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LANCASTER SANITARY LANDFILL LANCASTER, NEW YORK

MONITORING WELL INSTALLATION, ABANDONMENT & REPAIR CERTIFICATION REPORT

GGE 98-1047

prepared for: Gunville Energy Systems 2255 Bailey Avenue Buffalo, New York 14211



January 29, 1999



January 29, 1999

New York State Department of Environmental Conservation 270 Michigan Avenue Buffalo, New York 14203-2999

Attn: Ms. Mary McIntosh

Subject: Lancaster Sanitary Landfill Monitoring Well Installation, Abandonment and Repair Certification Report GGE 98-1047

Dear Ms. McIntosh:

The following report has been prepared to summarize the monitoring well installation, abandonment and repair efforts performed at the Lancaster Sanitary Landfill between November 3, 1998 and December 9, 1998.

All work was performed in accordance with the monitoring well installation, abandonment and repair specifications for the Lancaster Sanitary Landfill, with the exceptions and clarifications noted in this report. A copy of the specifications has been included for your reference.

In a November 2, 1998 correspondence, you noted that the specifications were generally acceptable, with the understanding that the source of potable water and area of drill rig decontamination would need to be addressed. The Lancaster Sanitary Landfill supplied an on-site source of potable water. This was city water and was the only water source used for drilling procedures. The drill rig decontamination area was located near the entrance to the landfill, in the roadway between the two main buildings. This site was chosen for it's ideal drainage regime and gravel rich soil, which would allow for containment within the landfill of any potentially contaminated material removed from the drill rig.

A summary of the work performed by Natures Way and observed by Glynn Geotechnical Engineering (GGE) is as follows:

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

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Lancaster Sanitary Landfill Monitoring Well Installation, Abandonment and Repair Certification Report GGE 98-1047 January 29, 1999 Page 2

11-03-98

The piezometer at B-17 was abandoned. Tremie grout was placed to within 5 ft. of ground surface, allowing for the remaining 5 ft. to be backfilled with soil. An unsuccessful attempt was made at pressure flushing W-6.

11-04-98

Due to unsuccessful attempts at pressure flushing W-6 on the previous day, a roller bit was used to overdrill from 37 ft. to 49.6 ft. Material could be heard falling to the bottom of the hole and was assumed to be coming from below the casing at 36.5 ft.

11-06-98

A bentonite seal was placed in W-8 to separate the cascading water inflow from the lower portion of the well using a pneumatic packer, which was inflated at several depths to determine the proper depth to place the bentonite seal. After several inflations the ideal depth was found to be at 35 ft. The packer was then removed and betonite was placed to a depth of 35 ft. On W-6, the depth was checked to determine the quantity of debris that had fallen into the well. Approximately 8 ft. of debris had fallen into the well, which needed to be cleaned out before a screen could be installed.

11-10-98

Sonotube forms were placed for concrete seals at W-15, W-16, W-3, W-A, W-D, W-E, W-G and W-H. The soil around the perimeters of the wells was regraded to promote drainage away from the wells. In W-6 and W-H, the metal casings could not be separated from the concrete seals, resulting in their removal along with the existing concrete seals. New casings will be installed with the new concrete seals.

11-13-98

Monitoring well 5A was installed to a depth of 32 ft., with continuous split spoon sampling performed throughout it's depth. There was concern for a possibly contaminated zone from 9 ft. to 15 ft., but there was no evidence of this found in the split spoon sampling. The depths of the new concrete seals were checked on W-15, W-16, W-3, W-A, W-D, W-E, W-G and W-H to verify depths between 3 ft. 8 in. and 4 ft. 0 in.

11-23-98

Well development and hydraulic conductivity tests were performed on W-5A. Approximately 1.5 ft. of sand was added over the bentonite seal in W-8 to decrease turbidity when sampling.



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Lancaster Sanitary Landfill Monitoring Well Installation, Abandonment and Repair Certification Report GGE 98-1047

11-30-98

Although a roller bit was used on 11-04-98 to clean out W-6, debris had fallen back into the hole by the time the screen was to be installed on 11-30-98. The hole was reopened to a depth of 50 ft., allowing for the well screen to begin at 49.5 ft. Well installation proved difficult due to several collapses within the hole. Any deviations from the standard well installation procedures are listed in GGE Field Observation Report #98-07.

12-09-98

Well development and hydraulic conductivity tests were performed on W-6 and a 6 ft. sign was installed adjacent to the well as a reference marker. A final inspection was made on all wells, with all work proving to be completed.

Although GGE was not present for every aspect of the construction on various wells, final inspections were made to ensure that work was properly completed. Miscellaneous elements observed on 12-09-98 include:

- 1. The 4 inch PVC riser on W-2 and W-3 was extended to approximately 30 inches above the concrete seal.
- 2. Concrete seals were added or replaced on W-2, W-3, W-4, W-4A, W-5A, W-15, W-15B, W-16, W-A, W-D, W-E, W-G, and W-H.
- 3. The protective casings on all wells were painted orange, with the well number/letter stenciled in black, fitted with a silver lid and locked with a pad lock.
- 4. The soils surrounding the wells were regraded when necessary to promote proper drainage.
- 5. The piezometers at W-15B were cut below the surface bends and fitted with caps.

Copies of the well development records and bore logs completed by Natures Way and Field Observation Reports (FOR's) completed by GGE have been included for your reference. Feel free to contact GGE if you should have any questions during your review.

Sincerely,

GLYNN GEOTECHNICAL ENGINEERING

Hunt

Edward Lover Senior Engineering Technician

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FIELD OBSERVATION REPORTS

LANCASTER SANITARY LANDFILL LANCASTER, NEW YORK

MONITORING WELL INSTALLATION, ABANDONMENT & REPAIR CERTIFICATION REPORT GGE 98-1047

January 29, 1999

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

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GGC	GLYNN GEOTECHNICAL ENGINEERING	
GEOTECHNICAL AND CIV	IL ENGINEERING SERVICES	

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PROJECT NO.:	98-1047	EPORT NO.: -	9001	DATE:	11/03/98	- DAY.	Tuedar		
PROJECT :	Lancaster Sar	Nitary Landfill	·				2 10 pm	5.40	
SUBJECT:	Monitoring V		epairs		PROJ		2:10 pli	<u>1-J:40</u>	pm
CLIENT:	Gunville Ene	ergy Systems				ILE IIME:	<u>2:45 pm</u>	<u>1 - 5:10</u>	pm
WEATHER:	40's ° F & C	lear				PHOTOS:	<u>YES</u>	<u>N(</u>	<u> </u>
• I arrive	d on site at 2:4	45 pm.							
• Piezom	eter B-17 had	been overdrilled	with 4.25 i	nch HSA t	o 30 ft. and en	tire piezo	meter ren	noved	
includ	ing well point.								
• GGE o	bserved mixin	g of Tremie Grou	t and Trer	nie placem	ent to bottom	of hole. 1	No water	was	
observe	ed when Trem	ie reached surface	e. Grout le	evel did nor	t drop with in a	uger.			
 Individ 	lual auger fligh	ts were removed	and hole T	remied to	surface as each	section w	as remov	ed. Fi	nal
5 ft. so	il was not adde	ed to permit curir	emoved to	ling of grou	it overnight.	in Dackfill	omplete		*** ****
at 4:00	pm.								
• Attemp	oted to pressur	re flush W-6 from	37 ft. to o	riginal 49 f	t. depth withou	it success	. Water of	lid not	
efforts	to fill up in he at 5.00 pm	ole. Possible rock	blocking	nole. Start	ed efforts at 4:0	00 pm. C	ompletec		
							·····		
• 3.75 in	.ch roller bit to	be used tomorro	w to clear	obstruction	n and ream hol	e to 49 ft	•		
I. (+ -:+	5 10			****					
• Left sit	e at 5:10 pm.								
PERSONNE	L ON SITE / (CONTACTED:		Ι	DISTRIBUTIO	N:			
Bruce - Natur	es Way								
Corey - Natur	tes Way			- r		·.	2 5	0	
		\frown			ALLI MANIOOKS	·	3.5	0	<u></u>
	Ar	$\sim (h)$				Į.			
	- A	\mathcal{A}				Man	IMA	r m	
REPORTED BY:	Neal P. Kochis	K. K. Wash		R	EVIEWED BY:	Ipur	Mark/W/C	Glynn, P	F.

