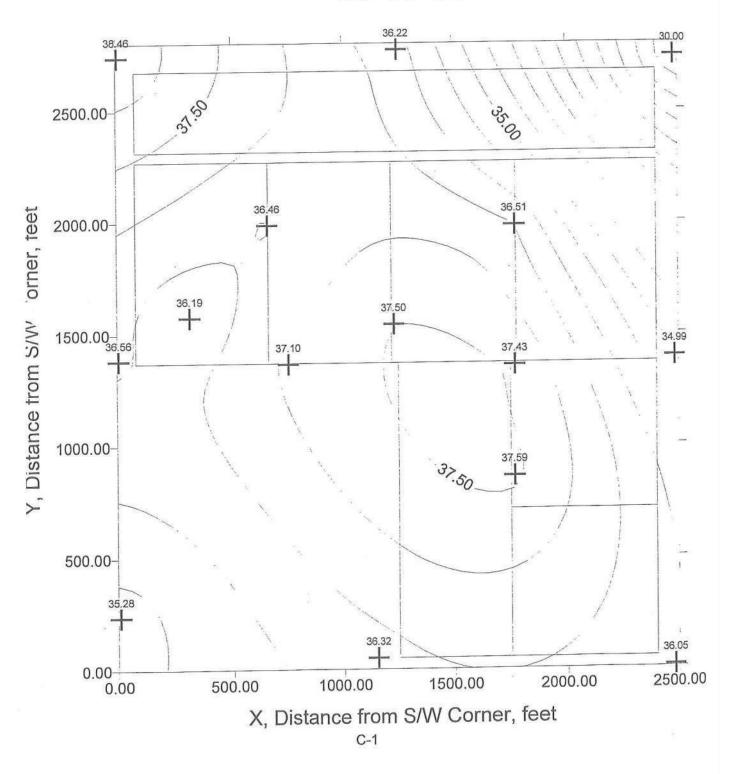
Ground Water Contours by Date

Ground Water Contour - June 16, 1998	C-1
Ground Water Contour - May 18, 1998	C-2
Ground Water Contour - February 18, 1998	C-3
Ground Water Contour - February 2, 1998	U-4
Ground Water Contour - January 20, 1998	C-5
Ground Water Contour - January 5, 1998	C-6
Ground Water Contour - December 22, 1997	C-7
Ground Water Contour - December 8, 1997	C-8
Ground Water Contour - November 24, 1997	C-9
Ground Water Contour - November 10, 1997	J-10
Ground Water Contour - October 28, 1997	0-11
Ground Water Contour - October 16, 1997	0-12
Ground Water Contour - September 29, 1997	C-13
Ground Water Contour - September 15, 1997	0-14
Ground Water Contour - September 2, 1997	C-15
Ground Water Contour - August 18, 1997	0-10
Ground Water Contour - August 4, 1997	C-17
Ground Water Contour - June 25, 1997	0-18
Ground Water Contour - March 20, 1997	C-19
Ground Water Contour - December 23, 1996	C-20
Ground Water Contour - July 11, 1996	C-21
Ground Water Contour - May 10, 1995	C-22
Ground Water Contour - March 14, 1994	C-23
Ground Water Contour - April 5, 1993	C-24
Ground Water Contour - September 28, 1992	C-25
Ground Water Contour - August 11, 1992	C-26
Ground Water Contour - April 14, 1992	C-27
Ground Water Contour - August 8, 1991	C-28
Ground Water Contour - July 30, 1991	C-29
Ground Water Contour - March 29, 1991	C-30
CHICHING WALES CONTOUS - WATER EST TOO STATE OF THE STATE	

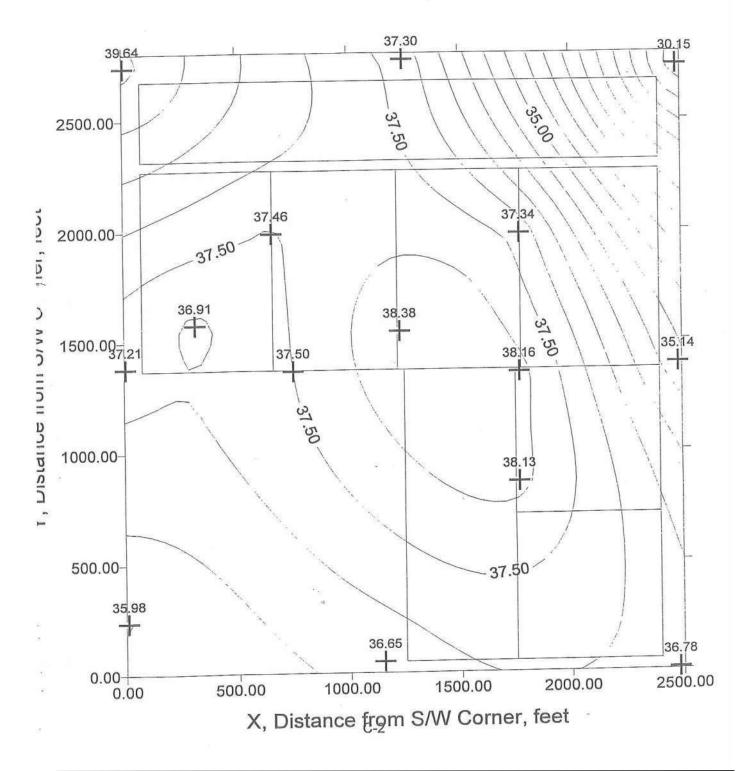
November 1997 Revision 1 - June 1998

C-0

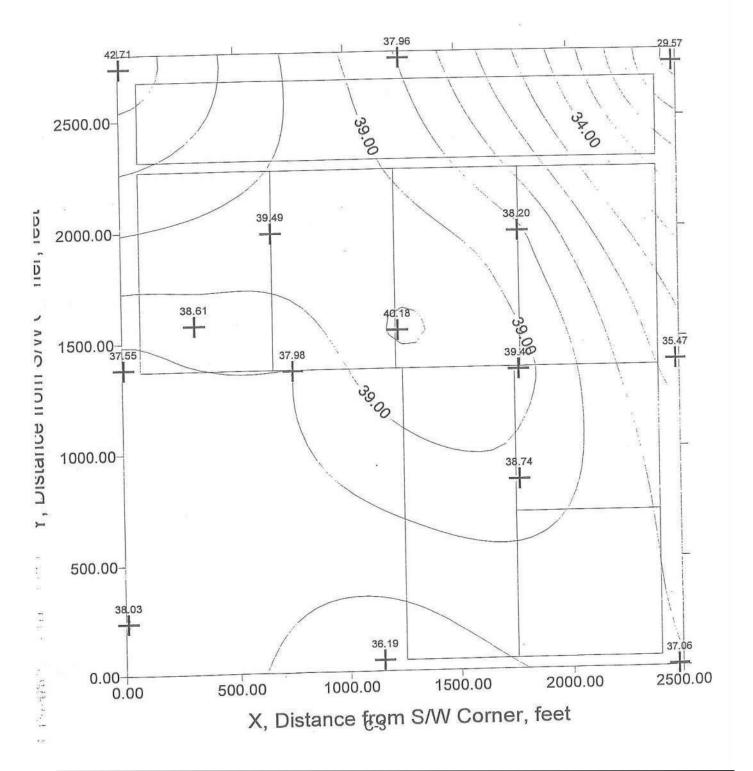
City of Kingsville, TX MSWLF GW Levels 06-16-98



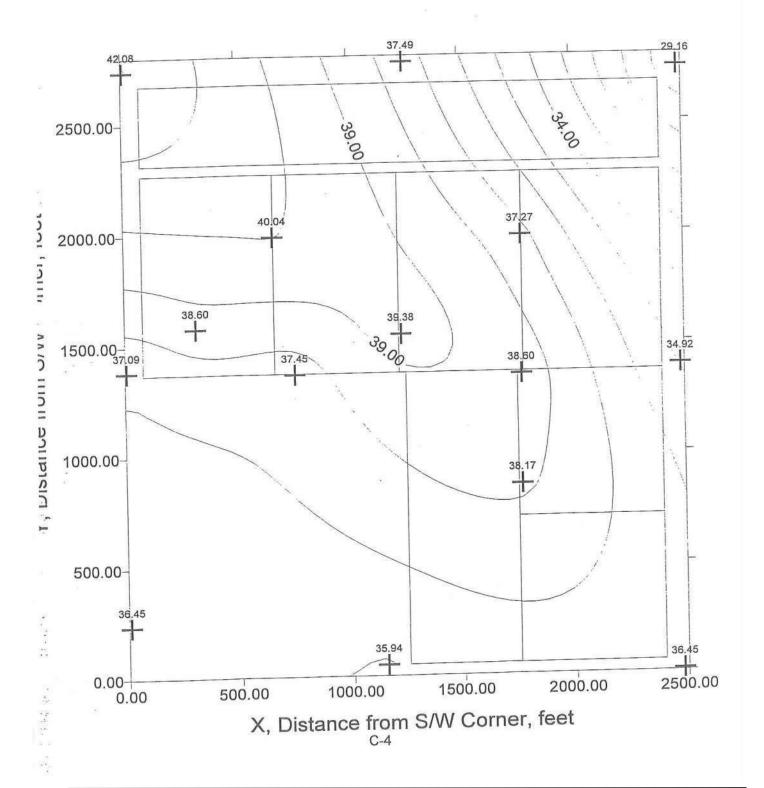
City of Kingsville, TX MSWLF GW Levels 05-18-98



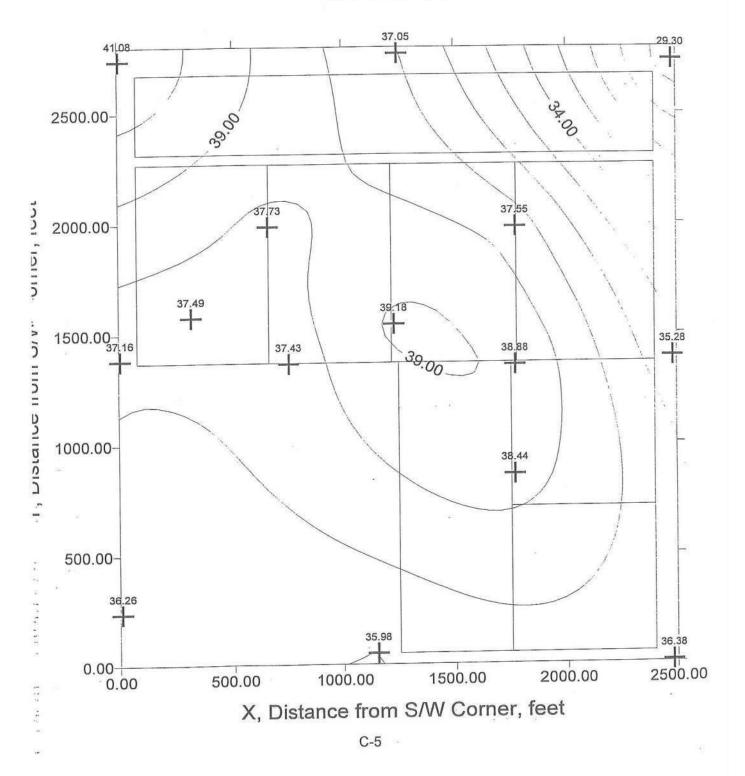
City of Kingsville, TX MSWLF GW Levels 02-18-98



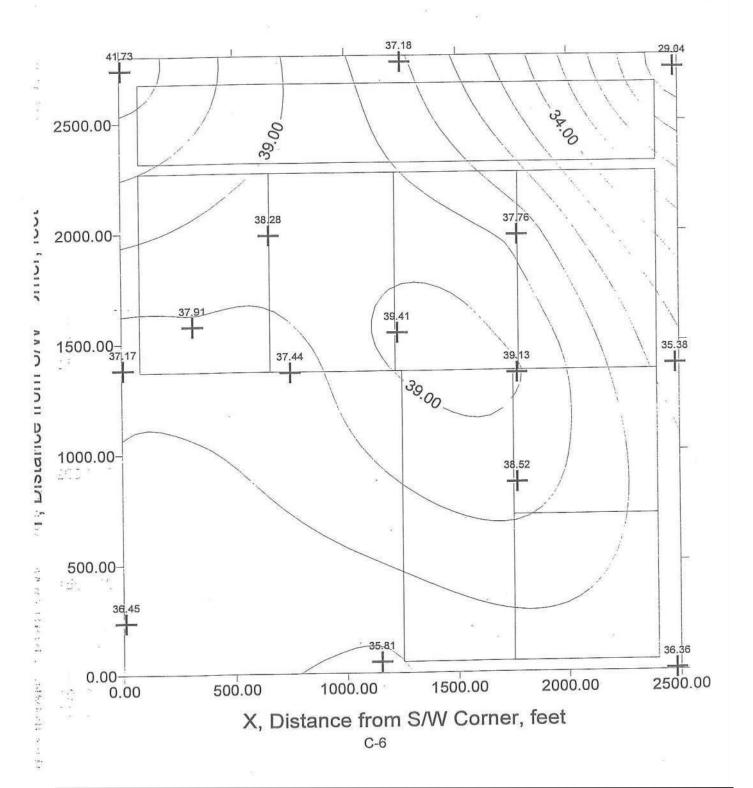
City of Kingsville MSWLF GW Levels 02-02-98



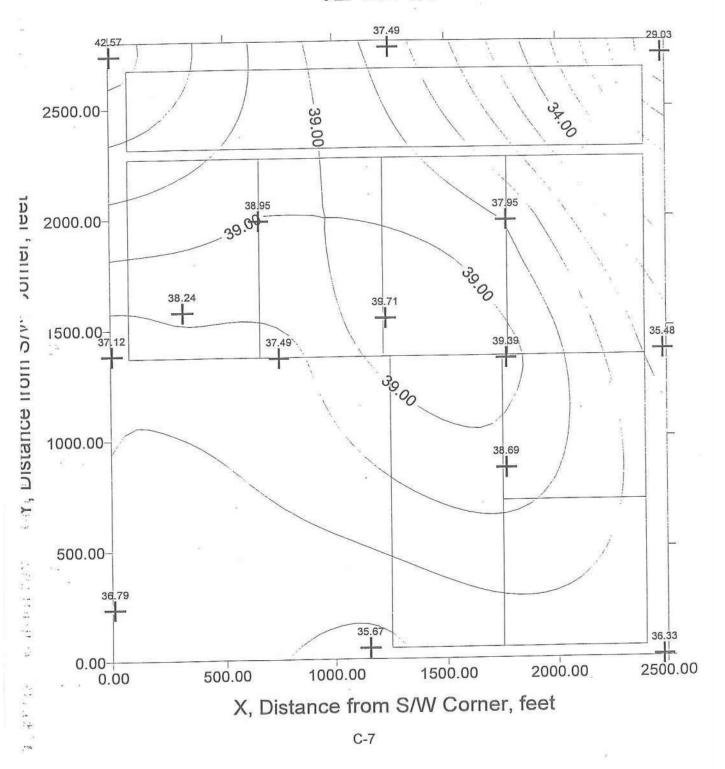
City of Kingsville, TX MSWLF GW Levels 01-20-98



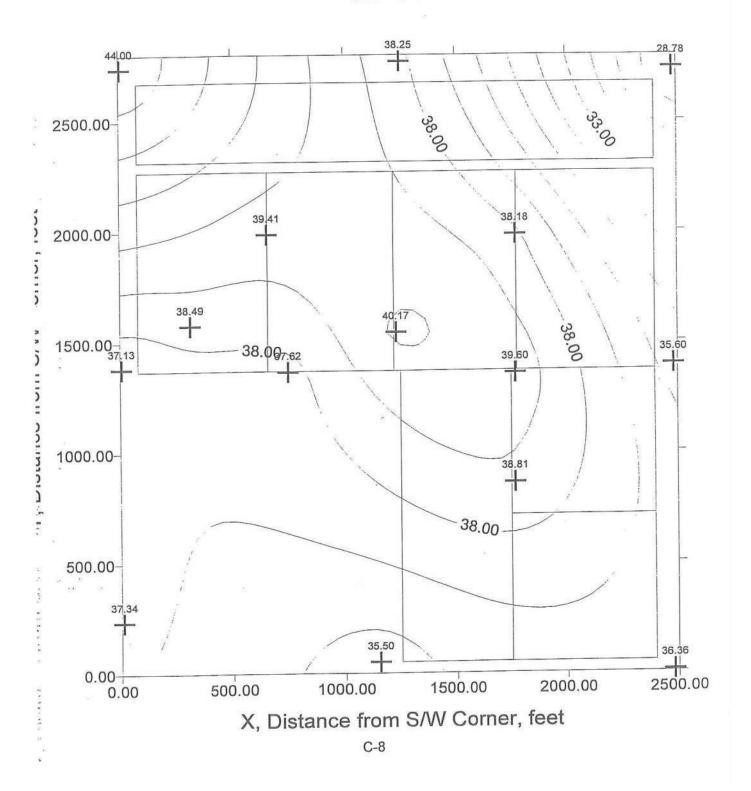
City of Kingsville, TX MSWLF GW Levels 01-05-98



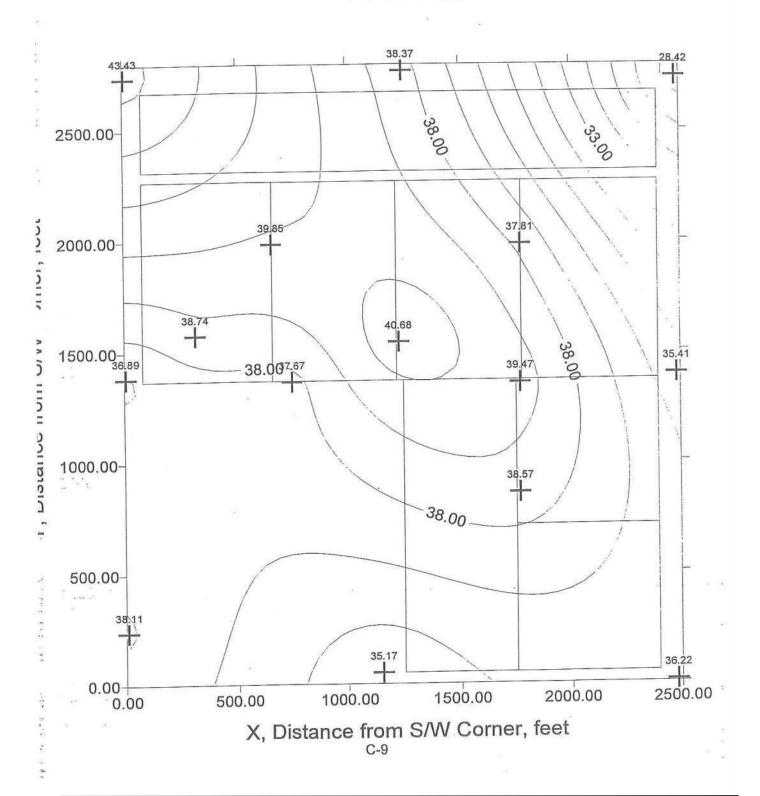
City of Kingsville, TX MSWLF GW Levels 12-22-97



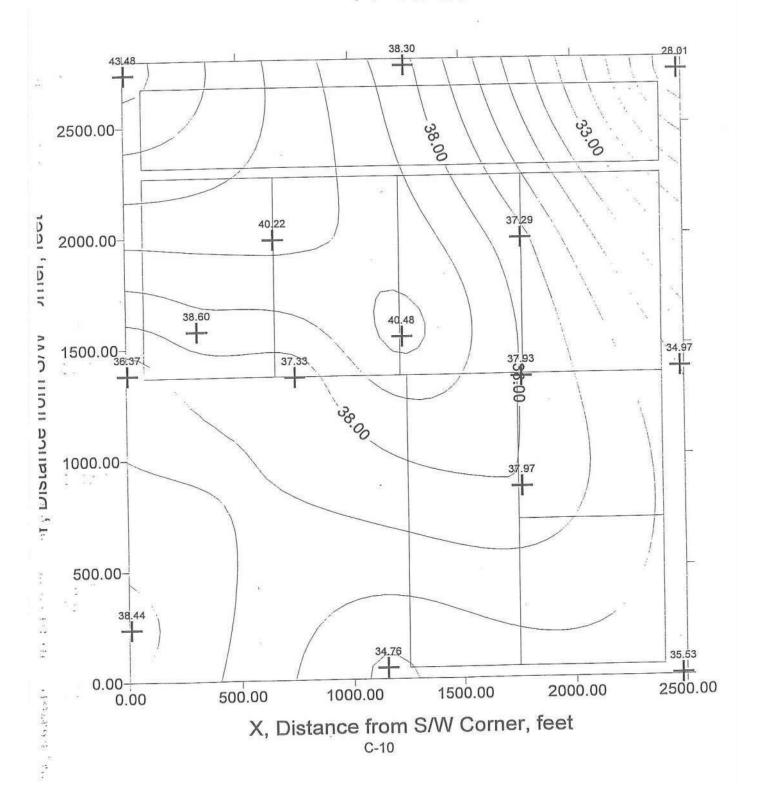
City of Kingsville, TX MSWLF GW Levels 12-08-97



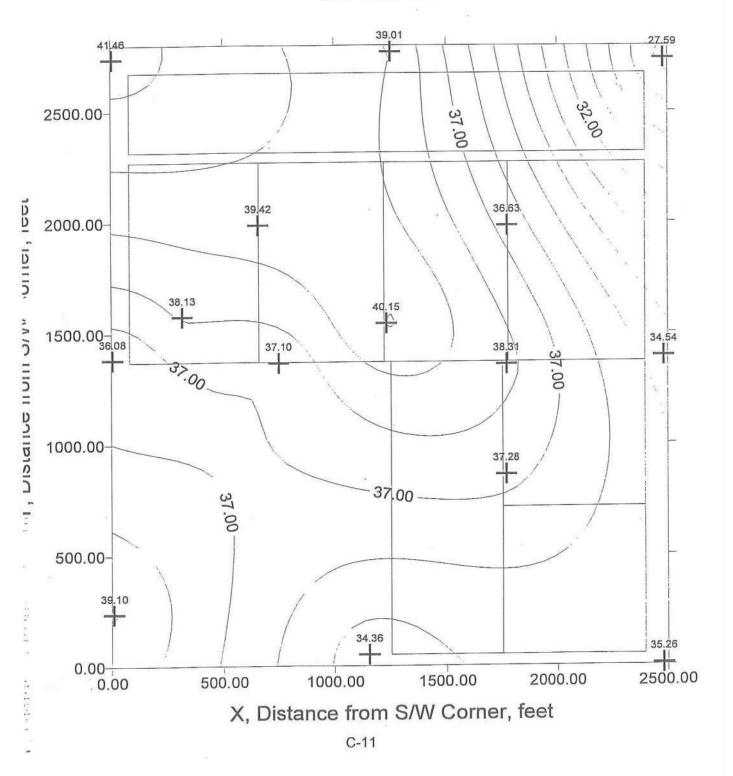
City of Kingsville, TX MSWLF GW Levels 11-24-97



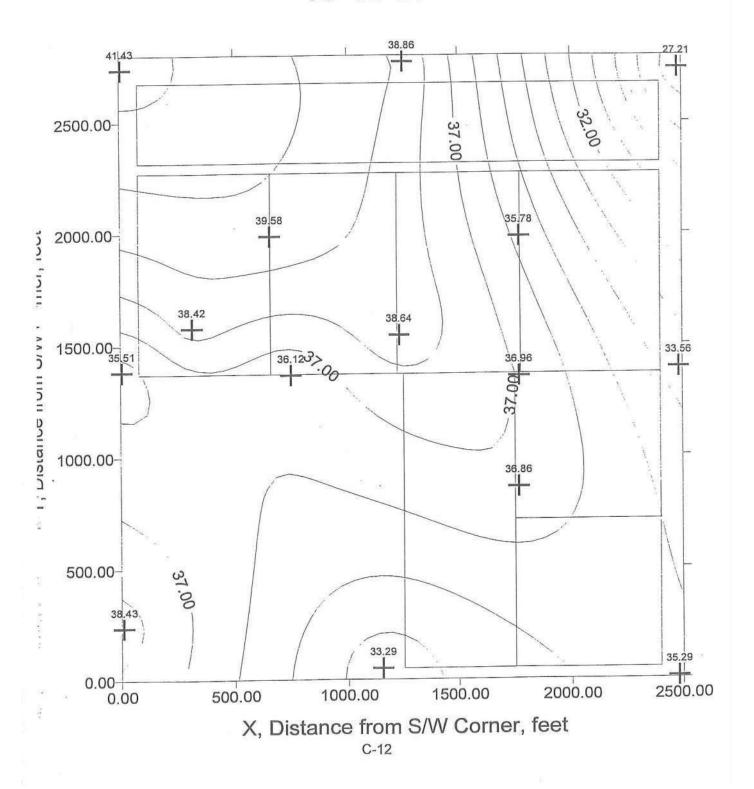
City of Kingsville, TX MSWLF GW Levels 11-10-97



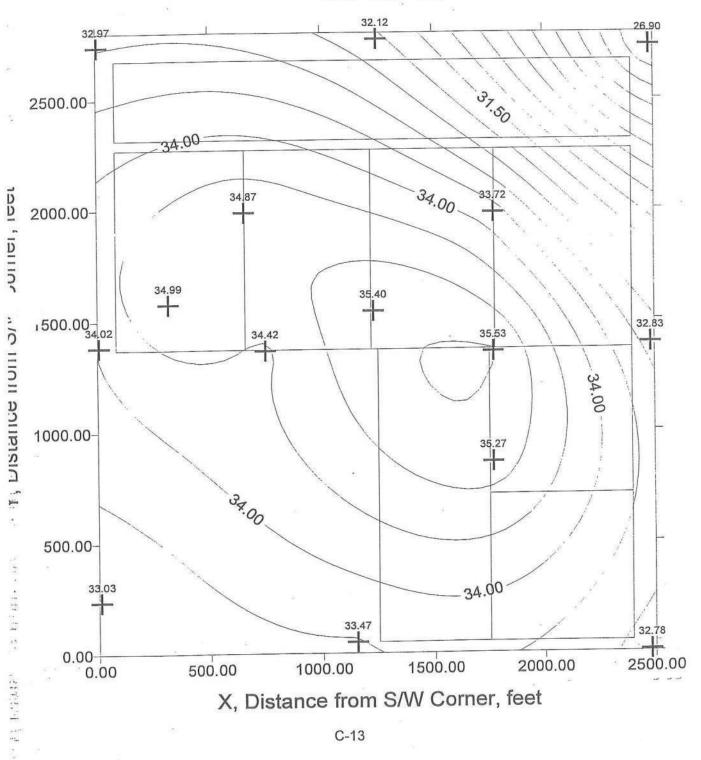
City of Kingsville, TX MSWLF GW Levels 10-28-97



City of Kingsville, TX MSWLF GW Levels 10-16-97

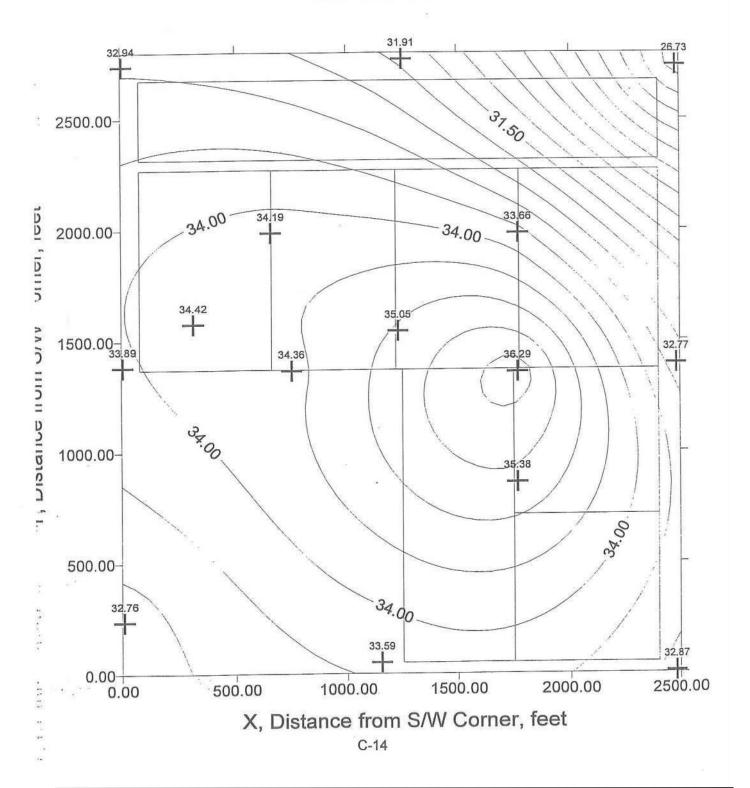


City of Kingsville, TX MSWLF GW Levels 09-29-97

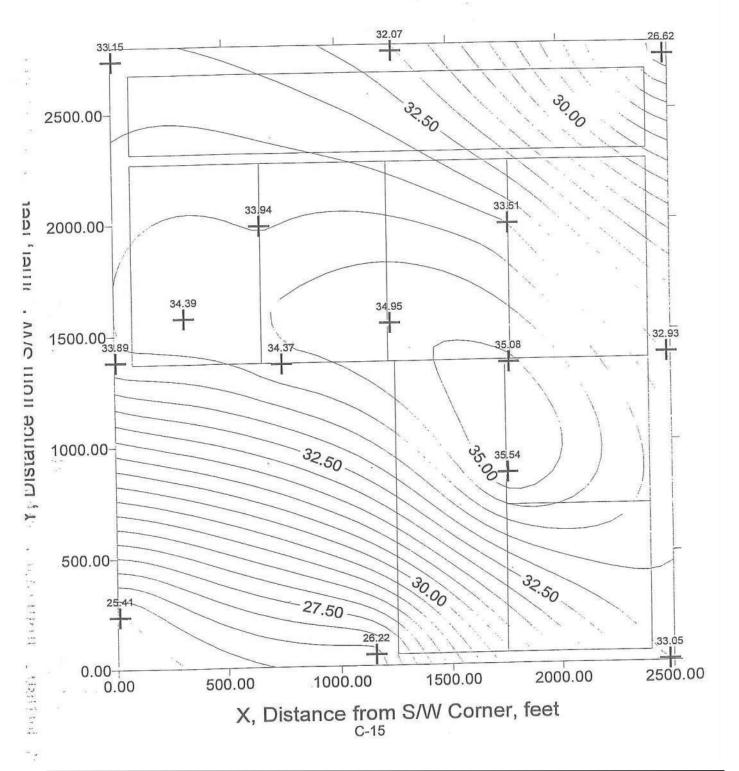


+ 56

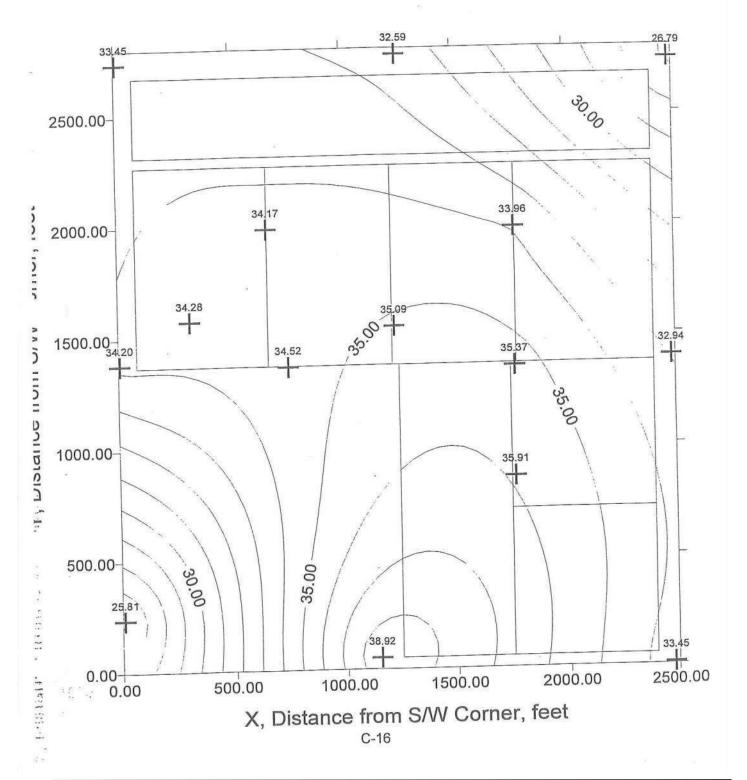
City of Kingsville, TX MSWLF GW Levels 09-15-97



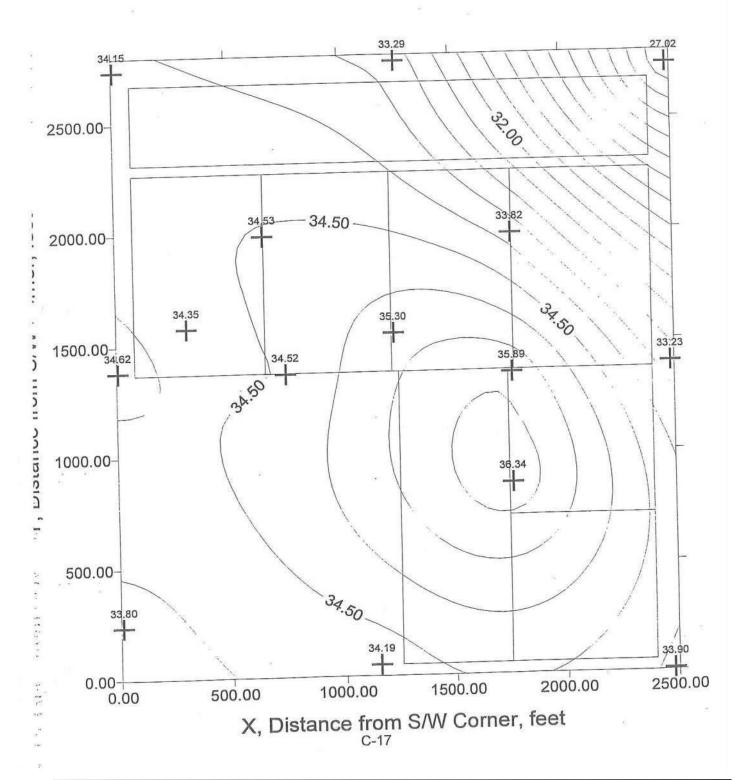
City of Kingsville, TX MSWLF GW Levels 09-02-97



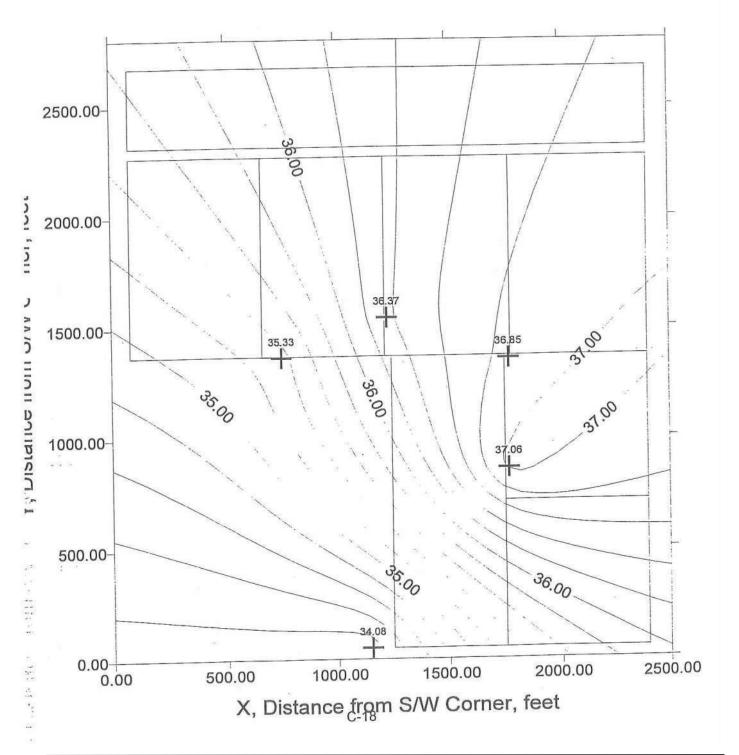
City of Kingsville, TX MSWLF GW Levels 08-18-97



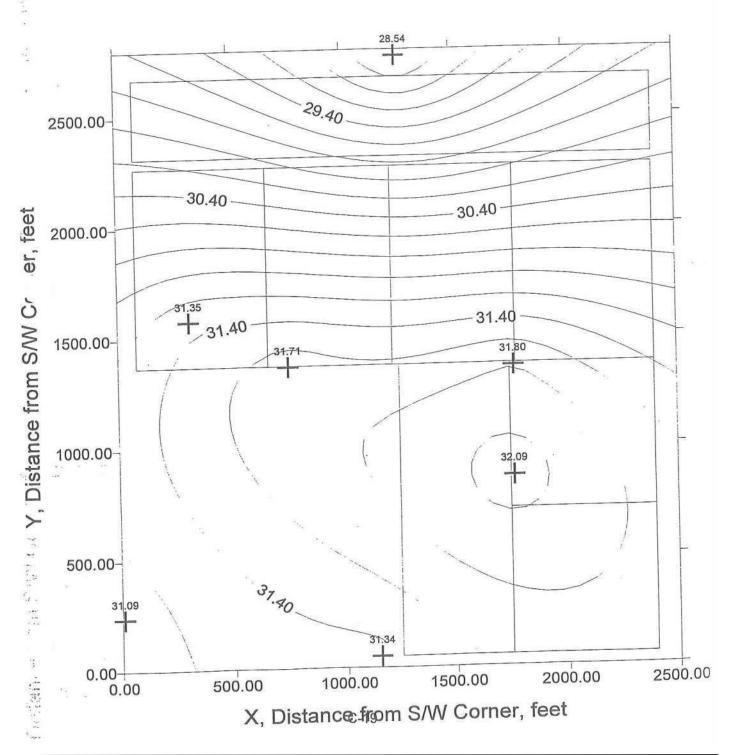
City of Kingsville, TX MSWLF GW Levels 08-04-97



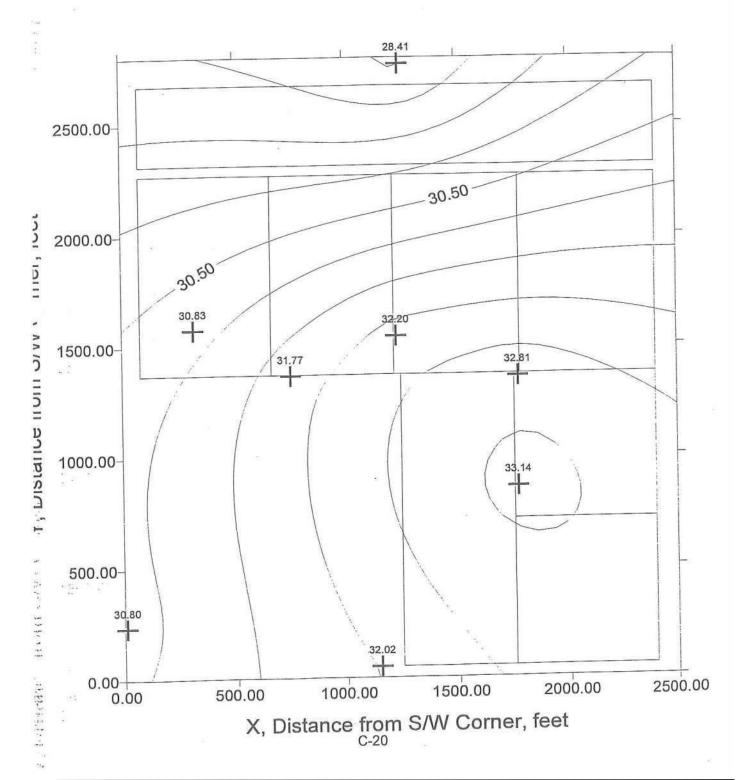
City of Kingsville MSWLF GW Levels 06-25-97



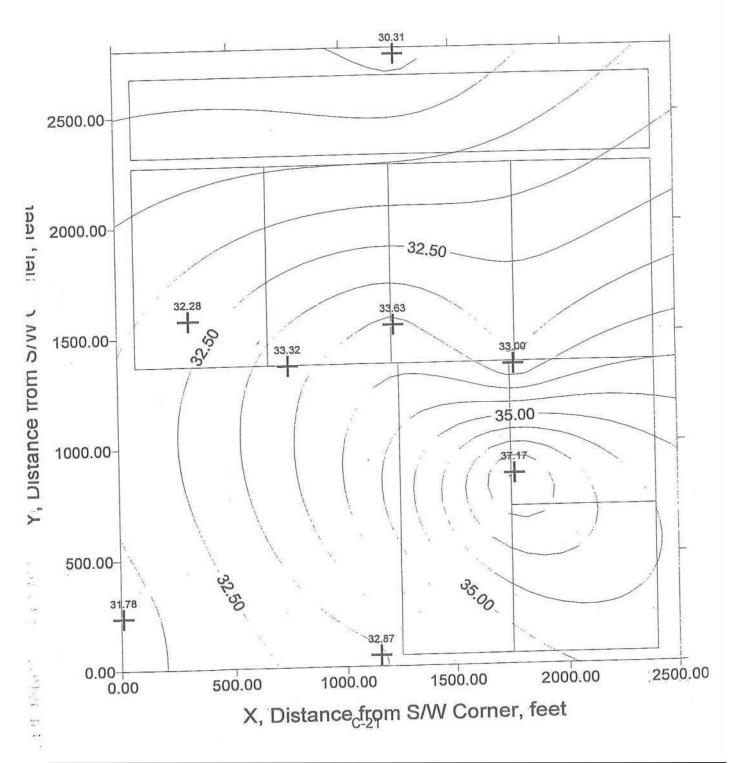
City of Kingsville, TX MSWLF GW Levels 03-20-97



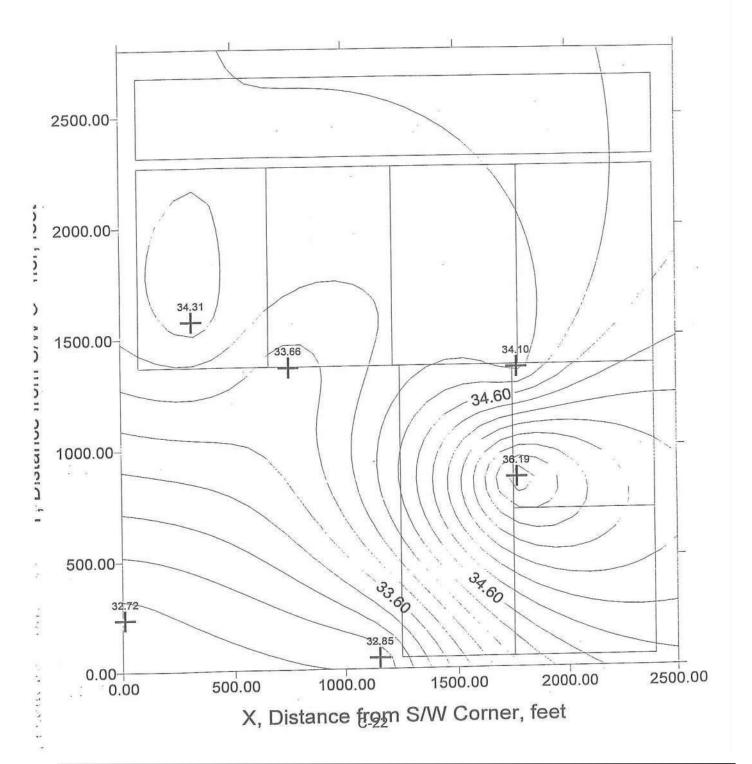
City of Kingsville, TX MSWLF GW Levels 12-23-96



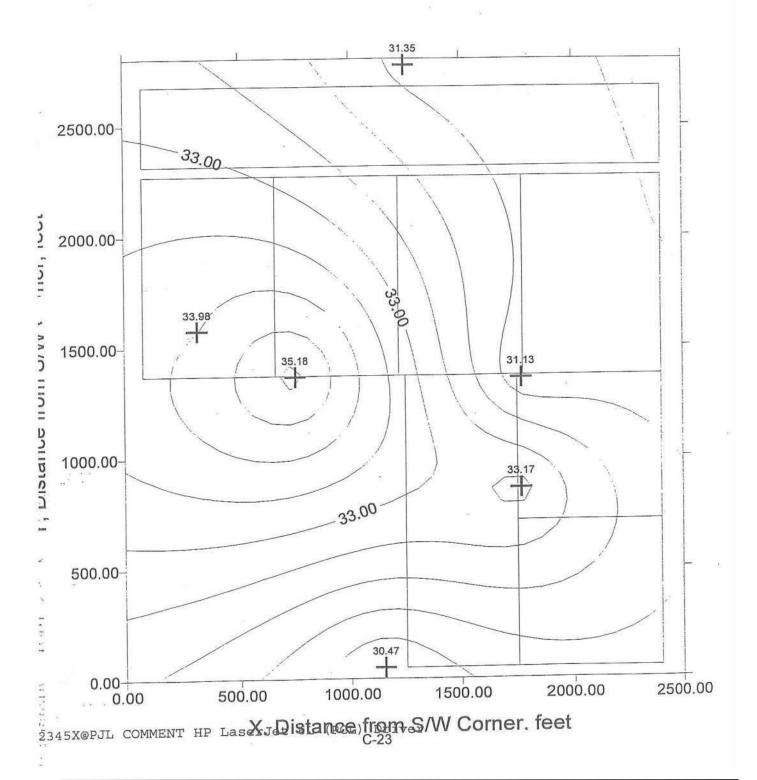
City of Kingsville, TX MSWLF GW Levels 07-11-96



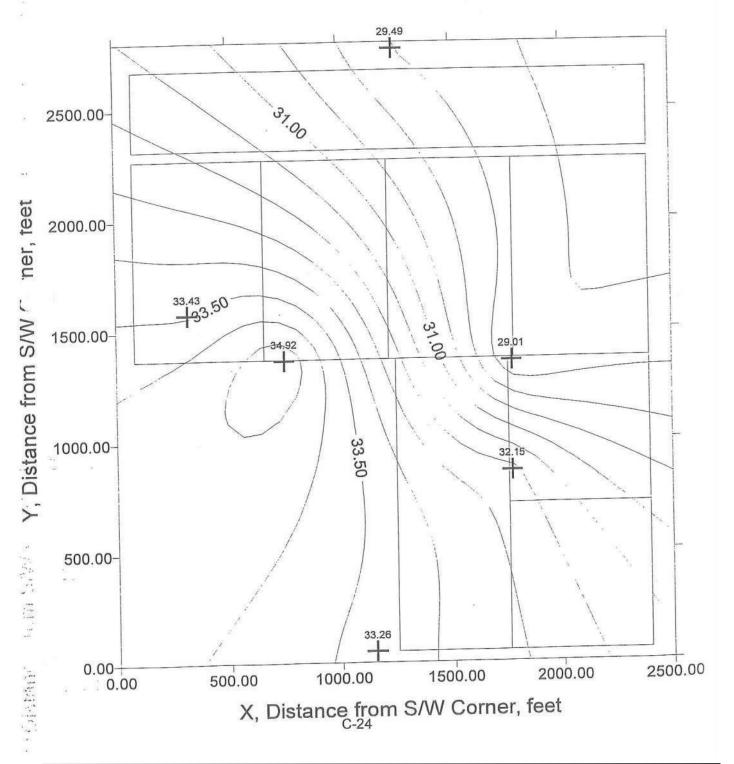
City of Kingsville, TX MSWLF GW Levels 05-10-95



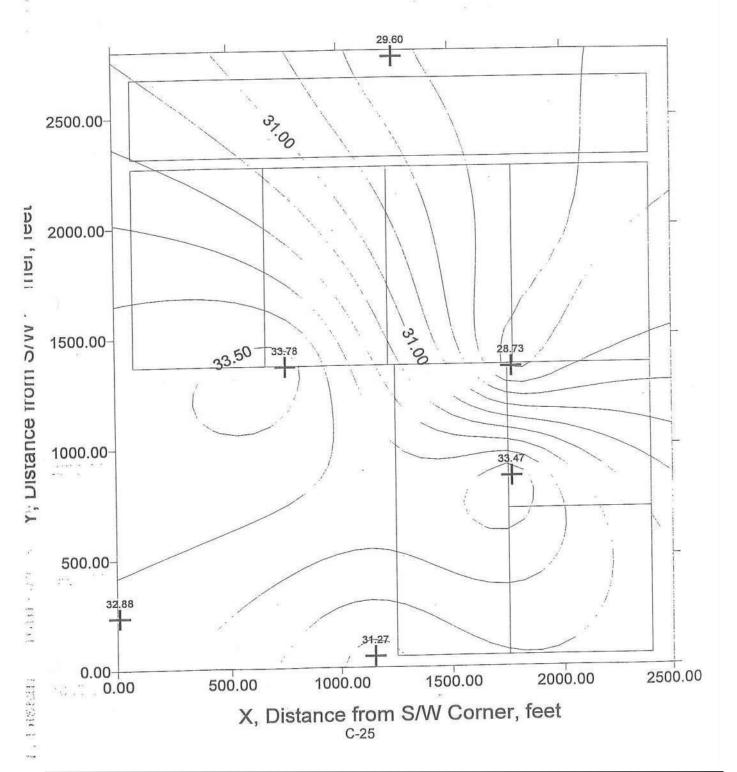
City of Kingsville, TX MSWLF GW Levels 03-14-94



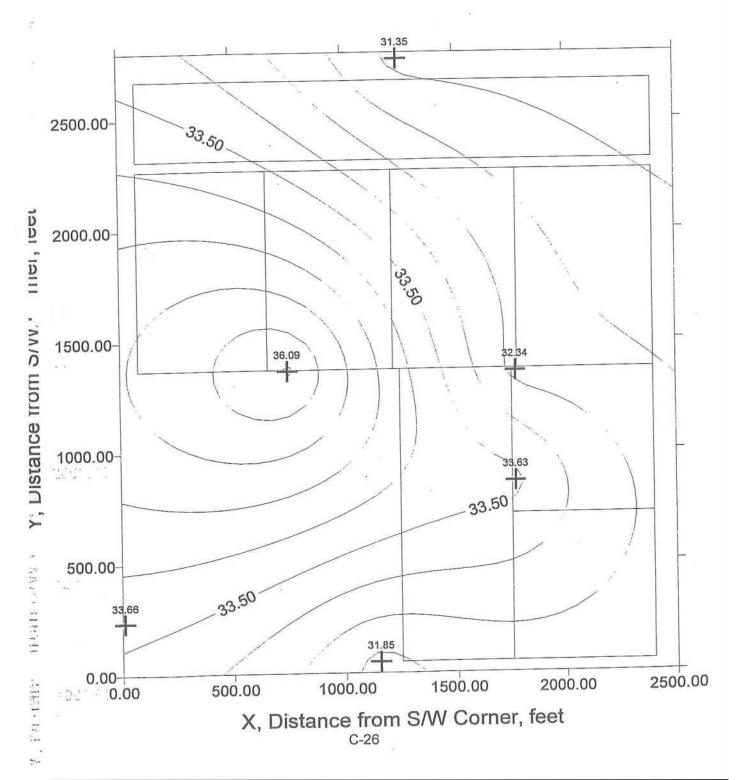
City of Kingsville, TX MSWLF GW Levels 04-05-93



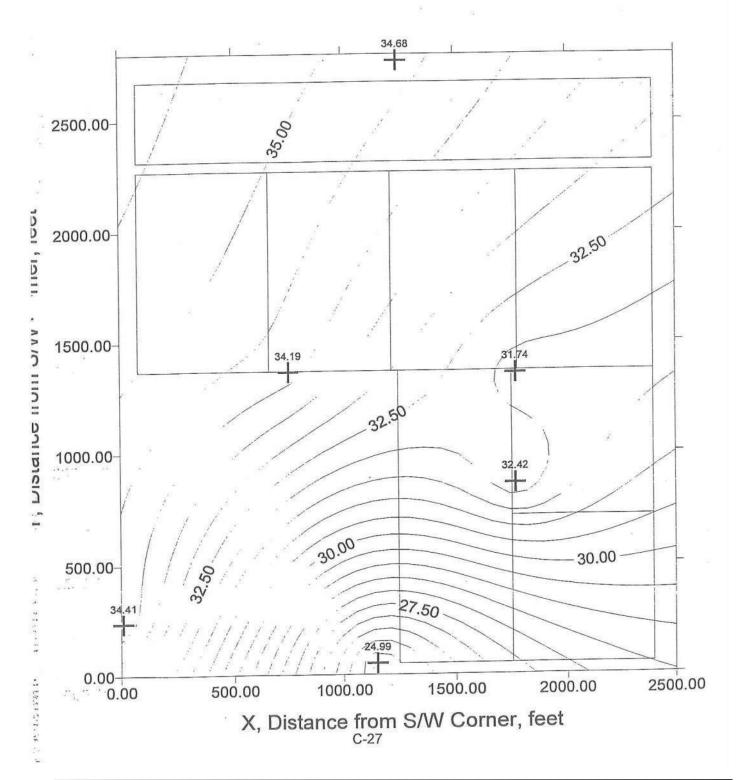
City of Kingsville, TX MSWLF GW Levels 09-28-92



City of Kingsville, TX MSWLF GW Levels 08-11-92

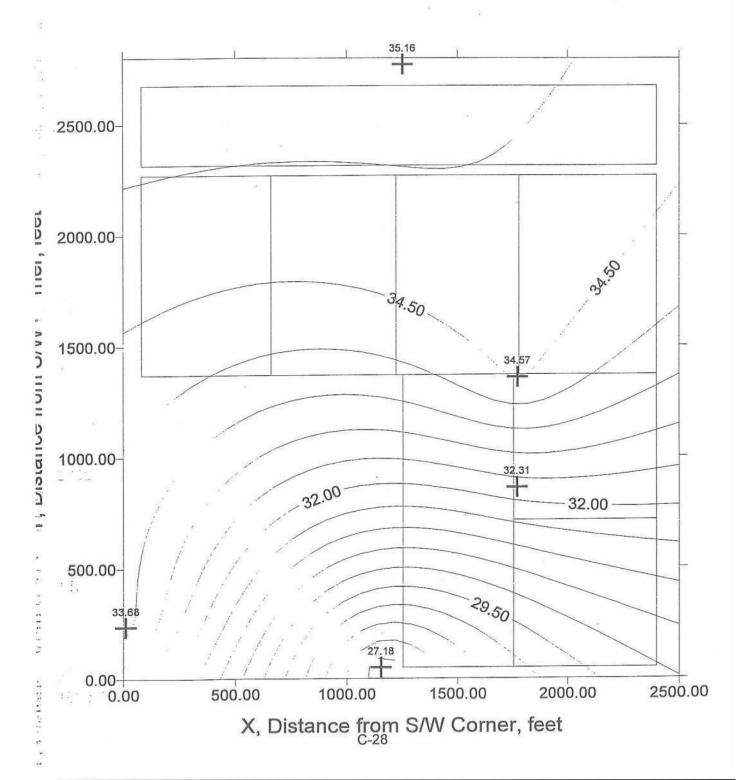


City of Kingsville, TX MSWLF GW Levels 04-14-92

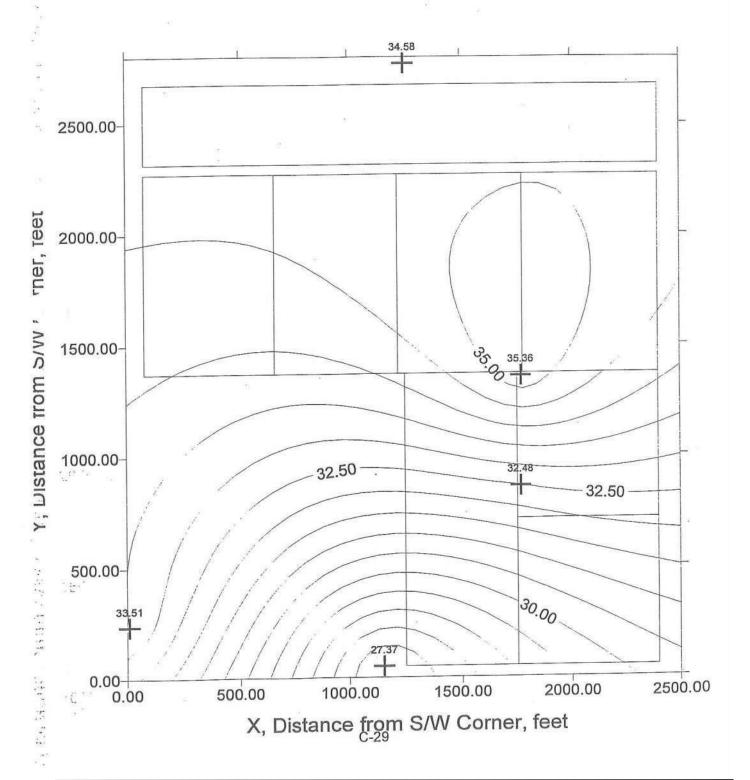


STATE OF

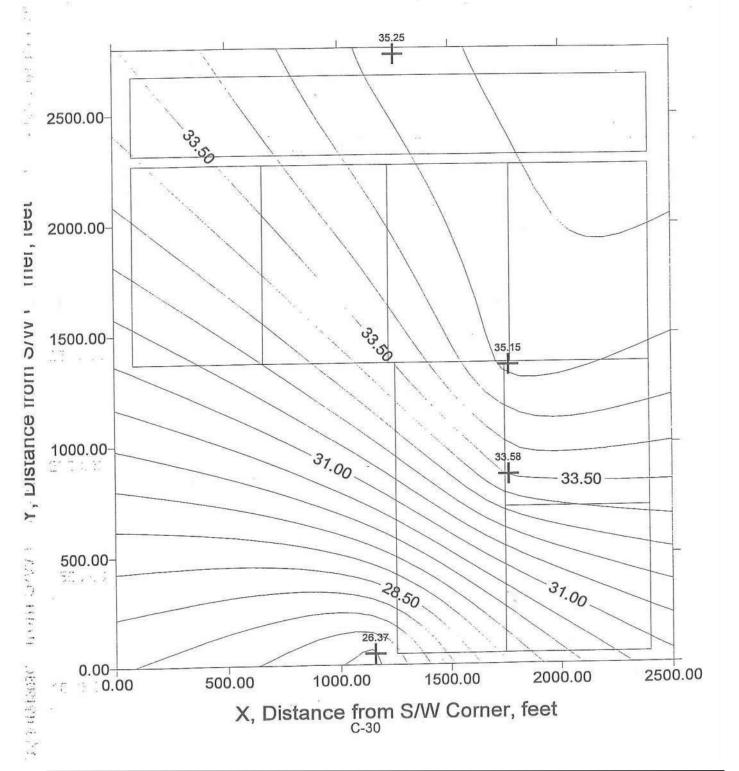
City of Kingsville, TX MSWLF GW Levels 08-08-91



City of Kingsville, TX MSWLF GW Levels 07-30-91



City of Kingsville, TX MSWLF GW Levels 03-29-91



City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

APPENDIX D

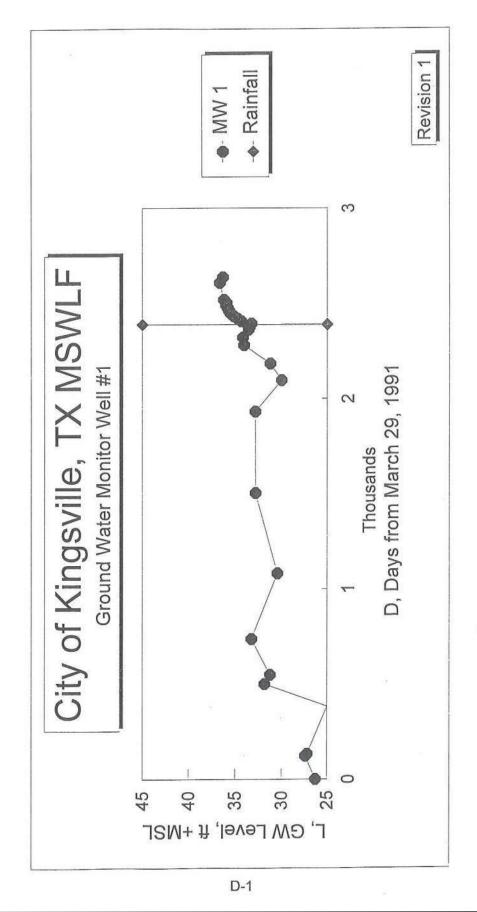
Hydrographs

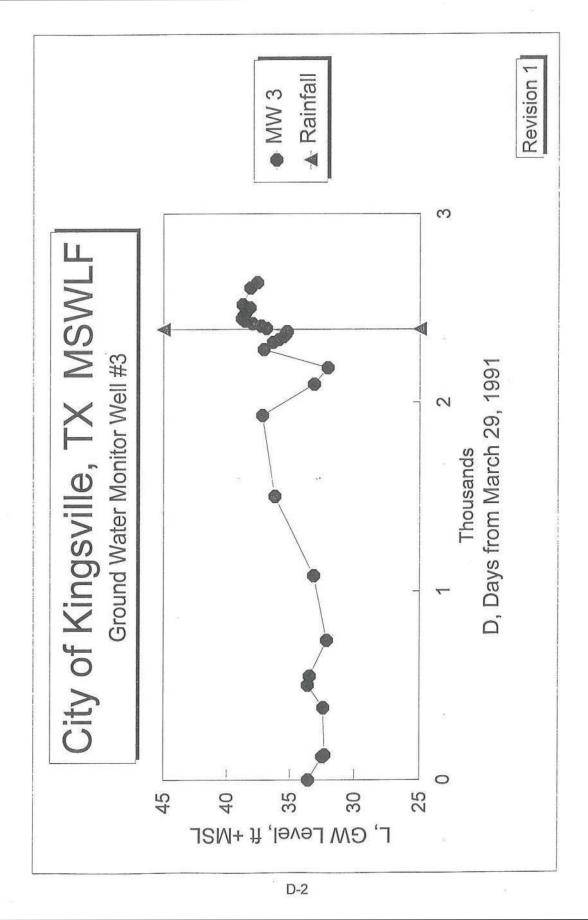
Ground Water	Monitor	Well	#1	700±0	ou ve																							D-1
Ground Water	Monitor	Wall	#3						3.05	31.35		500	nako E															D-2
Ground Water	MOTILO	14/-11	11.4	•	•	•	•	•	•	•	•	•	70	•		•	37.5	15.5										D-3
Ground Water	Monitor	vveii	#4		٠.		٠.			• •		٠.							•				•		*	•	•	D-4
Ground Water	Monitor	Well	#6															*	• •		•	٠	•		•		*	3
Ground Water	Monitor	Well	#8					٠							٠						• •		•					D-5
Ground Water	Monitor	Well	#9F	3																								D-6
Ground Water	Monitor	Wall	#10		2500	0.000									0020 0020	200	342	50U										D-7
Ground water	MOTITO	14/-11	1111		• •		٠.	•	•	٠.	•	•	•			-												D-8
Ground Water	Monitor	vveii	#11				٠.			٠.						•		•		•		6.0			0.0	•	•	1198
Ground Water	Monitor	Well	#12													٠					•					• •		D-9
Ground Water	Monitor	Well	#13								•	•														٠.		D-10
Ground Water	Monitor	Well	#14																						٠			D-11
Ground Water	Monitor	Wall	#15		05 00 36 76								0040 4741															D-12
Ground water	MONITO	14/-11	1110				•		•	• •	•	٠.			•													D-13
Ground Water	Monitor	vveii	#10														• •		٠.				•	•	•	•		D-14
Ground Water	Monitor	Well	#17						٠		•	٠.														٠.		
Ground Water	Monitor	Well	#18		•	•	•		•				•															D-15

