

Appendix E

Boring Logs – SBPC-01 and Existing Monitoring Wells



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

**LOG OF BORING
2013SBPC-01**

SHEET 1 OF 9

Report: URS-CHICAGO - Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINNEAPOLIS LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9
Drilling Company: Cascade		Date Started: 10/01/13	Date Finished: 10/02/13
Drilling Equipment: Rotosonic with 10' x 6" ID		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 117.0
Drilling Method: rotosonic		Water Level (ft bgs)	
Drill Bit Type/Diameter: 6" ID x 10' rotosonic		First Encount.:	At Completion:
Sampler Type/Diameter:		Driller:	Field Logger: George Gregory
Boring Location Description: SW corner of Pierson Creek Landfill, halfway down hill		Reviewed by: Heather Herr	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
		Fill: SAND "SM", medium brown; fine-grained sand; slightly damp to dry with gray limestone gravel; topsoil/roadbase.					
616		SAND (SP), tan; fine to medium grained sand; dry; loose.	2				
614			4				
612			6		NR		
610		SAND (SP), tan; medium to coarse grained sand; slightly damp.	8				
608			10		NR		10 ft Collected 2013SBPC-01-010
606		At 10'-13' some subrounded pebbles.					



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 2 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
604		SAND (SM), very fine grained sand; tan; slightly damp; loose.	14				
602			16		0.2		16 ft Collected 2013SBPC-01-016
600		At 17' becomes brown with rounded gravel.	18		1.4		
598			20				
596			22				
594		At 22' becomes tan; fine grained; dry.	24		0.2		
592		CLAY (CL), tan; slightly damp; moderately hard; interbedded tan silty clay and fine tan sand.	26		1.4		
					0.4		26 ft Collected 2013SBPC-01-026

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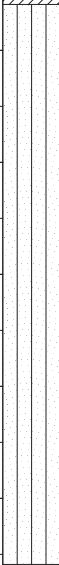


CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 3 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
590		At 27' becomes tan silty clay.			NR		36 ft Collected 2013SBPC-01-036
			28				
			30		NR		
588		SAND (SM), tan; fine to medium grained sand; slightly loose; wet.					
			32				
			34				
586		At 35' 2" clay lense.			NR		
			36				
584		SAND (SP), tan; medium grained sand; little fines; very wet.					
			38				
					NR		
			40				
582							
580							
578							

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 4 OF 9

Project:	DuPont - Montague	Project No.:	18984840
Location:	Montague, MI	Elevation:	617.4 ft msl
		Coordinates (N,E):	696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
576					NR		
		SANDY SILT (MLS), tan; occasional salmon colored silt lenses; firm.	42				
574							
			44		NR		
572							
			46				
570		SILTY CLAY (CLM), tan; very damp; slight plasticity; firm; silty clay to clayey silt.	48				
568							
		SANDY SILT (MLS), tan; wet; sandy silt.	50		NR		
566							
		SILTY SAND (SM), tan; fine to medium grained sand; loose; few silt.	52				
564							
		At 54' 2" clay seam.	54				

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 5 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
562					NR		55 ft Collected 2013SBPC-01-055
			56				
560			58				
			60		NR		
558			62				
			64				
556			66				
			68		NR		
554							
552							
550							

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING
2013SBPC-01

SHEET 6 OF 9

Project:		Project No.:					
DuPont - Montague		18984840					
Location:		Elevation:	Coordinates (N,E):				
Montague, MI		617.4 ft msl	696403.8, 12576718.9				
ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
548							
							
							
546							
							
							
544							
							
							
542							
							
							
							
540							
							
							
538							
							
							
536							
							
							
							</

Report: URS-CHICAGO - Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 7 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
532			84		0.2		85 ft Collected 2013SBPC-01-085
			86				
530		SAND (SM), tan; fine grained sand; wet; slightly loose.	88		0.2		
528			90				
526			92		0.3		95 ft Collected 2013SBPC-01-095
524			94				
522		SANDY SILT (MLS), gray to tan; firm; wet; sandy silt.	96		0.1		
		SILTY CLAY (CLM), light gray; sandy; firm; silty clay.					
520		SAND (SP), tan; medium grained sand; loose; wet.					



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 8 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
518			98				
			100		0.2		100 ft Collected 2013SBPC-01-010 Collected 2013SBPC-01-100
516			102				
			104				
512		CLAY (CL), light gray; very firm; laminations visible.			0.2		
		SAND (SP), light gray to tan; medium grained sand; loose; wet.	106		0.2		
510		CLAY (CL), dark gray; plastic; moist; slightly silty.					
			108				
508							
			110		NR		
506							
			112				

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING 2013SBPC-01

SHEET 9 OF 9

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 617.4 ft msl	Coordinates (N,E): 696403.8, 12576718.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
504		At 114' becomes very hard; slightly damp and breaks open with difficulty.	114		NR		
502			116				

End of Boring at 117 ft BGS.

Borehole backfilled with bentonite grout

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-207-055

SHEET 1 OF 5

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.1 ft msl	Coordinates (N,E): 696463.4, 12577201.8
Drilling Company:		Date Started: 11/01/79	Date Finished:
Drilling Equipment:		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 55.4
Drilling Method:		Water Level (ft bgs)	
Drill Bit Type/Diameter:		First Encount.:	At Completion:
Sampler Type/Diameter:		Well Installed? No	Dist.: 0
		Driller:	Field Logger:
Boring Location Description: Pierson Creek Area E. of dump site, in woods		Reviewed by: George Gregory	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
648		TOP SOIL (TOPSOIL).					
		SAND (SP), fine sand.					
646			2				
644			4				
642			6				
640			8				
638		SILTY SAND (SM), fine silty sand.	10				
		SAND (SP), fine medium sand.					



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-207-055

SHEET 2 OF 5

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.1 ft msl	Coordinates (N,E): 696463.4, 12577201.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
636							
634			14				
632		SAND WITH GRAVEL (SWG), fine to coarse sand with gravel.	16				
630			18				
628			20				
626		SAND (SP), fine to medium sand.	22				
624			24				
622			26				

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-207-055

SHEET 3 OF 5

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.1 ft msl	Coordinates (N,E): 696463.4, 12577201.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
620			28				
618		SAND (SP), fine sand.	30				
616			32				
614			34				
612			36				
610			38				
608			40				

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CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-207-055

SHEET 4 OF 5

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.1 ft msl	Coordinates (N,E): 696463.4, 12577201.8

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINNEAPOLIS LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
606			42				
604		SILT (ML).	44				
602		CLAYEY SAND (SC), very fine sand with clay.	46				
600			48				
598			50				
596			52				
594		Blind drilled.	54				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-207-055

SHEET 5 OF 5

Project: DuPont - Montague				Project No.: 18984840			
Location: Montague, MI				Elevation: 648.1 ft msl		Coordinates (N,E): 696463.4, 12577201.8	
ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
-	-		-	-			

End of Boring at 55.42 ft BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: MW-207-055