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GEOTECHNICAL AND CIVIL ENGINEERING SERVICES	FIELD OBSERVATION REPORT
PROJECT NO.: 98-1047 EPORT NO.: 98-02	DATE: <u>11/04/98</u> PAGE : <u>1</u> of <u>1</u>
PROJECT : Lancaster Sanitary Landfill	DAY: Wednesday
SUBJECT: Site Monitoring Well Efforts - Drilling	PROJECT TIME: 9:45 am - 3:15 pm
CLIENT: Gunville Energy Systems	SITE TIME: 10:30 am - 2:30 pm
WEATHER: 40's ° F & Partly Sunny	PHOTOS: YES NO X
• I arrived on site at 10:30 am.	
• Observed overdrill of W-6 from 37 ft. to 49.6 ft. co	mpleted with 3-7/8" roller bit at 1:00 pm.
Total densk belan med a 40.1.6. (tional 18 inch and total array with a sining 1
 I otal depth below grade = 49.1 ft. (casing has addit boring.) Bottom of casing is 36.5. Material could l 	be heard dropping to bottom of hole, assumed
from just below casing. Water level at 40.5 ft.	
 Packer for W-8 will not be available until probably be in until next week. Work on seals and casings w Per NYSDEC (Mary McIntosh), spoil/cuttings need for use as fill in depressed cap areas. 	Friday and screens for W-6 and W-5A will not vill be done in between drilling operations. d to be containerized and can be stored on site
• Drill rig was returned to the decon area for cleaning	g at 2:30 pm.
• GGE left site at 2:30 pm.	
PERSONNEL ON SITE / CONTACTED:	DISTRIBUTION:
Bruce - Natures Way	
Corey - Natures Way	
REPORTED BY:	REVIEWED BY:

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PROJECT NO .:	98-1047	REPORT NO.:	98-03	DATE:	11/06/98	PAGE	:1	OF	
PROJECT :	Lancaster San	itary Landfill				DAY:	Friday		
SUBJECT:	Monitoring W	ell Alteration			PRO	DJECT TIME:	8:45 am	n - 1:30 p	m
CLIENT:	Gunville Ener	gy Systems				SITE TIME:	9:15 am	n - 12:45	рі
WEATHER:	35 ° F & Over	cast				PHOTOS:	YES	<u>N</u>	С
 I arriv 	ed on site at 9:15	am to observe the p	lacement of	a bentonite	seal in monitor	ing well 8.			
• The to	otal depth of the	well was 57.2 ft. with	n water found	d at 56.1 ft.	Water was kno	wn to be ca	scading		
from	the upper portion	of the well and drai	face elevation	ne lower por	tion. The casca	iding water			

• A 2. (5 men diameter, 2	2.0 It. long pneumat	ic packer (in	natable to 4		was mserte			<u>`</u>
the we	ell and inflated at	30 ft. and 33 ft. Bo	th attempts	at sealing th	e well were uns	uccessful.	[he		
	r was brought to t	he surface to ensure	it was funct	ioning prop	erly. After look	ing the pac	ker		
раске	inde brought to			inflored on 7	5 ft Water we	- +l 11	und		
over, i	it was inserted int	o the well again and	successfully	innated at .	JII. Water wa	s then allow	veu		
over, i to col	it was inserted int lect over the pack	o the well again and er, eventually stabili:	successfully zing after app	proximately	1.5 hours at 23	.1 ft. The v	vater		
over, i	it was inserted int lect over the pack l not rise to the p	o the well again and er, eventually stabiliz pint of cascading at 2	successfully zing after app 21.25 ft. due	proximately to fractures	1.5 hours at 23 located from 2	1 ft. The v 3 to 23.5 ft	vater		
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EEEEEEEEEEEEE		GLYNN GEOTECH ENGINEEI	NICAL RING SERVICES			FIELD O	BSERVA	TION F	REPORT
GEOTECHNICKE									
PROJECT NO.:	98-1047	EP	ORT NO.:	98-04	DATE:	11/10/98	PAGE :	1	_0f1
PROJECT :	Lancaste	er Sanitary L	andfill				DAY:	Tuesday	
SUBJECT:	Site Mor	nitoring Wel	l Efforts - I	Inspection		PRO	JECT TIME:	11:30 am	n - 2:45 pm
CLIENT:	Gunville	Energy Syst	ems				SITE TIME:	12:05 am	n - 2:00 pm
WEATHER:	50's ° F &	& Light Rair	n				PHOTOS:	YES	NO X
• I arrive	d on site	at 12:05 pm	•						
 Checker 	ed depth o	of grout at a	bandoned	B-17; meas	sured at 5'-	9" below grade	2.		
 Inspect 	ed new a	nd replacem	ent concre	te seals at :	several mo	nitoring well l	ocations.	36 inch di	ameter
sonotu	bes were i	installed as f	orms to re	ceive conci	rete for nev	w seals. Old c	oncrete sea	als were fu	lly
remove	ed to the l	oottom of so	notube pla	acement wi	ith no visib	ole signs of dis	turbance to	o existing	
casings	. The fol	lowing effor	ts were obs	served:					
	W-15	Sonotube i	nstalled ar	ound exist	ing casing	to 3 ft. depth	and perime	eter soil	
		regraded to	promote	runoff awa	y f r om wel	l - no concrete	e placemen	t yet.	
	W-15A	Three piezo	ometers cu	t off at gra	de, extensi	ons added, ne	w 8 inch st	eel casing	
		added with	sonotube	setup like	W-15.				
	W-16	Sonotube s	etup like V	W-15.					
	W-3	Work in pr	ogress. 42	l inch <u>+</u> de	ep sonotul	be set in place	, grading ir	n progress.	
	W-16 W-3	Sonotube s Work in pr	etup like V ogress. 42	W-15. 2 inch <u>+</u> de	ep sonotul	be set in place	, grading ir	n progress.	

ight Rain	PHOTOS:	YES	NO X
2:05 pm.			
rout at abandoned B-17: measured at 5'-9" below grade	•		

- meter soil ent yet.
 - steel casing
- W-A Sonotube setup like W-15.
- W-D Sonotube setup like W-15. W-E Sonotube setup like W-15.
 - W-G Existing casing came out with concrete seal. Sonotube placed to 3 ft. depth around PVC riser. New casing will need to be installed.
 - W-H Similar condition as W-G.
- GGE informed Natures Way that specifications require 4 ft. sonotube depth versus 3 ft. Natures Way 6 agreed to revise.
- GGE placed large rock approximately 25 ft. south of W-5 to denote proposed W-5A installation point. 0
- GGE left site at 2:00 pm. 0

PERSONNEL ON SITE / CONTACTED:

DISTRIBUTION:

Kevin Haig - Natures Way Dale Gramza - Natures Way (per telecon)

REPORTED BY: Neal P. Kochis

DAILY MANHOURS: 3.25 REVIEWED BY: Mark W. Ølynn, P.E.

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

PROJECT NO .:	98-1047	EPORT NO.:	98-05	DATE:	11/13/98	PAGE	:1	OF	2
PROJECT :	Lancaster Sat	nitary Landfill				DAY:	Friday		
SUBJECT:	Monitoring W	Vell Installation C	bservation	L	PRC	JECT TIME:	8:45 am	1 - 6:00	pr
CLIENT:	Gunville Ene	rgy Systems				SITE TIME:	9:30 am	1 - 5:15	pr
- WEATHER:	40 - 45 ° F &	Sunny				PHOTOS:	YES	N	0 3
-	10 13 1 20								******
• I arrived	on site at 9:3	30 am.							
Cantin			anfarma d	* * = 10.00	tion of MIN/ 6	A to a tata	I donth o	£ 27 £.	
• Continu	ious split spo	instion found in a	the question	nable rop	from 9 to 1	5 ft with t	he except	$\frac{1.52}{1.00}$ not	
I fiele w	turally occurs	ring zones of orida	tion			J II., WIIII I		.1011 01	
a icw iia		ing zones of Oxida							
• A genera	al log of the b	oring is as follows	:						
	0 - 4 ft.	Previously exc	avated.						
	4 - 8 ft.	Moist, brown	silt, trace 1	ock fragm	ents (weather	ed shale), s	tiff, trace	of	
		roots from 6 -	8 ft.	*****					
	8 - 10 ft.	Damp, stiff, b	rown silt, 1	race rock	fragments.				
	10 - 20 ft.	Damp, brown	silt gradin	g to fine s	and with dep	th, occasion	nal zones		
<u></u>		of oxidation.							
	20 - 24 ft.	Damp, dense,	brown fin	e sand, sli	ght trace of r	ock.			
	24 - 26 ft.	Very dense, d	amp, brow	n fine sano	l, some grave	l, trace of c	xidation.	•	
	٩	Water at 26 ft	t.						
	26 - 30 ft.	Medium to fi	ne sand an	d gravel, w	et.				
	30 - 32 ft.	Fine brown sa	ind, slight	trace of gra	ivel, wet.		*****		
		1	1 1 10	6	1 1		1 1 6	21 5 6	
• Since no	contaminati	on was tound, a st	andard 10	It. screen	was used beg	inning at a	depth of	<u>31.5 fr</u>	t.
								•	
PERSONNEL	ON SITE / (Г	ISTRIBUTI	N.			
Dale Gramza -	Natures Way	sonnered.		L		J N .			
Dure Oramiza	Tractice way								

REPORTED BY:

Edward Lover c,

REVIEWED BY: Mark W. Glynn, P.E.