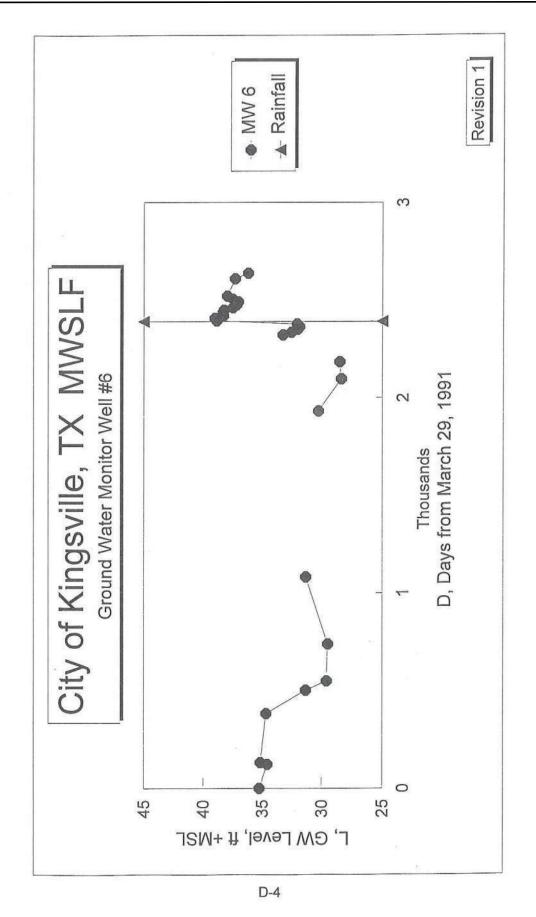
November 1997

Revision 1 - June 1998

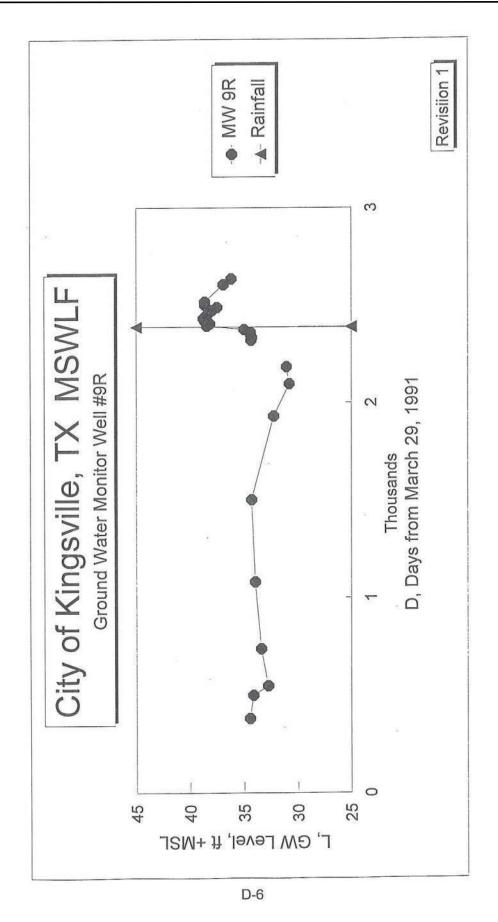
D-0



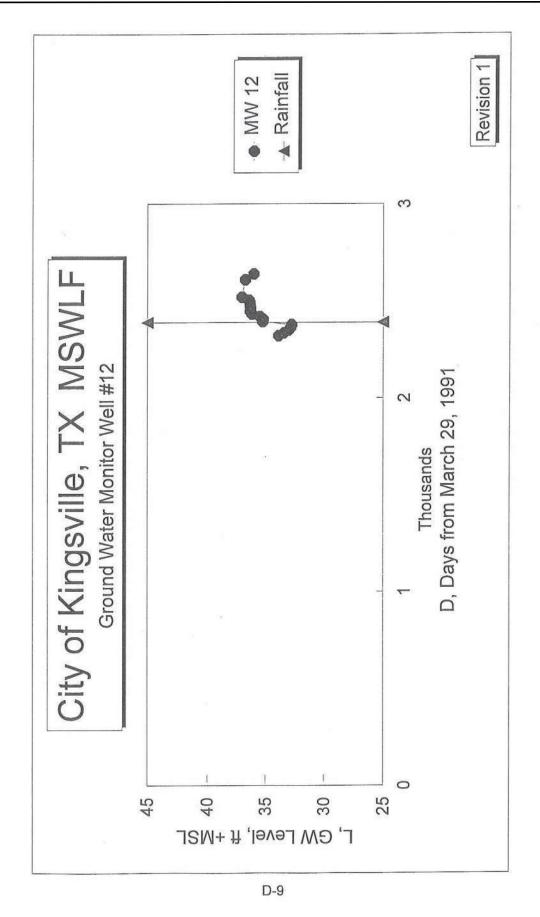


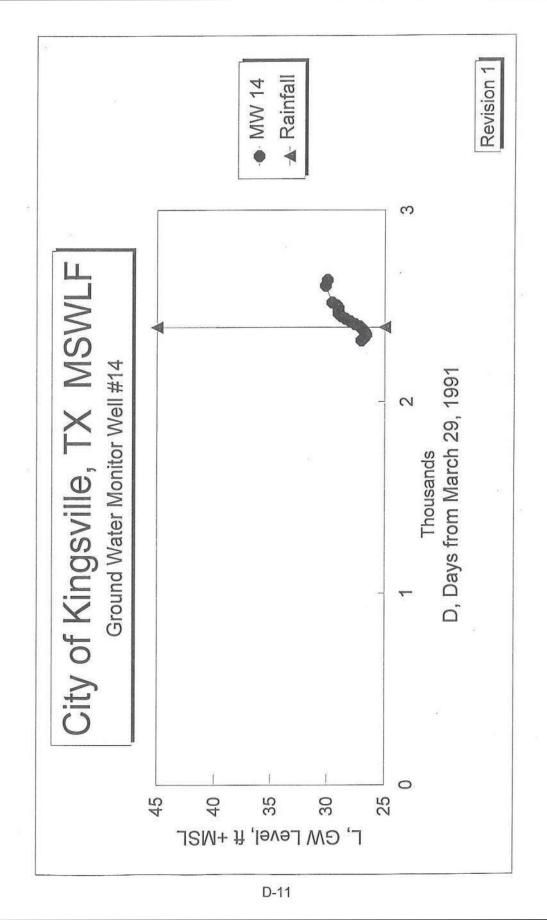


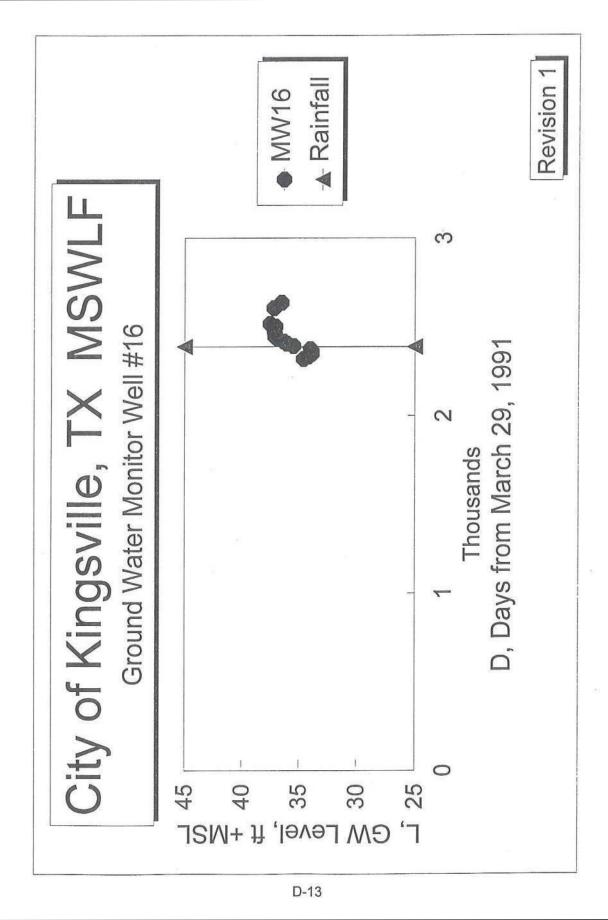
D-5

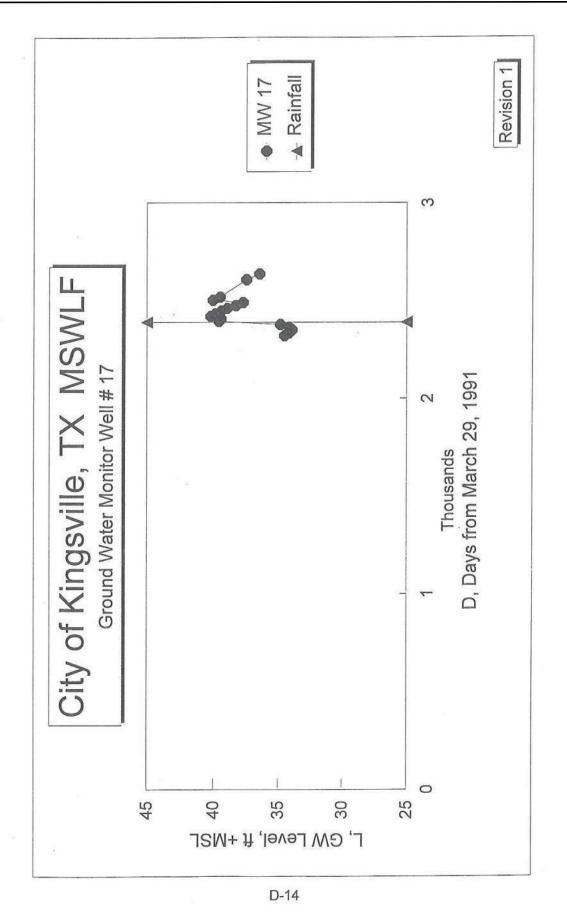


D-7









D-15

APPENDIX E

In-Situ Hydraulic Conductivity Test Data

Summary of In-Situ Hydraulic Conductivity Test Results	. E-1
Permeability - Well Number 11	. E-2
Figure 6 - MW-11	. E-3
Permeability - Well Number 12	
Figure 7 -MW-12	. E-5
Permeability - Well Number 13	
Figure 8 - MW-13	. E-7
Permeability - Well Number 14	. E-8
Figure 9 - MW-14	. E-9
Permeability - Well Number 15	E-10
Figure 10 - MW-15	E-11
Permeability - Well Number 16	E-12
Figure 11 - MW- 16	E-13
그러워 내가 그렇게 그렇게 하는 이렇게 되게 그녀들이 하고 하면 하면 하면 사람이 아니는 사람이 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니는	

November 1997

RAY N. FINCH
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INCLUDES PAGES THROUGH 13

E-0

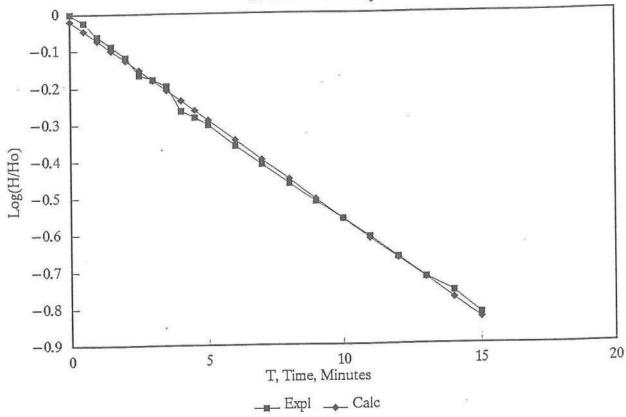
SUMMARY OF IN-SITU HYDRAULIC CONDUCTIVITY TEST RESULTS Municipal Solid Waste Landfill Kingsville, Texas

Piezometer	Estima	ted Horizontal Hyd	Iraulic Conductiv	vity (K)	
Number	ft/sec	ft/sec ft/min		cm/sec	
	6.6x10 ⁶	3.96x10 ⁴	0.57	2.01x10 ⁴	
MW-11	2.4x10 ⁵	1.43x10 ³	2.05	7.24x10 ⁴	
MW-12	8.9x10 ⁶	5.33x10 ⁴	0.77	2.71x10 ⁴	
MW-13		2.49x10 ⁻⁴	0.36	1.27x10 ⁴	
MW-14	4.2x10 ⁶	1.05x10 ³	1.51	5.31x10 ⁴	
MW-15	1.7x10 ⁵	1.22x10 ³	1.75	6.18x10 ⁴	
MW-16	2.0x10 ⁵	1.22X10	1170		
Averages	1.35x10 ⁵	8.13x10 ⁴	1.17	4.12x10 ⁻¹	

X				Υ	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft					del(h/ho)	log
area area a								
EQUIL	27.34	0	0	0	0	0	0.957611	-0.01881
0	30.42	3.08	1	0 00466	0		0.899938	-0.01661
0.5	30.25	2.91	0.944805	-0.02466	0.25	-0.01233	0.845739	-0.04379
1	30.01	2.67	0.866883	-0.06204	1			-0.07276
1.5	29.85	2.51	0.814935	-0.08888	2.25		0.794804	-0.09974
2		2.34	0.75974	-0.11933	4		0.746936	
2.5			0.681818	-0.16633	6.25		0.701952	-0.15369
3			0.662338	-0.17892	9		0.659676	-0.18067
3.5			0.636364	-0.19629	12.25		0.619947	-0.20765
4			0.545455	-0.26324	16	-1.05297	0.58261	-0.23462
4.5		1.61	0.522727	-0.28172	20.25		0.547522	-0.2616
5		1.54	0.5	-0.30103	25	-1.50515	0.514548	-0.28857
6	28.69	1.35		-0.35822	36	-2.1493	0.454436	-0.34253
7			0.38961	-0.40937	49		0.401347	-0.39648
8		1.06	0.344156	-0.46324	64	-3.70596	0.35446	-0.45043
9	28.29		0.308442	-0.51083	81	-4.59744	0.313051	-0.50439
10	28.19	0.85	0.275974	-0.55913	100	-5.59132		-0.55834
11		0.76	0.246753	-0.60774	121	-6.68511	0.24418	-0.61229
12		0.67	0.217532	-0.66248	144	-7.94971		-0.66624
13		0.59	0.191558	-0.7177	169	-9.33008	0.19046	-0.7202
14		0.54	0.175325	-0.75616	196	-10.5862	0.16821	-0.77415
15		0.47	0.152597	-0.81645	225	-12.2468	0.148559	-0.8281
132.5				-7.54376	1281.25	-71.6194		
	delta=	9350						
	alpha=	-175.883		A=	-0.01881			
	beta=	-504.458		B=	-0.05395			
	120000			**				
	K=		R))/(2*L*To))				
	r=	0.166667						
	L=	17						
	R=	0.416667		7.05.1047				
	To=	7.65		7.654617				
	K=	0.000396	ft/min					
		0.000201	cm/sec					
		6.6E-06	ft/sec					
		0.570347	ft/day					

FIGURE 6

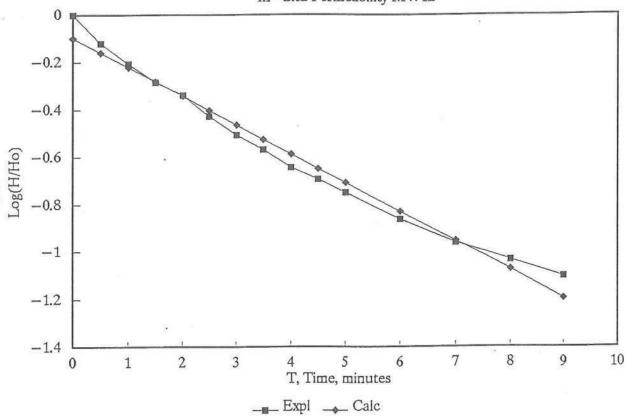
City of Kingsville, TX MSWLF In-Situ Permeability MW-11



X				Υ	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft					del(h/ho)	log
EQUIL	21.99	0	0					
0	24.9	2.91	1	0	0	0	0.796294	-0.09893
0.5	24.2	2.21	0.75945	-0.1195	0.25	-0.05975	0.692088	-0.1598
1	23.8	1.81	0.621993	-0.20621	1	-0.20621	0.601519	-0.2207
1.5	23.5	1.51	0.5189	-0.28492	2.25	-0.42737	0.522801	-0.2816
2	23.32	1.33	0.457045	-0.34004	4	-0.68008	0.454386	-0.3425
2.5	23.08	1.09	0.37457	-0.42647	6.25	-1.06617	0.394923	-0.40349
3	22.9	0.91	0.312715	-0.50485	9	-1.51455	0.343242	-0.464
3.5	22.78	0.79	0.271478	-0.56627	12.25	-1.98193	0.298324	-0.5253
4	22.65		0.226804	-0.64435	16	-2.5774	0.259284	-0.58622
4.5	22.58		0.202749	-0.69304	20.25	-3.11868	0.225353	-0.6471
5	22.51	0.52	0.178694	-0.74789	25	-3.73945	0.195862	-0.7080
6	22.39	0.4	0.137457	-0.86183	36	-5.171	0.147954	-0.8298
7	22.31	0.32	0.109966	-0.95874	49	-6.7112	0.111764	-0.951
8	22.26	0.27	0.092784	-1.03253	64	-8.26023	0.084426	-1.07352
9	22.22	0.23	0.079038	-1.10217	81	-9.91949	0.063775	-1.1953
57.5	15			-8.48881	326.25	-45.4335		
	delta=	1587.5						
	alpha=	-157.046		A=	-0.09893			
	beta=	-193.396		B=	-0.12182			*
	K=	((r^2*ln(L/	R))/(2*L*To))				
	Γ=	0.166667						
	L=	12						
	R=	0.416667	ft					
	To=	2.73						
	K=	0.001425	ft/min					
	80000	0.000724	cm/sec					
		2.37E-05						
		2.051511						

FIGURE 7

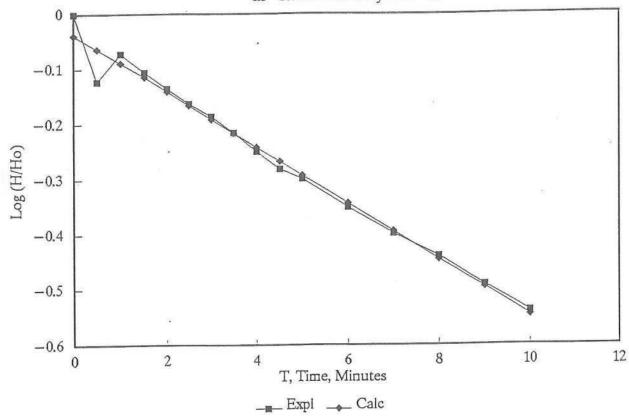
City of Kingsville, TX MSWLF In-Situ Permeability MW12



X				Υ	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft		1029			del(h/ho)	log
FOLIII	00.00	0	0					
EQUIL	29.28	0	0	0	0	0	0.04249	0.0202
0	32.6	3.32	1 (5		0.25	-0.0616	0.91348 0.861725	-0.0393 -0.06463
0.5	31.78	2.5		-0.1232	0.25			
1	32.09	2.81	0.846386 0.783133	-0.07243 -0.10616	2.25	-0.07243 -0.15925	0.812902 0.766845	-0.08996 -0.11529
1.5	31.88				2.25	-0.13925	0.700045	-0.11329
2	31.71		0.731928	-0.13553 -0.1632	6.25	-0.40801	0.682411	-0.16595
2.5	31.56		0.686747 0.650602		9			-0.19128
3	31.44			-0.18668	12.25	-0.56005	0.643748 0.607274	-0.19126
3.5	31.3		0.608434 0.563253	-0.21579 -0.2493	16	-0.75525	0.572868	-0.21002
4	31.15				20.25	-0.99719	0.54041	
4.5	31.02		0.524096	-0.28059		-1.26265		-0.26728
5	30.95	1.67		-0.29842	25	-1.49211	0.509792 0.453662	-0.29261 -0.34327
6	30.76	1.48	0.445783	-0.35088	36	-2.10526		
7	30.61	1.33		-0.39729	49	-2.78101	0.403711	-0.39393 -0.44459
8	30.49	1.21	0.364458	-0.43835	64	-3.50682	0.359261 0.319704	-0.44459
9	30.35	1.07	0.322289	-0.49175	81	-4.42579		
10	30.24	0.96	0.289157	-0.53887	100	-5.38867	0.284503	-0.54591
67.5	16			-4.04844	426.25	-24.2471		
	delta=	2263.75						
	alpha=	-88.9673		A=	-0.0393			
	beta=	-114.684		B=	-0.05066			
	K=		R))/(2*L*To))				
	r=	0.166667						
	L=	11						
	R=	0.416667						
	To=	7.75						
	K=	0.000533	ft/min					
		0.000271	cm/sec					
		8.89E-06	ft/sec				- 1	
		0.767944	ft/day					

FIGURE 8

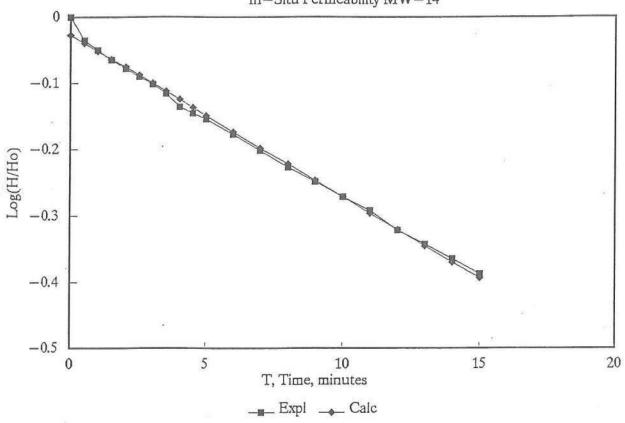
City of Kingsville, TX – MSWLF In-Situ Permeability MW-13



×				Υ	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft	resolution (Control Control	0.500			del(h/ho)	log
(()) () 		(53)						
EQUIL	25.9	0	0	5320	7050:		7. NO. 2011 121 121 121 122 122 122 122 122 12	X20 0 20 LL 122 0 2002
0	29.48	3.58	1	0	0		0.939426	-0.02714
0.5	29.2		0.921788	-0.03537	0.25	-0.01768	0.913406	-0.03934
1	29.09	3.19	0.891061	-0.05009	1	-0.05009		-0.05153
1.5	28.98		0.860335	-0.06533	2.25	-0.098	0.86351	-0.06373
2	28.89	2.99		-0.07821	4	-0.15642	0.839593	-0.07593
2.5	28.81	2.91	0.812849	-0.08999	6.25		0.816339	-0.08813
3	28.73		0.790503	-0.1021	9		0.793729	-0.10033
3.5	28.64		0.765363	-0.11613	12.25		0.771745	-0.11253
4	28.52		0.731844	-0.13558	16	-0.54233	0.75037	-0.12472
4.5	28.46		0.715084	-0.14564	20.25	-0.65539	0.729587	-0.13692
5	28.41	2.51	0.701117	-0.15421	25	-0.77105	0.70938	-0.14912
6	28.28		0.664804	-0.17731	36	-1.06384		-0.17352
7	28.15		0.628492	-0.2017	49		0.633994	-0.19791
8	28.02		0.592179	-0.22755	64		0.599361	-0.22231
9	27.92		0.564246	-0.24853	81	-2.23678	0.56662	-0.24671
10	27.82		0.536313	-0.27058	100		0.535667	-0.2711
11	27.73		0.511173	-0.29143	121		0.506405	-0.2955
12	27.61	1.71	0.477654	-0.32089	144		0.478742	-0.3199
13	27.53		0.455307	-0.3417	169	-4.44204	0.45259	-0.3443
14	27.45		0.432961	-0.36355	196	-5.08972	0.427866	-0.36869
15	27.37	1.47	0.410615	-0.38657	225		0.404493	-0.39309
132.5	21			-3.80246	1281.25	-34.8541		
	V 12	0050						
	delta=	9350		Λ	0.00744			
	alpha=	-253.736		A=	-0.02714			
	beta=	-228.11		B=	-0.0244			
	K=	//r\2*ln/1 /5	R))/(2*L*To	11				
	L= //	0.166667		11				
	L=	11						
		0.416667					(5)	
	R=	16.59						
	To=		ft/min					
	K=	0.000249 0.000127	cm/sec					
		4.15E-06	ft/sec					
		0.358744	ft/day					

FIGURE 9

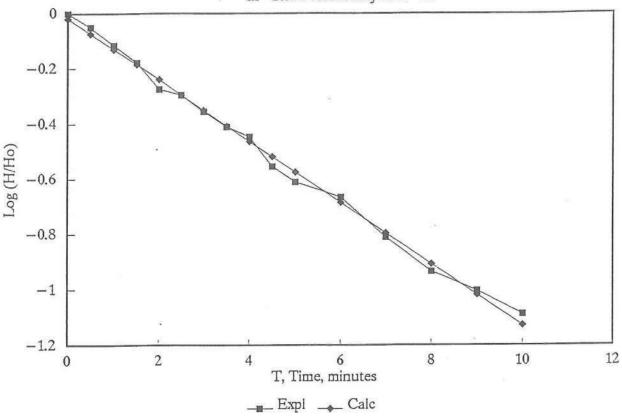
City of Kingsville, Tx-MSWLF In-Situ Permeability MW-14



X		99		Υ	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft	State of the state				del(h/ho)	log
	10 10							
EQUIL	18.57	0	0	•	•		0.05050	0.0400
0	22	3.43	1	0	0	0	0.95653	-0.0193
0.5	21.62	(2) (2)	0.889213	-0.05099	0.25	-0.0255	0.841835	-0.07477
1	21.2		0.766764	-0.11534	1	-0.11534	0.740892	-0.13025
1.5	20.84		0.661808	-0.17927	2.25	-0.2689	0.652053	-0.18572
2	20.39		0.530612	-0.27522	4	-0.55045	0.573867	-0.24119
2.5	20.3		0.504373	-0.29725	6.25	-0.74312	0.505056	-0.29666
3	20.08	1.51		-0.35632	9	-1.06895	0.444496	-0.35213
3.5	19.9		0.387755	-0.41144	12.25	-1.44005	0.391197	-0.4076
4	19.8		0.358601	-0.44539	16	-1.78156	0.344289	-0.46308
4.5	19.53	0.96	0.279883	-0.55302	20.25	-2.4886	0.303006	-0.51855
5	19.41	0.84	0.244898	-0.61101	25	-3.05507	0.266674	-0.57402
6	19.31	0.74	0.215743	-0.66606	36	-3.99637	0.206555	-0.68496
7	19.1		0.154519	-0.81102	49	-5.67713	0.15999	-0.79591
8	18.97	0.4	0.116618	-0.93323	64	-7.46587	0.123922	-0.90685
9	18.91	0.34	0.099125	-1.00382	81.	-9.03434	0.095985	-1.01779
10	18.85	0.28	0.081633	-1.08814	100	-10.8814	0.074347	-1.12874
67.5	16			-7.79752	426.25	-48.5926		
	delta=	2263.75						
	alpha=	-43.6935		A=	-0.0193			
	beta=	-251.149		B=	-0.11094			
	K=	((r^2*ln(L/F	R))/(2*L*To))				
	r=	0.166667		(Y)				
	L=	12						
	R=	0.416667						
	To=	3.72						
	K=	0.001046	ft/min					
	12-	0.000531	cm/sec					
		1.74E-05	ft/sec					
		1.505544	ft/day				38	
		1.000044	luday					

FIGURE 10

City of Kingsville, TX MSWLF In-Situ Permeability MW-15

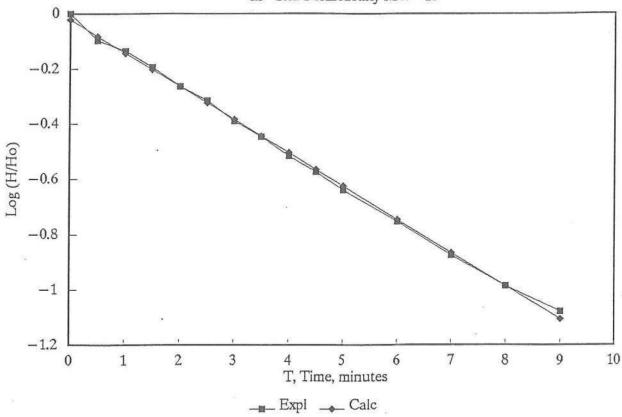


X				Y	X^2	X*Y		
Time	Depth	del h	del(h/ho)	log			calc'd	calc'd
min	ft	ft	With 15%	2572			del(h/ho)	log
EQUIL	24.91	0	0					
0	27.9	2.99	1	0	0	0	0.95017	-0.0222
0.5		2.39		-0.09727	0.25	-0.04864		-0.08238
1		2.19	0.732441	-0.13523	1		.0.720182	-0.14256
1.5		1.91	0.638796	-0.19464	2.25		0.626994	-0.20274
2	26.54	1.63	0.545151	-0.26348	4	-0.52697		-0.26292
2.5	26.36	1.45	0.48495	-0.3143	6.25	-0.78576	0.475231	-0.3231
3		1.22	0.408027	-0.38931	9	-1.16793	0.413738	-0.38327
3.5	25.98	1.07	0.35786	-0.44629	12.25	-1.56201	0.360202	-0.44345
4	25.82	0.91	0.304348	-0.51663	16	-2.06652	0.313593	-0.50363
4.5		0.8	0.267559	-0.57258	20.25	-2.57662	0.273016	-0.56381
5		0.69	0.230769	-0.63682	25	-3.18411	0.237688	-0.62399
6			0.177258	-0.7514	36		0.180156	-0.74435
7	25.31	0.4	0.133779	-0.87361	49	-6.11528	0.13655	-0.86471
8		0.31	0.103679	-0.98431	64	-7.87448	0.103498	-0.98507
9	25.16	0.25	0.083612	-1.07773	81		0.078446	-1.10543
57.5			-	-7.2536	326.25	-40.5434		
	delta=	1587.5						
20	alpha=	-35.2406		A=	-0.0222			
	beta=	-191.069		B=	-0.12036			
	K=.	//r\2*ln/1 /E	R))/(2*L*To	0				
	r=	0.166667		1)				
	L=	11						
	R=	0.416667						
	To=	3.4						
	K=	0.001216	ft/min					
	K-	0.001218	cm/sec					
		2.03E-05	ft/sec					
		1.750462	ft/day					
		1.700402	luday				(6)	

FIGURE 11

City of Kingsville, TX MSWLF

In-Situ Permeability MW-16



APPENDIX F

APPENDIX F

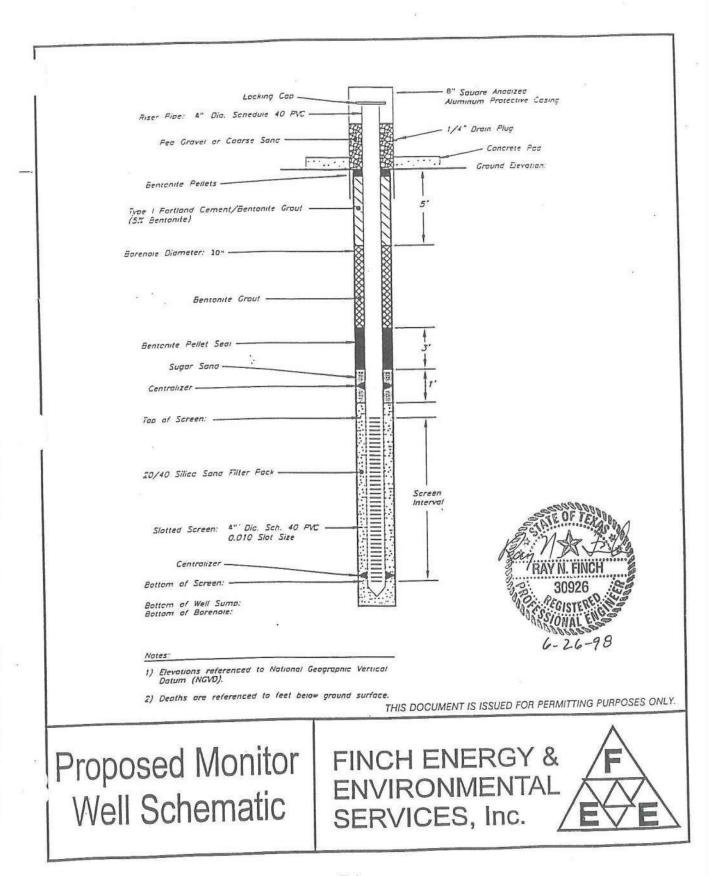
Monitor Well Schematic



November 1997

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INCLUDES PAGE E-1

F-0



APPENDIX G

Ground Water Direction, Gradient, & Flow Rate

Calculations for Ground Water Direction, Gradient and Flow Rate
MOME Cround Water Hitection (3) dilett and Flow Nato
MCM E Graind Mater Hitection (alament and Flow Mater Or Management
MSW/LE Ground Water Direction Gradient and Flow Rate - 5/EQUADIAN
MSW/ F Ground Water Direction, Gradient and Flow Rate - N/W Quadrant G-7
MCWI E Ground Water Direction Gradient and Flow Rate - Central G-oa
Figure N/E Quadrant Ground Water Direction
Figure - S/W Quadrant Ground Water Direction
Figure - S/E Quadrant Ground Water Direction
Figure - S/E Quadrant Ground Water Direction
Figure - S/E Quadrant Ground Water Direction
Figure - Central Site Ground Water Direction
Figure - N/F () Hadrant Ground Water Gradient
Eighte - S/W Changant Ground Water Gradient
Figure - S/F Quadrant Ground Water Gradient
Figure - N/W Quadrant Ground Water Gradient
Figure - Central Site Ground Water Gradient
N/F Overdrant Ground Water Flow Rate
Figure SAN Quadrant Ground Water Flow Rate
C/F Oundrant Cround Water Flow Rate
Figure - S/E Quadrant Ground Water Flow Rate
Figure - N/W Quadrant Ground Water Flow Rate
Figure - Central Site Ground Water Flow Rate



NOVEMBER, 1997

Revision 2 September 1998

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Calculations for Ground Water Direction, Gradient, and Flow Rate

The direction and gradient of ground water flow can be determined from ground water monitor well data by using a minimum of three wells. If more than three data points are used, then a least squares technique must be used to obtain the best fit to the data. The ground water elevation in these three wells define three points in three dimensional space which define the equation of a plane surface of the ground water in that region. Once the equation of the plane through the ground water surface has been determined, it is an easy step to determine the slope of that plane which gives the direction and the gradient of ground water flow. In order to make these calculations sufficiently accurate, these three wells must be sufficiently far apart due to the very shallow slopes of these ground water planes. However, the three well must also be in reasonable proximity to one another so that curvature of the ground water surface over larger areas does not distort the results. This type of calculation is can be done readily on a computer spread sheet program. The following pages are the results of Lotus 123 spreadsheet calculations.

The general form of the equation of a plane in three dimensional space is as follows:

$$Ax + By + Cz + D = 0$$

If, $A \neq 0$,

the equation may be reduced to the form:

$$x + by + cz + d = 0$$

where,
$$b = \frac{B}{A}$$
, $c = \frac{C}{A}$, and $d = \frac{D}{A}$.

Let x, y, & z represent the linear coordinates of a ground water elevation measurement in a well: x is the east west direction, y is the north south direction and z is the vertical elevation.

Then, the three data points can be put into three equations as given above and solved with matrices or vectors. This is what is done on the attached spread sheet.

The <u>first column</u> gives the number of the three ground water monitor wells used.

The <u>second column</u> gives the elevation of top of the lip of the ground water well casing in feet, Mean Sea Level (MSL), or NGVD.

The third column gives the depth to ground water measured from the top of the casing lip in feet to the nearest hundredths of a foot.

The <u>fourth column</u> gives the calculated height of the ground water relative to MSL in feet by taking the difference between the top of the casing lip in column one and the depth to ground water in column two.

G-0a

The values for x and y for the ground water monitor wells are taken from the last part of Table 5.3 in the text portion of Attachment 5, i.e. X" and Y" values. These values are determined from the surveyed UTM coordinates in the first part of Table 5.3 and rotated to give x and y parallel to the site boundaries.

The matrix solutions are set up following the space after the first nine rows of data. The solution to the matrices are given as delta, alpha, beta and gamma. These are use to solve for the coefficients as follows:

$$a = \frac{\delta}{\delta}$$
, $b = \frac{\alpha}{\delta}$, $c = \frac{\beta}{\delta}$, and $d = \frac{\gamma}{\delta}$.

From these numbers, the direction of ground water flow and the gradient can readily be determined:

Direction of ground water flow in the plane of the land surface, ie. x-y direction is:

$$Direction = \tan^{-1} \left(\frac{a}{b} \right)$$

The gradient of ground water flow in the direction of flow is:

Slope Angle of plane =
$$\theta = \cos^{-1} \left[\frac{c}{\sqrt{a^2 + b^2 + c^2}} \right]$$

$$Gradient = \tan^{-1} \theta$$

The direction is from 0° to 360° with 0° being site north. The gradient if ft/ft, but is converted into more convenient units below the determination.

For the determination of direction and gradient in a particular quadrant, three well are chosen which best represent that quadrant, i.e.northeast quadrant use MW #s 6,14 & 13.

In order to calculate ground water flow, a hydraulic conductivity is required (called permeability on the spread sheet). The hydraulic gradient was selected for the monitor well at the extreme corner of that quadrant. These are the in-situ measured hydraulic conductivities given in Appendix E of Attachment 5.

The flow rate is calculated by the Darcy equation for permeable flow,.i.e.

$$v = \frac{q}{A} = \frac{Ki}{\Theta}$$

where $v = velocity$ of ground water flow
 $q = volume$ rate of GW flow
 $A = cross$ section perpedicular to flow
 $K = hydraulic$ conductivity, L/T
 $i = gradient$, L/L

The spread sheet was set up so that a particular date and set of MW measurements was used to calculate ground water direction, gradient, and flow rate in a particular area. This data was then recorded permanently under the proper date and another set calculated for the ten month test period. The six rows of data below the input table gives the following data from top to bottom of the table:

Direction of GW flow on that date

Direction of GW flow averaged for the ten month period.

Gradient of GW flow on that date

Gradient of GW flow averaged for the ten month period.

Flow rate of GW for that date

Flow rate of GW averaged for the ten month period.

Both instantaneous and 10 month average data for direction, gradient, and flow rate are plotted on charts after the spread sheets.

GROUNDWA	IGSVILLE, TX ATER & GRADIENT		To N/E	35646 08/04/97	35660 08/18/97	35675 09/02/97	35688 09/15/97
	MOLLIN	Depth	GW MSL	SET#1	SET#2	SET#3	Set #4
Point #	MSL Lip	20.38	36.224	23.31	24.01	24.53	24.69
6	56.604		30.007	25.65	25.88	26.05	25.95
14	52.677	22.67	34.996	28.86	29.15	29.16	29.33
13	62.096	27.1	35.8	41.6	43.5	45.9	46.1
	degrees	36	33.0	36	36	36	36
Carried Control of Con	degrees	0.000	0.00634	0.006955	0.006642	0.006525	0.006231
	ft/ft	0.008	0.00034	0.008	0.008	0.008	0.008
01000	ft/ft	4.0	0.979715	1.074758	1.0264	1.008302	0.962801
	ft/yr	1.2	0.979715	1.074750	1.2	1.2	1.2
Flow rate	ft/yr			1.2	1.2		
	**	1/	z	n			
Point #	X	у 2771.07	36.224	. 1	-1249.75		
6	1249.752	2742.223	30.007	1	-2480		
14	2480	1394.179	34.996	1	-2482.68		
13	2482.683	1394.179	34.550				
400		+					
1,2,3	229621.1	-238146	=	-8524.71			
delta	-214224	208069.7	=	-6154.39			
alpha		13764351	=	-1658351			
beta	-1.5E+07 -4.5E+08	5.4E+08	=	87780110			
gamma	-4.5E+00	J.4L 100					
		а	=	1	50		
		b	=	0.721947			
		C	=	194.5346	1.5		
		d	=	-10297.1			
	therefore	direct'n	=	35.8	degrees	NE	
	1110101010					0.000057	
		gradient	=	0.99998	0.00634		
		70			0.00634	ft/ft	
				00.40	th/mile		
		gradient	=	33.48			
				1.9	ft/100yd		
				0.000294	ft/min		
	MW-14	permeab'y	=	0.000294	10111111		
		M	_	0.979715	ft/yr		
		flow rate	=	0.373710			
		distance	=	16.7	ft ft		
		distance	_	70			

	35962 06/16/98 #17 20.38 22.67 27.1 35.8 36 0.00634 0.008
	35933 05/18/98 #16 19.3 22.52 26.62 33.8 33.8 36 0.007106 0.008 1.098088
	35844 02/18/98 #15 18.64 23.1 26.62 32.4 36 0.008195 0.008
	35828 02/02/98 #14 19.11 23.51 27.17 32 36 0.008096 0.008 1.251108
	35815 01/20/98 #13 19.55 23.37 26.81 34.8 36 0.007795 0.008 1.204545
	35800 01/05/98 #12 19.42 23.63 26.71 35 0.008213 0.008 1.269186
	35786 12/22/97 #11 19.11 23.64 26.61 34.5 36 0.008745 0.008
	35772 12/08/97 #10 18.35 23.89 26.49 33 36 0.009317 0.008 1.439724
	35758 11/24/97 #9 18.23 24.25 26.68 32.4 36 0.009716 0.008 1.501446
	35744 11/10/97 #8 18.3 24.66 27.12 31.4 36 0.009939 0.008 1.535872
×	35731 10/28/97 #7 17.59 25.08 27.55 28.8 36 0.010731 0.008 1.658229
SITY OF KINGSVILLE, TX SROUNDWATER DIRECTION & GRADIENT	35719 10/16/97 #6 17.74 25.46 28.53 26.3 36 0.010682 0.008 1.650626
CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT	35702 09/29/97 #5 24.48 25.77 29.26 45.4 36 0.006188 0.008

CITY OF KINGSV GROUNDWATER	ILLE, TX					05000
DIRECTION & GF	RADIENT	to S/W	35646 08/04/97	35660 08/18/97	35675 09/02/97	35688 09/15/97
	L Lip Depth	GW MSL	SET #1	SET#2	SET#3	Set #4
	L Lip Depth 31.867 27.67	34.197	27.67	22.94	35.64	28.28
	58.839 24.21	34.629	24.21	24.63	24.94	24.95
	31.178 27.37	33.808	27.37	35.36	35.76	28.42
Direction degre		59.1	239.1	300.7	224.6	252.5 204.3
Direction degree	ees	204.3	204.3	204.3	204.3 0.00897	0.00088
Gradient ft/ft	0.00216	-0.00071	0.00071	0.00723 0.00216	0.00897	0.00216
Gradient ft/ft		0.405	0.00216	5.035	6.248	0.613
Flow Rate ft/yr	1.503	-0.495	1.503	1.503	1.503	1.503
Flow Rate ft/yr			1.000	,,,,,,		
Point #	х у	Z	n 1	-1249.75		
1 12	49.752 2771.07		1	-1249.73		
. 6	2480 2742.223		1	-2482.68		
8 24	82.683 1394.179	33.000				
1,2,3						
delta 23	6345.2 -235739		606.0384			
	212022 213033		1011.193			
beta -1	.5E+07 13764351		-1658351 53151142			
gamma -4	.7E+08 5.3E+08	3 =	55151142			
	а	=	1			
	b	=	1.668529	(4)		
	С	=	-2736.38			
	d	=	87702.6			
thor	efore direct'n	=	59.1	degrees	NE	
ulei	elole directi		239.1			
	11	=	-1	3.140882	179.9593	
	gradient	-		-0.0007		
			West-ball to			
	gradient	=	-3.75			
			-0.21	ft/100yd		
Ava MAA	V-16&12 permeab'y	/ =	0.001325	ft/min		
Avg MV						
	flow rate	=	-0.49507	ft/yr		
	distance	=	-8.4	4 ft		
				E	*	

	35962 06/16/98 #17 25.54 22.67 25.89 279.8 204.3 0.00066 0.00216
	35933 05/18/98 #16 25.21 25.19 25.19 242.4 204.3 0.00103 0.00216 0.718
	35844 02/18/98 #15 25.67 21.28 23.14 162.2 204.3 0.00115 0.804 1.503
	35828 02/02/98 #14 25.92 21.74 24.72 206.7 206.7 204.3 0.00106 0.739 1.503
	35815 01/20/98 #13 25.88 21.67 24.91 24.91 204.3 0.00118 0.00216 0.825 1.503
	35800 01/05/98 #12 26.05 21.66 24.72 205 204.3 0.00124 0.00216 0.865 1.503
	35786 12/22/97 #11 26.19 21.71 24.83 206 204.3 0.00133 0.0016 0.925 1.503
	35772 12/08/97 #10 26.36 21.7 23.83 173.4 204.3 0.00133 0.00216 0.927
	35758 11/24/97 #9 26.69 21.94 23.06 146.8 204.3 0.00165 0.00216 1.147
	35744 11/10/97 #8 27.1 22.46 22.73 129.7 204.3 0.00199 0.00216 1.388 1.503
× -	35731 10/28/97 #7 27.5 22.75 22.75 22.74 128 204.3 0.00221 0.00216 1.537
GSVILLE, T TER & GRADIEN	35719 10/16/97 #6 28.57 23.32 22.07 123.3 204.3 0.00216 0.00216
CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT	35702 09/29/97 #5 28.39 24.81 28.14 237.7 204.3 0.00087 0.00216 0.607

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CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT To S/E 35646 35660 35675								
BINLOTION	(0, 0, 0, 10, 10, 10, 10, 10, 10, 10, 10			08/04/97	08/18/97	09/02/97		
Point # MSL Lip		Depth	GW MSL	SET#1	SET#2	SET #3 35.64		
1 61.86		25.21	36.657	27.67	22.94			
12 54.879		18.09	36.789	20.97	21.42	21.82		
13 62.096		26.62 257.3	35.476	28.86	29.15	29.16 181.1		
Direction	Direction degrees		82.4	294	355.2	257.3		
Direction	Direction degrees			257.3	257.3	0.00556		
Gradient	ft/ft	0.00144	-0.00098	0.00055	0.00445 0.00144	0.00330		
Gradient	ft/ft		0.101	0.00144	9.663	12.062		
Flow rate	ft/yr	3.124	-2.134	1.186	3.124	3.124		
Flow rate	ft/yr			3.124	3.124	5.124		
5		.,	Z	n				
Point #	X	у 2771.07	36.657	1	-1249.75			
6 1249.752		2742.223	36.789	1	-2480			
14 2480		1394.179	35.476	i	-2482.68			
13 2482.683		1354.175	55.476					
1,2,3								
delta	250334.4	-250119	=	215.8179				
	-224965	226581	=	1615.67				
alpha -224965 beta -1.5E+07		13764351	=	-1658351				
gamma -5.0E+		5.6E+08	=	56043316	05			
gamma	0.01							
		а	=	1				
		b	=	7.486263				
		С	=	-7684.03				
		d	=	259678.7				
W 7					2	NE		
	therefore	direct'n	=	82.4	degrees	NE		
				-	0.44064	179.9437		
		gradient	=	-1	3.14061	179.9437		
					-0.00098			
			-	-5.19	ft/mile			
		gradient	=		ft/100yd			
				-0.29	10 100ya			
	101110		=	0.00413	ft/min			
	MW-12	permeab'y) - 1	0.00410	1011			
		flow rate	=	-2.13364	ft/yr			
		now rate		2				
		distance	=	-36.3	ft			

		35962	06/16/98	#17	25.54	18.82	1 7	77.1	284.2	257.3	0 00081	0000	0.00144	1.765	2 104	0.141
		35933														
		35844	02/18/98	#15	25.67	17.81	0.00	79.97	238.1	257.3	00100	0.00138	0.00144	3.025	2 404	0.124
		35828	02/02/98	#14	25.92	18 42	10.1	27.17	248.7	257.3	00000	0.00122	0.00144	2.651	200	3.124
		35815	01/20/98	#13	25.88	18 10	0.10	26.81	247.1	257.3	0000	0.00089	0.00144	1.93		3.124
		35800	01/05/98	#12	26.05	10 21	10.01	26.71	237.5	2573	0 000	0.00087	0.00144	188		3.124
		35786	12/22/97	#11	26 19	40 1	10.04	26.61	228.9	2573	0.10	0.00084	0.00144	1826	010	3.124
		35772	12/08/97	#10	26.36	0.00	18.51	26.49	218.5	257.3	20.10	0.00091	0 00144	1 98	0	3.124
			11/24/97													
		35744	11/10/97	#8	27.4	1.12	19.34	27 12	2123	0.00	507.0	0.00076	0.00144	1 0 C C	000.	3.124
	v	35731	10/28/97	#7	27 5	C.12	19.61	27.55	24.00	7.00	201.3	0 00092	0.00144	400	088.	3 124
	GSVILLE, T) TER § GRADIEN	35719	10/16/97	5 Y#	70 67	70.07	19.58	28 53	24.00	2.7.3	257.3	0.0021	0.00444	1 00.0	4.000	3 124
	CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT	35702	70/06/00	100750	2	20.33	22.09	20.06	7.000	303.7	25/3	0.00056	0.0000	0.00	1.218	3 124

G-6

CITY OF KINGSVILLE, GROUNDWATER	TX					
DIRECTION & GRADIE	NT	To N/W	35646 08/04/97	35660 08/18/97	35675 09/02/97	35688 09/15/97
Point # MSL Lip	MSL Lip Depth		SET #1	SET#2	SET#3	Set #4
6 56.604		GW MSL 36.224	23.31	24.01	24.53	24.69
15 51.624		38.464	17.47	18.17	18.47	18.68
16 58.839		36.169	24.21	24.63	24.94	24.95
Direction degrees	Daily	42.5	153.1	140.8	147.5	139.6
Direction degrees	Average	202.6	202.6	202.6	202.6	202.6
Gradient ft/ft	Daily	-0.00252	0.00077	0.00088	0.00103	0.00108
Gradient ft/ft	Average	0.00387	0.00387	0.00387	0.00387	0.00387
Flow rate ft/yr	Daily	-1.393	0.428	0.488	0.566	0.595
Flow rate ft/yr	Average	2.13718	2.13718	2.13718	2.13718	2.13718
Point # x	у	z	n			
6 1249.752		36.224	1	-1249.75		
14 2480		38.464	1	-2480		
13 2482.683		36.169	1	-2482.68		
1,2,3						
delta 256272.6	-253187	=	3085.822			
alpha -227702		=	2829.429			
beta -1.5E+07		=	-1658351			
gamma -5.1E+08	5.6E+08	=	48375045			
			a a			
	a	=	1			
	b	=	0.916912			
	C	=	-537.41			
	d	=	15676.55			
therefore	direct'n	=	42.5	degrees	NE	
	gradient	=	-1	3.139068	179.8554	
				-0.00252		
			10.00	£4/:1-		
	gradient	=	-13.33	ft/mile		
			-0.76	ft/100yd		
MW-15	permeab'y	=	0.00105	ft/min		
IVIVV-15	permean y	750	0.00100			
	flow rate	==	-1.39327	ft/yr		
				RESTAND		
	distance	=	-23.7	ft		

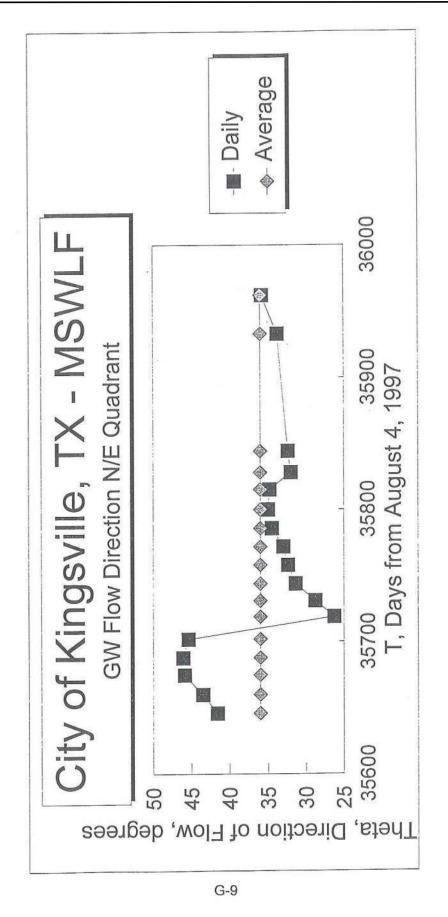
	35962	86/9	17	20.38	13.16	22.67	222.5	202.6	00252	70387	1.393	13718
	(-,	06/1	#						0.	o.		N
	35933	05/18/98	#16	19.3	11.98	21.62	222.8	202.6	0.00265	0.00387	1.463	2.13718
	35844	02/18/98	#15	18.64	8.91	21.28	224.1	202.6	0.0055	0.00387	3.037	2.13718
	35828	02/02/98	#14	19.11	9.54	21.74	224.1	202.6	0.00532	0.00387	2.936	2.13718
	35815	01/20/98	#13	19.55	10.54	21.67	221	202.6	0.00443	0.00387	2.447	2.13718
	35800	01/05/98	#12	19.42	9.89	21.66	221.9	202.6	0.00507	0.00387	2.8	2.13718
	35786	12/22/97	#11	19.11	9.05	21.71	223.8	202.6	0.00585	0.00387	3.229	2.13718
	35772	12/08/97	#10	18.35	7.62	21.7	226.8	202.6	0.007	0.00387	3.864	2.13718
	35758	11/24/97	6#	18.23	8.19	21 94	229	202.6	0.00644	0.00387	3.553	2.13718
	35744	11/10/97	#8	18.3	8.14	22.46	230.6	2026	0.00683	0.00387	3.77	2 13718
× F	35731	10/28/97	7#	17.59	10.16	22.75	242 4	2026	0.0045	0.00387	2.485	2 13718
GSVILLE, T. VTER & GRADIEN									0.00491			
CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT	35702	76/86/90	#22	24 48	18.65	24.81	1307	2026	0.00103	0.00387	0.569	2 13718

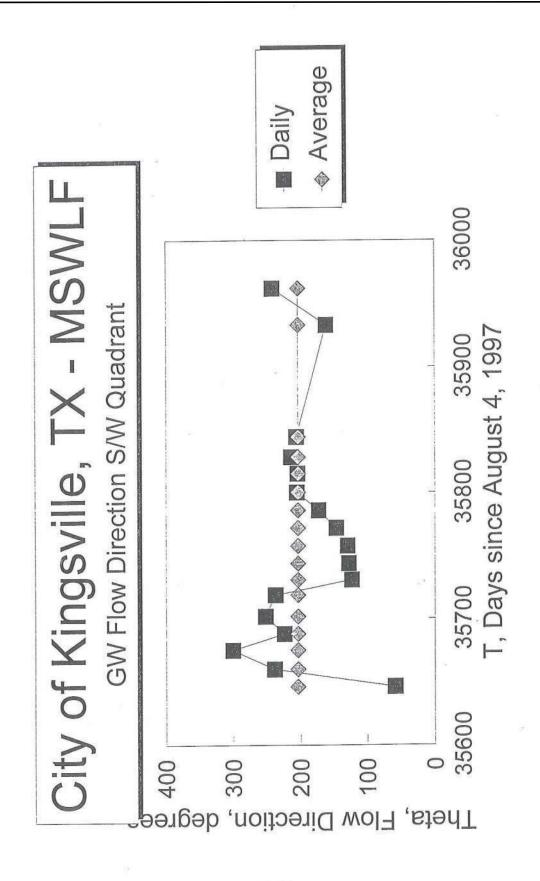
G-8

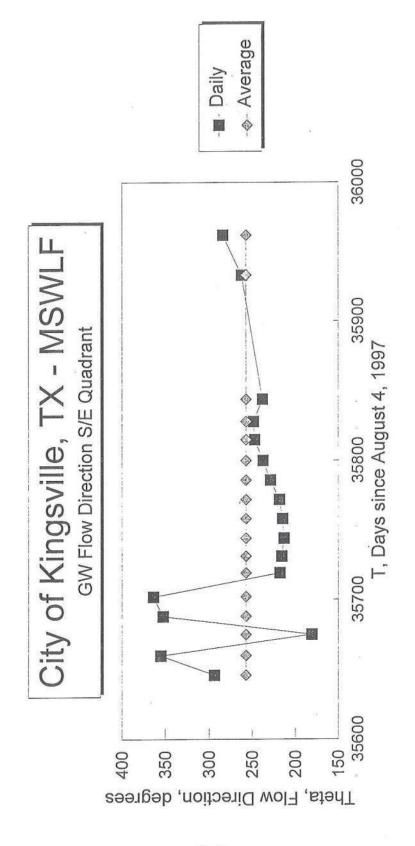
CITY OF KINGSVILLE, T GROUNDWATER	TX		1.5			
DIRECTION & GRADIEN	NT.	Central	35646 08/04/97	35660 08/18/97	35675 09/02/97	35688 09/15/97
Point # MSL Lip	Depth	GW MSL	SET#1	SET#2	SET#3	Set #4
12 54.879	18.82	36.059	33.909	33.459	33.059	32.869
14 52.677	22.67	30.007	27.027	26.797	26.627	26.727
15 51.624	13.16	38.464	34.154	33.454	33.154	32.944
	Daily	33	41.2	42.2	41.8	41.8
	Average	31.6	31.6	31.6	31.6	31.6
	Daily	0.00407	0.00382	0.00363	0.00353	0.00337
	Average	0.00519	0.00519	0.00519	0.00519	0.00519
	Daily	2.246	2.109	2.002	1.949	1.859
	Average	2.86665	2.86665	2.86665	2.86665	2.86665
Point # x	у	z	n			
12 2480	8	36.059	1	-2480		
14 2480	2742.223	30.007	.1	-2480		
15 5.08411	2739	38.464	1	-5.08411		
1,2,3	101070		00402 02			
delta 204482.5	-181379	=	23103.82			
alpha -169991	184969.6	=	14978.19			
beta -6826502	13593474	=	6766972			
gamma -5.1E+08	2.1E+08	=	-3.0E+08			
	а	=	7.487086			
	b	=	4.853873			
	. C	=	2192.923		2	
	d	=	-97681.4			
	-					
therefore	direct'n	=	- 33	degrees	NE	
			0.000000	0.004069	0.23313	
	gradient	=	0.999992	0.004069		
				0.004009		
		=-	21.48	ft/mile		
	gradient		1.22	ft/100yd		
			1.22	10 10090		
MW-15	permeab'y	=	0.00105	ft/min		
10100-13	permeas y					
	flow rate	=	2.245551	ft/yr		
	distance	=	38.2	π		

	35962 06/16/98 #17 36.059 30.007 38.464 33 31.6 0.00407 0.00519 2.246 2.86665
	35933 05/18/98 #16 36.789 30.157 39.644 32.3 31.6 0.00453 0.00519 2.502
	35844 02/18/98 #15 37.069 29.577 42.714 27.3 31.6 0.00597 0.00519 3.295
	35828 02/02/98 #14 36.459 29.167 42.084 27.1 31.6 0.00586 0.00519 3.233
	35815 01/20/98 #13 36.389 29.307 41.084 28.6 31.6 0.00541 0.00519 2.988 2.86665
	35800 01/05/98 #12 36.369 29.047 41.734 27.6 31.6 0.00578 0.00519 3.19 2.86665
	35786 12/22/97 #11 36.339 29.037 42.574 26 31.6 0.00608 0.00519 3.357 2.86665
	35772 12/08/97 #10 36.369 28.787 44.004 24.3 31.6 0.00574 0.00519 3.721 2.86665
	35758 11/24/97 #9 36.229 28.027 43.434 25.2 31.6 0.0067 0.00519 3.697 2.86665
	35744 11/10/97 #8 35.539 28.017 43.484 23.8 31.6 0.00682 0.006519 3.767 2.86665
×	35731 10/28/97 #7 35.269 27.597 41.464 26.6 31.6 0.00626 0.00626 0.006519 3.456
STY OF KINGSVILLE, TX SROUNDWATER SIRECTION & GRADIENT	35719 10/16/97 #6 35.299 27.217 41.434 27.2 31.6 0.00646 0.00519 3.563
CITY OF KINGSVILLE, TX GROUNDWATER DIRECTION & GRADIENT	35702 09/29/97 #5 32.789 26.907 32.974 41.3 31.6 0.00326 0.00519 1.799 2.86665