SITE NAME: DuPont - Montague BOREHOLE #: MW-207-055

STATE _____

PLANE COORDINATE: X 12577201.823 Y 696463.413 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: _____ DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

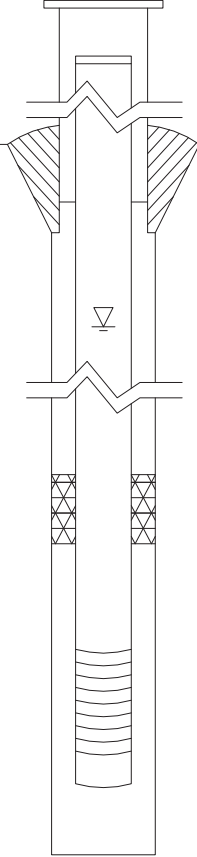
DRILLING METHOD: _____ DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: _____ DATE FINISHED: 11/1/79

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: _____		<u>648.07</u>	<u>0.00</u>	GROUND SURFACE
TYPE OF ANNULAR SEALANT: _____		<u>N/A</u>		TOP OF ANNULAR SEALANT
INSTALLATION METHOD: _____				
SETTING TIME: _____		<u>599.74</u>	<u>48.33</u>	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: _____				TOP OF SEAL
SETTING TIME: _____				TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)				TOP OF SCREEN
INSTALLATION METHOD: _____				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		<u>592.65</u>	<u>55.42</u>	BOTTOM OF SCREEN BOTTOM OF WELL
INSTALLATION METHOD: _____		<u>592.65</u>	<u>55.42</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	
ID OF RISER PIPE	(in)	2.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE	** (in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

**LOG OF BORING
MW-208-020**

SHEET 1 OF 2

Report: URS-CHICAGO; Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840					
Location: Montague, MI		Elevation: 598.8 ft msl	Coordinates (N,E): 696369.2, 12576636.1				
Drilling Company: Walkerville Well Drilling & Supply Co. Inc.		Date Started: 11/30/80	Date Finished: 12/03/80				
Drilling Equipment:		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 22.0				
Drilling Method: Hollow stem Auger		Water Level (ft bgs) Number of Samples					
Drill Bit Type/Diameter:		First Encount.:	At Completion:	Well Installed? No	Dist.: 0	Undist.: 0	Core: 0
Sampler Type/Diameter:		Driller: Rick		Field Logger:			
Boring Location Description: Pierson Creek Area at bottom of the hill		Reviewed by: George Gregory					

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
598		Blind drilled to 22 ft BGS to install well. Refer to MW-208-083 for lithology.					
			2				
596							
			4				
594							
			6				
592							
			8				
590							
			10				
588							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-208-020

SHEET 2 OF 2

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 598.8 ft msl	Coordinates (N,E): 696369.2, 12576636.1

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
586							
			14				
584							
			16				
582							
			18				
580							
			20				
578							
			22				

End of boring at 22 ft BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: MW-208-020

SITE NAME: DuPont - Montague BOREHOLE #: MW-208-020

STATE _____ PLANE COORDINATE: X 12576636.072 Y 696369.167 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: Rick

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

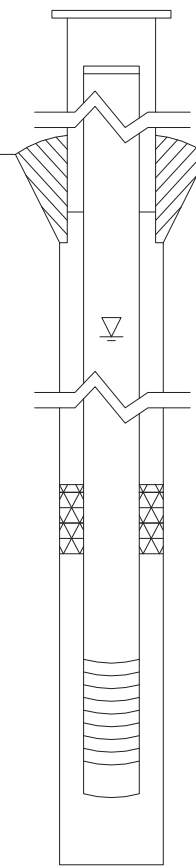
DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 11/30/80 DATE FINISHED: 12/3/80

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
		601.75	-3.00	TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Cement Grout</u>		598.75	0.00	GROUND SURFACE
TYPE OF ANNULAR SEALANT: <u>Cement Grout</u>		N/A	0.00	TOP OF ANNULAR SEALANT
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		587.25	11.50	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR ☒ PELLET ☐ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Gravity</u>		598.75	0.00	TOP OF SEAL
SETTING TIME: _____		586.75	12.00	TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)		584.75	14.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		579.75	19.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		576.75	22.00	BOTTOM OF WELL
		576.75	22.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
SCREEN	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	8.00
ID OF RISER PIPE	(in)	4.50
PROTECTIVE CASING LENGTH	(ft)	5.00
RISER PIPE LENGTH	(ft)	17
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	5.00
TOTAL LENGTH OF CASING	(ft)	17.00
SCREEN SLOT SIZE **	(in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING
MW-208-083

SHEET 1 OF 7

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

Project:	DuPont - Montague	Project No.:	18984840			
Location:	Montague, MI	Elevation:	601.1 ft msl	Coordinates (N,E):	696374.3, 12576644.7	
Drilling Company:	Date Started:		11/01/79		Date Finished:	
Drilling Equipment:	Refusal Depth (ft bgs):		Rock Depth (ft bgs):		Completion Depth (ft bgs): 95.0	
Drilling Method:	Water Level (ft bgs)				Number of Samples	
Drill Bit Type/Diameter:	First Encount.:	At Completion:	Well Installed?	No	Dist.: 0	Undist.: 0
Sampler Type/Diameter:	Driller:			Field Logger:		
Boring Location Description:		Reviewed by:				
Pierson Creek Area at bottom of the hill		George Gregory				

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
600		SAND (SP), fine to medium sand with organic material.					
			2				
598							
		SAND WITH GRAVEL (SPG), fine to medium sand with stones.	4				
596							
			6				
594							
			8				
592							
			10				
590							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 2 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
588	0		14				
586	0		16				
584	0		18				
582	0		20				
580	0		22				
578	0		24				
576	0		26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 3 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
574	0	SAND (SP), fine sand.	28				
	0						
	0						
	0						
	0						
	0						
572	0						
			30				
570							
			32				
568							
			34				
566							
			36				
564							
			38				
562							
			40				

Report: URS-CHICAGO; Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 4 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
560							
			42				
558							
			44				
556							
			46				
554							
			48				
552		At 49 ft BGS trace clay.					
			50				
550							
			52				
548							
			54				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 5 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
546		SAND (SP), fine to medium sand.					
			56				
544							
			58				
542							
			60				
540							
			62				
538							
			64				
536							
			66				
534							
			68				
532							

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 6 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
530			70				
			72				
528			74				
			76				
526			78				
			80				
524			82				
522							
520							
518							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-208-083

SHEET 7 OF 7

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 601.1 ft msl	Coordinates (N,E): 696374.3, 12576644.7

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
516			84				
			86				
514							
			88				
512							
			90				
510							
			92				
508							
			94				

End of Boring at 95 ft. BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: MW-208-083

SITE NAME: DuPont - Montague BOREHOLE #: MW-208-083

STATE _____

PLANE COORDINATE: X 12576644.657 Y 696374.317 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: _____ DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