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

DOCFILE for 98-1047 xb \XL

PROJEC	HNICAL AND CL	ENGINEE	RING			TILLO O			
	T NO.: <u>98-10</u>	47 E	PORT NO.: _	98-05	DATE:	11/13/98	PAGE : _	2	OF 2
•	Well installat Well Installat	ion was perfor ion Specificati	med in acc ons.	ordance w	ith the Lan	acaster Sanitary	Landfill M	onitoring	
• 1	Depth of con 3'8" to 4'-0".	crete surface s	eals were ch	necked on	all uncomp	pleted wells wit	h results rai	nging fron	n
•]	Boring sample	es were taken	back to GC	E office					
•]	Left site at 5:	15 pm.							
	· · · · · · · · · · · · · · · · · · ·								
									/
							MAUUL	H	
						O	. /	//	

DOCFILE for98-1047.xb XL

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PROJECT NO.:	98-1047 EPORT	NO.: 98-06	DATE:	11/23/98	PAGE :	1	OF	2
PROJECT :	Lancaster Sanitary Landf				DAY:	Monday	7	
SUBJECT:	Monitoring Well Installat	tion Observation	n	PROJE	CT TIME:	10:00 at	m - 2:30	pr
CLIENT:	Gunville Energy Systems			SI	TE TIME:	10:45 ai	m - 1:45	pr
WEATHER:	45 ° F & Partly Sunny, Ve	ery Windy			PHOTOS:	YES	NO	x
• Larriveo	on site at 10:45 am and	met with Dale (Gramza of I	Natures Wav.				
• Well de	velopment of 5-A and hyd	lraulic conducti	vity tests w	ere both perform	ned in ac	cordance	2	
with the	specifications. The total	depth of well 5	-A was mea	sured to be 32.	$\frac{2 \text{ ft., with}}{2}$	a static v	water	
level of	27.1 ft. from the top of th	ne concrete seal.	I he well	water volume wa	ing hail	to be		
approxi develop	ment.	ng m approxima	itery rive ga	nons of water De	ing paile			
						and the second second second		
• Wells W	/-5A, W-3, W-2, W-4A, W	7-6, W-E and W	D need pe	a gravel installed	l in the c	asings.		
 Wells W 	7-3, W-5A, W-2, W-4, W-4	4A. W.E. W.D a	nd W/6 ha	ve not had drain	age hole	s drilled		
	, , , , ,	<u>, , , , , , , , , , , , , , , , , , , </u>			luge non			
above th	ne concrete seals.							
above th	ne concrete seals.							
 Many w splashed 	ells will require a second of the casings	coat of paint alo	ong with th	e removal of exc	ess conc	rete that	was	
 above the splashed 	ells will require a second of on the casings.	coat of paint alo	ong with th	e removal of exc	ess conc	rete that	was	
 above the sport of the sport of	ells will require a second of on the casings. ils around B-17 have not	coat of paint alo been removed o	ong with th	e removal of exc	ess conc	rete that	was	
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DOCFILE tor98-1047 xieVXL

		IYNN GEOTECHNICAL NGINEEDING		$\left(\right)$	FIELD OF	BSERVAT	ION I	REPO
GEOTECI PROJECT NO.:	<u>98-1047</u>	REPORT NO.:	98-06	DATE:	11/23/98	PAGE :	2	OF
• Nature: exception	s Way will have a on of well W-6.	ll the wells completed	d by the end	l of 11/24/9	98, with the			
• Left site	e at 1:45 pm.							
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GGE	GLYNN GEOTECHNICAL ENGINEERING	
GEOTECHNICAL AND CIV	IL ENGINEERING SERVICES	