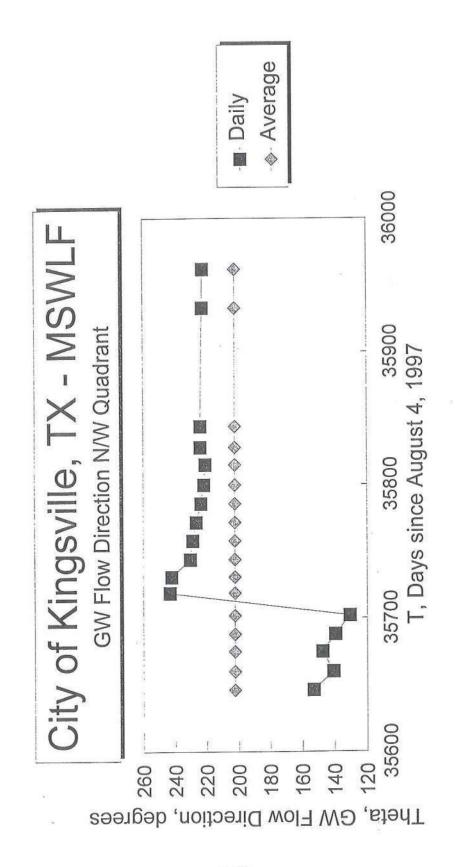
G-8b



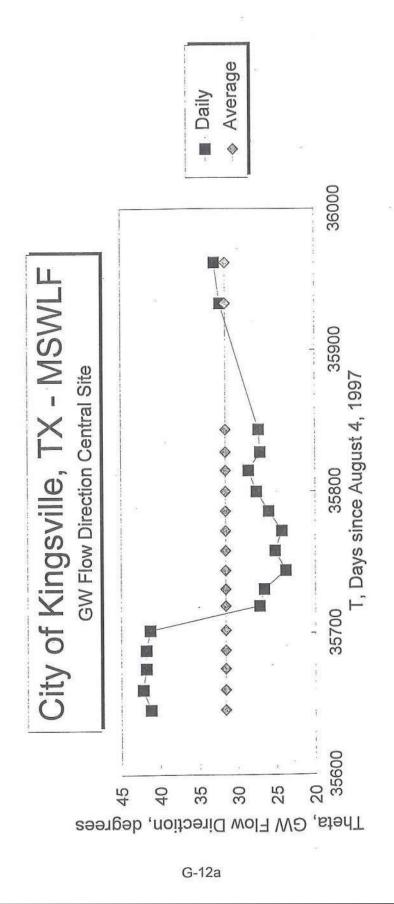


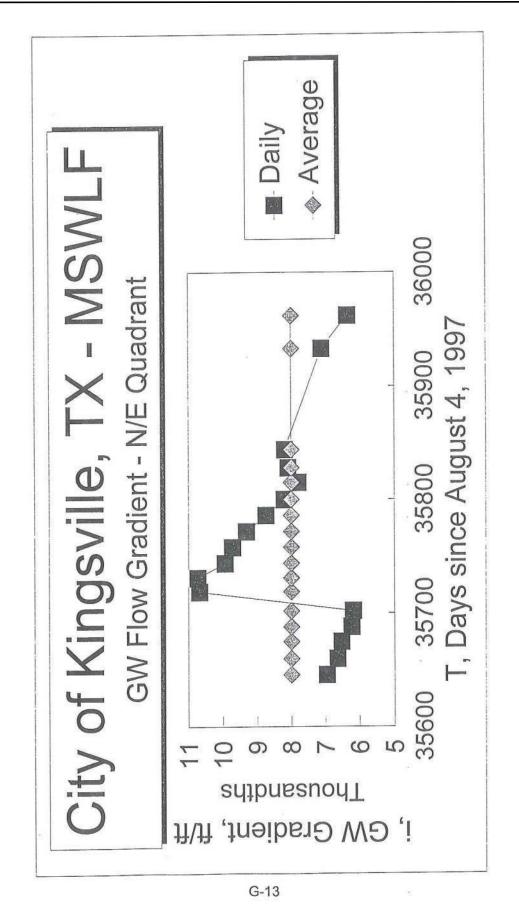


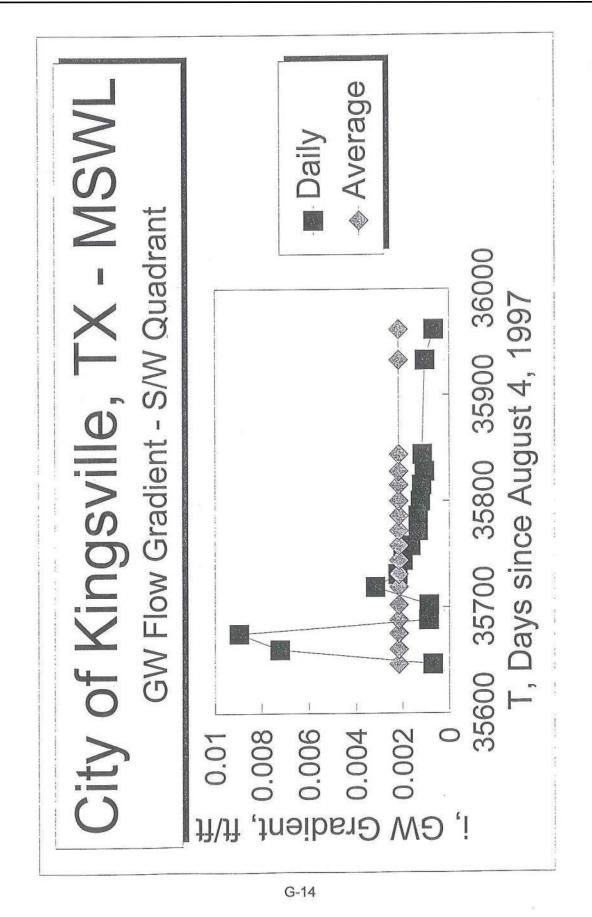
G-11



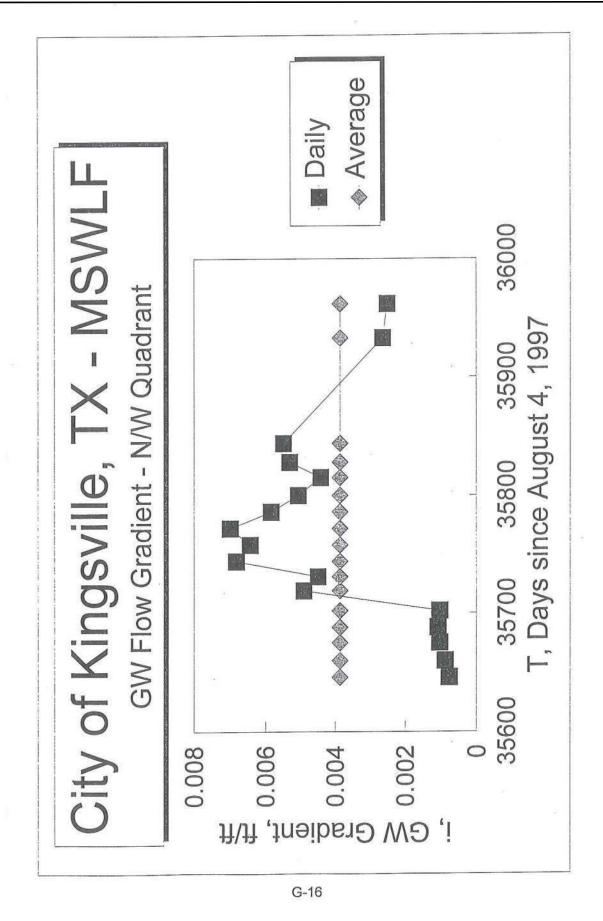
G-12

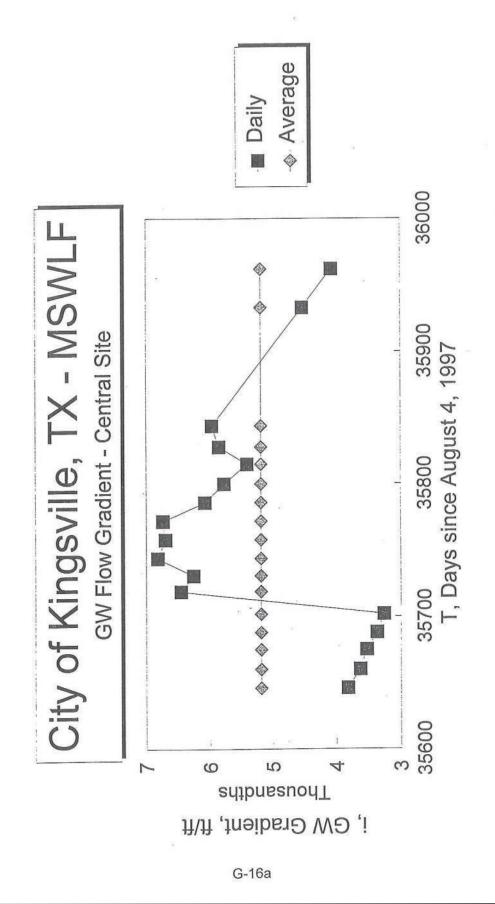






G-15

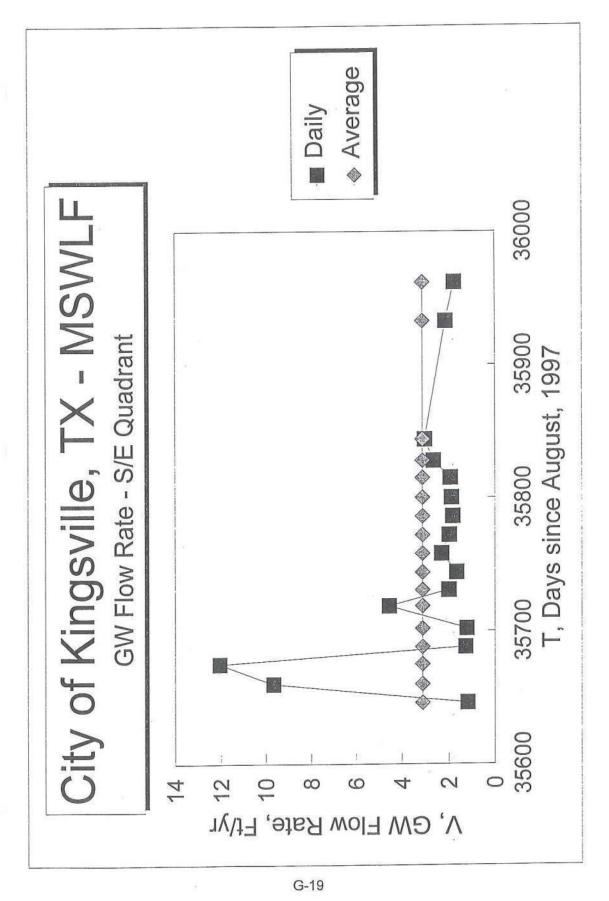


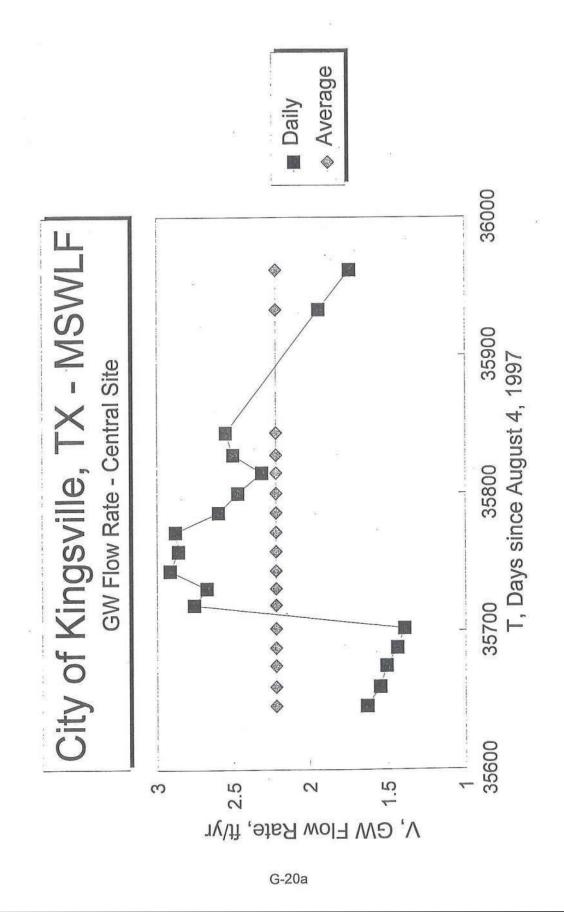


Part III

Part III

G-18





City of Kingsville MSWLF - Permit 235 B Attachment 5 - Groundwater Characterization Report

APPENDIX H

Boring Logs

Boring/Well N	lo 1																													H-1
Boring/Well N Boring/Well N	10. 1					•	•	•	• •	•	•	•	•			•														H-2
Boring/Well N	10.2		• •			•	• •	•	•	• •				•		• •				•	•		•	•	•		6000	8000		H-3
Boring/Well N	10.3	• • •						٠.												•				•	•	•	•	9.5		. H-4
Boring/Well N	10.4							٠.	٠		٠				•		٠	•	•	•		•					•	•		
Boring/Well N	No. 5			٠.	٠	٠.			٠		٠					٠.													•	
Daving AMOUN	No G																1													. 11-0
DaringAMall N	10 7														15		0000	20												
DavingAMall N	VIO Q													2002	050	200	272	.77												. 110
DavingAMOIIA	VIO O																													. 110
DaringAMOII	VIO OF	20																												11 10
DavingAMall N	No 10																													11 4 1
DavingAMall	No 11										N.S.		1		3.00	400														11 12
DaringAMall	No 12	Diores.											(12)	200	2.72	1200							 0.00							11.10
DavingAMall	No 12	61																												11.1
DavingAMall	No 11													0.00	33															11 10
DavingAMoll !	No 15	30												9500	9.5	1253	27.													11 10
Boring/Well I	No. 16																			000	·*/								٠	11.11
Boring/Well I	No. 17						100																							H-18
DavingAMall	No 19	2																												11-10
Boring Well	No. 7d			• •	• •	•	•	•			100 100			35)); 5027	SIJE SIJS		505 277				125									H-20
Boring Well	NO. 24		• •	• •	•	• •	•	•	•	•		•	•	•	•	•										 				H-21
Boring Well	NO. 21		٠.	٠.	٠.		•						•	•	•	•	• •		•		03*0			500			HENI Marie		1005 (10 2 0	H-22
Boring Well	No. 23		٠.	٠.													٠.	•	•	• •		•	•					e de la constante de la consta		
Boring Well					٠.	• •	•	•	• •	*			• •	*	• •			•	•	• •	•		•	•	•	 •				1101
Davina Wall	No 2F												500	7.0		100														

November 1997

Revision 1 - June 1998

H-0

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client:	City of Kingsville	Boring/Well No.:1
Project Name:	Kingsville Landfill	Date Drilled: June 19, 1984
Project Location:		Boring Method: Hollow_Stem Auger
LAT: 27º 26: 42.2		Sample Method: SHELBY TUBE & SPLIT SPOON
MSWLF ID:	Permit #235-B	Surface Elevation: 59.25' MSL
MOVEL 10.		Depth to Water: 31.0' BGS
		Total Depth: 42' BGS
	E	Casing: 2" S-40 PVC - 0-32' BGS
TOTAL TIME	÷	Screen: 10'of 2" S-40 PVC - 32' BGS
Well	(fee	Borehole Dia.: 6 inch
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Driller ID:TETCO
Mor	H & Z E	SOIL CLASSIFICATION
1 - 73	(o (o (o (o (o (o (o (o (o (o	TOP SOIL & DARK BROWN CLAY
1.1		TOP GOIL & BANK BROWN 92 II
		i i
		CALICHE, CLAY & SAND (I)
	10	
.51	1 1	
	100	a i i come
1	25	İ
	- 30	
		SILTY CLAY
	45	
ALC: Y	- 50 -	
and the same of	Water death on Drilling = 30	10ft BGS TOTAL DEPTH = 42 feet

H-1

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

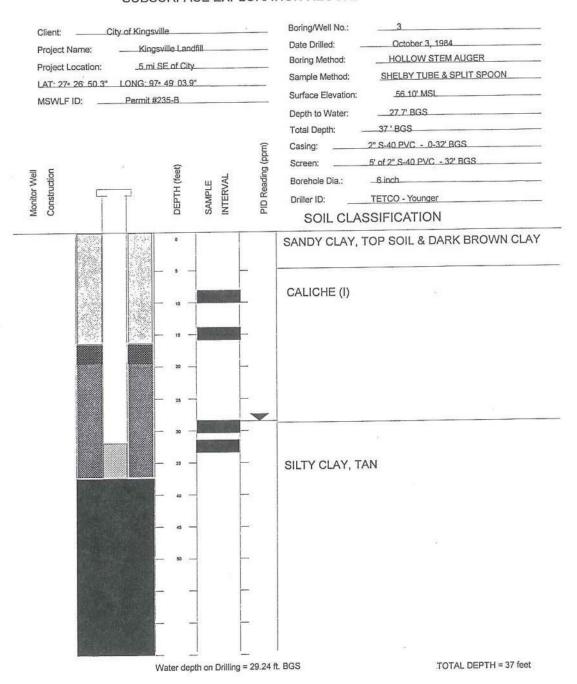
Client: City of King	sville	Boring/Well No.: 2
	gsville Landfill	Date Drilled: October 6, 1984
•	mi SE of City	Boring Method: Hollow Stem Auger
		Sample Method: SHELBY TUBE & SPLIT SPOON
MSWLF ID: Per	nit #235-B	Surface Elevation:52.64' MSL
The second of th		Depth to Water: 19.9' BGS
		Total Depth: 27' BGS
	(md	Casing: 2" S-40 PVC - 0-22' BGS
= c	et)	Screen: 5' of 2" S-40 PVC - 22' BGS
	1 (fe LE VAL	Borehole Dia.: 6 inch
Construction	DEPTH (feet) SAMPLE INTERVAL PID Reading (ppm)	Driller ID: TETCO - Younger
8 8		SOIL CLASSIFICATION
E. Land	. 0	SANDY CLAY
		SANDICEAL
		CALICHE
	10	OALIOTIL
5.254		
Install Inst	15	7.
		CUTY OLAY
	20	SILTY CLAY
	1000000	
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	- × -	
	35	e e
		S#1
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		100
The state of the s	22	

H-2

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD



H-3

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

	City_of Kingsville Kingsville_Landfill 5_mi_SE_of City 	Boring/Well No.: 4 Date Drilled: October.3, 1984. Boring Method: HOLLOW STEM AUGER Sample Method: SHELBY TUBE & SPLIT SPOON Surface Elevation: 58.01' MSL
Monitor Well Construction	DEPTH (feet) SAMPLE INTERVAL PID Reading (ppm)	Depth to Water: 31.2' BGS Total Depth: 39' BGS Casing: 2" S-40 PVC - 0-34' BGS Screen: 5' of 2" S-40 PVC - 34' BGS Borehole Dia.: 6 inch Driller ID: TETCO - Younger SOIL CLASSIFICATION
		TOPSOIL & DARK BROWN SANDY CLAY
	15	CALICHE (I)
	В —	
	- 55	SANDY CLAY
	45	
	50	
	Water depth on Drilling = 27,98 ft	t. BGS TOTAL DEPTH = 39 feet

H-4

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

С	lient:	City of Kingsville	9		Boring/Well No.:	5				
P	roject Name:	Kingsville_L	andfill		Date Drilled:	October 5, 1984				
Pi	roject Location:	_5 mi SE	of City		Boring Method:	Hollow Stem Auger				
-	-				Sample Method:	_ SHELBY TUBE & SPLIT SPOON				
M	ISWLF ID:	Permit #235	i-B		Surface Elevation:	60.54'_MSL				
					Depth to Water:	31.5' BGS				
					Total Depth: -	48' BGS				
				(md	Casing:					
_	c	4	a di di di di di di di di di di di di di	PID Reading (ppm)	Screen:					
We	rctio		VAL VAL	sadin	Borehole Dia.:	_6 inch				
Monitor Well	Construction	7 8	SAMPLE INTERVAL	D Re	Driller ID:	TETCO - Younger				
Mo	8	ì	5 % Z	₫.	SOIL CLAS	SSIFICATION				
Boring Grouted	10-6-84				SANDY CLAY					
					CALICHE	a				
			10							
			15		i i					
					1 4 1					
		-	20		-					
. 8		-	25 - 100000000							
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		-	20							
			THE STATE OF THE S							
			35		SILTY CLAY					
			40							
				1						
			45							
	i i		50	TDH						
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		-	-							
					1					
		-	-			TOTAL DEPTH = 48 feet				

H-5

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client:	City of Kingsville	Boring/Well No.:6
Project Name:	Kingsville Landfill	Date Drilled:October 3, 1984
Project Location:	5 mi SE of City	Boring Method: HOLLOW STEM AUGER
	LONG: 97° 49' 09.9"	Sample Method: SHELBY TUBE & SPLIT SPOON
MSWLF ID:	Permit #235-B	Surface Elevation: 55.46' MSL
		Depth to Water: 29.1' BGS
		Total Depth: 38' BGS
	E	Casing: 2" S-40 PVC - 0-33' BGS
= -	chi	Screen: 5' of 2" S-40 PVC - 33' BGS
Monitor Well Construction DEPTH (feet) SAMPLE INTERVAL		Borehole Dia.:6.inch
nitor 	DEPTH (fe	Driller ID: TETCO-Younger
[©] S [™]	SA SA	SOIL CLASSIFICATION
		SOIL GEAGGII IGATIGIA
	•	CALICHE (I)
-2	100000000000000000000000000000000000000	4
[74]	10	
	L	
573	20	
		(a)
	_ = _	SANDY CLAY
	40 -	
	- 45 -	
333		
		L.
	Water depth on Drilling = 27.92	off BGS TOTAL DEPTH = 38 feet

H-6

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client:		City of Kir	ngsville			Boring/Well No,:	_ 7
Project Na	me:	Kin	gsville Lan	dfill		Date Drilled:	August 1990
Project Location: 5 mi SE of City				Boring Method:			
LAT: 27° 2	6' 43.9"	LONG: 9	7• 49' 23.	3"		Sample Method:	
MSWLF IE):	Permi	#235-B			Surface Elevation:	61.05 ' MSL
Monitor Well Construction		7	DEPTH (feet)	SAMPLE INTERVAL	PID Reading (ppm)	Depth to Water: Total Depth: Casing: Screen: Borehole Dia.: Driller ID: SOIL CLASS	36' BGS Martin Water Wells SIFICATION
			٥			Monitor Well was P&A	A on 7-23-91
						4	
			- 5 -				
			- 10 -	<u> </u>			
				F			
			15	Γ			
		-		L			
1							
			- 20 -	F			
8	, 16, 46. ************************************	126(0)		L			
			25	-			
							20
		-		F		No.	
			- 20				
					*		
			- 25 -	<u>_</u>			

H-7

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073 (512) 592-9810 (512) 592-5552 FAX

PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

Client: City of Kingsville.	Boring/Well No.:
Project Name: Kingsville Landfill	Date Drilled:July 23, 1991
Project Location: _5 mi. SE of City	Boring Method: Hollow Stem Auger
LAT: 27° 26' 43.9 " LONG: 97° 49' 23.3"	Sample Method:Split-Spoon
MSWLF ID: Permit #235-B	Surface Elevation: 59.79.1 MSL
	Depth to Water: 32.02' BGS
	Total Depth: 43' BGS
· (E	Casing: 4"S-40 PVC - 0-33' BGS
Monitor Well Construction DEPTH (feet) SAMPLE INTERVAL	Screen: 10' of 4"S-40 PVC - 33' BGS
Monitor Well Construction DEPTH (feet) SAMPLE INTERVAL	Borehole Dia.: 10 inches
Monitor We	Driller:Martin Water Wells, Larry Martin
N N N N N N N N N N N N N N N N N N N	SOIL CLASSIFICATION
Q Q	Caliche Bearing Channel (I)
	(Caliche Clay & Sand to TD)
15 _ 15	
30 -	
10 -	
_ 25 _	*
- » -	
— 15 — ESSESSE	
	×

H-8

Water depth on Drilling = 28.0 ft. BGS

TOTAL DEPTH = 43 ft.

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc.
P.O. Box 73, Kingsville, Texas 78364-0073
(512) 592-9810 (512) 592-5552 FAX

PAGE_1_ OF _1_



SUBSURFACE EXPLORATION RECORD

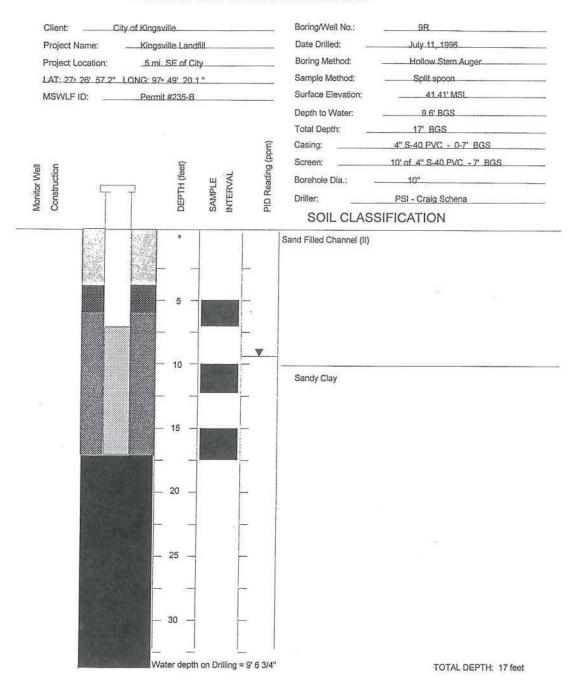
Client:Ci	ty of Kingsville	Boring/Well No.: 9
Project Name:	Kingsville Landfill	Date Drilled: March 24, 1992
Project Location:	_5 mi_ SE of City	Boring Method: Hollow-Stem Auger
LAT: 27º 27' 54"	LONG: 97° 49' 20.1 "	Sample Method: 5 foot core barrel
MSWLF ID:	Permit #235-B	Surface Elevation:62.51' MSL
		Depth to Water: 26' BGS
		Total Depth: 44' BGS
	(E	Casing: 4" S-40 PVC - 0-34' BGS
= C	(b)	Screen: 10' of 4" S-40 PVC - 34' BGS
. We	(fee A/AL	Borehole Dia.:10.inch
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Driller: JEDI, Charles L. Jones
& 8	S SA IN	SOIL CLASSIFICATION
	0	Monitor Well was P&A on 07-12-96
		Caliche, Dark Clay
	5	Road Fill
	10	Caliche, Fine Sand
1.2	15	Saloto, Title Salid
	15	29
	20	
	20	Very Fine Silty Sand
	25 - ₩	
1786	30 -	Very Fine Sandy Silt
		w/Clay Stringers
	— 35 — — — — — — — — — — — — — — — — — —	
	234	Very Fine Sandy Silt
	- 40	Wet, Soft w/Clay Stringers
	- 45 - Mills -	
		ži.
	Water depth on Drilling = 36.0 ft. I	BGS TOTAL DEPTH: 44 feet

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SUBSURFACE EXPLORATION RECORD



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SUBSURFACE EXPLORATION RECORD

Client: City of Kingsville Project Name: Kingsville Landfill Project Location: 5.mi. SE of City LAT: 27° 26′ 55.2″ LONG: 97° 49′ 15.3 ″ MSWLF ID: Permit #235-B					Boring/Well No.: Date Drilled: Boring Method: Sample Method: Surface Elevation: Depth to Water: Total Depth: Casing: Screen:	10 March 20, 1992 Hollow Stem Auger Split Spoon 49.78' MSL 19.5' BGS 29' BGS 4" S-40 PVC - 0-19' BGS 10' of 4" S-40 PVC - 19' BGS
Monitor Well Construction	Ti	DEPTH (feet)	SAMPLE	PID Reading (ppm)	Borehole Dia.: Driller: SOIL CLAS	JEDI, Charles L Jones SIFICATION
		 		the state of the second	Sandy Clay Sand Filled Channel (II	0
		- 15		- V	Clayey Sand	×
	·	- 30	on Drilling =	19.5 ft. B	GS	TOTAL DEPTH = 29 ft.

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SUBSURFACE EXPLORATION RECORD

Client: City	of Kingsville	Boring/Well No.: 11
Project Name:	Kingsville Landfill	Date Drilled:July_11, 1996
Project Location:	5.mi_SE of City	Boring Method:Hollow-Stem-Auger
-	ONG: 97• 49'_ 10"	Sample Method: Split Spoon.
	Permit #235 - B	Surface Elevation:60.20' MSL
		Depth to Water: 26.3' BGS
		Total Depth: 33' BGS
	Ê	Casing: 4" S-40 PVC - 0-18' BGS
	ndd)	Screen; 10' of 4" S-40 PVC - 18' BGS
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Borehole Dia.: 10 inches
- intor	DEPTH (fe SAMPLE INTERVAL	Driller: PSI - Craig Schena
Con	SAN SPID	Wester Address Committee C
		SOIL CLASSIFICATION
	0	DARK BROWN SANDY CLAY - TOPSOIL
	5 15 T 50 T 50 T 50 T 50 T 50 T 50 T 50	CALICHE BEARING CHANNEL (I) SAND FILLED CHANNEL (II)
		SANDY CLAY
	Water depth on Drilling = 18.0 ft. B	GGS (est'd) TOTAL DEPTH = 33 ft.

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SUBSURFACE EXPLORATION RECORD

	3	Client:	City_	of Kingsville_				Boring/well no12
		Project	Name:	Kingsville	Landfill			Date Drilled: July 7, 1997
			Location:	5 mi. SE				Boring Method: Hollow Stem Auger
				LONG: 97° 4				Sample Method:5_foot.core_barrel
		MSWL		Permit #235-I		(V), the	antie antie	Surface Elevation: 52.38' MSL
								Depth to Water:17.3' BGS
								Total Depth: 48' BGS
							(md	Casing: 4" S-40 PVC - 0-25' BGS
	ell	no			et)		PID Reading (ppm)	Screen: 10' of 4" S-40 PVC - 25' BGS
	or W	ructi			1 (fe	A A	adin	Borehole Dia.:10 inches
	Monitor Well	Construction	-		DEPTH (feet)	SAMPLE	D Re	Driller: PSI - Craig Schena
	Z	ŭ			D	S ≧	급	SOIL CLASSIFICATION
_			T	1 44	0	MERCORECT	-	
				1 1	- 3:		L	Topsoil
			. : -					Clay sandy, silty
				1			-	
				-	10 -			
			1	1 - 3				
					15 —	Z VIOLO DEL	-	
			4.2			The same	1	Clay silty, calcified,
			BIHERIEN	1131911111111	20 —		∇	caliche stringers and nodules, sandy lenses
								and the state of t
					25	TANKS AND THE REAL PROPERTY.		
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					25	STATE OF THE PARTY.		
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					45	AVERES!		*
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				Moto	- denth	:— on drilling = 19.	E # P.C.	No. 2009 Ch. Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa Santa S
			1	vvale	aeptri c	лт uriiirig = 19.	o II. BGS	TOTAL DEPTH = 48 ft.

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SUBSURFACE EXPLORATION RECORD

Client: City of King	sville	Boring/Weil No.: 13	
Project Name:Kin	gsville Landfill	Date Drilled: July 28, 1997	
Project Location:5	mi_SE of City	Boring Method: Hollow Stem Auger	
LAT: 27° 26' 55.7 " LONG: 9	7- 48' 56"	Sample Method: 5 foot core barrel	
MSWLF ID: Perr	nit #235-B	Surface Elevation:59.13' MSL	
		Depth to Water: 24' BGS	
		Total Depth:50'_BGS	
	(md	Casing: 4" S-40 PVC - 0-30' BGS	
o el	DEPTH (feet) SAMPLE INTERVAL	Screen: 10' of 4" S-40 PVC - 30' BGS	
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Borehole Dia.: 10 inches	
Monite Const	DEPTH (f	Driller: PSI - Craig Schena	
2 0		SOIL CLASSIFICATION	
	0		
	5 -	*	
		CLAY, SANDY TOPSOIL	
	10	, i.	
		10	
	15		
		SANDY CLAY	
	20		
	▼		
	25	40,000	
	- 00		
	30	*	
	35		
		CLAYEY SAND (III)	
	- 40	(CLAY DUNE)	
	- 45 -		
	- 50		
	i		
\$12.183BB			
	Vater depth on drilling = 25.0 ft. B	GS TOTAL DEPTH = 50 ft.	

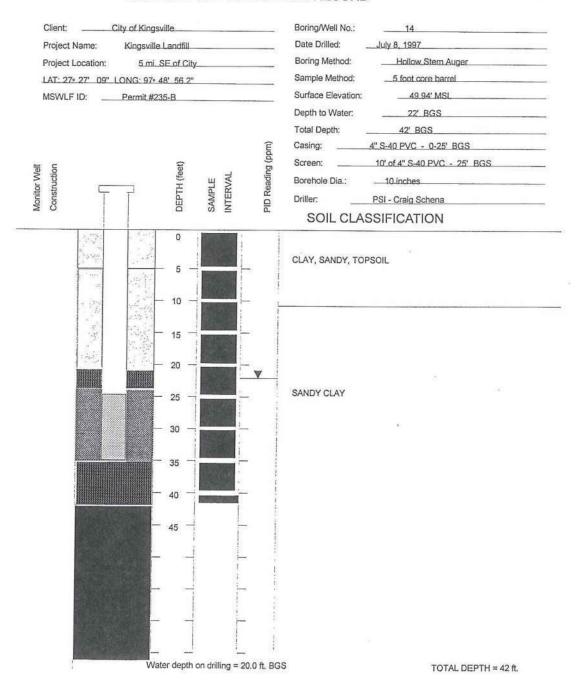
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SUBSURFACE EXPLORATION RECORD



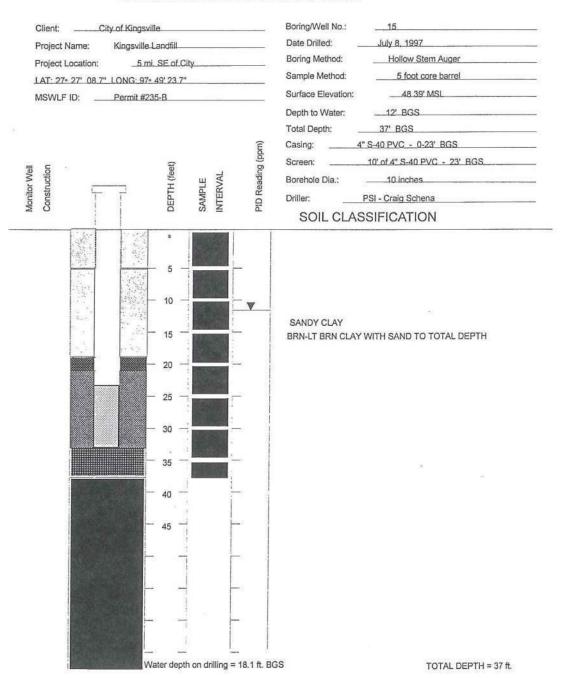
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SUBSURFACE EXPLORATION RECORD



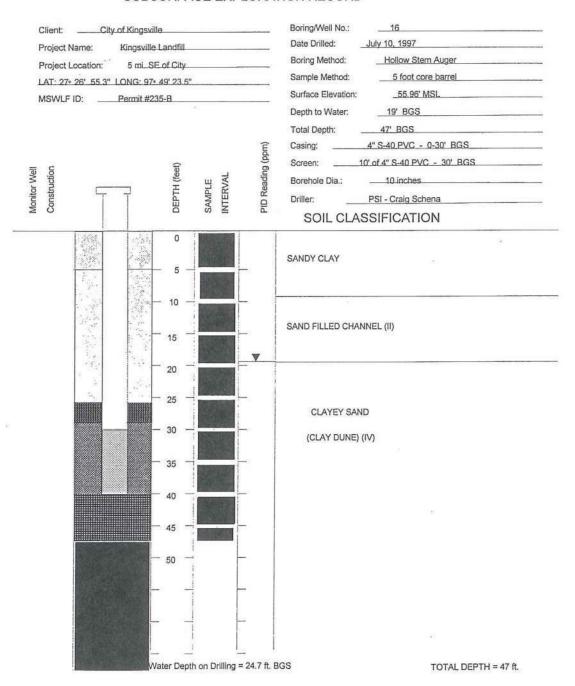
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SUBSURFACE EXPLORATION RECORD



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SUBSURFACE EXPLORATION RECORD

Client: City of Kin	ngsville	Boring/Well No.: 17
Project Name: King	gsville Landfill	Date Drilled: July 9, 1997
Project Location: 5 n	ni. SE of City	Boring Method: Hollow Stem Auger
LAT: 27° 27' 01.3" LONG: 9	97• 49' 16.4 "	Sample Method: 5 foot core barrel
MSWLF ID: Permit #	‡235-B	Surface Elevation: 41.35' MSL
		Depth to Water: 7' BGS
		Total Depth: 33' BGS
	(mc	Casing: 2" S-40 PVC - 0-13' BGS
= C	(be	Screen: 20' of 2" S-40 PVC - 13' BGS
Monitor Well Construction	DEPTH (feet) SAMPLE INTERVAL PID Reading (ppm)	Borehole Dia.: 6 inches
onito	DEPTH (fe SAMPLE INTERVAL PID Readir	Driller: PSI - Craig Schena
≥ 0		SOIL CLASSIFICATION
First No.	0 0	1
	5	SAND FILLED CHANNEL (II)
	A	
	10	
	15	
	20	SANDY CLAY
	25	BRN-LT BRN CLAY WITH SAND
	30	
	- 35 -	
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SUBSURFACE EXPLORATION RECORD

Client: City o	of Kingsville	Boring/Well No.: 18
	ngsville Landfill	Date Drilled:July 9, 1997
	5 mi, SE of City	Boring Method: Hollow Stem Auger
LAT: 27° 27' 01.4" LONG		Sample Method: 5 foot core barrel
MSWLF ID: Permit		Surface Elevation: 50.04' MSL
		Depth to Water. 15' BGS
18		Total Depth: 42' BGS
	Ê	Casing: 2" S-40 PVC - 0-22' BGS
= c	DEPTH (feet) SAMPLE INTERVAL	Screen: 20' of 2" S-40 PVC - 22' BGS
Monitor Well Construction	DEPTH (feet) SAMPLE INTERVAL	Borehole Dia.: 6 inches
nitor T	DEPTH (fe SAMPLE INTERVAL PID Readir	Driller: PSI - Craig Schena
8 8	H & E	SOIL CLASSIFICATION
Esseral Lev	-	GOIL GLAGGII ICATION
	•	
	5	DARK BROWN SANDY CLAY TOPSOIL
	5	II SI
	10	
		102 NOTE PROPERTY AND REAL REAL REAL REAL REAL REAL REAL REAL
	15	SAND FILLED CHANNEL (II)
	- 20 -	
	- 25 -	SANDY CLAY
		SILTY CLAY
	- 30 -	
	- 35 -	
	_ 40 _	
	45	
		9
国家和新疆		
	Water death on drilling = 19.0 ft	BGS TOTAL DEPTH - 42.6

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FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client: City	of Kingsville	Boring/Well No.: 24
Project Name: _	Kingsville Landfill	Date Drilled: April 30, 1998
Project Location:	5 mi SE of City	Boring Method: HOLLOW STEM AUGER
LAT: 27° 26' 41.9" LC	ONG: 97° 48' 48.9 "	Sample Method: Shelby Tube
MSWLF ID:	Permit #235-B	Surface Elevation: 47.38' MSL
		Depth to Water: 12.58' BGS
		Total Depth: 33' BGS
	(md	Casing: 4" S-40 PVC - 0-18'
₩ 5	et)	Screen: 15' of 4" S-40 PVC - 18' BGS
ar We	H (fe LE VAL	Borehole Dia.: 10 inches
Monitor Well	T.J. DEPTH (feet) SAMPLE INTERVAL PID Reading (ppm)	Driller ID: PSI - Craig Schena
≥ 0		SOIL CLASSIFICATION
I-NIC	o	TOP SOIL & DARK BROWN CLAY
	-	
		CALICHE BEARING CHANNEL (I)
	10	
	"	
	70 -	
	1.20.20 10.00	SILTY CLAY TAN
	- 15 -	
	1515500	
	- 20 -	
	- " -	LT OLIVE GREEN CLAY
	40	*
	- 45 -	
	- 50 -	
4. 经营业		
		(8)
	Water depth on Drilling = 12.0 ft. I	BGS TOTAL DEPTH = 33 feet

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FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

	Client:	City of Kingsville	Boring/Well No.: 21
	Project Name:	Kingsville Landfill	Date Drilled: April 27, 1998
	Project Location:	5 mi SE of City	Boring Method: HOLLOW STEM AUGER
	LAT: 27° 26' 09"		Sample Method: Shelby Tube
	MSWLF ID:	Permit #235-B	Surface Elevation: 52.41' MSL
			Depth to Water: 17.8' BGS
			Total Depth: 84' BGS
		(inc	Casing:
	₩ 5	dd) 6	Screen:
	Monitor Well Construction	DEPTH (feet) SAMPLE INTERVAL	Borehole Dia.: 6 inch
	onitio onstr	DEPTH (fe	Driller ID: PSI - Craig Schena
	Σŭ		SOIL CLASSIFICATION
3			Dark Brown Sand Clay - Topsoil
		<u></u>	Caliche Bearing Channel (I)
		10	
			Sand Filled Channel (II)
talled; bo	oring only	20	Sandy Clay
		20 —	
	1 1		Clayey Sand (Clay Dune)
		- A3 -	
			LT OLIVE GREEN CLAY
		50	
	1	70	
		- 60	
		TDH	
		- w - -	
			d resignation
	1 1	100 -	
	,	' F 7 F	
	1		i e
		Water depth on Drilling = 25.0 ft.	BGS TOTAL DEPTH = 84 feet

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Part III, Attachment 4, Appendix 1, p.g. 983

FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Name: Kingsville Landfill Date Drilled: April 24, 1998 Project Location: 5. fm ISE of City Boring Method: Shelby Tube LAT: 27- 27' 01.4" LONG: 97- 48' 28.2" MISWLF ID: Permit #235-B Jay 19 19 19 19 19 19 19 19 19 19 19 19 19	Clier	nt:Ci	ty of Kingsville		Boring/Well No.:	23	
LAT: 27* 27: 01.4* LONG: 97* 48* 28.2* MSVVLF ID: Permit #235-B Depth to Water: 49.50' MSL Depth to Water: 8.8' BGS Total Depth: 86' BGS Casing: Screen: Borehole Dia.: 6 inch Driller ID: PSI - Craig Schena SOIL CLASSIFICATION CALICHE BEARING CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY	Proje	ect Name:	Kingsville Landfill		Date Drilled:	April 24, 1998	
MSWLF ID: Permit #235-B Surface Elevation: Depth to Water: Bereit: Boren: Screen: Borehole Dia.: Ginch Driller ID: PSI - Craig Schena SOIL CLASSIFICATION CALICHE BEARING CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY	Proje	ect Location:	5 mi SE of City		Boring Method:	HOLLOW STEM AUGER	
Depth to Water: 8.8' BGS Total Depth: 86' BGS Casing: Screen: Borehole Dia.: 6 inch Driller ID: PSI- Craig Schena SOIL CLASSIFICATION CALICHE BEARING CHANNEL (I) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY	LAT:	27° 27' 01.4"	LONG: 97° 48' 28.2"		Sample Method:	Shelby Tube	
Total Depth:86'BGS	MSV	VLF ID:	Permit #235-B		Surface Elevation:	49.50' MSL	
Sories (II) Samp Filled; boring only Stalled; boring only Litalled;		THE DECEMBER AND ASSESSMENT OF THE PROPERTY OF		Depth to Water:	8.8' BGS		
Screen: Borehole Dia.: 6 Inch Driller ID: PSI - Craig Schena SOIL CLASSIFICATION CALICHE BEARING CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY					Total Depth: _	86' BGS	
SOIL CLASSIFICATION CALICHE BEARING CHANNEL (I) SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY 10 10 LT OLIVE GREEN CLAY				Œ	Casing:		
SOIL CLASSIFICATION CALICHE BEARING CHANNEL (I) SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY 10 10 LT OLIVE GREEN CLAY	₹ 5		Q	dd) 6	Screen:		
SOIL CLASSIFICATION CALICHE BEARING CHANNEL (I) SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY 100 LT OLIVE GREEN CLAY	r We		- LE VAL	adin	Borehole Dia.;	6 inch	
SOIL CLASSIFICATION CALICHE BEARING CHANNEL (I) SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY To	onito	T	EPTH	D Re	Driller ID:	PSI - Craig Schena	
SAND FILLED CHANNEL (II) CLAYEY SAND (CLAY DUNE) LT OLIVE GREEN CLAY 50 75 50 50 50 50 50 50 50 50	≥ 0		Ğ 8 ₹	E.			
CLAYEY SAND (CLAY DUNE) SO LIT OLIVE GREEN CLAY TO TO TO TO TO TO TO TO TO T	3		0		CALICHE BEARING CH	IANNEL (I)	
CLAYEY SAND (CLAY DUNE) SO LIT OLIVE GREEN CLAY TO TO TO TO TO TO TO TO TO T			10				
CLAYEY SAND (CLAY DUNE) SO TO TO TO TO TO CLAYEY SAND (CLAY DUNE)	stalled; boring onl	v			SAND FILLED CHANNE	EL (II)	
70			20		CLAYEY SAND (CLAY DUNE)		
70					***************************************		
70			"				
- 50			- 9 -		LT OLIVE GREEN CLAY	′ .	
50 TDH							
TDH			50				
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						29	
		1					
Water depth on Drilling = 25.0 ft. BGS TOTAL DEPTH = 86 feet			Water depth on Drilling = 25	i.0 ft. E	BGS	TOTAL DEPTH = 86 feet	

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FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Project Name: Kingsville Landfill Bring Method: April 30, 1998 Bring Method: Shelby Tube Sample Method: Shelby Tube Surface Elevation: LAT; 27, 26' 41,9' LONG: 97, 46' 48.9' Surface Elevation: Depth to Water: 10,0' BgS Total Depth: 72' BGS Casing: Screen: Borehole Dia: 6 inch. Driller ID: PSI - Craig Schena SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) Water depth on Drilling = 12.0 ft. BGS TOTAL DEPTH = 22 feet		Client:	Ci	ty of Kingsvil	e			Boring/Well No.:	24	
MSWLF ID: Permit #235-B Depth to Water: Total Depth: Total Depth: Sorrect Borehole Dia: Sinch Driller ID: PSI- Craig Schena SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN L'T OLIVE GREEN CLAY		Project N	Name:	Kingsville	Landfi	11		Date Drilled:	April 30, 1998	
MSWLF ID: Permit #235-B Depth to Water: 10.0° BGS Total Depth: 72° BGS Casing: Screen: Borehole Dia: 6 inch Dilter ID: PSI-Craig Schena SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) Associated by Tube Surface Elevation: 47.38 MSL Depth to Water: 10.0° BGS Total Depth: 72° BGS Screen:		Project L	ocation:	5 mi SE	of City			Boring Method:	HOLLOW STEM AUG	ER
Depth to Water: 10.0° BGS Total Depth: 72° BGS Casing: Screen: Borehole Dia: 6 inch. Driller ID: PSI - Craig Schena SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TOH TOH TOH TOH TOH TOH TOH TO		LAT: 27	26' 41.9"					Sample Method:	Shelby Tube	
Depth to Water: Total Depth: T2' BGS Total Depth: T2' BGS Casing: Screen: Borehole Dia: Ginch Driller ID: PSI- Craig Schena SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY		MSWLF	ID:	Permit #23	5-B			Surface Elevation:	47.38' MSL	
TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY								Depth to Water:	10.0' BGS	
And the property of the proper	120							Total Depth:	72' BGS	
SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TDH TDH TDH							(mc	Casing:		
SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TDH TDH TDH		₩ 5		*	et)		g.	Screen:		
SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TDH TDH TDH		or We	9	_	H (fe	¥ FE	eadin	Borehole Dia.:	6 inch	
SOIL CLASSIFICATION TOP SOIL & DARK BROWN CLAY CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TDH TDH TDH		onito	T	T	EPT	AMP TER	D Re	Driller ID:	PSI - Craig Schena	
CALICHE BEARING CHANNEL (I) SILTY CLAY TAN LT OLIVE GREEN CLAY TDH TDH		≥ 0				ò Z	五	SOIL CLAS	SSIFICATION	
nstalled; boring only SiLTY CLAY TAN LT OLIVE GREEN CLAY TDH	-			1 1	0	STATE		TOP SOIL & DARK BRI	OWN CLAY	
SILTY CLAY TAN SILTY CLAY TAN LT OLIVE GREEN CLAY TDH						Marks I		1		
SILTY CLAY TAN SILTY CLAY TAN LT OLIVE GREEN CLAY TDH				 -	10 —	LARGE				
SILTY CLAY TAN SILTY CLAY TAN LT OLIVE GREEN CLAY TDH	istalled: I	oring only			1					
LT OLIVE GREEN CLAY LT OLIVE GREEN CLAY TDH	io,anou,	oomig omy			20			SILTY CLAY TAN		Malifestation of the State of
- 50 - TDH									§	
- 50 - TDH					30	D. THE STREET				
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				 -	70 —	TS Open				
Water double on Drilling = 12.0 ft RCS					ĺ		TUH			
Water double on Drilling = 12.0 ft RCS					50					
Water doub on Drilling = 12.0 ft RCS										
Water double on Drilling = 12.0 ft RCS								7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
Water double on Drilling = 12.0 ft RCS										(6)
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Water double on Drilling = 12.0 ft RCS				-	-		_			
Wester double on Drilling = 12.0 ft RCS										54
Water double on Drilling = 12.0 ft RCS				-	-		-			9
Water death on Drilling = 12.0 ft RCS										
				14/61	'	on Dallin	- 1206	BCS	9 <u>00 200</u> 9 0 500	

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FINCH ENERGY AND ENVIRONMENTAL SERVICES, Inc. P.O. Box 73, Kingsville, Texas 78364-0073



SUBSURFACE EXPLORATION RECORD

Client:	City of Kingsville	Boring/Well No.: 25
Project Name:	Kingsville Landfill	Date Drilled: April 29, 1998
Project Location	5 mi SE of City	Boring Method: HOLLOW STEM AUGER
LAT: 27° 26' 55		Sample Method: SPLIT SPOON
MSWLF ID:	Permit #235-B	Surface Elevation:61.12' MSL
		Depth to Water: 21.1' BGS
		Total Depth: 88' BGS
	(in	Casing:
= -	(fe	Screen:
Wel	1 (fee	Borehole Dia.: 6 inch
Monitor Well	DEPTH (feet) SAMPLE INTERVAL	Driller ID: PSI - Craig Schena
¥ 8		SOIL CLASSIFICATION
-		TOP SOIL & DARK BROWN CLAY
	10	CALICHE BEARING CHANNEL (I)
		SAND FILLED CHANNEL (II)
nstalled; boring only	20	
	- 30 -	
	15-25-245	SANDY CLAY
	40	
	50	LT OLIVE GREEN CLAY
1		
	70 —	
		8
	- eo -	
*	TDH	
	- 50 -	
	100 —	
=		
:1	<u> </u>	
	Water depth on Drilling = 31.0 ft.	. BGS TOTAL DEPTH = 88 feet

H-24

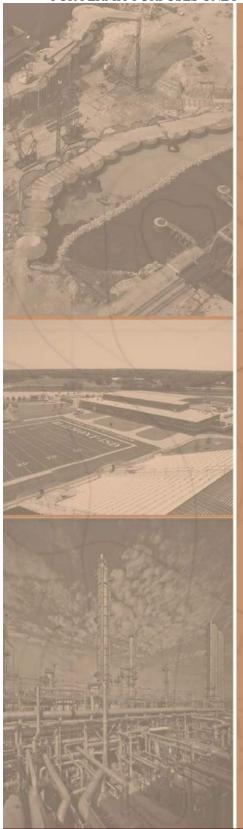
CITY OF KINGSVILLE LANDFILL

PART III, ATTACHMENT 4

APPENDIX 2

TOLUNAY-WONG ENGINEERS, INC. GEOTECHNICAL ENGINEERING STUDY





Tolunay-Wong Engineers, Inc.

GEOTECHNICAL ENGINEERING STUDY CITY OF KINGSVILLE MUNICIPAL SOLID WASTE LANDFILL EXPANSION KINGSVILLE, TEXAS

Prepared for:

Naismith/Hanson Corpus Christi, Texas

Prepared by:

Tolunay-Wong Engineers, Inc. 826 South Padre Island Drive Corpus Christi, Texas 78416

August 30, 2018

Project No. 16.53.042 / Report No. 12788R1

GEOTECHNICAL ENGINEERING, DEEP FOUNDATIONS TESTING, ENVIRONMENTAL SERVICES, CONSTRUCTION MATERIALS TESTING 1-888-887-9932 WWW.TWEINC.COM 826 South Padre Island Drive • Corpus Christi, Texas 78416 • Phone (361) 884-5050

August 30, 2018

Naismith/Hanson

4501 Gollihar Road Corpus Christi, Texas 78410

Attn: Mr. Jon Reinhard, P.E.

JReinhard@hanson-inc.com

Ref: Geotechnical Engineering Study

City of Kingsville

Municipal Solid Waste Landfill Expansion

Kingsville, Texas

TWE Project No. 16.53.042 / Report No. 12788R1

Dear Mr. Reinhard,

Tolunay-Wong Engineers, Inc. (TWE) is pleased to submit this revised report of our geotechnical engineering study for the above referenced project. This report contains a detailed description of the field program and laboratory services performed for this geotechnical engineering study as well as soil boring logs. Also included in this report are results of settlement predictions and waste mass stability analyses of the proposed landfill expansion and reinforcement recommendations as means to reduce settlement below future liner systems.

We appreciate the opportunity to work with you on this phase of the project and we look forward to the opportunity of providing additional services as the project progresses. If you have any questions or comments regarding this report or if we can be of further assistance, please contact us.

Sincerely,

TOLUNAY-WONG ENGINEERS, INC.

Texas Board of Professional Engineers Firm Registration Number F-000124

Jialin Li, E.I.T.

Geotechnical Staff Engineer

Don R. Rokohl, P.E.

Branch Manager

DRR/JL/drr

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1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Introduction

This report presents the results of our geotechnical engineering study performed for the proposed municipal solid waste landfill vertical and lateral expansion in Kingsville, Texas. Our geotechnical engineering study was conducted in accordance with TWE Proposal No. P15-C105R1 dated December 31, 2015. The study was authorized by Grant Jackson, P.E. of Naismith/Hanson (NEI).

1.2 Project Description

The City of Kingsville is planning a vertical and lateral expansion of the existing municipal solid waste (MSW) landfill (Permit No. MSW 235-B) located at the northeast corner of the intersection of County Road E 2130 and Farm to Market Road 2619 near Kingsville (Kleberg County), Texas. The current landfill permit boundary covers an area of about 120 acres and is located immediately adjacent to a closed Pre-Subtitle D MSW landfill (Permit No. MSW 235). The closed landfill includes about 40 acres and is located southwest of Permit No. MSW 235-B.

The landfill expansion will include placement of MSW refuse over areas of the previously filled, closed Permit MSW 235 landfill. Like the remainder of the landfill, the top of the closed Permit No. MSW 235 landfill will receive a liner and leachate collection system prior to receiving new MSW. Permit No. MSW 235 has not received new MSW since 1992 and first began receiving MSW sometime around mid 1970's. Since it is planned so that the Permit No. MSW 235 area will contain the last sectors to receive waste, it will be about 70+ years before any new waste is placed over Permit No. MSW 235 area. The final landfill top elevation will be about 200-ft, with a maximum thickness of new MSW refuse above the existing MSW refuse of about 115- ft. The final landfill side slopes will be at a maximum of 4(H):1(V).

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2 PURPOSE AND SCOPE OF SERVICES

The purposes of our geotechnical engineering study were to investigate the soil and groundwater conditions within the project site and to provide geotechnical design and construction recommendations for the proposed facility.

Our scope of services performed for the project consisted of:

- 1. Drilling 12 soil borings to depths of 33.5-ft to 86-ft within the project site to evaluate subsurface stratigraphy and groundwater conditions;
- 2. Performing geotechnical laboratory tests on recovered soil samples to evaluate the physical and engineering properties of the strata encountered;
- 3. Providing estimated compression of the waste within the existing landfill due to construction of the new vertical expansion;
- 4. Providing geosynthetic reinforcement requirements to be incorporated into the cover design at the base of the vertical landfill construction; and,
- 5. Performing waste mass stability analyses of the new landfill construction.

Our scope of services did not include any environmental assessments for the presence or absence of wetlands or of hazardous or toxic materials within or on the soil, air or water within this project site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the Client. A geological fault study was also beyond the scope of our services associated with this geotechnical engineering study.

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Project No. 16.53.042 Report No. 12788R1

3 FIELD PROGRAM

3.1 Soil Borings

TWE conducted an exploration of subsurface soil and groundwater conditions at the project site during June, July, and August 2016 by drilling and sampling 12 soil borings to depths of 33.5-ft to 86-ft below grade. The soil boring locations are presented on TWE Drawing No. 16.53.042-1 in Appendix A of this report. Drilling and sampling of the soil borings were performed using conventional truck-mounted drilling equipment. Our field personnel coordinated the field activities and logged the boreholes. The boring locations were staked at the site by professional public land surveyor. The latitude and longitude for each boring location were determined by the surveyor and are presented on the boring logs. The borings were pressure grouted from the bottom with a cementitious bentonite mixture.

Twenty three (23) exploratory borings were previously drilled at the site for development of the existing landfill. The previously drilled exploratory boring locations are presented on TWE Drawing No. 16.53.042.1 in Appendix A.

3.2 Drilling Methods

Field operations were performed in general accordance with the *Standard Practice for Soil Investigation and Sampling by Auger Borings [American Society for Testing and Materials (ASTM) D 1452]*. The soil borings were drilled using a truck-mounted drilling rig. Typically, borings are dry-augered using a flight auger to advance the boreholes until groundwater is encountered or until the boreholes become unstable and/or collapse. At that point, soil borings are completed using wash-rotary drilling techniques. Samples were obtained at intervals of 5-ft from existing ground surface to the completion depths of borings B-30, B-32, B-33, B-35, B-36, B-37, and B-41. A 2-ft sampling interval was used to the completion depths of borings B-31, B-34, B-38, B-39, and B-40. The completion depths of the borings were 33.5-ft to 86-ft below the ground surface at the time of the field exploration.

3.3 Soil Sampling

Fine-grained, cohesive soil samples were recovered from the soil borings by hydraulically pushing 3-in diameter, thin-walled Shelby tubes a distance of about 24-in. The field sampling procedures were conducted in general accordance with the *Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D 1587)*. Our geotechnician visually classified the recovered soils and obtained field strength measurements using a pocket penetrometer. A factor of 0.67 is typically applied to the penetrometer measurement to estimate the undrained shear strength of the Gulf Coast cohesive soils. The samples were extruded in the field, wrapped in foil, placed in moisture sealed containers and protected from disturbance prior to transport to the laboratory.

TWE

Cohesionless, semi-cohesionless, and dry, brittle cohesive samples were collected with the standard penetration test (SPT) sampler driven 18-in by blows from a 140-lb hammer falling 30-in in accordance with the *Standard Test Method for Standard Penetration Test (SPT) and Spilt-Barrel Sampling of Soils (ASTM D 1586)*. The number of blows required to advance the sampler three (3) consecutive 6-in depths are recorded for each corresponding sample on the boring logs. The N-value, in blows per foot, is obtained from SPTs by adding the last two (2) blow count numbers. The compactness of cohesionless and semi-cohesionless samples are inferred from the N-value. The samples obtained from the split-barrel sampler were visually classified, placed in moisture sealed containers and transported to our laboratory.

The recovered soil sample depths with corresponding pocket penetrometer measurements and SPT blowcounts are presented on the boring logs in Appendix B.

3.4 Boring Logs

Our interpretations of general subsurface soil and groundwater conditions at the soil boring locations are included on the boring logs. Our interpretations of the soil types throughout the boring depths and the locations of strata changes were based on visual classifications during field sampling and laboratory testing in accordance with *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) (ASTM D 2487)* and *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM D 2488)*.

The boring logs include the type and interval depth for each sample along with its corresponding pocket penetrometer measurements and SPT blow counts. The boring logs and a key to terms and symbols used on boring logs are presented in Appendix B.

3.5 Groundwater Measurements

Groundwater level measurements were attempted in the open boreholes during dry-auger drilling. Water level readings were attempted in the open boreholes when groundwater was first encountered and after a ten (10) to fifteen (15) minute time period. The groundwater observations are summarized in Section 5.5 of this report entitled "Groundwater Observations."

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4 LABORATORY SERVICES

A laboratory testing program was conducted on selected samples to assist in classification and evaluation of the physical and engineering properties of the soils encountered in the project borings. Laboratory tests were performed in general accordance with *ASTM International* standards to measure physical and engineering properties of the recovered samples. The types and brief descriptions of the laboratory tests performed are presented in Table 4-1 below.

Table 4-1: Laboratory Testing Program	
Test Description	Test Method
Amount of Material in Soils Finer than No. 200 Sieve	ASTM D 1140
Unconfined Compressive Strength of Cohesive Soil (UC)	ASTM D 2166
Water (Moisture) Content of Soil	ASTM D 2216
Liquid Limit, Plastic Limit and Plasticity Index of Soils	ASTM D 4318
Density (Unit Weight) of Soil Specimens	ASTM D 2937
One-Dimensional, Incremental Loading Consolidation	ASTM D 2435
Consolidated-Undrained Triaxial Compression w/ Pore Water Pressure	ASTM D 4767

Standard geotechnical laboratory test results and soil properties encountered in the project borings are presented on the logs of borings in Appendix B of this report. Results of completed one-dimensional consolidation and consolidated-undrained triaixial compression tests performed on the selected cohesive soil samples obtained for this study are included in Appendix C.

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5 SITE AND SUBSURFACE CONDITIONS

5.1 General

Our interpretations of soil and groundwater conditions within the project site are based on information obtained at the soil boring locations only. This information has been used as the basis for our conclusions and recommendations included in this report. Subsurface conditions may vary at areas not explored by the soil borings. Significant variations at areas not explored by the soil borings will require reassessment of our recommendations.

5.2 Site Description and Surface Conditions

The present MSW landfill (project site) is located at the northeast corner of the intersection of County Road E 2130 and Farm to Market Road 2619 near Kingsville (Kleberg County), Texas. The landfill covers an area of about 120 acres. Several active disposal areas are excavated and at various stages of use.

5.3 Subsurface Conditions

The soil profile encountered in the project borings consisted of alternating strata of cohesive clay soils (fat clays, sandy lean clays, and sandy lean silty clays) and semi-cohesionless clayey sands and silty sands, and cohesionless poorly graded sands with clay. The consistency of the cohesive clay soils was typically very stiff to hard, but occasionally stiff. The relative density of the semi-cohesionless silty sands/clayey sands and cohesionless poorly graded sands was typically medium dense to very dense, but occasionally loose. The borings were terminated at depths ranging from 33.5-ft to 86-ft. Detailed descriptions of the soils encountered at the boring locations are presented on the boring logs in Appendix B.

5.4 Subsurface Soil Properties

In-situ moisture contents of selected cohesive clay samples ranged from 18% to 34%. Results of Atterberg Limits tests on selected clay samples indicated liquid limits (LL) ranging from 31 to 81 with plasticity indices (PI) ranging from 18 to 58. The amount of materials finer than the No. 200 sieve on the selected samples ranged from 55% to 100%. In-situ moisture contents of selected silty sand samples ranged from 23% to 24%. The amount of materials finer than the No. 200 sieve on the selected samples tested for grain size distribution ranged from 14% to 38%.

Undrained shear strengths derived from field pocket penetrometer readings ranged from 0.25-tsf to 4.50-tsf. Undrained shear strengths derived from laboratory unconfined compressive (UC) strength testing ranged from 0.16-tsf to 3.41-tsf with corresponding total unit weights of 86-pcf to 105-pcf. Shear strength of cohesive soils inferred from SPT blow counts generally were similar. Based on this undrained shear strength data, the consistency of the cohesive soils encountered in the project borings is considered to be very soft to very stiff.

Tabulated laboratory test results at the recovered sample depths are presented on the boring logs in Appendix B.

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5.5 Groundwater Observations

Groundwater measurements were attempted in the project borings during dry-auger drilling. Groundwater level measurements are shown in Table 5-1 below.

	Table 5-1: Groundwater Level Measurements							
	Doning	Groundwater Level Depth						
Boring No.	Boring Depth (feet)	Encountered During Drilling (feet)	Observed in the Open Borehole after a 10 to 15 minute waiting period (feet)					
B-30	82.5	21	10.5					
B-31	68.0	23	21.5					
B-32	82.5	18	14.6					
B-33	86	32.5	28.1					
B-34	43	31	28.3					
B-35	72.5	34	30.8					
B-36	68	23	18.3					
B-37	48	15	9.3					
B-38	58	11	5.4					
B-39	68	27	26.5					
B-40	33.5	21	19					
B-41	62.5	19.5	19.2					

Groundwater levels may fluctuate with climatic and seasonal variations and should be verified before construction. Accurate determination of the static groundwater level is typically made with a standpipe piezometer. Installation of a piezometer to evaluate the long-term groundwater condition was not included within the current scope of services.

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Part III, Attachment 4, Appendix 2, pg-11

6 VERTICAL AND LATERAL LANDFILL EXPANSION

6.1 General

The results of engineering analyses performed are presented in the sections below. Project information provided to us was utilized in the analyses and represents our understanding of the proposed construction. It is imperative that we are contacted if any changes from the described information are made so that we can evaluate whether modifications to our findings will need to be made.

6.2 Permit No. MSW 235 Existing Waste Settlement

Classic consolidation theory describes compression settlement of municipal solid waste (MSW) when loaded by the weight of additional waste from vertical expansion as the total of primary settlement and secondary settlement. Specific testing to evaluate compression characteristics of municipal solid waste was not performed for this study. We, therefore, assumed the following parameters, which are based on published information (1) (2), for our analyses.

- Unit weight of new waste = 65 pounds per cubic foot (pcf)
- Unit weight of existing waste = 65 pcf
- Modified primary compression index, C_c', of existing waste = 0.17 to 0.36
- Modified secondary compression index, C_{α} , of existing waste = 0.03 to 0.10
- Age of existing waste = 33 years
- Ending time of secondary settlement = 90 years

For our calculations, we used procedures presented in the publications presented above and geometry from cross-sections presented on the following NEI drawing:

Appendix C, Cross Section J & O, City of Kingsville, Fig No. 2, dated 08/26/2018

The cross section is presented in Appendix C. Settlement estimates resulting from compression of the existing solid waste due to the weight of the new, overlying waste are presented in Table 6.1 below for various primary and secondary compression indices.

One-dimensional consolidation tests were performed using select samples from the soil borings completed for this study to evaluate the compressibility characteristics of the foundation soils. The results of the consolidation tests are presented in Appendix D. The calculated settlements resulting from consolidation of the foundation soils due to the weight of the overlying landfill material are on the order of magnitude of 1 foot. This consolidation settlement should be added to existing waste total settlement presented in Table 6.1 below to obtain total settlement of the solid waste and the foundation soils.

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	Table 6.1 - Marker-J-Section										
	Existing Waste	New MSW		Estimated Settlement (feet) of Existing Waste							
Section	Thickness (feet)	Thickness (feet)	C _c '	$= 0.17, C_{\alpha}' = 0$	0.03	C _c '	= 0.36, C_{α} ' =	0.10			
Se			Primary Settlement	Secondary Settlement	Total Settlement	Primary Settlement	Secondary Settlement	Total Settlement			
С	20	15	1.4	0.2	1.6	2.9	0.5	3.4			
Е	26	60	3.3	0.2	3.5	7.0	0.7	7.7			
G	31	100	4.6	0.2	4.8	9.7	0.8	10.5			
Ι	34	95	4.7	0.3	5.0	10.0	0.9	10.9			
K	35	105	5.0	0.3	5.3	10.6	0.9	11.5			
L	35	108	5.1	0.3	5.4	10.8	0.9	11.7			
M	30	115	4.8	0.2	5.0	10.1	0.8	10.9			

As biological decomposition of waste occurs, waste volume is reduced as the density increases, resulting in settlements of the overall landfill mass. This, in effect, will pre-compress the existing waste, reducing settlement due to placement of future waste. The magnitude of the settlement could be rather significant since it is planned that new waste will not be placed over the existing waste for another 70+ years. Site preparation will result in placement of soils in the Permit No. MSW 235 area. The additional weight of soils will surcharge the waste in this area, resulting in further pre-compression of the waste.

6.3 Reinforcement Design

The anticipated liner section to be constructed over the top of the existing waste will consist of (from bottom upwards) 24 inches of lightly compacted soil "foundation soil", a 6-inch thickness of compacted soil "interim cover soil", a geogrid stabilization layer, a geosynthetic clay liner (GCL), a 60 mil HDPE geomembrane, and a layer of drainage geocomposite. If the planned liner profile will be different from the assumed, TWE should be contacted so further evaluation can be made if necessary.

The geosynthetic reinforcement design uses the procedure provided in Qian, X. et.al., (2002) publication, and is based on the possible development of a void that is located immediately below the liner. The liner is assumed to bridge over the void, carrying the load from the proposed overlying waste. As commonly accepted scenario, the case of the "rusted refrigerator" is used, with the design depression having a radius of 3 feet. Other assumptions used in the design are listed below and in Tables 6.2 and 6.3.

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Part III, Attachment 4, Appendix 2, pg-13

- Design life of 50 years
- Maximum elevation of MSW on the lining system is 115 feet

Table 6.2 – Assumed Material Properties												
Material	Unit Weight (pcf)	Friction Angle (deg.)	Cohesion (psf)									
MSW	60	23	0									
Interim Cover Soil	120	30	0									

Table 6.3 – Assumed Geosynthetic Properties											
Material	Yield Strain (%)										
HDPE	10										
GCL	8										

Based on the results of the analyses, we recommend that geosynthetic reinforcement consisting of two layers of chemically resistant uniaxial geogrid placed perpendicular to each other be used. The geogrid should have a minimum design tensile strength of 2500 pounds per foot at an allowable stress of 5% or less over the 50 year design life. The geogrid should be placed on top of a minimum 6 inch thick layer of compacted soil "interim cover soil" placed between the foundation layer and the new GCL. It should be noted that the inclusion of geogrid reinforcement is intended to reduce, but not eliminate, the likelihood of failure.

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Project No. 16.53.042 Report No. 12788R1

Part III, Attachment 4, Appendix 2, pg-14

7 WASTE MASS STABILITY

7.1 Background Information

We understand that the liner system for the new expansion will consist of a 6-in thick layer of compacted native soil covered by a geosynthetic clay liner (GCL). A 60 mil HDPE geomembrane will be placed on the GCL, and will be anchored within trenches at the top of slope. The geomembrane will be textured on both sides and covered by a geocomposite drainage layer.

