Field Assistant:

Soil Scientist: Land & PL

Test Pit ID:	ヤー	9119	9190	1	147	シッと	Topographic Position:	ition:	BACK	500	PE		Parent material:	iterial:	COLEMINA		History and a series
Date:	6/	16/16					% Slope:		0				Slope Aspect:	ect:	2 1 2 "	- 1	
Job Name:	Dominion	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		SOL EW	TATIONS	77 77	FRISS	Depth to 1	Depth to Water Table:	(
RETTEW Job #:	089962000	00					Depth to Refusal:			- 1	þ		Slone Fall	Slope Failure or slip:	PTZI		
NRCS Soil Unit:	BAE	WEIKERT.	BER	KS			Bedrock Type :		VARRO	TONE	r.		Din Slope	Din Slone & Direction	300	0	
Mineralogy:	3	YE 0					Vegetation:		WHITE		W. F. T.	7 2 24	The dia		7		Strike: 216
										USDA			1	+	- STATISTICS		- VACE WEEKY
Horizon in	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickings:	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
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	1	2				5		04							, -		
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3.5	9	1/24/6	S.E	1	王	ं ज	0.5-2	9 0	15	722	3	1	1	2-4,1		١	
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20, 14				1		1	,		(1		ŧ	1	1	1	1	
27 2.	22	SANDS	7	2	a	N	700	X									
	-																

Other Notes:

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BYLLER RAINE

ABOVE

SCOPE

Soil Scientist: JOHN WALL

Fax: 717-394-1063		
Phone: 717-394-3721		
Lancaster, PA 17603	Signature:	COFC WAS
RETTEW Associates, Inc.		ESCRIPTION
	,	COINTION

Test Pit ID:	7 1	177-1	000	100		000	- opograpine r ostron.		3 4 M.	1			raicin material.	religi.	11		
Date:	6/	116/16					% Slope:		470				Slope Aspect:	et:	3250		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	urvey			Drainage Class:		NO MEN	1747	2x3	E15118	Depth to \	Depth to Water Table:			
RETTEW Job #:		089962000					Depth to Refusal:		>				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		WEIKERT	- BE	RKI			Bedrock Type :		51655	7026	,,		Dip Slope	Dip Slope & Direction:	•	Strike:	1
Mineralogy:		1					Vegetation:		MAPLE	-	CKOR	シャンチーナと	TE 4		日にくの日日	PPY	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastichy/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctions	Redox Feature Color	Radox Feature Description	Roots	Pocket Penetrumetes (Lab Sample ID	Notes
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												λ.					

Soil Scientist: JOHN MAN Field Assistant:

Slope Aspect:

Signature:

Test Pit ID: A-148-160616-1044-15W % Slope: Topographic Position: BACKYLOTE LX To Parent material: RESIDOUM 2009

Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		SOME WHAT EXCESSIVE	7	1 37 X	SIVE	Depth to 1	Depth to Water Table:	1		
RETTEW Job #:	0899	089962000					Depth to Refusal:		o? :				Slope Failure or slip:	ure or slip:	١		
NRCS Soil Unit:	٤	EIKERT	7 (95 As	PER	4		Bedrock Type:		51175	102	Z		Dip Slope	Dip Slope & Direction:	320 N	ZZW Strike:	ke: 2110
Mineralogy:	3	A JX:					Vegetation:		CHESTUUT	1	ANG	MICKEL	EV. VA	トヤイルも		140	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticky/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Haribon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrameter/	- C	Notes
0	0,	1522t>	1	1	7	1	f	1 1	1	1	5	(1	コーソアト	t ,	(
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C	2.4	Mestal	715 ROX	0 1	7	273	- 4	O P		LEP	٤	4	1	2-F,M,	5.00	(
CÍ	4,4	1	1	,	1		r	1		1	1	1)	1	1 1	,	
P	8	5112	5	0 7	1	3	2000	100	7								
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Other Notes:		SAND SI	90 0	BEDROCK	ICECP ICECP	P71-10	WA HAY	7 -	FROUT 1	A 2 4 A A A A A A A A A A A A A A A A A	1	CISTS	A V	P + 04	ROPPING	77	5
		5															

Field Assistant:

Soil Scientist: UPFLVFC

Test Pit ID:	4	011.00	-11-	2 201	1	3	Topographic Position:	tion:	BACKS	K51 075	CRIBIC	2050	Parent material:	iterial:	PES!	2002	
Date:	5	10					% Slope:		, 4				Slope Aspect:	ect:	1300		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soll S	urvey			Drainage Class:		STATESTAT	7	1353243	12	Depth to	Depth to Water Table:	1		
RETTEW Job #:	08996	089962000					Depth to Refusal:		1.21				Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	2	CIKKKY	t	3524	J		Bedrock Type :		SILTSTONE	9 74	1		Dip Slope	Dip Slope & Direction:	3100	(90°) St	Strike: % Q 6
Mineralogy:	3						Vegetation:		VAPINE	CICHE	TYPICA	VI OFK	とそうてい	てい マノスハ		BWEBERRY	RY
								W.		Si					-		
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Radox Feature Description	Roots	Pocket Penetrometer/ pit	Lab Sample ID	Notes
	/	1/8/1	(,		(=		. 4.			22	1	1	3-14	1		
De	0,	chro	(,	i		į.	1	,		9	4	1	2-F	4.4	1	
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30 to	`^	155 a 152 h	7.5 t	UJ.	5	SAL	2-5	000	1837	7	2	1	1	7 2 2 2 2	2 0	1	
								- 1							-		
30	2,5	10-12-516	Z. X.E.	3	7	4 元	2-5	500	12784 62	TP	P	ı	.t.		0 . 4	1	
	· ·	5) 17 5 40	+	7	k7	D	1000 X	,	1	1		1	1	1			
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Other Notes:

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Soil Scientist: JUSTU WA H

Test Pit ID:	, t	150-16	9199	1	24.	MSI	Topographic Position:	tion:	1.7	36075			Parent material:	erial:	7707	MUNNATO	OVER RELIDYVIA
loh Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	urvev			Drainage Class:		S M A W	E 1 3	740	THISSING	Depth to Wate	Depth to Water Table:	14		
RETTEW Job #:	089962000	000					Depth to Refusal:						Slope Failure or slip:	re or slip:	1		
NRCS Soll Unit:	NEIK	ICERT.	8 EZ K	2			Bedrock Type :		175	INOTE			Dip Slope 8	Dip Slope & Direction:	4404	440 2111/290 Strike:	Strike: 200
Mineralogy:	w 1	(3×1					Vegetation:		ヨナルナール	7125	AN	ヤースロ	TOKKYNOT		82K	BLUE BE 2211	E 2211
	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horison Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer	Lab Sample	Notes
0	7	15,000	1	1	,	1	1	1 1	1	1	2.5	1	1	3-45, 5,	£ 1	1	
D	2,00	10,72,01	250	11	2	£ 3	^	50	15/2	4	2 2	,	· ·	3 2 7	1 25	1	S*** プップラー
P 2	3.11	0/52/0	Sil	hl	81	T 50	< 1	50	1 W 5 8 X-	23	7,0	,	(1. 3. E. H.	4.5	,	Tagananto anotatorys
20	4	0/25/0	25 A SCE	15	Ty	CF	1-4	20 60	1878K	FR	9 2	((3 1	1 .0	1	
F .	124	2117	1	2	4	(A)	TEO	7									
Other Notes:	10	B & \$ 1200	7	4													

TEST PIT DESCRIPTION
Soil Scientist:

Soil Scientist: Steve Vada

Signature: Blaye Code

Date:	Job Name:	RETTEW Job #:	NRCS Soil Unit:	Mineralogy:	Horizon	0 <	A	0	Bwl	23	26.3	3P	
-	Domini	089962000	-	-	Depth in inches	-	4	6	*24	32	74	2	
06/06/16	Dominion - Atlantic Coast Pipeline Soil Survey	000	Lehew -		Matrix Color	2,58825	10483/2	1048/12	56,340	10.2%	7.54R63	1	
00001	ipeline Soil !	>	V-150	W.XCO	Texture Class	1	6	100	5)	51	5	1	
10	Survey		CXS		% сіау)	10	10	7	12	7	13	
800					% sand	1	60	65	29	65	55	1	
					Rock Fragment Type & %	50	40	5	8 +	25	子さ)	
% Slope:	Drainage Class:	Depth to Refusal:	Bedrock Type :	Vegetation:	Rock Fragment Size (inches)	4-8	H-8	4-4	4-4	9-H	2 2	1	
inon.		ľ			Plastidity/ Stickliness	1 1	80	80	50	80	PO 50	1	
	Mod				Structure Type, Grade, and Size)	15 31	795 J.I	lm56K	Imsk	1 M 55K	T	
2	Well	45	10	USDA	Moist Consistence		Jr.	151	4	7	17	(
2000			ands tork	brod -	Horizon Boundary Topography & Distinctness	N. S.	00	cw	CW	Cal	aw	1	
				51301C1	Redox Feature Color	1	. [1	1	10/23/6	7.548 516;	1	
Slope Aspect:	Depth to I	Slope Failure or slip:	Dip Slope	Cals	Redox Feature Description	1	1	1		CWG	CMJ	1	
ect:	Depth to Water Table:	are or slip:	Dip Slope & Direction:	LIAN)	Roots	12.4	3 7	3 5	3	43	0	1	
				3 ++ 1	Pocket Penetrometer/ pH	52.5	.75 H. 5	5.25	5,35	5.75	1.0	1 /	,
1500	40	NIP	0 180	40	Lab Sample ID	5	5 2	S	75	Un	00	i	
0	MODE		Strike:	27/21/00	ple					1			- 67
	7		L	COVEL									
			600		Notes								

Soil Scientist: Field Assistant:

Test Pit ID: Date:		08/06/16	10-112	1	00		% Slope:	tion:	35	back	S lope		Parent material: Slope Aspect:	terial:			130	(011 / res
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline So	Survey			Drainage Class:			arm				Depth to W	Depth to Water Table:			N .
RETTEW Job #:	089962000		2				Depth to Refusal:			32				Slope Failu	Slope Failure or slip:	Slope Failure or slip:	Slope Failure or slip:	Slope Failure or slip:
NKCS SOIL UNIT:	+	4.11	1961	3			Bedrock Type :			Sano	Stone			Dip Slope 8	Dip Slope & Direction:	Dip Slope & Direction:	70 S	70
Mineralogy:	-	171460	60		4		Vegetation:		516	ck o	ak manta	HOUN les	0	usel, s	I red map	1. red	l red maple	l red maple
						Back		000		USDA								
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickliness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color		Redox Feature Description	Redox Fashure Description Roots	Roots Peastometer/	Roots	Roots Peastometer/
00	7	104R 2/	1	Ţ	1	1.7 1.3	6-12	1 1	1	1	3.0	1		1	100+	5.7 C+ C-12	3 +	3 +
A	N	104R 3/2	2	0	60	I1	6-12	Pa	1 Cgr	34	mo	1		1	1	1	7 7	7 7
15 ml	18	7,54056	_	12	45	25	2-4	58	NG5W	5	J. J.	1 ,		1	1	- SE 5 25	v -	v -
Bw2	32	7.54856	_	12	24	43.	1-2	55	1 m sbk	17	aw	1)	+m	5-	5-	5-
2 R	37	1	1	1	1	1	1	1 1	1	1	1	1		1	1	1	1	1
											4							

Other Notes:

Soll Scientist: Field Assistant:

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

# Slope: Slope:	Topographic Position: % Slope: Drainage Class: Depth to Refusal: Depth to Refusal: Depth to Refusal: Figure 1 Rock Rock Fragment Fragment Size (Inches) Structure Type, Grade, and Size Condition: Rock Rock Size (Inches)	## Topographic Position: ## Slope / hench % Slope: ## Slope / hench % Slope: ## Slope / hench ## Drainage Class: ## Drainage / hench ## Drainage / hench ## Drainage Class: ## Drainage / hench ## Drainage / hench ## Drainage / hench ## Drainage / hench ## Drainage Class: ## Drainage / hench #	Topographic Position: Factor Slope Aspect: Slope Aspect: Slope Aspect: Slope Aspect: Slope Aspect: Slope Fallure or state Slope
t number Structure Type, Structure Type, and Size	Ted Maple chest MUSDA t matter Structure Type, Most Trappent's restores Grade, and Size Consistence Trappent's Consistence Co	t mater Structure Type, Molts Consistence Color Constraint Color Constraint Color Constraint Color Constraint Color Constraint M	t mutan Structure Type, Mobit transmission Grade, and Size Consistence material Color Consistence Consistence Consistence Color Consistence M F 4,25
S - USE	SIOPE / hence	Slope Abanch Slope Aspect: Slope Aspect: Slope Fallure or: Consistence or: Slope Fallure or: Slope Fallure or: Slope Fallure or: Slope Fallure or: Consistence or: Slope Fallure or: Slope Fallu	Slope Aspect: Slope Aspect: Slope Aspect: Slope Fallure or slip: And Hone Mandata Roots Moist Inspection Redox Feature Consistence Color Moist Consistence Color Moist Consistence Color Moist Statement Roots Color Consistence Color Consistence Color Consistence Color Consistence Color Consistence Color Color
	MW AND THE SAPE THE SAP	MW Slope Aspect: One Slope Failure or: Slope Failure or: Slope Failure or: Slope Failure or: Pressure Superior Redox Feature Bedox Feature Color Bedox Feature M M M M M M M M M M M M M	M.W. Slope Aspect: One Slope Fallure or slip: Note Standard Redox Feature International Roots Color Countries Redox Feature International Roots Park Park Park Park Park Park Park Park

Other Notes:

Field Assistant: Soil Scientist:

Test Pit ID:	8154-11	60606	141	7-3	99	Top	Topographic Position:	tion:		back	25/092		Parent material:	erial:		100
Date:	00100	0110				26.2	% Siope:						Slope Aspect:	St.		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	Coast Pipelin	e Soil Surv	еу		Dra	Drainage Class:		Moderately Well -	Well	7B		Depth to Water Table:	ater Table:		NIA
RETTEW Job #:	089962000					Dep	Depth to Refusal:				32		Slope Failure or slip:	re or slip:		NA
NRCS Soil Unit:	0	Dr.5Kony	Y			Bed	Bedrock Type :			Sanc	Stone		Dip Slope & Direction:	Direction:		1000
Mineralogy:		Mixed	0			Veg	Vegetation:		che	STAUT	ook	MOUNTA	O To	aurel		+
			-						-	USDA						1000
Horizon Dep	Depth in Matrix Color		Texture %	% clay % sand	Rock and Fragment Type & %	V-V-	Rock Fragment Size (Inches)	Plastidty/ Stickiness	Structure Type, Grade, and Size		Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID
Oe 4	548	2.5/1	T P	í	8 +		6-12	1 1	1	f	D. W.	1	1	Z Z	747	<u>\(\)</u>
D	8 logs	7/2	_	ō .	50 GC	_	6-12	80	1495	nfr	Ow O	Î	1	N N	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	52
13+11 2	T.548%	200	-	2	50 Ch	0	2-4	85	l msbk	4	2	1	1	アハ	,25	N
B+2 3	32 7,578 5	25	,	15 50	0 00	0	2-4	PS SS	lmsbk	4	aw	7.5425/4	CMO	アア	2.0	24
2R 3	32 1	1	!	1	1		1	1 1	(1	1	1	4)	/	×
																-
						-		,								

Other Notes:

Soil Scientist: Field Assistant: A. Thurax

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	0-1	155-16	160606-11	1110	1	4	Topographic Position:	ion:	Rackstope	ope			Parent material:	erial:	Collu	luvium	
Date:	0/0-	V	1110				% Slope:		32%				Slope Aspect:	ct:	1910	South	
lob Name:	Dominion -	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Su	ırvey			Drainage Class:		1	Rained			Depth to W	Depth to Water Table:	ZA		
RETTEW Job #:	089962000						Depth to Refusal:		_	Refuse	Refusal on Boulde	sulders)	Slope Failure or slip:	re or slip:	NA		
NRCS Soil Unit:	0	Kany	Rabblu sarda	Mario	Jack		Bedrock Type :		N/A:				Dip Slope 8	Dip Slope & Direction:	NIA		Strike: NA
Mineralogy:	IA	1	a		-		Vegetation:		Mixed C	Jak Va	Oak Varieties	Longled	0	ine, Moc	ountain.	Laurel	
Horizon	Depth in N	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Harizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
0e	0-1	542/	J	1	1	1	1	1 1	F	¥	SA	1	1	2000	4.5	S-18	
A	1-27.	,	8:0	N	35	CN 20%	0.25-	50	1 F	VFA	SA	T	1	26	0.25	5-24	
M	2-47	2/5 1.54/2	5)	6	65	x62.	2:0	50	SBK	YFR	IA	1	1	2 m	4.3	5-3A	
148	4-12	7.54R	×	15	50	162 167.	2,0	50	160 180	2	SA	1	1	2 m	1.25	S-4A S-4B	
B+2	12-247	754/2	~	22	2	X6n 60%	3.0	50	SBM	R	SA	1	1	1 MV	1.75	5-58	
BC	24-30	7.51/2	Js	6	85	XGR 7072	3.0	Po	NOS	FR	SA	1	1	M	2 2	5-64	
0	30-46	7.54	SI	=	61	X CB 85%	16"	So	180	572	TA	1	1	I M	4.7	X	NO SAMPLE ;

Other Notes:

Field Assistant: Duane Max Thurst

Signature:

Test Pit ID:	p.	P-156-160606-1355-DAT	606-	355	54		Topographic Position:	tion:	TOESCOPE	SPE			Parent material:	naterial:	Co110	lovium		
Date:	06	36-06-2016	0				% Slope:		10%				Slope Aspect:	pect:	1120G)))		
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		Samew	hat	Poor	In Drained		Depth to Water Table:	122"			
RETTEW Job #:	089962000	2000					Depth to Refusal:		1/14			0	Slope Fa	Slope Failure or slip:	N/A			
NRCS Soil Unit:	0	riskona	Cobbla	Sano	2	oam	Bedrock Type :		ZA				Dip Slop	Dip Slope & Direction:	N/A		Strike:	N/A
Mineralogy:	u.	Siliceous	,	٥	A		Vegetation:		Various	Oak	5	Sugar Mag	MaplesL	ong Leaf	- Pine,	Mt.	Laure	/
										USDA	Sec. Sec.	0	1	0				
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Standary Topography & Distinctness	Redox Feature	B Redox Feature Description	Roots	Pocket Penetrometer)	Lab Sample ID		Notes
Oe 1	0-2	7.542	f	1	1	1	١	1 1	1	ſ	¥	1.	1	22 H	4,0	5-13		many Cobbles and Stones on
W	2-6	7.542	S	S	65	253	0.5-	So	23	VFMI.	IA	\)	12 PM	0.25	5-2A 5-2B		
BEI	6-15	104R	50	12	55	10%	0.25-	50	SBNC - 3	VAC	54	1	Ţ	2 m	7.0	S-34 S-48		clay skins
Bt2 15-2 104R	5-2+	1048	0	16	48	48 Gr.	6.25-	50	SBK	25	1	D: 1074	CC	- M	4.6	5-48		clay skins
						-												٥

Other Notes:

Perdud Water Table 2 22 prevented description of profile to a greater dupth

Field Assistant: Max Dugan Duone A. Truax

Signature:

Loess does not contain coarse fragments; not present. Just a second colluvial event.