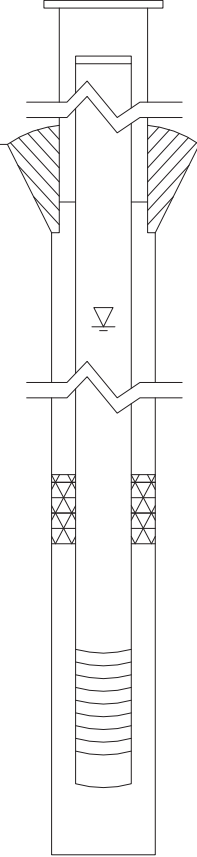
DRILLING METHOD: _____ DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: _____ DATE FINISHED: 11/1/79

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: _____		<u>601.09</u>	<u>0.00</u>	GROUND SURFACE
TYPE OF ANNULAR SEALANT: _____		<u>N/A</u>		TOP OF ANNULAR SEALANT
INSTALLATION METHOD: _____				
SETTING TIME: _____		<u>591.80</u>	<u>9.29</u>	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: _____				TOP OF SEAL
SETTING TIME: _____				TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)		<u>526.59</u>	<u>74.50</u>	TOP OF SCREEN
INSTALLATION METHOD: _____				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		<u>516.59</u>	<u>84.50</u>	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		<u>516.59</u>	<u>84.50</u>	BOTTOM OF WELL
		<u>506.09</u>	<u>95.00</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER:
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	
ID OF RISER PIPE	(in)	2.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE	** (in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-209-067

SHEET 1 OF 6

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINNEAPOLIS LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840			
Location: Montague, MI		Elevation: 629.5 ft msl		Coordinates (N,E): 696283.7, 12576853.8	
Drilling Company:		Date Started: 11/01/79		Date Finished: 11/01/79	
Drilling Equipment:		Refusal Depth (ft bgs):		Rock Depth (ft bgs):	
Drilling Method:		Water Level (ft bgs)		Completion Depth (ft bgs): 78.0	
Drill Bit Type/Diameter:		First Encount.:		Number of Samples	
Sampler Type/Diameter:		At Completion:		Well Installed? No	
		Driller:		Field Logger:	
Boring Location Description: Pierson Creek area 1.2 way down the hill		Reviewed by: George Gregory		Dist.: 0	
				Undist.: 0	
				Core: 0	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
628		SAND (SP), fine to medium sand.	2				
626			4				
624			6				
622			8				
620			10				
618							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-209-067

SHEET 2 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 629.5 ft msl	Coordinates (N,E): 696283.7, 12576853.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
616			14				
614			16				
612			18				
610			20				
608			22				
606			24				
604			26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-209-067

SHEET 3 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 629.5 ft msl	Coordinates (N,E): 696283.7, 12576853.8

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
602			28				
600			30				
598			32				
596		SILTY SAND (SM), fine sand with silt.	34				
594		SILT (ML).	36				
592			38				
590		CLAY (CL).	40				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-209-067

SHEET 4 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 629.5 ft msl	Coordinates (N,E): 696283.7, 12576853.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
588		SILTY SAND (SM), fine sand with silt.	42				
586			44				
584			46				
582			48				
580		SAND (SP), fine sand with trace medium sand and trace silt.	50				
578			52				
576			54				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-209-067

SHEET 5 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 629.5 ft msl	Coordinates (N,E): 696283.7, 12576853.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
574							
			56				
572							
		SAND (SP), fine to medium sand.	58				
570			60				
568			62				
566			64				
564			66				
562			68				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-209-067

SHEET 6 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 629.5 ft msl	Coordinates (N,E): 696283.7, 12576853.8

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
560							
			70				
558			72				
556			74				
554			76				
552							
			78				

End of Boring at 78 ft BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: MW-209-067

SITE NAME: DuPont - Montague BOREHOLE #: MW-209-067

STATE _____
PLANE COORDINATE: X 12576853.761 Y 696283.695 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: _____ DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

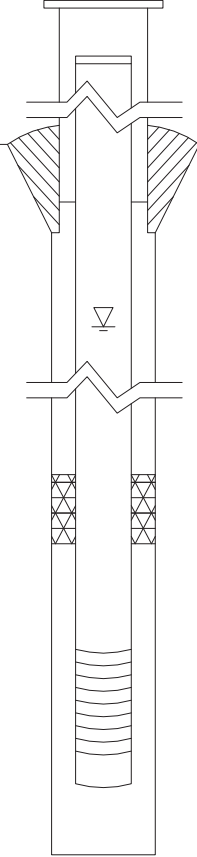
DRILLING METHOD: _____ DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: _____ DATE FINISHED: 11/1/79

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: _____		<u>629.48</u>	<u>0.00</u>	GROUND SURFACE
TYPE OF ANNULAR SEALANT: _____		<u>N/A</u>		TOP OF ANNULAR SEALANT
INSTALLATION METHOD: _____				
SETTING TIME: _____		<u>591.15</u>	<u>38.33</u>	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: _____				TOP OF SEAL
SETTING TIME: _____				TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)				TOP OF SCREEN
INSTALLATION METHOD: _____				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		<u>561.98</u>	<u>67.50</u>	BOTTOM OF SCREEN BOTTOM OF WELL
INSTALLATION METHOD: _____		<u>551.48</u>	<u>78.00</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	
ID OF RISER PIPE	(in)	2.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE	** (in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-250-054

SHEET 1 OF 5

Project:	DuPont - Montague	Project No.:	18984840		
Location:	Montague, MI	Elevation:	636.2 ft msl	Coordinates (N,E): 696691.9, 12576795.6	
Drilling Company:	Walkerville Well Drilling & Supply Co. Inc.	Date Started:			Date Finished:
Drilling Equipment:	ATV - Hollowstem Auger Rig	Refusal Depth (ft bgs):	Rock Depth (ft bgs):		Completion Depth (ft bgs): 55.0
Drilling Method:	Hollow stem Auger	Water Level (ft bgs)			Number of Samples
Drill Bit Type/Diameter:		First Encount.:	At Completion:	Well Installed? No	Dist.: 22 Undist.: 0 Core: 0
Sampler Type/Diameter:		Driller:	Field Logger:		
Boring Location Description:	Pierson Creek	Reviewed by:	George Gregory		

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
636		SAND (SP), brown, medium grained, moist.					
634		SAND (SP), light brown, medium grained, moist.	2				
632			4				
630			6				
628			8				
626			10				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-250-054

SHEET 2 OF 5

Project:	DuPont - Montague	Project No.:	18984840
Location:	Montague, MI	Elevation:	636.2 ft msl
		Coordinates (N,E):	696691.9, 12576795.6

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
624		SAND (SP), light brown, fine to medium grained, moist.					
			14				
622							
			16				
620							
		SAND (SP), light brown and dark brown, medium grained, moist.					
			18				
618							
			20				
616		SAND (SP), light brown, medium grained, moist.					
			22				
614							
			24				
612							
			26				
610							

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINNEAPOLIS LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-250-054

SHEET 3 OF 5

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 636.2 ft msl	Coordinates (N,E): 696691.9, 12576795.6