Deep-seated stability of the waste mass was evaluated by performing two dimensional, effective stress slope stability analyses for the final, closed geometry, using the computer program SLIDE. The program performs vertical slice limit equilibrium analysis for potential mass movement along assumed failure surfaces randomly generated by the program. We assumed potential deep-seated failure of the waste material within the waste or along the top of the HDPE liner, since failure would not be expected to occur in the foundation soils due to relatively high shear strength of this material.

For analyses purposes, we used geometry from the cross-sections presented on the following NEI drawings:

- Appendix C, Cross Section Plan, City of Kingsville Landfill, Fig. No. 1, dated 08/26/2018
- Appendix C, Cross Section J & O, City of Kingsville Landfill, Fig. No. 2, dated 08/26/2018
- Appendix C, Cross Section 12 & 18, City of Kingsville Landfill, dated 08/26/2018

Copies of these sections are presented in Appendix C.

7.2 Design Parameters

Consolidated-undrained (C-U) triaxial shear tests were performed using select samples from the soil borings to evaluate long-term effective stress shear strength of the foundation soils. The results of the C-U triaxial tests are presented in Appendix E.

Laboratory tests for liner material properties were not performed as part of the current scope of services. The stability analyses are based on laboratory tests results for the foundation soils and on assumed or published strength and interface friction values for the geocomposite drainage layer and the textured HDPE membrane. It is essential that the assumed parameters be verified by specific testing prior to construction.

Due to heterogeneous nature of municipal waste, traditional in-situ testing or laboratory testing to evaluate engineering properties of the waste is not feasible. As a result, we used published and assumed estimated effective stress values of shear strength, cohesion, and unit weight for

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municipal solid waste for our analyses(2) (3). The engineering properties used in the analyses are presented in Table 7.1 below.

Table 7.1 – Assumed Engineering Properties													
Material	Effective Friction Angle, peak φ (deg)	Effective Friction Angle, LD ¹ \$\phi\$ (deg)	Unit Weight γ (pcf)	Effective Cohesion, peak, c (psf)	Effective Cohesion, LD ¹ , c (psf)								
MSW Refuse	23	22	60	250	0								
Geocomposite/Texture d HDPE	28	23	N/A	0	0								

7.3 Analysis and Results

We analyzed both potential circular failure surfaces and potential block or sliding failure surfaces. The following assumptions were used during the analyses:

- Less than one foot of head will develop above the geocomposite drainage layer, and
- Excess pore pressure will not develop within the waste either through hydrostatic or waste gas pressure. The development of excess pore pressure could substantially reduce the factor of safety for stability.

The results of our stability analyses for peak strength parameters are presented in Table 7.2 below.

Table 7.2 – Results of Waste Mass Stability Analysis – Peak Parameters												
Cross Section	Factor of Safety – Circular Failure	Factor of Safety – Block Failure										
12	2.18	1.71										
18	2.27	1.68										
J	3.65	2.71										
0	2.27	1.72										

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To evaluate the potential for progressive failure, we also performed stability analyses using assumed large displacement interface shear strengths. The results of these analyses are presented in Table 7.3 below.

Table 7.3 – Results of Waste Mass Stability Analysis – Large Displacement Parameters												
Cross Section	Factor of Safety – Circular Failure	Factor of Safety – Block Failure										
12	1.65	1.50										
18	1.81	1.52										
J	3.51	2.49										
О	1.93	1.54										

The results of the mass stability analyses are presented graphically in Appendix F.

7.4 Conclusions

The calculated factor of safety for peak shear strength conditions exceeded 1.5 for our assumed strength and unit weight parameters, the analyzed cross sections, and assumed failure geometry. In addition, the calculated factor of safety for large displacement condition exceeds 1.5, which in our judgment, and based on published information, is acceptable.

Based on our results, in our opinion, we anticipate that the planned landfill configuration should be stable, provided excess pore pressures are not generated within the waste mass or that there is no increase in piezometric head above 1 foot within the underlying liner cover material or leachate collection system. The generation of pore pressures and increase in piezometric head within the materials could substantially reduce the factor of safety and increase the risk for stability problems.

Laboratory testing using the specific HDPE liner material chosen for the project should be performed to confirm our assumed interface friction values used in our analyses. Noticeable differences between the assumed parameters and parameters determined by testing could require that additional stability analyses be performed.

TWE

8 LIMITATIONS AND DESIGN REVIEW

8.1 Limitations

This report has been prepared for the exclusive use of Naismith/Hanson Engineering and the project team for specific application to the design of the proposed City of Kingsville Municipal Solid Waste Landfill Aerial Expansion in Kleberg County, Texas. Our report has been prepared in accordance with the generally accepted geotechnical engineering practice common to the local area. No other warranty, express or implied, is made.

The analyses and recommendations contained in this report are based on the data obtained from the referenced subsurface explorations within the project site. The soil boring indicates subsurface conditions only at the specific location, time and depth penetrated. The soil borings do not necessarily reflect strata variations that could exist at other locations within the project site. The validity of our recommendations is based in part on assumptions about the stratigraphy made by the Geotechnical Engineer. Such assumptions may be confirmed only during construction of the project. Our recommendations presented in this report must be reevaluated if subsurface conditions during the construction phase are different from those described in this report.

If any changes in the nature, design or location of the project are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions modified or verified in writing by TWE. TWE is not responsible for any claims, damages or liability associated with interpretation or reuse of the subsurface data or engineering analyses without the expressed written authorization of TWE.

8.2 Design Review

Review of the design and construction drawings as well as the specifications should be performed by TWE before release. The review is aimed at determining if the geotechnical design and construction recommendations contained in this report have been properly interpreted. Design review is not within the authorized scope of work for this study.

8.3 Construction Monitoring

Construction surveillance is recommended and has been assumed in preparing our recommendations. These field services are required to check for changes in conditions that may result in modifications to our recommendations. The quality of the construction practices will affect performance and should be monitored. TWE would be pleased to provide construction monitoring, testing and inspection services for the project.

8.4 Closing Remarks

We appreciate the opportunity to be of service during this phase of the project and we look forward to continuing our services during the construction phase and on future projects.

TWE

9 REFERENCES

- 1. Qian, X., et.al., (2002), "Geotechnical Aspects of Landfill Design and Construction," Prentice Hall
- 2. Eid, H.T., et.al., (2000), "Municipal Solid Waste Slope Failure I: Waste and foundation Soil Properties," *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 126(5) PP. 397-407
- 3. Singh, S. and Murphy, B., "Evaluation of Stability of Sanitary Landfills," (1990), *in* Geotechnics of Waste Fill Theory and Practice, ASTM STP 1070, Landva, A., and Knowles, G.D., eds.

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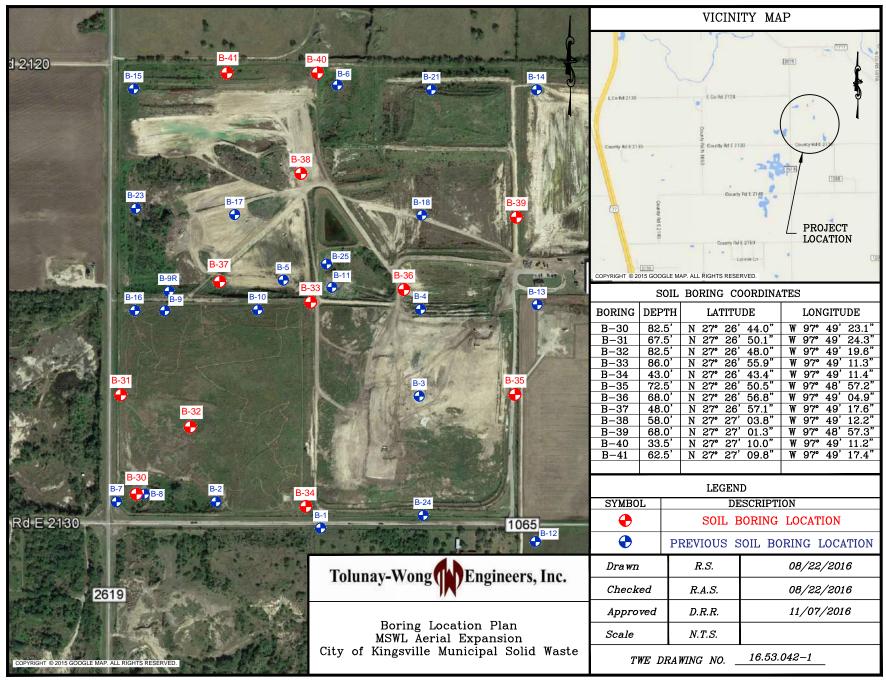
Part III, Attachment 4, Appendix 2, pg-19

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APPENDIX A

SOIL BORING LOCATION PLAN TWE DRAWING NO. 16.53.042-1

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APPENDIX B

LOGS OF PROJECT BORINGS AND A KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

TWE

PROJE	CT: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	3-30 Eng	inee	ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	COORDINATES: N 27° 26' 44.0" W 97° 49' 23.1" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	€ <u>F</u>	ST		ă				₹			
0 -	Dense to very dense tan and gray CLAYEY SAND (SC) with gypsum crystals		11/6" 23/6" 50/5"	16		42	17				37	
- 5 -	-color changes to tan with ferrous staining		34/6" 50/3"									
- 10 -	-with sand partings <u>▼</u>		13/6" 50/3"									
15 -			7/6" 12/6" 20/6"	35							33	
20 -	-color changes to reddish tan and light gray		6/6" 15/6" 20/6"									
	Very stiff to hard reddish tan and light gray FAT CLAY (CH) with gypsum crystals		10/6" 17/6" 26/6"									
- 25 -	-color changes to reddish tan and tan		10/6" 18/6" 30/6"	25		50	28				92	
30	-color changes to tan and reddish brown		8/6" 11/6" 16/6"									
35	-color changes to tan and gray		8/6" 12/6" 18/6"									
DATE B	ORING COMPLETED: 07/23/2016 was a	during out a depti	as encour drilling op n of 10'-6 I with cer	eration b". At the ment-b	ns. A he co entor	fter a 1 mpletionite gro	10 to 1 on of tout.	15-minu the bori	ute wa ing, th	iting p e ope	eriod,	water e-hole

PROJEC	T: City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	8-30 Eng	inee	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 44.0" W 97° 49' 23.1" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	€ _E	ST		ă				ΕĀ			
35	Very stiff to hard reddish tan and tan FAT CLAY (CH) with gypsum crystals and ferrous stains		10/6" 17/6" 21/6"	30							90	
40 -	-color changes to tan and reddish brown		9/6" 14/6" 21/6"									
45 -			13/6" 19/6" 29/6"									
50	-becomes sandy 48' to 52'		8/6" 11/6" 13/6"	30							70	
55 -	-color changes to tan and becomes slickensided	(P) 4.50+		23	100	71	51				87	
		(P) 4.50+										
60		(P) 4.50+										
65 -	-becomes sandy and color changes to tan and gray	(P) 4.50+		26	97	54	30	1.75	3		69	
70	-color changes to tan and reddish brown with trace calcareous nodules	(P) 3.00										
DATE BOI	RING COMPLETED: 07/23/2016 was	water wa e during c at a depth backfilled	Irilling op n of 10'-6	eratic 5". At t	ns. A he co	fter a 1	10 to 1 on of t	15-minເ	ıte wa	iting p e ope	eriod,	, water e-hole

PR	O.	JECT	City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	3-30 n Eng	inee	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 44.0" W 97° 49' 23.1" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N	MATERIAL DESCRIPTION	(E)	ြ						₹			
- 70 -			Very stiff to hard tan and reddish brown FAT CLAY (CH) with calcareous nodules											
	X		Very dense tan CLAYEY SAND (SC) with calcareous nodules		16/6" 43/6" 50/5"	17							17	
75 -			Very stiff to hard tan and gray FAT CLAY (CH) with		10/6"									
ı	X		ferrous staining		11/6" 17/6"									
- 80 -			-becomes slickensided with ferrous staining	(P) 4.50+										
			Bottom @ 82.5'											
- 85 -														
90 -														
- 95 -														
100-														
105-														
DA1	ΓE	BOR BOR	ING COMPLETED: 07/23/2016 was	e during o at a depth	drilling op n of 10'-6	perations". At t	ns. A he co	fter a 1 mpletio	0 to 1	າ5-minເ	ıte wa	iting p	eriod,	water
PRO	ΣĴΙ	ER: ECT I	NO.: 16.53.042 was	backfilled	with cer							Pag	e3 o	f3

PRO	IFC ⁻	LOG OF BO	ORIN	IG B	-31	ineei	rina lı	nc					
		Municipal Solid Waste Landfill Aerial Expansion			9								
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 50.1" W 97° 49' 24.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 68-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(a) (b)	ST		ă				₹			
0 -		Medium dense to very dense gray CLAYEY SAND (SC) -with calcareous nodules and sand pockets		4/6" 5/6" 7/6"									
- 5 -				22/6" 18/6" 4/6" 5/6"	11							46	
				6/6" 5/6"									
X				6/6" 8/6" 6/6"									
10		Warrant Land Harrie		8/6" 12/6" 8/6"	27							22	
X		-with cemented sand layers		27/6" 29/6"	21							22	
		-color changes to tan		18/6" 32/6" 39/6"									
15 -		Very dense tan POORLY GRADED SAND with CLAY (SP-SC) and sand partings		36/6" 50/5"									
-X				12/6" 50/5" 45/6"	15							9	
X				50/5" 35/6"									
20 -		_		50/4" 17/6" 26/6"									
		₹ \ -		50/5" 17/6" 38/6" 38/6"									
25		Hard reddish tan and light gray SANDY LEAN SILTY CLAY (CL-ML) with sand partings		13/6" 20/6" 31/6" 23/6" 34/6" 50/4" 12/6" 17/6" 50/5"	26		29	7				66	
30		-color changes to reddish tan and tan with ferrous stains		13/6" 32/6" 50/5" 7/6" 36/6" 39/6" 10/6" 21/6" 36/6"									
35				10/6" 18/6" 35/6"	25							62	
COMP DATE	BOR BOR	ING COMPLETED: 07/21/2016 was a J. Gonzalez was b	during of the during of the depth of the dep	drilling op n of 21'-6 I with cen	eration". At the nent-b	ons. A he co pentor	fter a 1 mpletionite gro	0 to 1 on of tout.	15-minu	ıte wa	iting p e oper	eriod,	water e-hole
		TOLUNAY-WONG	ENG	INEERS	S, INC	D							

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion		IG B laismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOLUSCS	COORDINATES: N 27° 26' 50.1" W 97° 49' 24.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 68-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	S						₹	_		
35	Hard reddish tan and tan SANDY LEAN CLAY (CL) with ferrous stains and laminated sands	1	17/6" 25/6" 35/6" 17/6" 13/6" 19/6" 7/6"									
40 -	Very stiff to hard reddish tan and tan FAT CLAY with SAND (CH) and ferrous stains		17/6" 3/6" 7/6" 10/6" 9/6" 20/6" 27/6" 5/6" 14/6" 17/6" 10/6"	37		59	36				76	
45 - 1	-with trace gypsum crystals and ferrous stains		18/6" 21/6" 18/6" 23/6" 30/6" 6/6" 20/6" 21/6" 9/6" 17/6" 19/6"	30							83	
- 55 -	-with calcareous nodules and ferrous stains	(P) 4.50+ (P) 4.50+	9/6" 18/6" 23/6" 11/6" 23/6" 26/6"	32	91	83	50	4.14	2		87	
- 60 -		(P) 4.50+ (P) 4.50+		34	87			2.88	2		83	
	-with trace gypsum crystals and ferrous stains	(P) 4.50+ (P) 4.50+										
- 65 -		(P) 4.50+										
- 70 -	Bottom @ 68'	,										
DATE BOY DATE BOY LOGGER:	RING COMPLETED: 07/21/2016 was a J. Gonzalez was a	water wa e during d at a depth backfilled	Irilling op n of 21'-6	eratio ". At t	ns. A he co	fter a 1 mpletion	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PROJECT	NO.: 16.53.042 Was to		NEERS			9.0				Pag	e2 of	f2

PROJEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	3-32 Eng	inee	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 49.7" W 97° 49' 17.0" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(£)	S						₹			
0	Stiff to hard tan and gray SANDY LEAN CLAY (CL) with gypsum crystals and trace organics		3/6" 5/6" 6/6"	9		34	18				54	
- 5 -			6/6" 21/6" 23/6"									
- 10 -			11/6" 26/6" 50/3"									
- 15 -	Medium dense to dense reddish tan and gray CLAYEY SAND (SC) with gypsum crystals		17/6" 50/6"	28							34	
	-color changes to tan and gray with sand partings		10/6" 17/6" 22/6"									
- 20 -	-with ferrous stains		4/6" 8/6" 13/6"									
- 25 -	-color changes to reddish tan		10/6" 18/6" 21/6"	22		31	10				29	
30	-color changes to reddish brown and tan		6/6" 8/6" 12/6"									
- 35 -			8/6" 8/6" 12/6"									
COMPLET DATE BOR	ING COMPLETED: 07/28/2016 was a	during out	as encou drilling op n of 14'-7 I with cer	eratio	ns. A he co	fter a 1 mpletion	10 to 1 on of t	15-minເ	ıte wa	iting p e ope	eriod, n bore	water e-hole
	TOLUNAY-WONG	ENG	INEERS	S, INC	D					rag	e1 of	١٥

PRO	0.	JECT	Municipal Solid Waste Landfill		IG B laismith			ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOLUSCS	Aerial Expansion COORDINATES: N 27° 26' 49.7"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 35 -		e e Alza		<u> </u>							ш			
			Medium dense to dense reddish tan and gray CLAYEY SAND (SC) with gypsum crystals Very stiff to hard tan FAT CLAY with SAND (CH), slickensided, with calcareous nodules	(P) 4.50+		29	89						79	
- 40 -	X		-color changes to tan and reddish brown with gypsum crystals and ferrous stains		8/6" 12/6" 15/6"									
- 45 -			-color changes to tan, gray, and reddish brown	(P) 4.50+										
- 50 -	X		-color changes to tan and reddish brown		4/6" 9/6" 10/6"	30		73	51				82	
- 55 -				(P) 4.50+										
- 60 -			-color changes to tan and gray	(P) 4.50+										
- 60 -				(P) 4.50+		26	94			0.61	2		81	
- 65 -			-color changes to tan, red, and brown	(P) 4.00										
- 70			-color changes to tan and gray	(P) 4.50+										
DAT DAT LOG	E	BOR BOR	ING COMPLETED: 07/28/2016 was a J. Gonzalez	water wa e during d at a depth backfilled	Irilling op n of 14'-7	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minເ	ıte wa	iting p e opei	eriod,	water e-hole
			TOLUNAY-WONG	ENGI	NEERS	S. INC	D					. ay	J_ U	

PR	.О.	JECT	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	3-32 n Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 49.7" W 97° 49' 17.0" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		١.	MATERIAL DESCRIPTION	€ _F	ST		ă				Ε			
- 70 -			Very stiff to hard tan and gray FAT CLAY with SAND (CH), slickensided with gypsum crystals and calcareous nodules											
- 75 -			Medium dense to dense tan CLAYEY SAND (SC) with calcareous nodules	(P) 0.75		21		24	8				24	
	X		-with gypsum crystals and ferrous stains		5/6" 10/6" 13/6"									
- 80 -	X				13/6" 20/6" 20/6"									
- 85 - - 90 - - 95 -														
-105-														
DA:	TE TE	BOR	ING COMPLETED: 07/28/2016 was a	during out	is encou drilling op n of 14'-7 with cer	eration". At t	ns. A he co	fter a 1	10 to 1 on of t	15-minເ	ıte wa	iting p e opei	eriod, n bore	water e-hole
			 TOLUNAY-WONG	ENGI	NEERS	S, IN(D					Pag	e3 of	f 3

PROJ	ECT: City of Kingsville CLIE Municipal Solid Waste Landfill Aerial Expansion		IG B Naismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	ST		ă				₹			
- 0 -	Medium dense to very dense tan CLAYEY SAND (SC) with gypsum crystals		2/6" 7/6" 9/6"									
- 5 -	-color changes to dark gray and gray with trace gravel		7/6" 11/6" 9/6"	16							47	
- 10 -	-color changes to tan and light gray sand partings		27/6" 50/6"									
- 15 -	-color changes to tan and white with trace caliche		50/5"									
	Dense to very dense tan and white POORLY GRADED SAND with SILT (SP-SM), and trace caliche)	17/6" 48/6" 50/3"	11		35	8				12	
- 20 -			17/6" 21/6" 27/6"									
- 25 -	-color changes to light gray and tan with gypsum crystals and ferrous stains		15/6" 17/6" 32/6"									
30	Medium dense to dense gray and white CLAYEY SANI (SC) with gypsum crystals	D	14/6" 22/6" 26/6"	42							20	
- 35 -	-color changes to tan		13/6" 21/6" 22/6"									
COMPL DATE E	ORING COMPLETED: 08/05/2016 was R: J. Gonzalez	water water	drilling op h of 28'-2	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p e opei	eriod, n bore	water e-hole
	TOLUNAY-WONG	ENG	INEERS	S. INC)					Pag	e1 of	3

PR	OJ	JECT	Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-33 Eng	inee	ring, li	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N.	MATERIAL DESCRIPTION	(£)	S						₹			
35 -	X		Medium dense to dense reddish tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains		6/6" 9/6" 12/6"									
40 -	X		-color changes to tan and reddish tan		8/6" 16/6" 18/6"									
45 -	X		Stiff to very stiff reddish tan LEAN CLAY with SAND (CL), slickensided, with ferrous stains		9/6" 12/6" 18/6"	29		43	24				79	
50	X		-color changes to reddish tan and tan with gypsum crystals		5/6" 6/6" 9/6"									
			Stiff to very stiff LEAN CLAY (CL), slickensided, with ferrous stains	(P) 2.00		40	79			1.06	3		96	
55 -			-color changes to reddish brown and tan with gypsum crystals	(P) 3.50										
60 -				(P) 4.00		34	87							
65 -			Very stiff to hard tan FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains	(P) 4.50+		32	42	64	33	2.57	2		95	
70	X		-color changes to tan and reddish brown		7/6" 12/6" 14/6"									
DAT DAT	Ē	BOR	ING COMPLETED: 08/05/2016 was a	during o t a depth ackfilled	Irilling op n of 28'-2	eratio ". At t nent-b	ns. A he co entor	fter a 1 mpletionite gro	0 to 1 on of tout.	15-minu the bori	ıte wa	iting p e ope	eriod,	, water e-hole

PR	О.	JEC		ORIN	IG B	-33 Eng	inee	ring, lı	nc.					
			Municipal Solid Waste Landfill Aerial Expansion											
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N	MATERIAL DESCRIPTION	9,0	, o						₽.			
- 70 -			Very stiff to hard tan and reddish brown FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains -color changes to tan and light gray	(P) 4.50+										
- 75 -			-with layers of calcareous nodules		9/6"									
					10/6" 21/6"									
- 80 -			Very stiff to hard tan FAT CLAY with SAND (CH) with gypsum crystals and ferrous stains	(P) 4.50+		18	106			3.57	3		77	
- 85 -			-color changes to tan and white	(P) 4.50+										
			Bottom @ 86'											
- 90 -														
- 95 -														
400														
-100-														
-105-														
DA DA LO	TE TE GG	BOR BOR ER:	ING COMPLETED: 08/05/2016 was: J. Gonzalez	e during o at a depth	as encour drilling op n of 28'-2 I with cen	eratio ". At t	ns. A he co	fter a 1 mpletion	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PR(OJI	ECT	NO.: 16.53.042 Was TOLUNAY-WONG		INEERS			me git	out.			Pag	e3 of	f3

PRO	JEC ⁻	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion		IG B laismith			ring, lı	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 43.4"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(a) (b)	S		ă				₹			
- 0 -		Medium dense dark gray, gray, and light gray CLAYEY SAND (SC) with trace of organics	(P) 4.50+	2/6" 5/6" 6/6"	15	112			2.53	6		42	
- 5 -		Very stiff to hard gray and light gray SANDY LEAN SILTY CLAY (CL-ML) with calcareous nodules	(P) 4.50+		15	115	21	7				59	
		-color changes to light gray	(P) 4.50+		14	114			6.13	4		62	
		-color changes to light gray and tan		4/6" 12/6" 16/6"									
10		-color changes to white and light gray		11/6" 18/6" 16/6"									
		-becomes stiff		5/6" 6/6" 8/6"									
- 15 -		Medium dense to dense white and light gray SILTY SAND (SM) with calcareous nodules		4/6" 6/6" 8/6"	17		38	7				31	
		-color changes to light gray and tan with ferrous stains		4/6" 10/6" 19/6"									
- 20 - - X	7			23/6" 50/5" 23/6" 50/4"									
	7	-color changes to light gray		27/6" 35/6" 50/4"	22							25	
- 25 -	7			5/6" 37/6" 45/6"									
	1	<u> </u>		20/6" 39/6" 37/6" 8/6"	26		39	2				28	
30	7	-becomes medium dense 	12/6" 9/6" 4/6"	33		Ja					39		
	7			12/6" 10/6" 5/6"									
35		-color changes to tan and marine green		6/6" 10/6" 3/6"									
COMF DATE	BOR BOR SER:	ING COMPLETED: 06/22/2016 was a	water wa e during d at a depth packfilled	Irilling op n of 28'-4	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p e opei	eriod,	water -hole
		TOLUNAY-WONG	ENGI	NEERS	S, IN(D					ı ay	G 1 U	_

MATERIAL DESCRIPTION A C C C C C C C C C	PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	-34 Eng	inee	ring, lı	nc.						
Medium dense tan and nesse and trace organics Hard tan and light gray LEAN CLAY (CL) Bottom @ 43' Bottom @ 43' Bottom @ 43' REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was a 48 depth of 28-4*, At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.	DEPTH (ft) SAMPLE TYPE SYMBOLUSCS	W 97° 49' 11.4" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 30 ft. Wash Bored: 30 ft. to 43 ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUIDLIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED	
(SM) with sand lenses and trace organics Hard tan and light gray LEAN CLAY (CL) (P) 4.50+ (P) 4.	35	Medium dense tan and marine green SILTY SAND		8/6"										
P) 4.50+ ((SM) with sand lenses and trace organics	(P) 4.50+	13/6										
Bottom @ 43' Bo		Traid tall and light gray ELAN GLAT (GE)	(P) 4.50+		30	91	40	17	0.93	1		91		
Bottom @ 43' 45 - 60 - 60 - COMPLETION DEPTH: OATE BORING STARTED: DATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE BORING STARTED: OATE	- 40 -		(P) 4.50+											
COMPLETION DEPTH: 66 - 670 - COMPLETION DEPTH: 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 66 - 67 - 68 - 68 - 68 - 68 - 68 - 68 - 69 - 69 - 60			(P) 4.50+											
COMPLETION DEPTH: 66 - COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: LOGGER: PROJECT No: 16.53.042 REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 28'-4". At the completion of the boring, the open bore-hole was at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: 06/22/2016 J. Garcia 16.53.042 REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, was backfilled with cerner-bentonite grout.	- 45 -													
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: 06/22/2016 J. Garcia 16.53.042 REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, was backfilled with cerner-bentonite grout.														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE B	- 50 -													
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE B														
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COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE B	- 55 -													
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE B														
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COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 J. Garcia PROJECT NO.: REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.	- 60 -													
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 J. Garcia PROJECT NO.: REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 J. Garcia PROJECT NO.: REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 J. Garcia PROJECT NO.: REMARKS: Free water was encounterd at an approximate depth of 31' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 U6/2	- 65 -													
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 DATE BORING COMPLETED: DATE BORING COMPLETED: U6/22/2016 U6/2														
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DATE BORING STARTED: 06/22/2016 DATE BORING COMPLETED: 06/22/2016 USA at a depth of 28'-4". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.	- 70 -													
Page 2 of 2	DATE BOR	ING STARTED: 06/22/2016 grade	e during o	drilling op n of 28'-4'	eratio '. At t	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water	
TOLUNAY-WONG ENGINEERS, INC	PROJECT						Ü				Pag	e2o	f 2	

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	-35 Eng	inee	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 50.5" W 97° 48' 57.2" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 72.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	ST						₹			
0 -	Medium dense tan and brown CLAYEY SAND (SC) with trace caliche		5/6" 8/6" 7/6"									
- 5 -	-color changes to reddish brown with ferrous stains		5/6" 8/6" 5/6"	12		31	17				38	
10	Very stiff to hard reddish tan SANDY LEAN CLAY (CL) with gypsum crystals	(P) 4.50+		14	117			2.22	3		52	
- 15 -	-color changes to reddish tan and tan with ferrous stains		5/6" 10/6" 12/6"									
	-color changes to reddish tan	(P) 4.50+		17	109	42	25					
- 20 -	-color changes to reddish tan and tan	(P) 4.50+										
- 25 -	Medium dense to dense reddish tan and tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains	(P) 4.50+		17	104			1.29	3		40	
30	-color changes to reddish tan		4/6" 7/6" 9/6"									
- 35 - 24 7	<u>⊽</u> =		8/6" 13/6" 20/6"									
DATE BOF	ING COMPLETED: 07/29/2016 was a	water wa e during c at a depth backfilled	drilling op n of 30'-9	eratic ". At t	ns. A he co	fter a 1	10 to 1 on of t	15-minເ	ıte wa	iting p	eriod,	water
FNOJECI	NO.: 16.53.042 TOLUNAY-WONG		NEERS			Ū				Pag	e1 o	f3

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	3-35 Eng	ineei	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 50.5" W 97° 48' 57.2" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 72.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	<u> </u>						₹			
35 - 77	Medium dense to dense reddish tan and tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains											
	Hard tan and light gray FAT CLAY with SAND (CH), gypsum crystals, and ferrous stains		17/6" 26/6" 30/6"	25		109	72				77	
$ /\!\!2$												
40 -	-color changes to tan and reddish brown		8/6" 15/6" 24/6"									
45 -	-with sand partings		10/6" 16/6" 16/6"									
50	Stiff to hard reddish brown and tan FAT CLAY (CH) with gypsum crystals and ferrous stains	1	4/6" 7/6" 10/6"	34							96	
	-becomes slickensided with sand layers	(P) 2.00										
55 -												
	-color changes to tan		4/6" 7/6" 10/6"									
60		(P) 3.75		33	89	90	67	3.88	4		89	
65 -		(P) 4.25										
	-color changes to tan and reddish brown	(P) 4.50+										
70												
DATE BOR	RING COMPLETED: 07/29/2016 was a	water wa during d at a depth backfilled	Irilling op of 30'-9	eratio	ns. A he co	fter a 1 mpletion	10 to 1 on of t	15-minu	ıte wa	iting p	eriod,	wate
PROJECT	NO.: 16.53.042 was t	Jackilleu	WILLI CEI	nont-L	GIILUI	ine git	out.			Pac	e2 of	f 3

PR	RO.	JEC	T: City of Kingsville CLIE Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	3-35 Eng	inee	ring, li	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 50.5" W 97° 48' 57.2" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 72.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		٨	MATERIAL DESCRIPTION	(E)	ST						₹			
70 -			Very stiff to hard reddish brown and tan FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains	(P) 4.50+		32	89			2.68	1		95	
			Bottom @ 72.5'											
75 -														
- 80 -														
00														
85 -														
- 90 -														
95 -														
-100-														
105-														
DA DA	TE	BOR	ING COMPLETED: 07/29/2016 was	water wa e during o at a depth backfilled	drilling op n of 30'-9	eration". At t	ns. A	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PK	UJI	=011	NO.: 16.53.042 was TOLUNAY-WONG		NEERS			Ü				Pag	e3 of	f 3

PROJ	IEC	Municipal Solid Waste Landfill	ORIN	IG B laismith	36 Eng	inee	ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	Aerial Expansion COORDINATES: N 27° 26' 56.8" W 97° 49' 04.9" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 22-ft. Wash Bored: 22-ft. to 68-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
_		MATERIAL DESCRIPTION	(E)	S S		Δ				₹			
- 0 -		Loose to medium dense dark gray and gray CLAYEY SAND (SC)											
		-with calcareous nodules		18/6" 20/6" 21/6"	10							36	
5 -		-color changes to light gray and tan		4/6" 5/6" 5/6"									
- 10 -				5/6"									
		-color changes to tan		4/6" 5/6" 6/6"	12		47	28				44	
- 15 -				2/6" 4/6" 6/6"									
- 20		-color changes to light gray with ferrous stains		4/6" 10/6" 14/6"									
		-becomes very dense and color changes to light gray and tan		15/6" 24/6" 50/6"	25							32	
- 25 -				12/6" 14/6" 15/6"									
- 30 -		-becomes dense		5/6" 17/6" 27/6"									
35				4/6"									
COMP DATE	BOR BOR ER:	ING COMPLETED: 06/24/2016 was a J. Garcia	water water water during of the desired th	drilling op n of 18'-3	eratio 5". At t	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water
. ACOL		TOLUNAY-WONG	ENG	INEERS	S. INC	.	_				Pag	e1 of	2

PRO)JEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-36 Eng	inee	ring, l	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 56.8" W 97° 49' 04.9" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 22-ft. Wash Bored: 22-ft. to 68-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	\perp	MATERIAL DESCRIPTION	(£)			Δ				₹			
35	(12) (12) (12) (12) (12) (12) (12) (12)	Medium dense light gray and tan CLAYEY SAND (SC)		7/6" 8/6"									
-40		-with sand seams, calcareous nodules, and ferrous staining		6/6" 10/6" 13/6"	21		47	30				35	
		-color changes to reddish brown and light gray		4/6" 8/6" 10/6"									
- 45 -		Stiff to very stiff reddish brown and light gray FAT CLAY (CH), slickensided, with ferrous staining	(P) 4.50+										
- 50 -		-with sand seams and calcareous nodules		4/6" 6/6" 8/6"	42							96	
- 55 -		-color changes to light gray with sand layers		11/6" 12/6" 14/6"									
- 60		-becomes hard		11/6" 21/6" 26/6"	37		70	44				94	
- 65 -				7/6" 8/6" 9/6"									
		-color changes to brown yellow, reddish brown, and light gray		7/6" 10/6" 10/6"									
- 70 -		Bottom @ 68'											
COMI	BOR BOR	ING COMPLETED: 06/24/2016 was a	e during o at a depth backfilled	is encour drilling op n of 18'-3' with cerr	eratio ". At t nent-b	ons. A he co pentor	fter a 1 impletionite gro	10 to 1 on of tout.	15-minu the bori	ıte wa	iting p e opei	eriod,	water e-hole

PRO	JEC	: City of Kingsville CLIEN Municipal Solid Waste Landfill		IG B			ing, lı	nc.					
		Aerial Expansion											
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 57.1" W 97° 49' 17.6" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 12-ft. Wash Bored: 12-ft. to 48-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	Э)	S						7			
- 0 -		Very dense light gray and tan SILTY SAND (SM)											
	7	-with ferrous staining		6/6" 16/6" 50/5"									
- 5 - 	7			11/6" 50/5"	20		33	9				20	
- 10 -	7	-with calcareous nodules		23/6" 37/6" 50/6"									
- 15 -		Very stiff to hard tan and light tan SANDY LEAN SILTY CLAY (CL-ML)		6/6" 7/6" 10/6"	31							52	
20		-color changes to tan and light gray with ferrous staining		9/6" 17/6" 27/6"									
- 25 -				7/6" 12/6" 13/6"									
		Stiff to very stiff reddish brown and light gray FAT CLAY (CH) with calcareous nodules and ferrous staining		4/6" 5/6" 9/6"	33		56	39				99	
- 30 -		-color changes to light gray with sand layers		5/6" 7/6" 12/6"									
35				5/6"	34							86	
DATE DATE LOGG	BOR BOR SER:	ING COMPLETED: 06/25/2016 was a J. Garcia	during of table a	as encou drilling op n of 9'-3" I with cer	eratio	ns. A	fter a 1	0 to 1	15-minu	ite wa	iting p	eriod,	water
PROJ	ECI	NO.: 16.53.042 Was b		INEERS							Pag	e1 of	2

PR	OJ	JECT	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-37 Eng	ineei	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 57.1" W 97° 49' 17.6" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 12-ft. Wash Bored: 12-ft. to 48-ft. MATERIAL DESCRIPTION	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 35 -				=										
			Stiff to very stiff light gray and brownish tan FAT CLAY (CH) with sand seams, calcareous nodules, and ferrous staining		7/6" 12/6"									
- 40 -	X				4/6" 5/6" 7/6"									
	X		-color changes to light gray and reddish brown		6/6" 6/6" 9/6"									
- 45 -	X		-color changes to light gray		4/6" 5/6" 9/6"	35		80	51				86	
- 50 -			Bottom @ 48'											
- 55 -														
- 60 -														
- 65 -														
- 70 -														
DA ⁻ DA ⁻ LO(TE TE GG	BOR BOR ER:	ING COMPLETED: 06/25/2016 was a J. Garcia	during out	drilling op n of 9'-3".	eratic At th	ns. A e com	fter a 1	0 to 1	15-minເ	ıte wa	iting p	eriod,	water
		ĒĊŤI			with cem			iile gro	uí.			Pag	e2o	f2

PRO	JEC ⁻	T: City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion		IG B			ring, li	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 27′ 03.76″	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
0 -		Very stiff to hard light gray SANDY FAT CLAY (CH)											
		with ferrous stains and trace calcareous nodules		10/6" 18/6" 31/6" 20/6" 45/6"	17		50	19				55	
5 -		_		50/4" 3/6" 33/6"									
		-		50/5" 12/6"									
				27/6" 37/6" 17/6" 36/6"	30							66	
10		<u>∇</u> =		50/3" 18/6"									
				35/6" 50/3" 13/6"									
15 -		-color changes to light gray and tan		33/6" 50/2" 8/6"									
13 X				14/6" 20/6" 7/6"									
X				12/6" 19/6" 6/6"	28		60	40				57	
20				10/6" 14/6" 6/6"									
X		becomes stiff		11/6" 15/6" 5/6"									
X		-becomes stiff		7/6" 8/6"									
25 -				6/6" 8/6" 13/6"									
$ \longrightarrow $			(P) 4.50+	4/6" 9/6" 9/6"	25	92	47	29					
30 -			(P) 4.50+										
		-color changes to brown and light gray and becomes stiff with sand layers		4/6" 5/6" 8/6"									
35				9/6"									
DATE	BOR BOR SER:	J. Garcia was	water wa e during d at a depth backfilled	drilling op n of 5'-5"	eration	ns. A e com	fter a 1 opletion	10 to 1	15-minu	ıte wa	iting p	eriod,	water
		TOLUNAY-WONG	FNGI	NEERS	SINC						Pag	e1 of	f 2

PR	O.	JEC ⁻	City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	-38 Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 27' 03.76"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	_	٨	MATERIAL DESCRIPTION	(E)	S						₹			
- 35 -	X		Very stiff to hard reddish brown and light gray SANDY FAT CLAY (CH) with sand seams and layers	(P) 4.50+	8/6" 10/6"									
			Stiff to hard light gray FAT CLAY (CH), slickensided, with calcareous nodules and ferrous stains	(P) 4.50+		42	78	100	72	2.95	2		93	
40 -			-color changes to reddish brown and light gray	(P) 4.50+										
				(P) 4.50+										
45 -			-color changes to tannish brown and light gray with trace organics	(P) 4.50+										
10	\/		-color changes to light gray		5/6"									
	X			(P) 4.50+	6/6" 8/6"	30	91			2.14	3		87	
- 50 -					6/6"									
	X				7/6" 7/6"									
	X				4/6" 5/6" 8/6"									
- 55 -	X		-color changes to tannish brown and light gray		5/6" 7/6" 9/6"									
	X		-color changes to light gray		6/6" 7/6" 9/6"									
			Bottom @ 58'											
- 60 -														
- 65 -														
00														
- 70 -														
DA ⁻	ΓE	BOR	ING COMPLETED: 06/23/2016 was	water wa e during c at a depth backfilled	drilling op n of 5'-5".	eration At th	ns. A e con	fter a 1	10 to 1 n of th	15-minເ	ıte wa	iting p	eriod,	water
FK	JJI	_01	TOLUNAY-WONG		NEERS			Ū				Pag	e2 o	f 2

PROJ	IECT	Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-39 Eng) inee	ring, li	nc.					
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 27' 01.3" W 97° 48' 57.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 26 ft. Wash Bored: 26 ft. to 68 ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
_		MATERIAL DESCRIPTION	(E)	ြ		Δ				₹			
0 -		Medium dense to dense tan and light gray CLAYEY SAND FILL with trace gravel		8/6" 9/6" 6/6"	18							33	
		-color changes to brown		40/6" 27/6" 19/6"									
5 -		Medium dense to dense brown and reddish brown CLAYEY SAND (SC)		6/6" 7/6" 8/6"									
		-color changes to tan and gray with calcareous nodules		4/6" 5/6" 6/6"									
				5/6" 6/6" 8/6"	11		36	20				49	
10		-color changes to tan and light gray		4/6" 6/6"									
		-color changes to light gray		7/6" 7/6" 8/6"									
15 -		-color changes to light gray and tan with ferrous stains		11/6" 6/6" 12/6"									
		-color changes to light gray		19/6" 11/6" 19/6"									
-		Citta band links and CANDV LEAN OLAY (CL.) with		22/6"	19							65	
20		Stiff to hard light gray SANDY LEAN CLAY (CL) with calcareous nodules and ferrous stains		3/6" 4/6" 5/6"	19							65	
				6/6" 9/6" 13/6"									
		and the same of the same and the same	(P) 4.50+	8/6" 11/6" 20/6"									
25 -		-color changes to light tan and light gray											
		color changes to light gray	(P) 4.00										
		⊻		7/6" 11/6"									
30		-color changes to light gray and tan	(P) 4.50+	13/6"	19	102			1.14	7		50	
				12/6"									
				16/6" 20/6" 8/6"									
35	~ \			2.0									
DATE I	BOR BOR	ING COMPLETED: 06/24/2016 was a	water wa during dat a depth backfilled	Irilling op of 26'-6	eratio	ns. A he co	fter a 1	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PROJE	ECT I	NO.: 16.53.042 was t	aonilieu	WILLI CELL	nent-L	, GI ILUI	iie git	ui.			Pag	e1 o	f 2

PRO	JEC ⁻	Municipal Solid Waste Landfill		IG B			ring, lı	nc.					
DEPTH (ft)	SYMBOL/USCS	Aerial Expansion COORDINATES: N 27° 27' 01.3" W 97° 48' 57.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 26 ft. Wash Bored: 26 ft. to 68 ft. MATERIAL DESCRIPTION	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
35		Stiff to hard light gray and tan SANDY LEAN CLAY (CL)		12/6" 16/6"									
		with ferrous stains Medium dense to dense light gray CLAYEY SAND (SC) with ferrous stains		7/6" 8/6" 11/6" 6/6" 11/6"									
40				12/6" 7/6" 10/6" 13/6"	25		69	51				45	
				13/6" 19/6" 21/6"									
45 -		Dense light gray POORLY GRADED SAND with CLAY (SP- SC)		12/6" 21/6" 20/6" 11/6" 16/6"									
- 50 -		Hard reddish brown and light gray FAT CLAY with SAND (CH)	(P) 4.50+ (P) 4.50+	16/6"	28	93			0.85	1		72	
		-becomes slickensided with calcareous nodules	(P) 4.50+										
- 55 -		-with ferrous stains	(P) 4.50+ (P) 4.50+										
			(P) 4.50+										
- 60 -			(P) 4.50+										
		-becomes stiff		7/6" 7/6" 7/6"									
- 65 -													
	(\$222) (\$222) (\$222)	Medium dense light gray CLAYEY SAND (SC) with calcareous nodules and ferrous stains Bottom @ 68'		6/6" 10/6" 13/6"	20	102	61	45	1.91	5		46	
- 70 -		20 © 00											
DATE	BOR BOR SER:	ING COMPLETED: 06/24/2016 was a	during dat a depth	s encoun Irilling ope of 26'-6" with cem	eration	ns. A he co	fter a 1 mpletio	0 to 1	15-minເ	ıte wa	iting p e opei	eriod, n bore	water e-hole
		TOLUNAY-WONG	ENGI	NEERS	, INC	D					Pag	e2 of	f 2

PROJ	EC	Municipal Solid Waste Landfill		IG B laismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	Aerial Expansion COORDINATES: N 27° 27' 09.97"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 0 -		Loose to very dense light gray and gray SILTY SAND (SM) with trace caliche		4/6" 4/6"									
		-color changes to light gray and tan with ferrous stains		6/6" 5/6" 7/6" 11/6"	16		35	10				31	
- 5 -				7/6" 17/6" 17/6"									
		-color changes to light gray with calcareous nodules		12/6" 21/6" 34/6"									
- 10 -		-color changes to light gray and white -color changes to white		12/6" 27/6" 50/3" 15/6"	18							34	
		-color changes to light gray and white		50/3" 25/6"									
- 15 -	//	Hard light gray FAT CLAY with SAND (CH), calcareous		7/6" 26/6"	22		70	41				80	
		nodules, and ferrous stains		50/5" 5/6" 17/6" 28/6"									
20		▼ ☑		10/6" 30/6" 35/6"									
		Hard light gray SANDY FAT CLAY (CH) with calcareous nodules and ferrous stains		9/6" 25/6" 35/6"	31							59	
				16/6" 32/6" 50/5"									
- 25 -		Dense to very dense light gray CLAYEY SAND (SC)		16/6" 31/6" 50/5"	30		53	32				49	
		with calcareous nodules		18/6" 27/6" 6/6" 18/6"									
30				50/6" 6/6" 20/6" 50/5"									
		Bottom @ 33.5'		3/6" 40/6" _50/3"	16							30	
- 35 -		DOROIII & 33.3											
DATE I DATE I LOGGI	BOR BOR ER:	ING COMPLETED: 06/22/2016 was a J. Garcia	during of	as encour drilling op n of 19'. <i>F</i> I with cen	eratio	ns. A comp	fter a 1 letion	0 to 'of the	15-minu	ıte wa	iting p	eriod,	water
PROJE	:CT	NO.: 16.53.042 Was b		INEERS			gro	ut.			Pag	e1 of	1

PROJEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	- 41 Eng	ineei	ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 27' 09.8" W 97° 49' 17.4" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 62.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	S S						₹			
0 -	Loose to medium dense gray CLAYEY SAND (SC) with calcareous nodules		4/6" 5/6" 5/6"	8							35	
- 5 -	-color changes to light gray		4/6" 5/6" 6/6"									
10	Stiff to very stiff gray SANDY FAT CLAY (CH)		5/6" 8/6" 11/6"	20		78	52				64	
15 -	-becomes hard and color changes to brown with interbedded sand seams		9/6" 17/6" 25/6"									
	-color changes to brown and tan		7/6" 12/6" 14/6"									
- 20 -	-color changes to tan with sand layers		3/6" 4/6" 6/6"	36							64	
25 -	-color changes to brown with sand partings		5/6" 4/6" 6/6"									
30	-color changes to brown and tan		6/6" 7/6" 8/6"	31		52	30				51	
35 -			4/6" 6/6" 6/6"									
COMPLETI DATE BOR	ING COMPLETED: 07/20/2016 was a	during of the depth	as encour drilling op n of 19'-3 I with cen	eratic	ns. A he co	fter a 1 mpletio	0 to 1	15-minւ	ite wa	iting p	eriod,	water
	TOLUNAY-WONG	ENG	INEERS	S. INC	C .					Pag	e1 of	f 2

PRO	DJE	CT: City of Kingsville Municipal Solid Waste Landfill Aerial Expansion	LOG OF B	ORIN	IG B laismith	- 41 Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE IYPE		to 62.5-ft. to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
_	+	MATERIAL DESCRIP	TION	(E)	ြ						ı₹			
35 -		Stiff to very stiff gray SANDY FAT C	, ,											
		Very stiff brown FAT CLAY with SAN	ND (CH)	(P) 3.25		27	92						77	
40 -		-color changes to brown and tan			6/6" 13/6" 11/6"									
45 -					4/6" 9/6" 14/6"									
50					6/6" 8/6" 9/6"	35		97	75				84	
55 -		-color changes to brown and gray			7/6" 9/6" 12/6"									
		-color changes to gray		(P) 4.50+										
60 -				(P) 3.50										
		Bottom @ 62.5'												
65 -														
70 -														
DATI DATI	E BO	ETION DEPTH: 62.5 ft DRING STARTED: 07/20/2016 DRING COMPLETED: 07/20/2016 R: M. Anderson 16.53.042	was	water wa e during o at a depth backfilled	Irilling op n of 19'-3	eratio	ns. A he co	fter a 1	0 to 1	15-minu	ıte wa	iting p e ope	eriod,	, water e-hole

KEY TO SYMB	OLS AND TERMS USED	ON BOR	ING LOGS FOR SOIL
Most Common Uni Classifications Systen		Sampler Symbo	ols <u>Meaning</u>
Lean Clay (CL)	Well Graded Sand (SW)		Pavement core Thin - walled tube sample
Lean Clay w/ Sand (CL)	Well Graded Sand w/ Gravel (SW-GM)		Standard Penetration Test (SPT)
Sandy Lean Clay (CL)	Poorly Graded Sand (SP)		Auger sample
<u>/</u>			Sampling attempt with no recovery
Fat Clay (CH)	Poorly Graded Sand w/ Silt (SP-SM)	H	TxDOT Cone Penetrometer Test
Fat Clay w/ Sand (CH)	Silt (ML)	Field Test Dat	t <u>a</u>
		2.50	Pocket penetrometer reading in tons per square foot
Sandy Fat Clay (CH)	Elastic Silt (MH)	(T)1.13	Torvane Measurement in tons per square foot
Silty Clay (CL-ML)	Elastic Silt w/ Sand (MH-SP)	8/6"	Blow count per 6 - in. interval of the Standard Penetration Test
			Observed free water during drilling
Sandy Silty Clay (CL-ML)	Silty Gravel (GM)		Observed static water level
X-IX-II X-IX-II	• •	Laboratory Tes	t Data
Silty Clayey Sand (SC-SM)	Clayey Gravel (GC)	Wc (%)	Moisture content in percent
[-22]	••• Well Graded Gravel (GW)	Dens. (pcf)	Dry unit weight in pounds per cubic foot
Clayey Sand (SC)	•	Qu (tsf)	Unconfined compressive strength in tons per square foot
Sandy Silt (ML)	Well Graded Gravel w/ Sand (SP-GM)	UU (tsf)	Compressive strength under confining pressure in
Silty Sand (SM)	Poorly Graded Gravel (GP)		tons per square foot
		Str. (%)	Strain at failure in percent
Silt w/ Sand (ML)	Peat	LL	Liquid Limit in percent
[-1_k:1_1]		PI	Plasticity Index
Miscellaneous M	atorials	#200 (%)	Percent passing the No. 200 mesh sieve
Miscenaneous M	arei mis	()	Confining pressure in pounds per square inch
Fill Concrete	Asphalt and/or Base	*	Slickensided failure
		**	Did not fail @ 15% strain

RELATIVE DENSITY OF COHESIONLESS & SEMI-COHESIONLESS SOILS

The following descriptive terms for relative density apply to cohesionless soils such as gravels, silty sands, and sands as well as semi-cohesive and semi-cohesionless soils such as sandy silts, and clayey sands.

Relative <u>Density</u>	Typical N ₆₀ Value Range*		
Very Loose	0-4		
Loose	5-10		
Medium Dense	11-30		
Dense	31-50		
Very Dense	Over 50		

^{*} N_{60} is the number of blows from a 140-lb weight having a free fall of 30-in. required to penetrate the final 12-in. of an 18-in. sample interval, corrected for field procedure to an average energy ratio of 60% (Terzaghi, Peck, and Mesri, 1996).

CONSISTENCY OF COHESIVE SOILS

The following descriptive terms for consistency apply to cohesive soils such as clays, sandy clays, and silty clays.

Typical Compressive Strength (tsf)	Consistency	Typical SPT "N ₆₀ " <u>V</u> alue Range**
q ₁₁ < 0.25	Very soft	≤ 2
$0.25 \leq q_{11} < 0.50$	Soft	3-4
$0.50 \le q_{11}^{3} \le 1.00$	Firm	5-8
$1.00 \le q_{11} < 2.00$	Stiff	9-15
$2.00 \le q_{11}^{3} < 4.00$	Very Stiff	16-30
$q_{\mathrm{u}} \ge 4.00$	Hard	≥ 31

^{**} An " N_{60} " value of 31 or greater corresponds to a hard consistency. The correlation of consistency with a typical SPT " N_{60} " value range is approximate.

Tolunay-Wong



Engineers, Inc.

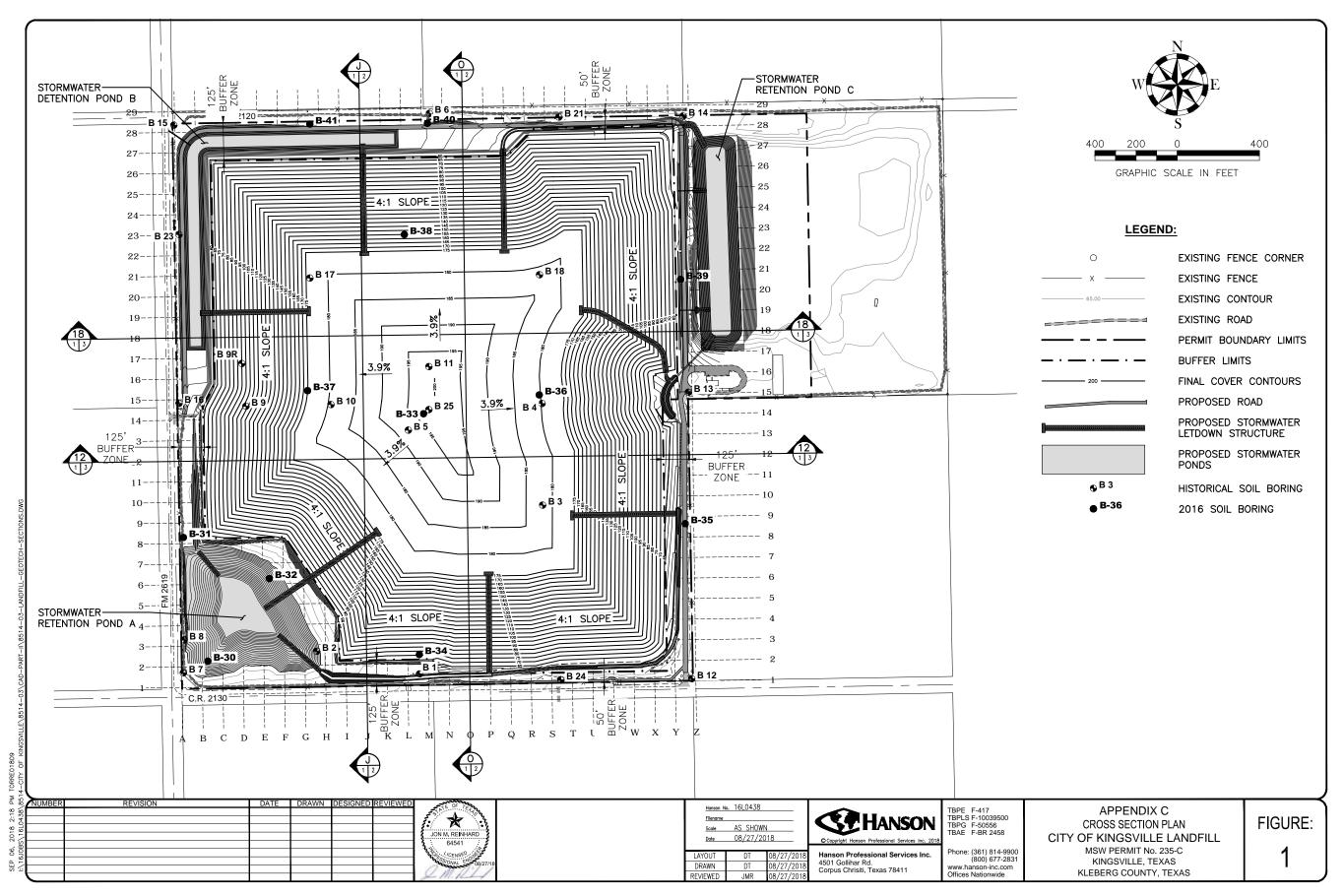
REVISION DATE 1-5-12 GEOSYSTEM

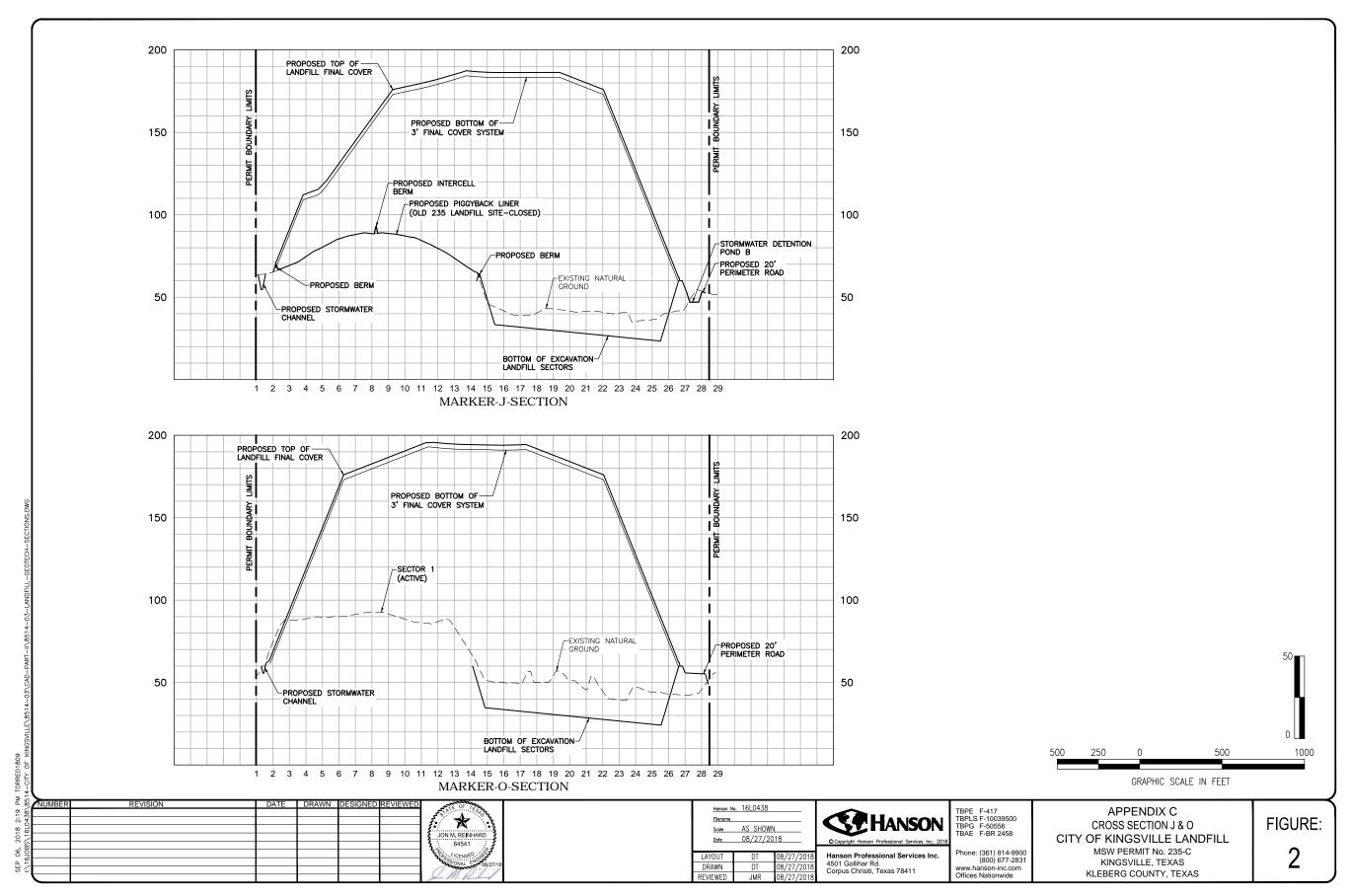
APPENDIX C

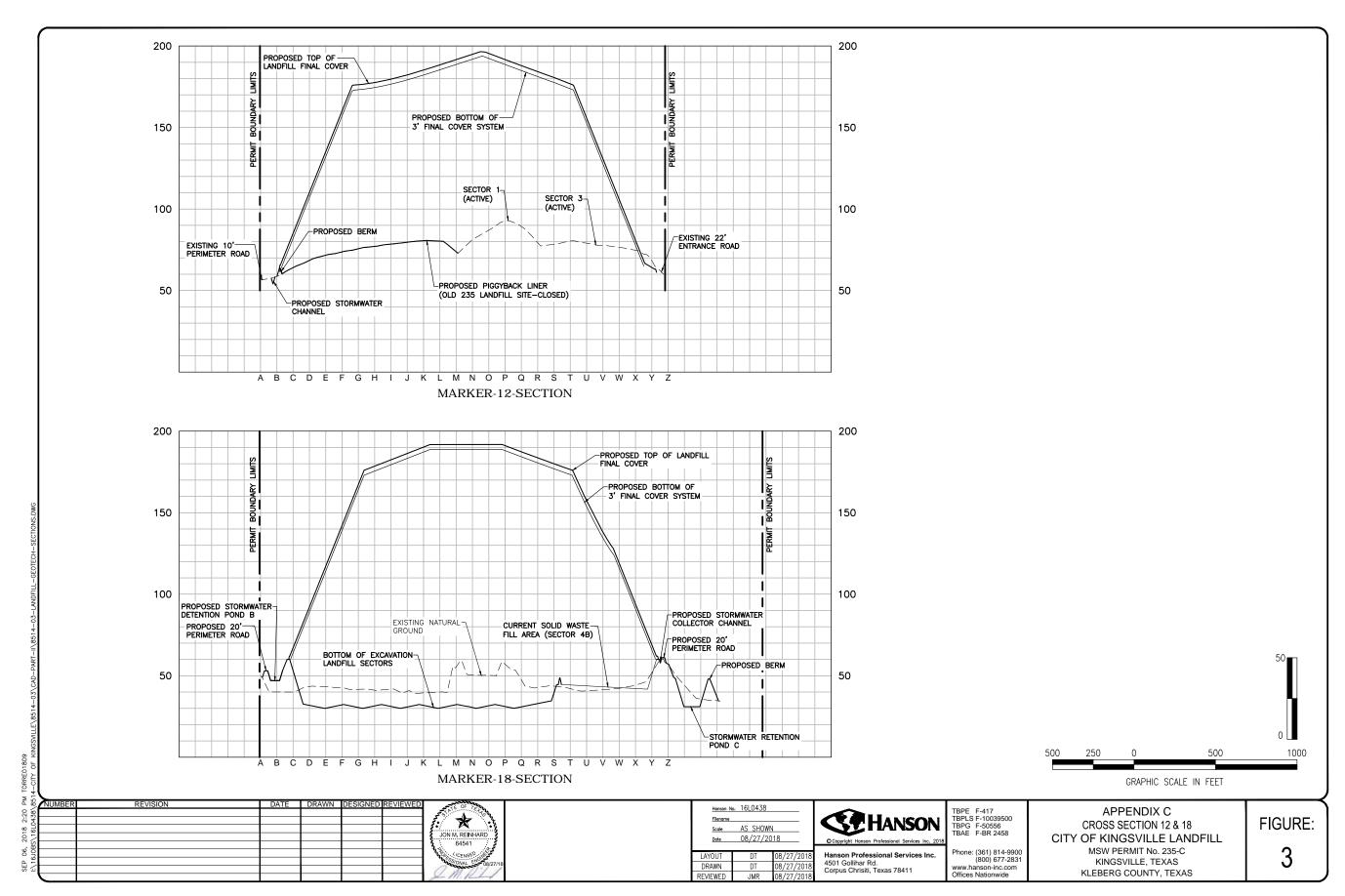
CROSS SECTION PLAN, CROSS SECTION J & O, CROSS SECTION 12 & 18

TWE

Project No. 16.53.042 Report No. 12788R1





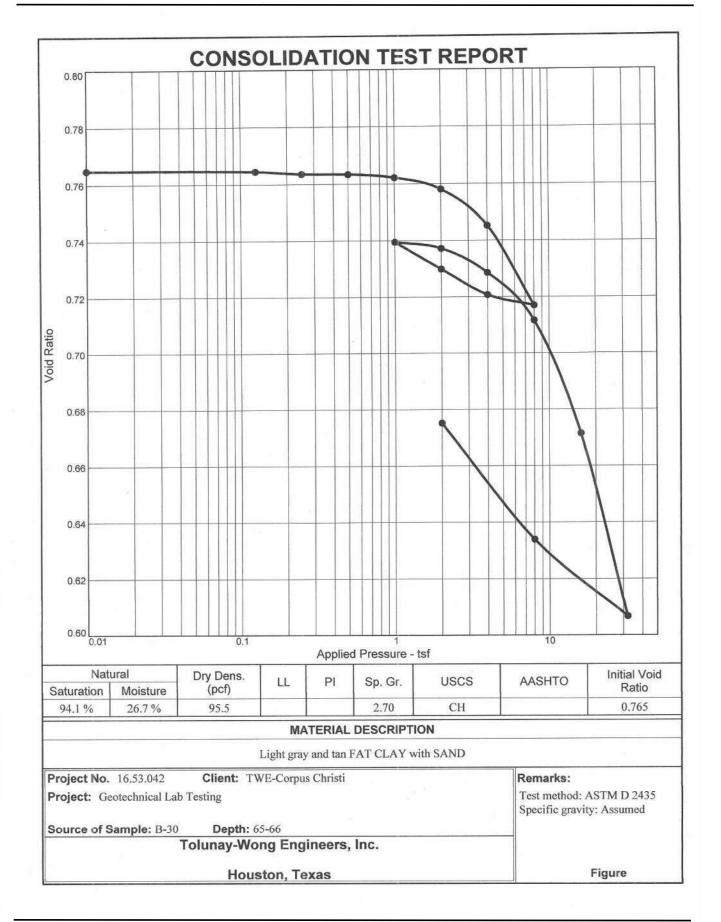


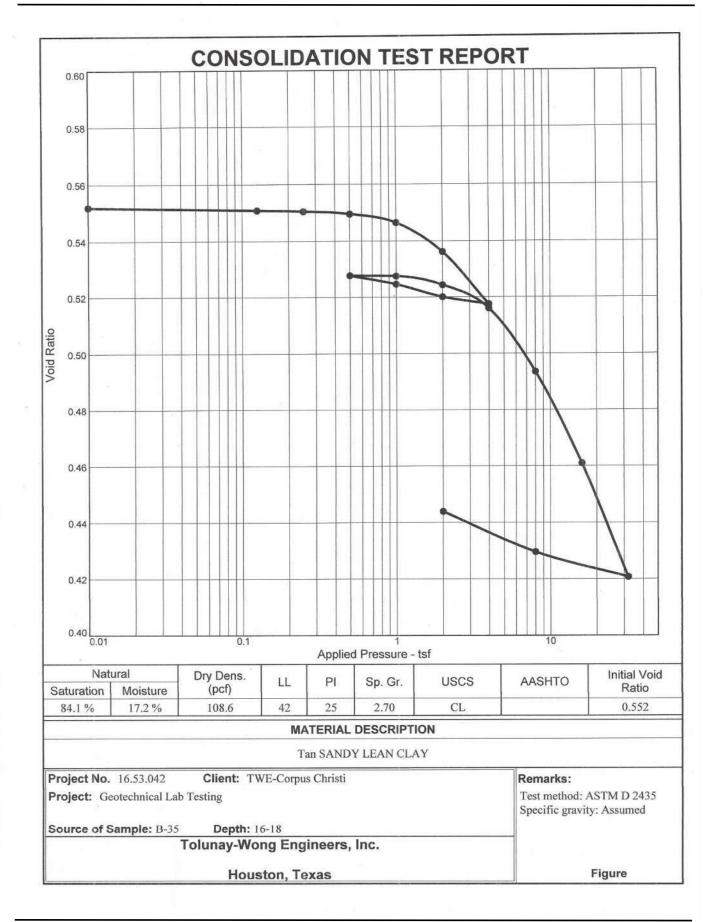
APPENDIX D

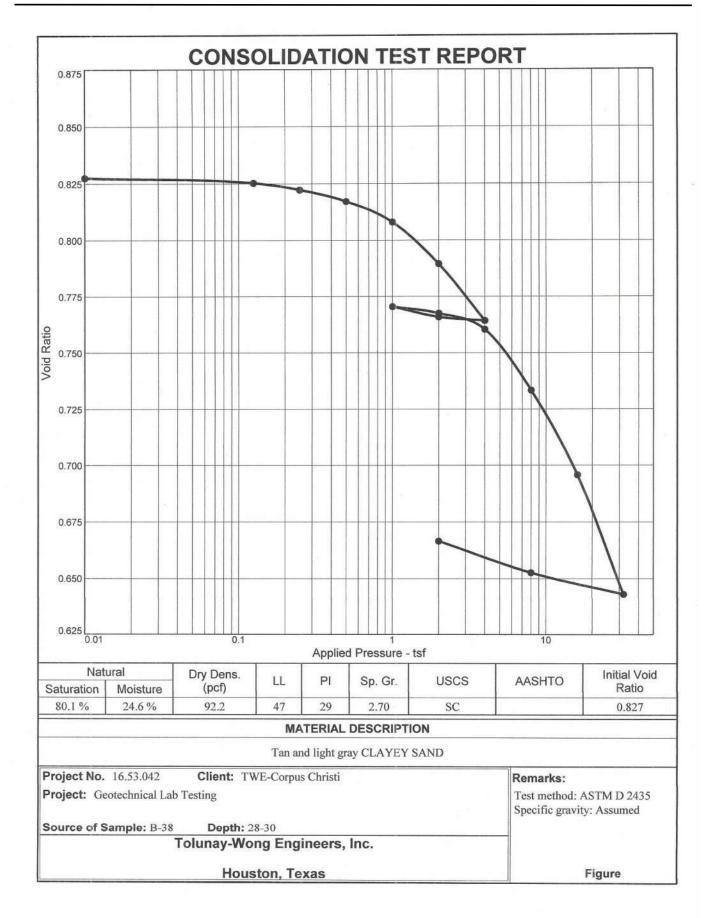
ONE-DIMENSIONAL CONSOLIDATION TESTS RESULTS