ROJECT: Lancaster Sanitary Landfill DAY: Monday BUBJECT: Monitoring Well Installation Observation PROJECT TIME 9:30 am - 3:45 pm CLIENT: Gunville Energy Systems SITE TIME 10:15 am - 3:00 pm WEATHER: 60 ° F & Overcast PHOTOS: YES NO X • I arrived on site at 10:15 am. • • NO X • Although MW-6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned out with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As and was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft, making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resulting in three Measuring times and pack and pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site spec	PROJECT NO .:	98-1047	EPORT NO.:	98-07	DATE:	11/30/98	PAGE	:1	OF	2
SUBJECT: Monitoring Well Installation Observation PROJECT TIME: 9:30 am -3:45 pm STEP TIME: Gunville Energy Systems STEP TIME: 10:15 am -3:00 pm WEATHER: 60 ° F & Overcast PHOTOS: YES NO X • Although MW-6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned out with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack being installed one foor higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack being installed one foor higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack between the top is included one foor higher than intended. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. • Grout depth will be checked after it is cureed, along with gravel insta	PROJECT :	Lancaster Sar	nitary Landfill				DAY:	Monday	y	
CLIENT: Gunville Energy Systems SITE TIME: 10.15 am - 3:00 pm WEATHER: 60° F & Overcast PHOTOS: YES NO X • I arrived on site at 10:15 am. I arrived on site at 10:15 am. • Although MW-6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned out with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. • Grout depth will be checked after it is cured, along with gravel installation at a later date. PERSONNEL ON SITE / CONTACTED: DISTRIBUTION: Proce - Natures Way	SUBJECT:	Monitoring W	Vell Installation (Observation	ı	PROJEC	CT TIME:	9:30 an	1 - 3:45	pm
WEATHER: 60 * F & Qvercast PHOTOS: YES NO X • I arrived on site at 10:15 am. • Although MW/6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned out with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. DISTRIBUTION: * FERSONNEL ON SITE / CONTACTED: DISTRIBUTION: * Mark W Zimp, P.E. Mark W Zimp, P.E. EFORTED BY: Mark W Zimp, P.E.	CLIENT:	Gunville Ene	rgy Systems			SI	FE TIME:	10:15 a	m - 3:0	0 pm
I arrived on site at 10:15 am. Although MW-6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned our with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resulting in the sand pack being installed one foor higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. Grout depth will be checked after it is cured, along with gravel installation at a later date. DISTRIBUTION:	WEATHER:	60 ° F & Ove	rcast			F	HOTOS:	YES	<u>NC</u>	с х
Although MW-6 was drilled on a previous date to a depth of 49.5 ft., a screen was not installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned out with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Forunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonire had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. Grout depth will be checked after it is cured, along with gravel installation at a later date. PERSONNEL ON SITE / CONTACTED: DISTRIBUTION: Tuce - Natures Way DAILY MANHOURS: 4.50 EFORTED BY: Edward Lover	• I arrive	d on site at 10	:15 am.							
 Arthough MW-8 was drilled on a previous date to a depth of 41.0 ft. The rock debris was iter installed resulting in the hole becoming clogged with rock debris to a depth of 41.0 ft. The rock debris was cleaned our with a roller bit to a depth of 50.0 ft., resulting in a screen being installed at 49.5 ft. As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resulting in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. Grout depth will be checked after it is cured, along with gravel installation at a later date. PERSONNEL ON SITE / CONTACTED: DISTRIBUTION: EBORTED BY: BARAMAN AND AND AND AND AND AND AND AND AND A	A 1.1		1.:11.1	<u>1</u>	a danah a	£ 40 5 ft a como		ot install		
EPORTED BY:	• Althou	$\frac{1}{2}$ $\frac{1}$	drilled on a previo	with tock	debris to g	$\frac{1}{2}$ depth of 41.0 ft	- The r	ock debri	s was	
As sand was being placed around the screen, the hole managed to collapse in on itself several times. After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. • Grout depth will be checked after it is cured, along with gravel installation at a later date. PERSONNEL ON SITE / CONTACTED: DISTRIBUTION: PREVIEW Way DAILY MANHOURS: 4.50 Mark WGlym/P.E. Mark WGlym/P.E.	cleaner	lout with a ro	ller bit to a depth	of 50.0 ft	resulting	in a screen being		d at 49.5	5 was 5 ft.	
After each collapse, the hole had to be cleaned out by running water through a tremie pipe. Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. • Grout depth will be checked after it is cured, along with gravel installation at a later date. PERSONNEL ON SITE / CONTACTED: DISTRIBUTION: PERSON REL DARY: Mark Wy Glym/P.E.	As san	d was being pla	ced around the s	creen the	hole mana	ged to collapse it	n on itse	elf several	times.	
Fortunately, the sections that collapsed did not exceed 1.5 ft., making for easy removal. Due to the numerous hole collapses, the sand pack and bentonite had to be installed as quickly as possible, resultin in the sand pack being installed one foot higher than intended. The sand should go to 38 ft. and instead it goes to 37 ft. There was also no fine silica sand pack between the bentonite and the sand pack around the seal. Due to the previous casing that was present, three measuring tapes were lost, resulting in three 1/8 inch pieces of galvanized steel buried in the hole, ranging in length from 2 ft. to 6 ft. • With exception to the instances previously noted, all other aspects of the well installation were in accordance with site specifications. • Grout depth will be checked after it is cured, along with gravel installation at a later date. ??ERSONNEL ON SITE / CONTACTED: DISTRIBUTION: ??ERSONNEL ON SITE / CONTACTED: DAILY MANHOURS: 4.50 REVIEWED BY: Mathematication at a later date. ************************************	A fter e	ach collapse t	he hole had to be	cleaned or	it by rupp	ing water throug	h a trem	ie nine		-
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GEOTEC	FC HNICAL AND CIV	GLYNN GEOTE ENGINI IL ENGINEER	CHNICAL EERING RING SERVICES			FIELD OF	SERVATION REPOR
PROJEC	CT NO.: <u>98-10</u> 2	17	EPORT NO.:	98-07	DATE:	11/30/98	PAGE : 2 OF 2
•	A site invento been complete missing a meta	ry was taker ely installed al cap and t	n to verify the including pa he remainde	e completio aint and sto r of W-6.	on of the re enciled lette	emaining wells o ering, with the o	on site. All wells have exception of W-E which is
•	The new meta	l cap shoule	d arrive some	e time this	week.		
•	Left site at 3:0	0 pm.					
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PROJECT NO .:	98-1047	REPORT NO.:	98-08	DATE:	12/09/98	PAGE	:	OF
PROJECT :	Lancaster Sanitar	ry Landfill				DAY:	Wednes	day
SUBJECT:	Monitoring Well	Inspection			PRC	JECT TIME:	9:00 am	- 3:15 p
CLIENT:	Gunville Energy	Systems				SITE TIME:	9:45 am	- 2:15 p
WEATHER:	Sunny, 40 ° F					PHOTOS:	YES	<u>NC</u>
• Larrive	ed on site at 9.45 an	n and met with D	ale Gramza	of Nature's V	Vav			
	ut // jo un				/			
• Well d	evelopment and hv	draulic conductiv	ity tests wer	e performed	on W-6. After	the well wa	s develop	ed
			11, 1				out the	
and ap	proximately 3.5 wel	ll volumes were b	ailed out of	the well, thre	e attempts were	e made to t	est the	
hydrau	ilic conductivity. In	nmediately after t	he last bail v	was removed,	the water level	was measu	red and	
on all	three occasions the	water level was hi	gher than tl	he initial stat	ic water level. 7	he hydrau	lic	
	ctivity could still be	manurad as the	water level of	tropped back	to static but th	vie is the or	posite of	
condu		measured as the	water level (to static, but th	iis is the of		
1	hould hannen Two	o possible explana	tions for th	is could be e	ther that the re	charge is so	o fast that	
what s	nould imppelie 1 we			1 . 1	1 1 1. 1	1 1		
the wa	ter actually rises pas	st the static water	level, or nat	ural gas is bu	lbbling up throu	igh the wat	er	
	ter actually rises pas ng in strange fluctua	st the static water ations in the wate	level, or nat r table. A s	trong natura	bbling up throu gas odor was n	oticed toda	er av and	
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• /	All othe given to	er wells o Glynn	passed Geote	the fin chnical	al insp l Engin	ection leering.	and we	ere fitte s were s	ed with supplie	padlo d by th	cks, in v 1e Lanc	which c aster La	ne set Indfill.	of keys	s was	
• <u>-</u> t	Althoug he test	gh the h did per	ydraul form a	ic cond s expec	luctivit ted usi	y test d ing the	lid not slug ar	perfor nd reco	m as ex very me	pected ethod.	l with tl	ne bail :	and re	covery	metho	d,
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WELL DEVELOPMENT DATA AND BORING LOGS

LANCASTER SANITARY LANDFILL LANCASTER, NEW YORK

MONITORING WELL INSTALLATION, ABANDONMENT & REPAIR CERTIFICATION REPORT GGE 98-1047

January 29, 1999

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

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Environmental Consultants & Contractors, Inc.

3553 Crittenden Road Crittenden, New York 14038 Phone: (716) 937-6527 Fax: (716) 937-9360

Mr. Neal Kochis, P.E. Glynn Geotechnical 6503 Campbell Boulevard Lockport, New York 14094

Mr. Kochis,

The enclosed information pertains to the Lancaster Sanitary Landfill, Lancaster, New York. Included are tables containing well data for well numbers W-5A and W-6, as well as boring logs and well installation diagrams for wells W-5A, W-6, and W-8. If there are any questions or comments please call.

I appreciated the opportunity of working with you, and I look forward to future opportunities. We here at NWEC&C, Inc. wish you a happy holiday season and new year.

Dale M. Gramza

Manager of Geologic Services NWEC&C, Inc.



NATURE'S WAY

Environmental Consultants & Contractors, Inc.

3553 Crittenden Road Crittenden, New York 14038

LANCASTER LANDFILL Gunville Road Lancaster, New York Glynn Geotechnical 6503 Campbell Blvd. Lockport, New York

Phone: (716) 937-6527 Fax: (716) 937-9360 Well Number: W5A Well Depth: 33.6' Date: 11/23/98 1 ½" Tephlon Bailer

Well Purging and Sampeling

Well Volume Number	Purging Time	Initial Water Level	Gallons Removed From Well	Comments
1	11:00am	28.55feet	.8	Cloudy Light Brown
2			.8	
3			.8	
4			.8	
5			.8	

Rising Head After Bailing Test 1

Falling Head Test

Clock Time	Depth in feet
0	31.1
.5min	30.4
1min	29.65
1.5min	29.15
2min	28.82
2.5min	28.75
3min	28.73
4min	28.70
5min	28.65
6min	28.63
7min	28.61
8min	28.60
9min	28.59
10min	28.57

t 1	T	est 2
Clock Time	Depth (ft)	
0	28.30	
.5min	28.45	
1min	28.48	
1.5min	28.50	
2min	28.51	
2.5min	28.51	
3min	28.52	
3.5min	28.52	
4min	28.52	
4.5min	28.52	
5min	28.52	

[¥
Clock Time	Depth (ft)
0	28.35
.5min	28.41
1min	28.45
1.5min	28.48
2min	28.49
2.5min	28.49
3min	28.50
3.5min	28.51
4min	28.51
4.5min	28.51
5min	28.51

Falling head test- place 1/2 30" long solid pvc slug down hole

LANCASTER LANDFILL Gunville Road Lancaster, New York Glynn Geotechnical Well Number: W-6 Well Depth: 38.6' Date: 12/9/98 1 ¹/₂" Tephlon Bailer