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	6	157-160	0606-	1512	-174	4	Topographic Position:	tion:	KA37	300			Parent material:	terial:	1	10011	Winn Resident
Date:	06	6-06-20	010				% Slope:		990				Slope Aspect:	ect:	1220	7	1
Job Name:	Domin	itic Coa	Pipeline Soil	Survey			Drainage Class:		Welld	raine	Y		Depth to	Depth to Water Table:	スト		
RETTEW Job #:	089962000	2000					Depth to Refusal:		ZA				Slope Fail	Slope Failure or slip:	Z/A		
NRCS Soil Unit:	0	Kany	riddos	100	sanda	Jagm	Bedrock Type:		ZIA				Dip Slope	Dip Slope & Direction:	N/A		Strike: N/A
Mineralogy:	(A)	1 1	0		Δ		Vegetation:		Various	004	s, Lo	ong leaf	Pine	5	Laures		
Horizon	Depth in	Matrix Color	Texture	% clay	% sand	Rock	Rock Fragment	Flastichy/ Stickhess	Structure Type,	Moist	Horizon Boundary	Redox Feature	Rados Festure	Roots	Pocket Penetrometer/	Lab Sample	Notes
0e (2-0	7.546	1)	1	1	T	1	. 1	į.	54	1	1	W F	I n	5-14	
7	2-4	7.51/2	5:5	0	20	52	0.25-	50 PO	JAK-	NEW	SA	1	1	シェカ	200	5-28	
GE .	1-1	7.54h	Sil	16	26	GA 10%	0.25-	55 95	53K	En.	SA	1	j.	1100 11m	5.5	5-3A 5-3B	
28+11	8(-1)	3/5 NYS:1	sick 31	18	8	T	1	35	5BK	E	SA	1	1	1,00	4.75	5-48	
2Bt21	18-26	2/12	Sic	4	6	1)	MP	27 M	The state of the s	SA	1).	1,100	6,0	2-58	
28t3 1	16-38	2/15	0	3	N	1	1	MS AN	2,00	召	SA	ŗ	t	m	6.4	5-67	Lithochromis
Bet	2850	3850 7.54n	Sich	8	=	SIF.	513	35 mp	1,00	fn.	5A	-	1) m f l	6,7	24-5	00

Other Notes:

Soil Scientist: Joseph W 4 H

mature: AN WI

Test Pit ID: P - 158 - 160606 - 1717 - 27W Topograph Date: 6/6/16 W Slope:	Topographic Position: % Slope:	TOFSL	24	.,		Parent material: Slope Aspect:	terial:	3000	00°
- Atlantic Coast Pipeline Soil Survey		TO BE	→ Som	Somewhat Poorly	oorly	Depth to V	Depth to Water Table:	7"	
b#: 089962000		-10	Water	siable	6	Slope Failure or slip:	re or slip:	1 -	
it or skary	ē:	AMAS) -	すいしいと	1		Dip Slope	Dip Slope & Direction:	(
Mineralogy: SILICEOUS Vegetation:		MAPLE	RITORE	DA	PRARA	Z W		PINE	3 173
Horizon Inches Depth in Matrix Color Class Sciay Sand Fragment Size (Inches)	Plasticity/ Sticklesss	Structure Type, Grade, and Size	Moist Consistence	Harbon Roundary Topography & Distinctness	Redox Feature Color	Radox Feature Description	Roots	Product Parameters	Lab Sample
· > <18228/1	1 1)	1	1/2	1	١	2-VE, E	¥ 1	1
3/5 104 Ext 3 9R 10 72 52 5-2	0 0 0	1250	JER J	CN	1	1	1. F, A	1 (NOT)	1
Du 5, 10/82/p 2/2 2 2 2 2 2 6	SS PO	NESW!	F	1	1	1	1-F. M	4.0	1

Soil Scientist: YOUNG WANT

Test Pit ID:

P-159-

MSC - 00 HI - 909091

% Slope:

2670

BACKSLOPE

CINEAR

VOME OF HAT

EX (535) VE

Depth to Water Table:

1

Parent material: Slope Aspect:

COLUNION PART

RISIDOVM

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Topographic Position:

Job Name:
RETTEW Job #:
NRCS Soil Unit:

SILICEONS

Depth to Refusal: Bedrock Type:

Vegetation:

SANDITONE

とよけつ

PINE LAUREL

BUNEBERRY

Strike:

1

Slope Failure or slip: Dip Slope & Direction:

Dominion - Atlantic Coast Pipeline Soil Survey

089962000

Wineralogy:

Horizon

Depth in inches

Matrix Color

Texture Class

% clay

% sand

Fragment Type & %

Rock Fragment Size (inches)

> Mastichy/ Stickiness

Structure Type, Grade, and Size

Moist Consistence

Redox Feature Color

Redox Feature Description

Roots

Lab Sample ID

Notes

1

2

1

4-25

1

3 - VT

Rock

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3

128×1

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J

Signature:

Other Notes:		284	* 13 12 X	178	20	4
		24,20	3/24	9	4.9	3, 1
37412KS		3/25/6 3/2	7. STRESTO STR	4 545.4	10125/6 USE	10-10-2 11 SE
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J.D.		0	2	23	16	-w
E SMAY - U.W.		t	fo	40	16 HZ	47
2		2000	- N 0	Pro P	STO	22
なみにとういってを		-	-	1-2	1.3	7
2		50 P0	25	3 3	2 2	Po Po
		13 41	25 2458K	MP 2750X	28 /48 SA K	1897
ا مد ا ده ا		47	FP	P	RP CE	447 24
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		1				

Field Assistant: Soil Scientist: 2 944 WAL

Signature:

Test Pit ID:	-0	160-16	0606	- 12	10 -	55 &	Topographic Position:	tion:	BACKS	CON	AUCI	STATION	Parent material:	aterial:	COLLONION		AND	MUNCH SAS
Date:	6	16/16					% Slope:		3270				Slope Aspect:	ect:	2850			
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:			TAHMA	コンメル	SVIVE	Depth to	Depth to Water Table:	1			
RETTEW Job #:	0899	089962000					Depth to Refusal:)				Slope Fail	Slope Failure or slip:	1			
NRCS Soil Unit:		DEKALB-A	23127	2 4	1		Bedrock Type :		-SEWAS	10 L	2		Dip Slope	Dip Slope & Direction:	1		Strike:)
Mineralogy:	م	14118007					Vegetation:		CHESTANT	21	D F K	しないでとし、		るしいをまをまとい	,			
						100				USDA				/				
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Panetrometer/	Lab Sample ID		Notes
0	2,0	5-12251	- (V	(1	1	1 1	1	1	2	(1	W 1221-8	5 1	1		
ァ	3,4	1/24/01	55	Tus .	7	242	1-1	00	2531	VFR	2	(1	2-44-C	1 2	1		
38	4.9	10-185/6	378	18	of	572	7-4	55	YS'MI	44	6 47	(1	N'4-6	N . 3	1		
(30)	127	1/22/2/1	25ct	21	5	19 p	2-4	55	745ML	43	2	1	1	2-5.5	1 0	1	2	5212664
2787	22,73	9/54K3	0	4	80	2 s	17	MS	2458K	A	2	(ţ	2- 1,3	2.0	1	THE SHE	THE WORLDSTOWN
285	3x.	1/2412	CC	35	90	520	17	25	1 W SAK	TP	1	(- 1	W-1	2.0	,	5 Laxond CLX5 ATO THOOF LOT	DOCKET & 012
																	> 5	2 (SELY VED S)

Other Notes:

340× 51082. SPND 5102K

Soil Scientist: 1 274 | N P 1

						900 000		- 1	1					-	1000	
6	6/16					% Slope:						Slope Asp	ect:	100 M		
Domir	nion - Atlantic Coast I	Pipeline Soil	Survey			Drainage Class:		WALL	`			Depth to	Water Table:	1		
08996	2000					Depth to Refusal		36"				Slope Fail	ure or slip:	1		
E A	181	TITIC	1	7		Bedrock Type :		7	14			Dip Slope	& Direction:	4	0,	Strike: 1000
3	(3×1					Vegetation:		CHESTW		r		334	TR -1 41			R
Depth in	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment		Structure Type,	Moist		Red	Redox Feature Franchiston		1	Lab Sample	
5	4-1225/·	,	1	1	1	,	3 "	1	(5		1	2 - N F E	f 1	N S	
	10423/2	25. E. C. ±	13	15	CH	1	500	2880	70	2	1	I	3-F 2-VF,4			
	10/25/6	200	81	25	0.00	-	55	JACAL.	FP	2	Ī	1	2-F, M	54,1		CLBY SKINS
2,36	10425/6	7. X X X X X	S	15	CFO		SS	3	T P	1	J	1	7	1 1	1	CONT BETWEEN
36+																
	•															
	50000	S Fron	302	10 p	5025	17	SEE	X 3 N C	36.	- 7	* 1 × 2	0	. S. T.	2	200	1.46
Date: Job Name: RETTEW Job #: NRCS Soil Unit: Mineralogy: Horizon R O O O O O O O O O O O O	36 5 7 7 7 9 28	36 5 7 7 7 9	Depth in Matrix Color Texture Inches No 427 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1	Depth in Matrix Color Texture % clay 13 13 15 15 15 15 15 15	Dominion - Atlantic Coast Pipeline Soil Survey 089962000 Degth in Marrix Color Texture Inches Inches Inches Marrix Color Class No. 15 10123 2 CH SAL 18 18 2 CH SAL 18 2 SH 2 SH 2 CH SAL 18 SEPORD SHOULES BEORD SHOULES BEORD SHOULES TO SAL 18	Depth in Matrix Color Texture Inches Matrix Color Class Welay Sand Fragment Type & ST SAL	Depth in Matrix Color Texture Rock Inches No. No	Dominion Atlantic Coast Pipeline Soil Survey Dominion Atlantic Coas	Dominion-Atlantic Coast Pipeline Soll Survey Dominion-Atlantic Coas	Depth in Matrix Color Tecture Stelly State Progress State Color Class Stelly State Progress Stell State Progress State Progres	Depth in Matrix Color Tenture Scill Survey Change Class: WHE LE COMPAND CLASS SCIENCE TO THE STATE STA	Depthin Admit Coast Pipeline Soil Suney Depthin Red Solver Depthin Red Solver Solver	Dominion Admitic Coast Pipeline Soll Suney Dominion Admitic Coast	Dennistic Admitic Coast Pipeline Soil Suney Dennistic Admitic Coast Pipeline Soil Suney Dennistic Admitic Coast Pipeline Soil Suney Dennistic Coast Pipeline	Deminion - Addition Count Resident 501 Showers	

Soil Scientist: JOHN |N & H

P-162-160606-10円0-35W Topographic Position: ミッルル・コートレートリック Parent material: 足よりDVVM Slope Aspect: フェリッ
graphic Position: ミリメルトートレーマーメリー Pare
Slop
9 3
2040

	J			-			Tanagraphic Pos	idan.	M W W		-		Parent material:	terial:	フトゥー	アトラーション	
lest Pit ID:		10	0 6 0 6	1	1040-	S S W	% Slope:		Y. Y.	-	0	2	Slope Aspect:	Ä	2040		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		とれてし				Depth to V	Depth to Water Table:	1		
RETTEW Job #:		2000					Depth to Refusal:		1				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		DEKALB - DL	410	REST	Cor	X318H	Bedrock Type :		SHALE				Dip Slope	Dip Slope & Direction:	1		Strike:
Mineralogy:	Ш	BAXIN					Vegetation:		CHESTHAL	2	OAK PE	NAG Q3	MAT	MAPLE, WHITE		ALMIT LA	LAVEL BUVEBELD
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Plasticky/ Stickiness	Structure Type, Grade, and Size		Horizon Boundary Topography & Distinctorss	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
00	6.0	115:21.3	1	1	1	1	1	1 1	1	1	2	-	1	2. 4. 4	FOY	75	
7	N.	2/5/23/3	٢	w.	4	72	17	ad ad	2249	F	2	(1	2-12/2	9.5	×2	
130	3	3/24/6	5.	6	00	Pa.	^	SPS	TWISK KA	4ª	5	1	1	2-F. M	4.5	53 A/3	TN DISCONT. SLAW
278	3	3/44/8	8.	7	2	4	17	55	NESON	43	2	((2-F	4.5	54 A/B	CUEY SEIN S
90	32.10	7.54R3/651L	5.	5	30	945	17	58	1 KAL	ER TA	1	22.5	W127	1	7 4. 5. 4. 7	PST B	CLAY SKINS
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									Maria Maria				7				
Other Notes:		5 Jah Ja 1	1	0	1 18	4	2	576	1327	13.4	13.5	70 6	70 10	0 Th C4034	2570	-	2
					1												1

TEST PIT DESCRIPTION

Soil Scientist: Jent J WATS

Field Assistant: DAN FERSINE R PLA

Test Pit ID:	-16	3-160	620-	1126	1 050		Topographic Position:	-	おすってい	12076	101		Parent material:	erial:	Carroniam		SARNO
Date:	6/20	116				% Slope:	pe:		4670				Slope Aspect:	at:	150		
Job Name:	Dominion - A	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Su	irvey		Drain	Drainage Class:		MAM				Depth to Water Table:	ater Table:	١		
RETTEW Job #:	089962000					Dept	Depth to Refusal:		39 4				Slope Failure or slip:	e or slip:	8 m 37	173	TREE
NRCS Soil Unit:	THE CC	2000	() !	1		Bedn	Bedrock Type:		SKNO	STOF	34		Dip Slope & Direction:	Direction:	1		Strike:
Mineralogy:	- 1	CKOU	5	15		Vege	Vegetation:		MAPLE	5 F	LITE	7 40	1060	ORY C	アンスナ	707	OFT
Horizon De	Depth in Mai	Matrix Color	Texture Class	% clay %	Rock % sand Fragment Type & %		Rock Fragment Size (inches)	Plastidly/ Stickiness (Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podast Penetrumeter/ pH	Lab Sample	
000	3	1/5.245	1	*	,		,	* *	1	i	9	1	1	T TV	5.5	1	
7	For k	1/5-4701	r	5	42 10	,	-	0 0	1590	LAN P	8	(÷(:	3-45,F,	0.25	1	
02/	2 .5		2	9 01	010	2	-	30	145 PK	YFR	2	,	1		1 22.0	1	
727	1,53	2.5/RN/6	STR	= +	7 92			50 P	12535	JER	0 %	f	1	2-F, A	2.5	t	
15 Cr 97	5. S.	7.5VR4/6	55	= +	525	-	1	20 D	JAS BK	FR	2	1	1	W'3-1	4.6	1	DETAYE STE
7 700	S.	PZO	51	5	M	D	200	1)									
Other Notes:	DIP	My d	200	0000	1000	۲,											

Soil Scientist:

Test Pit ID:	P	164-16	0230	-	4	RSA	Topographic Position:	ition:	BACK	500	Th.		Parent material:	terial:	01000	MON	NOR
Date:	8	20/16			1		% Slope:		452				Slope Aspect:	ect:	1290	- 1	
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		いきとし				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		0 T				Slope Failure or slip:	re or slip:	FEW B	A Z A	776
NRCS Soil Unit:	75/ 0	PHON	- (1)	KY			Bedrock Type :		SAHDS	400	0		Dip Slope	Dip Slope & Direction:	30° NI	16306	Strike:
Mineralogy:	51	1118800	5				Vegetation:		MAPLE	1710	CKORY.	CH	TUNTER	-	2	1	BOUR
- 111				1		Rock				USDA				*			
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	
200	0,2	115.2215	(1	,	(,	1 1	t	1	۶	,	ī	3-45, 5	ا ه	1	
V	7,	10-12-3/2	15	4	8 3	900	(7	5 0	Top	TAP	82.0	r	7	7 - 4 T	0.27	1	
30	4,10	4.542416	5	_0	24	50		50 PO	1 4 50 K	TX P	Pi	t	1	1.1.8	7 0 27	1	
(20)	01/9	2/54/25/6	75	~	50	98	1	5 5 5	NAS AN	77	C×	(1	1. J.	0.7	r	br by
822	18 29	1541516	250	7	5	N 0	0.5-3	55	2 Mary R	47	Cv	!	1	7	- 0	I.	STATES SECANING SECANING
200	3,30	4.5/R4/6	-	5	20	920	17	50	1 * 5 * X	TP	2	,	1	(2 2 2		5384 C1180
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2º	*ox	4145	13	2	()	3.5	020	1									

Field Assistant: Soil Scientist: Joy WAU

ID:			sistant:	entist: Jours	LII DESCRIPTION
165-			ľ	MA	CIA
160620-					
- 1112 -	Y				
250					
Topographic Position:		0	//	Signature:	>
あっている 日日			,		
Parent material:					
COLLONION					
		Fax: 717-394-1063	Phone: 717-394-3721	3020 Columbia Avenue	BETTEW Associator Inc

Date:	6	120/16					% Slope:		257				Slope Aspect:	e.	270		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		がないい				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	08996	089962000					Depth to Refusal:		1				Slope Failure or slip:	re or slip:	E S D	757	TREES
NRCS Soil Unit:	07	ORISKENY					Bedrock Type:		1				Dip Slope 8	Dip Slope & Direction:			
Mineralogy:	5	SLOSSINI	3				Vegetation:		MAPLE	3413	トナレレナ	OAK, F	3		85250		
Horizon .	Depth in	Matrix Color	Texture	2		Rock	Rock Fragment	Plasticity/	Structure Type,	USDA	Horizon Boundary	Redox Feature				lah Campia	
	-					Type & %	size (inches)		Grade, and Size	Consistence	Distinctness	Color	Description		1	Б	adies
	/	15.51)	()	(,			^		(3-4F F	1		
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			イントンメ			^		Po		0				7.74.1	0077		プロスグン コウスカ つのか
V		10-1	50	S	7	42	1. 1	So	15.5	4	0. 44	,	1	47	١	1	
	6	ال ال	42			0		170	1						1		
BR	2	2512	7	7	77	D P	- 1	0.5	1450	F	50	((7 . 7	()	
		1															
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Soil Scientist:

Somewhat poorly drained

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7-1	66-16	0620	1	40	-USW	Topographic Position:	tion:	BROKS	500	M	\	Parent material:	terial:	2200	0000	
Date:	6/2	0/16					% Slope:		87			/	Slope Aspect:	ect:	1340		
Job Name:	Dominion	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		12 3 COM	1766	y work	V	Depth to 1	Depth to Water Table:	1 1 1 1		
RETTEW Job #:	089962000	0	I				Depth to Refusal:		,				Slope Fail	Slope Failure or slip:	1.		
NRCS Soil Unit:	08	ORISKANY -	MUR	22112			Bedrock Type:		1				Dip Slope	Dip Slope & Direction:	,		Strike:
Mineralogy:	5101	TEROUR	n				Vegetation:		ZFIR	0 47	CHES	TUUT 0	7 2 4	10 5153H	4 12	1	BLUE BE PR
										USDA			+			1	
Horizon D	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plantidty/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Roundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
	1	1/2:5						r			,			3 1 V E	,		
000	1	SP	,	,		1	,	,	(1	8	ī	1		4.5	1	
	y.	12/4	CL		1	15		0 4		0				2-45,5,	< 0.25		
A	4	1.5/21	75	_0	St	CH	1	05	184	44.	2	1	1	Z	1	1	
	1	1)6	7		7	20		Po	**					2 - F. M	0.25		
34	10	PARY	75	0	+	SP	1-1	50	1436	TP	2	,	1	1	1	1	
	18	5 35/6 5/2	SP	2	,	22		45	767					1 4 3	0.1		THE DISCONTING CLAY
BK! 1	2	517	75	18	11	52		55	24	TE	04				4.5	1	
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2×2	8	2.50	75	7	10	C8	4 - 8	\$ 5	1450	77	2			1	ı	-1	
	×	000			3	0		SP	28				727	(2.5		77
8×7 5	4 .95	7.57	15	X	++	4	^	5.5	243	T	1	77/27/2	628		4.5	1	FRAGIC PREPERTIES

Other Notes:

Soil Scientist:

Signature: () ()

Test Pit ID:	V	- 161-	6062	1-0	034	MSC.	Topographic Position:	tion:	S C C K	34915	8		Parent material:	erial:	COLLUNIUM	MULP	
Date:	5	91100					% Slope:		1				Slope Aspect:	ct:	3210		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil !	survey			Drainage Class:		SOMEWI	TANIM	POOK	LY	Depth to V	Depth to Water Table:	10.		
RETTEW Job #:	089962000	2000					Depth to Refusal:		1				Slope Failure or slip:	re or slip:)		
NRCS Soil Unit:	1.1	104-N.C	DUNG	1	+ XX	8	Bedrock Type :		ı				Dip Slope &	Dip Slope & Direction:	1		Strike:
Mineralogy:	3	MIYED					Vegetation:		WHITE	NAD	5453	AFRAS,	MAPLE	- 5	BLUETERRY	LRY!	
-	100000					Back				USDA						,	
Horizon	Depth in Inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Festure Description	Roots	Pucket Penetrometer/ pH	Lab Sample ID	Notes
0 0	3	115.5	(1	,	(t		(5	23	(-	(7.45, 5,	t	5	
00	0	4.47	1			((1	,	1				4.3	2/3	
	^			1			1	00		è	Ĺ			3-47	s is	52	
V		10423/1	707	0	7	-		05	149	LX	8	,	1		4.5	AB	
	,			د	2			45	18×		,	9/42401	27.0	2- 5, 2	1.0	53	TRES
200	1	10-12-2/4	-	1	- X	((55	247	1	63			2-1	4.4	A/B	
- 1	5							MP	-AK-	3		3/521/5 t	070	12 JN - 6	1.5	50	TN 015000 TIN.
3x	1.	10122 hol	215	00	0.1	(1	55	2000	22	53	10725/2	ことで	01	4.7	R/B	CC PY SE
1	30	2		2				AM	787			5.545.76 CZD	620	7 7	0.0	55	PUES
8× 1	,5,	102601.	00	20	28	1	1	55	2 13	Car	53	1/2-2601	CLK		4.5	A/8	
-	S. C.							98	8			45/25/8020	CZP	n	2.7	58	
C. Casa	000	16-18-01	SCL	22	55			55	247	7	65				4.5	4/8	
	20							Od	78.83			1/22/01	3 3 0		2.0	4	DENSE IN PLACE
186	مرو	2 8-18	25	8	4	t	1	0 5	100	TP	1	2.5/6/2	127	1	とよっ	A/B	

Other Notes:

BACK SUBPE. NOFILAM 4111 SYRY/6 NO して るる とっちんる 4004 PROTO-SPODIC

TEST PIT DESCRIPTION
Soil Scientist: D. Fe Mott Neugh Field Assistant: REACHE

Signature:

Test Pit ID:	10	-170-	160620-	_	138 - DEF	13(Topographic Position:	ition:	Upost	Backslane	ence		Parent material:	iterial:	2	rope wantary	Mary Cecation
Date:		(e/20)16	0/1/0				% Slope:		0	Ch.			Slope Aspect:	ect:	1/2/0		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	t Pipeline Soil S	urvey			Drainage Class:		130				Depth to	Depth to Water Table:	1		
RETTEW Job #:		089962000					Depth to Refusal:	1	779				Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	- 1	Do V. 6 10- A/A.C.	res con	NO BOND	181		Bedrock Type :			mol Str	3		Dip Slope	Dip Slope & Direction:	10	t	Strike: U/O
Mineralogy:	-	M	1 x o d		1		Vegetation:		Chestrut och	Hook	Red n	mente whi	100	Blacksum		Dr. 07.100	o her
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickings	Structure Type, Grade, and Size	Moist Consistence	Horiton Bound Topography I Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
0	51.1-0	0-1.75 542	(1	1)	(11	1	1	AW	1	1	*	= 1	5	
V	-51:1	1/62/101	15	25	25 85	307.	14-7"	0	16834	NEC	2		(25	0,00	5	
	(1				20			3.4	,			410		
14	200	10-12-21-01	57	N	28	900.	1/4-7	000	N 59531	171	RE	1	£	も	50.05	53	
	17	1				20.	11 110	07						25	7 -		0
Bhs s	0	1/8/12/	75	the	84 48	CB	14.7	20	1853K NEC CMB	VEC	CWB	Ī	(-2x+	F 0.05	5	Probent in 600. orpit
Bu	2.6	TOUR	2	1	76	7 76 FOR	19-4-	00	155BH NEW CM)	NFR	CW	1	(W ye	035	35	
720	192	104RS/4	5	D.	0	4 40 HOT	1/4-14"	Po	IMSIMI	VFR	VENCIONED	(1	X	0	86	
5	7	1	(1		(1			t	1	1		13		
产	4		(1	1	1	1	1	1	7.)		1	

Other Notes:

Soil Scientist: Description Field Assistant: Real A Hill

Signature:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

	22	30	25643	13m2	Bul	4	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
	R.	100	35	121	35	0-25	Depth in inches	F	01	089962000	Domini		7
	(7.5 42 414(5) SCL33 57		N S S S S S S S S S S S S S S S S S S S	815	10422/2	Matrix Color	4	Or Knay-M	2000	Dominion - Atlantic Coast Pipeline Soil Survey	(0/20)160	1-171-1600
	1	1250	506	75	76	75	Texture Class	W. X to	" CLITT		Pipeline Soil		100000-109-DEF
	(Es	33	à	2	ع	% clay		* work		Survey		15-1
	1	12	57	67	73	78	% clay % sand			1			th
	1	GR 407.	351.	250	Car.	62	Rock Fragment Type & %		(19th)	,			
	,	700	13.	23.	1/4-5	79.,	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
	1	55	S &	8	50	50	Plasticity/ Scicoliness						tion:
	1	MO	1M58K	MASSA WAS	18884	18531	Structure Type, Grade, and Size	The Mark	Cherty	30.	1100		STACO!
	Ţ	I,	7	F	VF	130	Moist Consistence	Class+	36			8	200
	(AW	æ	S	3	VET AW	Horiton Soundary Topography & Distinctness	trutoall	SandShr				SUSTEMPOR
	(1	1	1	1	1	Redox Feature Color	Hop hoins	Se				4
	(1	1	1	(1	Redox feature Description	wasqui ou	Dip Slope	Slope Fail	Depth to	Slope Aspect:	Parent material:
	(725	Z.	28.4	oring	200	Roots	1. properly	Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	ect:	aterial:
	11	0,6	1.5	205	5.5	4.5	Pocket Peoetzameter/ pri	Ch.	200	1	1	1360	(anison
	ĺ.	8	3	S	2	2	Lab Sample ID		SSE			0	
		Lithodiers &	wo.			+11: ndofflage	Notes		Strike: 55°				over her anon

Other Notes:

PM 3 - Chert COF Project

COF prosent

Soil Scientist: P. Hanster Market

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

7 7.15	Horizon Depth in Matrix Color Class % clay % sand Fragment Type & %		Mineralogy: My XXX	NRCS Soil Unit: Or. 5 M Gray MUSS (Complex (46C) B	RETTEW Job #: 089962000 D	Job Name: Dominion - Atlantic Coast Pipeline Soil Survey D	9	Test Pit 10: P = 173-1606 20-1117-DEF	
1	Rock Fragment PRANTICENT Size (inches)		Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
N64531	Structure Type, Grade, and Size		Sossof	1	X60	well	181.	nose slope	-
2	Moist Consistence	USDA	766, bli		s			lope	
35	Horizon Baumdary Topography & Distinctness		blachua						
1	Redox Feature Color	U.	Meny, hop						
1	Rados Feature Description		hop horn bearn	Dip Slope &	Slope Failure or slip:	Depth to M	Slope Aspect:	Parent material:	
2000	Roots		earl 10	Dip Slope & Direction:	re or slip:	Depth to Water Table:	Ġ.	erial:	
15 S	Product Personnelist/ Lab Sample	1	domando		1	1	0	Cal	
1	Lab Sample ID	The state of the s	0 - 0	1			200	Inclina	
1 passed				Strike:				250	
	Notes			1				MUNICIPAL RESIDENT	

200 Other Notes: 38C 33- 7540-16 5.C 1 Sew 5 Sandstore A Sh 40 6 6 52 250 1 21,7 10 Delomitic 35 D.Co.S.F.K 35 30 2011 16531 Linestone -0 CE (1 caretraguents 1 1 0 W. TE 18.3 も 00 2 3 3.0 2.75 6.8 4.1) C100 311000 CoFOIZ RONSHOR

soil Scientist: D.FINSHOMANIK TEST PIT DESCRIPTION Field Assistant: Pally

Signature:

00 Job Name: Other Notes: NRCS Soil Unit: RETTEW Job #: Test Pit ID: 3 842 R Horizon P 6 1 9 5 Depth in inches 6 1 Dominion - Atlantic Coast Pipeline Soil Survey Leany Ville 2 Shocurs 7.5 VR 7,51R 7.548 7.54 Matrix Color 173-160600-10011 DIXIO 3.2 Texture Class 97 S 4 0 % clay % sand 112-DEF 25 86 shallow as 00 1 3 Fragment Type & % 5 Rock SE 1/4 J % Slope: Rock Fragment Size (inches) Bedrock Type: Depth to Refusal: Drainage Class: Topographic Position: Vegetation: S 5 MS BUSSIN 88 5 000 1 22567 JESK. Structure Type, Grade, and Size Sugar maple, Hop humbon Dolo mitic 110 100 V Backslerge 3 7 Moist 70 dee 00 A DA E Horizon Soundary Topography & Distinctness RE 5 Redox Feature 25 720 blucklocust Dip Slope & Direction: Depth to Water Table: Slope Failure or slip: Slope Aspect: Parent material: Redux Feature Description 1 w'th 2 270 1/1/ 1000 3+ Roots 3.25 6.8 100 4.8 7.0 6.4 is Ros-dusin cak 800 1 22 Sa Lab Sample 5 6 Stale Coffins Sew linestyne could stone Strike: Chresing (husands on surface 1 Notes

MASON!

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Surface - more imported in

Surfice stehas

osed depression

Field Assistant: Soil Scientist: TEST PIT DESCRIPTION

R 39+		Bt2 39	Bt, 28	6 23	AE &	A	09 Z	Horizon Depth in inches	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:	
	Ŧ		104RS/1	2547/2 FSL	104861	104,23/1		th in Matrix Color	N.X.	McChing - W	089962000	Dominion - Atlantic Coast Pipeline Soil Survey	6 21 7	20174-16	
		5.7	5	157	X	754		Texture Class		e town		Pipeline Soil S	016	0621-	
		27 15	25 35	7	10 (10 1		% clay %		2		urvey		11445	
		5	5	60	0	90		% sand Fragment Type & %		eks/b				- RLL	
	ri.					1		Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
		8 8	55	83	SO	00	11	Plasticity/ Stickiness			-			sition:	
		M25BK	M2SBH	MSBL	F768	FIGR	KIGR.	Structure Type, Grade, and Size	Blue berr	Sand	1-	32	260	Bac	
		R	A	R	R	9	F	Moist Consistence	USDA S	Stone	1 65	f	0/0	K 510	
			55	65	65	53	CS	Horizon Boundary Topography & Distinctness	HOP					20	
		7.54815						Redox Feature Color	210						
		CZE				1		Redox Feature Description		Dip Slope	Slope Failure or slip:	Depth to V	Slope Aspect:	Parent material:	
			7	25, IM	77	275	25 IM	Roots		Dip Slope & Direction:	re or slip:	Depth to Water Table:	Ct:	terial:	
		5.00	3.5	5.25	N.	0.70	5.0	Pocket Penetrometer/ pH		23	1			7	
		5	54	53	52		2	Lab Sample ID	380			285	1990	esidoum	
		V			A	S. Tarker	ļ	Notes		Strike: 5550W				3	

Other Notes:

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist:

Test Pit ID:		P175-16	862	-1150	OR	77	Topographic Position:	tion:	Nos.	6			Parent material:	erial:	Collevivor	Krisia	S CONTRACTOR
Date:		6 21 20	=				% Slope:		16	16%			Slope Aspect:	æ		U	1700
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	Aavin			Drainage Class:		E \$ 1	11.5	7		Depth to Water Table:	ater Table:		14+	
RETTEW Job #:	089962000	52000					Depth to Refusal:		1.	140			Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		Unas	Watakal	9.1	* Ka	5	Bedrock Type :		line	stone	0		Dip Slope & Direction:	Direction:		Si	Strike: 5750W
Mineralogy:		1					Vegetation:		Red	Maple	3/1				160	0	
Horizon	Depth in inches	Matrix Color	Texture Class	% стау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Sticklerss	Structure Type, Grade, and Size	5	Horiton Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ prt	Lab Sample ID	Notes
9 .	-	1/5.5 Jis						1 1	4162	B	5			22	200		
D	W	109R3/1 85	153	00	5	420	1/c) "	80	FIGR	AR cls	0/5			WIAZ	5,0		
17	7	7 h(0,340)		6	Oh	200	h/1		FISBK FR GK	R	65			211	4.25		
D	74	>1 82 175 015 3401	17:5	23	入	100%	" h'	30	FESBE FI	T				1	5.0		
R	14+																

Soil Scientist: TEST PIT DESCRIPTION
Soil Scientist: RUSSEN

Signature:

Test Pit ID:	70	176-16	06:	2 -	5	RIL	Topographic Position:	tion:	1000	1	Shoule	100	Parent material:	terial:	00.1100	SALD MA	2	Suns
Date:		6/21/20	31/0				% Slope:			310/			Slope Aspect:	ct:		1580	0	
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		a	8 5			Depth to V	Depth to Water Table:		50+		
RETTEW Job #:		089962000					Depth to Refusal:		(0	50			Slope Failure or slip:	re or slip:				
NRCS Soil Unit:		McClura	Watak	ala-	Do	Kalb	Bedrock Type :		Lines	one			Dip Slope	Dip Slope & Direction:	1		Strike:	
Mineralogy:		Milxo	2				Vegetation:		200	Mao	1							
	Denth in		Tayture			Rock	Back Fragment		Structure Type.	USDA	Horizon Boundary	Radox Feature				lah Samola		
Horizon	inches	Matrix Color	Class	% clay	% sand	Fragment Type & %	Size (inches)	Plasticity/ Stickiness	Grade, and Size	Moist Consistence	Topography & Distinctness	Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	ID ID		Notes
3		1 5.7.5						9	(1)	6	5			NITE	0	-		
Ca	-	54Kr. 1	1					1	THE THE	4	2			11111	5.5	2		
AE	00	1 (59 pm	157	ō	59	1	\	PO	KISBY - PR	A	5			R	1	25		
		IVI	,			2		8			,				(2.0)			
Bw	37	Josifento SL	25	7	0	Z2,	2×18"	8	MISBY NA CIS	B	0/5			W132	5.25	53		
287	050	28+ 50 754RUL	0	5	10	1		10	MISBR (1)	17					20	112		
				1				1										

Other Notes:

Soil Scientist: Dour NAN

Field Assistant: TAYLOR WALTER

Test Pit ID:	7		0622-	2-107	27-	158	Topographic Position:	tion:	3 PCKS	200			Parent material:	terial:	4 13	MOINN	X
Date:	6	91/12					%-Slope:		14/0				Slope Aspect:	CE	- 6	Ç.	1
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil	survey			Drainage Class:		3000	11/1/14	100	40 8 00	pepul to .	Deput to water rapie.	1	5	
RETTEW Job #:	089962000		McClung-Watahala-Dekalb complex	nala-De	ekalb co		Depth to Refusal:		1				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	0	(171-04)	-	A W	100	C	Bedrock Type:		1				Dip Slope	Dip Slope & Direction:	,		Strike:
Mineralogy:	1	00	1			18	Vegetation:		MEPUE	, 11	CKO	RY, ST	TIP	TRIPPING MA	3740	丁のガえ	PL
. Kennerangan	1						i d			USDA				1			
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Masticky/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Obstoctness	Redox Feature Color	Redox Feature Description	Roots	Pucket Penetrometer/	Lab Sample ID	
,	7	1/3.5	i	1	,	,	1	,	,	3	22	,	Ļ	サーマド ド	1	(
0		570						4			,	,			4.5		
	4	2	VCIT		,	to		po	6	221		r		3-15	0.25		SANDSTONE COR
P	2	104 ROIL	75	X	7	50	1	20	(F)	457	2		(2 - 2	1)	
	11	1</td <td></td> <td></td> <td></td> <td>0</td> <td></td> <td>0</td> <td>53 4</td> <td>9</td> <td></td> <td></td> <td></td> <td>2-45</td> <td>5:5</td> <td></td> <td></td>				0		0	53 4	9				2-45	5:5		
BK.	×	101210	75	+	St	C T	1	50	14 27	44	53	1	1	0	1	,	
	2	21.	101		,	15		0	×					7 - VE	- 4		SKINS KONS
Bt.	12	10-12-10	5	5	60	412		\$0	545 M	13	5 2)	1	1-17	5.2	Ī	
	Pa		HO		1	25	70	SP	4			1/92/01	020	1	2.5	(CLAY SEINS
かなと	3	8 52ho)	5	×	0	FID	^	55	247	P	50	7.542.46	173		1	,	Scidetich action
	00	1.1)	4		45	N K	_		1000 6/4 000	020	1	2.5		100
おとろ	30	10-125/6	5	-0	6	CH	^	5	29	TR	(7.5424/6025	225		4.5	1	ERASIC PRES
					1												
																	_

Soil Scientist: Dugne Frus

gnature: Mush

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P	-178-160	1621-	157	-101-		Topographic Position:	tion:	SHOULD	193			Parent material:	terial:	Callervium	1	Ceritimes
Date:	0	6-21-20	316				% Slope:		35%				Slope Aspect:	ict:	1900	1	
lob Name:	Dom	Dominion - Atlantic Coast Pipeline Soll Survey	t Pipeline Soll	Survey			Drainage Class:		Samewhat to	not 4	3000	() rained	Depth to \	Depth to Water Table:	NIA		
RETTEW Job #:	2680	089962000					Depth to Refusal:		48.		0		Slope Failure or slip:	re or slip:	2/2		
NRCS Soil Unit:	3	W- PMW (DS)	atahala-	7	ekall-	Cample	Bedrock Type :		Sandit	tope			Dip Slope	Dip Slope & Direction:	NIA		Strike: N/A
Mineralogy:	4	Ticoous					Vegetation:		Feel May	el. 7.	Bother	Red Oak	, 24c	3	do		
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Scickiness	Structure Type, Grade, and Size	Moist	Horizon Boundary Topography A Distinctness	Redox Feature Color	Redox Feature Description	Roots	Prochet Penetrometer/	Lab Sample	Notes
De	0-12	59h	1	1	1	r	(1	1	TA	1	1	12 M	0.25	1/2	No SAMPLES
A	15-25	2000	in in	0	5	157.	2.6	00	13	Um	45	- (1	7.50	4.5	1/12	7.4
521	2.5-1	1646	5	12	30	25%	8.25	P0	58M	The	25	1	1	2.2	NN	3/3	1/1
Bu2	11-18	7512	1	Re	40	85	120	50	59n	343	Z P	(1 -	27	1.5	- 1	t)
BC	18-29		7	7	400	XX +	25.0	50	5800	FRE	7	75ms/2	00	1, 100	3,25	1	1.1
0	29-4	8542	5	00	5	4.2%	10.0	DO 25	59121	Vin	H	2/5 mms/5	00	1,00	4.6	1	35
2	8	1	3	1	- (1	1	7 /		1	1	1		I	1	-	BENEZENKINCO

Other Notes:

Field Assistant: TRYTOR MALTER Soil Scientist: お子は

Signature:

Test Pit ID:	F1-9	9-16	0621	117	15-1	JSW.	Topographic Position:	ion:	BACKS	107	R		Parent material:	erial:	2020	MOUNTA	
Date:	6/22	116				.0	% Slope:		357				Slope Aspect:	CF.	2010		
Job Name:	Dominion - A	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Sur	vey			Drainage Class:		MALLIS	MHE	ZHAT	FXCES114E	Sty VE Depth to Water Table:	/ater Table:	,		
RETTEW Job #:	089962000						Depth to Refusal:		1				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	MCCLUN	51 2	MALA	010	- 000	BUTHE	Bedrock Type :		5 4 K 4 5	701	E		Dip Slope 8	Dip Slope & Direction:	1		Strike:
Mineralogy:	51116	5003					Vegetation:		345544	FAS	31	PLE M	4176	EAR	は日の日本	E PR	
										USDA				,			
Horizon	Depth in Ma	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticht/ Stickiness	Structure Type, Grade, and Size	Moist	Heritan Roundary Topography A Distinctores	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetromete// per	Lab Sample ID	Notes
0 %	5.3,0	Starie),	T	1	,	J	1	1	1	1	2	ţ	ţ	3-45,8	١ س	Ť	
A.	15.00		ハイブ	5	78	2 5 2 Sept	2-4	200	1494	33	7 2	4	-1	7 7 7	10.25	Ţ	SEALED SAND
Ø 7	2,1	- 60	275	∞(12	040 k	4-4	20 PO	1.	AT P	うえ	1	1	してが	1 24.07	t	
BC1 8	9.24	52 a 152601		4	28	4000 N	10-15	200	1474	4	2	1	1	J. W. C	1 .25	t	
302	x 20 x 20	9/24/5.4	L S	4	4	Sac n.	10-15	500	1822	LAP	1	1	i	1-4.6	5.5	i	

Other Notes:

してでスア 11000 ON SURFACE SACE SHOULD PROTOL 214025 WORLZON. SKUYS TONE

TEST PIT DESCRIPTION
Soil Scientist: コマルル Field Assistant: TAYLOR

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-	91-081	-1230	125	2-3	SW	Topographic Position:	ion:	BACKS	LOP	E/F	OPTSLOPE	Parent material:	aterial:	00000	MULLA	>
Date:	6	41/23/16					% Slope:		3570		1		Slope Aspect:	pect:	1460		
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	Survey			Drainage Class:		MODER	ATELY	٤	526	Depth to	Depth to Water Table:	2711	SEW	
RETTEW Job #:	089962000	2000					Depth to Refusal:		1				Slope Fai	Slope Failure or slip:	THE.	RENT	+ REES
NRCS Soil Unit:	74734	AN - B14	TOURLD	100	27 14	1000	Bedrock Type :		50425	TON	0		Dip Slope	Dip Slope & Direction:	,		Strike:
Mineralogy:	215	5002217				1	Vegetation:		14 15 4 th 3	70	DAK	MAPLE	in .	いていてや	2 + 5		
										NSDA			1				
Horizon	Depth in Inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stichiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redos Feature Description	Roots	Pucket Penetrometer/ pH	Lab Sample ID	Notes
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9	N	25.12.5/3	75	2	1+	600	4 - 6	20 PO	* * * * * * * * * * * * * * * * * * *	272	ç ·		1	2-4,M	1 25.25	1	
2 2	3	10 10 mg/0	2 5	_9	St	C 8	4-6		14.34	4	2	i,	14-	C. F. A.	1 0.25	ţ	TOR TREEPS
800	9 23	10485/6	2 × 5 × 5	0	7	C4 2	4-10	0 0	* SEL TO X	JER	8	,	(2-1, 4,	1 0.23	1	ACM STONES
272	250	10752/8	C 2 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4	N	d d	Cas X	4-10.	50	1 W SAX	472	+	2/22601	C2F	W - 1	5.0.23	t	FEW STONES

Other Notes:

CONKY

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FOOTSLOPE .