TWE

Project No. 16.53.042 Report No. 12788R1





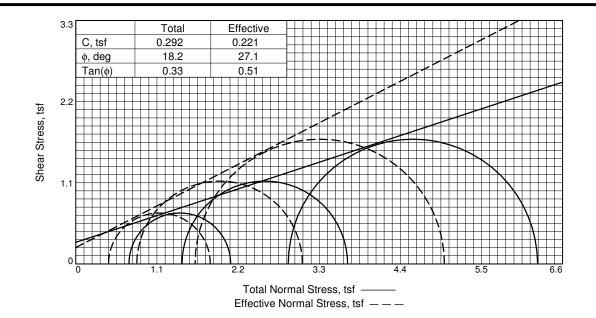


APPENDIX E

CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TESTS RESULTS

TWE

Project No. 16.53.042 Report No. 12788R1



Sa	mple No.	1	2	3	
	Water Content, %	28.3	28.3	28.3	
	Dry Density, pcf	88.5	88.5	88.5	
Initial	Saturation, %	84.6	84.6	84.6	
Init	Void Ratio	0.9043	0.9043	0.9043	
	Diameter, in.	2.06	2.06	2.06	
	Height, in.	4.17	4.17	4.17	
	Water Content, %	26.8	26.8	26.8	
±:	Dry Density, pcf	97.7	97.7	97.7	
At Test	Saturation, %	100.0	100.0	100.0	
=	Void Ratio	0.7246	0.7246	0.7246	
1	Diameter, in.	1.96	1.99	2.02	
	Height, in.	4.17	4.05	3.94	
Str	ain rate, %/min.	0.01	0.01	0.01	
Eff	. Cell Pressure, psi	10.00	20.00	40.00	
Fai	I. Stress, tsf	1.38	2.24	3.38	
E	Excess Pore Pr., tsf	0.28	0.61	1.26	
5	Strain, %	3.5	1.9	1.3	
Ult	. Stress, tsf	1.38	2.42	3.45	
E	Excess Pore Pr., tsf	0.28	0.50	1.21	
5	Strain, %	3.5	3.5	2.6	
σ₁	Failure, tsf	1.82	3.07	5.00	
	Failure, tsf	0.44	0.83	1.62	
ľ	*				

Type of Test:

CU with Pore Pressures **Sample Type:** Undisturbed

Description: Light gray and tan FAT CLAY with

little calcareous nodules

Assumed Specific Gravity= 2.70

Remarks:

Test method: ASTM D 4767 Failure type: Slickensided

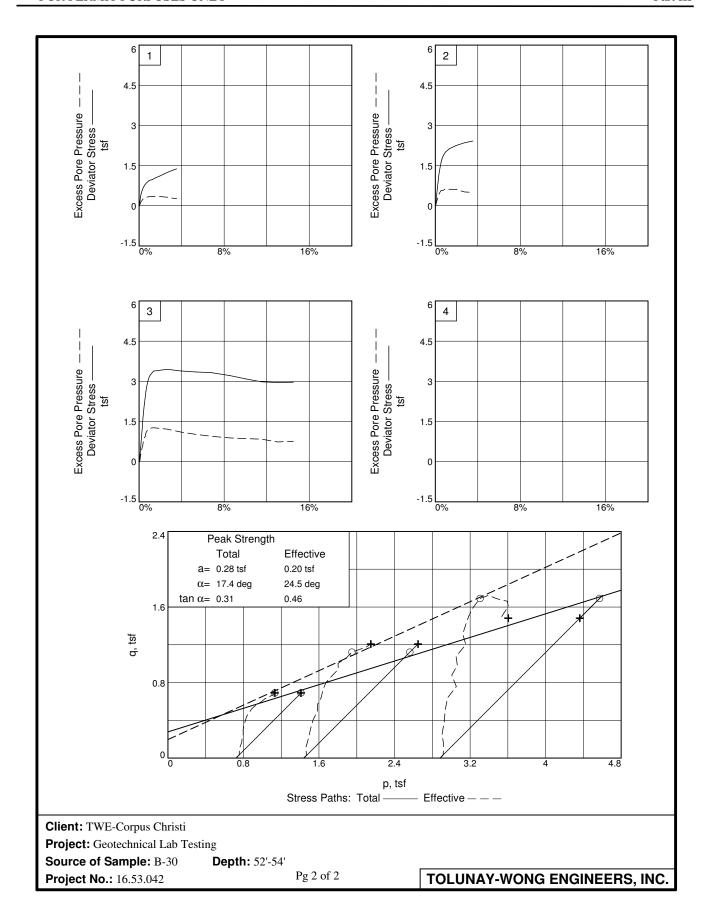
Pg 1 of 2

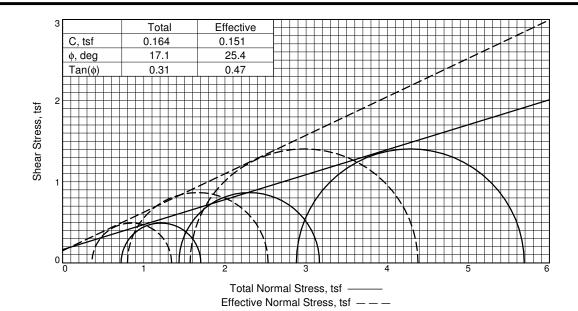
Client: TWE-Corpus Christi

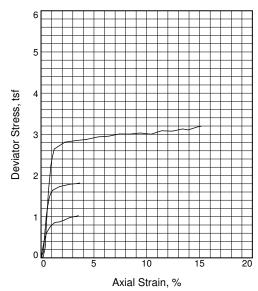
Project: Geotechnical Lab Testing

Source of Sample: B-30 Depth: 52'-54'

> TRIAXIAL SHEAR TEST REPORT Tolunay-Wong Engineers, Inc. Houston, Texas







	Sample No.		1	2	3	
		Water Content, %	31.2	31.2	31.2	
		Dry Density, pcf	86.6	86.6	86.6	
	ä	Saturation, %	89.0	89.0	89.0	
	Initial	Void Ratio	0.9473	0.9473	0.9473	
		Diameter, in.	2.87	2.87	2.87	
		Height, in.	5.59	5.59	5.59	
		Water Content, %	33.8	33.8	33.8	
	#	Dry Density, pcf	88.1	88.1	88.1	
	At Test	Saturation, %	100.0	100.0	100.0	
	;=	Void Ratio	0.9136	0.9136	0.9136	
	_	Diameter, in.	2.85	2.90	2.94	
		Height, in.	5.58	5.40	5.23	
	Str	ain rate, %/min.	0.01	0.01	0.01	
	Eff.	. Cell Pressure, psi	10.00	19.90	40.00	
	Fai	I. Stress, tsf	0.98	1.73	2.81	
	E	Excess Pore Pr., tsf	0.36	0.63	1.31	
	5	Strain, %	2.7	1.8	2.2	
	Ult.	. Stress, tsf	1.03	1.82	3.19	
		Excess Pore Pr., tsf	0.33	0.57	0.87	
	5	Strain, %	3.5	3.7	15.2	
	$\overline{\sigma}_1$	Failure, tsf	1.34	2.53	4.38	
	$\overline{\sigma}_3$	Failure, tsf	0.36	0.80	1.57	

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and reddish-brown FAT CLAY with few calcareous nodules

Assumed Specific Gravity= 2.70 Remarks:

Test method: ASTM D 4767 Failure type: Slickensided

Figure Pg 1 of 2

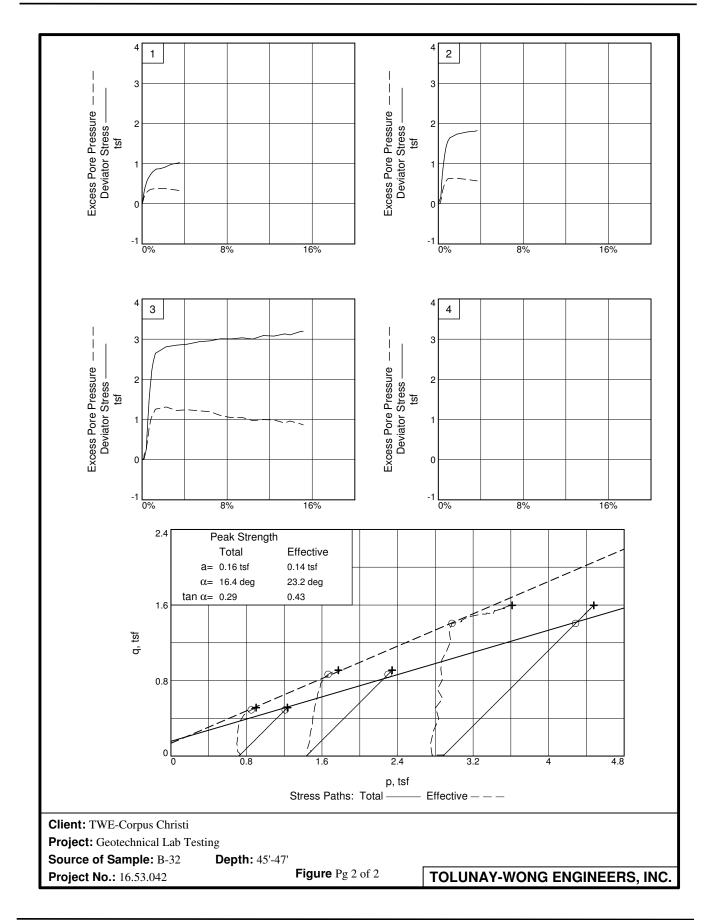
Client: TWE-Corpus Christi

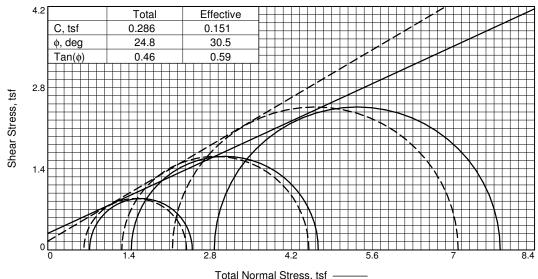
Project: Geotechnical Lab Testing

Source of Sample: B-32 **Depth:** 45'-47'

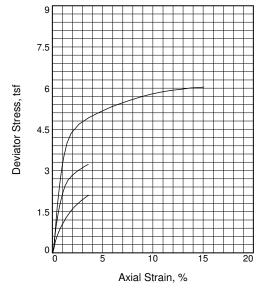
Proj. No.: 16.53.042 **Date Sampled: 8/26/16**

> TRIAXIAL SHEAR TEST REPORT Tolunay-Wong Engineers, Inc. Houston, Texas





Total Normal Stress, tsf ———
Effective Normal Stress, tsf ———



5	Sample No.		1	2	3	
		Water Content, %	13.6	13.6	13.6	
		Dry Density, pcf	114.1	114.1	114.1	
	nitia	Saturation, %	76.8	76.8	76.8	
	Ξ	Void Ratio	0.4771	0.4771	0.4771	
		Diameter, in.	2.87	2.87	2.87	
		Height, in.	5.56	5.56	5.56	
		Water Content, %	15.2	15.2	15.2	
	ij	Dry Density, pcf	119.5	119.5	119.5	
	At Test	Saturation, %	100.0	100.0	100.0	
	<u>'</u>	Void Ratio	0.4100	0.4100	0.4100	
	_	Diameter, in.	2.81	2.87	2.92	
		Height, in.	5.55	5.32	5.12	
5	Stra	ain rate, %/min.	0.01	0.01	0.01	
E	Ξff.	Cell Pressure, psi	10.00	20.00	39.90	
F	-ai	I. Stress, tsf	1.77	3.23	4.93	
	Е	Excess Pore Pr., tsf	0.10	0.16	0.72	
	5	Strain, %	2.5	3.6	3.7	
ι	Jlt.	Stress, tsf	2.09	3.23	6.04	
	Е	Excess Pore Pr., tsf	-0.02	0.16	0.04	
	5	Strain, %	3.6	3.6	15.1	
$\dashv_{\bar{\epsilon}}$	5 ₁	Failure, tsf	2.39	4.50	7.08	
	$\overline{\sigma}_3$ Failure, tsf		0.62	1.28	2.15	

Type of Test:

CU with Pore Pressures

Sample Type: Undisturbed

Description: Light gray and tan SANDY LEAN

CLAY

LL= 36 **PL=** 16 **PI=** 20

 $\textbf{Assumed Specific Gravity=}\ 2.70 \\$

Remarks:

Test method: ASTM D 4767

Failure type: Bulge

Pg 1 of 2

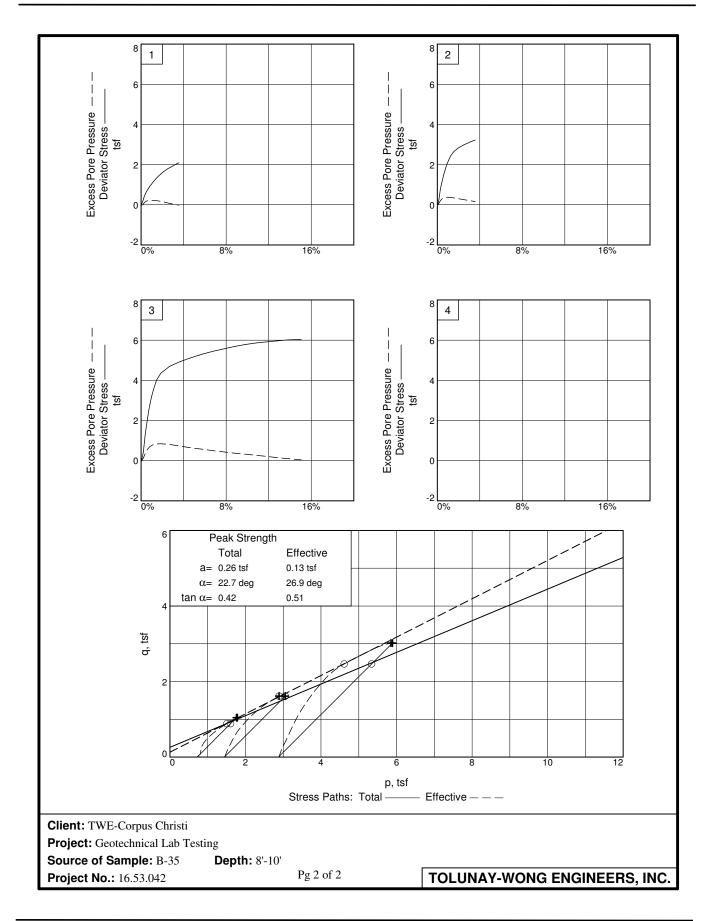
Client: TWE-Corpus Christi

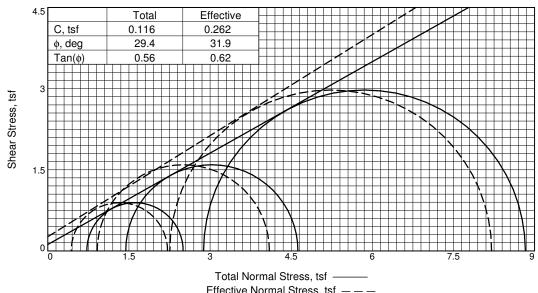
Project: Geotechnical Lab Testing

Source of Sample: B-35 Depth: 8'-10'

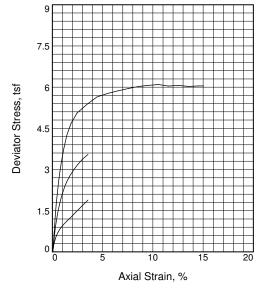
Proj. No.: 16.53.042 **Date Sampled:** 8/25/16

TRIAXIAL SHEAR TEST REPORT Tolunay-Wong Engineers, Inc. Houston, Texas





Effective Normal Stress, tsf ---



Sample No.		1	2	3	
Water Content, %		20.7	20.7	20.7	
	Dry Density, pcf	103.5	103.5	103.5	
Initial	Saturation, %	89.1	89.1	89.1	
Ξ	Void Ratio	0.6282	0.6282	0.6282	
	Diameter, in.	2.82	2.82	2.82	
	Height, in.	5.58	5.58	5.58	
	Water Content, %	20.4	20.4	20.4	
#	Dry Density, pcf	108.6	108.6	108.6	
At Test	Saturation, %	100.0	100.0	100.0	
=	Void Ratio	0.5518	0.5518	0.5518	
< <	Diameter, in.	2.77	2.81	2.84	
	Height, in.	5.50	5.37	5.25	
Strain rate, %/min.		0.01	0.01	0.01	
Eff.	. Cell Pressure, psi	10.00	20.00	40.00	
Fail. Stress, tsf		1.78	3.18	5.95	
Excess Pore Pr., tsf Strain, % Ult. Stress, tsf Excess Pore Pr., tsf Strain, %		0.29	0.53	0.62	
		3.2	2.5	7.5	
		1.89	3.55	6.09	
		0.26	0.40	0.49	
		3.5	3.5	10.6	
$\overline{\sigma}_1$	Failure, tsf	2.21	4.10	8.20	
$\overline{\sigma}_3$ Failure, tsf		0.43	0.91	2.26	

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and tan SANDY FAT

CLAY

LL= 52 **PL=** 19 **PI=** 33

Assumed Specific Gravity= 2.70

Remarks:

Test method: ASTM D 4767

Failure type: Bulge

Pg 1 of 2

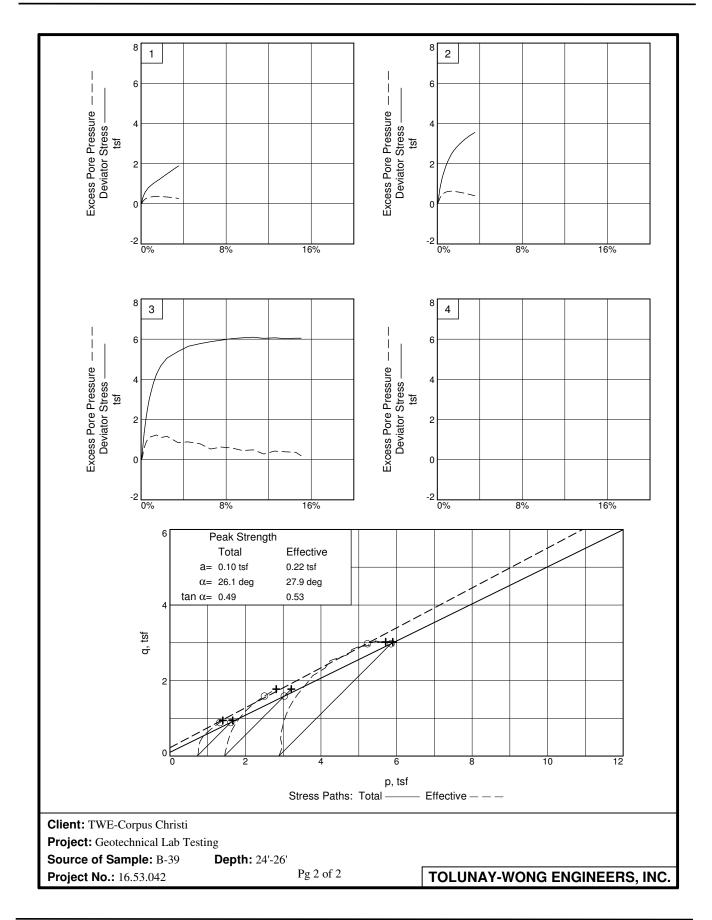
Client: TWE-Corpus Christi

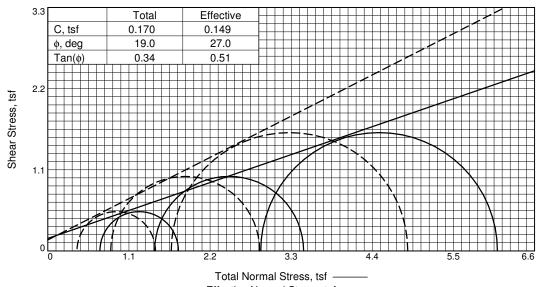
Project: Geotechnical Lab Testing

Source of Sample: B-39 **Depth:** 24'-26'

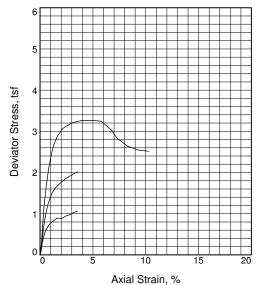
Proj. No.: 16.53.042 Date Sampled: 8/25/16

> TRIAXIAL SHEAR TEST REPORT Tolunay-Wong Engineers, Inc. Houston, Texas





Effective Normal Stress, tsf ---



Sample No.		1	2	3	
Water Content, %		30.9	30.9	30.9	
	Dry Density, pcf	91.8	91.8	91.8	
Initial	Saturation, %	97.8	97.8	97.8	
Ē	Void Ratio	0.8696	0.8696	0.8696	
	Diameter, in.	2.77	2.77	2.77	
	Height, in.	5.58	5.58	5.58	
	Water Content, %	31.7	31.7	31.7	
; ;	Dry Density, pcf	91.7	91.7	91.7	
At Test	Saturation, %	100.0	100.0	100.0	
7	Void Ratio	0.8728	0.8728	0.8728	
_	Diameter, in.	2.78	2.82	2.86	
	Height, in.	5.57	5.39	5.23	
Str	ain rate, %/min.	0.01	0.0060	0.0070	
Eff.	. Cell Pressure, psi	9.80	20.10	40.10	
Fai	I. Stress, tsf	1.06	2.02	3.21	
Е	Excess Pore Pr., tsf	0.31	0.59	1.21	
5	Strain, %	3.6	3.6	3.0	
Ult.	. Stress, tsf	1.06	2.02	3.27	
Е	Excess Pore Pr., tsf	0.31	0.59	1.18	
5	Strain, %	3.6	3.6	4.0	
	Failure, tsf	1.46	2.87	4.88	
$\overline{\sigma}_3$	Failure, tsf	0.39	0.85	1.67	
•	•				

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and tan FAT CLAY with SAND and some calcareous nodules

LL= 77 **PL=** 24 **PI=** 53

Assumed Specific Gravity= 2.75

Remarks:

Test method: ASTM D 4767 Failure type: Slickensided

Figure Pg 1 of 2

ြ	Saturation, %	100.0	100.0	100.0	
At Te	Void Ratio	0.8728	0.8728	0.8728	
1	Diameter, in.	2.78	2.82	2.86	
	Height, in.	5.57	5.39	5.23	
Str	ain rate, %/min.	0.01	0.0060	0.0070	
Eff.	. Cell Pressure, psi	9.80	20.10	40.10	
Fai	I. Stress, tsf	1.06	2.02	3.21	
Е	Excess Pore Pr., tsf	0.31	0.59	1.21	
5	Strain, %	3.6	3.6	3.0	
Ult.	Stress, tsf	1.06	2.02	3.27	
Е	Excess Pore Pr., tsf	0.31	0.59	1.18	
5	Strain, %	3.6	3.6	4.0	
$\overline{\sigma}_1$	Failure, tsf	1.46	2.87	4.88	
$\overline{\sigma}_3$	Failure, tsf	0.39	0.85	1.67	

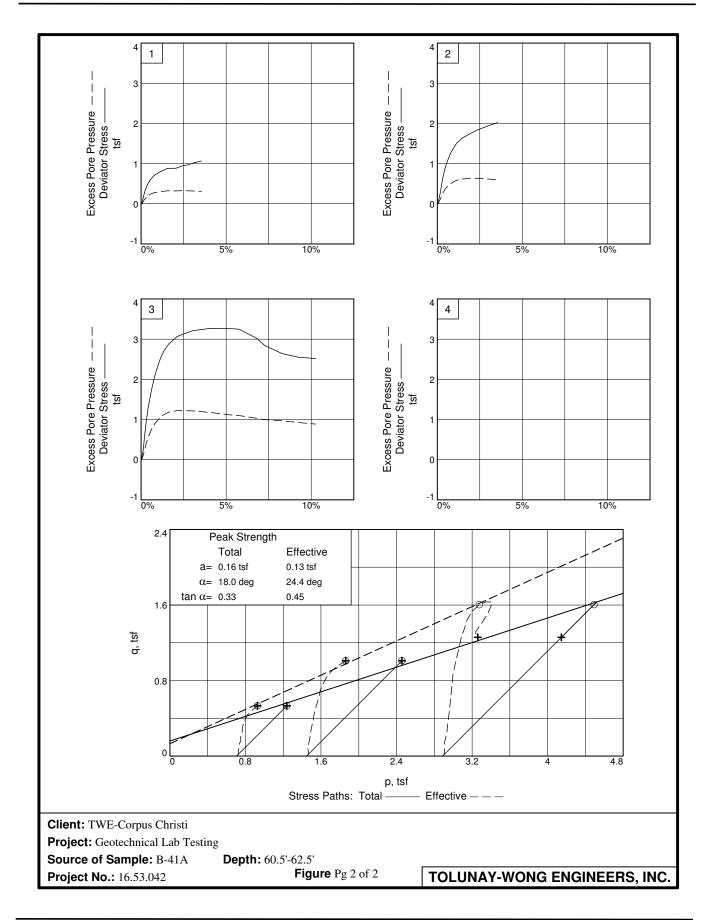
Client: TWE-Corpus Christi

Project: Geotechnical Lab Testing

Source of Sample: B-41A **Depth:** 60.5'-62.5'

Proj. No.: 16.53.042 **Date Sampled:**

> TRIAXIAL SHEAR TEST REPORT Tolunay-Wong Engineers, Inc. Houston, Texas

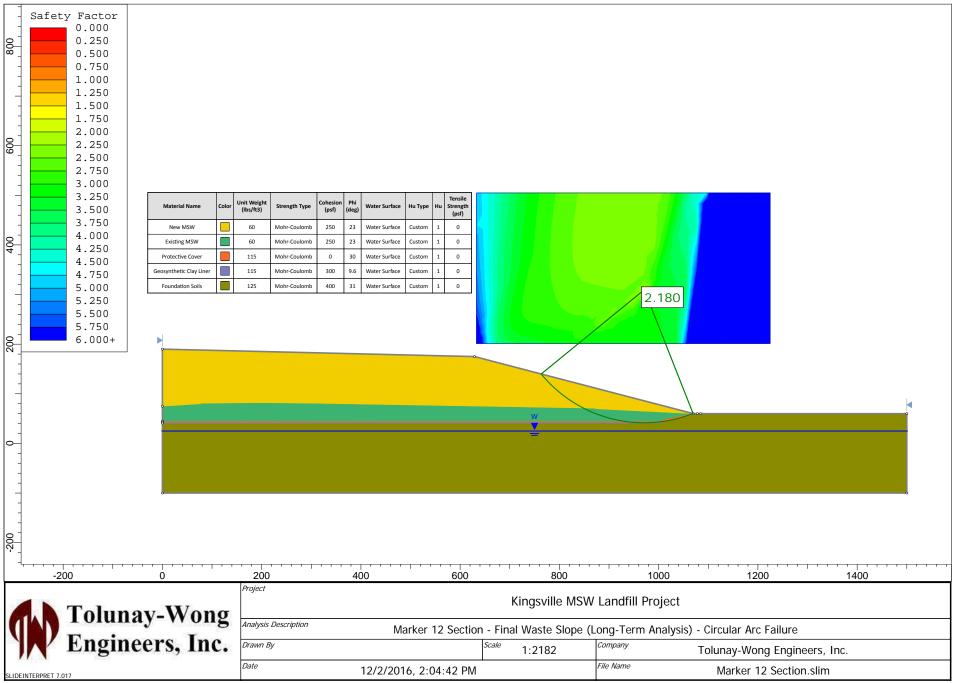


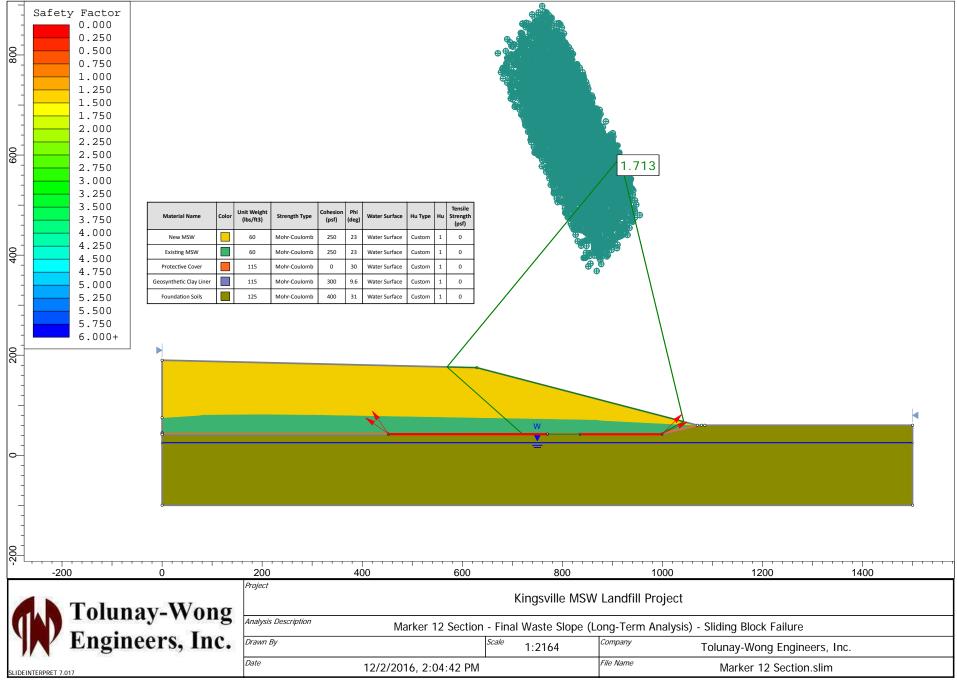
APPENDIX F

GRAPHICAL PRESENTATION OF MASS STABILITY ANALYSES RESULTS

TWE

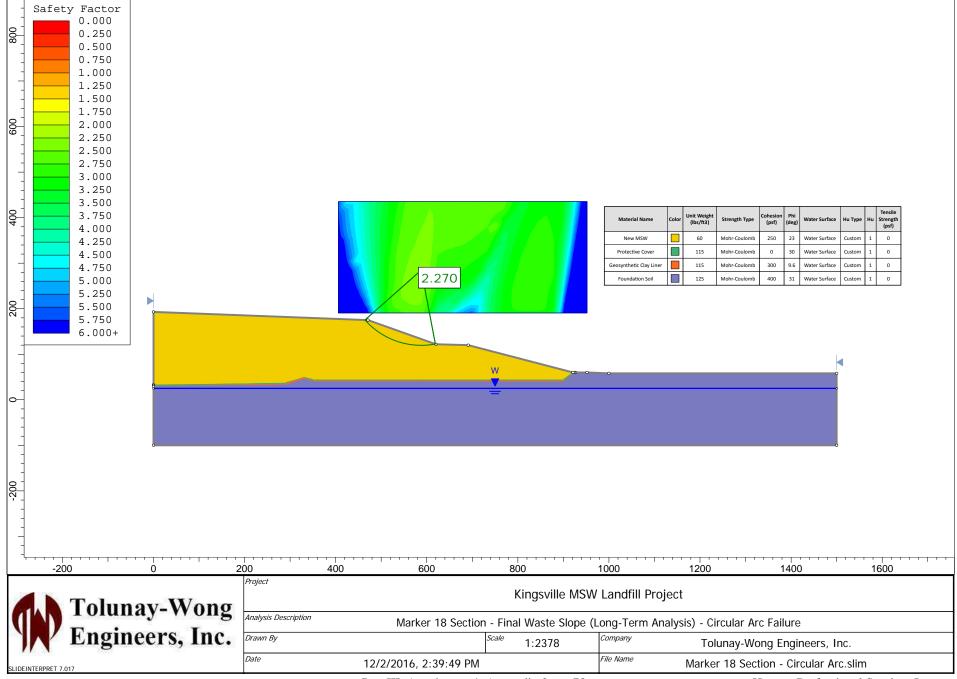
Project No. 16.53.042 Report No. 12788R1



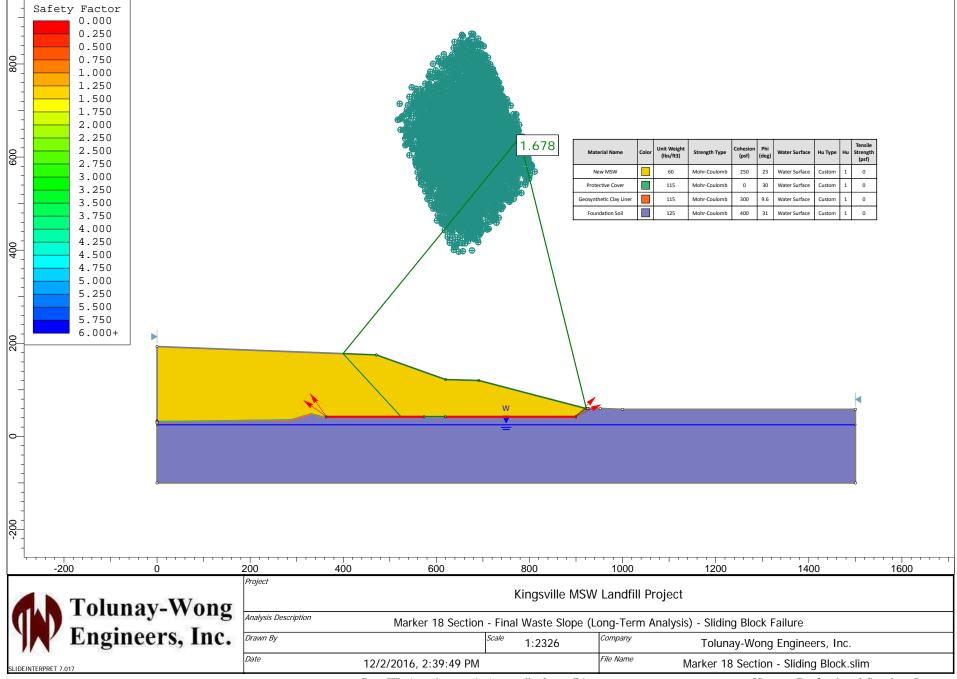


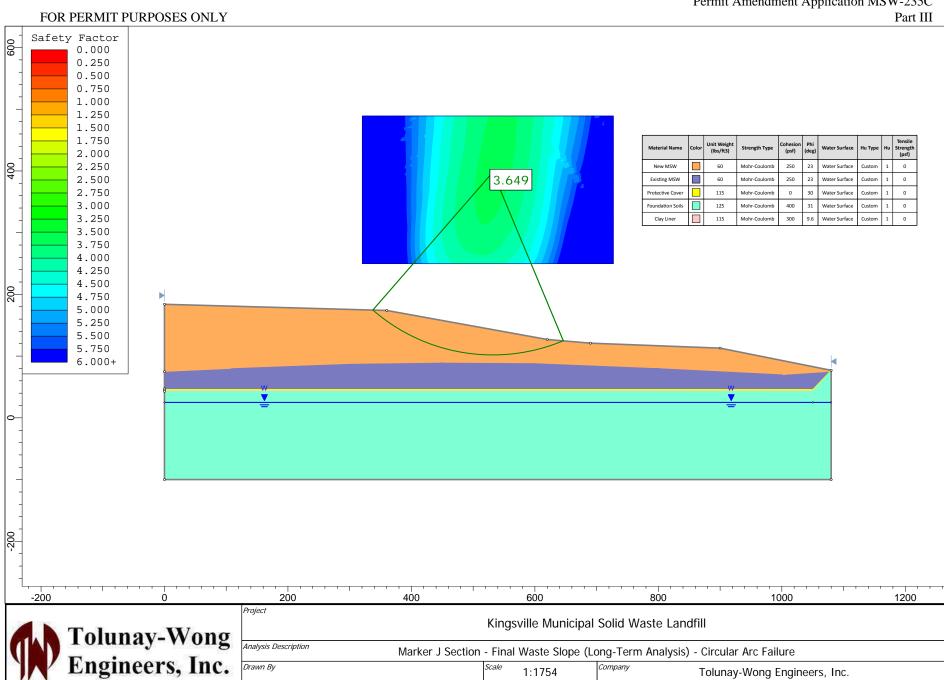
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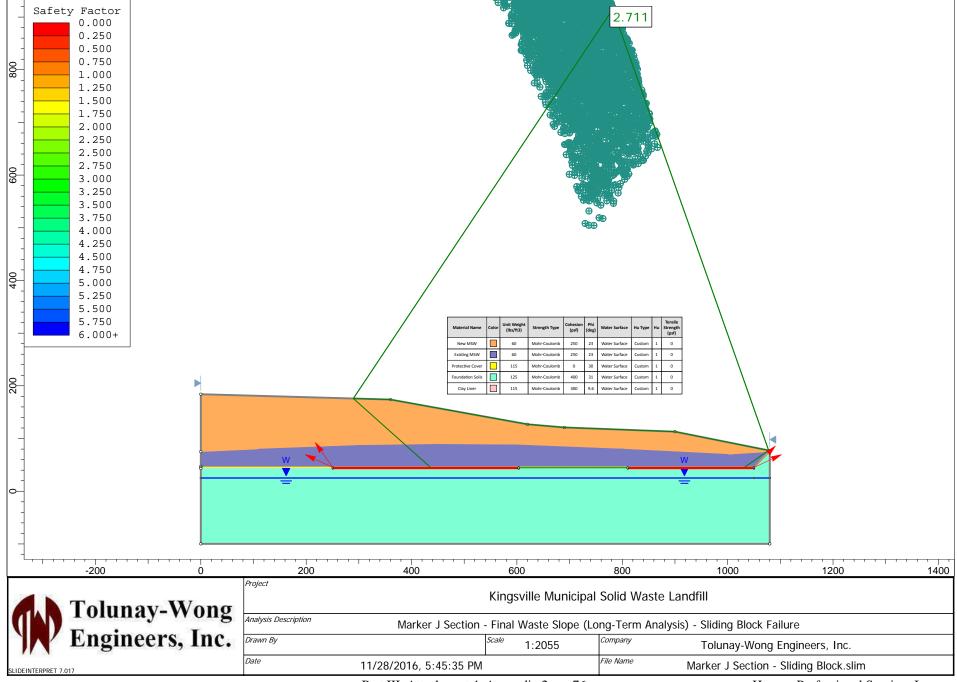
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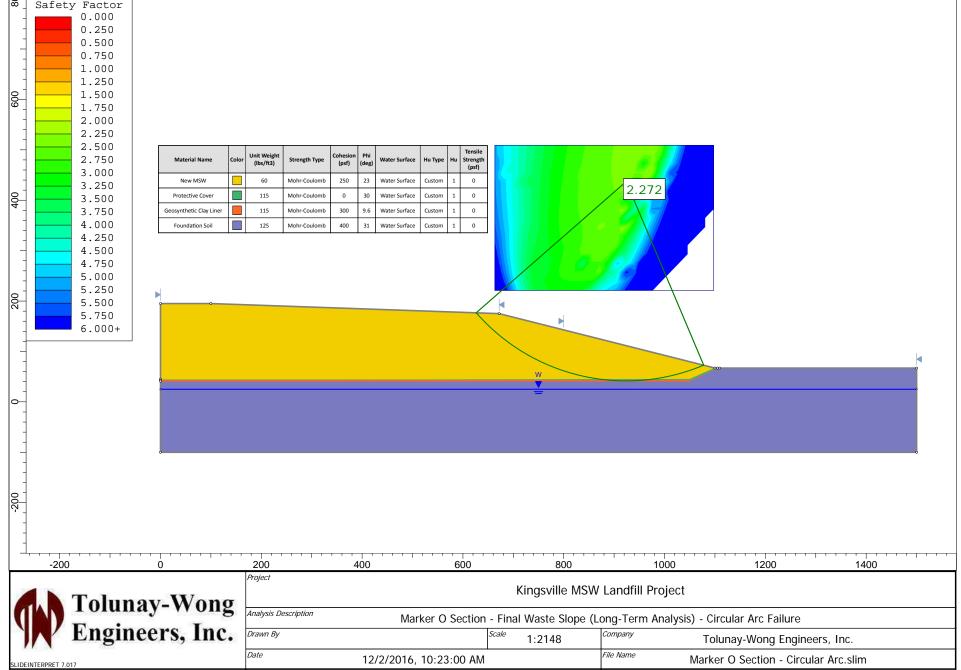
Tolunay-Wong Engineers, Inc.

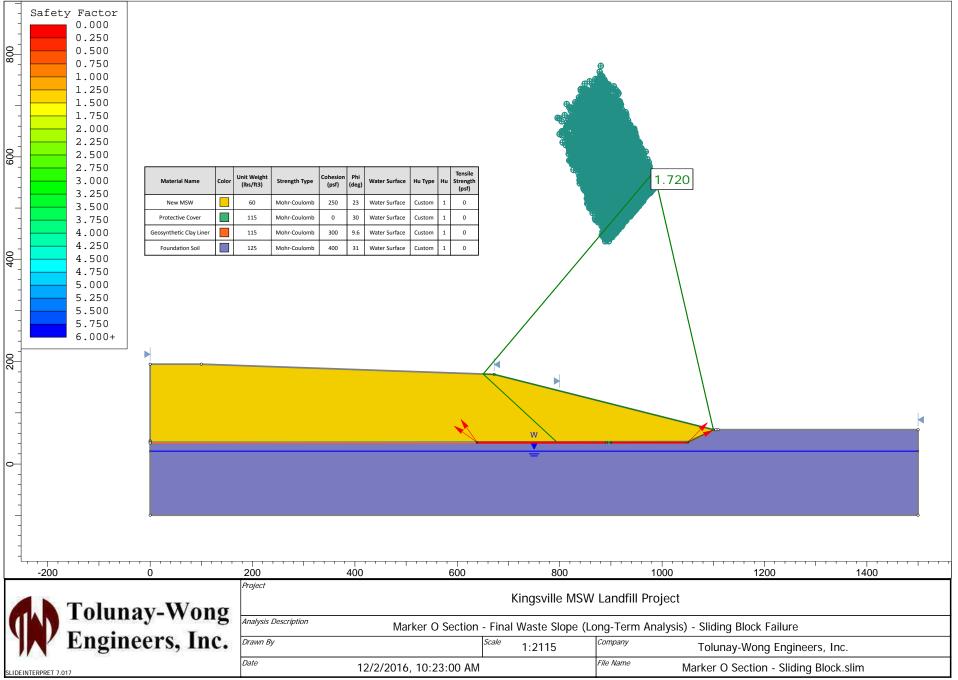
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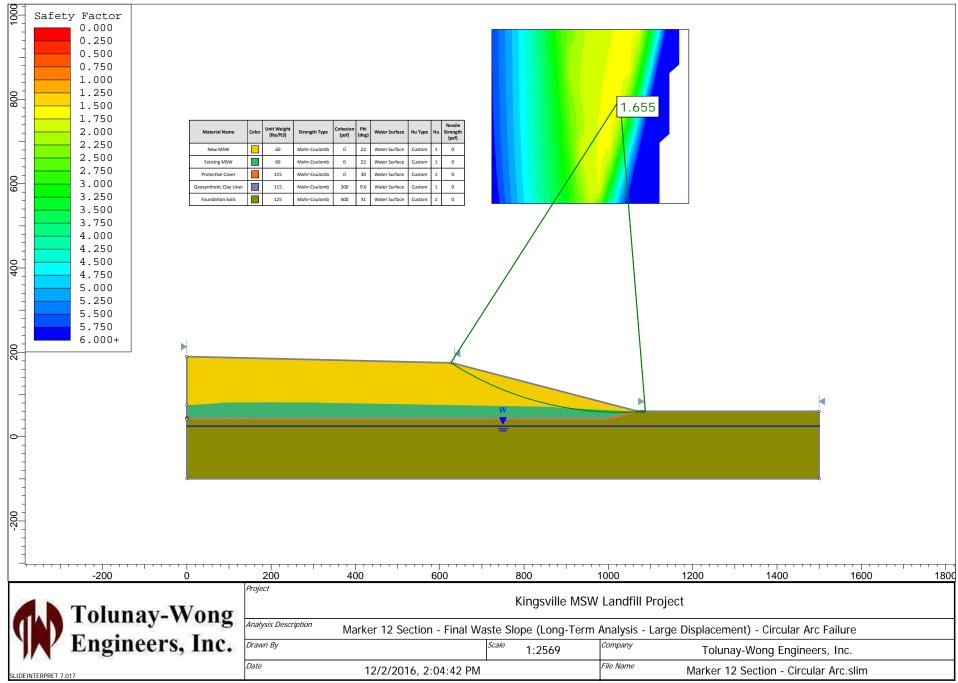
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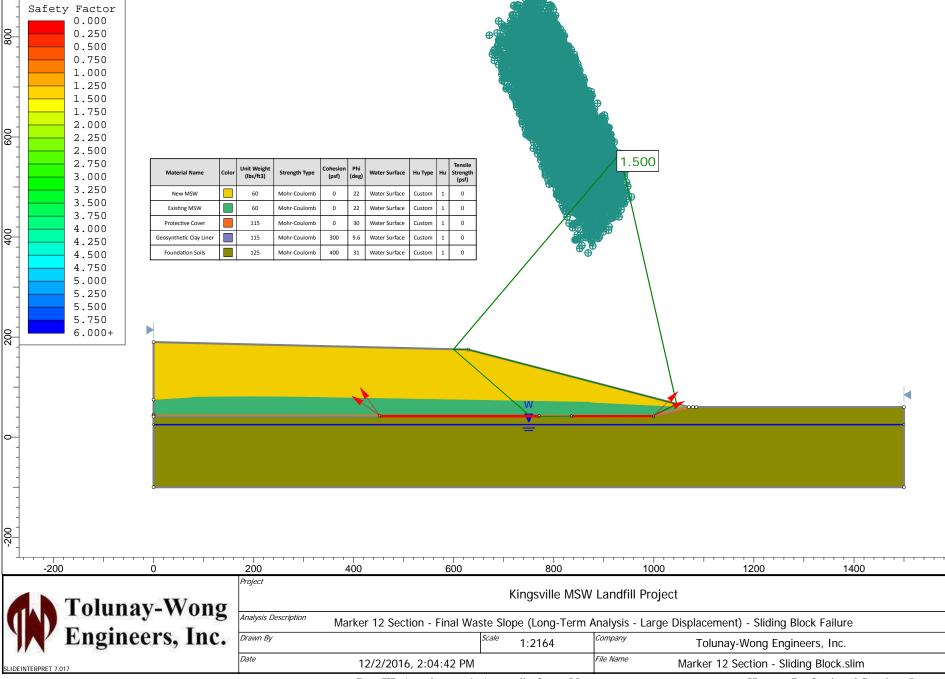


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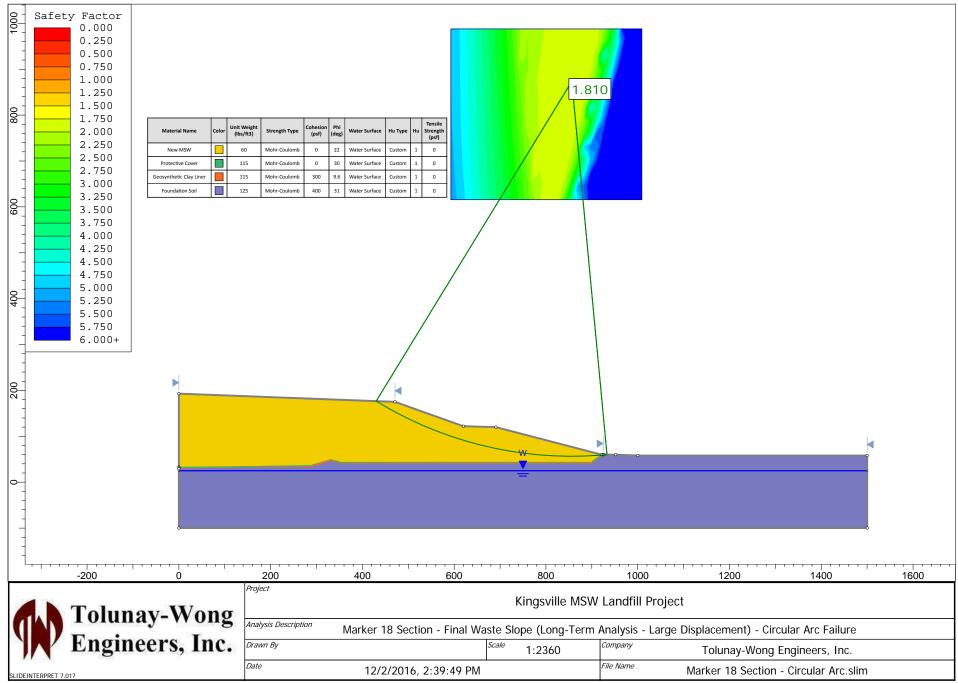








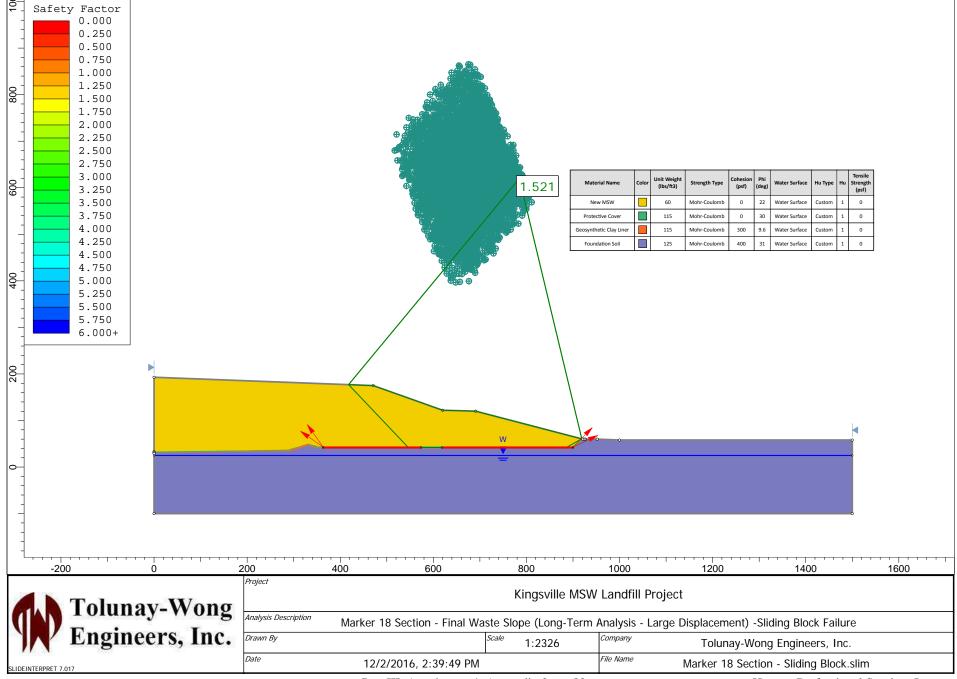
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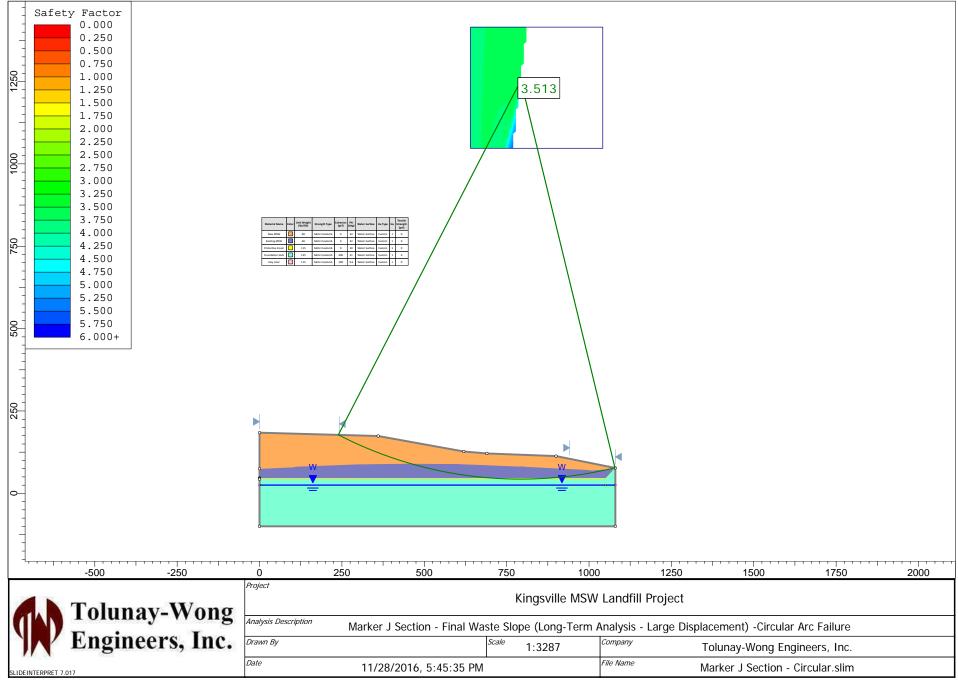
FOR PERMIT PURPOSES ONLY

Permit Amendment Application MSW-235C

Part III



FOR PERMIT PURPOSES ONLY



FOR PERMIT PURPOSES ONLY Part III Safety Factor 2.495 0.000 0.250 0.500 0.750 800 1.000 1.250 1.500 1.750 2.000 2.250 2.500 2.750 009 3.000 3.250 3.500 115 125 3.750 4.000 4.250 4.500 4.750 400 5.000 5.250 5.500 5.750 6.000+ 200 1000 1200 -200 400 600 800 Project Kingsville MSW Landfill Project Tolunay-Wong Analysis Description Marker J Section - Final Waste Slope (Long-Term Analysis - Large Displacement) - Sliding Block Failure Engineers, Inc. Drawn By Company 1:2055 Tolunay-Wong Engineers, Inc.

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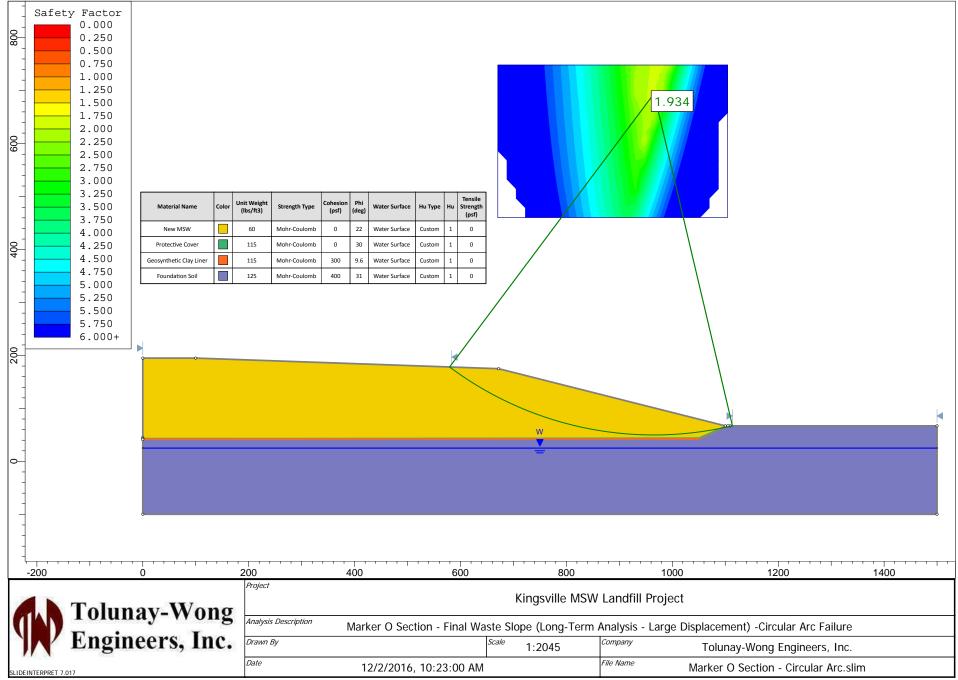
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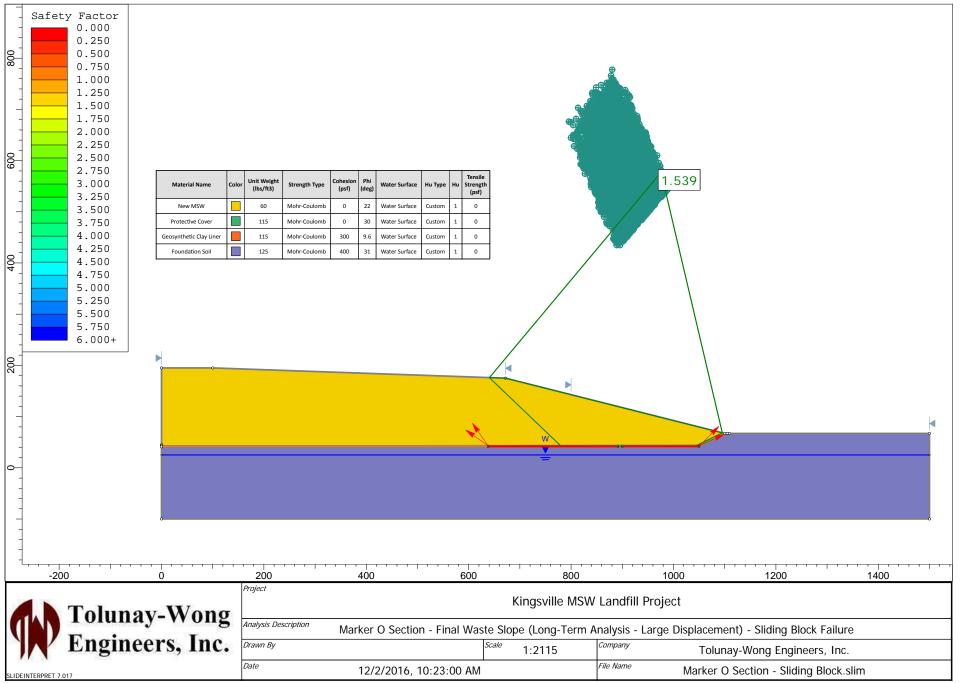
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LIDEINTERPRET 7.017

Marker J Section - Sliding Block.slim

FOR PERMIT PURPOSES ONLY





CITY OF KINGSVILLE LANDFILL PART III, ATTACHMENT 4

APPENDIX 3

HANSON PROFESSIONAL SERVICES, INC. SOIL BORING REPORT

Engineering | Planning | Allied Services





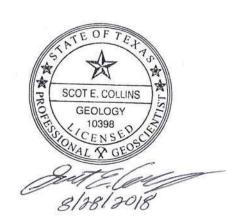


Soil Boring Report City of Kingsville Landfill

August 2018

Prepared for:
The City of Kingsville, Texas
Municipal Solid Waste Landfill
Permit Amendment Application No. MSW 235-C

August 28, 2018





Tab	le c	of C	on	tents
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3.2 Groundwater 4. Laboratory Testing	
3.1 Typical Profile	
3. Subsurface Conditions	
2. Geotechnical Exploration	4
1. Introduction	4



Exhibits

Exhibit I Property Location Map

Exhibit II Geotechnical Engineering Study Report

Exhibit III Soil Boring Location Map Exhibit IV Soil Boring Cross Sections

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1. Introduction

On behalf of the City of Kingsville, Hanson Professional Services, Inc. is preparing a permit amendment application for the City of Kingsville Landfill. This amendment includes both a horizontal and vertical expansion of the current Municipal Solid Waste (MSW) Landfill located in Kleberg County, Texas. The City of Kingsville Landfill is located approximately 5 miles southeast of the City of Kingsville at the northeast corner of the intersection of Farm to Market Road 2619 and East County Road 2130 as shown on Exhibit I.