Purging and Sampling

moved Comments	Gallons Removed From Well	Initial H2O Level (ft)	Purging Times	Well Volume Number
Water cloudy Grey Brown	1.5	38.6		1
clear after the first we	1.5	38.6		2
	1.5	38.6		3
After pulling 3 well vol	1.5	38.6		4
water level was at 2	1.5	38.6		5
Remove additional well	1.5	38.6		6
	1.5	38.6		7
water level was at a Remove additional well	1.5 1.5 1.5	38.6 38.6 38.6		5 6 7

Recharge Rate

	Test 1	میں اور		Test	2		
Time	Water Level	Time	Water Level	Time	Water Level	Time	Water Level
0	36.75	2.5min	36.74	0	37.5	2.5min	37.36
.5min	36.7			.5min	37.37	3min	37.40
1 min	36.7			1 min	37.35	3.5min	37.38
1.5min	36.7			1.5min	37.35	4min	37.40
2min	36.73			2min	37.35		

Rising Head

Clock Time	Depth (feet)	Clock Time	Depth (feet)			
0	37.6	5min	37.46			
.5min	37.43	6min	37.48			
1 min	37.38	7min	37.50			
1.5min	37.38	8min	37.52			
2min	37.38	9min	37.54			
2.5min	37.39	10min	37.55			
3min	37.40	12min	37.60			
3.5min	37.42	14min	37.63			
4min	37.44	16min	37.64			
4.5min	37.45	20min	37.70			

Falling Head

Clock Time	Depth (feet)	Clock Time	Depth (feet)
0	36.7	6min	37.53
.5min	37.18	7min	37.54
1 min	37.30	8min	37.54
1.5min	37.36	9min	37.55
2min	37.40	10min	37.55
3min	37.43	15min	37.60
3.5min	37.45	min	
4min	37.48	min	
4.5min	37.50	min	
5min	37.50	min	

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and the second		NATUR	E'S WAY				
, colorado	3553 Critten Crittenden, N HOLE NO. <u>W-5A</u>	Environmental Consult Jen Road Jew York 14038	ants & Contractors,	Inc. Office: (Fax : (F. ELV	(716) 937-6527 (716)937-9360		
yattawilditey	PROJECT98-239		LOCATIONGUNNVILLE Road				
	Lancaster Sanit	ary Landfill	Lancast	er, NY	······		
	CLIENT Glynn Geotech		DATE STARTED11	/13/98	COMPLETED11/13/98		
	DEPTH FEET FEET FEET FEET BLOWS ON SAMPLER SAMPLER 0 6 12 18 N 6 12 18 24 N	DESCRIPTION & CLASSIF	TICATION	WELL	WATER TABLE & REMARKS		
uonomy ponesty	I Test pit	Extremely moist brown v (SILTY-SAND) with 40 very fine to coarse size s compact in place weakly	very gravelly to 50 % gravel and little silt stratified 2.5		Note: Test pit excavated to 4.0 feet before drilling - to allow for the installation of 3' by 4' surface seal.		
sudenting	Ý //// 1 7 5 10 1 7 10 18 2 8 2 8	Moist brown (CLAYEY- % mostly fine size gravel Blocky soil structure with ped faces	-SILT) with 3 to 5 little clay very stiff n gray silt coated 6.5		Water sorted and deposited sand and gravel with little silt to 2.5 feet over silty lake sediment with little clay to 6.5 feet over coarse silty lake sediment with		
	47 3 10 41 60 10 4 18 42 61 61 60 10 50/4" 50/4" 4 18 60 10 50/4" 50/5	Moist brown (SILT) with fine size gravel trace clay soil structure with occ fin gray silt coated ped faces	1 to 3.% mostly very dense blocky e size roots along 12.0	e grout	trace clay to 12.0 feet over coarse silty slack water sediment with trace sand to 18.0 feet over water sorted and deposited sand with little silt to 22.0 feet over water sorted and deposited sand and gravel with trace gravel little silt to 26.0 feet		
	01 510 30 40 59 612 35	Moist brown (SILT) with with trace very fine size sa very weakly bedded with o staining along bedding play desiccation cracks	1 to 3 % gravel and very dense occasional iron nes and vertical 18.0	2" pvc riser pipe ement bentonite	over water sorted and deposited sand and gravel with trace silt to 29.0 feet over water sorted and deposited sand with little silt to end of boring.		
contrasting	45 7 34 36 48	Extremely moist brown (S with 3 to 5 % gravel with v little silt very dense in place with iron staining noticed	ILTY-SAND) very fine size sand e weakly bedded		-16.0 -16.5 1) Very fine size sand 2) Bentonite scal		
2000rong 	8 18 38 38 46 46 20 60			2	3) 2" pvc riser pipe _19.5		
	N = NUMBER OF BLOWS TO DRIVE LOGGED BY Dale M. Gramza	2 - SPOON12	."with <u>140</u> ю.	WT. FALLII	NG <u>30</u> - PER BLOW. <u>1</u> <u>2</u> OF <u></u>		

plandy		NATUR	E'S WAY		
		Environmental Consult	tants & Contractors, In	nc.	
	3553	Crittenden Road	Ot	office: (716) 937-0	5527
	HOLENO W-5A	enden, New York 14038	Fa	ax: (716)937-9	9360
	HULE NU		SURF.	e Road	
, citemage	PROJECT	Sanitary Iandeill	LOCATION Gainiville		
			Lancaster	er, NY	
	CLIENTGIYNN Geoto	ecn	DATE STARTED11/2	13/98_COMPLETED	11/13/98
1008.000y	DEPTH FEET	DESCRIPTION & CLASSI	FICATION	water WELL	TABLE & REMARKS
	38 28 10 39 10 16 37 31 38 38	Extremely moist brown with 3 to 5 % gravel ver silt very dense in place v iron staining noticed	(SILTY-SAND) y fine size sand little veakly bedded with 22.0	3 - 21.5	/ater level 11/23/98
	11 18 25 75 100/5' 12 18 38 45 38	Extremely moist gray and SAND) with 5 to 15 % g fine size sand little silt ve bedded-iron staining noti	d brown (SILTY- gravel very fine to rry dense weakly ced at 24.5 feet 26.0	cinuous wrap pvc s pack	7.1' ground level
	13 17 24 27 30 27 14 12 27 33 33 50/3	Wet brownish gray very g • with 40 to 50 % gravel very coarse size sand trace silt • place stratified	gravelly (SAND) ery fine to very very dense in 29.0	#1 size sand point of the second seco	Sample \neq Recovery11 o21 531 541 o
	35	Wet brown (SILTY-SAN to fine size sand little silt v soil tends to liquify when o	D) with very fine very dense in place disturbed bedded 32.0	52.0	$ \begin{array}{c c} 5 & -18 \\ \hline 6 & 1^{-1} \\ \hline - & 10 \\ \hline 8 & 18 \\ \hline 9 & 1^{-1} \\ \hline 10 & 18 \\ \hline \end{array} $
denament.		Boring completed a	t 32.0 feet		
			4		12 20
Magazinen		4			
					للمستشبين
	40		3)) 2" pvc riser	pipe
- shidolog	N = NUMBER OF BLOWS TO DR	RIVE2 - SPOON12	_* with140 ib. wt	T. FALLING <u>30</u> EET <u>2</u> OF	_ * PER BLOW.