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
608			28				
606		SAND (SP), tan, medium grained, moist.	30				
604			32				
602			34				
600		SAND (SP), light tan, medium grained, moist.	36				
598		SAND (SP), tan, fine to medium grained, moist.	38				
596			40				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

MW-250-054

SHEET 4 OF 5

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 636.2 ft msl	Coordinates (N,E): 696691.9, 12576795.6

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
594			42				
592			44				
590		SAND (SP), tan, medium to coarse grained, moist.	46				
588		SAND (SP), tan, wet, medium to coarse grained, trace clay.	48				
586		SILTY SAND (SM), tan, fine grained.	50				
584		SILTY SAND/CLAY (SM-CH), tan, fine grained silty sand, red clay.	52				
582			54				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-250-054

SHEET 5 OF 5

Project: DuPont - Montague				Project No.: 18984840			
Location: Montague, MI				Elevation: 636.2 ft msl		Coordinates (N,E): 696691.9, 12576795.6	
ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			

End of Boring at 55 ft BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: MW-250-054

SITE NAME: DuPont - Montague BOREHOLE #: MW-250-054

STATE _____

PLANE COORDINATE: X 12576795.624 Y 696691.869 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: _____ DATE FINISHED: _____

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS (MSL)* DEPTHS (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
		639.24	-3.00	TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Grout</u>		636.24	0.00	GROUND SURFACE
		N/A	0.00	TOP OF ANNULAR SEALANT
TYPE OF ANNULAR SEALANT: <u>Bentonite Grout</u>				
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		589.07	47.17	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET ☒ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Tremme</u>		596.24	40.00	TOP OF SEAL
SETTING TIME: _____		594.24	42.00	TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)		592.24	44.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		582.24	54.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		582.24	54.00	BOTTOM OF WELL
		581.24	55.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
SCREEN	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	5.00
RISER PIPE LENGTH	(ft)	47
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.02



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 1 OF 6

Report: URS-CHICAGO; Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINNEAPOLIS LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 649.5 ft msl	Coordinates (N,E): 696679.8, 12577107.6
Drilling Company: Walkerville Well Drilling & Supply Co. Inc.		Date Started: 05/31/90	Date Finished: 05/31/90
Drilling Equipment: ATV - Hollowstem Auger Rig		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 70.0
Drilling Method: Hollow stem Auger		Water Level (ft bgs)	
Drill Bit Type/Diameter:		First Encount.:	At Completion:
Sampler Type/Diameter:		Well Installed? No	Dist.: 0
		Driller:	Field Logger:
Boring Location Description: 30' North of PCL		Reviewed by: George Gregory	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
648		SAND (SP), light red orange medium grained sand.	2				
646			4				
644			6				
642			8				
640			10				
638							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 2 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 649.5 ft msl	Coordinates (N,E): 696679.8, 12577107.6

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
636			14				
634			16				
632			18				
630			20				
628			22				
626			24				
624			26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 3 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 649.5 ft msl	Coordinates (N,E): 696679.8, 12577107.6

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
622			28				
620			30				
618			32				
616			34				
614			36				
612			38				
610			40				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 4 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 649.5 ft msl	Coordinates (N,E): 696679.8, 12577107.6

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
608			42				
606			44				
604			46				
602			48				
600			50				
598			52				
596			54				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 5 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 649.5 ft msl	Coordinates (N,E): 696679.8, 12577107.6

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
594							
			56				
592							
			58				
590							
			60				
588							
			62				
586							
			64				
584							
			66				
582							
			68				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-001-067

SHEET 6 OF 6

Project: DuPont - Montague				Project No.: 18984840			
Location: Montague, MI				Elevation: 649.5 ft msl		Coordinates (N,E): 696679.8, 12577107.6	
ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
580							
			70				

End of Boring at 70 ft. BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-001-067

SITE NAME: DuPont - Montague BOREHOLE #: PCL-001-067

STATE _____ PLANE COORDINATE: X 12577107.614 Y 696679.816 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: Sandel Surveying REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 5/31/90 DATE FINISHED: 5/31/90

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS (MSL)* DEPTHS (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Slurry</u>		<u>649.50</u>	<u>0.00</u>	GROUND SURFACE
		<u>N/A</u>	<u>0.00</u>	TOP OF ANNULAR SEALANT
TYPE OF ANNULAR SEALANT: <u>Bentonite Slurry</u>				
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		<u>N/A</u>		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET ☒ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Tremme</u>		<u>649.50</u>	<u>0.00</u>	TOP OF SEAL
SETTING TIME: _____		<u>599.50</u>	<u>50.00</u>	TOP OF SANDPACK
TYPE OF SAND PACK: <u>Ottawa</u>		<u>592.50</u>	<u>57.00</u>	TOP OF SCREEN
GRAIN SIZE <u>Medium grained</u> (SIEVE SIZE)		<u>582.50</u>	<u>67.00</u>	BOTTOM OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>		<u>582.50</u>	<u>67.00</u>	BOTTOM OF WELL
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		<u>579.50</u>	<u>70.00</u>	BOTTOM OF BOREHOLE
INSTALLATION METHOD: _____				

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER:
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01



SHEET 1 OF 6

ELEV		DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
648		SAND (SP), light red brown medium grained.					
646			2				
644			4				
642			6				
640			8				
638	10						



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

PCL-002-067

SHEET 2 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.2 ft msl	Coordinates (N,E): 696461.7, 12577163.3

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
636							
634			14				
632			16				
630			18				
628			20				
626			22				
624			24				
622			26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-002-067

SHEET 3 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.2 ft msl	Coordinates (N,E): 696461.7, 12577163.3

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
620			28				
618			30				
616			32				
614			34				
612			36				
610			38				
608			40				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-002-067

SHEET 4 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.2 ft msl	Coordinates (N,E): 696461.7, 12577163.3

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
606			42				
604			44				
602			46				
600			48				
598			50				
596			52				
594			54				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-002-067

SHEET 5 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 648.2 ft msl	Coordinates (N,E): 696461.7, 12577163.3

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
592			56				
590			58				
588			60				
586			62				
584			64				
582			66				
580			68				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-002-067

SHEET 6 OF 6

Project: DuPont - Montague				Project No.: 18984840			
Location: Montague, MI				Elevation: 648.2 ft msl		Coordinates (N,E): 696461.7, 12577163.3	
ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
			70				

End of Boring at 70 ft BGS.