2. Geotechnical Exploration

In order to identify the engineering characteristics of the subsurface materials in accordance with 30 TAC 330.63 (e)(4), a geotechnical exploration was conducted at the City of Kingsville Landfill. This exploration was completed by Tolunay-Wong Engineers, Inc. during June, July, and August of 2016.

Twelve soil borings were installed using a truck-mounted drill rig, utilizing hollow-stem auger and wash rotary drilling techniques. Boring depths ranged from 33.5 feet to 86 feet below grade. Twenty three (23) exploratory borings were previously drilled at the site for development of the existing landfill and the locations of these can be seen in Exhibit III. Surveyed locations and surface elevations for the twelve new soil borings can also be seen in Exhibit III. Upon completion of drilling, the new borings were pressure grouted from the bottom with a cement-bentonite mixture.

During the sampling procedure, standard penetration tests (SPT) were performed at pre-determined intervals to obtain the standard penetration resistance value of the soil. The standard value or "N-value" was recorded and can be found on the boring logs located in Appendix B of Exhibit II. Standard penetration tests utilized a 140-lb hammer falling 30 inches in accordance with the Standard Test Method for Standard Penetration Test (SPT) and Split Barrel Sampling of Soils (ASTM D 1586).

Fine grained cohesive soil samples were obtained using thin walled sampling (ASTM D1587) procedures. A geotechnician visually classified recovered soils and obtained field strength measurements using a pocket penetrometer for samples collected via thin walled sampling. These samples were extruded in the field, wrapped in foil, placed in moisture sealed containers, and protected from disturbance prior to transport to the laboratory.

Cohesionless, semi-cohesionless, and dry, brittle cohesive soil samples were obtained using split-barrel sampling (ASTM D1586) procedures. The compactness of cohesionless and semi-cohesionless samples are inferred from the N-value. The samples obtained from the split-barrel sampler were visually classified, placed in moisture sealed containers, and transported to the laboratory.

The recovered soil sample depths with corresponding pocket penetrometer measurements and SPT blowcounts can be found on the boring logs provided in Appendix B of Exhibit II. Interpretations of soil types throughout the boring depths and the locations of strata changes were based on visual classifications during field sampling and laboratory testing in accordance with Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) (ASTM D 2487) and Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM D 2488).

Revision: 0



3. Subsurface Conditions

3.1 Typical Profile

Typical soil profiles encountered in the soil borings consisted of alternating strata of cohesive clay soils (fat clays, sandy lean clays, and sandy lean silty clays) and semi-cohesionless clayey sands and silty sands, and cohesionless poorly graded sands with clay. The consistency of the cohesive clay soils was typically very stiff to hard, but occasionally stiff. The relative density of the semi-cohesionless silty sands/clayey sands and cohesionless poorly graded sands was typically medium dense to very dense, but occasionally loose. Depths of boring termination ranged from 33.5 ft to 86 ft. Detailed descriptions of the soils encountered at each boring location are presented on the boring logs that have been included in Appendix B of Exhibit II.

3.2 Groundwater

Typically borings were dry-augered using hollow stem augers to advance the boreholes until groundwater was encountered. Wash rotary drilling techniques were then used as necessary in order to continue advancing the borings. Groundwater measurements were recorded at depths ranging from approximately 11 ft to 34 ft BGS in the open boreholes when groundwater was first encountered. Groundwater measurements were recorded again after a 10 to 15 minute time period and those depths ranged from 5.4 ft to 30.8 ft. Depths to which groundwater was observed during drilling and after the 10 to 15 minute waiting period can be seen on the Groundwater Level Measurements Table below.

Groundwater Level Measurements						
		Groundwater Level Depth				
Boring No.	Boring Depth (feet)	Encountered During Drilling (feet)	Observed in Open Borehole After 10 to 15 Minute Waiting Period (feet)			
B-30	82.5	12	10.5			
B-31	68	23	21.5			
B-32	82.5	18	14.6			
B-33	86	32.5	28.1			
B-34	43	31	28.3			
B-35	72.5	34	30.8			
B-36	68	23	18.3			
B-37	48	15	9.3			
B-38	58	11	5.4			
B-39	68	27	26.5			
B-40	33.5	21	19			
B-41	62.5	19.5	19.2			

 $I: 16JOBS \setminus 16L0438 \setminus 8514-CITY\ OF\ KINGSVILLE \setminus LF\ AMENDMENT \setminus SOIL\ BORING\ PLAN \setminus SOIL\ BORING\ REPORT \setminus SP-3_SOIL\ BORING\ REPORT \setminus DOCUMENT \setminus SOIL\ BORING\ REPORT \setminus SP-3_SOIL\ BORING\ REPOR$



These groundwater observations were made during the installation of the soil borings. Groundwater conditions may be different at the time of construction due to seasonal variations in rainfall, runoff, irrigation, or other conditions not apparent at the time of drilling.

4. Laboratory Testing

In order to further classify and evaluate the physical and engineering properties of the soils encountered in the project borings, laboratory testing was conducted on selected samples. Laboratory tests were conducted in general accordance with ASTM International standards to measure physical and engineering properties of the recovered samples. Laboratory testing descriptions and methods can be viewed in the table below.

Test Description	Test Method	
Amount of Material in Soils Finer than No. 200 Sieve	ASTM D 1140	
Unconfined Compressive Strength of Cohesive Soil (UC)	ASTM D 2166	
Water (Moisture) Content of Soil	ASTM D 2216	
Liquid Limit, Plastic Limit and Plasticity Index of Soils	ASTM D 4318	
Density (Unit Weight) of Soil Specimens	ASTM D 2937	
One-Dimensional, Incremental Loading Consolidation	ASTM D 2435	
Consolidated-Undrained Triaxial Compression w/ Pore Water Pressure	ASTM D 4767	

Standard geotechnical laboratory test results and soil properties encountered in the project borings are presented on the boring logs provided in Appendix B of Exhibit II. Results of completed one-dimensional consolidation and consolidated-undrained triaixial compression tests performed on the selected cohesive soil samples obtained for this study are included in Appendix D of Exhibit II.

Exhibit I

Property Location Map

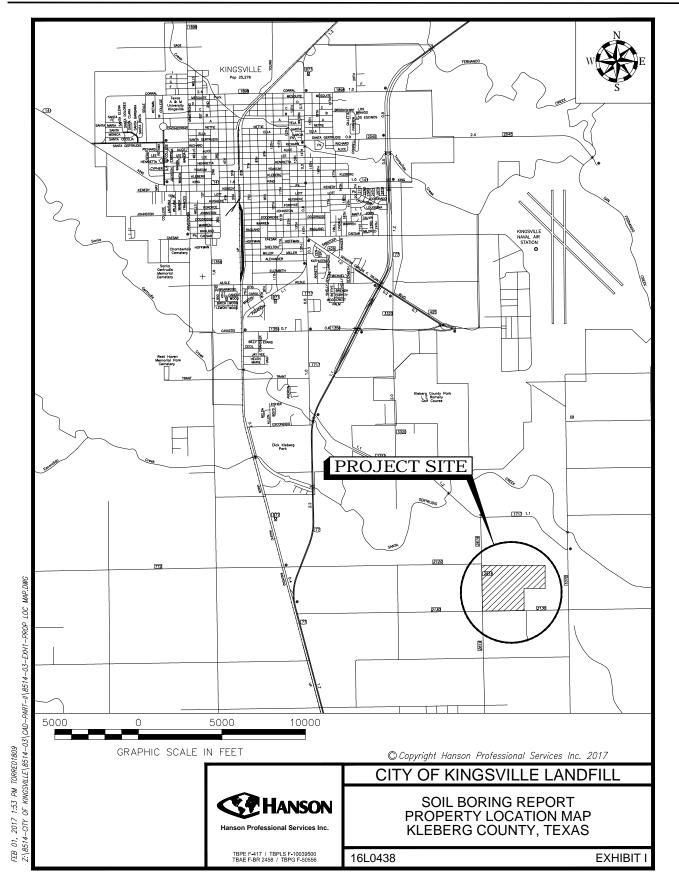
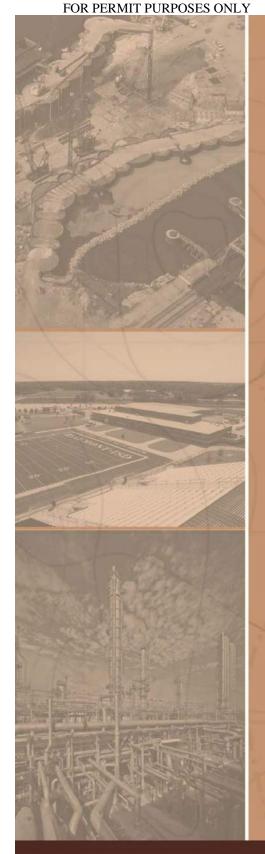


Exhibit II

Geotechnical Engineering Study Report



Tolunay-Wong Engineers, Inc.

GEOTECHNICAL ENGINEERING STUDY CITY OF KINGSVILLE MUNICIPAL SOLID WASTE LANDFILL EXPANSION KINGSVILLE, TEXAS

Prepared for:

Naismith/Hanson Corpus Christi, Texas

Prepared by:

Tolunay-Wong Engineers, Inc. 826 South Padre Island Drive Corpus Christi, Texas 78416

August 30, 2018

Project No. 16.53.042 / Report No. 12788R1

GEOTECHNICAL ENGINEERING, DEEP FOUNDATIONS TESTING, ENVIRONMENTAL SERVICES, CONSTRUCTION MATERIALS TESTING 1-888-887-9932 WWW.TWEINC.COM 826 South Padre Island Drive • Corpus Christi, Texas 78416 • Phone (361) 884-5050

August 30, 2018

Naismith/Hanson

4501 Gollihar Road Corpus Christi, Texas 78410

Attn: Mr. Jon Reinhard, P.E.

JReinhard@hanson-inc.com

Ref: Geotechnical Engineering Study

City of Kingsville

Municipal Solid Waste Landfill Expansion

Kingsville, Texas

TWE Project No. 16.53.042 / Report No. 12788R1

Dear Mr. Reinhard,

Tolunay-Wong Engineers, Inc. (TWE) is pleased to submit this revised report of our geotechnical engineering study for the above referenced project. This report contains a detailed description of the field program and laboratory services performed for this geotechnical engineering study as well as soil boring logs. Also included in this report are results of settlement predictions and waste mass stability analyses of the proposed landfill expansion and reinforcement recommendations as means to reduce settlement below future liner systems.

We appreciate the opportunity to work with you on this phase of the project and we look forward to the opportunity of providing additional services as the project progresses. If you have any questions or comments regarding this report or if we can be of further assistance, please contact us.

Sincerely,

TOLUNAY-WONG ENGINEERS, INC.

Texas Board of Professional Engineers Firm Registration Number F-000124

Jialin Li, E.I.T.

DRR/JL/drr

Geotechnical Staff Engineer

Don R. Rokohl, P.E.

Branch Manager

Part III, Attachment 4, Appendix 3, pg-11

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1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Introduction

This report presents the results of our geotechnical engineering study performed for the proposed municipal solid waste landfill vertical and lateral expansion in Kingsville, Texas. Our geotechnical engineering study was conducted in accordance with TWE Proposal No. P15-C105R1 dated December 31, 2015. The study was authorized by Grant Jackson, P.E. of Naismith/Hanson (NEI).

1.2 Project Description

The City of Kingsville is planning a vertical and lateral expansion of the existing municipal solid waste (MSW) landfill (Permit No. MSW 235-B) located at the northeast corner of the intersection of County Road E 2130 and Farm to Market Road 2619 near Kingsville (Kleberg County), Texas. The current landfill permit boundary covers an area of about 120 acres and is located immediately adjacent to a closed Pre-Subtitle D MSW landfill (Permit No. MSW 235). The closed landfill includes about 40 acres and is located southwest of Permit No. MSW 235-B.

The landfill expansion will include placement of MSW refuse over areas of the previously filled, closed Permit MSW 235 landfill. Like the remainder of the landfill, the top of the closed Permit No. MSW 235 landfill will receive a liner and leachate collection system prior to receiving new MSW. Permit No. MSW 235 has not received new MSW since 1992 and first began receiving MSW sometime around mid 1970's. Since it is planned so that the Permit No. MSW 235 area will contain the last sectors to receive waste, it will be about 70+ years before any new waste is placed over Permit No. MSW 235 area. The final landfill top elevation will be about 200-ft, with a maximum thickness of new MSW refuse above the existing MSW refuse of about 115- ft. The final landfill side slopes will be at a maximum of 4(H):1(V).

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2 PURPOSE AND SCOPE OF SERVICES

The purposes of our geotechnical engineering study were to investigate the soil and groundwater conditions within the project site and to provide geotechnical design and construction recommendations for the proposed facility.

Our scope of services performed for the project consisted of:

- 1. Drilling 12 soil borings to depths of 33.5-ft to 86-ft within the project site to evaluate subsurface stratigraphy and groundwater conditions;
- 2. Performing geotechnical laboratory tests on recovered soil samples to evaluate the physical and engineering properties of the strata encountered;
- 3. Providing estimated compression of the waste within the existing landfill due to construction of the new vertical expansion;
- 4. Providing geosynthetic reinforcement requirements to be incorporated into the cover design at the base of the vertical landfill construction; and,
- 5. Performing waste mass stability analyses of the new landfill construction.

Our scope of services did not include any environmental assessments for the presence or absence of wetlands or of hazardous or toxic materials within or on the soil, air or water within this project site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the Client. A geological fault study was also beyond the scope of our services associated with this geotechnical engineering study.

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3 FIELD PROGRAM

3.1 Soil Borings

TWE conducted an exploration of subsurface soil and groundwater conditions at the project site during June, July, and August 2016 by drilling and sampling 12 soil borings to depths of 33.5-ft to 86-ft below grade. The soil boring locations are presented on TWE Drawing No. 16.53.042-1 in Appendix A of this report. Drilling and sampling of the soil borings were performed using conventional truck-mounted drilling equipment. Our field personnel coordinated the field activities and logged the boreholes. The boring locations were staked at the site by professional public land surveyor. The latitude and longitude for each boring location were determined by the surveyor and are presented on the boring logs. The borings were pressure grouted from the bottom with a cementitious bentonite mixture.

Twenty three (23) exploratory borings were previously drilled at the site for development of the existing landfill. The previously drilled exploratory boring locations are presented on TWE Drawing No. 16.53.042.1 in Appendix A.

3.2 Drilling Methods

Field operations were performed in general accordance with the *Standard Practice for Soil Investigation and Sampling by Auger Borings [American Society for Testing and Materials (ASTM) D 1452]*. The soil borings were drilled using a truck-mounted drilling rig. Typically, borings are dry-augered using a flight auger to advance the boreholes until groundwater is encountered or until the boreholes become unstable and/or collapse. At that point, soil borings are completed using wash-rotary drilling techniques. Samples were obtained at intervals of 5-ft from existing ground surface to the completion depths of borings B-30, B-32, B-33, B-35, B-36, B-37, and B-41. A 2-ft sampling interval was used to the completion depths of borings B-31, B-34, B-38, B-39, and B-40. The completion depths of the borings were 33.5-ft to 86-ft below the ground surface at the time of the field exploration.

3.3 Soil Sampling

Fine-grained, cohesive soil samples were recovered from the soil borings by hydraulically pushing 3-in diameter, thin-walled Shelby tubes a distance of about 24-in. The field sampling procedures were conducted in general accordance with the *Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D 1587)*. Our geotechnician visually classified the recovered soils and obtained field strength measurements using a pocket penetrometer. A factor of 0.67 is typically applied to the penetrometer measurement to estimate the undrained shear strength of the Gulf Coast cohesive soils. The samples were extruded in the field, wrapped in foil, placed in moisture sealed containers and protected from disturbance prior to transport to the laboratory.

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Cohesionless, semi-cohesionless, and dry, brittle cohesive samples were collected with the standard penetration test (SPT) sampler driven 18-in by blows from a 140-lb hammer falling 30-in in accordance with the *Standard Test Method for Standard Penetration Test (SPT) and Spilt-Barrel Sampling of Soils (ASTM D 1586)*. The number of blows required to advance the sampler three (3) consecutive 6-in depths are recorded for each corresponding sample on the boring logs. The N-value, in blows per foot, is obtained from SPTs by adding the last two (2) blow count numbers. The compactness of cohesionless and semi-cohesionless samples are inferred from the N-value. The samples obtained from the split-barrel sampler were visually classified, placed in moisture sealed containers and transported to our laboratory.

The recovered soil sample depths with corresponding pocket penetrometer measurements and SPT blowcounts are presented on the boring logs in Appendix B.

3.4 Boring Logs

Our interpretations of general subsurface soil and groundwater conditions at the soil boring locations are included on the boring logs. Our interpretations of the soil types throughout the boring depths and the locations of strata changes were based on visual classifications during field sampling and laboratory testing in accordance with *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) (ASTM D 2487)* and *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM D 2488)*.

The boring logs include the type and interval depth for each sample along with its corresponding pocket penetrometer measurements and SPT blow counts. The boring logs and a key to terms and symbols used on boring logs are presented in Appendix B.

3.5 Groundwater Measurements

Groundwater level measurements were attempted in the open boreholes during dry-auger drilling. Water level readings were attempted in the open boreholes when groundwater was first encountered and after a ten (10) to fifteen (15) minute time period. The groundwater observations are summarized in Section 5.5 of this report entitled "Groundwater Observations."

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4 LABORATORY SERVICES

A laboratory testing program was conducted on selected samples to assist in classification and evaluation of the physical and engineering properties of the soils encountered in the project borings. Laboratory tests were performed in general accordance with *ASTM International* standards to measure physical and engineering properties of the recovered samples. The types and brief descriptions of the laboratory tests performed are presented in Table 4-1 below.

Table 4-1: Laboratory Testing Program							
Test Description	Test Method						
Amount of Material in Soils Finer than No. 200 Sieve	ASTM D 1140						
Unconfined Compressive Strength of Cohesive Soil (UC)	ASTM D 2166						
Water (Moisture) Content of Soil	ASTM D 2216						
Liquid Limit, Plastic Limit and Plasticity Index of Soils	ASTM D 4318						
Density (Unit Weight) of Soil Specimens	ASTM D 2937						
One-Dimensional, Incremental Loading Consolidation	ASTM D 2435						
Consolidated-Undrained Triaxial Compression w/ Pore Water Pressure	ASTM D 4767						

Standard geotechnical laboratory test results and soil properties encountered in the project borings are presented on the logs of borings in Appendix B of this report. Results of completed one-dimensional consolidation and consolidated-undrained triaixial compression tests performed on the selected cohesive soil samples obtained for this study are included in Appendix C.

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5 SITE AND SUBSURFACE CONDITIONS

5.1 General

Our interpretations of soil and groundwater conditions within the project site are based on information obtained at the soil boring locations only. This information has been used as the basis for our conclusions and recommendations included in this report. Subsurface conditions may vary at areas not explored by the soil borings. Significant variations at areas not explored by the soil borings will require reassessment of our recommendations.

5.2 Site Description and Surface Conditions

The present MSW landfill (project site) is located at the northeast corner of the intersection of County Road E 2130 and Farm to Market Road 2619 near Kingsville (Kleberg County), Texas. The landfill covers an area of about 120 acres. Several active disposal areas are excavated and at various stages of use.

5.3 Subsurface Conditions

The soil profile encountered in the project borings consisted of alternating strata of cohesive clay soils (fat clays, sandy lean clays, and sandy lean silty clays) and semi-cohesionless clayey sands and silty sands, and cohesionless poorly graded sands with clay. The consistency of the cohesive clay soils was typically very stiff to hard, but occasionally stiff. The relative density of the semi-cohesionless silty sands/clayey sands and cohesionless poorly graded sands was typically medium dense to very dense, but occasionally loose. The borings were terminated at depths ranging from 33.5-ft to 86-ft. Detailed descriptions of the soils encountered at the boring locations are presented on the boring logs in Appendix B.

5.4 Subsurface Soil Properties

In-situ moisture contents of selected cohesive clay samples ranged from 18% to 34%. Results of Atterberg Limits tests on selected clay samples indicated liquid limits (LL) ranging from 31 to 81 with plasticity indices (PI) ranging from 18 to 58. The amount of materials finer than the No. 200 sieve on the selected samples ranged from 55% to 100%. In-situ moisture contents of selected silty sand samples ranged from 23% to 24%. The amount of materials finer than the No. 200 sieve on the selected samples tested for grain size distribution ranged from 14% to 38%.

Undrained shear strengths derived from field pocket penetrometer readings ranged from 0.25-tsf to 4.50-tsf. Undrained shear strengths derived from laboratory unconfined compressive (UC) strength testing ranged from 0.16-tsf to 3.41-tsf with corresponding total unit weights of 86-pcf to 105-pcf. Shear strength of cohesive soils inferred from SPT blow counts generally were similar. Based on this undrained shear strength data, the consistency of the cohesive soils encountered in the project borings is considered to be very soft to very stiff.

Tabulated laboratory test results at the recovered sample depths are presented on the boring logs in Appendix B.

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5.5 Groundwater Observations

Groundwater measurements were attempted in the project borings during dry-auger drilling. Groundwater level measurements are shown in Table 5-1 below.

	Table 5-1: Groundwater Level Measurements										
	Boring	Groundwater Level Depth									
Boring Depth No. (feet)		Encountered During Drilling (feet)	Observed in the Open Borehole after a 10 to 15 minute waiting period (feet)								
B-30	82.5	21	10.5								
B-31	68.0	23	21.5								
B-32	82.5	18	14.6								
B-33	86	32.5	28.1								
B-34	43	31	28.3								
B-35	72.5	34	30.8								
B-36	68	23	18.3								
B-37	48	15	9.3								
B-38	58	11	5.4								
B-39	68	27	26.5								
B-40	33.5	21	19								
B-41	62.5	19.5	19.2								

Groundwater levels may fluctuate with climatic and seasonal variations and should be verified before construction. Accurate determination of the static groundwater level is typically made with a standpipe piezometer. Installation of a piezometer to evaluate the long-term groundwater condition was not included within the current scope of services.

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6 VERTICAL AND LATERAL LANDFILL EXPANSION

6.1 General

The results of engineering analyses performed are presented in the sections below. Project information provided to us was utilized in the analyses and represents our understanding of the proposed construction. It is imperative that we are contacted if any changes from the described information are made so that we can evaluate whether modifications to our findings will need to be made.

6.2 Permit No. MSW 235 Existing Waste Settlement

Classic consolidation theory describes compression settlement of municipal solid waste (MSW) when loaded by the weight of additional waste from vertical expansion as the total of primary settlement and secondary settlement. Specific testing to evaluate compression characteristics of municipal solid waste was not performed for this study. We, therefore, assumed the following parameters, which are based on published information (1) (2), for our analyses.

- Unit weight of new waste = 65 pounds per cubic foot (pcf)
- Unit weight of existing waste = 65 pcf
- Modified primary compression index, C_c', of existing waste = 0.17 to 0.36
- Modified secondary compression index, C_{α} , of existing waste = 0.03 to 0.10
- Age of existing waste = 33 years
- Ending time of secondary settlement = 90 years

For our calculations, we used procedures presented in the publications presented above and geometry from cross-sections presented on the following NEI drawing:

Appendix C, Cross Section J & O, City of Kingsville, Fig No. 2, dated 08/26/2018

The cross section is presented in Appendix C. Settlement estimates resulting from compression of the existing solid waste due to the weight of the new, overlying waste are presented in Table 6.1 below for various primary and secondary compression indices.

One-dimensional consolidation tests were performed using select samples from the soil borings completed for this study to evaluate the compressibility characteristics of the foundation soils. The results of the consolidation tests are presented in Appendix D. The calculated settlements resulting from consolidation of the foundation soils due to the weight of the overlying landfill material are on the order of magnitude of 1 foot. This consolidation settlement should be added to existing waste total settlement presented in Table 6.1 below to obtain total settlement of the solid waste and the foundation soils.

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	Table 6.1 - Marker-J-Section										
Existing New Estimated Settlement (feet) of Existing Waste Waste MSW											
Section	Thickness (feet)	Thickness (feet)	C _c '	$= 0.17, C_{\alpha}' = 0$	0.03	$C_c' = 0.36, C_{\alpha'} = 0.10$					
Se			Primary Settlement	Secondary Settlement	Total Settlement	Primary Settlement	Secondary Settlement	Total Settlement			
С	20	15	1.4	0.2	1.6	2.9	0.5	3.4			
Е	26	60	3.3	0.2	3.5	7.0	0.7	7.7			
G	31	100	4.6	0.2	4.8	9.7	0.8	10.5			
I	34	95	4.7	0.3	5.0	10.0	0.9	10.9			
K	35	105	5.0	0.3	5.3	10.6	0.9	11.5			
L	35	108	5.1	0.3	5.4	10.8	0.9	11.7			
M	30	115	4.8	0.2	5.0	10.1	0.8	10.9			

As biological decomposition of waste occurs, waste volume is reduced as the density increases, resulting in settlements of the overall landfill mass. This, in effect, will pre-compress the existing waste, reducing settlement due to placement of future waste. The magnitude of the settlement could be rather significant since it is planned that new waste will not be placed over the existing waste for another 70+ years. Site preparation will result in placement of soils in the Permit No. MSW 235 area. The additional weight of soils will surcharge the waste in this area, resulting in further pre-compression of the waste.

6.3 Reinforcement Design

The anticipated liner section to be constructed over the top of the existing waste will consist of (from bottom upwards) 24 inches of lightly compacted soil "foundation soil", a 6-inch thickness of compacted soil "interim cover soil", a geogrid stabilization layer, a geosynthetic clay liner (GCL), a 60 mil HDPE geomembrane, and a layer of drainage geocomposite. If the planned liner profile will be different from the assumed, TWE should be contacted so further evaluation can be made if necessary.

The geosynthetic reinforcement design uses the procedure provided in Qian, X. et.al., (2002) publication, and is based on the possible development of a void that is located immediately below the liner. The liner is assumed to bridge over the void, carrying the load from the proposed overlying waste. As commonly accepted scenario, the case of the "rusted refrigerator" is used, with the design depression having a radius of 3 feet. Other assumptions used in the design are listed below and in Tables 6.2 and 6.3.

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- Design life of 50 years
- Maximum elevation of MSW on the lining system is 115 feet

Table 6.2 – Assumed Material Properties									
Material	Unit Weight (pcf)	Friction Angle (deg.)	Cohesion (psf)						
MSW	60	23	0						
Interim Cover Soil	120	30	0						

Table 6.3 – Assumed Geosynthetic Properties							
Material Yield Strain (%)							
HDPE	10						
GCL	8						

Based on the results of the analyses, we recommend that geosynthetic reinforcement consisting of two layers of chemically resistant uniaxial geogrid placed perpendicular to each other be used. The geogrid should have a minimum design tensile strength of 2500 pounds per foot at an allowable stress of 5% or less over the 50 year design life. The geogrid should be placed on top of a minimum 6 inch thick layer of compacted soil "interim cover soil" placed between the foundation layer and the new GCL. It should be noted that the inclusion of geogrid reinforcement is intended to reduce, but not eliminate, the likelihood of failure.

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7 WASTE MASS STABILITY

7.1 Background Information

We understand that the liner system for the new expansion will consist of a 6-in thick layer of compacted native soil covered by a geosynthetic clay liner (GCL). A 60 mil HDPE geomembrane will be placed on the GCL, and will be anchored within trenches at the top of slope. The geomembrane will be textured on both sides and covered by a geocomposite drainage layer.

Deep-seated stability of the waste mass was evaluated by performing two dimensional, effective stress slope stability analyses for the final, closed geometry, using the computer program SLIDE. The program performs vertical slice limit equilibrium analysis for potential mass movement along assumed failure surfaces randomly generated by the program. We assumed potential deep-seated failure of the waste material within the waste or along the top of the HDPE liner, since failure would not be expected to occur in the foundation soils due to relatively high shear strength of this material.

For analyses purposes, we used geometry from the cross-sections presented on the following NEI drawings:

- Appendix C, Cross Section Plan, City of Kingsville Landfill, Fig. No. 1, dated 08/26/2018
- Appendix C, Cross Section J & O, City of Kingsville Landfill, Fig. No. 2, dated 08/26/2018
- Appendix C, Cross Section 12 & 18, City of Kingsville Landfill, dated 08/26/2018

Copies of these sections are presented in Appendix C.

7.2 Design Parameters

Consolidated-undrained (C-U) triaxial shear tests were performed using select samples from the soil borings to evaluate long-term effective stress shear strength of the foundation soils. The results of the C-U triaxial tests are presented in Appendix E.

Laboratory tests for liner material properties were not performed as part of the current scope of services. The stability analyses are based on laboratory tests results for the foundation soils and on assumed or published strength and interface friction values for the geocomposite drainage layer and the textured HDPE membrane. It is essential that the assumed parameters be verified by specific testing prior to construction.

Due to heterogeneous nature of municipal waste, traditional in-situ testing or laboratory testing to evaluate engineering properties of the waste is not feasible. As a result, we used published and assumed estimated effective stress values of shear strength, cohesion, and unit weight for

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municipal solid waste for our analyses(2) (3). The engineering properties used in the analyses are presented in Table 7.1 below.

Table 7.1 – Assumed Engineering Properties										
Material	Effective Friction Angle, peak ¢ (deg)	Effective Friction Angle, LD ¹ \$\phi\$ (deg)	Unit Weight γ (pcf)	Effective Cohesion, peak, c (psf)	Effective Cohesion, LD ¹ , c (psf)					
MSW Refuse	23	22	60	250	0					
Geocomposite/Texture d HDPE	28	23	N/A	0	0					

7.3 Analysis and Results

We analyzed both potential circular failure surfaces and potential block or sliding failure surfaces. The following assumptions were used during the analyses:

- Less than one foot of head will develop above the geocomposite drainage layer, and
- Excess pore pressure will not develop within the waste either through hydrostatic or waste gas pressure. The development of excess pore pressure could substantially reduce the factor of safety for stability.

The results of our stability analyses for peak strength parameters are presented in Table 7.2 below.

Table 7.2 – Results of Waste Mass Stability Analysis – Peak Parameters										
Cross Section	Factor of Safety – Circular Failure	Factor of Safety – Block Failure								
12	2.18	1.71								
18	2.27	1.68								
J	3.65	2.71								
0	2.27	1.72								

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To evaluate the potential for progressive failure, we also performed stability analyses using assumed large displacement interface shear strengths. The results of these analyses are presented in Table 7.3 below.

Table 7.3 – Results of Waste Mass Stability Analysis – Large Displacement Parameters										
Cross Section	Factor of Safety – Circular Failure	Factor of Safety – Block Failure								
12	1.65	1.50								
18	1.81	1.52								
J	3.51	2.49								
0	1.93	1.54								

The results of the mass stability analyses are presented graphically in Appendix F.

7.4 Conclusions

The calculated factor of safety for peak shear strength conditions exceeded 1.5 for our assumed strength and unit weight parameters, the analyzed cross sections, and assumed failure geometry. In addition, the calculated factor of safety for large displacement condition exceeds 1.5, which in our judgment, and based on published information, is acceptable.

Based on our results, in our opinion, we anticipate that the planned landfill configuration should be stable, provided excess pore pressures are not generated within the waste mass or that there is no increase in piezometric head above 1 foot within the underlying liner cover material or leachate collection system. The generation of pore pressures and increase in piezometric head within the materials could substantially reduce the factor of safety and increase the risk for stability problems.

Laboratory testing using the specific HDPE liner material chosen for the project should be performed to confirm our assumed interface friction values used in our analyses. Noticeable differences between the assumed parameters and parameters determined by testing could require that additional stability analyses be performed.

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Part III, Attachment 4, Appendix 3, pg-26

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8 LIMITATIONS AND DESIGN REVIEW

8.1 Limitations

This report has been prepared for the exclusive use of Naismith/Hanson Engineering and the project team for specific application to the design of the proposed City of Kingsville Municipal Solid Waste Landfill Aerial Expansion in Kleberg County, Texas. Our report has been prepared in accordance with the generally accepted geotechnical engineering practice common to the local area. No other warranty, express or implied, is made.

The analyses and recommendations contained in this report are based on the data obtained from the referenced subsurface explorations within the project site. The soil boring indicates subsurface conditions only at the specific location, time and depth penetrated. The soil borings do not necessarily reflect strata variations that could exist at other locations within the project site. The validity of our recommendations is based in part on assumptions about the stratigraphy made by the Geotechnical Engineer. Such assumptions may be confirmed only during construction of the project. Our recommendations presented in this report must be reevaluated if subsurface conditions during the construction phase are different from those described in this report.

If any changes in the nature, design or location of the project are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions modified or verified in writing by TWE. TWE is not responsible for any claims, damages or liability associated with interpretation or reuse of the subsurface data or engineering analyses without the expressed written authorization of TWE.

8.2 Design Review

Review of the design and construction drawings as well as the specifications should be performed by TWE before release. The review is aimed at determining if the geotechnical design and construction recommendations contained in this report have been properly interpreted. Design review is not within the authorized scope of work for this study.

8.3 Construction Monitoring

Construction surveillance is recommended and has been assumed in preparing our recommendations. These field services are required to check for changes in conditions that may result in modifications to our recommendations. The quality of the construction practices will affect performance and should be monitored. TWE would be pleased to provide construction monitoring, testing and inspection services for the project.

8.4 Closing Remarks

We appreciate the opportunity to be of service during this phase of the project and we look forward to continuing our services during the construction phase and on future projects.

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9 REFERENCES

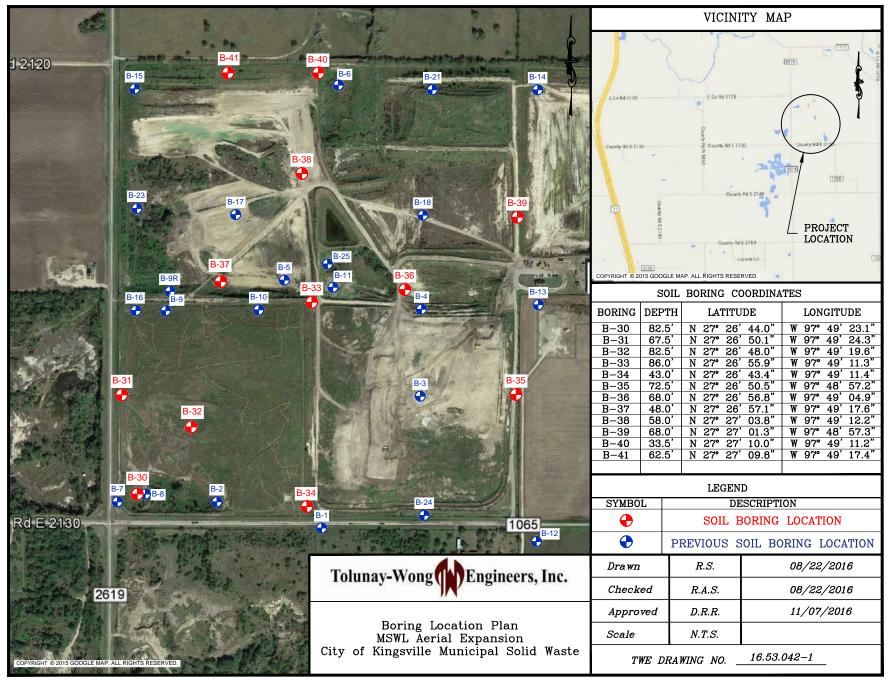
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APPENDIX A

SOIL BORING LOCATION PLAN TWE DRAWING NO. 16.53.042-1

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APPENDIX B

LOGS OF PROJECT BORINGS AND A KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

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PRO	JEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	8-30 n Eng	inee	ring, l	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 44.0"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(E)	ST		ă				Ε			
0 -	(2) (2) (2) (2) (2) (3) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	Dense to very dense tan and gray CLAYEY SAND (SC) with gypsum crystals		11/6" 23/6" 50/5"	16		42	17				37	
- 5 -		-color changes to tan with ferrous staining		34/6" 50/3"									
- 10 -		-with sand partings		13/6" 50/3"									
- 15 -				7/6" 12/6" 20/6"	35							33	
- 20 -		-color changes to reddish tan and light gray		6/6" 15/6" 20/6"									
Z0 X		Very stiff to hard reddish tan and light gray FAT CLAY (CH) with gypsum crystals		10/6" 17/6" 26/6"									
- 25 -		-color changes to reddish tan and tan		10/6" 18/6" 30/6"	25		50	28				92	
30		-color changes to tan and reddish brown		8/6" 11/6" 16/6"									
X		-color changes to tan and gray		8/6" 12/6" 18/6"									
DATE	BOR BOR	ING COMPLETED: 07/23/2016 was a	during of t a depti ackfilled	as encou drilling op n of 10'-6 I with cer	eration b". At the ment-b	ns. A he co entor	fter a 1 mpletionite gro	10 to 10 to	15-minu the bori	ite wa ng, th	iting p e ope	eriod,	water e-hole

PROJEC	T: City of Kingsville CLIE Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	-30 Eng	inee	ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOLUSCS	COORDINATES: N 27° 26' 44.0" W 97° 49' 23.1" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	ST						₹			
35 -	Very stiff to hard reddish tan and tan FAT CLAY (CH) with gypsum crystals and ferrous stains		10/6" 17/6" 21/6"	30							90	
40 -	-color changes to tan and reddish brown		9/6" 14/6" 21/6"									
45			13/6" 19/6" 29/6"									
50	-becomes sandy 48' to 52'		8/6" 11/6" 13/6"	30							70	
55 -	-color changes to tan and becomes slickensided	(P) 4.50+		23	100	71	51				87	
		(P) 4.50+										
60		(P) 4.50+										
65	-becomes sandy and color changes to tan and gray	(P) 4.50+		26	97	54	30	1.75	3		69	
70	-color changes to tan and reddish brown with trace calcareous nodules	(P) 3.00										
DATE BOR	RING COMPLETED: 07/23/2016 was J. Gonzalez	water wa e during d at a depth backfilled	Irilling op n of 10'-6	eratic	ns. A he co	fter a 1	0 to 1	15-minu	ıte wa	iting p	eriod,	water
	TOLUNAY-WONG	ENGI	NEERS	SING						Pag	e2 of	3

PR	O.	JECT	City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	3-30 Eng	inee	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 44.0" W 97° 49' 23.1" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
			MATERIAL DESCRIPTION	(E)	S						₹			
- 70 -			Very stiff to hard tan and reddish brown FAT CLAY (CH) with calcareous nodules											
- 75 -	X		Very dense tan CLAYEY SAND (SC) with calcareous nodules		16/6" 43/6" 50/5"	17							17	
73	X		Very stiff to hard tan and gray FAT CLAY (CH) with ferrous staining		10/6" 11/6" 17/6"									
- 80 -			-becomes slickensided with ferrous staining	(P) 4.50+										
		///	Bottom @ 82.5'											
- 85 -														
- 95 -														
30														
-100-														
-105-														
DAT DAT LOC	TE TE GG	BOR	ING COMPLETED: 07/23/2016 was J. Gonzalez	water wa e during o at a depth backfilled	drilling op n of 10'-6	eratic 5". At t	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water
	JUL		TOLUNAY-WONG	ENG	INEERS	S. INC	D					Pag	e3 of	3

PRO	IFC ⁻	LOG OF BO	ORIN	IG B	-31	ineeı	rina lı	nc					
		Municipal Solid Waste Landfill Aerial Expansion			9								
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 50.1" W 97° 49' 24.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 68-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(a) (b)	S		ă				₹			
0 -		Medium dense to very dense gray CLAYEY SAND (SC) -with calcareous nodules and sand pockets		4/6" 5/6" 7/6"									
- 5 -				22/6" 18/6" 4/6" 5/6"	11							46	
				6/6" 5/6"									
X				6/6" 8/6" 6/6"									
10		71		8/6" 12/6" 8/6"	27							22	
X		-with cemented sand layers		27/6" 29/6"	21							22	
		-color changes to tan		18/6" 32/6" 39/6"									
15 -		Very dense tan POORLY GRADED SAND with CLAY (SP-SC) and sand partings		36/6" 50/5"									
-X				12/6" 50/5" 45/6"	15							9	
X				50/5" 35/6"									
20 -		_		50/4" 17/6" 26/6"									
		₹ ₩ -		50/5" 17/6" 38/6" 38/6"									
25		Hard reddish tan and light gray SANDY LEAN SILTY CLAY (CL-ML) with sand partings		13/6" 20/6" 31/6" 23/6" 34/6" 50/4" 12/6" 17/6" 50/5"	26		29	7				66	
30		-color changes to reddish tan and tan with ferrous stains		13/6" 32/6" 50/5" 7/6" 36/6" 39/6" 10/6" 21/6" 36/6"									
35				10/6" 18/6" 35/6"	25							62	
COMP DATE	BOR BOR	ING COMPLETED: 07/21/2016 was a J. Gonzalez was b	during of the during of the depth of the dep	drilling op h of 21'-6 I with cen	eratio ". At t nent-b	ons. A he co pentor	fter a 1 mpletionite gro	0 to 1 on of tout.	15-minu	ıte wa	iting p e oper	eriod,	water e-hole
		TOLUNAY-WONG	ENG	INEERS	S, INC). <u> </u>							

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion		IG B laismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOLUSCS	COORDINATES: N 27° 26' 50.1" W 97° 49' 24.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 68-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	S						₹	_		
35	Hard reddish tan and tan SANDY LEAN CLAY (CL) with ferrous stains and laminated sands	1	17/6" 25/6" 35/6" 17/6" 13/6" 19/6" 7/6"									
40 -	Very stiff to hard reddish tan and tan FAT CLAY with SAND (CH) and ferrous stains		17/6" 3/6" 7/6" 10/6" 9/6" 20/6" 27/6" 5/6" 14/6" 17/6" 10/6"	37		59	36				76	
45 - 1	-with trace gypsum crystals and ferrous stains		18/6" 21/6" 18/6" 23/6" 30/6" 6/6" 20/6" 21/6" 9/6" 17/6" 19/6"	30							83	
- 55 -	-with calcareous nodules and ferrous stains	(P) 4.50+ (P) 4.50+	9/6" 18/6" 23/6" 11/6" 23/6" 26/6"	32	91	83	50	4.14	2		87	
- 60 -		(P) 4.50+ (P) 4.50+		34	87			2.88	2		83	
	-with trace gypsum crystals and ferrous stains	(P) 4.50+ (P) 4.50+										
- 65 -		(P) 4.50+										
- 70 -	Bottom @ 68'	,										
DATE BOY DATE BOY LOGGER:	RING COMPLETED: 07/21/2016 was a J. Gonzalez was a	water wa e during d at a depth backfilled	Irilling op n of 21'-6	eratio ". At t	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PROJECT	NO.: 16.53.042 Was to		NEERS			9.0				Pag	e2 of	f2

PROJEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	3-32 Eng	inee	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 49.7" W 97° 49' 17.0" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(£)	S						₹			
0	Stiff to hard tan and gray SANDY LEAN CLAY (CL) with gypsum crystals and trace organics		3/6" 5/6" 6/6"	9		34	18				54	
- 5 -			6/6" 21/6" 23/6"									
- 10 -			11/6" 26/6" 50/3"									
- 15 -	Medium dense to dense reddish tan and gray CLAYEY SAND (SC) with gypsum crystals		17/6" 50/6"	28							34	
	-color changes to tan and gray with sand partings		10/6" 17/6" 22/6"									
- 20 -	-with ferrous stains		4/6" 8/6" 13/6"									
- 25 -	-color changes to reddish tan		10/6" 18/6" 21/6"	22		31	10				29	
30	-color changes to reddish brown and tan		6/6" 8/6" 12/6"									
- 35 -			8/6" 8/6" 12/6"									
COMPLET DATE BOR	ING COMPLETED: 07/28/2016 was a	during out	as encou drilling op n of 14'-7 I with cer	eratio	ns. A he co	fter a 1 mpletio	10 to 1 on of t	15-minເ	ıte wa	iting p e ope	eriod, n bore	water e-hole
	TOLUNAY-WONG	ENG	INEERS	S, INC	D					rag	e1 of	١٥

PRO	0.	JECT	Municipal Solid Waste Landfill		IG B laismith			ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOLUSCS	Aerial Expansion COORDINATES: N 27° 26' 49.7"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 35 -		e e Alza		<u> </u>							ш			
			Medium dense to dense reddish tan and gray CLAYEY SAND (SC) with gypsum crystals Very stiff to hard tan FAT CLAY with SAND (CH), slickensided, with calcareous nodules	(P) 4.50+		29	89						79	
- 40 -	X		-color changes to tan and reddish brown with gypsum crystals and ferrous stains		8/6" 12/6" 15/6"									
- 45 -			-color changes to tan, gray, and reddish brown	(P) 4.50+										
- 50 -	X		-color changes to tan and reddish brown		4/6" 9/6" 10/6"	30		73	51				82	
- 55 -				(P) 4.50+										
- 60 -			-color changes to tan and gray	(P) 4.50+										
- 60 -				(P) 4.50+		26	94			0.61	2		81	
- 65 -			-color changes to tan, red, and brown	(P) 4.00										
- 70			-color changes to tan and gray	(P) 4.50+										
DAT DAT LOG	E	BOR BOR	ING COMPLETED: 07/28/2016 was a J. Gonzalez	water wa e during d at a depth backfilled	Irilling op n of 14'-7	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minເ	ıte wa	iting p e opei	eriod,	water e-hole
			TOLUNAY-WONG	ENGI	NEERS	S. INC	D					. ay	J_ U	

PR	.О.	JECT	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	3-32 n Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 49.7" W 97° 49' 17.0" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 82.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		١.	MATERIAL DESCRIPTION	€ _F	ST		ă				Ε			
- 70 -			Very stiff to hard tan and gray FAT CLAY with SAND (CH), slickensided with gypsum crystals and calcareous nodules											
- 75 -			Medium dense to dense tan CLAYEY SAND (SC) with calcareous nodules	(P) 0.75		21		24	8				24	
	X		-with gypsum crystals and ferrous stains		5/6" 10/6" 13/6"									
- 80 -	X				13/6" 20/6" 20/6"									
- 85 - - 90 - - 95 -														
-105-														
DA:	TE TE	BOR	ING COMPLETED: 07/28/2016 was a	during out	is encou drilling op n of 14'-7 with cer	eration". At t	ns. A he co	fter a 1	10 to 1 on of t	15-minເ	ıte wa	iting p e opei	eriod, n bore	water e-hole
			 TOLUNAY-WONG	ENGI	NEERS	S, IN(D					Pag	e3 of	f 3

PROJ	ECT: City of Kingsville CLIE Municipal Solid Waste Landfill Aerial Expansion		IG B Naismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	ST		ă				₹			
- 0 -	Medium dense to very dense tan CLAYEY SAND (SC) with gypsum crystals		2/6" 7/6" 9/6"									
- 5 -	-color changes to dark gray and gray with trace gravel		7/6" 11/6" 9/6"	16							47	
- 10 -	-color changes to tan and light gray sand partings		27/6" 50/6"									
- 15 -	-color changes to tan and white with trace caliche		50/5"									
	Dense to very dense tan and white POORLY GRADED SAND with SILT (SP-SM), and trace caliche)	17/6" 48/6" 50/3"	11		35	8				12	
- 20 -			17/6" 21/6" 27/6"									
- 25 -	-color changes to light gray and tan with gypsum crystals and ferrous stains		15/6" 17/6" 32/6"									
30	Medium dense to dense gray and white CLAYEY SANI (SC) with gypsum crystals	D	14/6" 22/6" 26/6"	42							20	
- 35 -	-color changes to tan		13/6" 21/6" 22/6"									
COMPL DATE E	ORING COMPLETED: 08/05/2016 was R: J. Gonzalez	water water	drilling op h of 28'-2	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p e opei	eriod, n bore	water e-hole
	TOLUNAY-WONG	ENG	INEERS	S. INC)					Pag	e1 of	3

PR	OJ	JECT	Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-33 Eng	inee	ring, li	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N.	MATERIAL DESCRIPTION	(£)	S						₹			
35 -	X		Medium dense to dense reddish tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains		6/6" 9/6" 12/6"									
40 -	X		-color changes to tan and reddish tan		8/6" 16/6" 18/6"									
45 -	X		Stiff to very stiff reddish tan LEAN CLAY with SAND (CL), slickensided, with ferrous stains		9/6" 12/6" 18/6"	29		43	24				79	
50	X		-color changes to reddish tan and tan with gypsum crystals		5/6" 6/6" 9/6"									
			Stiff to very stiff LEAN CLAY (CL), slickensided, with ferrous stains	(P) 2.00		40	79			1.06	3		96	
55 -			-color changes to reddish brown and tan with gypsum crystals	(P) 3.50										
60 -				(P) 4.00		34	87							
65 -			Very stiff to hard tan FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains	(P) 4.50+		32	42	64	33	2.57	2		95	
70	X		-color changes to tan and reddish brown		7/6" 12/6" 14/6"									
DAT DAT	Ē	BOR	ING COMPLETED: 08/05/2016 was a	during o t a depth ackfilled	Irilling op n of 28'-2	eratio ". At t nent-b	ns. A he co entor	fter a 1 mpletionite gro	0 to 1 on of tout.	15-minu the bori	ıte wa	iting p e ope	eriod,	, water e-hole

PR	О.	JEC		ORIN	IG B	-33 Eng	inee	ring, lı	nc.					
			Municipal Solid Waste Landfill Aerial Expansion											
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 55.9" W 97° 49' 11.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 86-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N	MATERIAL DESCRIPTION	9,0	, o						₽.			
- 70 -			Very stiff to hard tan and reddish brown FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains -color changes to tan and light gray	(P) 4.50+										
- 75 -			-with layers of calcareous nodules		9/6"									
					10/6" 21/6"									
- 80 -			Very stiff to hard tan FAT CLAY with SAND (CH) with gypsum crystals and ferrous stains	(P) 4.50+		18	106			3.57	3		77	
- 85 -			-color changes to tan and white	(P) 4.50+										
			Bottom @ 86'											
- 90 -														
- 95 -														
400														
-100-														
-105-														
DA DA LO	TE TE GG	BOR BOR ER:	ING COMPLETED: 08/05/2016 was: J. Gonzalez	e during o at a depth	as encour drilling op n of 28'-2 I with cen	eratio ". At t	ns. A he co	fter a 1 mpletion	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PR(OJI	ECT	NO.: 16.53.042 Was TOLUNAY-WONG		INEERS			me git	out.			Pag	e3 of	f3

PRO	JEC ⁻	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	3-34 n Eng	ļ inee	ring, li	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 43.4" W 97° 49' 11.4" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 30 ft. Wash Bored: 30 ft. to 43 ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(E)	S		۵				₹			
0 -		Medium dense dark gray, gray, and light gray CLAYEY SAND (SC) with trace of organics	(P) 4.50+	2/6" 5/6" 6/6"	15	112			2.53	6		42	
- 5 -		Very stiff to hard gray and light gray SANDY LEAN SILTY CLAY (CL-ML) with calcareous nodules	(P) 4.50+		15	115	21	7				59	
		-color changes to light gray	(P) 4.50+		14	114			6.13	4		62	
10		-color changes to light gray and tan		4/6" 12/6" 16/6"									
10		-color changes to white and light gray		11/6" 18/6" 16/6"									
		-becomes stiff		5/6" 6/6" 8/6"									
- 15 -		Medium dense to dense white and light gray SILTY SAND (SM) with calcareous nodules		4/6" 6/6" 8/6"	17		38	7				31	
		-color changes to light gray and tan with ferrous stains		4/6" 10/6" 19/6"									
- 20 -				23/6" 50/5"									
				23/6" 50/4"									
		-color changes to light gray		27/6" 35/6" 50/4"	22							25	
- 25 -				5/6" 37/6" 45/6" 20/6"									
		▼		39/6" 37/6" 8/6"	26		39	2				28	
30		-becomes medium dense 		12/6" 9/6" 4/6"	33		00					39	
X				12/6" 10/6" 5/6"									
		-color changes to tan and marine green		6/6" 10/6" 3/6"									
- 35 				3/0									
DATE	BOR BOR	ING COMPLETED: 06/22/2016 was a	water wa e during o at a depth packfilled	Irilling op n of 28'-4	eratio	ns. A	fter a 1 mpletio	0 to 1	15-minເ	ıte wa	iting p	eriod,	water
		TOLUNAY-WONG	ENIO	NEERS	e ikiz	_					Pag	e1 o	f 2

PR	OJ	JEC ⁻	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	-34 Eng	ineei	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 43.4"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 35 -) H)										
	X		Medium dense tan and marine green SILTY SAND \((SM)\) with sand lenses and trace organics // Hard tan and light gray LEAN CLAY (CL)	(P) 4.50+ (P) 4.50+	8/6" 13/6"	30	91	40	17	0.93	1		91	
- 40 -				(P) 4.50+										
				(P) 4.50+										
- 45 -			Bottom @ 43'											
- 60 -														
- 65 -														
- 70 -														
DA ⁻	ΓE	BOR	ING COMPLETED: 06/22/2016 was a	e during o	as encoundrilling open of 28'-4' with cem	eratic ". At t	ns. A he co	fter a 1 mpletion	0 to 1	15-minu	ıte wa	iting p e opei	eriod, n bore	water e-hole
			TOLUNAY-WONG	ENGI	NEERS	, INC). <u> </u>					rag	e2 of	1 4

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	-35 Eng	inee	ring, l	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 50.5" W 97° 48' 57.2" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 72.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(E)	ST						₹			
0 -	Medium dense tan and brown CLAYEY SAND (SC) with trace caliche		5/6" 8/6" 7/6"									
- 5 -	-color changes to reddish brown with ferrous stains		5/6" 8/6" 5/6"	12		31	17				38	
10	Very stiff to hard reddish tan SANDY LEAN CLAY (CL) with gypsum crystals	(P) 4.50+		14	117			2.22	3		52	
- 15 -	-color changes to reddish tan and tan with ferrous stains		5/6" 10/6" 12/6"									
	-color changes to reddish tan	(P) 4.50+		17	109	42	25					
- 20 -	-color changes to reddish tan and tan	(P) 4.50+										
- 25 -	Medium dense to dense reddish tan and tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains	(P) 4.50+		17	104			1.29	3		40	
30	-color changes to reddish tan		4/6" 7/6" 9/6"									
- 35 - 24 7	<u>∇</u> =		8/6" 13/6" 20/6"									
DATE BOF	ING COMPLETED: 07/29/2016 was a	water wa e during c at a depth backfilled	drilling op n of 30'-9	eratic ". At t	ns. A he co	fter a 1	10 to 1 on of t	15-minເ	ıte wa	iting p	eriod,	water
FNOJECI	NO.: 16.53.042 TOLUNAY-WONG		NEERS			Ū				Pag	e1 o	f3

PROJEC [*]	Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	-35 Eng	inee	ring, li	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 50.5" W 97° 48' 57.2" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 72.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(a) (b)	S						₹			
35 - 7705	Medium dense to dense reddish tan and tan CLAYEY SAND (SC) with gypsum crystals and ferrous stains											
	Hard tan and light gray FAT CLAY with SAND (CH), gypsum crystals, and ferrous stains		17/6" 26/6" 30/6"	25		109	72				77	
40 -	-color changes to tan and reddish brown		8/6" 15/6" 24/6"									
45	-with sand partings		10/6" 16/6" 16/6"									
	Stiff to hard reddish brown and tan FAT CLAY (CH) with gypsum crystals and ferrous stains	n	4/6" 7/6" 10/6"	34							96	
50	-becomes slickensided with sand layers	(P) 2.00										
55 -	-color changes to tan		4/6" 7/6" 10/6"									
60		(P) 3.75		33	89	90	67	3.88	4		89	
65 -		(P) 4.25										
70	-color changes to tan and reddish brown	(P) 4.50+										
COMPLET DATE BOR	ING COMPLETED: 07/29/2016 was a	water wa e during c at a depth packfilled	drilling op n of 30'-9	eratio	ns. A he co	fter a 1 mpletic	10 to 1 on of t	15-minu	ıte wa	iting p e oper	eriod,	water e-hole
	TOLUNAY-WONG	ENGI	NEERS	S, INC	D					rag	- 20	١٥

PR	RO.	JECT	City of Kingsville CLIE Municipal Solid Waste Landfill Aerial Expansion	ORIN NT: N	IG B laismith	3-35 Eng	inee	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 50.5"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 70 -			Very stiff to hard reddish brown and tan FAT CLAY (CH), slickensided, with gypsum crystals and ferrous stains	(P) 4.50+		32	89			2.68	1		95	
			Bottom @ 72.5'											
- 75 -														
- 80 -														
- 85 -														
- 90 -														
- 95 -														
-100-														
-105-	1													
DA DA LO	TE TE GG	BOR	ING COMPLETED: 07/29/2016 was J. Gonzalez	e during o at a depth backfilled	drilling op n of 30'-9	eration ". At the nent-b	ons. A he co pentor	fter a 1 mpletionite gro	0 to fon of tout.	15-minu the bori	ite wa	iting p e opei	eriod	, water e-hole

PROJEC	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	8-36 n Eng	ineei	ring, li	nc.					
DEPTH (ft) SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 26' 56.8" W 97° 49' 04.9" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 22-ft. Wash Bored: 22-ft. to 68-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	(a) (b)	S		ă				Ā			
0 - 222	Loose to medium dense dark gray and gray CLAYEY SAND (SC)											
	-with calcareous nodules		18/6" 20/6" 21/6"	10							36	
5 - 222			4/6"									
	-color changes to light gray and tan		5/6" 5/6"									
10 -	-color changes to tan		4/6" 5/6" 6/6"	12		47	28				44	
15 -			2/6" 4/6" 6/6"									
	-color changes to light gray with ferrous stains		4/6" 10/6"									
20	abla		14/6"									
	-becomes very dense and color changes to light gray and tan		15/6" 24/6" 50/6"	25							32	
25 -			12/6" 14/6" 15/6"									
30 -	-becomes dense		5/6" 17/6" 27/6"									
35			4/6"									
COMPLET DATE BOR	ING COMPLETED: 06/24/2016 was a	water water water during of the desired th	drilling op n of 18'-3	eratio 8". At t	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p e opei	eriod, n bore	water e-hole
	TOLUNAY-WONG	ENG	INEERS	S, INC	D					Pag	e1 o	f 2

PRO)JEC	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B laismith	-36 Eng	inee	ring, l	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 26' 56.8" W 97° 49' 04.9" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 22-ft. Wash Bored: 22-ft. to 68-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	+	MATERIAL DESCRIPTION	(£)			Δ				₹			
35	(12) (12) (12) (12) (12) (12) (12) (12)	Medium dense light gray and tan CLAYEY SAND (SC)		7/6" 8/6"									
-40		-with sand seams, calcareous nodules, and ferrous staining		6/6" 10/6" 13/6"	21		47	30				35	
		-color changes to reddish brown and light gray		4/6" 8/6" 10/6"									
- 45 -		Stiff to very stiff reddish brown and light gray FAT CLAY (CH), slickensided, with ferrous staining	(P) 4.50+										
- 50 -		-with sand seams and calcareous nodules		4/6" 6/6" 8/6"	42							96	
- 55 -		-color changes to light gray with sand layers		11/6" 12/6" 14/6"									
- 60		-becomes hard		11/6" 21/6" 26/6"	37		70	44				94	
- 65 -				7/6" 8/6" 9/6"									
		-color changes to brown yellow, reddish brown, and light gray		7/6" 10/6" 10/6"									
- 70 -		Bottom @ 68'											
COMI	BOR BOR	ING COMPLETED: 06/24/2016 was a	e during o at a depth backfilled	is encour drilling op n of 18'-3' with cerr	eratio ". At t nent-b	ons. A he co pentor	fter a 1 impletionite gro	10 to 1 on of tout.	15-minu the bori	ıte wa	iting p e opei	eriod,	water e-hole

PROJ	JECT	: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN T: N	IG B laismith	3-37 Eng	inee	ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 57.1" W 97° 49' 17.6" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 12-ft. Wash Bored: 12-ft. to 48-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	(F)	S		□				Ā			
- 0 -		Very dense light gray and tan SILTY SAND (SM)											
		-with ferrous staining		6/6" 16/6" 50/5"									
- 5 -													
		•		11/6" 50/5"	20		33	9				20	
- 10 -		-with calcareous nodules		23/6" 37/6" 50/6"									
		<u>√</u>		0/0"	04							50	
- 15 -		Very stiff to hard tan and light tan SANDY LEAN SILTY CLAY (CL-ML)		6/6" 7/6" 10/6"	31							52	
- 20		-color changes to tan and light gray with ferrous staining		9/6" 17/6" 27/6"									
				7/6" 12/6" 13/6"									
- 25 -													
		Stiff to very stiff reddish brown and light gray FAT CLAY (CH) with calcareous nodules and ferrous staining		4/6" 5/6" 9/6"	33		56	39				99	
- 30 -		-color changes to light gray with sand layers		5/6" 7/6" 12/6"									
35				5/6"	34							86	
DATE	BOR BOR	ING COMPLETED: 06/25/2016 was a	during o	s encou drilling op n of 9'-3". with cen	eration	ns. A e con	fter a 1 opletion	0 to 1 of th	15-minւ	ite wa	iting p	eriod,	water
i NOJE	_011	TOLUNAY-WONG		NEERS			Ü				Pag	e1 o	2

PR	O	JECT	City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion	ORIN IT: N	IG B	-37 Eng	inee	ring, lı	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 26' 57.1" W 97° 49' 17.6" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0-ft. to 12-ft. Wash Bored: 12-ft. to 48-ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		N	MATERIAL DESCRIPTION	<u> </u>							7			
- 35 -	X		Stiff to very stiff light gray and brownish tan FAT CLAY (CH) with sand seams, calcareous nodules, and ferrous staining		7/6" 12/6"									
- 40 -	X				4/6" 5/6" 7/6"									
	X		-color changes to light gray and reddish brown		6/6" 6/6" 9/6"									
- 45 -	X		-color changes to light gray		4/6" 5/6" 9/6"	35		80	51				86	
- 50 -			Bottom @ 48'											
- 55 -														
- 55 -														
- 60 -														
	-													
- 65 -	1													
-70 -														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE BORING COMPLETED: DATE Was at a depth of 9'-3". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
1.18	JJI	_011	NO.: 16.53.042 Was b		INEERS							Pag	e2 o	f 2

PRO	JEC ⁻	T: City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion		IG B			ring, li	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 27′ 03.76″	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
0 -		Very stiff to hard light gray SANDY FAT CLAY (CH)											
		with ferrous stains and trace calcareous nodules		10/6" 18/6" 31/6" 20/6" 45/6"	17		50	19				55	
5 -		_		50/4" 3/6" 33/6"									
		-		50/5" 12/6"									
				27/6" 37/6" 17/6" 36/6"	30							66	
10		<u>∇</u> =		50/3" 18/6"									
				35/6" 50/3" 13/6"									
15 -		-color changes to light gray and tan		33/6" 50/2" 8/6"									
13 X				14/6" 20/6" 7/6"									
X				12/6" 19/6" 6/6"	28		60	40				57	
20				10/6" 14/6" 6/6"									
X		becomes stiff		11/6" 15/6" 5/6"									
X		-becomes stiff		7/6" 8/6"									
25 -				6/6" 8/6" 13/6"									
$ \longrightarrow $			(P) 4.50+	4/6" 9/6" 9/6"	25	92	47	29					
30 -			(P) 4.50+										
		-color changes to brown and light gray and becomes stiff with sand layers		4/6" 5/6" 8/6"									
35				9/6"									
DATE	BOR BOR SER:	J. Garcia was	water wa e during d at a depth backfilled	drilling op n of 5'-5"	eration	ns. A e com	fter a 1 opletion	10 to 1	15-minu	ıte wa	iting p	eriod,	water
		TOLUNAY-WONG	FNGI	NEERS	SINC						Pag	e1 of	f 2

PR	O.	JEC ⁻	City of Kingsville CLIEI Municipal Solid Waste Landfill Aerial Expansion	ORIN	IG B laismith	-38 Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE TYPE	SYMBOL/USCS	COORDINATES: N 27° 27' 03.76"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	_	٨	MATERIAL DESCRIPTION	(E)	S						₹			
- 35 -	X		Very stiff to hard reddish brown and light gray SANDY FAT CLAY (CH) with sand seams and layers	(P) 4.50+	8/6" 10/6"									
			Stiff to hard light gray FAT CLAY (CH), slickensided, with calcareous nodules and ferrous stains	(P) 4.50+		42	78	100	72	2.95	2		93	
40 -			-color changes to reddish brown and light gray	(P) 4.50+										
				(P) 4.50+										
45 -			-color changes to tannish brown and light gray with trace organics	(P) 4.50+										
10	\/		-color changes to light gray		5/6"									
	X			(P) 4.50+	6/6" 8/6"	30	91			2.14	3		87	
- 50 -					6/6"									
	X				7/6" 7/6"									
	X				4/6" 5/6" 8/6"									
- 55 -	X		-color changes to tannish brown and light gray		5/6" 7/6" 9/6"									
	X		-color changes to light gray		6/6" 7/6" 9/6"									
			Bottom @ 58'											
- 60 -														
- 65 -														
00														
- 70 -														
COMPLETION DEPTH: DATE BORING STARTED: DATE BORING COMPLETED: DATE BORING COMPLETED: DAGER: PROJECT NO.: REMARKS: Free water was encounterd at an approximate depth of 11' below existing grade during drilling operations. After a 10 to 15-minute waiting period, water was at a depth of 5'-5". At the completion of the boring, the open bore-hole was backfilled with cement-bentonite grout.														
FK	JJI	_01	NO.: 16.53.042 Was TOLUNAY-WONG		NEERS			Ū				Pag	e2 o	f 2