HOLE NO	Crittenden,	New York 14038	Fa SURF.	ELV	6)937-9360			
PROJECT	98-239	-	LOCATIONGUNNVIILE ROad					
11100201 -	Lancaster Sar	nitary Landfill	Lancast	er, NY				
CLIENT	Glynn Geotech	1 -	DATE STARTED11/	13/98	COMPLETED11/30/98			
	BLOWS ON SAMPLER	DESCRIPTION & CLASS	IFICATION	WATER TABLE & REMARKS				
FEET VY	0 6 12 18 N 6 12 18 24 N							
		Open hol	.e					
			41.0		Water level 11/30/9 31.0' ground level			
15		Advance 3 7/8 inch roll debris	er cone through rock	nite grout				
30			50.0	riser pipe ement bento				
		Roller coning complete	d at 50.0 feet	2" pvc	33.5 34.0 - 37.0 37.5			
45				3 4	-39.5			
					49.5			
				1) Ve 2) Be 3) 2" pv	ry fine size sand ntonite seal 6 slot continuous wra c screen - #1 size sar			
		VE SPOON	• with	lb. WT. FAL	LING " PER BLOW.			

verenoting						Envir	NA [*] onmental Co	TURE'S	WAY s & Contra	ictors, I	nc.		
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PROJE	CT	98-	239	Lar	ıcas	ter Sanitary	/ Landfill	f	OCATION GI	unnvil	le Roa	ad	
1.000	.0	Pac	ker	Tes	st a	nd Seal_Bott	om of Casa	ading W	ell La	ancaste	er, N	Y	
CLIEN	r	Gly	nn (Geot	cech			D/	ATE STARTED	11,	/06/98	3_COMPL	ETED11/06/98
DEPTH FEET	SAMPLE NO.	0 6	SAMP	S ON	N	D	ESCRIPTION & C	LASSIFICAT	TION		WELL	WA	TER TABLE & REMARKS
20											tonite seal Open rock hole 4" Steel casing	32.8 35.0	Water level: Initial 11/6/98 56.1' with bottom of hole at 57.2 feet 11/6/98 21.25' ground level With packer set at 35.0 feet 11/23/98 15.2' ground level Inflate packer (30.0' to 32.8') unable to
60											Ber	57.2	seal lower top of packer to 33.0' BGS unable to seal. Note: pull packer and run surface test every thing functioning properly
80) Ver	y fine	Lower top of packer to 35.0 feet and test size sand
N = NU	MBER	OF BL	.ows	то р	RIVE		SPOON	• w	ітн	Ib. V	VT. FALL	.ING	- PER BLOW.
LOGGED	BY			I	Dale	M. Gramza				SI	HEET	1	_ OF1
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PROJECT SPECIFICATIONS

LANCASTER SANITARY LANDFILL LANCASTER, NEW YORK

MONITORING WELL INSTALLATION, ABANDONMENT & REPAIR CERTIFICATION REPORT GGE 98-1047

January 29, 1999



MONITORING WELL INSTALLATION, Abandonment & Repair Specifications

LANCASTER SANITARY LANDFILL LANCASTER, NEW YORK

GGE 98-1047

prepared for:

Gunville Energy Systems 2255 Bailey Avenue Buffalo, New York 14211

October 1998

DOCFILE:65005Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

• VISIT OUR WEB SITE AT www.glynngroup.com/ E-MAIL: ggeny@earthlink.net •

TECHNICAL PROVISIONS

I. <u>QUANTITIES AND LOCATIONS:</u>

A. General:

The approximate number, location, depth, and/or details of each required work item is indicated in the Scope of Work Section I. of the General Provisions and supplemented by the attached Wehran site plan drawing, Figures A – D and included bore logs. The actual number, location, depths and details of the borings and maintenance/repair efforts are subject to change, depending on the field conditions, and will be directed in the field by the Contractor with concurrence of the Engineer as necessary.

II. MOBILIZATION AND DEMOBILIZATION

Mobilization shall consist of the delivery to the initial work site of all personnel, equipment and supplies to be furnished by the Contractor/Driller. Demobilization shall consist of the removal from the final work site of all personnel, equipment and materials after completion of the work.

III. PROCEDURE

- A. General Requirements (Ref. 6NYCRR Part 360-2.11(a)(8)(i)):
 - 1. The Contractor shall employ appropriate construction techniques to prevent leakage of groundwater or contaminants along the well annulus.
 - 2. The Contractor shall take every precaution during drilling and construction of monitoring wells to avoid introducing contaminants into a borehole. Only potable water of known chemistry may be used in drilling monitoring wells unless otherwise approved by the Engineer.
 - 3. The Contractor shall properly decontaminate all equipment placed into the borings before use at the site and between boreholes. The initial cleaning at the site must ensure that no contaminants from the last site drilled will be introduced into the borings. All equipment must be steam cleaned between holes. Where possible, up-gradient wells should be drilled first.
 - 4. Drilling muds, air systems and drilling lubricants shall not be used.
 - 5. Well borings must have an inside diameter at least two inches larger than the outside diameter of the casing and screen to ensure that a tremie may sufficiently place material around the well casing. Borings shall be drilled with a minimum of 4 ¼ inch inside diameter hollow stem auger. Soil samples shall be obtained on a continuous basis using a standard split barrel sampler starting from the ground surface. For borings into bedrock, advance the auger to the top of rock and collect rock cores to the appropriate depth. After coring, the boring shall be reamed with a roller bit of sufficient size as to produce the required 2 inch annulus.

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B. Soil Borings and Soil Sampling

Soil samples shall be obtained on a continuous basis using a standard split barrel sampler. Sampling shall start at the ground surface. All samples shall be preserved in accordance with the applicable requirements under <u>Preserving Samples and Cores</u>. The procedure described in ASTM D-1586, 1984, <u>Penetration Test and Split Barrel Sampling of Soils</u> and ASTM D-4220, <u>Preserving and Transporting of Soil Samples</u> shall be followed. Refusal of the soil sampler shall be one hundred (100) blows with a penetration of less than two inches (2").

C. Coring of Rock

The Driller shall exercise particular care in coring to minimize damage or erosion of cored materials. A non-rotating split inner barrel may be required for adequate recovery of cored glacial till. The procedure described in ASTM D-2114, 1983, "Diamond Core Drilling for Site Investigation" shall be followed. Selected borings to be advanced to recover bedrock core or till core beyond soil sampler refusal will be determined in the field by the Engineer. (See also TP Section VI.)

- B. Groundwater Levels
 - 1. The level at which groundwater is first encountered in the borings shall be noted. Groundwater levels shall be measured before and after the casing or drive pipe is pulled. Each water level reading shall be recorded showing the date and time the reading was made, the depth of the drive pipe or casing, and the depth to water. Any loss or gain of water in the boring, except that caused by deliberately introducing water and/or inserting or removing of tools shall be recorded. **Twenty-four (24) hour water level readings shall be obtained for all well installation borings**, except as directed by the Engineer.
 - 2. All water level readings and related data shall be recorded on the boring logs under "Remarks". If necessary, additional forms shall be used for recording groundwater data.

IV. <u>ABANDONED BORINGS AND FALSE STARTS</u>

A. Abandoned Borings

Borings that are abandoned or lost before reaching the required depth, or from which unsatisfactory cores are being obtained shall be supplemented by other borings adjacent to the original in order that satisfactory cores, monitoring wells and the required information can be obtained. Penetration to the depth where the original boring was abandoned may be made by any method selected by the Contractor that in the opinion of the Engineer will permit satisfactory samples were not obtained in the original boring. No payment will be made for supplementary borings that are required to be made to replace borings that were abandoned or from which satisfactory samples were not obtained because of mechanical failure of drilling and sampling equipment, negligence on the part of the Contractor, or other preventable cause for which the Contractor is responsible. However, payment will be made for acceptable portions of these supplementary borings below the depths or outside the reaches for which payment was made for original boring. (See abandonment procedures in Section X.)

B. False Starts

It is intended that borings will clear all embedded pipes, rock anchors, and underground structures. However, should the Contractor be unable to complete any boring because obstacles or obstructions are encountered which the Contractor considers to be of an unusual nature and that failure to penetrate them is not the fault of the Contractor's methods or equipment, a false start will be allowed. In such cases, if directed by the Engineer, another boring will me made in the adjacent vicinity. All core runs taken in the boring, and the length of the false start measured from the original exposed surface to the lowest elevation penetrated, will be paid for at the Contract Unit Price bid in the Proposal for the particular type boring performed, provided, however, that the Contractor shall submit to the Engineer a complete record and samples of all false starts. (See abandonment procedures in Section X.)

V. SPLIT SPOON DRIVE SAMPLES

A. Advanced Soil Borings

Each boring shall be advanced by hollow stem auger methods to the sampling elevation. Hollow stem augers shall be of sufficient diameter to allow the passage of this walled tubes, and NX or NQ wireline coring equipment, without introduction of overburden soils in the rock boring.