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-002-067

SITE NAME: DuPont - Montague BOREHOLE #: PCL-002-067

STATE _____
 PLANE COORDINATE: X 12577163.314 Y 696461.700 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: Sandel Surveying REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

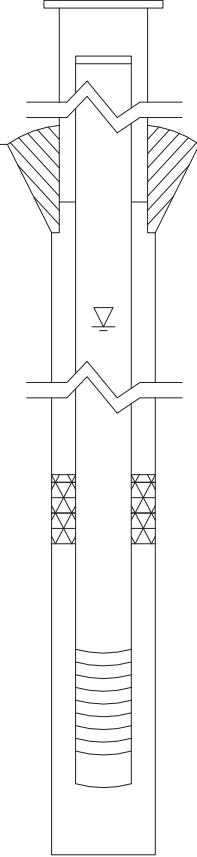
DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 5/31/90 DATE FINISHED: 5/31/90

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Slurry</u>		<u>648.16</u>	<u>0.00</u>	GROUND SURFACE
		<u>N/A</u>	<u>0.00</u>	TOP OF ANNULAR SEALANT
TYPE OF ANNULAR SEALANT: <u>Bentonite Slurry</u>				
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		<u>N/A</u>		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET ☒ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Tremme</u>		<u>648.16</u>	<u>0.00</u>	TOP OF SEAL
SETTING TIME: _____		<u>600.16</u>	<u>48.00</u>	TOP OF SANDPACK
TYPE OF SAND PACK: <u>Ottawa</u>				
GRAIN SIZE <u>Medium grained</u> (SIEVE SIZE)		<u>591.16</u>	<u>57.00</u>	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>		<u>581.16</u>	<u>67.00</u>	BOTTOM OF SCREEN
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		<u>581.16</u>	<u>67.00</u>	BOTTOM OF WELL
INSTALLATION METHOD: _____		<u>578.16</u>	<u>70.00</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER:
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01



SHEET 1 OF 2

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
		SILTY SAND (SM), medium brown, wet.					
590			2				
588			4				
586			6				
584			8				
582			10				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-003-017

SHEET 2 OF 2

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 592.0 ft msl	Coordinates (N,E): 696295.6, 12576608.6

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
578			14				
576			16				

End of Boring at 17 ft BGS.

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-003-017

SITE NAME: DuPont - Montague BOREHOLE #: PCL-003-017

STATE _____ PLANE COORDINATE: X 12576608.573 Y 696295.611 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: Sandel Surveying REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

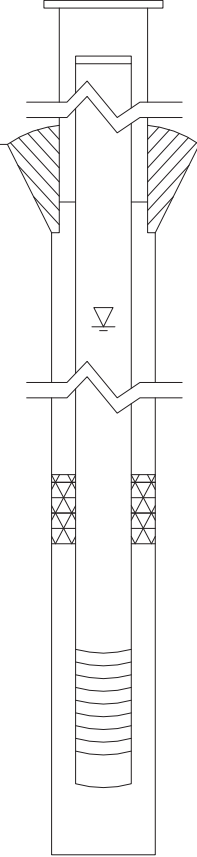
DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 6/1/90 DATE FINISHED: 6/1/90

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS (MSL)* DEPTHS (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Grout</u>		591.95	0.00	GROUND SURFACE
TYPE OF ANNULAR SEALANT: <u>Bentonite Grout</u>		N/A	0.00	TOP OF ANNULAR SEALANT
INSTALLATION METHOD: <u>Gravity</u>				
SETTING TIME: _____		N/A		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR ☒ PELLET ☐ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Gravity</u>		591.95	0.00	TOP OF SEAL
SETTING TIME: _____		588.95	3.00	TOP OF SANDPACK
TYPE OF SAND PACK: <u>Ottawa</u>				
GRAIN SIZE <u>Medium grained</u> (SIEVE SIZE)		584.95	7.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		574.95	17.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		574.95	17.00	BOTTOM OF WELL
		574.95	17.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
SCREEN	☒ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING
PCL-004-017

SHEET 1 OF 2

Report: URS-CHICAGO; Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 589.0 ft msl	Coordinates (N,E): 696443.7, 12576578.4
Drilling Company: Walkerville Well Drilling & Supply Co. Inc.		Date Started: 06/01/90	Date Finished: 06/01/90
Drilling Equipment: ATV - Hollowstem Auger Rig		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 17.0
Drilling Method: Hollow stem Auger		Water Level (ft bgs)	
Drill Bit Type/Diameter:		First Encount.:	At Completion:
Sampler Type/Diameter:		Well Installed? No	Dist.: 0
		Driller:	Field Logger:
Boring Location Description: 100' South of MW-208 S&D		Reviewed by: George Gregory	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
588		No lithology logged..					
			2				
586							
			4				
584							
			6				
582							
			8				
580							
			10				
578							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-004-017

SHEET 2 OF 2

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 589.0 ft msl	Coordinates (N,E): 696443.7, 12576578.4

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
576							
			14				
574							
			16				
572							

End of Boring at 17 ft BGS..

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-004-017

SITE NAME: DuPont - Montague BOREHOLE #: PCL-004-017

STATE _____
PLANE COORDINATE: X 12576578.414 Y 696443.722 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: _____ DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

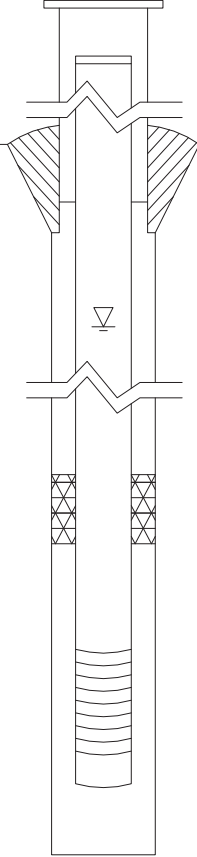
DRILLING METHOD: _____ DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: _____ DATE FINISHED: _____

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		<u>N/A</u>		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: _____		<u>588.98</u>	<u>0.00</u>	GROUND SURFACE
TYPE OF ANNULAR SEALANT: _____		<u>N/A</u>		TOP OF ANNULAR SEALANT
INSTALLATION METHOD: _____				
SETTING TIME: _____		<u>N/A</u>		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: _____				TOP OF SEAL
SETTING TIME: _____				TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)				TOP OF SCREEN
INSTALLATION METHOD: _____				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)				BOTTOM OF SCREEN
INSTALLATION METHOD: _____				BOTTOM OF WELL
		<u>571.98</u>	<u>17.00</u>	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	SS304	SS316	PTFE	PVC	OTHER:
RISER PIPE ABOVE W.T.	SS304	SS316	PTFE	PVC	OTHER:
RISER PIPE BELOW W.T.	SS304	SS316	PTFE	PVC	OTHER:
SCREEN	SS304	SS316	PTFE	PVC	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	
ID OF RISER PIPE	(in)	
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE	**	(in)



LOG OF BORING PCL-005-045

Project:	DuPont - Montague	Project No.: 18984840					
Location:	Montague, MI	Elevation: 618.1 ft msl		Coordinates (N,E): 696366.1, 12575924.4			
Drilling Company:	Walkerville Well Drilling & Supply Co. Inc.	Date Started: 05/21/90			Date Finished: 05/22/90		
Drilling Equipment:	Hollowstem Auger Rig	Refusal Depth (ft bgs):		Rock Depth (ft bgs):		Completion Depth (ft bgs): 45.0	
Drilling Method:	Hollow stem Auger	Water Level (ft bgs)			Number of Samples		
Drill Bit Type/Diameter:		First Encount.:	At Completion:	Well Installed? No	Dist.: 0	Undist.: 0	
Sampler Type/Diameter:		Driller:			Field Logger:		
Boring Location Description:	300' East of O.C.T.	Reviewed by: George Gregory					

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
618		Boring blind drilled to 45 ft BGS to set well. Please refer to soil boring PCL-005-078 for lithology..					
616		2					
614		4					
612		6					
610		8					
608		10					



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-045

SHEET 2 OF 4

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 618.1 ft msl	Coordinates (N,E): 696366.1, 12575924.4

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
606							
604			14				
602			16				
600			18				
598			20				
596			22				
594			24				
592			26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-045

SHEET 3 OF 4

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 618.1 ft msl	Coordinates (N,E): 696366.1, 12575924.4

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
590			28				
588			30				
586			32				
584			34				
582			36				
580			38				
578			40				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-045

SHEET 4 OF 4

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 618.1 ft msl	Coordinates (N,E): 696366.1, 12575924.4

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
576			42				
574			44				

End of Boring at 45 ft BGS..