PRO	JEC ⁻	T: City of Kingsville CLIEN Municipal Solid Waste Landfill Aerial Expansion		IG B laismith			ring, lı	nc.					
DEPTH (ft)	SYMBOL/USCS	COORDINATES: N 27° 27' 01.3" W 97° 48' 57.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 26 ft. Wash Bored: 26 ft. to 68 ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
		MATERIAL DESCRIPTION	<u> </u>	ω						12			
0 -		Medium dense to dense tan and light gray CLAYEY SAND FILL with trace gravel		8/6" 9/6" 6/6"	18							33	
$=$ \times		-color changes to brown		40/6" 27/6" 19/6"									
5 -		Medium dense to dense brown and reddish brown CLAYEY SAND (SC)		6/6" 7/6" 8/6"									
X		-color changes to tan and gray with calcareous nodules		4/6" 5/6" 6/6" 5/6"	11		36	20				49	
10	(-color changes to tan and light gray		6/6" 8/6" 4/6"			00	20				.0	
$-\nabla$		-color changes to light gray		6/6" 7/6" 7/6" 8/6"									
15 -		-color changes to light gray and tan with ferrous stains		11/6" 6/6" 12/6" 19/6"									
		-color changes to light gray		11/6" 19/6" 22/6"									
20		Stiff to hard light gray SANDY LEAN CLAY (CL) with calcareous nodules and ferrous stains		3/6" 4/6" 5/6"	19							65	
X				6/6" 9/6" 13/6" 8/6"									
25 -		-color changes to light tan and light gray	(P) 4.50+	11/6" 20/6"									
		color changes to light gray	(P) 4.00										
30		-color changes to light gray and tan	(P) 4.50+	7/6" 11/6" 13/6"	19	102			1.14	7		50	
X				12/6" 16/6" 20/6"									
35				8/6"	\vdash								
DATE DATE LOGG	BOR BOR SER:	ING COMPLETED: 06/24/2016 was a	water wa e during d at a depth backfilled	Irilling op of 26'-6	eratio	ns. A he co	fter a 1 mpletio	0 to 1	15-minu	ıte wa	iting p	eriod,	water
PROJ	ECI	NO.: 16.53.042 Was I		NEERS			910				Pag	e1 of	2

	Municipal Solid Waste Landfill Aerial Expansion		aismith						I			
SAMPLE TYPE SYMBOL/USCS	COORDINATES: N 27° 27' 01.3" W 97° 48' 57.3" SURFACE ELEVATION: DRILLING METHOD: Dry Augered: 0 ft. to 26 ft. Wash Bored: 26 ft. to 68 ft.	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS
	MATERIAL DESCRIPTION	<u>©</u> E	S		<u></u>				Æ			
5	Stiff to hard light gray and tan SANDY LEAN CLAY (CL) with ferrous stains		12/6" 16/6"									
	Medium dense to dense light gray CLAYEY SAND (SC) with ferrous stains		7/6" 8/6" 11/6" 6/6"									
			11/6" 12/6" 7/6" 10/6"	25		69	51				45	
			13/6" 13/6" 19/6"									
5 -	Dense light gray POORLY GRADED SAND with CLAY (SP- SC)		21/6" 12/6" 21/6" 20/6" 11/6"									
	Hard reddish brown and light gray FAT CLAY with SAND (CH)	(P) 4.50+	16/6" 16/6"									
	-becomes slickensided with calcareous nodules	(P) 4.50+ (P) 4.50+		28	93			0.85	1		72	
5 -	-with ferrous stains	(P) 4.50+										
		(P) 4.50+										
		(P) 4.50+										
0 -		(P) 4.50+										
	-becomes stiff		7/6" 7/6" 7/6"									
5 - /												L
- V (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	Medium dense light gray CLAYEY SAND (SC) with calcareous nodules and ferrous stains Bottom @ 68'		6/6" 10/6" 13/6"	20	102	61	45	1.91	5		46	
0 -												
OMPLET DATE BO	RING COMPLETED: 06/24/2016 was a	during d	Irilling ope of 26'-6"	eratio	ns. A he co	fter a 1 mpletio	0 to 1	I5-minu	ıte wa	iting p	eriod,	, wat

PROJ	EC	Municipal Solid Waste Landfill		IG B laismith			ring, lı	nc.					
DEPTH (ft) SAMPLE TYPE	SYMBOL/USCS	Aerial Expansion COORDINATES: N 27° 27' 09.97"	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
- 0 -		Loose to very dense light gray and gray SILTY SAND (SM) with trace caliche		4/6" 4/6"									
		-color changes to light gray and tan with ferrous stains		6/6" 5/6" 7/6" 11/6"	16		35	10				31	
- 5 -				7/6" 17/6" 17/6"									
		-color changes to light gray with calcareous nodules		12/6" 21/6" 34/6"									
- 10 -		-color changes to light gray and white -color changes to white		12/6" 27/6" 50/3" 15/6"	18							34	
		-color changes to light gray and white		50/3" 25/6"									
- 15 -	//	Hard light gray FAT CLAY with SAND (CH), calcareous		7/6" 26/6"	22		70	41				80	
		nodules, and ferrous stains		50/5" 5/6" 17/6" 28/6"									
20		▼ ☑		10/6" 30/6" 35/6"									
		Hard light gray SANDY FAT CLAY (CH) with calcareous nodules and ferrous stains		9/6" 25/6" 35/6"	31							59	
				16/6" 32/6" 50/5"									
- 25 -		Dense to very dense light gray CLAYEY SAND (SC)		16/6" 31/6" 50/5"	30		53	32				49	
		with calcareous nodules		18/6" 27/6" 6/6" 18/6"									
30				50/6" 6/6" 20/6" 50/5"									
		Bottom @ 33.5'		3/6" 40/6" _50/3"	16							30	
- 35 -		DOROIII & 33.3											
DATE I DATE I LOGGI	BOR BOR ER:	ING COMPLETED: 06/22/2016 was a J. Garcia	during of	as encour drilling op n of 19'. <i>F</i> I with cen	eratio	ns. A comp	fter a 1 letion	0 to 'of the	15-minu	ıte wa	iting p	eriod,	water
PROJE	:CT	NO.: 16.53.042 Was b		INEERS			gro	ut.			Pag	e1 of	1

PROJECT:	LOG OF BO		IG B			rina li	nc					
T NOULOT.	Municipal Solid Waste Landfill Aerial Expansion		aiomin	Liig		g,	10.					
(#) (#) SU SU SU	OORDINATES: N 27° 27' 09.8" W 97° 49' 17.4" JRFACE ELEVATION: RILLING METHOD: Dry Augered: 0-ft. to 62.5-ft. Wash Bored: to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	-AILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
	MATERIAL DESCRIPTION	€ _F	ST		ă				₹			
	oose to medium dense gray CLAYEY SAND (SC) with alcareous nodules		4/6" 5/6" 5/6"	8							35	
- 5	color changes to light gray		4/6" 5/6" 6/6"									
s	tiff to very stiff gray SANDY FAT CLAY (CH)		5/6" 8/6" 11/6"	20		78	52				64	
	pecomes hard and color changes to brown with sterbedded sand seams		9/6" 17/6" 25/6"									
	color changes to brown and tan		7/6" 12/6" 14/6"									
-20 -	color changes to tan with sand layers		3/6" 4/6" 6/6"	36							64	
- 25	color changes to brown with sand partings		5/6" 4/6" 6/6"									
-30	color changes to brown and tan		6/6" 7/6" 8/6"	31		52	30				51	
- 35 -			4/6" 6/6" 6/6"									
LOGGER:	S STARTED: 07/20/2016 grade G COMPLETED: 07/20/2016 was a M. Anderson	during out a depth	as encour drilling op n of 19'-3 with cen	eratio ". At t	ns. A	fter a 1 mpletio	0 to 1	15-minu	ite wa	iting p	eriod,	water
PROJECT NO.	: 16.53.042 was t		NEERS			o gi				Pag	e1 of	2

PRO	DJE	CT: City of Kingsville Municipal Solid Waste Landfill Aerial Expansion	LOG OF B	ORIN	IG B laismith	- 41 Eng	inee	ring, l	nc.					
DEPTH (ft)	SAMPLE IYPE		to 62.5-ft. to	(P) POCKET PEN (tsf) (T) TORVANE (psf)	STD. PENETRATION TEST (blows/ft)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
_	+	MATERIAL DESCRIP	TION	(E)	ြ						ı₹			
35 -		Stiff to very stiff gray SANDY FAT C	, ,											
		Very stiff brown FAT CLAY with SAN	ND (CH)	(P) 3.25		27	92						77	
40 -		-color changes to brown and tan			6/6" 13/6" 11/6"									
45 -					4/6" 9/6" 14/6"									
50					6/6" 8/6" 9/6"	35		97	75				84	
55 -		-color changes to brown and gray			7/6" 9/6" 12/6"									
		-color changes to gray		(P) 4.50+										
60 -				(P) 3.50										
		Bottom @ 62.5'												
65 -														
70 -														
DATI DATI	E BO	ETION DEPTH: 62.5 ft DRING STARTED: 07/20/2016 DRING COMPLETED: 07/20/2016 R: M. Anderson 16.53.042	was	water wa e during o at a depth backfilled	Irilling op n of 19'-3	eration". At t	ns. A he co	fter a 1	0 to 1	15-minu	ıte wa	iting p e ope	eriod,	, water e-hole

KEY TO SYMB	OLS AND TERMS USED	ON BOR	ING LOGS FOR SOIL
Most Common Uni Classifications System		Sampler Symbo	ols <u>Meaning</u>
Lean Clay (CL)	Well Graded Sand (SW)		Pavement core Thin - walled tube sample
Lean Clay w/ Sand (CL)	Well Graded Sand w/ Gravel (SW-GM)		Standard Penetration Test (SPT)
Sandy Lean Clay (CL)	Poorly Graded Sand (SP)		Auger sample
[2:2.]		Ø	Sampling attempt with no recovery
Fat Clay (CH)	Poorly Graded Sand w/ Silt (SP-SM)	H	TxDOT Cone Penetrometer Test
Fat Clay w/ Sand (CH)	Silt (ML)	Field Test Dat	t <u>a</u>
		2.50	Pocket penetrometer reading in tons per square foot
Sandy Fat Clay (CH)	Elastic Silt (MH)	(T)1.13	Torvane Measurement in tons per square foot
Silty Clay (CL-ML)	Elastic Silt w/ Sand (MH-SP)	8/6"	Blow count per 6 - in. interval of the Standard Penetration Test
			Observed free water during drilling
Sandy Silty Clay (CL-ML)	Silty Gravel (GM)		Observed static water level
44-14-14 12-14-14	• •	Laboratory Tes	t Data
Silty Clayey Sand (SC-SM)	Clayey Gravel (GC)	Wc (%)	Moisture content in percent
77 61 6 1/00	••• Well Graded Gravel (GW)	Dens. (pcf)	Dry unit weight in pounds per cubic foot
Clayey Sand (SC)	0	Qu (tsf)	Unconfined compressive strength in tons per square foot
Sandy Silt (ML)	Well Graded Gravel w/ Sand (SP-GM)	UU (tsf)	Compressive strength under confining pressure in
Silty Sand (SM)	Poorly Graded Gravel (GP)	,	tons per square foot
		Str. (%)	Strain at failure in percent
Silt w/ Sand (ML)	Peat	LL	Liquid Limit in percent
		PI	Plasticity Index
Mina D	[s4-sd-la	#200 (%)	Percent passing the No. 200 mesh sieve
Miscellaneous M	tateriais	()	Confining pressure in pounds per square inch
Fill Concrete	Asphalt and/or Base	*	Slickensided failure
[**	Did not fail @ 15% strain

RELATIVE DENSITY OF COHESIONLESS & SEMI-COHESIONLESS SOILS

The following descriptive terms for relative density apply to cohesionless soils such as gravels, silty sands, and sands as well as semi-cohesive and semi-cohesionless soils such as sandy silts, and clayey sands.

Relative Density	Typical N ₆₀ Value Range*		
Very Loose	0-4		
Loose	5-10		
Medium Dense	11-30		
Dense	31-50		
Very Dense	Over 50		

^{*} N_{60} is the number of blows from a 140-lb weight having a free fall of 30-in. required to penetrate the final 12-in. of an 18-in. sample interval, corrected for field procedure to an average energy ratio of 60% (Terzaghi, Peck, and Mesri, 1996).

CONSISTENCY OF COHESIVE SOILS

The following descriptive terms for consistency apply to cohesive soils such as clays, sandy clays, and silty clays.

Typical Compressive Strength (tsf)	Consistency	Typical SPT "N ₆₀ " Value Range**
~ < 0.25		
$q_{\rm u} < 0.25$	Very soft	≤ 2
$0.25 \le q_{\rm u} < 0.50$	Soft	3-4
$0.50 \le q_{11} < 1.00$	Firm	5-8
$1.00 \le q_u^{<} 2.00$	Stiff	9-15
$2.00 \le q_u^{4} < 4.00$	Very Stiff	16-30
$q_{u} \ge 4.00$	Hard	≥ 31

^{**} An " N_{60} " value of 31 or greater corresponds to a hard consistency. The correlation of consistency with a typical SPT " N_{60} " value range is approximate.

Tolunay-Wong



Engineers, Inc.

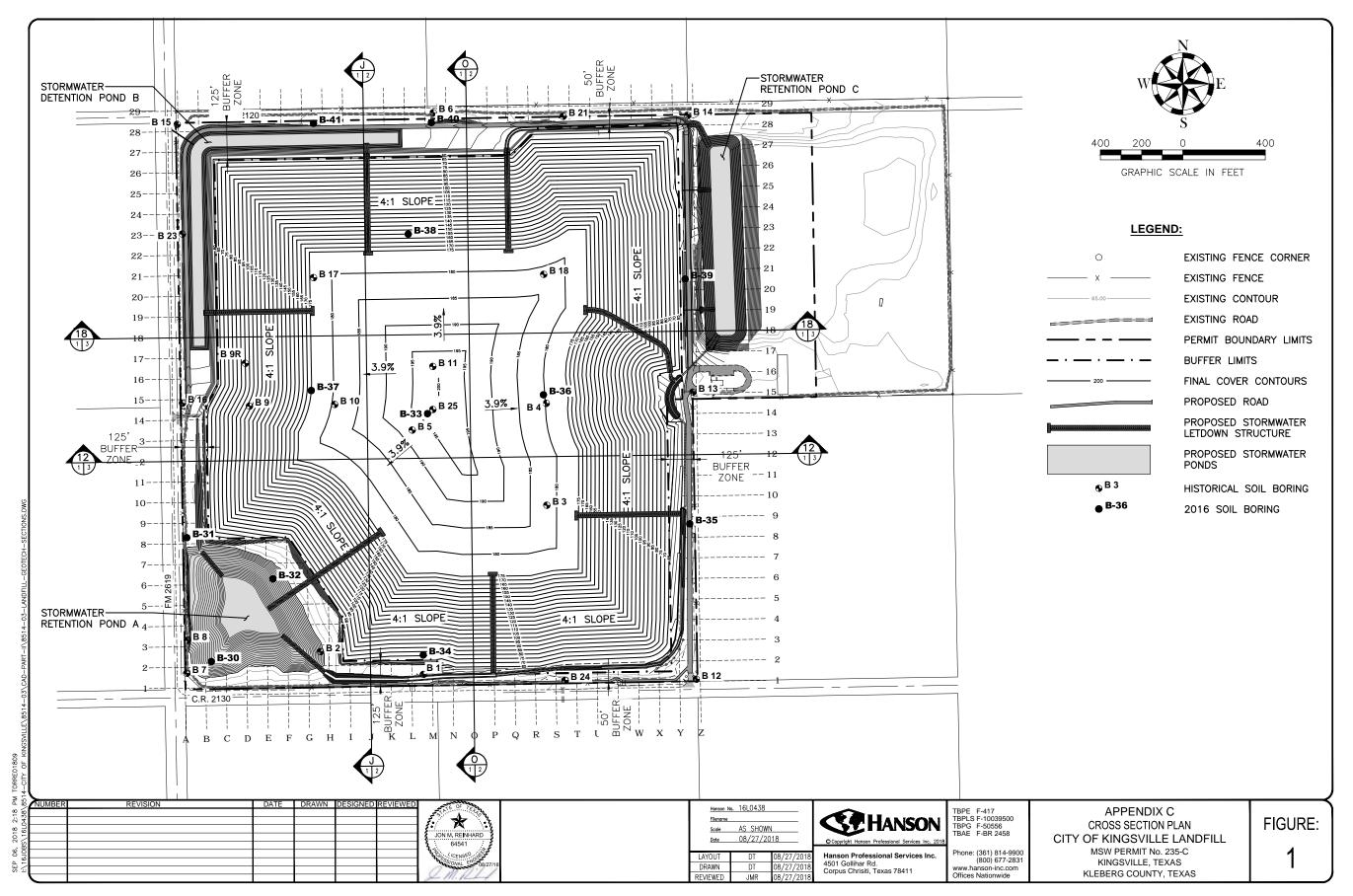
REVISION DATE 1-5-12 GEOSYSTEM

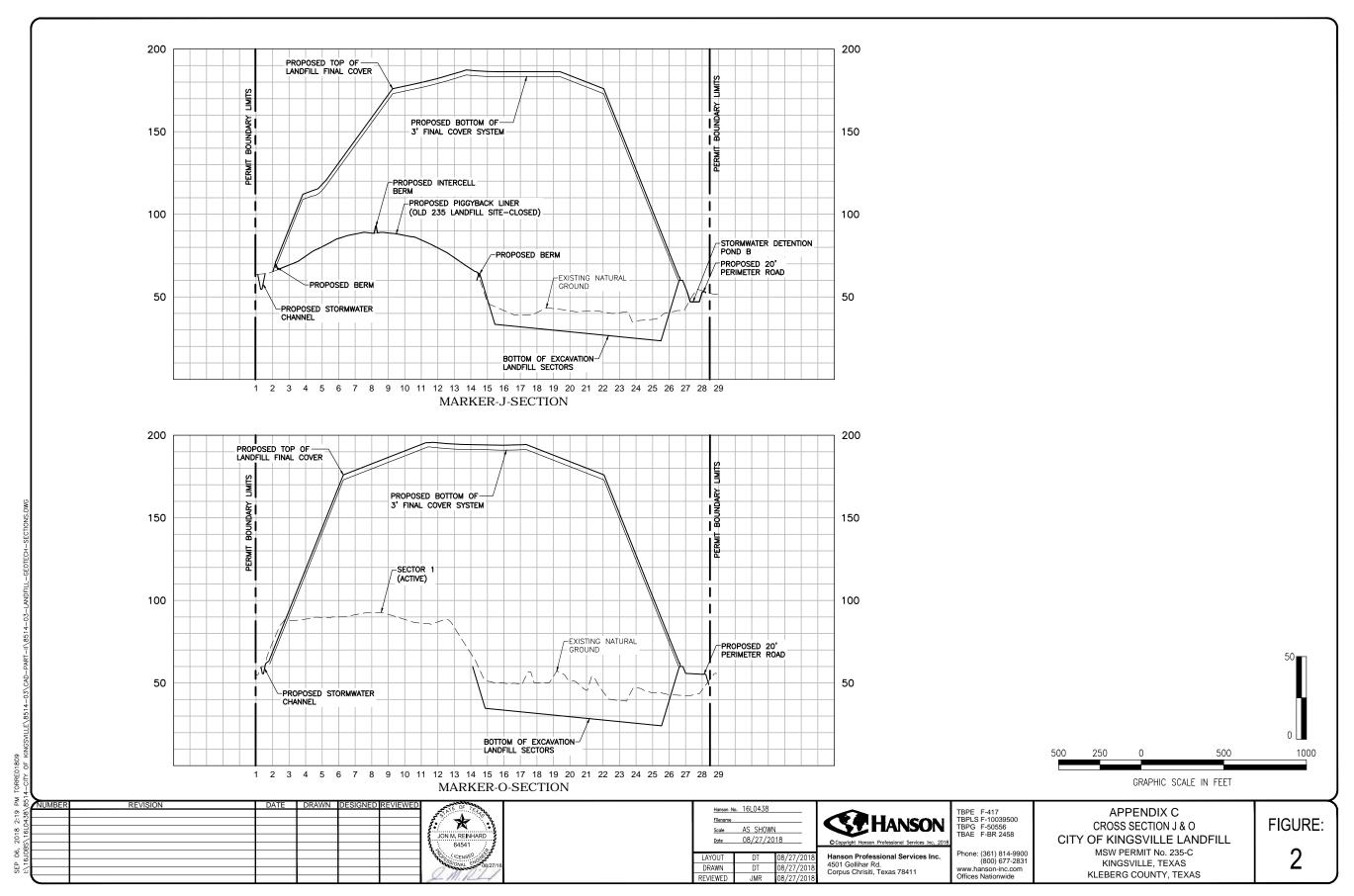
APPENDIX C

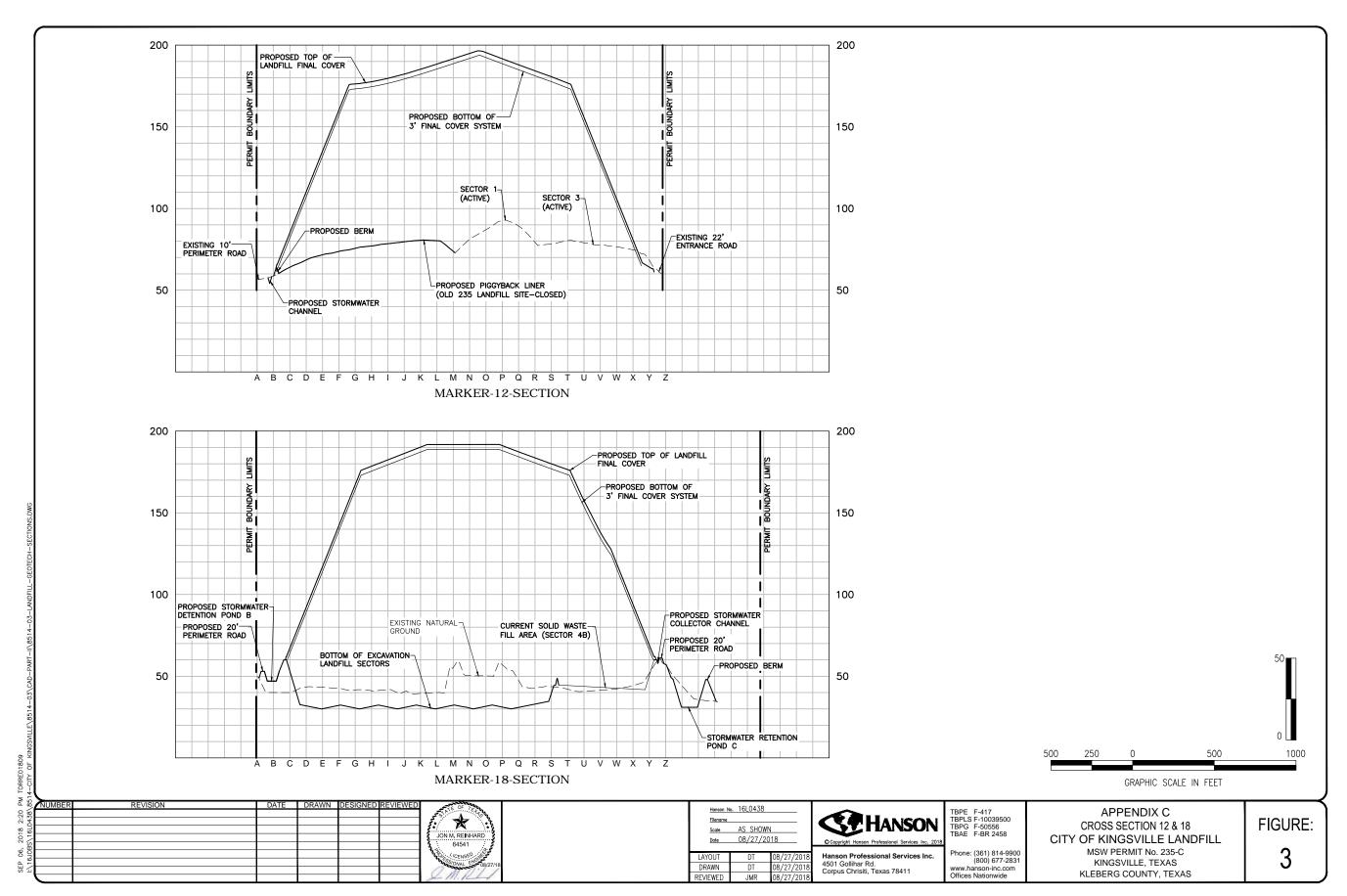
CROSS SECTION PLAN, CROSS SECTION J & O, CROSS SECTION 12 & 18

TWE

Project No. 16.53.042 Report No. 12788R1





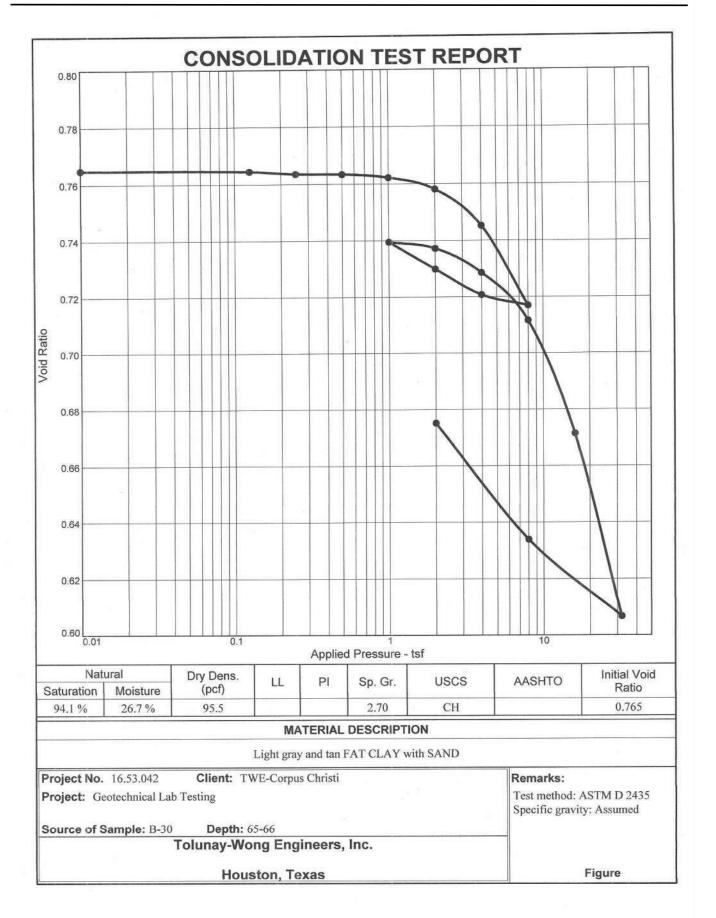


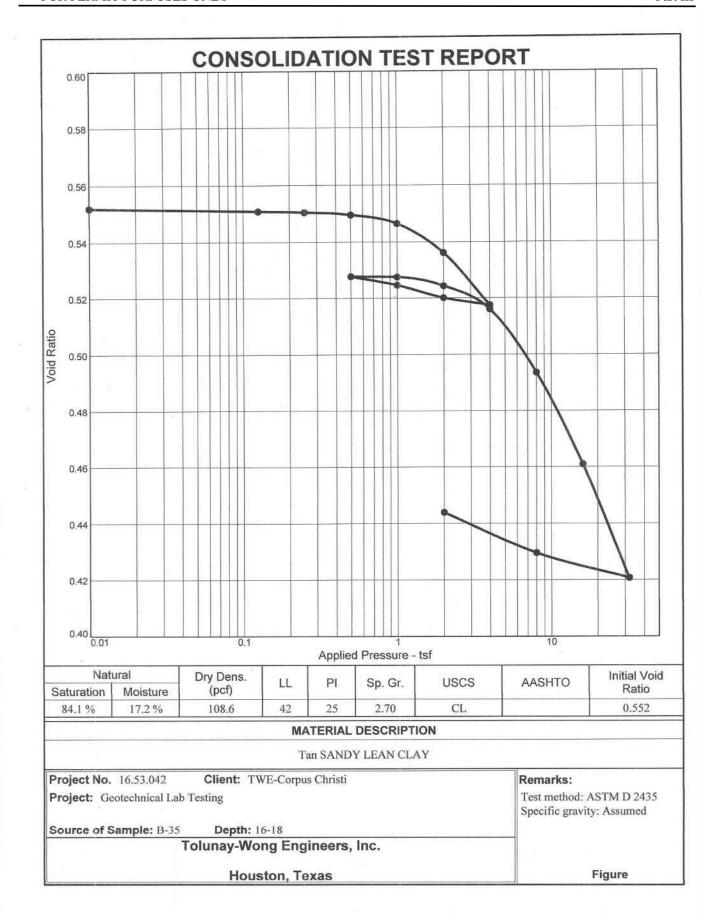
APPENDIX D

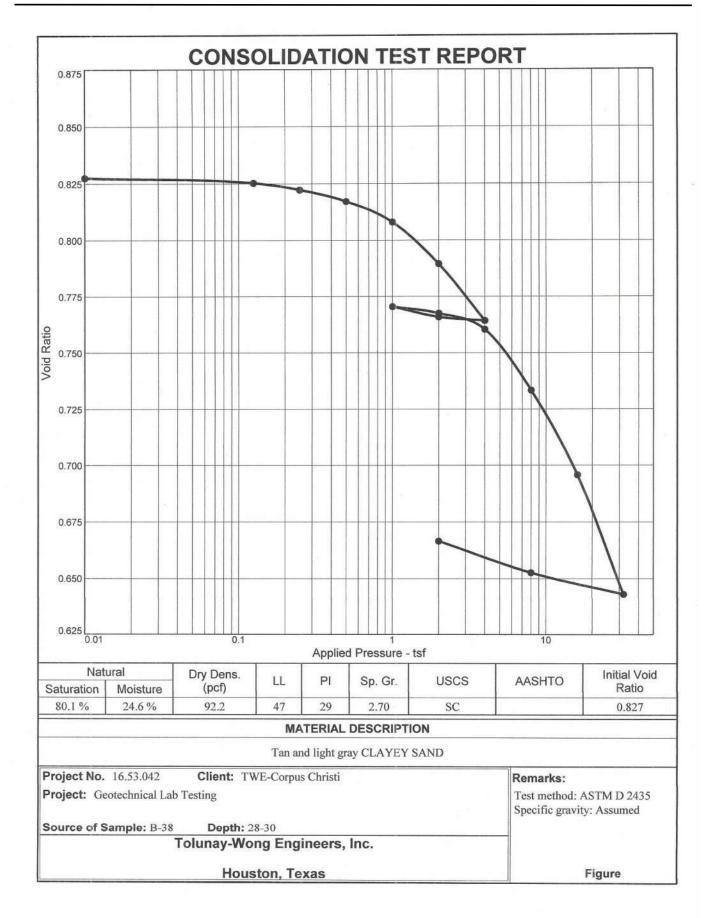
ONE-DIMENSIONAL CONSOLIDATION TESTS RESULTS

TWE

Project No. 16.53.042 Report No. 12788R1







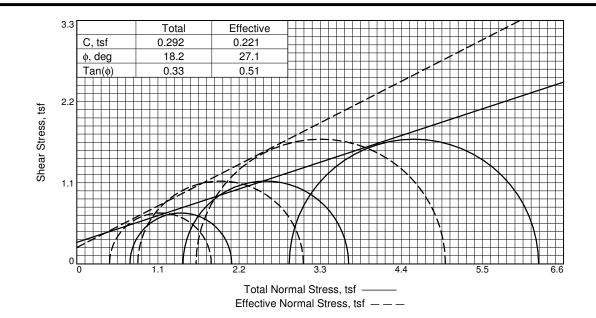
APPENDIX E

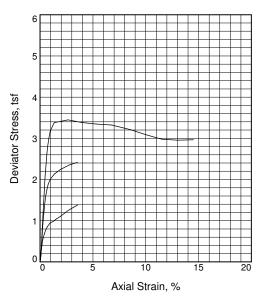
CONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TESTS RESULTS

TWE

Project No. 16.53.042 Report No. 12788R1

Revision: 0





Saı	mple No.	1	2	3	
	Water Content, %	28.3	28.3	28.3	
	Dry Density, pcf	88.5	88.5	88.5	
Initial	Saturation, %	84.6	84.6	84.6	
Ē	Void Ratio	0.9043	0.9043	0.9043	
	Diameter, in.	2.06	2.06	2.06	
	Height, in.	4.17	4.17	4.17	
	Water Content, %	26.8	26.8	26.8	
; ;	Dry Density, pcf	97.7	97.7	97.7	
At Test	Saturation, %	100.0	100.0	100.0	
7	Void Ratio	0.7246	0.7246	0.7246	
1	Diameter, in.	1.96	1.99	2.02	
	Height, in.	4.17	4.05	3.94	
Str	ain rate, %/min.	0.01	0.01	0.01	
Eff.	. Cell Pressure, psi	10.00	20.00	40.00	
Fai	I. Stress, tsf	1.38	2.24	3.38	
Е	Excess Pore Pr., tsf	0.28	0.61	1.26	
5	Strain, %	3.5	1.9	1.3	
Ult.	. Stress, tsf	1.38	2.42	3.45	
Е	Excess Pore Pr., tsf	0.28	0.50	1.21	
5	Strain, %	3.5	3.5	2.6	
	Failure, tsf	1.82	3.07	5.00	
$\overline{\sigma}_3$	Failure, tsf	0.44	0.83	1.62	
•	•				

Type of Test:

CU with Pore Pressures **Sample Type:** Undisturbed

Description: Light gray and tan FAT CLAY with

little calcareous nodules

Assumed Specific Gravity= 2.70

Remarks:

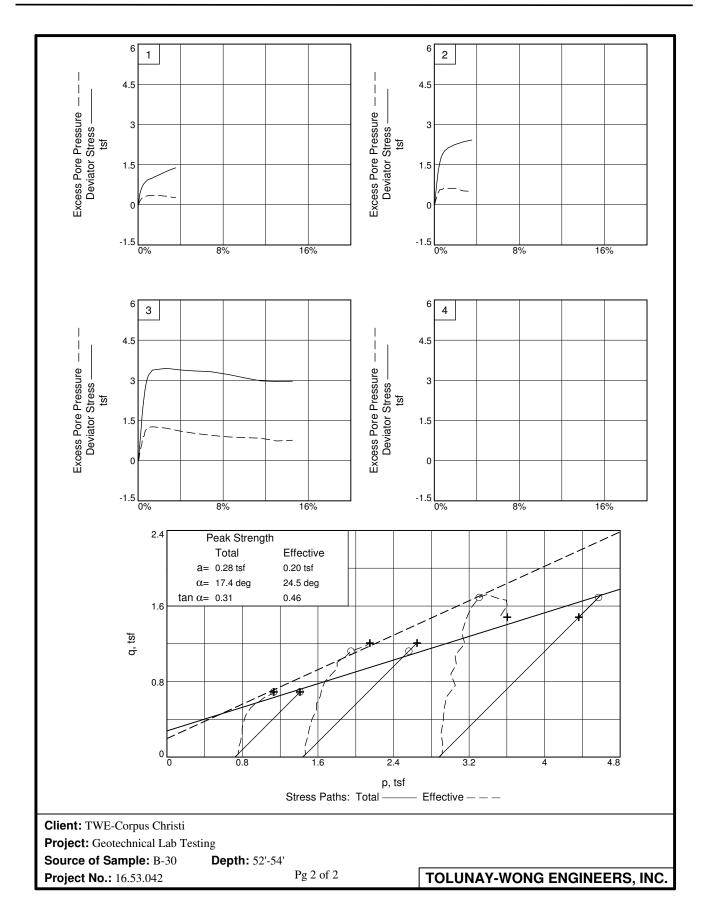
Test method: ASTM D 4767 Failure type: Slickensided

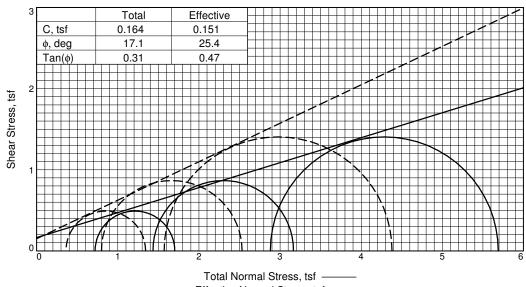
Pg 1 of 2

Client: TWE-Corpus Christi

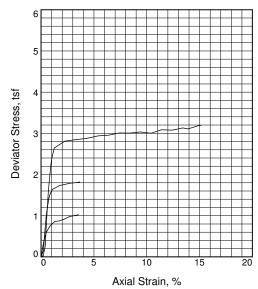
Project: Geotechnical Lab Testing

Source of Sample: B-30 Depth: 52'-54'





Effective Normal Stress, tsf ----



Sample No.		1	2	3	
	Water Content, %	31.2	31.2	31.2	
	Dry Density, pcf	86.6	86.6	86.6	
Initial	Saturation, %	89.0	89.0	89.0	
<u>=</u>	Void Ratio	0.9473	0.9473	0.9473	
	Diameter, in.	2.87	2.87	2.87	
	Height, in.	5.59	5.59	5.59	
	Water Content, %	33.8	33.8	33.8	
#	Dry Density, pcf	88.1	88.1	88.1	
ĕ	Saturation, %	100.0	100.0	100.0	
At Test	Void Ratio	0.9136	0.9136	0.9136	
_	Diameter, in.	2.85	2.90	2.94	
	Height, in.	5.58	5.40	5.23	
Strain rate, %/min.		0.01	0.01	0.01	
Eff.	. Cell Pressure, psi	10.00	19.90	40.00	
Fail. Stress, tsf		0.98	1.73	2.81	
E	Excess Pore Pr., tsf	0.36	0.63	1.31	
5	Strain, %	2.7	1.8	2.2	
Ult.	Stress, tsf	1.03	1.82	3.19	
E	Excess Pore Pr., tsf	0.33	0.57	0.87	
5	Strain, %	3.5	3.7	15.2	
$\overline{\sigma}_1$	Failure, tsf	1.34	2.53	4.38	
$\overline{\sigma}_{\!\scriptscriptstyle 3}$	Failure, tsf	0.36	0.80	1.57	

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and reddish-brown FAT CLAY with few calcareous nodules

Assumed Specific Gravity= 2.70 Remarks:

Test method: ASTM D 4767 Failure type: Slickensided

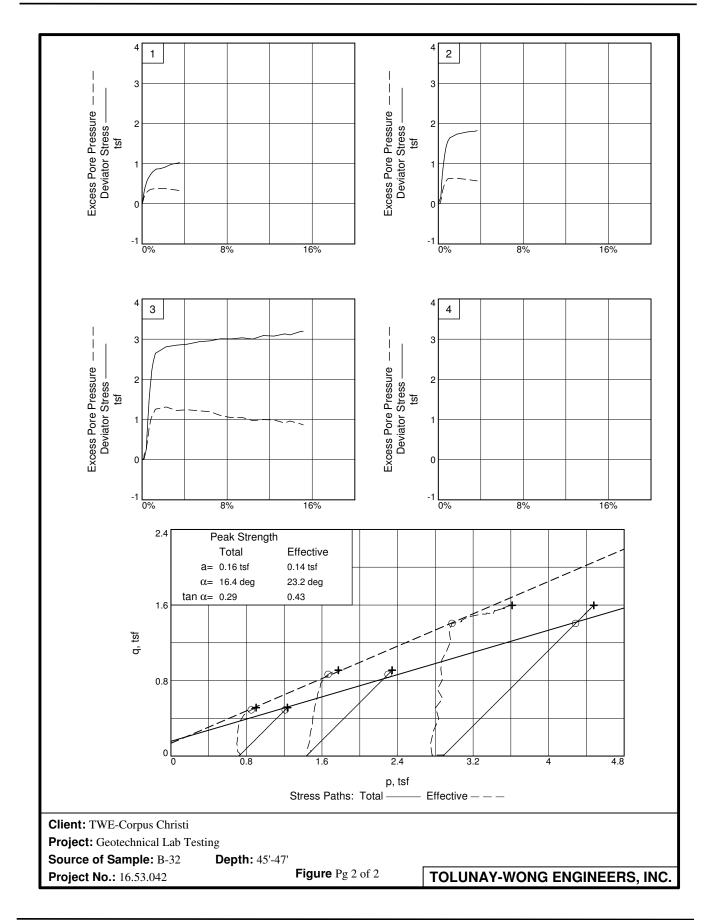
Figure Pg 1 of 2

Client: TWE-Corpus Christi

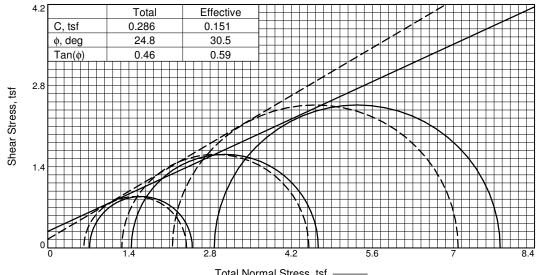
Project: Geotechnical Lab Testing

Source of Sample: B-32 **Depth:** 45'-47'

Proj. No.: 16.53.042 **Date Sampled: 8/26/16**

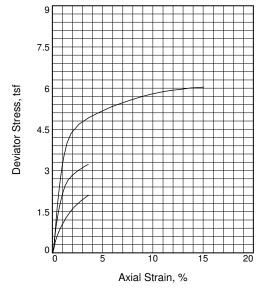


3



Total Normal Stress, tsf ——— Effective Normal Stress, tsf ———

Sample No.



		•				
		Water Content, %	13.6	13.6	13.6	
		Dry Density, pcf	114.1	114.1	114.1	
	<u>a</u>	Saturation, %	76.8	76.8	76.8	
	Initial	Void Ratio	0.4771	0.4771	0.4771	
		Diameter, in.	2.87	2.87	2.87	
		Height, in.	5.56	5.56	5.56	
		Water Content, %	15.2	15.2	15.2	
	#	Dry Density, pcf	119.5	119.5	119.5	
	At Test	Saturation, %	100.0	100.0	100.0	
	=	Void Ratio	0.4100	0.4100	0.4100	
	4	Diameter, in.	2.81	2.87	2.92	
		Height, in.	5.55	5.32	5.12	
	Stra	ain rate, %/min.	0.01	0.01	0.01	
I	Eff.	. Cell Pressure, psi	10.00	20.00	39.90	
I	Fai	I. Stress, tsf	1.77	3.23	4.93	
	Excess Pore Pr., tsf		0.10	0.16	0.72	
	5	Strain, %	2.5	3.6	3.7	
Įι	Ult.	Stress, tsf	2.09	3.23	6.04	
	Е	Excess Pore Pr., tsf	-0.02	0.16	0.04	
	5	Strain, %	3.6	3.6	15.1	
٦,	<u>5</u> 1	Failure, tsf	2.39	4.50	7.08	
-	$\overline{\sigma}_3$	Failure, tsf	0.62	1.28	2.15	

Type of Test:

CU with Pore Pressures **Sample Type:** Undisturbed

Description: Light gray and tan SANDY LEAN

CLAY

LL= 36 **PL=** 16 **PI=** 20

 $\textbf{Assumed Specific Gravity=}\ 2.70$

Remarks:

Test method: ASTM D 4767

Failure type: Bulge

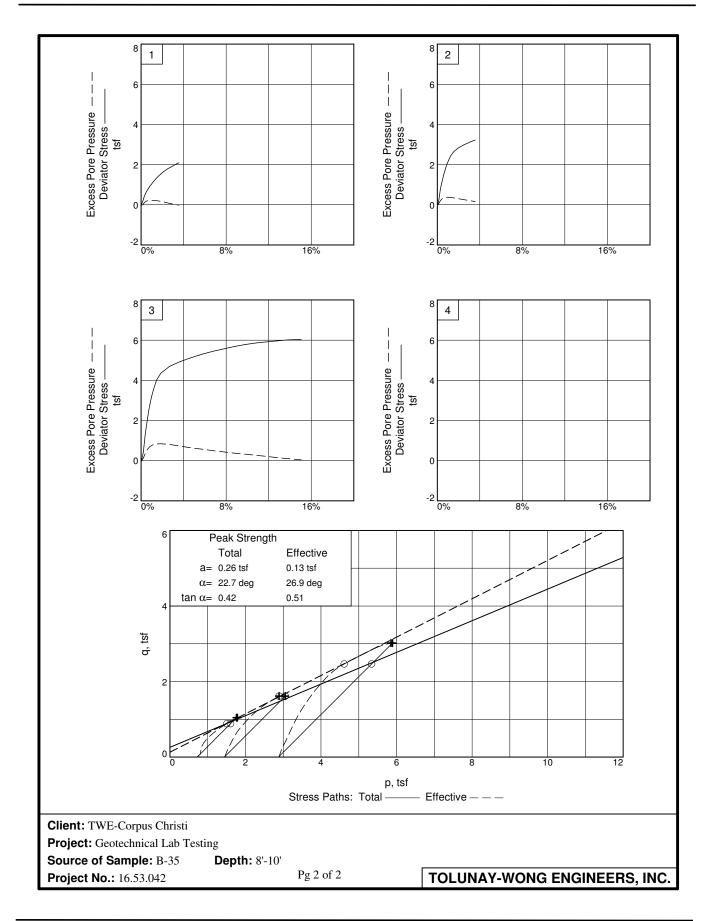
Pg 1 of 2

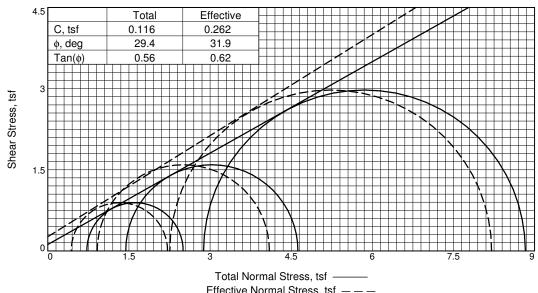
Client: TWE-Corpus Christi

Project: Geotechnical Lab Testing

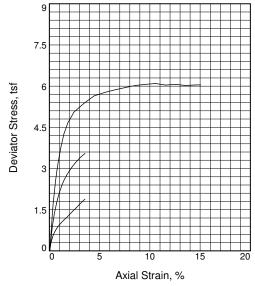
Source of Sample: B-35 Depth: 8'-10'

Proj. No.: 16.53.042 **Date Sampled:** 8/25/16





Effective Normal Stress, tsf ---



	Sample No.		1	2	3	
		Water Content, %	20.7	20.7	20.7	
	_	Dry Density, pcf	103.5	103.5	103.5	
	Initial	Saturation, %	89.1	89.1	89.1	
	İ	Void Ratio	0.6282	0.6282	0.6282	
		Diameter, in.	2.82	2.82	2.82	
		Height, in.	5.58	5.58	5.58	
		Water Content, %	20.4	20.4	20.4	
	#	Dry Density, pcf	108.6	108.6	108.6	
	At Test	Saturation, %	100.0	100.0	100.0	
	=	Void Ratio	0.5518	0.5518	0.5518	
	1	Diameter, in.	2.77	2.81	2.84	
		Height, in.	5.50	5.37	5.25	
	Stra	ain rate, %/min.	0.01	0.01	0.01	
	Eff.	Cell Pressure, psi	10.00	20.00	40.00	
	Fai	I. Stress, tsf	1.78	3.18	5.95	
	Е	excess Pore Pr., tsf	0.29	0.53	0.62	
	5	Strain, %	3.2	2.5	7.5	
	Ult.	Stress, tsf	1.89	3.55	6.09	
	E	excess Pore Pr., tsf	0.26	0.40	0.49	
	S	Strain, %	3.5	3.5	10.6	
	$\overline{\sigma}_1$	Failure, tsf	2.21	4.10	8.20	
	$\overline{\sigma}_3$	Failure, tsf	0.43	0.91	2.26	

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and tan SANDY FAT

CLAY

LL= 52 **PL=** 19 **PI=** 33

Assumed Specific Gravity= 2.70

Remarks:

Test method: ASTM D 4767

Failure type: Bulge

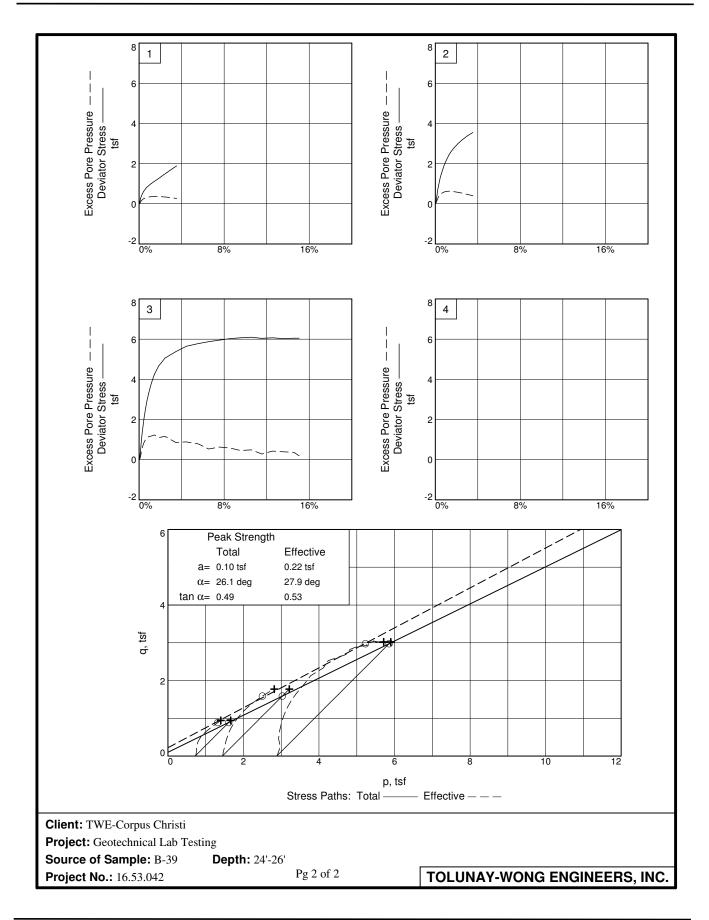
Pg 1 of 2

Client: TWE-Corpus Christi

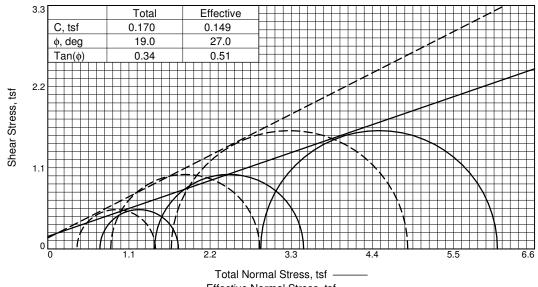
Project: Geotechnical Lab Testing

Source of Sample: B-39 **Depth:** 24'-26'

Proj. No.: 16.53.042 **Date Sampled: 8/25/16**

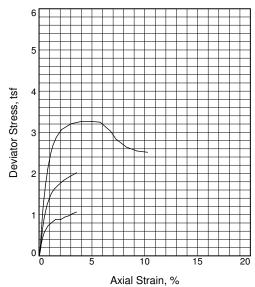


3



Effective Normal Stress, tsf ---

Sample No.



		•				
		Water Content, %	30.9	30.9	30.9	
		Dry Density, pcf	91.8	91.8	91.8	
	Initial	Saturation, %	97.8	97.8	97.8	
	Ξ	Void Ratio	0.8696	0.8696	0.8696	
		Diameter, in.	2.77	2.77	2.77	
		Height, in.	5.58	5.58	5.58	
		Water Content, %	31.7	31.7	31.7	
	#	Dry Density, pcf	91.7	91.7	91.7	
	<u>6</u>	Saturation, %	100.0	100.0	100.0	
	At Test	Void Ratio	0.8728	0.8728	0.8728	
	4	Diameter, in.	2.78	2.82	2.86	
		Height, in.	5.57	5.39	5.23	
	Str	ain rate, %/min.	0.01	0.0060	0.0070	
	Eff.	. Cell Pressure, psi	9.80	20.10	40.10	
	Fai	I. Stress, tsf	1.06	2.02	3.21	
	Excess Pore Pr., tsf Strain, %		0.31	0.59	1.21	
			3.6	3.6	3.0	
	Ult.	Stress, tsf	1.06	2.02	3.27	
	Е	Excess Pore Pr., tsf	0.31	0.59	1.18	
	5	Strain, %	3.6	3.6	4.0	
	$\overline{\sigma}_1$	Failure, tsf	1.46	2.87	4.88	
- 1	$\overline{\sigma}_3$	Failure, tsf	0.39	0.85	1.67	

Type of Test:

CU with Pore Pressures Sample Type: Undisturbed

Description: Light gray and tan FAT CLAY with SAND and some calcareous nodules

LL= 77 **PL=** 24 **PI=** 53

Assumed Specific Gravity= 2.75

Remarks:

Test method: ASTM D 4767 Failure type: Slickensided

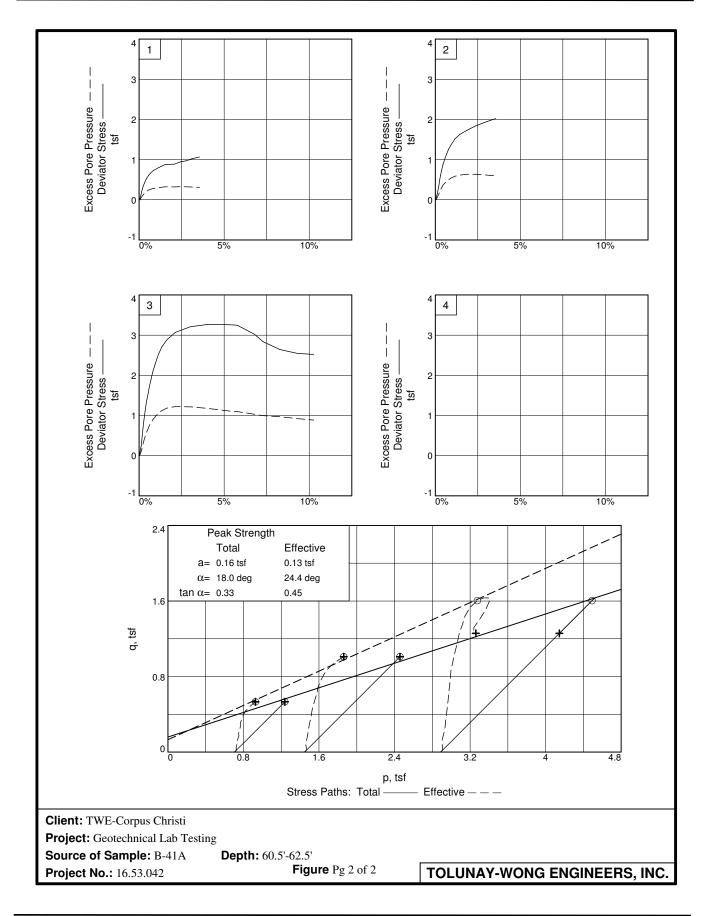
Figure Pg 1 of 2

Client: TWE-Corpus Christi

Project: Geotechnical Lab Testing

Source of Sample: B-41A **Depth:** 60.5'-62.5'

Proj. No.: 16.53.042 **Date Sampled:**

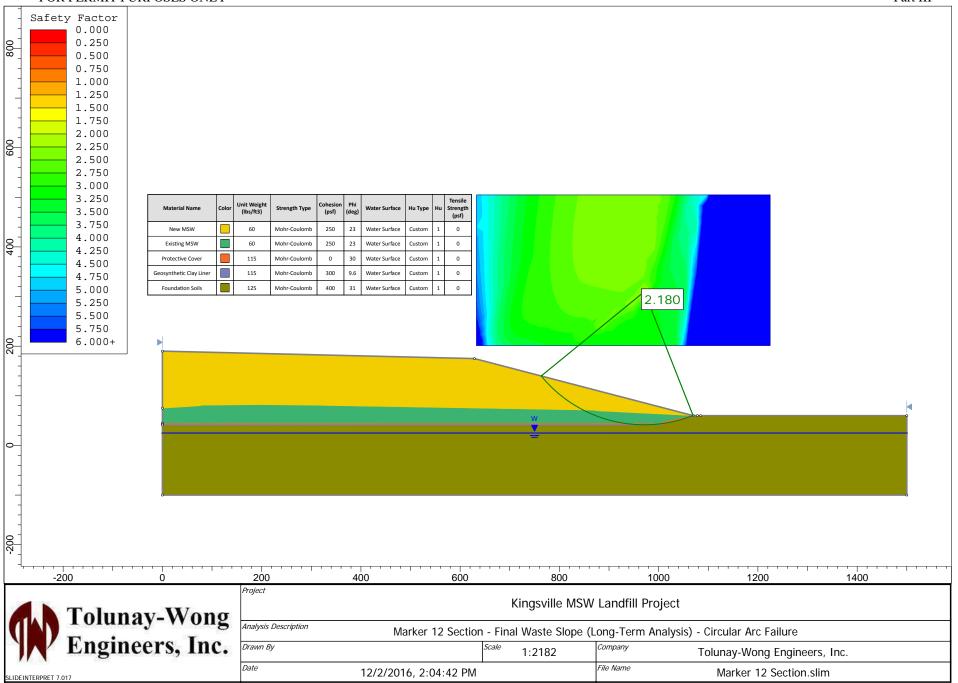


APPENDIX F

GRAPHICAL PRESENTATION OF MASS STABILITY ANALYSES RESULTS

TWE

Project No. 16.53.042 Report No. 12788R1



FOR PERMIT PURPOSES ONLY Part III Safety Factor 0.000 0.250 800 0.500 0.750 1.000 1.250 1.500 1.750 2.000 2.250 009 2.500 1.713 2.750 3.000 3.250 3.500 Tensile Strength (psf) 3.750 (lbs/ft3) (psf) 4.000 New MSW 60 Mohr-Coulomb 250 Water Surface 0 4.250 400 0 Existing MSW Mohr-Coulomb Water Surface 4.500 Mohr-Coulomb 0 4.750 0 300 Geosynthetic Clay Liner 115 Mohr-Coulomb Water Surface 5.000 0 5.250 Foundation Soils Mohr-Coulomb Water Surface 5.500 5.750 6.000+ -200 Ó 200 400 600 800 1000 1200 1400 Project Kingsville MSW Landfill Project Tolunay-Wong Analysis Description Marker 12 Section - Final Waste Slope (Long-Term Analysis) - Sliding Block Failure Engineers, Inc. Drawn By Company 1:2164 Tolunay-Wong Engineers, Inc.