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OF

Soil Scientist: JOH J VJ K

Signature:

Test Pit ID:	P-	18 - 16	0621	130	0	といと	Topographic Position:	ition:	BACKS	LA PS			Parent material:	terial:	COLLANIAN	N(0)4	MUNDISTE REPO
Date:	6	22/16					% Slope:		35%				Slope Aspect:	ect:	200		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		とせてし				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		1				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	Mc	CEUNG -	ZPTA	ナイヤカ	7 75	KALK	Bedrock Type :		SILTST	340			Dip Slope	Dip Slope & Direction:	,		Strike:
Mineralogy:	3	CBXI					Vegetation:		MAPLE	Fic	はっとい	LS 3 HO	PESTUVI		WITCH	1422	5056450
										USDA				1		17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	1
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidty/ Stiddness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pucket Penetrometer/ pH	Lab Sample ID	Notes
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	8.	157	-	i		CE	1	8	163.	1	63			31.3-1	١		
	3	6/2	4		3	7		04	SAK					, M. C.	24.0		CHERT COT
12	,	Joy Kay	30	0	1	SR	-	30	JA.	4	0 %		•	40	4.5		CLAY SKINS
3	3	6/200	. 1"		2	40	17	SP	SAK	d d	2				1.0		CLAY SKINS
2000		10-1-	7 10	1	1	C V	4-6	55	Je 34	4 1				1.8.0	1		
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2000		512	8	6	20	CH	1	50	1631	7	1 40			W-1	1		
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								- 1									

Other Notes:

THE TONE P2510-

Soil Scientist: ZAIL

Field Assistant: TA-/LOR WALTER

Test Pit ID:	P-187	- 160	621	2	0	152	Topographic Position:	tion:	N M N S	1			Parent material:	terial:	COLLUNIA	1107	OVER RESIDENM
Date:	1122/1			- 1		-	% Slope:		370				Slope Aspect:	ect:	125.		
lob Name:	inion	Coast Pipe	line Soil Su	rvey			Drainage Class:		MELL				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	089962000						Depth to Refusal:						Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	G3 X 1 22						Bedrock Type:		51175	5102	18		Dip Slope	Dip Slope & Direction:	,		Strike:
Mineralogy:			そりてな	747	7 . 0	DEKAUS Vegetation:	Vegetation:				X	FEW B	LOE	BLUEBERRI	23		
10		-															
Horizon Del	Depth in Matrix Color		Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
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28×7/2	12.3 5.25/4	250	0	4	10	1	(55	2007	1	2	,			1		
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18 CXBY	1 52/5	2	250		~	512	1	55	J. to Ja	1	1	1	,	1	F . 01		DELAYING SILT-
		-														1	STONE CCE
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Other Notes:

Soil Scientist: JOHU WAH

Field Assistant: TAYLOR WALTER

Test Pit ID:	7.	183-16	0621	1	100	35	Topographic Position:	ition:	BACK	SLO	PE		Parent material:	aterial:	000	2001000	
Date:	6/2	21/16					% Slope:		522				Slope Aspect:	pect:	970		
Job Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		WECL -	SOMEWHA	TAHW	FXC65514	Depth to	S 5145 Depth to Water Table:	1		
RETTEW Job #:	089962000	000					Depth to Refusal:		1				Slope Fai	Slope Failure or slip:	Tra	RALI	78587
NRCS Soil Unit:	DEX	DEKKLB - WI	24147	CA	Hec	PRONT	Bedrock Type:		5				Dip Slope	Dip Slope & Direction:			Strike:
Mineralogy:	3115	recous	5				Vegetation:		TULLE	POPL	DP.	CHC STNUT	7 04	4	STA EP	2	TEDY
STATE OF THE PARTY OF										USDA				-		-	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Radox Feature Description	Roots	Pocket Penestrometer/ ph	Lab Sample ID	Notes
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7	2	10/23/2	5	+	4	Pr P	1	So P	1892	288	G-W	,	1	3-455	1 25.02	1	
8 2	4.10	10-12-4/6	5	~	8	57	^	0 0	NES WI	TA P	53	*	r	3-5'7C	725.12	1	300 2 15 9 405
C) (0	10.2,	1/23/0	V	Co	90	22	1 - 2	0 0	056	6	2	*	4	1-12/5	5.5	1	200 shousdows
5	5,70	1 22 L	N S	+	و	854	01- h	20	0.59	6	(Ť			1 27	1	

Other Notes:

Soil Scientist:) THE WAY WAY

Soll Scientist: 1944 WAH
Field Assistant:

Signature:

RETTEW Job #: Job Name: Test Pit ID: **VRCS Soil Unit:** fineralogy: 30 Horizon 5 P 0 D 6 × × 'w 0. Depth in inches NEIKERT - BERKS- ROUGH 089962000 Dominion - Átlantic Coast Pipeline Soil Survey MIXED £09091-381-4 1/3 10/R5/8 1/5.29/5 2 leakol 10/25/61 Matrix Color 5.50 Six AP Texture Class 1 12 50 5 % clay 1 18 6 8 % sand 1 F 29 Type & % 040 22 Fragment Rock É 0.5-2 Topographic Position: Rock Fragment Size (Inches) Vegetation: Depth to Refusal: Bedrock Type: % Slope: **Drainage Class:** 2 1 1 4 PO 50 50 Po PO Plastidty/ Stickiness 0 137日本 1888 Structure Type, Grade, and Size CHESTHUT SHELLE 23: TIMMUS SOMESHAL 0 MA 750 B Moist FR USDA OPK F4CESS 1VE 82 2 CY 23 Horizon Boundary Topography & Distinctness MATE Redox Feature 1 Color 1 1 INE HICKORY Slope Aspect: Dip Slope & Direction: Slope Failure or slip: Depth to Water Table: Parent material: Redax Feature Description (1 1 --2-14 アード 2-1 -MIC 5. W-7 Roots TI T ないしまとなると 1.670 SS E (160°) Strike: 3 0.25 0.5 4.5 4 RESIDUUM n 1 1 1 4 ار 0 Lab Sample 1 1 0 THOSINT SA CAPIT 4 ROCKS Notes

Other Notes:

PEU SLOPING 0 VMMIT NABBOW -BEERK 70 STEEP おそのとうしのかやっ 32 74 10 ٤

Soil Scientist: JOHN WAR H

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

rest Fit ID;	-	4	000	163	1	Conda	- opobiability osition.	itioii.	2 2	1000			Parent material:	terial:	KEYLO	200	
Date:	6	7/16					% Slope:		2870				Slope Aspect:	ect:	3420		
lob Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		SOX FULLY	12	EX CES	SIVE	Depth to \	Depth to Water Table:	١		
RETTEW Job #:	089962000						Depth to Refusal:		26"				Slope Failure or slip:	re or slip:	١		
NRCS Soil Unit:	E M	IKERT.	4×3×4	100	2	Ŧ	Bedrock Type :		いれないと				Dip Slope	Dip Slope & Direction:	tb) MNN 25	ノ(タナ。) Strike:	ke:
Mineralogy:	3	(ASXI			-		Vegetation:		F. CROP	N. Ka	P	HA WHITE	TE		ヤーエ ロギス	-	2
	Depth in		Texture			Rock	Rock Fragment	Residen/	Structure Type.	Moles	Horison Boundary	Redox Feature		,		ah Camala	
	inches	mania colo	Class	Aprilak	9 saile	Type & %	Size (inches)	Stiddiness	Grade, and Size	Consistence	Distinctness	Color	Description	Roots	¥	8	Notes
00	5	1227	1	1	(1	(1	1	1	25	Ť	1	3-45,5	7 1	l	
	7	5 (4 4)	TON	7	×	145	^	4 0	9	Y To	٤			2-46-4	X	,	
2	5	10-12-1-	215	1	5	N.O.	-	50	18		1	,	1		4.5	,	
2	2	125/6		ī	20	S.t	1	0	181	D	2		1	1	0.5		
	3.	101	3	-	- 1	F		55	1	A				1 × 1 ×	4.5		
P	XX	の子を	R P	J	1d	ROCK											
1																	

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Soil Scientist: Tohn Wah

Test Pit ID: 7-187-160607-1477-154 Topographic Position: SUNNAII Parent material: RCSI	
Slope Aspect: 30% o	0
Class: SOMENHAT EXCESSIVE Depth to Water Table:	1
al: 나 % '' Slope Failure or slip:	1
Bedrock Type: SHALE Dip Slope & Direction: 222	222 SE(140 Strike: 500
Vegetation: PIN ONK, HICKORY, CHESTRUT CAK	~
Rock	-
Horizon Inches Depth in Matrix Color Class Clay % sand Fragment Type & % Clay % sand Type & % Clay % sand Type & % Clay % sand Type & % Class Class Type & % Class Type & % Class Cl	Product Propriemental/ Lab Sample ID Notes
0° 0' 25 0' 1 - 1 - 1 - 2 - 1 - 3-1 - 1 - 4.5	4.7 51
SHL 11 25 CH 11 80 1892 NER ON 3-NE, FO.	7 5
BN 2 (0/PS) 6 XCH 14 22 85 1-3 PO 1584 FR CI - 3-VE, F 0.5	5
2-5	1.
31	4
XX SFILE BEARDOCK	T FINES
XX STALLO BEDFOCK	T FINES
XX SFILE BEDROCK	T FINES

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist: 5 + e ve

Signature:

Test Pit ID:		0/88-	6060	-09	137-5	d	Topographic Position:	tion:		Upper	Pr B	4	Parent material:	terial:	Cal	11/00	5
Date:		06/07/16					% Slope:			2	7		Slope Aspect:	A	W	350	
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		1	dm			Depth to V	Depth to Water Table:	WIA	A	
RETTEW Job #:	089962000	2000					Depth to Refusal:		36				Slope Failure or slip:	re or slip:	N	A	
NRCS Soil Unit:		5	pin				Bedrock Type :		5	1/1stone	300		Dip Slope 8	Dip Slope & Direction:	2	1700	Strike: 80
Mineralogy:		MIXED					Vegetation:		Wh, 10		0	hestact	3 20	moun	an la	dusp/	
								1		USDA '							
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidty/ Stickness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
P	_	1/2 N/01	5	7-1	25	15	1-2	PS 8	1 fgr	4	me.	1	1	0 M	4,5	1	thin 14 00
BWI	12	1048 612	5	16	20	30 91	1-2	P5	lmsbk	7	3	1	1	70	5,5	1	
Bure	20	IOYR 6/4	5,1	6	20	250	7-4	55	16571	14	W.D.)	1	000	5,50	1	
20	82	108864	5:1	드	10	17	11-8	25	0	4	D.W.	1		+ + 1	7.50	(
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Other Notes:

TEST PIT DESCRIPTION

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Signature:

Field Assistant:

Dave 5 Kippon

ature: Dodici

	28	20	280	Bt 2	B+1	00	Horizon I		Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:	
	キ	47	35	22	6	2	Depth in inches	-	-	Wei	089962000	Dominic	-	8	
		7.57R5/6	7.54856	107R6/6	10786/	104R 3/2	Matrix Color		M, Yec	e, Kert - Ber	000	Dominion - Atlantic Coast Pipeline Soil Survey	06/07/	189-1606	
			sid	2:0	Sic	7	Texture Class		6	of ks		ipeline Soil	16	607 -1	
			28	22	8	1	% clay		-	Rovan		Survey		143-5	
		5	12	Q	ō.	1	% sand			0				500	
		10	30 gr	97	36	36	Rock Fragment Type & %			OMPlex					
		3%	2-4	2.5	4.5	7.5	Rock Fragment Size (inches)		Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	1
		P5	85	NS PS	MS PS	1 1	Plastidty/ Stickiness							tion:	
		0	1 m sbx	2 m5 bk	2 m s68	1	Structure Type, Grade, and Size		ch	CA	4			lower	
		++	7	4	7	1		USDA	hestnut	Siltston	7	UN	38%		
1		aw	CW	CW	CW	3.6	Horizon Boundary Topography & Distinctness			No				backsk	
		59R5he	10YR 6/3	1048 218	ı	1	Redox Feature Color		soulc hick					ope	
0.		fmf	cmd	cm o	1	(Redox Feature Description		You	Dip Slope	Slope Fail	Depth to I	Slope Aspect:	Parent material:	M
		F M 3	M	CM	CA	U 22 11 22 20 21 21 22 20 21 21 21 21 21 21 21 21 21 21 21 21 21				Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	ect:	terial:	
		3,0	2.75	5.25	5.25	4,5	Pocket Penetrometer/ pH		2100	90	N	7			
	1	55	54	53	52	5 1	Lab Sample ID			>	A	IA	180	(0)	
										Strike:				HOUNDE	
						4	Notes			20				1005	
		4				M. 6				00				0)	
						11.69	100		7	L					

Other Notes:

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Soil Scientist: Field Assistant:

SKIPPON

Signature:

20 42 R 424	26 4		2B+2 26	8+1 2	T	Oa	000	Horizon Depth in inches	Mineralogy:	NRCS Soil Unit:	#:	me:	Date:	Test Pit ID:	
	42+	2 7.54R =	6 7,54R %	20 7.51R 5/6	9 10486/4	4 10482/1	2 54R2.5/	th in Matrix Color	MITE	10	089962000	Dominion - Atlantic Coast Pipeline Soil Survey	06/07/	p190-16060	
		5.1	5,0	5.7	51	1	1	Texture Class	,	PPN		Pipeline Soil	07/16	7 - 1	
		12	30	25	20	1	,	% сіау				survey		315-	
		5	-6	18	20	1	1	% sand						500	
		80	Ç	9	97	30	970	Rock Fragment Type & %							
		H-2	2-4	1-2	1-2	1.5	\$.5	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
			P5	P5	PS 55	1 1	1 1	Plantidty/ Stickhers						tion:	
		0) msbk	2 mssk	1 mssk	ĵ	J	Structure Type, Grade, and Size	Mhite						
		4	かか	5	\$	1	ı		USDA	511	42	000	32	60	
8			CK.	2	CX	25	CS	Horizon Boundary Topography & Distinctness	ine, b	+Stork			2	CKS	10
		i	1	1	= (-	1	1	Redox Feature Color	lack oak					OPE	
		1	1	(1	Ţ	ſ	Redox Feeture Description	t	Dip Slope	Slope Fail	Depth to	Slope Aspect:	Parent material:	
		7	TI TI	2 3	CF	Z C Z	TIO O	Roots	mountour	Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	ect:	aterial:	
		5.75	1.75	5.25	1,0	17.5	4.5	Pocket Penetrometer/ pH	laurel	20		Λ.			
		Ī	ſ	1	Ī	1	1	Lab Sample ID		808	WA	1/A	330	colluvium	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
								Notes		Strike: 180				mresidum	

Other Notes:

Depth in Matrix Color Texture Yclay	Field Assistant: Test Pit ID: Date:	-1619	160607-	1 1	sdd	Topographic Position: % Slope:	Position:		N C M M L				Parent mater	Parent material: Slope Aspect:	al:	81:
Depth in Matrix Color Texture Scape Class	ite:	/30 /	01/16			% Slope:			5				Slope Aspect	Slope Aspect:	2	260
It:	RETTEW Job #:	089962000	ic Coast Pipeline So	ii survey		Depth to Re	fusal:		- 10				Slope Failure	Sione Failure or slin:	Slope Fallure or slip:	Sione Failure or silo:
Mixed Vegetation: Virginization Virginiz	NRCS Soil Unit:					Bedrock Typ	ē:		ts		Such	avo,	avo,	avo,	avo,	TONG Dip Slope & Direction: 5
Depth in Matrix Color Texture Kelay Kelay Kelay Rock Rock Fragment Rock R	Mineralogy:		MIXPD			Vegetation:		Virgin	NO.	-	3010	oine chestou	oine chestou	pine Chestnut Oak, Sca	pine chestnut oak, Scarlet o	pine shestout oak, Scarlet oak
1 3 107R3/8 511 14 10 40 1-2 85 1 4gr St1 8 107R4/6 51 20 8 ch 2 13 107R4/6 51 20 8 ch 2 2 4 55 1 ms5k - 1 ms5k				% сіау					Moist Consistence		Horizon Boundary Topography & Distinctivess	Norteon Boundary Redox Feature Teoperaphy & Color		Redox Feature nedar feature Roots	Redox Feature auton funion Roots Pedar Peatments/	Redox Feature nedar feature Roots
3+1 8 104R4/6 5:1 20 8 ch 2-4 ps 1 ms5k + 2 13 104R4/6 5:1 20 8 ch 2-4 ss 1 ms5k	A						85	- £ gr	5		MA	aw	aw I	aw I C C C	00	000
12 13 104R4/6 5i1 20 8 ch 2-4 ps 1 msbk							PS 85	1 m s 6 k	7		3	CW	N N N	0 m	1	5 C 3 L.
£ 23	+ 2		118 9/1					1 msbk			24	Q.W.	1	aw F f		- C C S - 1 - C C S - 1 - C C S - 1 - C C S - 1 - C C S - 1 - C C S - C
		23					1				Se .	OM .	W	OW	OW	OW -
	R						1 1									
										1						

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist: 5+eve Dadio SKIPPON

Signature:

Test Pit ID:	Job Name:	RETTEW Job #:	NRCS Soil Unit:	Mineralogy:	_	Horizon	0	00	2	1+1	3	15+2	N.	784	70					
+	Domin	089962000			Depth in	Depth in inches	0	2		12		28	1	5	21+	00				
192 - 160	Dominion - Atlantic Coast Pipeline Soil Survey	2000	5	7		Matrix Color	15.5 00	5×8 1	1040 6		2/0 6/E	7	7.5YR 5	6						
607	Pipeline Soil		010	-xed	Texture	Texture Class	į.			115		511	`.	15						
- 163	Survey					% clay	,	,		23	N	47,	E							1
1-50						% sand	1	1		3										
0						8 7	90	20	90	200	S	40	Ch	70						
Topographic Position:	Drainage Class:	Depth to Refusal:	Bedrock Type :	Vegetation:	Rock Fragment	Rock Fragment Size (inches)	1-7		1-2		h- C	1	N- C	-						
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iterial:	Depth to Water Table:	Slope Failure or slip:	Dip Slope & Direction:	5 COL (+)		Roots		T	TT	C M	71	00	FM	00						
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over residuum			Strike:										8/5 NYS							
siduum			355	- 1		Notes							3/8 lithochrom	10						

Soil Scientist: JOWN WAY Field Assistant:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-	193-16	10000	-	201	MST	Topographic Position:	tion:	BACKS	100	(61		Parent material:	terial:	COLLANION	MOIN	OVER RESIDVUM
Date:	5	3/10					% Slope:		3570				Slope Aspect:	ect:	700		ľ
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	ırvey			Drainage Class:		P	MHAT	e k	サノハームド	Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		40:				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	Bt	(5- W	E185	1			Bedrock Type :		SILISTONE	TOZE	1574	47	Dip Slope	Dip Slope & Direction:	7		Strike:
Mineralogy:	ž	MIXED					Vegetation:		1 NHISAHO	010	PK	AD OAK	+	ICKORY		76 P	1
										P		1	+		1	-	a
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickboness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Product Penetrameter/	Lab Sample ID	Notes
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			-														

Other Notes:

MEATHERED GOLD BEDROCK For PICH SHALE SILTSTONE

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TEST PIT DESCRIPTION

Soil Scientist:

Field Assistant:

Dave Skippon

Signature: 25 0

2000

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID: Date: Job Name: RETTEW Job #:		p 195 - 16060 % - 137 0 6 /0 % / 16 Dominion - Atlantic Coast Pipeline Soil Survey 089962000	Pipeline Soi	137S	50	0	Topographic Position: % Slope: Drainage Class: Depth to Refusal:	tion:		AIN DAM	1 10		backsign	backsign	back	Slope Aspect: Depth to Water Table: Slope Failure or slip:	backsign
NRCS Soll Unit:		- 200	Woda he	hala -	Dekal	6	Bedrock Type :			5	1+stone		-	Din Sione &	Dip Slope & Direction:		
Mineralogy:	-						Vegetation:		hick	WSDA 1	sed (maple,	1	+0116	+ulip popla	+ulip poplar	+Ulif poplar
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastichy/ Sticklesss	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color		P. Redox Feature Description		Bades Feature Roots Peaker Bearingment pt	Redus Feature Description Roots
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203 60	60	7.57R% SI	SI	20	0	30	1-2	55	2msbk	ナラ	1	1		1	1 4	η	η

Other Notes:

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION

Steve Dadio

Dave Skippon

Test Pit ID:		0196-11	-80909	=	57-50	99	Topographic Position:	tion:	,	Joper		backsbop	Parent material:	terial:	0		180	3
Date:		06/0	08/16				% Slope:		3	211			Slope Aspect:	ect:		X		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:			WO			Depth to 1	Depth to Water Table:	NIA			
RETTEW Job #:	0899	089962000					Depth to Refusal:			NIA			Slope Fail	Slope Failure or slip:	-	A		
NRCS Soil Unit:	7	und -	Wataha	10 - E	Dekal	0	Bedrock Type :		5,14	tstone	0		Dip Slope	Dip Slope & Direction:		Str	Strike:	1
Mineralogy:		3	1480				Vegetation:		red 1	Mcyole	tulip	p poplar	'			-	inc.	
										USDA								
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plantidty/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Chilhothess	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
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Other Notes:

TEST PIT DESCRIPTION
Soil Scientist:
Field Assistant:

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Signature:

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RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	0 10 7	- 160606	,	1047-5	PP	Topographic Position:	ition:		backs	3000		Parent material:	erial:	00	Ollovion	11	85
Date:	0	-				% Slope:			40			Slope Aspect:	ft.	1	40		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	tic Coast Pipeli	ne Soil Survi	еу		Drainage Class:			Ty.	7		Depth to Water Table:	ater Table:	2	A		
RETTEW Job #:	089962000	/				Depth to Refusal:			2	A		Slope Failure or slip:	e or slip:	N/A			
NRCS Soil Unit:	Mr Cluna	- Wa	0	ada - De	De Kalb De	- 10	X	1	5.	totone	0	Dip Slope & Direction:	Direction:	1		Strike:	1
Mineralogy:		Jiyon						red	Maple		+0110 E	oplas	hickory	1			
									USDA		, ,	100					
Horizon	Depth in Matrix Color inches		Texture %	% clay % sand	Rock nd Fragment Type & %	Rock Fragment Size (inches)	Plantidty/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horlaun Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Product Panetrometer/ pH	Lab Sample ID		Notes
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Other Notes:

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Steve

Signature:

Job Name:	NRCS Soil Unit:	Mineralogy	The state of the s	Horizon	00	A	m	26+	2 8,2	236	
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st Pipeline Soll	+ 1/4 -	Man	200	Texture Class	i	5.1	5:1	1:5	Sil	5:1	
Survey	alasta	SHOWED	-	% clay	1	15	13	8	23	6	
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		JE ROUD		Rock Fragment Type & %	20	20	9 25	2 25	30	C30	
Drainage Class:	Depth to Refusal:	Bedrock Type:	Vegetation:	Rock Fragment Size (inches)	1-5.	351	1-5.	2.5	٠٠	1-2	
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5			red	Structure Type, Grade, and Size	7	1 fgr	yasm 1	2 mssk	2 ms6k	1 m p1	
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Slope Aspect: Depth to Wate	Slope Fail	Dip Slope	+01	Redox Feature Description	1	1	Į.	(-	1	dwo	
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		Strike:		Notes					2,54R 5/8	Manganese	HT.
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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION

Test Pit ID:	100-160603-1496 - Sde	103-IH	-35	Sde	Т	Topographic Position:	ion:		1977	のできるのが		Parent material:	rial:		
Date:	27.03/2	5			V P	% Slope:			21%	>>		Slope Aspect:	f.	300	
ame:	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil				Drainage Class:			(J)			Depth to Water Table:	iter Table:	2/2	>
b#:	089962000			,,		Depth to Refusal:			þ			Slope Failure or slip:	or slip:	1)
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Other Notes:

TEST PIT DESCRIPTION

Soil Scientist: New Long Village Paraves,
Field Assistant: Miguel Paraves,

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lob.Name:	Dominio	ominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		ハスゴル				Depth to Water Table:	ater Table:	4			
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NRCS Soil Unit:	J.	J. 785	インこ	- N.	. CWW	Ω	Bedrock Type :		終むこ15	\$ 1-02 x			Dip Slope & Direction:	, Direction:			Strike:	•
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Soil Scientist: シャップァ しゅくごう Fjeld Assistant: シュック・ラ トゥッカーの

Signature:

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NRCS Soil Unit: RETTÊW Job #: lob Name: Test Pit ID; がで Horizon 12: Depth in inches ار الم 089962000 Dominion - Atlantic Coast Pipeline Soil Survey J1548 54 TOTAL S Matrix Color 6 Texture Class IA Services 1 W. $\bigcup_{n \in \mathbb{N}} A_n$ シトガイのファ % clay F3. Ō. 1330 A LE 1 % sand 190gr 41. Fragment Type & % ত্ৰ্ ত $\tilde{\circ}$ ٩ R Drainage Class:
Depth to Refusal: Rock Fragment Size (inches) Vegetation: Bedrock Type: Topographic Position: 4 \$. 4 Planticky/ Stickings Structure Type, Grade, and Size 4 3 3 55 Chestaux 2 以下 Molst Consistence 5 Saucision P 0C 22 23 C. W. Horton Boundary Topography & Olithochess Δ 000 Redox Feature Color Reson Feature Description Slope Failure or slip: Parent material: Dip Slope & Direction: Depth to Water Table: Slope Aspect: 1 n 2 E Try Roots <u>i</u> ě. K. C.V. 7.75 11.81 67 Š ٧Ţ 75 Lab Sample ID 780 50 Strike: NOCON 360

Other Nates:

Field Assistant: Down Skippon

Test Pit ID: ob Name: /lineralogy: RCS Soil Unit: RETTEW Job #: J. 4 Horizon J m Depth in inches 5 1-7 w _____ 089962000 Dominion - Atlantic Coast Pipeline Soil Survey 7.58.2 10 × 27 7.582 アンダング 3×5 Matrix Color 10785/ W P うべきゅう Texture Class <u>.</u> ſ Michiga % clay <u>~</u> 3 Ol. 15<u>=</u> Ō % sand (C) (J) Ü E ð Rock Fragment Type & % 5 J G P Soc. Ğ. Ğ. Š Š C % Slope: Rock Fragment Size (inches) Topographic Position: Bedrock Type : Depth to Refusal: Drainage Class: Vegetation: _. {\} 5 5 - 23 Planticity/ Stickings ١ Structure Type, Grade, and Size N 2 1 7387 4 Chestrut oak block ا <u>ک</u> 020000 5 で すっ Moist Consistence di. 1 4) 7 \$ \$ É CD9 65 4 ٤ 100 DA Redox Feature Color A STANSON -Ì Redox Feature Description Dip Slope & Direction: Depth to Water Table: Slope Aspect: Parent material: Slope Failure or slip: 1 j } · · ĺ 0 1 (^\$ (^\$ Z () Z 1° (`` Z E E Roots 5.5V 4.25 2,25 かが 22.t 75. ائم × . × Ţ. 75 'n 0 0 0 Lab Sample ID 1 l *Hellerin ij 1 closeto porto-channer). U Notes you'ze

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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION

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Other Notes:

Field Assistant:

Signature:

Test Pit ID:	P-205-16	0603 -	こへイ	1730	Topographic Position:	sition:	54 xx yx (7 / 5	ンチュー	7 17	Parent material:	erial:	COCCOVION		ever resident
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Field Assistant: を产立

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Soil Scientist: Field Assistant しょうてん Test Pit ID: V-7 Mineralogy: NRCS Soil Unit: RETTEW Job #: Job Name: TEST PIT DESCRIPTION Other Notes: ds L () () Horizon 10 V الاز کې ور ئ 13, -X Depth in inches 1040 20 21-109031-10 Dominion - Atlantic Coast Pipeline Soil Survey かいこのでして A KANA 089962000 5 Kyrra IV 10/2/V/E 42 MF, 42x ヘアリン ハー のとれ の以来とうるいろ Matrix Color ۸, T とやら MACAX 150 400 1 Texture Class (" T (J <u>(</u>5 % clay ţ 6 Ö (ゆかのべ、ひかとて、 シング 0 % sand ټـ ن L 60 1 マチィャ アスロアをデスソ Fragment Type & % 10/20 B 1-2-5-VI ROCK Ø こでけ こっ ア À١ Rock Fragment Size (Inches) % Slope: Vegetation: Topographic Position: Bedrock Type: Depth to Refusal: Drainage Class: \bigcirc ٧ د ٧ 6 ر ا ا ~ Signature: ŧ 0 14 6 1970-350 7³ -d 0 SS Martiety/ Stellens Ş ු අ d # 3 1 (あっこで むりのと・ とずった 1550 To Sp Structure Type, Grade, and Size MIXCY DECITOR とうかけ かんだい いかなけいてのなれ へい いいろう 1 クナヤ パヤ ₹! ~ در LA Moét -1 ... でき ļ بة (ي とすることはいれ ソレスドート ₹ 2 2 Ę ١ 1/9/ なしられのからない。 Redox Feature Color つりるので F. ... されマ人 シルらかし 1 ſ 7 12075 Nation Fasture Description Dip Slope & Direction: Slope Failure or slip: Depth to Water Table: Slope Aspect: Parent material: ١ ١ 1 TALE SALT 1 Well Drained くしむせの マダイメーン 17 17 14 4 5 h なり、い 7-4 ر. خ $\vec{\eta}$, (スペンソ Roots ١ 2000 ンコロディスク 0.25 7/2 Sio ですのことことと N. S. $v_{\rm v}$) Į 1 1 'n S w (240) Strike: V AI (I) 70 Lab Sample が く 1, ١ といろし Z OT TO RETOURS アヤセアハナショド しれしゃついで かりづからの大 ر ارو ارو RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phoner 717-394-3721 Faxr 717-394-1063 Notes ٧ 2:

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Soil Scientist: Field Assistant:

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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist:

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RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION Dave

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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION Soil Scientist: $S+e \lor e$ Dave Skippon Dadio

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	l	1-12	117,3	1-3,0	7. 17	3-44,5	Roots		Dip Slope & Direction:	re or slip:	Depth to Water Table:	it:	terial:	
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	 S-15	5-5 A/B	S-4 A/B	8-3	S-2 A/B	S-1 A/8	Poden Presidentiast/ Lab Sample					,	l	
	141.75 1875	いったり	ر ده.						Strike:				2 10	
***************************************	CITHATARA C	5, 4 4 5,45 4 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	SPINS FOUND				Notes						がごびららえ	
		م ^ا												

Other Notes:

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TEST PIT DESCRIPTION

Soil Scientist: ノタヤイ スタル

Signature: () () () () ()

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Test Pit ID:	P-214	140802-	1 1 1 1 1 1 1	100	Topographic Position:	L	はなってくてったと	1	アンアスト	***************************************	Parent material:	rial:	てのしていないひか	l	のくれだ	がいているとろ
Date:	25.5				% Slope:	3-7	20/0			10	Slope Aspect:		N N O			
iob Name:	Domínion - Atlantic Coast Pipeline Soil Survey	Coast Pipeline Soil Su	rvey		Drainage Class:	ź	えれでく			_	Depth to Water Table:	ter Table:	-			
RETTEW Job #:	089962000				Depth to Refusal:		; X			10	Slope Failure or slip:	or slip:	*			
NRCS Soll Unit:	J へ ド と こ	F			Bedrock Type:	<u></u>	いかかりくてので	929		-	Dip Slope & Direction:	Direction:	M ~20]	لا لا لا	Strike: 2	1400
Mineralogy:	S1010E 003	5			Vegetation:	<u>ን</u>	アンメイク	OME!	50000				(2	シ		
								SDA.	USDA							
Horizon	Depth in Matrix Color Inches	Texture Class	% clay % sand	Rock d Fragment Type & %	Rock Fragment Size (inches)	Mendatry/ Strue	Structure Type, Grade, and Size	Moise 4	Horizon Boundary Topography & Distinctories	Redox Feature Color	Radux Feature Description	Roots	Pocket Penetrometer/ L	Lab Sample		Notes
9	0/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2	1	1		1	1 1		(a. J	1	(ペーペポッド		.		
Ŋ	1 cotto	У Г	4	the na		400	(9/2	•	1	3-4°E, F,	E. S	†		TO THE PROPERTY OF THE PROPERT
M	SERVIN A	2 5	ج ب ا	70	Ŝ.	7 5	1450	200	7_	١	1	1 - E M	, 8	1		
J. 22)	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		ો હ	_A_6	7-4	75 17	12,184	7	(et	1	١	7-5,40	0.25	1		
2 2 2	827 2 2 10 10 SE	, ,	F 50	200	+	5 P / 18		7	8	1	\	マウン アン・アン・アン・アン・アン・アン・アン・アン・アン・アン・アン・アン・アン・ア	9.5	1	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	्र १ ८
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Field Assistant: NONE TRUMY

TEST PIT DESCRIPTION

Test Pit ID:	7 1	1000	ر ان ان	C T	1 (0 ,	するいく	う デージ シンギ Topographic Position:	tion:	でやったかい	(0 V	いてえ	ZKAN	Parent material:	terîal:	つかってとというか		かんちゅ	可いてくない。
Date:	612	7. 1 a			'		% Slope:		٠ ١				Slone Aspect:	d:	در پذر	- [2 to 3 do 4 d
Job Name:	Dominic	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:	ş	をやして	`			Depth to \	Depth to Water Table:)			
RETTEW Job #:	089962000	000					Depth to Refusal:		3000				Siope Failure or slip:	are or slip:	ı	***************************************		
NRCS Soil Unit:	<u> </u>	O M KECK					Bedrock Type:		シャンナー	* 0 %	₹.,		Dip Slope	Dip Slope & Direction:	S. 7. S.	274	Strike:	ুক্ত সংব
Mineralogy:	\$ 16	10.00000					Vegetation:		シーメック	المحدد	500J×	,			\sim	7880)		
										USDA	USDA							
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (Inches)	Fleeddry/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Boandary Topography & Oldfactures	Redox Feature Color	Rudox Feeture Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID		Notes
<i>⊘</i> e	o , , ,	1	}	1	1	١	(-	ļ	ţ	9			71 71 74 74	()	5/2		
7	2,2	Tour sold	SL	Ø	42	e p	4 +	0 d 0 S	333	YER	PY		1	3742,4	f &	- 1 ·		
Δ.	24	[m25]2	27	o √ ?	h	S 19	2 - 3	ठूठ १०	1650	75	84	1	1	3144,4	ت ع ت ع	W W		
34	20	(0101)0	27	(5)	9 9	27	ري ر ي	55	13/5%	752	CY	1	f	7 11	٠. ٢ ٢٠٥٥ کې ۲۰۵	PUL		
827	3 3/	7 7 7 7	25	16	6	77	, i	\$ \$2	300	7	C4.	1	1	7 7	4.4 52.0	8 /4 N		
5 %	SK 28	10-10-10	25	ኔ ታ	N	To a	1-2	\$ 0	13 JA F	13	2		f	- n - N	8.8	4/8	ひろとない マウック マントイン マントイン アン・ストン アン・ストン・ストン・ストン・ストン・ストン・ストン・ストン・ストン・ストン・スト	CLUMONTO TO T
F	3°4×	10,10,6		A S S S S S S S S S S S S S S S S S S S	1	J.	<i>M</i>	3	Pock	ļ.	in the second	Brown.	, ,		6,3	4.000m	BHON PULV	ではいくなからから
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BEST CHARACTER CANONINA

TEST PIT DESCRIPTION

Soil Scientist: DUANE TRUAY

Field Assistant: Taylor Walter

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	40	216-160608	1	140-	741		Topographic Position:	tion:	RACK SLOPE	OPE			Parent material:	terial:	Resid	Sidución	
Date:	00	06-08-2016			1		% Slope:		302				Slope Aspect:	ect:	1960	5-5	W
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		MODERATECH	5711	WELL	DANNED	Depth to \	NEO Depth to Water Table:	NIA		
RETTEW Job #:	0899	089962000					Depth to Refusal:		361				Slope Fail	Slope Failure or slip:	NIA		
NRCS Soil Unit:	3	27	Channely	Loca	4		Bedrock Type :		ンプをイン				Dip Slope	Dip Slope & Direction:	660	>	Strike: 26/0
Mineralogy:	G.	~	0				Vegetation:		White	Jak.	Chestout	not oak	5	Nott But	E. Dogwood	1	Mary Engl
										USDA					, 0	17	0
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Bowndary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrumeter/ pH	Lab Sample ID	Notes
be	9	7512	1		(1	1	1	1	L	54	į.	Ţ	1	4 1	1	
1 mB	-0	6/4	8	00	35	35%	2.0	50	1,1	205	YS IN	Ī	1	7,0	1.25	1	
BWZ	8-21	1042)	21	de est	XC1+	6.0	52 50	5BL	Fr. F	FRS WA	J	1	1-1	7.25	3	
0	200	10712	Sil	2	24 28		45% 0.25-	5 8	SBK	IN	AT IA	Civient Dilong	600 CD	1,0	1.5	1	
R	2007	1	1		1)-	7.	1 1	1	1	1	t	1	1	, ,	1	SHALE

Other Notes:

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION

Soil Scientist: DUANC TOWAY

Field Assistant: Tay or Wellter

Signature:

Test Pit ID:	102	P 216A-160	160605-	1270	1320-DA+	'	Topographic Position:	tion:	S HOULDER	1			Parent material:	erial:	Kesidu	wow	
Date:	06	06-08-2016					% Slope:		280				Slope Aspect:	Ct.	3060	NN	
Job Name:	Domini	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil :	Survey			Drainage Class:		SOMEWHAT		EXCESSIVELY	DRAINED	Depth to W	ater Table:	NA		
RETTEW Job #:	089962000	000					Depth to Refusal:	at.	24"	V			Slope Failure or slip:	re or slip:	NIA		
NRCS Soil Unit:		Borks chamner	S Sanar	1	MOON		Bedrock Type :		Shale				Dip Slope &	Dip Slope & Direction:	740	5	Strike: 2150
Mineralogy:		Siliceous	1	1			Vegetation:		Virginia	Pine							
-80						Rock				USDA							
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
00	1-0	7.57K	j	1	1	1	1	1 1	7	1	SA	1	1		4,2	1	
Bul	5	tork 414	2	7	42	35% OF	5.1	50	1,1	FAT	FAT SA	1	1	- 12- C 27	1.5	١	
2002	5-10	71512	X	2	7	15% 113%	3,0	00	SBK 1,2	724	SA	1	1	1,c	2.5	1	
12	10-18	7,54	Sil	01	30	189°	4.8-	50	W'M	200	IA	1	T	1, m	4.5	J.	
2	$\tilde{\omega}^{t}$	-1	1	1	ţ	1	1	, 1	1	(1	1	y	Ţ		r	SHILL BEDROOM

TEST PIT DESCRIPTION

Soil Scientist: Juane Truck

Field Assistant: Taylor Walter

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

	0.	0211-8 11-01-08-1414-	100-11	114-1	A		Tonographic Position:	ion:	RAMA LOPE	SIGN			Parent material:	erial:	RESIDUAM	Riber !	1995	There's
Date.	2/2	06-08-2016	000				% Slope:		25%				Slope Aspect:	Ħ	2630	-		
lob Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		SOME WHAT	五十四	EXCESSIVEY	the i	VOA! NEW Depth to Water Table:	ater Table:	NIA			
RETTEW Job #:		2000					Depth to Refusal:		26"				Slope Failure or slip:	e or slip:	NIA			
NRCS Soil Unit:	7	Spales channers	1	+	MOD		Bedrock Type :		June				Dip Slope & Direction:	Direction:	860 1		Strike:	245
Mineralogy:		1100	0				Vegetation:		Virginia (Pine 6	Whitefing	ORes	trut &	Oak, Wa	aite Olas	Scarlett	Lett Bel	R
100		шь							1000	USDA								
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Platticky/ Stickings	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography A Distinctness	Redox Feature Color	fledos Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
00	1-0	1/52	1	43.	1	1	1	1	1	t	SA	١	١	1	4 1)		
Bul	4-1	1042	P.S.	12	25	25%	0.25-	50	1.1	FAF	4	,	1	D 37	45	1		
Bur	7-14	6/4	Sid	4	X	767.	0.25	50	58K	ES .	SA	ì	1	10 %	7.0	1		
0	14-26	104%	03	18	74	X0.14 92%	0.25-	50	MA	FMZ 54	4	1	1	1,3	北大	Ţ		
2	26+		1	1		7	<i>j</i> =	1	ľ	1	1	1	1	1	1 1	1	1	

Other Notes:

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION Signature:

Test Pit ID:	10	P-217-161	3608-0823-	082	3-AAT	4	Topographic Position:	tion:	RACKSLOPE	De			Parent material:	terial:	Periduin.	u.A.		
Date:	00	06-08-2	-2016				% Slope:		(05%				Slope Aspect:	ect:	160			
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		WE26 D	DRAWCO	8		Depth to V	Depth to Water Table:	1/1/			
RETTEW Job #:	089962000	2000					Depth to Refusal:		101				Slope Failure or slip:	re or slip:	NIA			
NRCS Soil Unit:	Ber	Berks Channery	my Jacon	· ·			Bedrock Type :		SHAC				Dip Slope	Dip Slope & Direction:	700	Z T	Strike:	1950
Mineralogy:	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	iccous	0				Vegetation:		Rosmo	al. S	rear 1	moch .	carl	carlett Oak	Dogwood	-	Wichon	
										USDA		1 1			0	40	7	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctions	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
000	5-05	0-05 25/1	1	١	1	T.	,	f r	İ	1	NA A	1	1	1	4 1	1		
A	0.5-1.5	7.582	Sil	_0	元	BR 15%	0.25-	P0 50	6n	3271	VENT SA	1	1	2,7	250	١		
Bul 1	15-90	75th	Sil		4 35	30%	15.7	50	58K	FAT SA	54	1	1	7,7	1.0	1		
BWL 9 049.0	pipe P	21/6	2	17	X	YOK YOK	YCK 0.75-	50	5BK	PAI SA	SA	1	1	700	7.8	T		
N	19.0+	1	1		-()	1	1	1 1	1	t	T	(1	1	1	1	7X	SHALL BEDROW

Other Notes:

Soil Scientist: DUANC TRUAX Field Assistant: Taylor Walter

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P2/8-	P218-160608-1010-	5-1010	0	7		Topographic Position:	ition:	SHOUNER	612			Parent material:	terial:	RESID	mun	
Date:	06-0	06-08-2016					% Slope:		242				Slope Aspect:	ect:	2710	2	
lob Name:	Dominion - /	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		0	RAINE	0		Depth to \	Depth to Water Table:	N/A	-	
RETTEW Job #:	089962000						Depth to Refusal:		18"				Slope Fail	Slope Failure or slip:	N/A		
NRCS Soil Unit:	Benks		channers	Lonn	4		Bedrock Type:		NHAM				Dip Slope	Dip Slope & Direction:	790	M	Strike: 10
Mineralogy:	Silineous		0				Vegetation:		Chartne	4 70	the	Mars.	5/2	most Pas	2 2/0	B	3
									USDA	USDA		1			1		more
Horizon in	Depth in Ma	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrumeter/	Lab Sample	Notes
De 0-		25/1	1	1	1	1	1	1 1	1	1	*	1	1	1	25		
A I-	-3 7	4/2	0	13	4	202	0.25	000	-6	TA	54	1	1	7,5	27.0	١	
01	7	7.57K	0	5	ì	101	0.25-	BA	N. N.					o h	1.75		
15/23	0	4/5	X	22	47	4+ 50%		55	1,2	FIT SA	54	(1	27.7	4.4	1	
Bt 9.	9-100 7	2/12	Cl	2	50	15% XC+	0.25°	22 62	58x	FAT IA	IA	1	V.	 * T	N S	1	
7	00	1	1	1	JF.	1	1	1 1	1	ĵ	1	1	1	1	1	1	SHALLE

Soil Scientist: Field Assistant: DUANG IPMAY

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	00	0-11-10160	1-0207-	1430-	- DAY	1	Topographic Position:		Rackelo	lone			Parent material:	terial:	Residerom	MON	
Date:	00	1	16				% Slope:		5170	-			Slope Aspect:	ect:	2300	Non	ORTH FACING
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	survey			Drainage Class:		SOMEWITE	1	EXCESSIVERY	1627	Depth to 1	Depth to Water Table:	NIA		
RETTEW Job #:	089962000	52000					Depth to Refusal:		15.5				Slope Fail	Slope Failure or slip:	NIA		
NRCS Soil Unit:		Books chamers	in out	t loans	M		Bedrock Type:		SHA				Dip Slope	Dip Slope & Direction:	550		Strike: 2810
Mineralogy:		2	9				Vegetation:		Whitefine	ANA I	Lickory	y Oak u	14.70C	be the	1 Maple		
										USDA		p.					
Horizon	Depth in inches	Matrix Color	Texture Class	% clay % sand		Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
Da	5.0	7.572	1	1	1	1	1	1 1	1	1	SP	1	1	1	1 2	1	
5	200	10411	7	9	5	CP	1	Po	SBM	7	^	1		2,2	25	5-14	
7	200	413	7	0	-	15%	2.0	8	-	410	F			1,0	T. N	5-13	
	0	lock			\	T	0.25	00	SBK		1			2 12	1.0	524	
Bel	AI		Sil	10	N	18	2.0	50	1,2	2	SA	1	1		45	5-23	
	201	1048				AION	-52:0	89	N815					2 1	2.25	5-34	
Bur	SS	1/2	215	15	5	55%		55	1,3	57	WA.	1	1		7.8	5-3B	
								1							,		CHAIR TOPARL
7	15.5	1	1	1	1	1	,	-	1	7)	1	,	t	7-	Ť	Comment of the Commen
											1						

Other Notes:

N.