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-005-045

SITE NAME: DuPont - Montague BOREHOLE #: PCL-005-045

STATE _____
 PLANE COORDINATE: X 12575924.427 Y 696366.054 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: Sandel Surveying REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

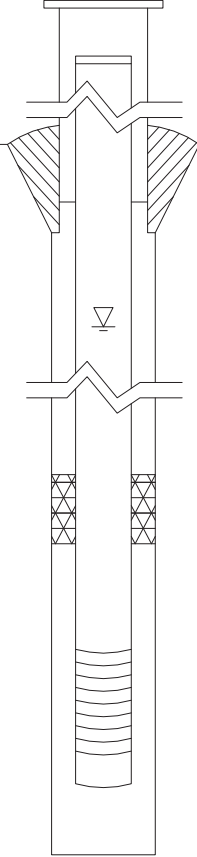
DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 5/21/90 DATE FINISHED: 5/21/90

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS (MSL)* DEPTHS (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Grout</u>		618.09	0.00	GROUND SURFACE
TYPE OF ANNULAR SEALANT: <u>Bentonite Grout</u>		N/A	0.00	TOP OF ANNULAR SEALANT
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		N/A		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET <u>SLURRY</u> (CIRCLE ONE)				
INSTALLATION METHOD: <u>Tremme</u>		618.09	0.00	TOP OF SEAL
SETTING TIME: _____		590.09	28.00	TOP OF SANDPACK
TYPE OF SAND PACK: <u>Ottawa</u>				
GRAIN SIZE <u>Medium grained</u> (SIEVE SIZE)		583.09	35.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		573.09	45.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		573.09	45.00	BOTTOM OF WELL
		573.09	45.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	<u>SS304</u>	SS316	PTFE	PVC	OTHER:
RISER PIPE ABOVE W.T.	SS304	SS316	PTFE	<u>PVC</u>	OTHER:
RISER PIPE BELOW W.T.	SS304	SS316	PTFE	<u>PVC</u>	OTHER:
SCREEN	SS304	SS316	PTFE	<u>PVC</u>	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING
PCL-005-078

SHEET 1 OF 6

Project:	DuPont - Montague	Project No.:	18984840		
Location:	Montague, MI	Elevation:	616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2	
Drilling Company:	Walkerville Well Drilling & Supply Co. Inc.	Date Started:	05/21/90	Date Finished: 05/22/90	
Drilling Equipment:	Hollowstem Auger Rig	Refusal Depth (ft bgs):		Rock Depth (ft bgs):	Completion Depth (ft bgs): 80.0
Drilling Method:	Hollow stem Auger	Water Level (ft bgs)		Number of Samples	
Drill Bit Type/Diameter:		First Encount.:	At Completion:	Well Installed? No	Dist.: 5 Undist.: 0 Core: 0
Sampler Type/Diameter:	2 inch	Driller:	Field Logger:		
Boring Location Description:	300' East of O.C.T.	Reviewed by:	George Gregory		

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
616		SAND (SP), very light brown, dry, fine to very fine.					0 ft Background PID: 0.5 ppm
			2				
614							
			4				
612							
			6				
610							
			8				
608		At about 8 ft BGS, cuttings become wet, clayey/silty sand. Mucky and is either wet from rainfalls or 'perched' water.					
			10				
606							

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-078

SHEET 2 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
604		SAND (SP), very light brown, dry, medium grained, well rounded, well sorted.		1.5			
			14				
602							
			16				
600							
			18				
598							
			20				
596							
			22				
594							
			24				
592				1.5			
			26				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-078

SHEET 3 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
590							
		SAND (SP), light red brown, fine to very fine, wet.					
			28				
588							
			30				
586							
			32				
584							
			34				
582				2.0			
			36				
580							
		SAND (SP), light brown, fine to very fine.					
			38				
578							
			40				
576							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-078

SHEET 4 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
574			42	2.0			
			44				
572			46				
570							
		SAND (SP), light brown, medium sand, wet.	48				
568			50				
566			52				
564			54				
562							

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-078

SHEET 5 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
560			56				
558			58				
556			60				60 ft Blow in
554			62				
552			64				
550			66				
548			68				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-005-078

SHEET 6 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 616.4 ft msl	Coordinates (N,E): 696364.9, 12575932.2

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
546			70				
544			72				
542			74				
540			76				
538			78	2.0			

At 79.5 ft BGS 2" gray sandy clay layer.

At 80 ft BGS, in tip of split spoon, blue-gray sandy clay.

80

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-005-078

SITE NAME: DuPont - Montague BOREHOLE #: PCL-005-078

STATE _____
 PLANE COORDINATE: X 12575932.166 Y 696364.948 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: Sandel Surveying REGISTRATION #: _____

DRILLING CONTRACTOR: Walkerville Well Drilling and Supply Co. Inc DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

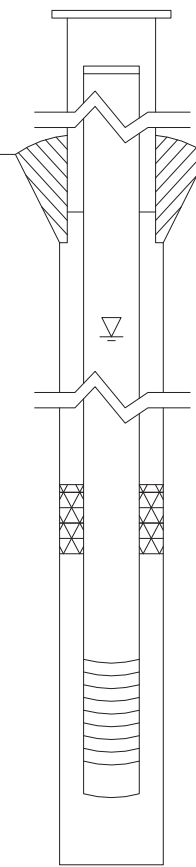
DRILLING METHOD: Hollowstem Auger DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 5/21/90 DATE FINISHED: 5/21/90

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
				TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Grout</u>		616.40	0.00	GROUND SURFACE
TYPE OF ANNULAR SEALANT: <u>Bentonite Grout</u>		N/A	0.00	TOP OF ANNULAR SEALANT
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		N/A		STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR ☒ PELLET ☐ SLURRY (CIRCLE ONE)				
INSTALLATION METHOD: <u>Gravity</u>		616.40	0.00	TOP OF SEAL
SETTING TIME: _____		606.40	10.00	TOP OF SANDPACK
TYPE OF SAND PACK: <u>Ottawa</u>				
GRAIN SIZE <u>Medium grained</u> (SIEVE SIZE)		548.40	68.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Natural Collapse</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		538.40	78.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		538.40	78.00	BOTTOM OF WELL
		536.40	80.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	☒ SS304	☐ SS316	☐ PTFE	☐ PVC	OTHER: _____
RISER PIPE ABOVE W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
RISER PIPE BELOW W.T.	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____
SCREEN	☐ SS304	☐ SS316	☐ PTFE	☒ PVC	OTHER: _____