12/2/2016, 2:04:42 PM

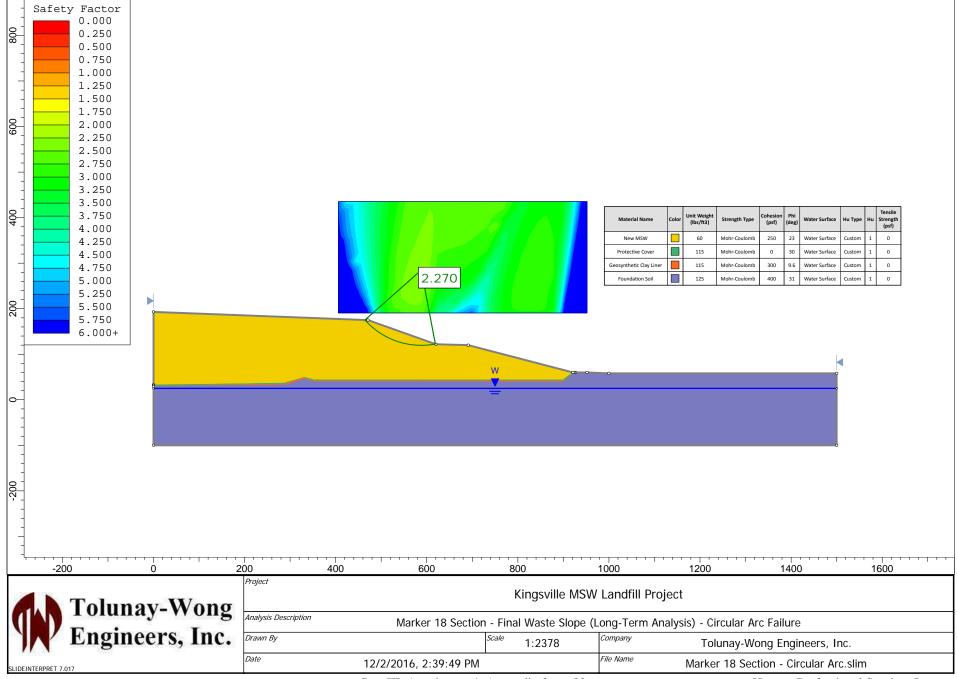
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Date

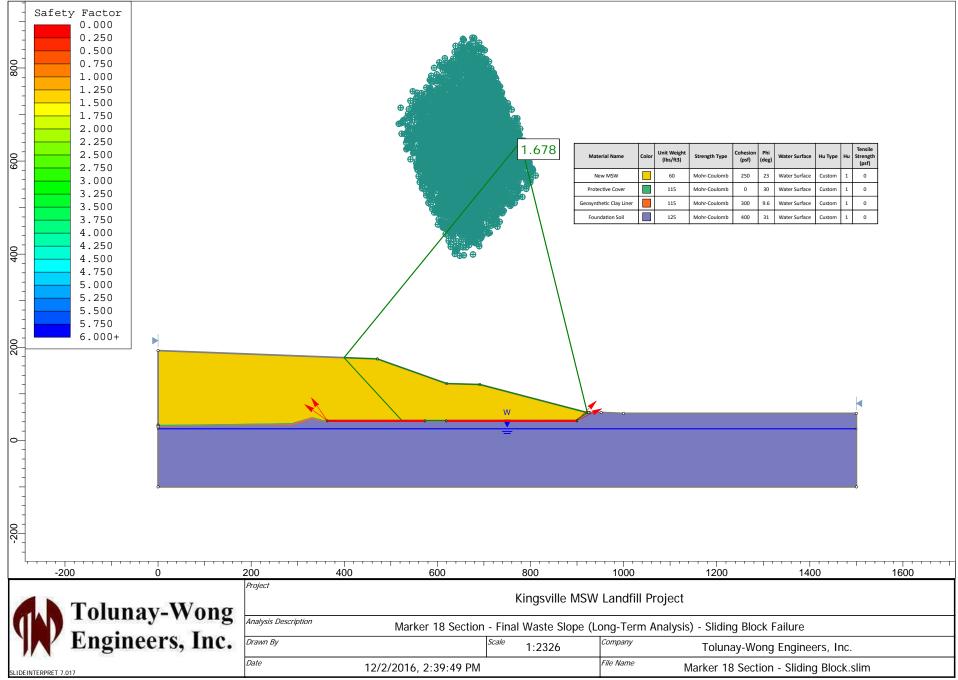
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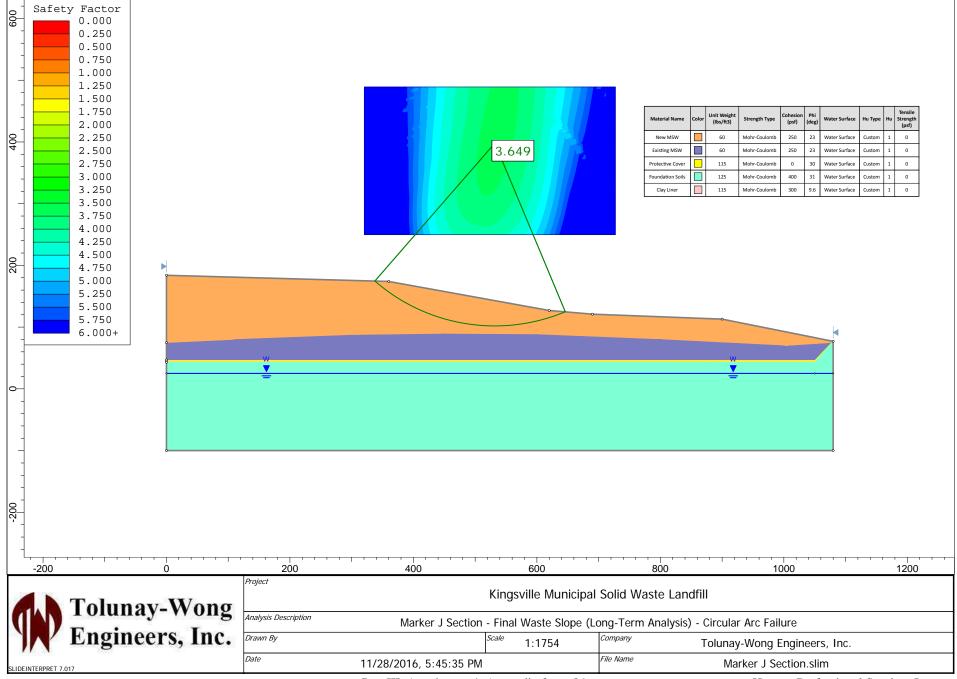
FOR PERMIT PURPOSES ONLY Part III

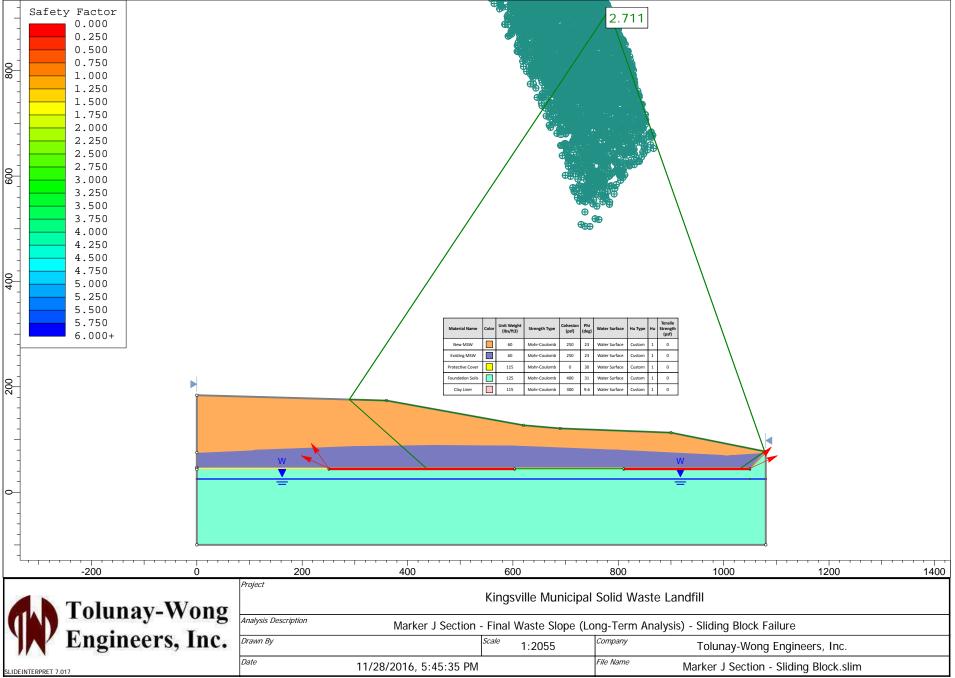


FOR PERMIT PURPOSES ONLY



FOR PERMIT PURPOSES ONLY Part III

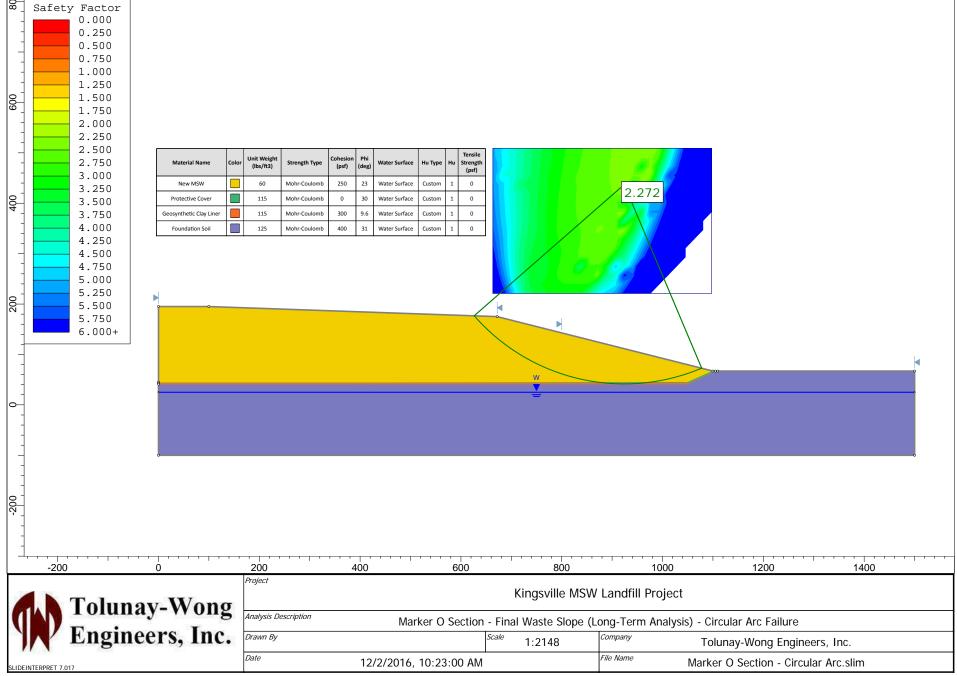


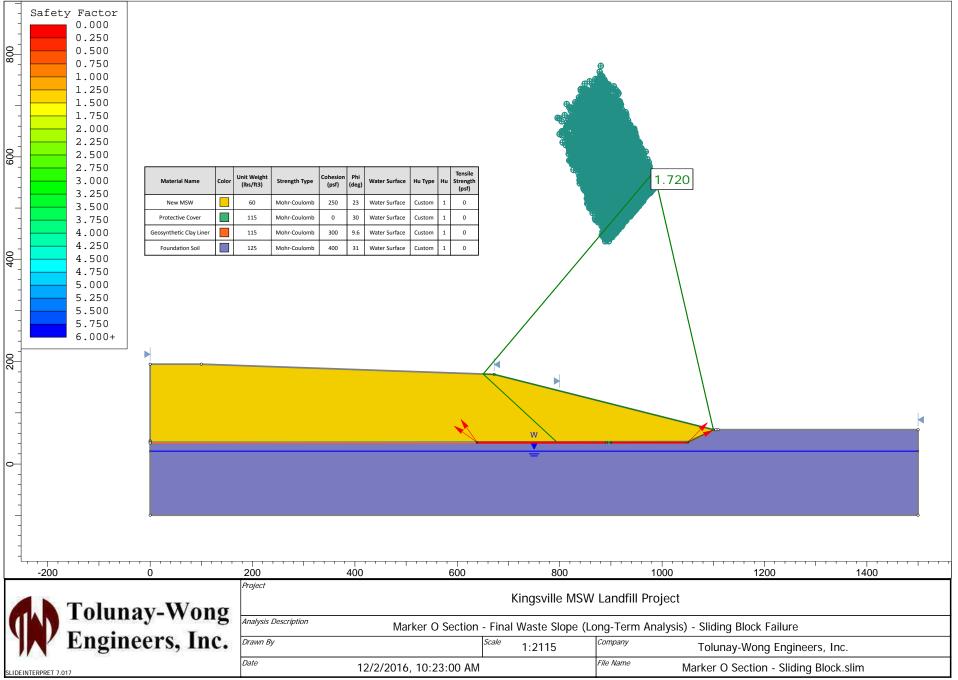


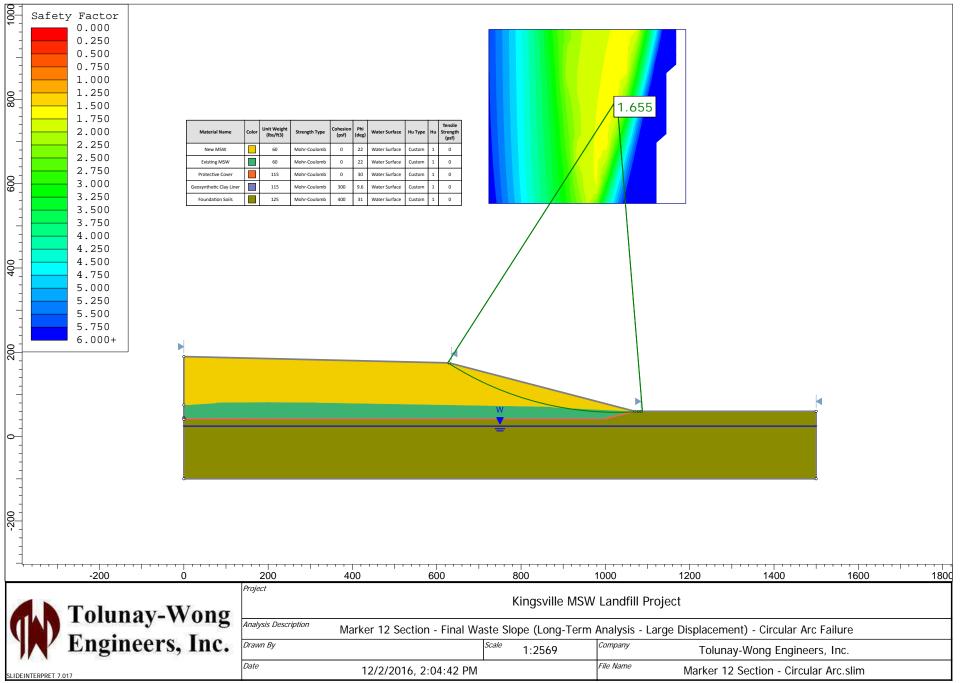
FOR PERMIT PURPOSES ONLY

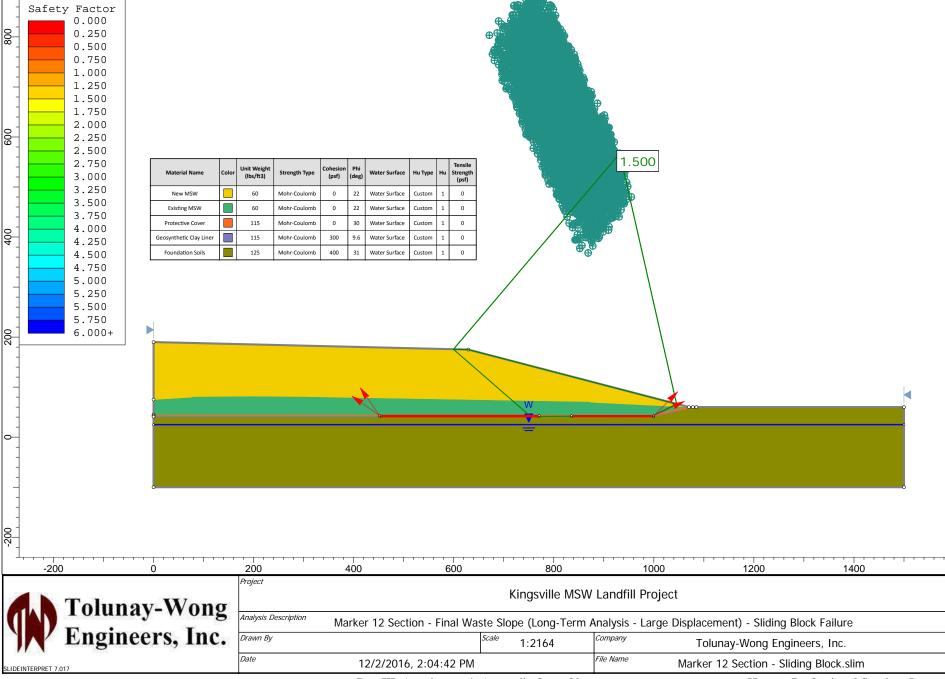
Permit Amendment Application MSW-235C

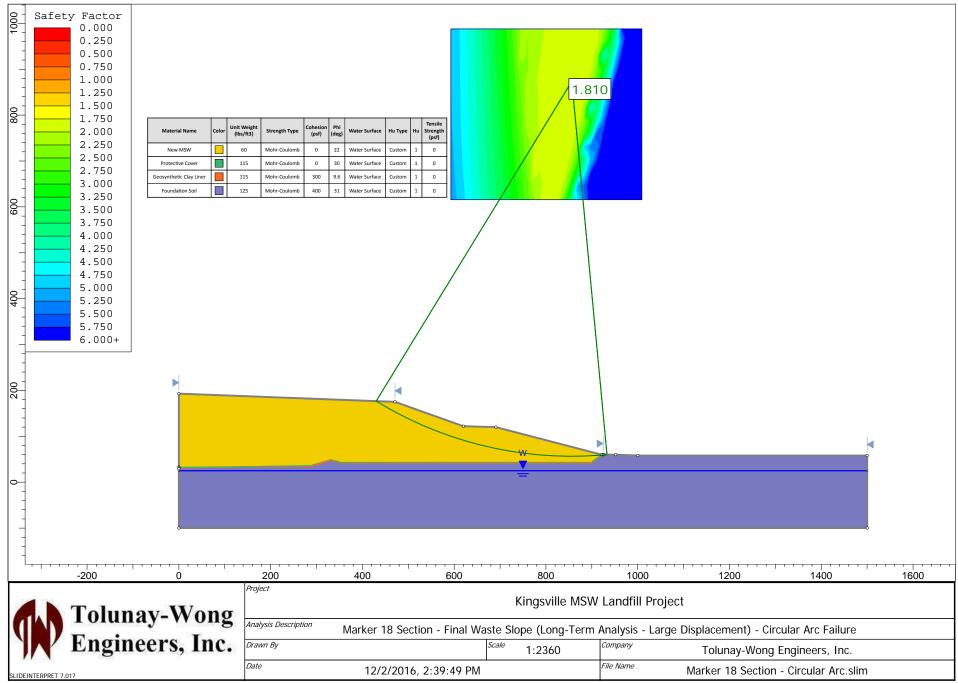
Part III



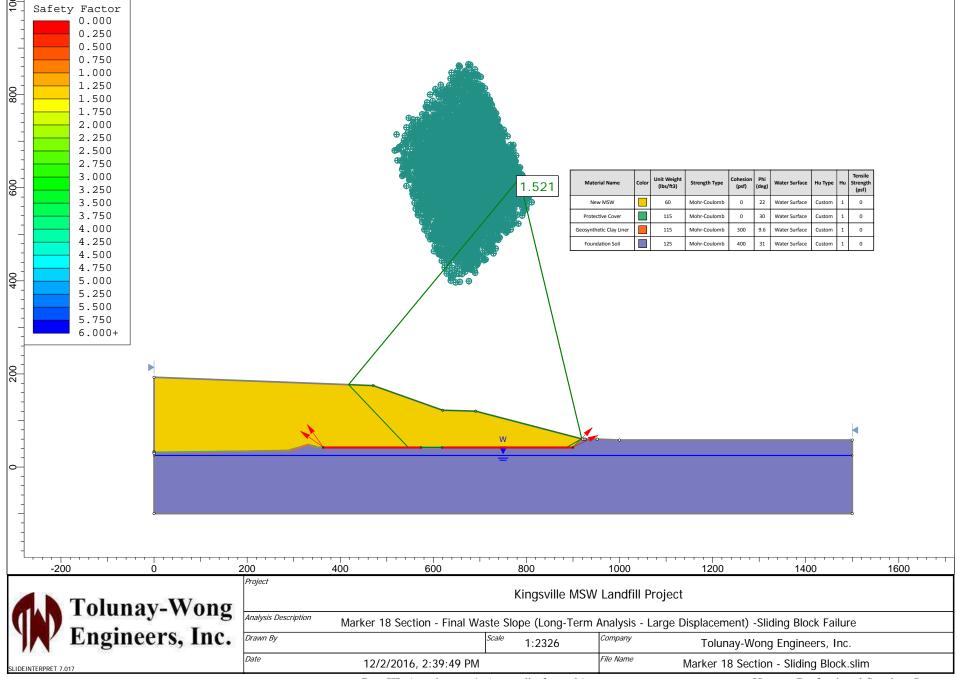


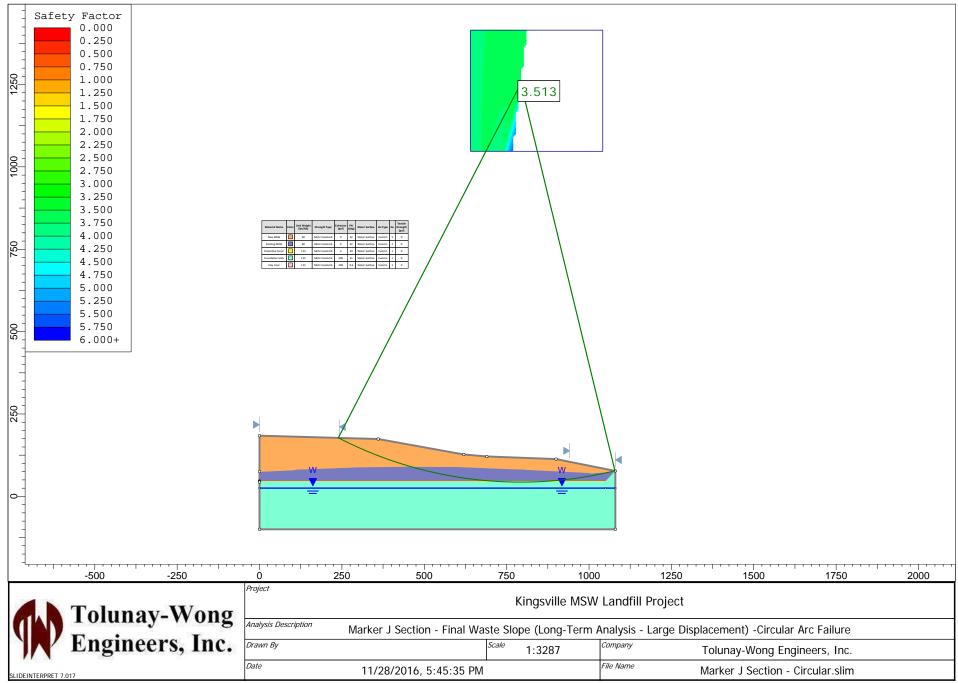






FOR PERMIT PURPOSES ONLY Part III

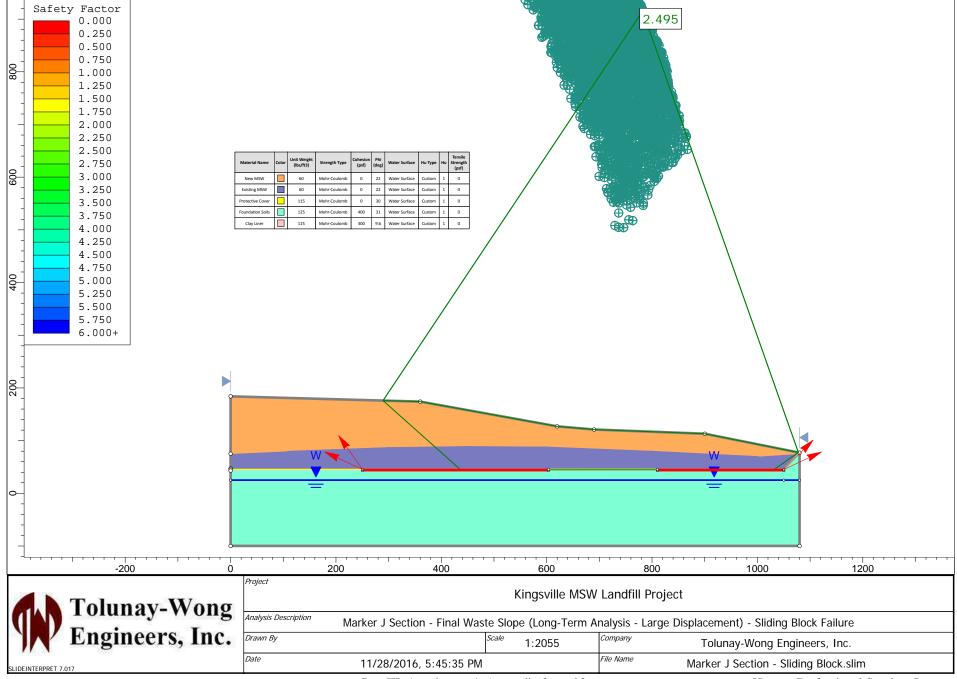


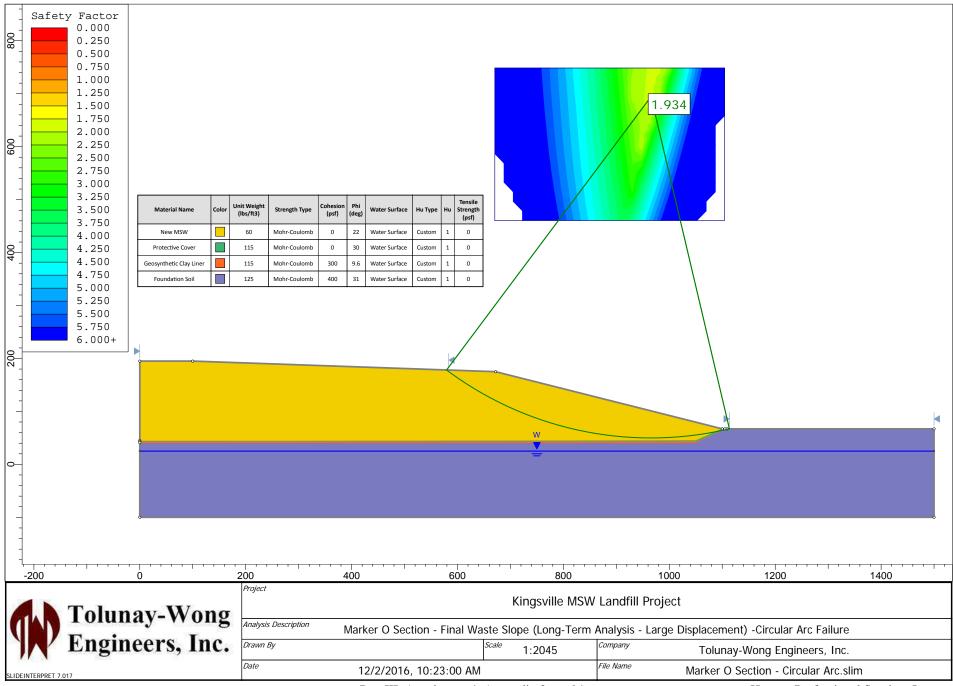


FOR PERMIT PURPOSES ONLY

Permit Amendment Application MSW-235C

Part III





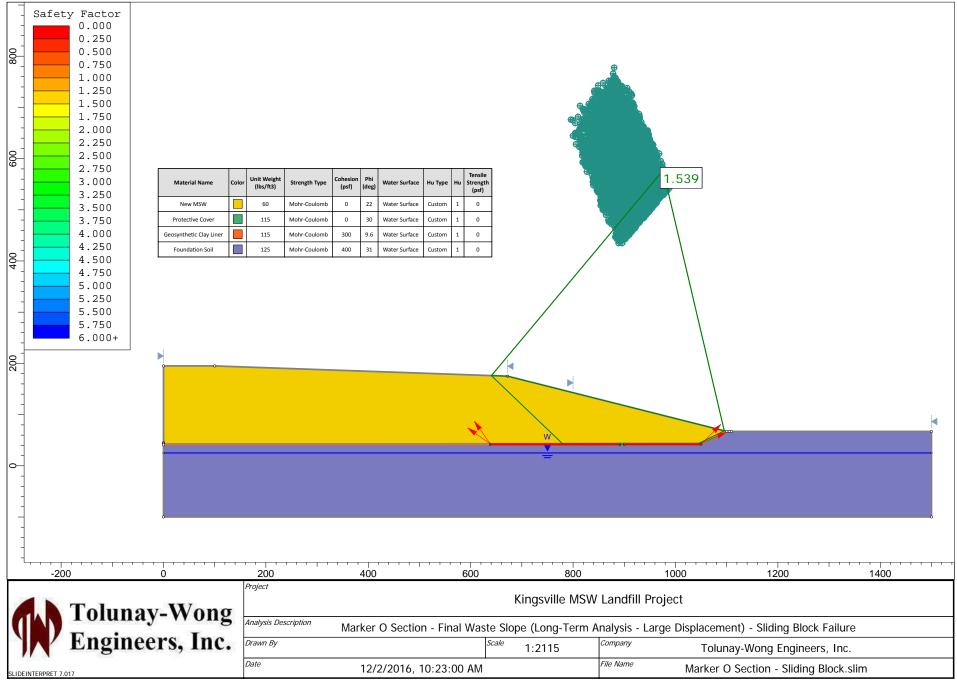


Exhibit III

Soil Boring Location Map

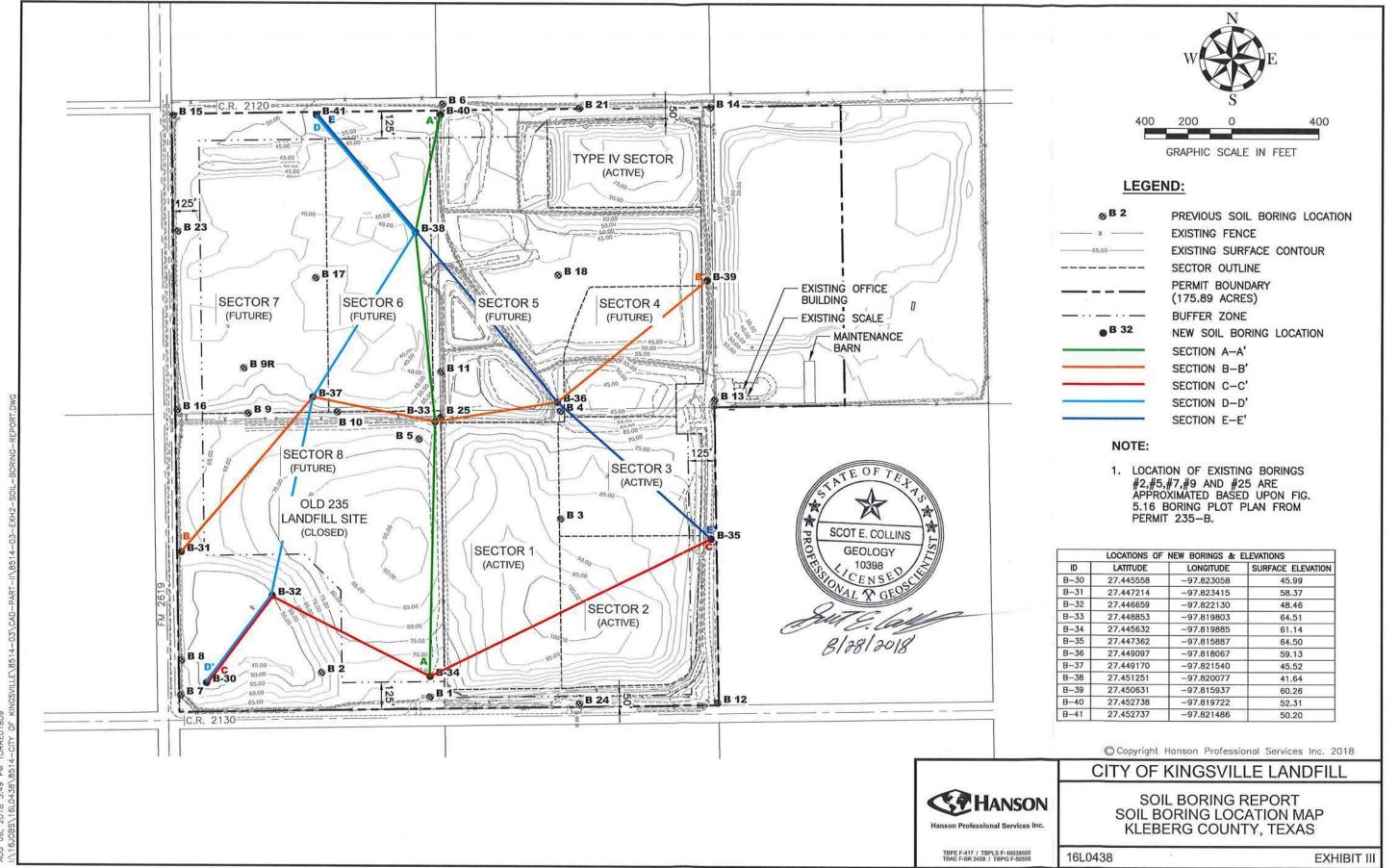
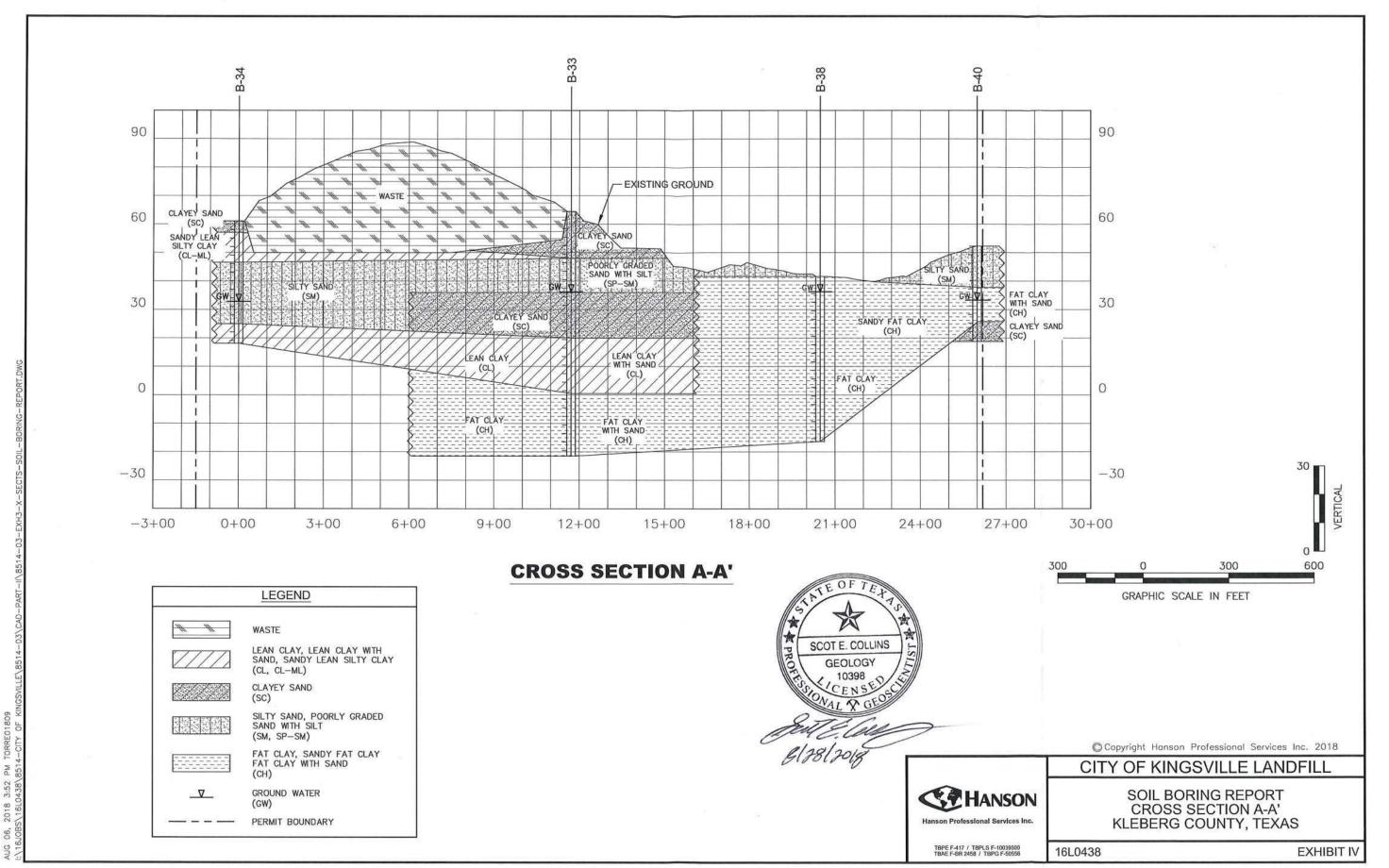
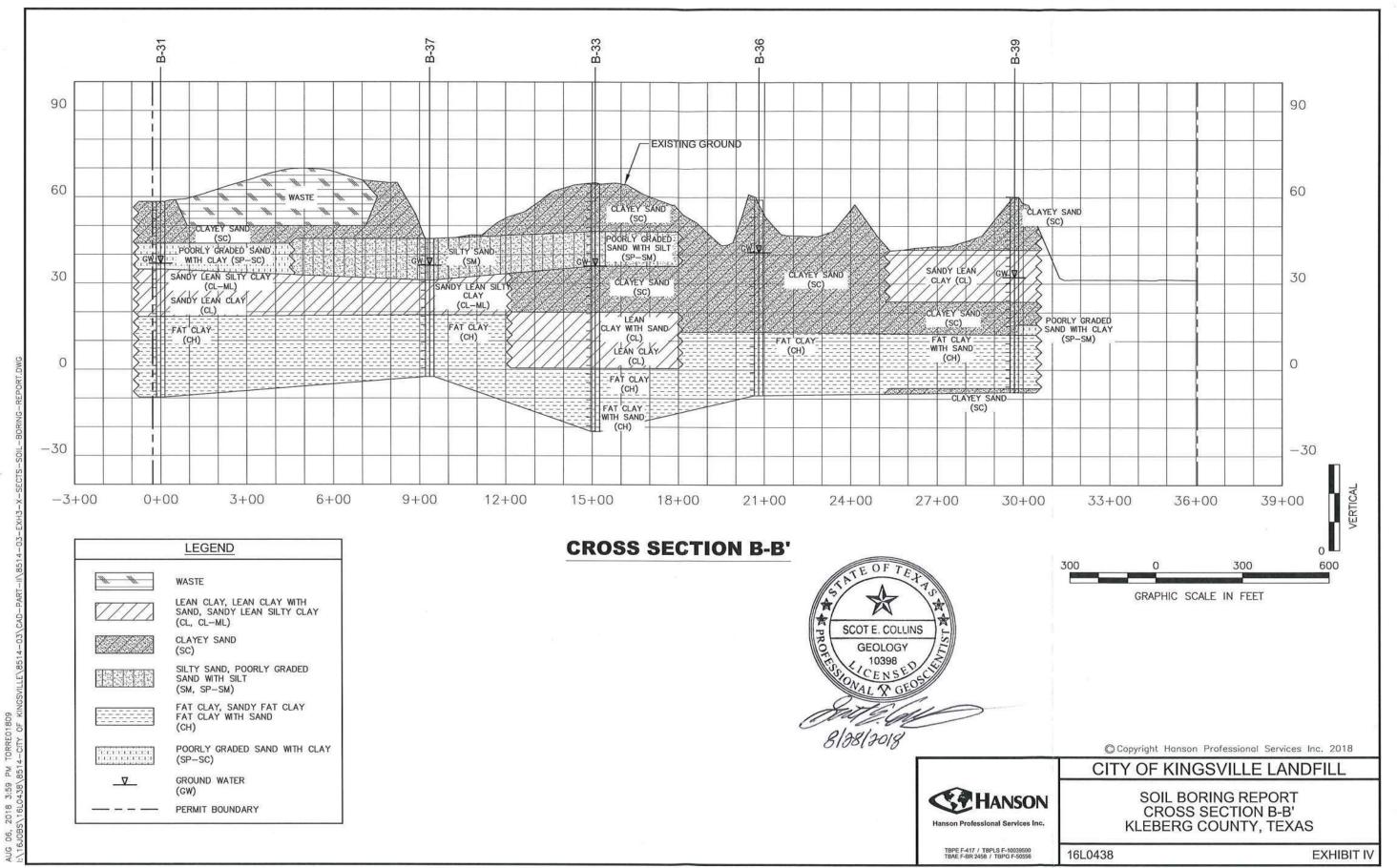
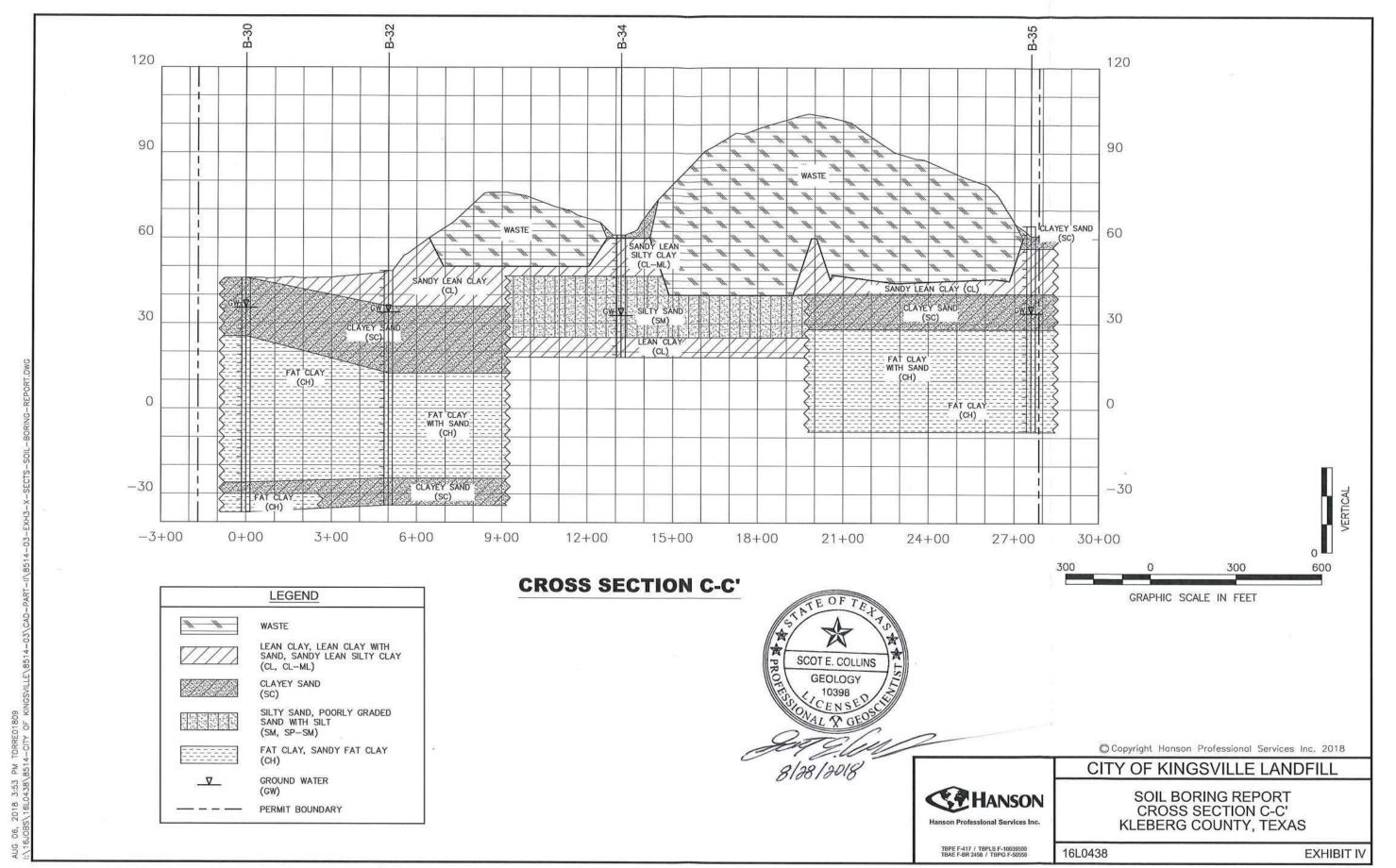


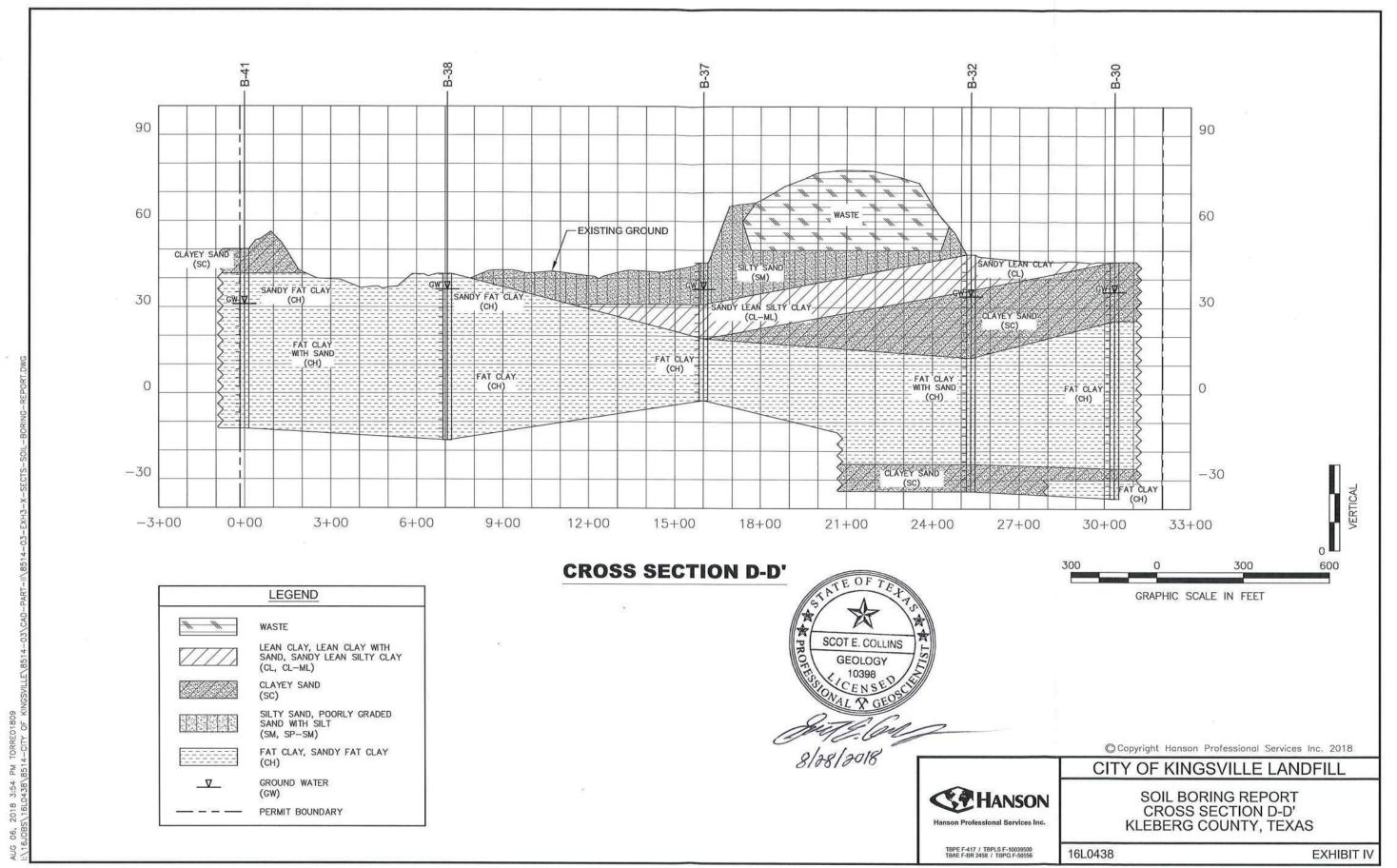
Exhibit IV

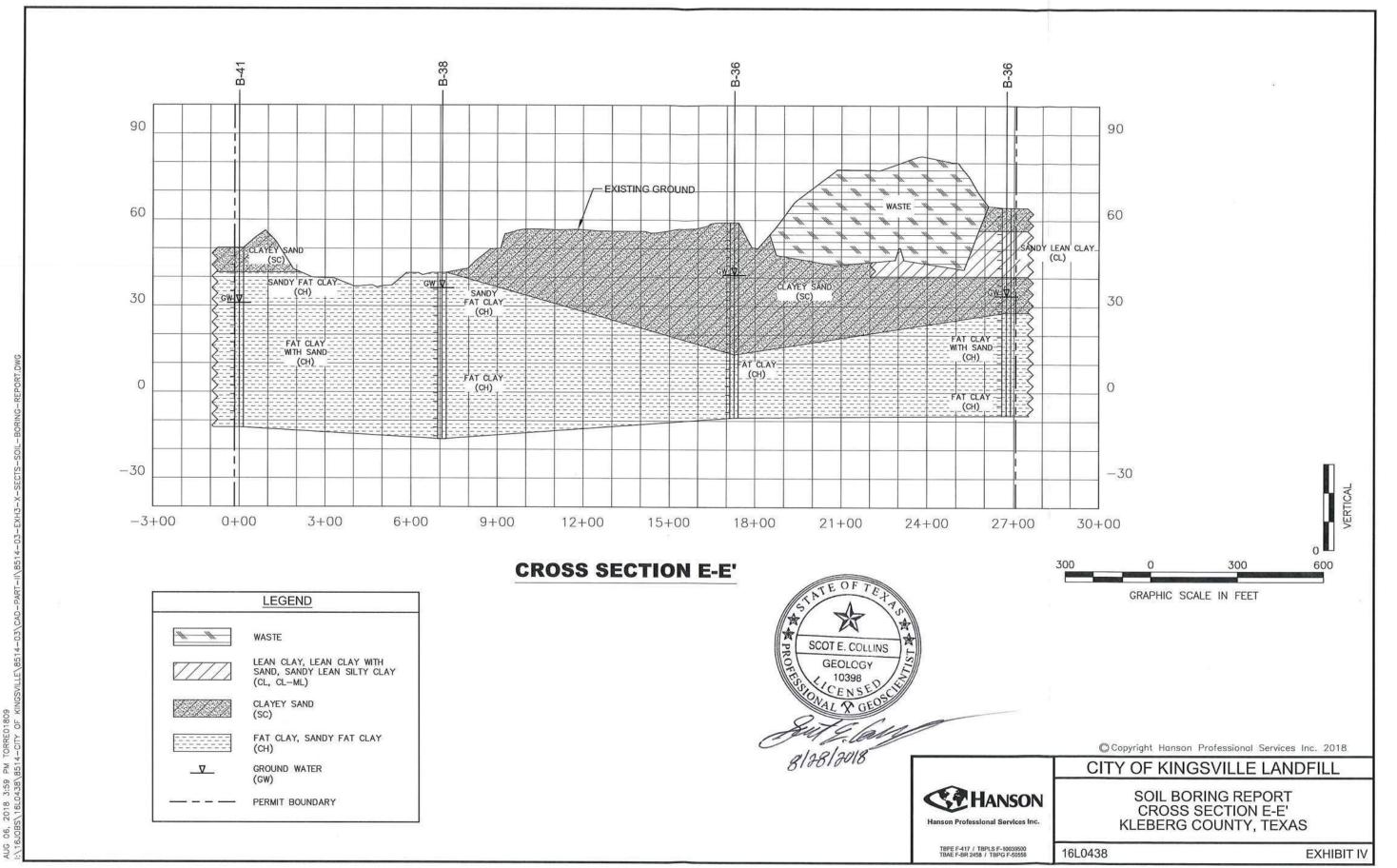
Soil Boring Cross Sections



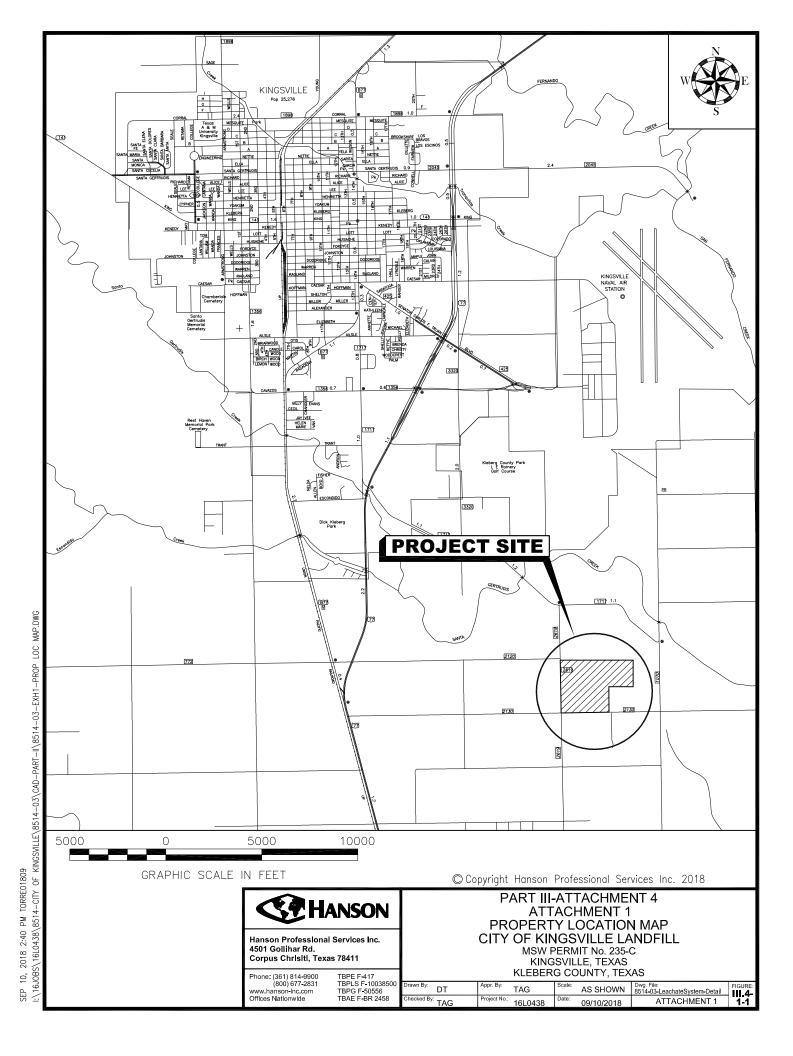




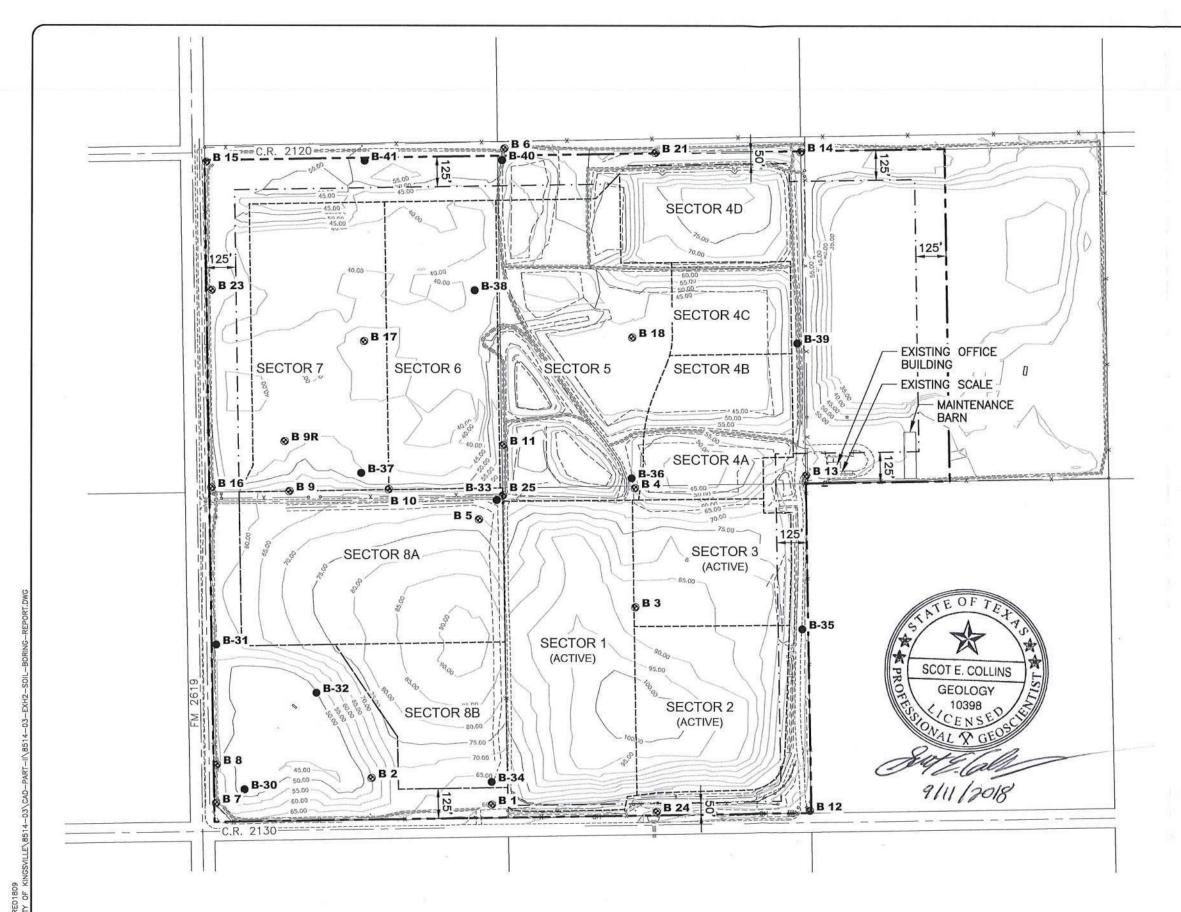


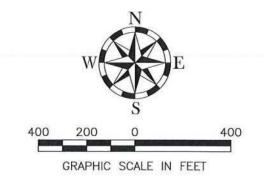


LOCATION MAP



SOIL BORING LOCATION MAP





LEGEND:

⊗ B 2	PREVIOUS SOIL BORING LOCATION
x	EXISTING FENCE
65.00	EXISTING SURFACE CONTOUR
	SECTOR OUTLINE
	PERMIT BOUNDARY (175.89 ACRES)
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	BUFFER ZONE
●B 32	NEW SOIL BORING LOCATION

NOTE:

 LOCATION OF EXISTING BORINGS #2,#5,#7,#9 AND #25 ARE APPROXIMATED BASED UPON FIG. 5.16 BORING PLOT PLAN FROM PERMIT 235-B.

	LOCATIONS OF	NEW BORINGS &	ELEVATIONS
ID	LATITUDE	LONGITUDE	SURFACE ELEVATION
B-30	27.445558	-97.823058	45.99
B-31	27.447214	-97.823415	58.37
B-32	27.446659	-97.822130	48.46
B-33	27.448853	-97.819803	64.51
B-34	27.445632	-97.819885	61.14
B-35	27.447362	-97.815887	64.50
B-36	27.449097	-97.818067	59,13
B-37	27.449170	-97.821540	45.52
B-38	27.451251	-97.820077	41.64
B-39	27.450631	-97.815937	60.26
B-40	27.452738	-97.819722	52.31
B-41	27.452737	-97.821486	50.20

NUMBER	REVISION	DATE	DRAWN	DESIGNED	REVIEWED
			4		
				_	
			-		
			-	_	

Hanson No.	16L0438	
Filename		
Scole	1"=400"	- 53
Date	09/10/1	88
LAYOUT	DT	09/10/18

DRAWN

09/10/10

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Hanson Professional Services Inc.
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Corpus Christit, Texas 78411
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TBPE F-417
TBPLS F-10039500
TBPG F-50556
TBAE F-BR 2458

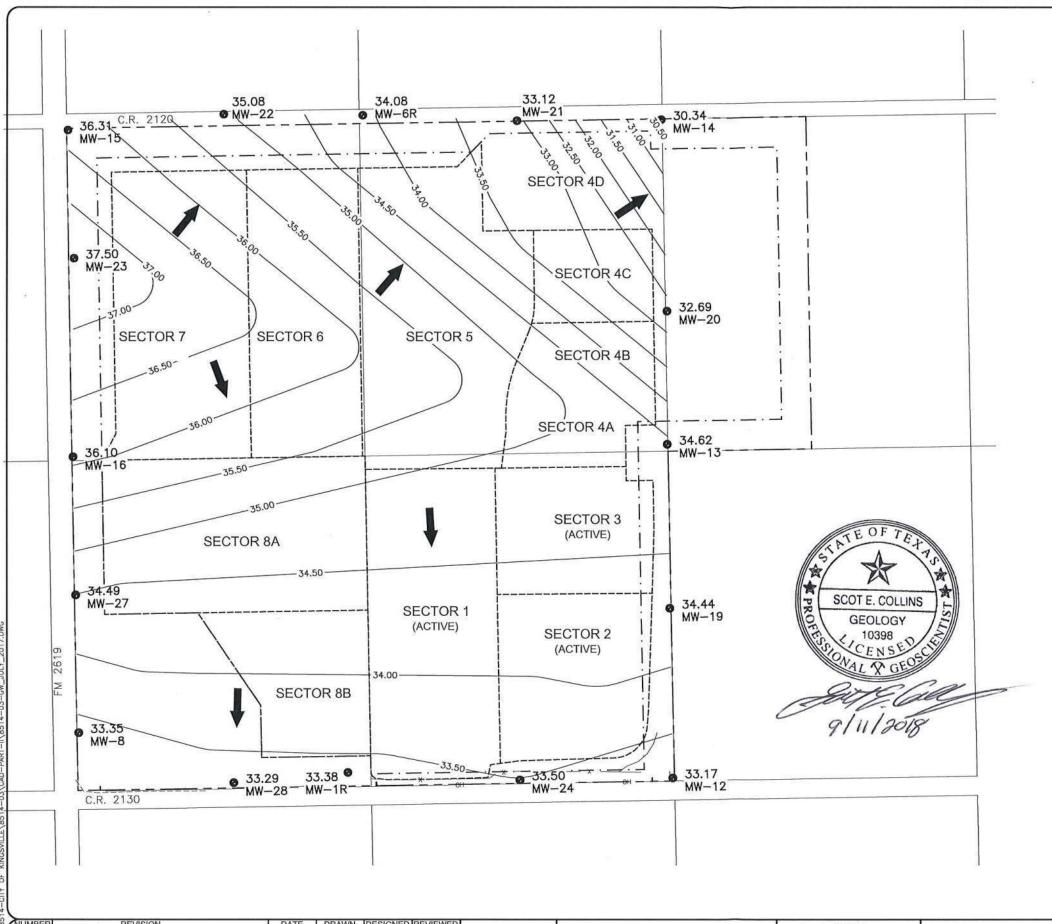
Phone: (361) 814-9900 (800) 677-2831 www.hanson-inc.com Offices Nationwide PART III, ATTACHMENT 4
ATTACHMENT 2
SOIL BORING LOCATION MAP
CITY OF KINGSVILLE LANDFILL
MSW PERMIT NO. 235-C
KINGSVILLE, TEXAS
KLEBERG COUNTY, TEXAS

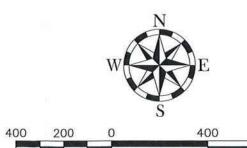
FIGURE:

11.4-2-1

GROUNDWATER CONTOUR MAP

EXHIBIT 1 – GROUNDWATER ELEVATION TABLE EXHIBIT 2 – ANALYTICAL DATA SUMMARY





GRAPHIC SCALE IN FEET

LEGEND:

⊗ 32.69 MW-20 **——** 35.00 **—**

MONITOR WELL WITH GROUNDWATER

800

ELEVATION(FEET AMSL) GROUNDWATER CONTOUR (FEET AMSL)

GROUNDWATER DIRECTIONAL

FLOW ARROW

SECTOR OUTLINE

PERMIT BOUNDARY

(175.89 ACRES)

BUFFER LIMITS

	SITE COORDINA	IES
М	ONITOR WELL LO	CATIONS
MW	Northing	Easting
MW-1R	17051309.05	1204795.45
MW-6R	17054038.00	1204859.33
MW-8	17051473.78	1203673.74
MW-12	17051286.30	1206148.09
MW-13	17052672.16	1206127.95
MW-14	17054020.04	1206103.02
MW-15	17053976.10	1203628.61
MW-16	17052619.76	1203651.21
MW-19	17051991.35	1206137.50
MW-20	17053225.01	1206127.20
MW-21	17054015.40	1205502.94
MW-22	17054042.52	1204280.12
MW-23	17053444.05	1203654.88
MW-24	17051277.99	1205512.42
MW-27	17052045.52	1203661.75
MW-28	17051266.46	1204320.24

R	REVISION	DATE	DRAWN	DESIGNED	REVIEWED
-					
					/
_				_	-

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09/10/18

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PART III, ATTACHMENT 4 ATTACHMENT 3 GROUNDWATER CONTOUR MAP JANUARY 2017 CITY OF KINGSVILLE LANDFILL MSW PERMIT No. 235-C KINGSVILLE, TEXAS KLEBERG COUNTY, TEXAS

FIGURE:

Groundwater Elevations City of Kingsville Landfill January 2017 Monitoring Event

Well	TOC Elev.	DTW (BTOC)	GW Elevation
MW-1R	62.59	29.21	33.38
MW-6R	57.31	23.23	34.08
MW-8	61.11	27.76	33.35
MW-12	54.78	21.61	33.17
MW-13	61.98	27.36	34.62
MW-14	52.54	22.20	30.34
MW-15	51.55	15.24	36.31
MW-16	58.80	22.70	36.10
MW-19	63.07	28.63	34.44
MW-20	60.66	27.97	32.69
MW-21	52.74	19.62	33.12
MW-22	52.81	17.73	35.08
MW-23	51.63	14.13	37.50
MW-24	54.65	21.15	33.50
MW-27	61.08	26.59	34.49
MW-28	68.91	35.62	33.29

^{*}TOC Elevations were re-surveyed on August 29, 2011

Revision: 0

	MW-1R	MW-6R	MW-8	MW-12	MW-13	MW-14	MW-15	MW-16	MW-19	MW-20	MW-24	MW-27	MW-28
Groundwater elevation	33.38	34.08	33.35	33.17	34.62	30.34	36.31	36.10		32.69	33.50	34.49	33.29
Antimony	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005
Arsenic	0.05	0.16	0.02	0.17	0.16	0.21	0.07	0.03	0.16	0.07	0.27	0.02	0.05
Barium	0.05	0.05	0.14	0.11	0.08	0.07	0.03	0.05	0.11	0.03	0.06	0.08	1.03
Beryllium	< 0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.004	< 0.004	<0.004	<0.004	<0.004
Cadmium	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002
Chromium	<0.020	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.02	<0.020	<0.020	<0.020
Cobalt	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Nickel	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	< 0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Selenium	< 0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	0.19	0.34	0.14	0.85	0.53	0.68	0.16	0.30	0.47	0.31	0.96	0.03	0.08
Zinc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
рН	7.19	8.08	7.76	7.45	7.47	7.24	7.12	7.29	7.56	7.03	7.60	7.27	7.20
Specific Conductance umho/cm	4109.00	2089.00	1131.00	5183.00	3619.00	8761.00	8644.00	3895.00	1627.00	16760.00	1635.00	2072.00	6356.00
	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	.0.000	-0.000
Acetone	<0.020	<0.020	<0.020	<0.020	< 0.020	<0.020	<0.020	<0.020		< 0.020	<0.020	<0.020	<0.020
Acrylonitrile	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	<0.050	< 0.050		< 0.050	< 0.050	<0.050	<0.050
Benzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00
Bromochloromethane	< 0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
Bromodichloromethane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromoform	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005
Carbon Disulfide	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Carbon tetrachloride	< 0.005					<0.005	<0.005				<0.005	<0.005	<0.005
Chlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane (ethyl chloride)	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	< 0.005	<0.005	<0.005	<0.005
Chloroform (trichloromethane)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dibromo-3-Chloropropane (DBCP)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromoethane (ethylene dibromide, EDB)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Dichlorobenzene (1,2-dichlorobenzene)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
p-Dichlorobenzene (1,4-dichlorobenzene)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,4-Dichloro-2-butene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane (ethylidene chloride)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane (ethylene dichloride)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethylene (1,1-dichloroethene, vinylidene d		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,2-Dichloroethylene (cis-1,2-dichloroethene)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
trans-1,2 Dichloroethylene (trans-1,2-dichloroethene)		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane (Propylene dichloride)	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

January 2017 Analytical Data Summary

	MW-1R	MW-6R	MW-8	MW-12	MW-13	MW-14	MW-15	MW-16	MW-19	MW-20	MW-24	MW-27	MW-28
cis-1,3-Dichloropropene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,3-Dichloropropene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	< 0.002
2-Hexanone (methyl butyl ketone)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methyl bromide (bromomethane)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	< 0.010
Methyl Chloride (chloromethane)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	< 0.005
Methylene bromide (dibromomethane)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	< 0.001
Methylene chloride (dichloromethane)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	< 0.005
Methyl ethyl ketone (MEK,2-butanone)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005
Methyl iodide (iodomethane)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005
4-Methyl-2-pentanone (methyl isobutyl ketone)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Styrene	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	< 0.002
1,1,1,2-Tetrachloroethane	< 0.002	<0.002	<0.002	< 0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	< 0.002	<0.002
1,1,2,2-Tetrachloroethane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
Tetrachloroethylene (tetrachloroethene, perchloroethy	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005
Toluene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
1,1,1-Trichloroethane (methylchloroform)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
1,1,2-Trichloroethane	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	< 0.001
Trichloroethylene (trichloroethene)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005
Trichlorofluoromethane (CFC-11)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	< 0.010
1,2,3-Trichloropropane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
Vinyl acetate	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vinyl chloride	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	<0.002	< 0.002	<0.002	<0.002	< 0.002
Xylenes	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
All units mg/L unless otherwise noted.													

SEISMIC-HAZARD MAPS FOR THE CONTERMINOUS UNITED STATES