TEST PIT DESCRIPTION

Soil Scientist: DUDNE Truck

Field Assistant: Dr. John Colbraith

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P. 220-1	60607-1336-DAZ	336-7	DAT		Topographic Position:	tion:	SHAULDER		DM NO	NOSE	Parent material:	terial:	Day	B	MUM	
	06-07-	2016				% Slope:		188				Slope Aspect:	ect:			2400 N	
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	Coast Pipeline Soi	Survey			Drainage Class:		WellD	Cuine	1		Depth to Water Table:	Vater	Table:		N/X	N/A
RETTEW Job #:	089962000					Depth to Refusal:		2.0				Slope Failure or slip:	re or	slip:		N	N
NRCS Soil Unit:	Derke Shannens SIT	ample S	L	00 m		Bedrock Type :		Shale				Dip Slope & Direction:	& Dire	ction:	ction: 120 S		120 5
Mineralogy:	Sliceaus	0				Vegetation:		Cherry (7	Hinday	Lingian	16	3	hidefine	Pine white	e suder, e	se with white oak
Horizon	Depth in Matrix Color inches	Texture Class	% clay	% clay % sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Stickiness	Structure Type, Grade, and Size	Moist	Horiton Boundary Topography & Distinctness	Redox Feature Color	Redux Feature Description		Roots	Picket Penetrometer/		Picket Penetrometer/
000	0.5 7.5m	7	1	١	1	1	1	1	J	SA	t	1	N	12	T		
A	B.0 1042	Sid 15	7	S	407-	0.25-	\$0 50	1,1	NEW	VEN WA	1	1	- 10	40	40	40	40
BNI	3.0- 109K	o Sid	20	8		4.0	55	1,2	2	S A	1	1	- 14	2			
Bul.	9,0- 7,54x 20,0 5/t	4 Sil	24	24 20	X01+	8.0	5 5	113	2	SA	1	1		202			
2	24+ -	Ţ	1	1	f	1	1. 1	1	1	1	1	1		-1	1	1 1	SHALE BEXINE

Field Assistant: Tona Galbraith

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	100	10-10-11-17-07	1	72-	777-14		Topographic Position:	tion:	RAKSLOPE	390			Parent material:	terial:	10CL	LUVION FE	北美沙公子人
Date:	06	6-07-2016					% Slope:		2000				Slope Aspect:	Ct:	2000	South	F FACING
lob Name:	Dominio	lantic Co	Pipeline Soil S	urvey			Drainage Class:		MELLI	RAINE	(1)		Depth to V	Depth to Water Table:	>50'		
RETTEW Job #:	089962000	000					Depth to Refusal:		>50				Slope Failure or slip:	re or slip:	NA		7.
NRCS Soil Unit:	72	~	Chammon I som	Don			Bedrock Type:		NA				Dip Slope	Dip Slope & Direction:	11/4	Strike:	ke: N/A
Mineralogy:	12	2	0				Vegetation:		Black Oak,		Chestant Oa	Oak, Will	it a	WHILL AND	tetia.	AN	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
0.0	1-0	7.572	1	1	1	1	,	1 1	1	1	54	1	1	7,5	e 1	5-18	
P	3	754	Sil	Oh	10	802 802	0.25-	50	1,3	宝	NET SA	1	1	7,7	6.6	5-2A 5-28	
M	3-9	107n	ris	0	10	789°	1:0	SO	584	TES	YEAS SA	١	1	2,1	57.5	5-3/4	
Bwl c	9-15	1042	1	12	50	VCIX So7.	0.25	50	5Bh	3	FOT SC	1	(2,100	2.6	5-48	
Bu21	5-23	101×	7	5	50	xc11	50 KC14 0.25-	Po	5BL	E	SA	1	1	J. M.	6.3	5-54	
0 7	2350	109h	52	00	70	なけ	0.25-	500	0,56	SE.	1		1	1	6.5	5-63	
TO SERVICE SER																	

Field Assistant: Dr. John Galbraith Soil Scientist: DUATE TABLE

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-222-		160607-	1055	-DA	7	Topographic Position:	tion:	BARKSLARE	SP			Parent material:	terial:	10/100	MONION		
Date:	06-07-	7-2016	0				% Slope:		2320				Slope Aspect:	act:				
lob Name:	Dominion - A	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Su	vey			Drainage Class:			1366	DRANGO	0	Depth to \	Depth to Water Table:	750			
RETTEW Job #:	089962000						Depth to Refusal						Slope Failure or slip:	re or slip:	NA			
NRCS Soil Unit:	Berks	Berks Channery		Loon			Bedrock Type :		NA				Dip Slope	Dip Slope & Direction:			Strike:	1/11
Mineralogy:	Siliceous	645	1.0				Vegetation:		Scarlet	100	Chestnat	nat Oak	F.YM	PINA	Red Ma	10 10	1	- L
						200				USDA		10000		,		1/1		Same I
Horizon Do	Depth in Mai	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Bowndary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID		Notes
A O.	0.0.5 1042		Sil	0 1	72	353	1	00	111	TAN	SA	1	1	一十	0.25	5-14		
io I	o.5- 10°	104/2	J.S	12	Z	402	5:0	50	SBK	82 SA	2	1		N N		5.2A		
Bu 1 9	9-18 1041		rs	12	20	VCt 557.	3,0	Pr	1,3	ENT 54	54	1	1	2,2	- 1	5-34		
BWZ 18-33		5/2	518	00	53	XCI+	4.0	50	5BK	ENT.	54).	-1	- 73	2:4	5-44		
BC 33	33-50 7	7576	\sim	12 38		x017	4.0	50	5Bn	FA	1-	Dilo4/6/3	67	1		5-58		
4																		

Field Assistant: Dr. John Galbraith

Signature: Magnet John and

Test Pit ID:	P-223	73-16C	1667-	091	0-1	F	Topographic Position:	tion:	M	TOPE			Parent material:	terial:	COLLU	alluvium/	Residuum
Date:		1	2016				% Slope:		400				Slope Aspect:	ect:	1800	,	
lob Name:	Dominion -	8	ipeline Soil Su	rvey			Drainage Class:		MELLI	RAINE	63		Depth to V	Depth to Water Table:	NIA		
RETTEW Job #:	089962000						Depth to Refusal:		Bottom Q 46"	2 46"	Soft si	: Itstone	Slope Failure or slip:	re or slip:	N/M		
NRCS Soil Unit:	Beths	s chann	S have	17	00 m		Bedrock Type :		51/tstone	ne			Dip Slope	Dip Slope & Direction:	150	5000+ S	Strike:
Mineralogy:	1111		1880 F	南	STATE OF		Vegetation:		Scotlet Bull hestout	W DY	strut	Oak, W	Stute dak	at this	WWW.	Phaybod	-
3			4		Section 2					USDA					0		
Horizon De	Depth in Inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penethimetet/	Lab Sample ID	
0a 0	2000	187	y	1	1	S. Ja	1	1 1	2 2	71/1/	CA 	,	1	27 FZ	68	5-14	
A	1.52.0	2/2	-opm	0	8	25	0.25	50	1,3	YEAT SA	A	Ì	1	2, 1/2	7,0	5-14	
Bt1 3		7512	SIR	N	0)	32/	0.25	50	1,1	3m	UME SA	ř	1	1.44	0,25	to so	
827	70	7.5.7	Loan 25		N	多年	0.1	X B	58x	m	ME SA	1	1	T _M	6,5	2-4-S	
PK3 1-	7- 7	215	ca	20	30	30%	3.0	\$ 2	782	T	\$	1	-	M	2:25	S#S	
2BC 2	29-	7,542	5:1	00	5	XCH 70%	0.25.	Sos	SBK	24	54	١	1	1	40	5-84	lithochromic colors
20r 3	46	1	1	1	1	1	j	1	1	t	y.		1	A.	f	Ī	Saprolitic

Other Notes:

TEST PIT DESCRIPTION

Soil Scientist: 5 + e + e + e

Field Assistant: Downs

Signature: & Oadle

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	-	p-224	-1606	80	- 1315	600	Topographic Position:	tion:		Back	KSlope		Parent material:	terial:	00	-	lovium over residuum
Date:	1	1	116				% Slope:			34			Slope Aspect:	ect:	100		
loh Nāme:	Domin	00	Pipeline Soil !	urvey			Drainage Class:			SED			Depth to \	Depth to Water Table:	>	1A	
RETTEW Job #:	089962000	2000					Depth to Refusal:			26			Slope Failure or slip:	re or slip:	7.0	H	
NRCS Soil Unit:		Rocks	10	hann	473	51	Bedrock Type :			5, 1+0	STONE		Dip Slope	Dip Slope & Direction:	350	E 40	Strike: 300
Mineralogy:		6	697		,	l i	Vegetation:		h,cl	15054	white	pine,	white	te oools			
-	Depth in	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Plastidy/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
0	-	5782.5/	j	1	t	Ch	1-2	1 1	1	t	9.4	1	1	T C 7	5.0	ŧ	
A	3	101R 3/2	1.5	16	20	50 45	1-2	80	16 85	141	Ow.	1	1	71 0	5.0	1	
5	7	101R 5/6	1.5	15	70	40	2-4	80	14 sbk	+	9.4	1	V	ロエつ	1.25	1	
\cap	26	104R516	S.	75	B	0b	11-11	80	0 m	13	78.50 18.50	1	(コアコ	4.75	1	foots between
P	26+	1	1	T.	1	1	1	, t	1	1	1	1	1	-(-	1	1	

TEST PIT DESCRIPTION
Soil Scientist: Michael Lane
Field Assistant: Dr. Ge lb a PM

Other Notes:		14	S X	(A)	2842	281	123	0	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
ı			19-15	65.0	80	6-24	7.6	0-7	Depth in inches		000		Domini	6	Ø
Sampled/Dup.	ere .		3B x 39-1575/124/4 5:	38t \$0.59 10/R5/6 5il	281224.307.542514 Sil	28+1 16-24 7.540514 511	Bt 7-16 7.5425/6 5:1	10/12/15 sil 12	Matrix Color	Muses Wines	1 (Duowadan)	000	Dominion - Atlantic Coast Pipeline Soil Survey	101/2016	D-225-160601-1130-MED
1/1991			i g	ž.	1 S. B.	V. 2	~	s: l	Texture Class	279	1	>	Pipeline Soil	6	0000
ر برق آ	9: sca -		76	W	び	ひ	20	72	% clay		+ING OUNA	· .	Survey		-1130
· .		J.m.	U .	<i>Q</i> 0	Ū	101, of 101, o	<u>0</u>	ō	% sand	,	1300				1 300
			30%		15 40%	\$5.00 Page	ä		Rock Fragment Type & %						
			6.4		^	V	-		Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
			G W	8 3	X 5	R A	357	8 8	Plentidhy/ Stiddonos						ition:
			2mabk FI	SE ZMSBK	15	2fsbk	MS 2msbx	2f8ran	Structure Type, Grade, and Size	USDA WHITE AME, I		cobbly free chorizon	スとり	2.5%	foots
			7	Ty.	N. T.	7	T/K	क	Moire Consistence	USDA C		500	V	0,3	000
				200	SC	20	20	C	Horton Doundary Topography & Directors	10 P	5	C Post	,	1	\searrow
			1.5425/2 7.5405/8	7.5405/L MMd	1,5/10,5/6				Redox Feature	, on , or or or		on 45"			FERRICE
			ACD TO	N N N	C 33 +7	1	1		Radox Feature Description	000,50	Dip Slope	Slope Failure or slip:	Depth to V	Slope Aspect:	Parent material:
				77	2 f, m	2¢,~	3 m /3c	3vf,f,mx	Roots	AJONO: A AMERICAS' DOOMNA	Dip Slope & Direction:	re or slip:	Depth to Water Table:	ect:	terial:
			2.0	2.0	N.T.	took,	2.25	4.8	Pocket Penetrometer/ PM	l T	1 1	-	24.0	2500	હિં
			8	S,	τ. \	\N \N	52	SI	Lab Sample ID	Dr. 164, 41.	1		S	S	Colluvium
-			,						Notes	1 d 09 w 000	Strike:		The state of the s	***************************************	
					.:										

18,30 E 2 /sa TEST PIT DESCRIPTION
Soil Scientist TONAL COBULTS :ameN dol Field Assistants M. 11/900 . Sohn Wak RETTEW Job #: Test Pit ID: Other Notes: Vlineralogy: VRCS Soll Units Horizon D 1<u>0</u>, × Depth in inches Dominion -- Atlantic Coast Pipeline Soil Survey 089962000 72-4-9511-CE P-2251 - 16 06 01 - 1130 - JCR -Fair C 1 1 x 3/10 Story Sign 9 K 3 X 1 Matrix Color 5. 77 Texture Class S. . T <u>~</u> 7 % clay ()e +) % sand 25 ٢ 3 £ 63 C O (c 2) Fragment
Type & % 7 Rock % Slope: Rock Fragment Size (inches) Bedrock Type: Depth to Refusal: Drainage Class: Topographic Position: Vegetation: ٧ 10.5 7 Signature: ا مسر دو MAN CE WAS I REPLACE MAN DE DUE -Ø 9 3 Pleaddy/ Stickless SS SS S -3,00 LASSETTE ですって不可 Structure Type, Moist
Grade, and Size Consistence MIXED DET COUSTY THE DEPT OF THE PARTY かくするかかくずる l 1 NEERS 53 Horizon Doundary Topography & Oirdnames ١ ना भि Redox Feature Color ١ U Dip Slope & Direction: Slope Failure or slip: Depth to Water Table: 10/25/6 2 E Radox Feebura Description Slope Aspect: Parent material: (Somewhat Poorly Drained 3 p 9 × 20 Ē Roots υ 5 7.4.7 ふう 0 s e 0,忧 ナーシュー 7 ١ ١ Lab Sample ID b 5 $\frac{2}{8}$ Strike: l RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fazc 717-394-1063 Notes

Soil Scientist: STEVE DA

Signature: Dave Ordi

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

7 2 2 4			1			ľ	
ا ا ا		% Slope:			Slope Aspect:	() ()	,e
lob Name: Dominion - Atlantic Coast Pipeline Soil Survey	ast Pipeline Soil Survey	Drainage Class:	S		Depth to Water Table:	2,21	
b#:		Depth to Refusal:	V 50 %		Slope Failure or slip:	***************************************	
.		Bedrock Type :	٦	compared some	్ ైన్ లేస్తు Dip Slope & Direction:	Strike:	
		Vegetation:	r I	2) ^ (0	aak, witch	hozel red madle seserrass	Serves
Horizon Depth in Matrix Color	Texture % clay % sand	Rock Rock Fragment Predaty/ Fragment Size (Inches)	Structure Type, Most	Horbort Do.	ature Autor functive Roots	redestransonment Lab Sample	Notes
2 2/c 2/c 2/c	5	00 1 7 20 00 00 00 00 00 00 00 00 00 00 00 00	23 5 7 7 7 7	F & 1	- 101 - 101 - 107 - 107	2 0 0	
apathola ring	18 12	7 · · · · · · · · · · · · · · · · · · ·	43/3K	CM CM -	1 1-4	2.0 \$ 2	
118 aloate of the	72 14	1	\$ 2000 \$ K	620 Fr 5	Volument Spacet	\(\frac{1}{2}\)	DISCONTINUESS
BKY No SO TSYESIA	SY 18 10	10 21 SS	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	443 -	8/5=2/5 W-7/2=26st	1 hs 0 4 xxx	FRACIC PROFERIES
							•

TEST PIT DESCRIPTION
Soil Scientist: Duane Truck
Field Assistant: Michael Lane

222	5	2,7	Rt 1	BE 2-7	The state of the s	Oe o	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
31-38	43	16-24	7-16		N	0	Depth in inches	1771	17	089962000	Domir	6	ע
1	24-31 IOYR46	8+2 16-24 to 7.51/2 XCM	B+1 7-16 101/25/8	10/R sile	10/12 4/3	7.54R 2-5/1	Matrix Color	m Xec	NO CRV	2000	Dominion - Atlantic Coast Pipeline Soil Survey	0/1/16	P-226-160001-1400-DAT
1	XCX	·		ā' S	õ.	1	Texture Class				Pipeline Soil S		Q601-
ì)	20	20	ō	œ	,	% сау			٠	urvey		O
\	. ,	32	$\bar{\mathbb{Q}}$		Ŋ	j	% sand						Ž-Š
١	Ω Ø	S.	いた	Ī	<u>0</u>	1	Rock Fragment Type & %						
١	chounters 1"	channes	M-12"	channers	Channers		Rock Fragment Size (inches)	Vegetation:	Bedrock Type:	Depth to Refusal:	Drainage Class:	% Stope:	Topographic Position:
1 1	† \ <u>`</u>	ष्ठ ४	8 8	SS Pd	8 8		Plantidity/ Sticklingss	_					don:
١	Ø 3	1fsbk	- MS-S	1 m sblc	COATYER	1	Structure Type, Grade, and Size	White pine, White Oak, Black from	STINE	8	E	43%	Shoulder
}	K	FR	T S	12 13	TR		Moist Consistance	USDA TRE	≥ 			,	6
)	1/4	SA	SA	S/A	\$	SA	Hofton Soundary Topography & Distinctoness	1 1 M)			c	(भिभूष्याड
				,	1	١	Redox Feature Color	333	. [slightly conceive
-	1	1	-		1	١	Redox Frature Description	ICEC MODIF	Dip Slope	Slope Faiture or slip:	Depth to V	Slope Aspect:	Parent material:
, 	1	l m	2 m	3m,0 5.0	3	-	Roots	70/8	Dip Slope & Direction:	are or slip:	Depth to Water Table:	ed:	terial:
1	too	7.75	4.5	0.5	o.25		Podet Panetrometer/ pH		72,	1	1	1950	Collwood
ţ)	S	12	S3	52	S	Lab Sample ID		m			٥	al creeo
Si/	S?/	7. 1.参c							Strike:				Creeo Over
silt stave bedrock	Hytone	7.5/125/3					Notes		W				residuan

Other Notes:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Signature:

なるとなることが

Field Assistant:

TEST PIT DESCRIPTION

3750 Notes 20 % € (85°) Strike: RESIDUAL Lab Sample 1D 2 rΔ -}-~ ىن このかし 1 - C GLES Pocket Penetrometer/ pH とんか マナング・アングランナウ 0 6,0 0 ì アンスでん なって、とり スースアート 2-6,16 Roots 7 Depth to Water Table: Dip Slope & Direction: Slope Failure or slip: Parent material: Slope Aspect: Rador Festure Description) 1 ١ Ì Redox Feature Color いっていくいうか Ì 1 ١ 1 DEC 10,100 S Hariton Boundary Topography & Distinctmen Z, 3 5 S C はっていて とうころ 12 MGP 1872 品 Moist Consistence とのとのことのと ì 1x28K 1 F10K 30 3 3 Structure Type, Grade, and Size Y ON ار بر Ì W Playfelly/ Shishnay Ś p p <u>۲</u> V) **0**~ 20 þ Topographic Position: Depth to Refusal: Rock Fragment Size (inches) Drainage Class: M Bedrock Type: P 10 N. Vegetation: % Slope: ļ V; o Vi N N Rock Fragment Type & % 0 1/2 10 J } J. ტ ქლ ار. ا - 10,50 1251 % sand اب درا 1 2 ¥ P-227 - 160601- 1500 2007 % clay } 12 2 / LO Š Dominion - Atlantic Coast Pipeline Soil Survey - 3 5)) ? Texture Class ゴッフ アンドア 15/0/ 11526 1/5.5012 7 Matrix Color プレング BERKS 089962000 9 F, (2) X P/ Depth in inches 1 ` 0 100 PS NRCS Soil Unit: 1200 RETTEW Job #: Mineralogy: d O Test Pit ID: Horizon Job Name: 2 Δ Date:

とうかい N. K. W 7 1 からない in charle S A A A つなることがして の中午へ 3

Soil Scientist: Drensler months

Signature:

Test Pit ID: Date:	Pominion Atlantic Co	- 16016 IV	100	TO THE	% Slope:	sition:	-16	tolep				Parent mai	Parent material: Slope Aspect:	25	Slope Aspect: 3 6
me:	Dominion - Atlantic Coast Pipeline Soil Survey	oast Pipeline Soil Sur	vey		Drainage Class:		1130					Depth to W	Depth to Water Table:		
NRCS Soil Unit:	Berky	(3 6)			Bedrock Type :		1)				Dip Slope 8	Dip Slope & Direction:	Dip Slope & Direction:	Dip Slone & Direction:
Mineralogy:	, W.	KRA			Vegetation:		Redmaple, Blacksum, V	4, Ble	acksup	(hite	hitcock, L	whitep	white,	white pine blubers
Horizon De	Depth in Matrix Color inches	Texture Class	% clay % sand	Rock nd Fragment Type & %	Rock Fragment Size (inches)	Planticky/ Stickhness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Datinctness	Redox	Redox Feature Color	Feature Bedow Feature	-	Redox Feature Description	Bedon Feature Description Roots
000	0-15 542	1	1	1	1	1 1	Ì	1	SA)) 3£) 3£ 4.5) 3£ <u>45</u> 51
AB 15		7.5	80	18 22 CN	12.	88	18821	VF	CW	,)	1 25 M	1 35 0,1 2M 0,1	
Bw 4	MS h	2,1	20 2	22 38%.	12.	38	IMSBN NEC	3311	Cw			1	1 of M	1 25 N 1:0	2
Tom Ic	h15 of	S, L 14 35	14 35	Sign	12-3"	8 8	ILCOSON VECCU	VFC	33		1	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 8t manyle	
38w 306.		1.546 SIL :	22 18	SS. 38.1.	74"	828	105134 EC CM	5	CW	1	1.	1	110	0.1 11	
30 %	21 25 158 A	2.5	25	25 3E1.	C4"	55	1658K Fr	7	1		1	1	1 - 14	- If 1,25	- If 1,25 Sto
					27.										

soil Scientist: 2, Fenster morely Field Assistant: May

Test Pit ID:	7	N-229-16	160610-		0400-DEF		Topographic Position: % Slope:	ition:	Wid !	Soch	Mid Backstone		Parent material: Slope Aspect:	terial:	187	Linn	
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		Well Drained	ined			Depth to V	Depth to Water Table:	10		
RETTEW Job #:	089962000	52000		1			Depth to Refusal:		59"	- Augur	Ser Ru	Refusa	Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit: Mineralogy:	-	Berks	X R				Bedrock Type : Vegetation:		Hicko	W. M	Hickory, whiteoak,		Dip Slope &	Direction:	Shakeroot	-	Strike:
-	Depth in inches	Matrix Color	Texture Class	% clay % sand	% sand	Rock Fragment	Rock Fragment Size (inches)	Plastidty/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Rados Feature Description	Roots	Pocket Penetrometer/	= S	-
ヤ	511-0	2016	212	16 28			C1/2"	00	80 / 788K UF CW	27V	CM	1		100 E	50	1	Thin layer of duft
BW	17	7.5/10	719	ge 31		404.	1 di 1/4-1/2	P6 255	1884 PG MSBL FG		CW	[(1co	2,0	1	
R	1-12	1.5 NIS 217		18	28	CN 521.	1/4-160	50	1658M Fr	7	SV	1	(T K	1 1	1	
0	465	1	1	1	1	N 851°	2-10"		MO	1	1	t	1	- Q)	1	1	few (no on Ruch laces
Other Notes:		C- CON/9	tains	sisonal single	suppose	- 13	00	33	54 WWG023 85500		with void	63	Special C	51	between.		

Soil Scientist: D. FENSTE MACHE

Soil Scientist: P. Fenstermal Ind.
Field Assistant: Max Dujan

Signature: Aunual M

Test Pit ID:	アーン	アージャー・ロー・ロー・ログ・ロボア	0610-	8	DE		Topographic Position:	tion:	50110	5000	,		Parent material:	orial:	Con		
Date:		-	0110116	6			% Slope:		47	3			Slope Aspect:	#	07	TO TO STATE OF	
Job Name:	Dominion -	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil Su	rvey		-	Drainage Class:		Hall				Depth to Water Table:	ater Table:	1		
RETTEW Job #:	089962000	/				-	Depth to Refusal:		26:				Slope Failure or slip:	e or slip:	1		
NRCS Soil Unit:	Be	Ser 14 (8	(3				Bedrock Type :		Shalo -	Brown	>		Dip Slope & Direction:	Direction:	120	2/2	Strike: 20°
Mineralogy:	>	presim					Vegetation:		5	78/101	hazel, chestnutock,		mapple	Redmaple, Alleghang Blackberry	Blacks	-	13
Horizon D	Depth in M	Matrix Color	Texture	% clay % sand	_	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Roundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Pecetrometer/	Lab Sample	Notes
7	0.8.5	Jhol Vhol	7,5	15 28 381.	30	987	C12"	P0	- PAGR	VF	VETAW	\)	E 32	50	1	Red Shale Co F
AB	1 Ja.5- 10	215 Uho1	1,5	15 28	6	58	V//2"	80 80	80 1853H	NEC CM	33	1	1	10 St. W.	1 28.0	1	Rudshall Cof
BU 3	7-18	7,5 h15,01	2,5	17 22	2 F		1/4-7"	36	1/4-7" SP 1/88/ Fr CW	T	CW	1	(W.to	4,80	1	
5		1042514	1	1	(C5.3	2-16"	1 1	Detired.	1	Cw	1	(示	1 1	-	Bedded Rock w/
P 26+	+	1	1	-	-1	1	-	11	1	(,	- 1	1	t	1.	1	
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TEST PIT DESCRIPTION

Soil Scientist: Michael Lawe

Field Assistant: Rachel Mill

Test Pit ID:	7	P-255-1600	160001-1000-ME	8	MEL		Topographic Position:	ition:	Kick S	Showings	C		Parent material:	torial:	2300	10 10 10	N
Date:	6	17/16					% Slope:		CA HI				Slope Aspect:	7.	25.0	0000	
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		D3				Depth to V	Depth to Water Table:	10		
RETTEW Job #:	089962000	2000					Depth to Refusal:		1521				Slope Failure or slip:	ra or clin-)		
NRCS Soil Unit:	W	Berks 8	¥				Bedrock Type :		Shoole				Dip Slope	Dip Slope & Direction:	230		Strike: 3700
Mineralogy:	me	mixed					Vegetation:		white	DINE	3731	20 to	1	4:4C)	000		-uine.
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctors	Redox Feature	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample	Notes
000)-(1522NS									,	-		W38	0 0	5	
D	N	15 XO	58	0	25	5	^	\$ 2	NOK	天	7			12/32	0.25	N	
	6	1/2 SN 01	2	U	25	3	_	00	NSRI	6	3		-	1436	0.5	9	
			7:0					01		-	1		-		2	,	
6	1	10/1/5/6	Z Z	5	8	3	1-3	30	JARENO	天	= =	-		25,41	tooky		WES FILEP
12	8-1	1018 %	S X X	3	8	4	very	33	53- 7		200		1-1-1		33		
70	7	200	30	9	(5	2	070	5			estilit,				

TEST PIT DESCRIPTION
Soil Scientist: VICTURE
Field Assistant: Science

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Bw 3-87.	Cr 8-247.54	(C 8-24/	7 24+	117												-1	11/1	1 24+	7)					(0 9	7-14	7 8 1	1	1	,					-	1	>)					1.	1 0 1	1	0 11	3				(00	1 1 5	7			inches	Ī	Depth in			The second secon	Mineralogy:		MACO SOIL CHIEF COME TO BE A PO P		KEI IEW Job #: 089962000			loh Name:	1000	Date:	2		Test Pit ID:	
3/4/19	3/6	9/2		trach	4										01-1041	100	1))			ī				1	1100	3	7			1	1	5	111111111111111111111111111111111111111	11/10	1000	5	1			-		-	3	×		1 1 2 2 1				1.00	777	(D./ V	100			_	Matrix Color	_				X80	1	500	100	00	5	Politimon - Atlantic Coast Pipeline Son Survey	Atlantic Coast Din	0 0 0	0	111	100000	37116000	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
VER.	XCB SIL	-6	3	28	(_		5 8	2	-						(1	-			-	(147		r		-			2	11-15	11 11	7		-	116	0 / 0			1	5 5 7	1													7								ne noc anna	olino Call C.				10	11211	2 2 2
2	7 2	22		80		_	-	_		_	_	_	_		1	Q	1		-						5	3	2	1	1	1				(0	1	1	1	J					-	1	1		,		_					_					% clay % sand											vey					111	1 - Ch	1
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1-2	4 204	24																					č	ō	5		2	21010	13	0				1		Ī			1							-	-													THE WORK LIGHT					Vegetation:		Bedrock Type:		Depth to Refusal:		Drainage Class:		waiohe.	& Slope.		ropographic Position:	The state of the s	
88	88	200			-								_	-								1	1	1	2	1		1	7	7	3	1	00	5	7		-	7	17	7			00	>	7		-	70		>							-			Plasticity/		-		-	7	-	4.									tion:		
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7	77	1												-															1	-	1	-	1						(/	-	1	1						(1	13	1						Distinctness	w Audustodes	Yestimos nouncary				1	7					1		>						
-	1	1			9									0											-	1										-										1												Color	-	-	_			11. 1000 - 1000	- Kar													
1	Ì	Ì		-	-									-											-	- Control of the last																												1				mentioner	Description	Redox Feature						orb Stope	71.01	Slope Fallure or Slip:	Claus Fall	A Or tradad	Denth to V		Slope Aspect:		raicit material.	Darent ma		
25/19	Constanta (Gersonal Freehores	1000000																		下 てかしょうしょう	frankling !	1		Contract of the Contract of th	0.000 1.000	The state of the s	7						(1-1-1	1 + 101	1 65	7						1	7	1	The same						0	7	1)			Roots							orb probe of prirection:	2	re or sup:		peper to state lane:	Jator Table.		ď.		rendi.	tarial.		
2000	T to a	and the																			1000		T.	47			1.501057	1	†			01 4	5	Z		-	()	1	7	1	2 300	5	12	1		200	2	S 111 5			60 1	7	1	0	() . ()	2		PH	/attenument tarner							1300	150		-		(10	55	1	201100	1		
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Soil Scientist: Rache Lane

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7.2	235-160607-1135-MEL	0667-	1135	ME		Topographic Position:		Ridge S	umm	+		Parent material:	terial:	(PES.)	PAI HEALTH	1 3600 1-10 11 11
Date:	6/	7/16				9	% Slope:		5%				Slope Aspect:	ect:	100	0.00	Contract to the Contract of th
Job Name:	Dominion	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		WD .				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	00						Depth to Refusal:		23"				Slope Failure or slip:	re or slip:			
NRCS Soil Unit:		TR SY					Bedrock Type :		Shale				Dip Slope	Dip Slope & Direction:	1	St	Strike:
Mineralogy:	Mixed	pa					Vegetation:	-	white Oak		chary	hickory, dogwood, pine	Dine				
Horizon	Depth in inches	Matrix Color	Texture Class	% clay 9	% sand Fi	Rock Fragment	Rock Fragment Size (inches)	Pautidy/ Stidiness	Structure Type, Grade, and Size	Moist Consiste	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podet Peretometer/	Lab Sample	Notes
00	01/0	1823/VS									>		1	W. 48	70		
AE	114-7	5K 7/3	250	5	25 7	2	-	8 8	837	R	17		1	SMIC	0.75		
Bw	1- 1	YQ5/6	VGR 51L	15	20 -	04	-	8 8	MSBK	F	1 8		1	2FMC	0,75		
3	10-11/10	10189/c	XGR SIL	15 7	0	58	7	88	masine	FR	t	1		me on	かって		
20	82-11	frao	tar	6	10	0	0 6	0	100	N							
															-		
Other Notes:) d mad	sample	de													
	1	Sep 7	0 7-233-16060-1000-MEL	000	1000	MEL											

235

Test Pit ID: NRCS Soil Unit: RETTEW Job #: Job Name: fineralogy: Horizon E 8 73.t 2-4 4-3 4 Depth in inches 1 089962000 Dominion - Atlantic Coast Pipeline Soil Survey Berks Syers 236-160607-1535-MEL Matrix Color 25 Texture Class 8 5 % clay 73 30 % sand 070 25 Fragment Type & % 25 Rock % Slope: Rock Fragment Size (inches) Drainage Class: Depth to Refusal: Topographic Position: 小 Vegetation: Bedrock Type: 30 00 FO Plasticity/ Stickiness MSBK OMER Structure Type, Moist
Grade, and Size Consistence H 5 果果 USDA Horizon Boundary Topography & Distinctness Redox Feature Color Centimately Blues in Reporterin Slope Failure or slip: Redox Feature Description Dip Slope & Direction: Depth to Water Table: Slope Aspect: Parent material: 2FM Roots 0 0 0.75 0.25 Pocket Penetron pH S 310" 0 Lab Sample ID 52 4 S 6001 Strike: Synthe S Notes

Field Assistant:

Packel Hill

Signature:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Soil Scientist: With Classed

28

TEST PIT DESCRIPTION
Soil Scientist: Michael
Field Assistant: Rachel

BC 14-587578 36 VGR	AE 0-210/18 8/2 GR BE 2-810/18 8/4 GR SIL BE 3- BIOYR 8/8 VGR SIL	Mineralogy: MXXXXX Horizon Depth in Matrix Color Class	# #	Test Pit ID: P-237 - 160007 Date: 6/7/16
15 VC 60	12 25 15 16 25 15 18 25 40	Rock S sand Fragment Type & %	Soil Survey	237-160607-1240-MEL
10.25 1 mp ts	40.25	Rock Fragment Size (inches)	Drainage Class: Depth to Refusal: Bedrock Type:	Topographic Position: % Slope:
SO OTHER VE	SO IFER OF	Pustales Structure Type, states Grade, and Size	3	
天 天 日 日	R R R	Structure Type, Mosts Transport Consistence Consistenc		, head of hollow
		Redox Feature Color	+	
ZZ	3FM - 3FM	Feature neinsteam Roots	Slope Fallure or slip: Dip Slope & Direction:	Parent material: Slope Aspect:
1.28	5.0 5	Product Prontingendary Lab Sample	111	Collevium 205°
2 mary drawer 725	Tan O norto		Strike:	

Soil Scientist: Richael Lane
Field Assistant: Rachel Hill

Signature:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	U	-238-160007-	207-1	355	1355-NE		Topographic Position:	tion:	Solsapis	ř			Parent material:	terial:	11101	11416	
Date:	6						% Slope:		00				Slope Aspect:	ect:	U		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil	Survey			Drainage Class:		900				Depth to 1	Depth to Water Table:	13		
RETTEW Job #:	089962000	52000		1			Depth to Refusal:		1				Slope Fail	Slope Failure or slip:	4		
NRCS Soil Unit:		Herks (8F					Bedrock Type :		Shale	10			Dip Slope	Dip Slope & Direction:)		Strike:
Mineralogy:	M	mixed	Ì				Vegetation:		1057461	1 bro	1321	2016					
Horizon	Depth in	Matrix Color	Texture	% clay	% sand		Rock Fragment	Plantidity/ Stickliness	Structure Type,	Moist	Horizon Roundary Topography &	Redox Feature	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample	Notes
00	3-6	1/523/18										1		254	0		
7	5-35	DYRTH	7.5	0	25	40		20	IFGR	R	30	\		W35	200		
BE	15-12	453M	500	21	20	ū	-	8 8)F58k	K	3			25/10	5.0		
200	2-19	10/15/6	S.L	15	20	6	+	23	18811	天	7 5			ME			
()	3-18	864K5/8	XCR SIL	12	20	75	et of	83	Je Grand O	天	3	1	1	N- 131 KO	145		
N	R-50	Wice	X	6	7	0	S	-	5	50	8			8445.09L	Happarky		

Soil Scientist: PIFENS TO MOCAL

Signature: Samil Husta

Test Pit ID:	2	239-1	60607-1427	Jya.	1-DEF		Topographic Position:	tion:	Terrace	06/6		e Berk	Parent material:	terial:	AUVE	UVIUM	aval Colluvin
Date:		(0)7/11	0				% Slope:		10%	,	-	4	Slope Aspect:	ect:	163	٥	- 1
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	Survey			Drainage Class:						Depth to \	Depth to Water Table:	15		
RETTEW Job #:	089962000	2000	,				Depth to Refusal:		42" -	flac	-flastone		Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:		Be114(8E	SE)				Bedrock Type:		1			,	Dip Slope	Dip Slope & Direction:	1		Strike:
Mineralogy:	2	MIXIN					Vegetation:		Redin	ام مار	Mysola-Mostly	M (KITE	ton	-	SHY	oine,	Greenbriar
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% clay % sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Moist Grade, and Size Consistence	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometes/	Lab Sample ID	Notes
P	0-3	2/1	715	\$	82	CN 124.	SIL 18 22 151 61/2"	50	SO TESPIK FO AM	7	AW	١	1	78	250	S	Rounded Cot Verythin De
Bul 3-147,546	3-19	2/4 Jusil	7.5	23	pe	N 52	4/6 5, L 22 23 23 CN 21/2"	8 8	18881 FC CW	7	ms	1	(1co	525	Se	Allevial
26-2	4-	14- 1412 Al CV	(5:12) 26 33	26.	9	281. 981.	981, 41/4"	200	MY MY 19531.	231	MA)	1	40	27.0	53	Sherp edged COF
3Bw3 6	が、	36 75 11945 B +24 2mgs	2.L	26	HI	CN .	EN Reflagsh SS / Cossil F.O	25	1658M	To	1	dw 2/15 WE	dr	F	200	25	Colluvium
							(
		-															
	5											*					
												4					

Other Notes:

Soil Scientist: PEOSECMAS M. Field Assistant: MCAX

Other Notes:				53	385	But	Bwi	P	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
				\$37	200	(O)	1-12	-	Depth in inches	-		089962000	Dominio		カー
Seri				10412	19 PM	7/5	MSH	11 2 may	Matrix Color	Mil	Belks	000	Dominion - Atlantic Coast Pipeline Soil Survey		239 A-
30 50	-			25CN	2:5	2xx	LS Sig	7.5	Texture Class	600	(SE)	1	Pipeline Soil		- MaDIODY-
				23	57	25	0 21	8	% clay				Survey	1	7-1
Allv				00	23	33			% sand						05.h
(wina)				80	58	J. B.	CA.	J. 2.	Rock Fragment Type & %	100					-DEF
mederia	+7	1		K4	20 %	1. N. 7	174"	25	Rock Fragment Size (inches)	Vegetation:	Bedrock Type:	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
0	×.			8 8	58	SB	So	1)	Plasticity/ Stickiness			Ï			tion:
a				165BN Fr	I.MSBK F	JAN WAR	1 MS/3k	2MGR VER AW	Structure Type, Grade, and Size	Chestaut	1	文	Mode	90	flood
cf				7	7	231	7	YFR	Moist Consistence	USDA K		was	arahely		000
Gllvviu				1 -	C	CW	CH	AK	Horizon Boundary Topography & Distinctness	MON	-	400 t	mell.		2
MOIN		£		10485/6 CFD	MANOI			1	Redox Feature Color	walnut and an		2000	Dra ma		
		-20.4	many.	1212 (4)	G	1	1	1	Redox Feature Description	50 M 0170	Dip Slope	Slope Fail	Depth to 1	Slope Aspect:	Parent material:
				8 P M		がある	25%	150	Roots	20 1 HI CHELL	rect	Slope Failure or slip:	Depth to Water Table:	ect:	terial:
		-		3.5	Sis	N N	2 5	4.60	Pocket Penetrometer/	-	1	1	24	182	THE PARTY OF
			0	25 25 S	hs	53	SZ	15	Lab Sample ID	my to bus				20	MINNER
	\$			Cothar Shelp					Notes	WEST TOO LOS CHENTY					Ched Comman