- B. Sampling Procedure & Storage
 - 1. Continuous sampling will be employed.
 - 2. Before taking each sample, the boring shall be cleaned out to the sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts, the drill bit shall be withdrawn slowly to prevent loosening of the soil around the borehole. When a casing is used, it shall not be advanced below the top elevation of the next sample.
 - 3. Samples shall be taken using a split-barrel sampler conforming to the requirements of ASTM D-1558. The cutting edge shall be maintained in good condition and replaced as required.
 - 4. With the sampler resting on the bottom of the borehole, the sampler shall be driver with blows from a 140 lbs. drive hammer falling 30 inches until either a penetration of 18 inches has been achieved or 100 blows have been applied for penetration of 2 inches or less which shall be considered refusal.
 - 5. Samples shall be placed in glass jars with threaded caps upon recovery. Preserved samples shall be suitably boxed, marked and identified with legible labels including the project name, hole #, location and jar #.

VI. <u>VERTICAL CORE BORING IN ROCK, NX DOUBLE TUBE</u> <u>OR NO WIRELINE CORE BARRELS</u>

A. General

The purpose of the borings in rock is to obtain NX – or NQ-size cores for classification. The coring is to be performed at the locations indicated in Section I.A of the General Provisions, and as directed by the Engineer. Procedures outlined in ASTM D-2113-83 shall be followed.

B. Criteria

The core shall be a minimum diameter of two and one-eighth inches for the NX Double Tube Core Barrel, or one and seven-eighths inches for the NQ Wireline Core Barrel. Bedrock coring shall be made in two (2) runs. The first run shall extend through the top 24 inches of rock. The second run shall extend from 2 feet to 7 feet. A complete description shall be required for each run (i.e. recovery, etc.).

C. Equipment

The coring shall be done with an NX size Series M Double Tube Core Barrel non-rotating inner barrel, as standardized by the Diamond Core Drilling Manufacturer's Association, or an NQ Wireline Core Barrel, with non-rotating inner barrel.

- D. Sampling Procedure & Storage
 - 1. The general procedure shall be as specified in Section V.B "Split Spoon Sampling". In addition, the core shall be withdrawn at the first sign of blockage or grinding. If core recovery is poor or breakage is excessive, the Contractor shall make every effort to improve the recovery and sample quality by changing bit types and alternating drilling rates, by shortening runs, or by whatever other methods are required.
 - 2. The core recovered shall be placed in clean wooden or metal core boxes, each having a hinged top with a hook and eye clasp, divided into separate compartments running the full length of the box and having the same width as the core. Core shall be placed in these boxes in such a manner that the various strata are in the same relative position in the core box as they are in the ground. The order of placing cores shall be the same in all core boxes. The top of each core obtained and its true depth shall be clearly and permanently marked in each box.
 - 3. Wherever core is lost, or at any cavity, or whenever core is removed for testing or other purposes, a wooden spacer shall be placed in its place in the core box and notation made of the length of hole not represented in the box and the date, purpose, and person who removed core if such is the case.

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VII. CONSTRUCTION OF MONITORING WELLS (Ref. 6NYCRR Part 360-2.11(a)(8)(ii))

- A. Well screens and risers shall be constructed of schedule 40 polyvinyl chloride (PVC). Joints, caps, and end plugs are to be secured by welds, threads with Teflon tape, or force fittings. Solvents and glues or other adhesives are prohibited. Caps must be vented to allow for proper pressure equalization. The inside diameter of each well screen or riser pipe must be nominally two (2) inches in diameter and must allow for proper development. A permanent mark shall be made at the top of the riser pipe to provide a datum for subsequent water level measurement.
- B. Well screens shall be factory constructed non-solvent welded/bonded continuous slot wire wrap screens of a material appropriate for long term monitoring without contributing contaminants to or removing contaminants from the groundwater. The slot size of the screen must be compatible with the grain size of the sand pack.
- C. The sand pack shall consist of clean, inert, siliceous material whose grain size is based upon a representative sieve analysis of the screened horizon. The silica sand shall be placed into the borehole to a depth of no more than 6 inches above the bottom of the hole. Subsequently, the slotted screen, end cap and riser pipe, shall be threaded together at the collar of the boring and gradually lowered in.
- D. Once the well is installed to a predetermined depth, the annular space around the well screen shall be backfilled to a depth of 1.5 feet above the top of the well screen. Another six (6) inches of fine grained silica sand pack (100% passing a No. 30 sieve and less than 2% passing a No. 200 sieve) shall then be backfilled to a depth of two (2) feet above the top of the screen. All sand pack materials must be placed using the tremie method and must avoid bridging. The elevation of the silica sand shall be continually monitored during installation by a measuring tape fitted with a weighted tamper at the end.
- E. A minimum three (3) feet of bentonite shall be placed over the sand pack using a tremie. A six (6) to twelve (12) inch fine grain sand pack shall be placed above the bentonite seal to minimize grout infiltration. If pellets or chips are used, allow sufficient time for full hydration of the bentonite before overlying materials are placed.
- F. A cement/bentonite grout mixture or bentonite alone shall be added to the hole with a tremie pipe, filling the remaining annular space to grade. This grout mixture must set up without being diluted by formation water and must displace water in the annular space to ensure a continuous seal. Casing must be left in the hole before grouting to prevent caving.
- G. After grouting, a minimum four (4) inch square, five (5) feet long, protective steel casing with a locking cap shall be installed over the PVC riser. The riser pipe and protective casing shall have a minimum stickup of 24 to 30 inches above the ground surface at each well location. A permanent mark is to be placed on the riser for a measurement datum. The Owner shall provide a marker to identify the well number. A ¼"± drain hole shall be drilled at the base of the protective casing. A ¼"± vent hole shall be located near the top of the protective casing to prevent explosive gas build up and allow water levels to respond naturally to barometric pressure changes.

G. (con't)

The annulus of the protective casing should be filled with pea gravel. A locking cap must be installed with one to two inches clearance between the top of the well cap and the bottom of the locking cap when in the locked position and a weather resistant padlock must be placed on the protective casing and duplicate keys provided.

H. A concrete surface seal designed to last throughout the planned life of the monitoring well must be constructed. The surface seal must extend 4' below grade to prevent potential well damage. The top of the seal must be constructed by pouring the concrete into a pre-built 30" square form or 30" diameter "Sono-tube" (or equal). The seal must be designed to prevent surface runoff from ponding and entering the well casing.

VIII. WELL DEVELOPMENT PROCEDURE (Ref. 6NYCRR Part 360-2.11(a)(8)(iii))

- A. All monitoring well installations must be developed by the Contractor as soon as possible after installation but not before the well seal and grout have set (minimum 24 hours). Water must not be introduced into the well for development unless warranted by geologic conditions. All water removed must be properly managed by the Contractor. Development must not disturb the strata above the water bearing zone or damage the well.
- B. Every precaution must be taken to ensure that development activities do not introduce contaminants into the well. The entire vertical screened interval must be developed. The Engineer may require multiple attempts at well development to increase the likelihood that sediment free water can be obtained for sampling. The Contractor shall be responsible for reporting all data concerning monitoring well development in a typed summary to the Engineer.
- C. After completing well development, the Contractor will be responsible for in-situ hydraulic conductivity testing of all new installations. The testing method must not introduce contaminants into the well. The Contractor shall be responsible for proper management of any water removed from the wells during the course of the testing. The Contractor shall report all data collected and hydraulic conductivity calculations in a typed test data report.
- D. The test data report shall include the well number and date of test, type of test (rising, falling, other), stickup of well, static water level, all measured values of the water level along with the respective time increment, all calculations, and the graphical representation of the data. The suggested method for determination of hydraulic conductivity will be a slug test using the methodology noted in Section IX.