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	10.00
ID OF RISER PIPE	(in)	4.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	10.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING

PCL-006-077

SHEET 1 OF 6

Report: URS-CHICAGO; Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 620.4 ft msl	Coordinates (N,E): 696684.1, 12576703.9
Drilling Company: Bowser Morner Inc		Date Started: 04/19/94	Date Finished: 04/21/94
Drilling Equipment: Cable Tool		Refusal Depth (ft bgs):	Rock Depth (ft bgs): Completion Depth (ft bgs): 82.0
Drilling Method: Cable Tool		Water Level (ft bgs)	
Drill Bit Type/Diameter:		First Encount.:	At Completion:
Sampler Type/Diameter:		Well Installed? No	Dist.: 0
		Driller:	Field Logger:
Boring Location Description: Pierson Creek Landfill		Reviewed by: George Gregory	

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
620		SAND (SP), tan brown, fine to medium grained, moist, trace silt.			0.0		
			2				
618							
			4				
616					0.0		
			6				
614							
			8				
612							
			10		0.0		
610							



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-006-077

SHEET 2 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 620.4 ft msl	Coordinates (N,E): 696684.1, 12576703.9

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template:URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
608							
			14		0.2		
606							
			16				
604							
			18				
602							
			20		0.2		
600							
			22				
598		SILTY SAND (SM), tan to tan brown, moist, fine grained, some silt.					
			24				
596					0.0		
			26				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-006-077

SHEET 3 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 620.4 ft msl	Coordinates (N,E): 696684.1, 12576703.9

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERRID\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
594							
			28				
592							
			30		0.0		
590		At 30 ft BGS becomes wet. CLAYEY SILT (MLC), reddish brown, some sand.					
			32				
588							
			34				
586					0.1		
		SILTY CLAY (CLM), reddish brown, silt to sandy silt seams, seams wet.	36				
584							
			38				
582							
			40		0.2		
580		Becomes tan, sand with silt, CLAY AND SILTY.					



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-006-077

SHEET 4 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 620.4 ft msl	Coordinates (N,E): 696684.1, 12576703.9

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
578			42				
576			44				
		SILTY SAND (SM), tan, fine grained, silty clay.			1.5		
574			46				
572			48				
570		CLAYEY SILT (MLC), tan, silty sand.	50		0.6		
568			52				
566			54				



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-006-077

SHEET 5 OF 6

Project:	DuPont - Montague	Project No.:	18984840
Location:	Montague, MI	Elevation:	620.4 ft msl
		Coordinates (N,E):	696684.1, 12576703.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
564		SILTY CLAY (CLM), 2 thin seams of very fine sand in interval.	56		0.0		
562			58				
560		SILTY SAND (SM), tan brown, silty clay.	60		0.0		
558			62				
556			64				
554		Fine grained, trace clay.	66		0.4		
552			68				

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13



CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING PCL-006-077

SHEET 6 OF 6

Project: DuPont - Montague		Project No.: 18984840	
Location: Montague, MI		Elevation: 620.4 ft msl	Coordinates (N,E): 696684.1, 12576703.9

ELEV	Graphic	DESCRIPTION	SAMPLES		PID Direct (ppm)	PID Head space (ppm)	REMARKS
			DEPTH	Rec (ft)			
550		SAND (SP), tan, fine grained, trace silt.	70		0.4		
548			72				
546		At 75 ft BGS, no silt.	74		0.4		
544			76				
542			78				
540			80		0.4		
			82				

End of Boring at 82 ft BGS.

Report: URS-CHICAGO: Project File: C:\USERS\HEATHER_HERR\DESKTOP\FILES TO SORT\DUPOINT\DUPOINT - MONTAGUE, MINEOPRENE LANDFILL BORINGS 2013.GPJ; Data Template: URS-CHICAGO.GDT Printed: 12/17/13

Well Completion Report

SITE #: 18984840 COUNTY: Muskegon WELL #: PCL-006-077

SITE NAME: DuPont - Montague BOREHOLE #: PCL-006-077

STATE _____
PLANE COORDINATE: X 12576703.937 Y 696684.130 (or) LATITUDE _____ ° _____ ' _____ " LONGITUDE _____ ° _____ ' _____ "

SURVEYED BY: _____ REGISTRATION #: _____

DRILLING CONTRACTOR: Bowser Morner Inc. DRILLER: _____

CONSULTING FIRM: URS Corporation GEOLOGIST: _____

DRILLING METHOD: Cable Tool DRILLING FLUIDS (TYPE): _____

LOGGED BY: _____ DATE STARTED: 4/19/94 DATE FINISHED: 4/21/94

REPORT FORM COMPLETED BY: _____ DATE: _____

ANNULAR SPACE DETAILS

ELEVATIONS DEPTHS
(MSL)* (BGS) (.01 ft)

		N/A		TOP OF PROTECTIVE CASING
		623.44	-3.00	TOP OF RISER PIPE
TYPE OF SURFACE SEAL: <u>Bentonite Grout</u>		620.44	0.00	GROUND SURFACE
		N/A	0.00	TOP OF ANNULAR SEALANT
TYPE OF ANNULAR SEALANT: <u>Bentonite Grout</u>				
INSTALLATION METHOD: <u>Tremme</u>				
SETTING TIME: _____		590.44	30.00	STATIC WATER LEVEL (AFTER COMPLETION)
TYPE OF BENTONITE SEAL - GRANULAR PELLET <u>SLURRY</u> (CIRCLE ONE)				
INSTALLATION METHOD: <u>Tremme</u>		556.24	64.20	TOP OF SEAL
SETTING TIME: _____		553.54	66.90	TOP OF SANDPACK
TYPE OF SAND PACK: _____				
GRAIN SIZE: _____ (SIEVE SIZE)		550.44	70.00	TOP OF SCREEN
INSTALLATION METHOD: <u>Gravity</u>				
TYPE OF BACKFILL MATERIAL: _____ (IF APPLICABLE)		545.44	75.00	BOTTOM OF SCREEN
INSTALLATION METHOD: _____		545.44	75.00	BOTTOM OF WELL
		538.44	82.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS (CIRCLE ONE)

PROTECTIVE CASING	<u>SS304</u>	SS316	PTFE	PVC	OTHER:
RISER PIPE ABOVE W.T.	SS304	SS316	PTFE	<u>PVC</u>	OTHER:
RISER PIPE BELOW W.T.	SS304	SS316	PTFE	<u>PVC</u>	OTHER:
SCREEN	SS304	SS316	PTFE	<u>PVC</u>	OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE	(in)	6.00
ID OF RISER PIPE	(in)	2.00
PROTECTIVE CASING LENGTH	(ft)	
RISER PIPE LENGTH	(ft)	
BOTTOM OF SCREEN TO END CAP	(ft)	
SCREEN LENGTH (1st SLOT TO LAST SLOT)	(ft)	5.00
TOTAL LENGTH OF CASING	(ft)	
SCREEN SLOT SIZE **	(in)	0.01