IX. <u>HYDRAULIC CONDUCTIVITY TESTING (Slug Test Procedure)</u>

A. Utilizing a length of solid "slug" made up of an inert chemical substance, with sufficient volume to displace a minimum of 2.5 feet of water within the well casing, a calibrated flat tape water level indicator that measures water level to the hundredth of a foot, and a stopwatch, the in-situ hydraulic conductivity test shall be performed in this manner:

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TECHNICAL PROVISIONS 01000-6

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- 1. A static water level shall be measured to the nearest hundredth of a foot immediately prior to the testing of the monitoring well from a datum point on the well. The time at which the static water level was taken as well as the static water level shall be recorded on a field test log.
- 2. A clean, chemically inert "slug" shall be lowered into the monitoring well and placed at a depth such that the "slug" shall remain completely covered with water throughout the duration of the test and not impede the flow of water within the well casing or screen.
- 3. Measurements of water level (head) changes shall be made to adequately complete a response curve that well allow for the calculation of the hydraulic conductivity of the well. These measurements shall also be made to the nearest hundredth of a foot as measured from the datum point of the well. The time intervals for the measurements shall be selected by the Engineer. Measurements along with the time interval of the reading shall be recorded in a field test log.
- 4. The testing shall be complete when the water level (head) within the well has recovered to within 10% of the static water level as calculated from the first water level reading of the test (H_o).
- 5. The "slug" will be removed from the well and the water level (head) will again be monitored as previously mentioned until the water level has recovered to within 10% of the original static water level. All results and associated data shall be recorded on a field test log.
- 6. A graphical representation shall be generated on a semi-log graph with the Y axis (logarithmic) having the calculated head ratio and the X axis having the time in minutes for each rising and falling head test performed. A line or lines shall be drawn to represent trends within the data.
- 7. Hydraulic conductivity shall be calculated using the Hvorslev (1951) method.
- B. All tests shall be reviewed by the Engineer for any problems that may have arisen during the test, which may prompt a retest of the hydraulic conductivity if necessary. Copies of the Field Test Logs must be supplied upon completion of the work.

X. <u>ABANDONMENT OF MONITORING WELLS</u> (Ref. 6NYCRR Part 360-2.11(a)(8)(vi))

- A. All soil borings and/or rock cores which are not completed as monitoring wells and other abandoned wells must be fully sealed as directed by 6 NYCRR Part 360 regulations and as herein specified to prevent contaminant migration through the borehole.
- B. The Contractor shall remove the protective casing, if present, from each well in a manner which minimizes disturbance to the well.
- C. The Contractor shall over-drill the well using a minimum 4¼ inch inside diameter (I.D.) hollow stem auger with outward facing cutting teeth to a minimum of two (2) feet below the total depth of the original boring or over-reaming tool with a pilot bit approximately similar in size to the inside diameter of the well material.

- D. Following over-drilling, the Contractor shall withdraw the well materials from within the auger and measure well elements to confirm complete removal. All casing and well installations within the upper five (5) feet of the boring, or within five (5) feet of the proposed level of excavation, must be removed. If complete removal below this point can not be attained, perforate any casing elements left in place.
- E. For wells not advanced into rock, material brought up on auger shall be observed by Engineer for signs of well elements. When rock over-drilling is necessary for wells advanced into rock, flush completed bore holes with potable water of known chemistry and pump out. Collect samples of flush water for inspection by Engineer for signs of well elements.
- F. The Contractor shall seal the borehole by pressure injection with cement bentonite grout using a tremie pipe to fill the inside of the auger to the ground surface or the proposed excavation level. The screened interval of the borehole must be sealed separately and tested to ensure its adequacy before sealing the remainder of the borehole. Additional grout shall be added, as required, as the augers are removed to maintain the level of grout within five (5) feet of the ground surface or proposed excavation level. The upper five (5) feet must be backfilled with appropriate native materials and compacted to avoid settlement.

XI. <u>REMOVAL OF OLD CONCRETE SEALS</u>

- A. Disturbance of monitoring well should be minimized during removal of concrete seal. Consider the following:
 - 1. Do not push, pull or otherwise apply direct force to the well casing or monitoring well riser pipe at any time.
 - 2. Preclude introduction of contaminants into the riser pipe.
 - 3. If excavation around the seal is warranted, limit depth of excavation to 4 ft.+.
 - 4. Hand operated pneumatic tools will be permitted to aid in concrete removal.
 - 5. Near complete removal of the concrete is expected. Small portions of concrete adhered to casing/riser may be left in-place as deemed acceptable by the Engineer.

XII. PAINTING OF MONITORING WELL CASINGS

- A. Furnish and install all monitoring well casing painting as described in General Provisions, Section I. A. and as herein specified.
- B. Submit product data (manufacturers descriptive data fully describing product).
- C. Materials: "Rust Reformer" rust inhibitor by Rust-Oleum or approved alternate. Rust-Oleum oilbased paint or approved alternate; color – Aluminum.

D. Surface Preparation

- 1. Use a wire brush to remove dirt, loose paint and surface rust to the greatest extent possible on the exterior of the casing and lid.
- 2. Remove residual dust and debris with a damp cloth.

E. Application

- 1. Apply rust inhibitor to exterior surfaces per manufacturers recommendations. Do not apply to interior surfaces. Allow sufficient time to dry (approximately 24 hours).
- 2. Apply paint per manufacturers recommendations with a brush or roller. Spray painting is not permitted. Do not paint interior surfaces.
- 3. Apply second coat after first coat has dried.

XIII. <u>SIGNAGE</u>

A. Furnish and install all monitoring wells signs as described in General Provisons, Section I. A. and as herein specified.

B. Materials:

- $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{3}{16}$ " galvanized steel angle.
- ¹/₄" dia. A 307 bolts and nuts.
- 4" x 8" x $\frac{1}{8}$ " galvanized steel plate.
- 2" weather resistant, permanent, adhesive lettering or stencil painted lettering.
- C. Construct and install signs as shown on Figure D (attached).

XIV. <u>RECORDS</u>

- A. General:
 - 1. Complete and accurate, typed drilling logs must be provided by the Contractor. For soils, all logs must contain a description of matrix and clasts, mineralogy, roundness, color, appearance, odor, and behavior of materials using the Unified Soil Classification System (USCS). A clear description of the system used must be included with the logs.
 - 2. All well logs must contain drilling information as observed in the field including: moisture content; location of water table during drilling; water loss during drilling; depths to significant changes in material and rock; samples recovery measured in tenths of a foot; hammer blow counts and other pertinent comments including: method of drilling used; anomalous features within the well; and the use and descriptions of drilling fluids or additives, including the source and calculated and actual amounts of materials used.

- 3. Logging of rock must describe the lithology, mineralogy, degree of cementation, color, grain size, and any other physical characteristics of the rock; percent of recovery and rock quality designation (RQD); other primary and secondary features, and contain all drilling observations and appropriate details required for soils boring logs. A clear photographic record of all labeled cores must also be taken and submitted with the logs.
- 4. Monitoring Well installation reports must contain a diagram of the completed well, all pertinent details on well construction, a description of the materials used, and elevations of all well features.
- B. Responsibility

The responsibility of the Contractor or Engineer or the keeping of separate drilling records by the Contractor or Engineer shall not relieve the Contractor of the responsibility for the work specified in this section. Payment will not be made for any work for which the required records have not been furnished by the Contractor.

XV. STORAGE AND SUBMISSION OF SAMPLES AND ROCK CORES

A. General:

The Contractor shall be solely responsible for preserving all samples in good condition until delivered to storage and accepted by the Engineer. He shall keep samples from freezing and from undue exposure to the weather. Samples permitted to freeze, even partially, shall be replaced by the Contractor at his expense. The Contractor shall keep all descriptive labels and designations on sample boxes clean and legible until final acceptance by the Engineer. The Contractor shall comply with all requests of the Engineer concerning the care and protection of samples.

B. Submission of Samples:

All core boxes and sample jars and boxes shall become the property of the Owner and the cost thereof shall be included in the Contract Unit Prices.

XVI. EQUIPMENT AND CREW TIME (STAND-BY)

A. General:

In the event that the drilling equipment and crew are out of production during the course of the boring program not through the cause or fault of the Contractor, the Contractor will be entitled to compensation under this item. Measurement of this item is to be made by the Engineer.

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XVII. MEASUREMENT AND PAYMENT

A. General:

The Contract Unit Price for each item shall include the furnishing of all labor, materials, equipment, plant, facilities and services and the performance of all work. Payment for these items shall include compensation for putting down boreholes; obtaining, preserving, packing, marking and submitting samples; performing necessary tests; compiling and submitting records; and costs of shipping samples. No other payments for any specified or indicated work or for any work reasonably implied therefrom will be made. No payment will be made for work abandoned without authorization of the Engineer or for work for which satisfactory samples and/or data are not submitted.

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LANCASTER LANDFILL	FIGURE:
OVERBURDEN WELL	
DETAIL	
NO SCALE	





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LANCASTER LANDFILL BEDROCK WELL DETAIL NO SCALE	FIGURE:





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LANCASTER LANDFILL PIEZOMETER CLUSTER CASING & SEAL DETAIL NO SCALE	





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LANCASTER LANDFILL MONITORING WELL SIGN DETAIL NO SCALE	