Appendix F

Geophysical Downhole Survey Report

25 October 2013

Dennis Robins
Michael Ade
Cascade Drilling
6215 Lehman Drive, Flint, MI 48507
9816 Rawless Rd. Indianapolis, IN 46229

George Gregory
Geologist
URS Corporation
10550 Richmond Ave, Ste 155
Houston, TX 77042

Geophysical Downhole Survey, Industrial Landfill Sites, Montague, Michigan: Log Report

Dear Dennis, Michael and George:

Geosphere has completed geophysical logging of 16 wells at the Montague Industrial sites using the downhole Gamma39 (Geonics) Natural Gamma Ray instrument. The wells were located at two old landfills northwest and southwest of the former DuPont Chemical Plant, situated west of the Town of Montague, Michigan. These were the Pierson Creek and Burial Pit Landfills.

Two new wells that were logged are in the 107 to 117-foot depth range, which were logged through the sonic steel casing prior to final well installation (one at each landfill site). The remaining 14 wells were older, 2- to 4-inch diameter PVC monitor wells, ranging in depth from 60 to 97 feet. One well was attempted but not completed because the 2-inch casing was bent and distorted due to soil creep on a steep roadside slope. The logging effort was done from our 4-wheel drive logging vehicle for most of the wells; where necessary, the portable logger was manually carried and setup for logging (as done for the two new wells on the drilling platform).

Data Collection

The logging procedure consisted of setting up the truck and equipment at each well and employing a small tripod with pulley above the well bore. The electronics are mounted in the truck and operate on 12-volt batteries. The natural gamma ray probe is lowered into the hole with a small powered winch using an electronic encoder in the pulley/tripod system. The sampling rate will be set to record gamma counts/second readings every 0.025 meters (about 1 inch) down the length of the hole at a speed of approximately 2-4 feet per minute. Data was recorded digitally onto a SD memory chip within a special PDA and downloaded to our laptop computers. The total depth of the hole was measured with a fiberglass tape to an accuracy of about 0.01 feet, allowing us to normalize/correct the downhole logging depth readings for cable stretch (dependent on the depth to water level). As the natural gamma ray probe was brought back to the surface, the cable and probe were decontaminated/washed with distilled water.

Processing/Reporting

The datasets were processed and plotted using our standard graphics software package where it was analyzed and interpreted. Geological log information from the geologists/drillers observations was added to our interpretation as to the type of sand/silt/clay or rock units. Logs are attached in our high resolution pdf format for ease of transport and viewing/analysis by the client(s).

Nine wells were logged at the **Burial Pit Landfill**:

BP3-70	BPL6-D	BPL9
BP4-70	BPL7-D	BP210-D
BP5-70	BPL08-S	SBBP-01-2013 (new well)

Seven wells were logged at the **Pierson Creek Landfill** (only 6 completed):

PCL1-D	PCL6-D	SBPC-01-2013 (new well)
PCL2-D	PCL205 (bent casing ~10ft)	
PCL5-D	PCL208	

Burial Pit Landfill

The natural gamma ray logs show that most of the older wells at this site have moderate to strong influences from clay minerals in the bentonite used to seal the top of the well casing (near the surface). The bentonite “effect” is very strong in wells: BP3, BP4, BP5, and BP210, all of which (except BP3) are directly adjacent to the landfill boundary. At BP3 and BP5, the bentonite reaches to a depth of almost 45 feet, and at BP210 almost 50 feet. At BP3, BP4 and BP5, a strong bentonite peak is evident immediately above the well screen. At BP6, BP7, BP08, and BP9, lesser amounts of bentonite are interpreted in this upper seal between 0 and 50 feet. All wells show very low gamma counts/second values in the bottom of the wells (except BP08), indicating sand layers with low clay/silt content. The relatively high values at BP08 at the bottom suggest that the bentonite seal intended to be set above the screen, settled in the area around the screen. Low values above the screen are likely close to “normal” sand conditions.

The layers interpreted at BP210 suggest that a very clean sand exists in the 59-65 foot interval with rests on a ~10 foot thick clayey silt layer starting at 72 feet. A very clean sand layer lies in the 87 to 97 foot interval. At the new well SBBP-01-2013 location (within 100 feet of BP210), a clayey silt layer resides in the 39 to 49 foot interval, with clean sand from 57 to 88 feet, followed by silt/sand layers and silty clay from 93 to over 107 feet depth.

Pierson Creek Landfill

Wells PCL1 and PCL2 show evidence of bentonite seals near the surface and above the well screen (~55 feet); the intervening depth interval (0 to 55 feet) also shows higher than expected gamma counts and may reflect lower bentonite concentrations along the well casing. Lower counts near and in the screened interval are likely natural conditions. Similarly, PCL5 shows high counts from 2 to 48 feet (bentonite?), followed by a clean sand to 67 feet, where the sand grades into a silt and clayey silt (in the screen) (suggesting that the screen may have been set too low). At PCL6, strong bentonite peaks are obvious at the surface and at the top of the screen. Clay and silt layers from 25 to 45 feet may be real (opposed to bentonite “contamination”). Good sand was encountered at 70 feet.

The log at Well ~~PCL205~~ was not completed as the gamma probe could not pass a bend in the 2-inch PVC casing at a depth of about 10 feet; soil creep down the steep road incline is pushing the entire top part of the well to the north. At PCL208, no distinctive bentonite peaks were noted; the top 41 feet shows silty to clayey silt zones with occasional thin sand layers. More sandy conditions dominate the 42 to 80-foot interval; the 80 to 82-foot interval seems to be the start of a silt layer.

The new well SBPC-01-2013 shows considerable variations of gamma counts along its entire length. The “clarity” of the individual peaks is very distinct indicating the lack of sediment smearing via

the sonic method versus other drilling techniques. The log shows a highly variable sequence of layers from 15 to 55 feet and a lesser zone from 55 to 72 feet. These are interpreted as a sequence of relatively thin layers of sand, silt, clayey silt and silty clay; the sand component seems to be slightly more dominant. From 72 to 105 feet, three relatively thicker sand layer are present, separated by silty and clay layers. From 105 to 117 feet, the clayey component increases as depth increases in thin silt and silty clay layers. (The high gamma counts found in the interval of 15 to 72 feet could also be caused by the presence of high levels of potassium feldspars (microcline/orthoclase minerals) and could be sands (not clays), but this effect is generally found in gravel/cobble layers.)

Our results and interpretations described in this proposal are based on reliable instruments and methods. Data collection and interpretative logic were developed at similar sites in Central Michigan over the past 28 years.

Sincerely,

A handwritten signature in blue ink, reading "Robert A. Glaccum", with a long horizontal flourish extending to the right.

Robert A. Glaccum, PG
Chief Scientist