TEST PIT DESCRIPTION
Soil Scientist: DELMG LES MACHA
Field Assistant: Max

gnature: Dawn Mister

Atlantic Co	55 55 55 55 55 55 55 55 55 55 55 55 55	なるられている。	36 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5 5 5 000	4.50	0.3	(FP	Horizon Depth In Inches Matrix Color	Mineralogy:		#:	ıme:		Test Pit ID: P-24
		2	2		STAN TO STAN T	SIL 11)			1	/	line Soil Surve		7000
Pipeline Soil Surve	1	1		(16	16 15	1	lay % sand				Y		
1 Survey			1	60:	40%	15%	1	Rock Fragment Type & %						完
OA 32 -DEE Rock Fragment Type & %			F	200	125	187	(Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Posi
OA 32 -DEE Rock Fragment Type & %			1 1	1 1	50	50	11	Plasticity/ Stickiness						tion:
Topographic Position: % Slope: Slope: Drainage Class: Depth to Refusal: Bedrock Type: Vegetation: Vegetation: Passess Type & % Size (Inches) Size (Inches			T.	WO	IMSBK Fr	1888W	t	Structure Type, Grade, and Size	carlet	finegro	2	WE11		Back
Topographic Position: % Slope: % Slope: Drainage Class: Depth to Refusal: Bedrock Type: Vegetation: Vegetation: Fragment Type & % Size (Inches) Structure Type Grade, and Size (Inches)			1	1	3	VFC	-1	Moist Consistence	USDA K		21.		20	12/21
Slope: Slo			t	CK	CW	Aw	AW	Horizon Boundary Topography & Distinctors	lolack	rolonly			-	8
Solope: Solope: Solop			1	1	1	1	1	Redox Feature Color	MIA	U ~51/15t			24	048
Siope: Siope: Siope: SalkSiana Achte Siope:			1	1	1	-	1	Redox Feature Description	12	Dip Slope	Slope Failu	Depth to V	Slope Aspe	Parent ma
Siope: Siope: Siope Si			t =	71	ころか	250	75	Roots	Stout	& Direction:	re or slip:	later Table:	ct:	terial:
Slope: Slope: Slope Aspect: Depth to Refusal: Slope Aspect: Slope Failure or:			1 1	1 1	1.0	4,40	1 1	Pocket Penetrometer/ pH	Muelae	700 5	A	1	226	Pesi
Siope Siope Class: We Siope Failure or slip: We Siope			1	1	1	1	1	Lab Sample ID	-	3			0	aurun
Siope: Siope: Siope Aspect: Siope Aspe								Notes	Andultan Lavie L	Strike: 106				

Soil Scientist: The Asternative of Field Assistant:

Signature:

Test Pit ID:	P-	1-1h2	40607-0926-DEF	096	3000		Topographic Position:	tion:	Ridge T	90			Parent material:	terial:	Rosid	MAN	
Date:		01149					% Slope:		031	1. "			Slope Aspect:	ect:	245		
Job Name:	Domini	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		Well				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		9 "				Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	6	Serks. 9	YY.				Bedrock Type :		Sine Brained	ned S	andistana	ne ashalo	Dip Slope	Dip Slope & Direction:	310 1	it	Strike: 294°
Mineralogy:		MAX:W					Vegetation:		estry	oak,	oak, White Pino. In		cake	hit cak , Sluckery	3		
										USDA					/		
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidty/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Radius Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
000	51-0	2/2/2 2/2	1	1	1	1		1)	1	1	AW		1	34M	1,4	5	
D	3.5	3.5 loyey/2	5:5	7	$\bar{\infty}$	14 18 cm	C)"	P6	149571	770	UF AW	1	1	N. SEW	5.0	52	
801	1-52	10/4 101/4	NCN	5	10	10 381	6		JESSEL Fr	7	Ch O	1	1	110 W.38	5.2	53	
Bu2	19	1000 y	2:5 XCM	15	0	CA.	CN 74"	SP	14 x85ml	13	AW	1	1	\$ 5°	1.25	15	
75	R 19+	1	1	1	1	1)	1 1	1	1	1	1	1	1	t^{\perp}	1	

Other Notes:

Field Assistant: Max TEST PIT DESCRIPTION
Soil Scientist: D. Ferred Comment Comments

Test Dit ID:	0	100	00000	7-	1000	770-1	Topographic Position:	tion:	Backe	love			Parent material:	erial:		COUR	
Date:	-	7					% Slope:		000	N			Slope Aspect:	rt:	3/0		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil Sı	urvey			Drainage Class:		inell				Depth to Water Table:	ater Table:	1		
RETTEW Job #:		2000					Depth to Refusal:		,00				Slope Failure or slip:	e or slip:	1		
NRCS Soil Unit:		Be/KG	85)				Bedrock Type :		Sing grains	10	prod sho	tense	Dip Slope & Direction:	Direction:	280 N	C SI	Strike: 320°
Mineralogy:		mixed					Vegetation:		+lickery, Rod	1	CON	weberr	5.4.2	Chost	nutos	CH	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Horison Boundary Topography & Distinctorss	Redox Feature Color	Redox Feature Description	Roots	Pucket Penetrometer/ pH	Lab Sample ID	Notes
8	0.0.5	7,512	1	1	1	- (1	()	1	1	AN	Ţ	,	36	1 54)	
A	Mis	104 8/5 NOU	SIL	5	ol	38%	1.	20	MALJU ZIONC	UF	AW	1	0	JWE	4.7	1	
Be	200	7.54RSH	からか	I	8	10% 10%	12.	58	13 34 485WI	13	CW	1	(188	57.0	1.	
6	1 E 60	115 Jus.	7,5 92A	7	16	CB.	1-6"	55	16584	Fo	AW	1	1	200	525	1	
Q	30+)	1	1	1	1	7	1)	1		1	1	1	1	()	1	

Soil Scientist: TEST PIT DESCRIPTION
Soil Scientist: D. Fe Blandicher

Field Assistant:

Signature:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID: Date:	1-042	6/7/16			9	% Slope:	% Slope:	O.		-		10	Slope Aspec	Slope Aspect:		Slope Aspect: 276°
ob Name: D	Dominion - Atlantic Coast Pipeline Soil Survey	ast Pipeline Soil Su	rvey			Drainage Class:		well	Draw	amed		-	Depth to W	Depth to Water Table:	Depth to Water Table:	er Table:
RETTEW Job #: 0	089962000	1				Depth to Refusal:		1				1 4	orope ranur	Siope railure or silp:	Stope ratiure of sup:	Siope railure or sup:
NRCS Soil Unit:	150115	0				Bedrock Type :		Maria	and	L. L.	100,00	3	Charles de la Company	Christony and b	aak, blar	nak, blarkown An
Mineralogy:	S IVI	4 6				0			USDA							11 0
Horizon Depth in inches	in Matrix Color	Texture Class	% clay %	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plantidky/ Sticklesess	Structure Type, Grade, and Size	Moist Consistence	Horizon Roundary Topography & Distinctness	Redox Feature Color		Redox Feature Description		Redux Festure Roots Pouter Perstament/	Redox Feature Roots
20-2	254	(1	1	-1	(1 1	J	1	1			١	1 34	1 35	
1 2 - 4	104/22/1	55	6 22		50.	16,7	P0	SO 1586 VF AW	VF	AW	1		١	1000	50 2	
Bw1 4-	h/0) Nh01	NE	16 18		(G)	C1/2"	58 88	HESTI	17	Fr CW	1		1	- 1co	- 1co 1.7	
BW2 32	7.8.1%	Zie	20	$\overline{\varpi}$	30	GR C1/2"	SP 88	SP IMSBK Er CW	2	CW	1		1	1	1.75	4.8 54
1603 32.	9/15 to	5.5	18 15	7	301	21/2"	58	MY YESMA	42	1	L		1	1	F 7.75	F

21-1000

Soil Scientist: D. KINSTER MOCKU Field Assistant:

Signature:

Test Pit ID:	8-	245-16	10001-	-090	00		Topographic Position:	ition:	Backel	076	-5/14/	SONT	Parent material:	terial:	Rocid	27/2	
Date:		6/5/16					% Slope:		S	-	-		Slope Aspect:	ŭ.	200	- 1	
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil !	urvey			Drainage Class:		hell				Depth to V	Depth to Water Table:	1		
RETTEW Job #:		2000					Depth to Refusal:		27				Slope Failure or slip:	re or slip:	١		
NRCS Soil Unit:		Berks.	38				Bedrock Type :		Sandale	no-li	1.01232	7	Dip Slope	Dip Slope & Direction:	230 N	131	Strike: 312°
Mineralogy:		mixed	16				Vegetation:	u l	Chestrut call	+00	W. White	100	Blackeur.	2	Lebe in		
										USDA			c		<		
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctions	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
0	9	che dus	1	-	1	1	1	11	1	1	AL	\	1	35	, 1	1	
F	25	3/2	715	2	8	1	1	50	JMGR UF	27	Au	1	1	250	1.25	7	
Bei	755	h(Spol	25	25	18	500:	17	35	IARBA FI	7	cw		1	2000 2000	2:0	1	
B w2	7-	h15	200	ER	8	Si	12"	35	1/4581	7	CW	1	1	aco with	0,75	1	Shall Car
30	20-	1/8/K		22	20	70i.	3-8	58	165BK	7	MA	1		wtc	1 2 5 Y	1	Aira graind said for
P	27	1	1	1	1	1).	11	1	1	1	1	1	1	1 1	1	

Other Notes:

anine intohillsick

TEST PIT DESCRIPTION
Soil Scientist: PIFENGTE TOMOCHET Field Assistant:

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	2	11-66	10000	100	-0410-DE	,	Topographic Position:	tion:	10	8 dolg.			Parent material:	erial:	191100	un as	102 resigning
Date:	6	917/16					% Slope:		42				Slope Aspect:	e.	262		
Job Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		12001	_			Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	000					Depth to Refusal:		20				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		Be(K5	(3E)				Bedrock Type :		Shorle	Bedil	11 200	4 - 1/2" Start Dip Slope & Direction:	Dip Slope	k Direction:	100 6	BN3	Strike: 322°
Mineralogy:							Vegetation:		Chestru	U+ 00	K, b	2	35	Scarlet cont	-	Work to in	1 SAMO
Horizon De	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Plastidty/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horiton Boundary Topography & Distinctness	Redox		Roots	Pocket Penetrometer/	Lab Sample ID	Notes
DO	w	200	755 X C. K	ज	w.	901	B	50	MGR.	Afr.	AW	1	1	3f	0,25	5	
AB 3-	001	101R5B	2:5 xG&	元	28	188	ひかっ	\$5	1882	YE	Bo	\	1	35,M	8%	52	sandature (or
20 00	231	16/4 1048	2:5	5	83	5.484	1/2	55	MASINI	77	CE	1	1	- 122 22-1-125 24-125	27.5	53	Should Lot
Bw 2	23	104/2	25	17	ES LES	301.	7/2	55	1005BK	7	S	1	1	35	20.5	5	
200 37	37-	104R	35	9(41	189	3-6.	58	MO	7	AS S	1	1	も	1 1	1	
R	39+	1	(1.	1	1	Ţ	1 1	1	1	1	1	1	1	1 1	l	
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TEST PIT DESCRIPTION
Soil Scientist: D. FORS-FA MOLCANA
Field Assistant:

Signature:

Test Pit ID:	245-1	80900	-085	30-S	t	Topographic Position:	tion:	Back	15/11	ight no	nose	Parent material:	aterial:	Rosi	dovur
Date:	011213					% Slope:		200				Slope Aspect:	ect:	SHO	
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	ast Pipeline Soil	Survey			Drainage Class:		-5	hat ex	xcessively	Drown	Depth to	Depth to Water Table:	1	
NRCS Soil Unit:	DP 1 6 C	(3%)				Bedrock Type :		D'war are	3 8	andster	2	Din Slope	Dip Slope & Direction:	160	ENE
Mineralogy:	W.					Vegetation:		40	0	ackoak.	Chestnut cak	cak B	7	CS. Pine	w/ 3 tourist
Horizon Depth in inches	h in Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Scuadary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample
S 1.5	SYR 25/	1	1	1.	1	1	(/	1	Ţ	MA	1	1	3f, M	1 2	1
A 325	5 104/53	715	万	3	33 6R	11/	50	1853K	T	AW	1	1	250 35M		1
Bw 3,25-	6/4 2.5.2-5	311	5	20	300	13.	55	1488K	7	CK	1	1	450	27.0	1
181	11/9 G	(S.C)	2	20	984 CB	9-10"		0M	7	MA	1	1	727	11	1
P 18+	1	1	1	1	1	1	11			1	(t	ţ	ı ı	1

Soil Scientist: Di Fengter macher

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

IEST FIL IO:	1	12461	00000	01	J.	0900-0KF	Topographic Position:	ition:	K San	5	2000	1	Parent material:	terial:	Rocal	MAN	
Date:		810	_			- 4	% Slope:		20%	Che con	Remoduld of Aug	24	Slope Aspect:	ect:	1690	1000	
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil !	Survey			Drainage Class:		No.		1	+	Depth to	Depth to Water Table:	100		
RETTEW Job #:	089962000	2000					Depth to Refusal:		ひとい				Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	7	1/67/210100	(SID				Bedrock Type :		Siltstone	E			Dip Slope	Dip Slope & Direction:	1000 N	TI	2920
Mineralogy:			-				Vegetation:		Christnut cak	reak	h: chon	White	Dino	blueher	- 0	arass	Suine: S
										USDA		100		0.00	1	200	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Strickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pudiat Penatrometer/	Lab Sample ID	Notes
D	5.5	0-3.5 104R3/R S.L	25	11	28	CN CN.	710	80	DARGRUFF AW	VFr	AW	1	1	2004	26.57	1	Sparse of
BW 3	17.5	75445/45, L 10	7.5	0	20	7 53 OB	11/	50	M) 231 265-21	VFC	CW	1	1	25	4.40	1	Shall Cof
9	27	7.5405/4	1	1	1	5/60	1	1 1	1	1	AW	1	t	ち	1 1	1	mining lines boun
P	22	1												1	1 1	1	Competent Rock Notinesinbetumen

Soil Scientist: D. REPERSONAL WAR

Signature: David Man

Test Pit ID:	P-	P-247-1600	430-81 PO-80000	13-8	13(Topographic Position:	tion:	2000	1 30	Backsloop		Parent material:	terial:	Colluvium		ave Castima
Date:		6/8/16					% Slope:		25.	7	4		Slope Aspect:	ect:	7000		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	urvey			Drainage Class:		Nell				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	52000					Depth to Refusal:		34"			1	Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	+	Haz letun	(SUE)				Bedrock Type :		Shale	1/4-1/2	this	Sheet Brown	bip Slope	Broubip Slope & Direction:	220	76	Strike: 3 090
Mineralogy:	1	V.X.V					Vegetation:			1. Ver -		3			white Sight was	ally soi	
Horizon	Depth in	Matrix Color	Texture	% clay	% sand	Rock	Rock Fragment	Plastichy/	Structure Type,	Moist	Horizon Boundary Topography &	Redox Feature	Redox Feature	Roots	Pocket Penetrometer/	Lab Sample	Make
	inches		Class	1	1	Type & %	Size (inches)	Stickiness	Grade, and Size		-	Color	Description	KOOLS	1	ID	Notes
	0.10	7,54R	1	F	2	151	<1/2	PO		ñ	(1)	1	1	かか,か	0	7	m 2
D	6	3/3	2.5	ā	2	dy GR		50	145BK	14	14 CM			160	8,5	0	Only thin Dutt
		ANA	50)		157.	11/1/2	SP						24.M	20)	Recl shale and Brann
80-	-0	4	7.5	ā	24	10		8	HSSY NEST	T	CV	1	(160	6.5	52	Soundstone Car
	9-	1 110	N JX	2	E	100	112-311	SP						2+3	S)	1	Ge For ented W/BR
JBW1	00°	15/6	25	2	a	S	_		11/08B/ FC	5	CW	1	1	IN	4.9	2	
0	-36	7.572	CS			90%	יית כלי	1	-	3				75	4		Ma Corantration
5	200	5/6	(57)	200	9	CS	6	1	MO	7	AW	1	1			١	Beckled Shale Lylla
0	中							1		(1		- 1
7		1	1	-	1	1	(1	1		1	(1	-	١	1	

Other Notes:

ishaly concave horizontally

TEST PIT DESCRIPTION
Soil scientist: V. F. E.M.S. T. I. M. A.C. W. T. Fleid Assistant: M.C.X. Duglin

Signature:

Test Pit ID:	7	1. 2hr.	Clothe	1	100	2	% Slone:	uon:	200	MONE	C		Slope Aspect:	terial:		521	1680
Job Name:	Dominior	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		Somewhat excessively drained	excess	sively drai		Dept	h to V	Depth to Water Table:	1	1
RETTEW Job #:	089962000	00					Depth to Refusal:		17"				Slope	e Failu	Slope Failure or slip:	1	1
NRCS Soil Unit:	Ber	TKS ((CXX				Bedrock Type :		Shorte		12 21	2	무	Slope	Dip Slope & Direction:	8	80 20
Mineralogy:	r	V1141	74 97				vegetation:		NOSU		- CO. 1	The fred out	1	Acar N	The state of the s	2	18
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (Inches)	Plastidity/ Scidiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	- 7	Redox Feature Description	dox Festure Roots	Roots Feder Presbonate/	Roots Pecket Penetrom
000	2/0	15.6 24/2	1	(ı	11	1	1	my	١)	2 st	- 3£ -	
X	0,1	Colho School	7.5	6	R	38%.	12"	PO	HSBK VF1	13/	CM	1	4	1	NXE W	4.5	
BE	of the	2/2	2.5	Co	hi	CV)	12.	55	MSBK	7	CN	1			246	4.4	
B+8	75	9/9 2/2/12	2:5 NICN	24	ō	CN 401.	13.	SW	JMSBK	7	MM	· ·		1	J.W.C	3M.F 1.75	+
P	17+	1		(1	1	(()			- (-	I		1	t	1 1	1 1

Soil Scientist: D. FIRS & Mac Degan

Signature: Auni Miles

RETTEW Associates, Inc.
3020 Columbia Avenue
Luncaster, PA 17603
Phone: 717-394-3721
Fax: 717-394-1063

Test Pit ID:	2	7-244-160608-0933	3608	093	3		Topographic Position:	ition:	12000	Bac	Backelora	20	Parent material:	terial:	1110	011	0
Date:		16/8/16	6	,			% Slope:		354				Slope Aspect:	ect:	מוני		over residuc
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		mell				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	1: 089962000	52000	1	1			Depth to Refusal:		50m				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		ville	29 F.	3)			Bedrock Type:		nayo	16- 2	ay		Din Slope	Dip Slope & Direction:	000	NE	1190
Mineralogy:	-	Mixed	1	1			Vegetation:		Chestrut	cake	Black	(Gilym)	Nounte	Lountain laure	white	Pin	8(V & 120
Horizon	Depth in	Matrix Color	Texture	% clay	% clay % sand	Rock	Rock Fragment	Plastidty/	Structure Type,	Most	Horizon Boundary Topography &	Redox Feature	Radox Feature		Podet Penetrometer/	Lab Sample	
0	51.0	Jh5:51-0	1	1	1	- ide	(1	(1	AW)	1	34	1	S =	
	3	110.0						1							4.4	(
D	250	Me John	Sil 15 23	15	23	36%	21/2	88	IMGR UFR AW	VFR	AW)		35.M	2,0	52	
AB	- 3	104/8 5,L	2,5	5	30	6 P. S.	74.	88	155BK NF6	NEC	CW	1		360	200	23	
B	29	his	7	16	38	55.1	2-10"	200	1658K Fr	7	3	1	1	3/15	1.25	18	
0	200	2.54512 2.545/16	5.11.33	23	8	35.1 CH	97	SS 45	MO	70	AW)	(23	475	25	thicker onic
P	405) (1	1	t	1	1	11	1	1	((((()		

Test Pit ID:	ס	-250-16	1000B-1320-	(2)	0-1	MEL	Topographic Position:	tion:	Richar	Summ	time		Parent material:	terial:	Shale		Roshlein
Date:	6	8/16					% Slope:		00				Slope Aspect:	ct	3	Caro monda	
Job Name:	Domini		ipeline Soil S	urvey			Drainage Class:		200				Depth to V	Depth to Water Table:	10		
RETTEW Job #:	089962000	2000					Depth to Refusal:		32"				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		18 5/12					Bedrock Type :		Shele				Dip Slope	Dip Slope & Direction:	450	2	Strike: 285
Mineralogy:		mixed					Vegetation:			(1chon	Hickory, Black	Locust					
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% clay % sand	Rock Fragment	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrameter/ pH	Lab Sample ID	Notes
30	2-0	1/42 SAS									7			35/	0,0	_	
7	2-4	2-4 10484/3	150	7	3	73	-	50	156R	K	, ,			W.50	5,0		Suntstane cit.
BE	- F	Pfs Mone	SIL	17	0	25	_	8	XXX	F	23			SEARC	1.25		
27	119	9/5 BA 9/8	22	15	10	30	8 m	88	[FSJIK	FR	200		- Anna Anna Anna Anna Anna Anna Anna Ann	34.15	52,1		
C	75.5	104876	5/2			3		5 5	OMESINE	夫	28			12000	4, F	-	Some lithrecturences
N	32+	2010	X	2.1	1	Since											ACIMIS GROWN FINCES

TEST PIT DESCRIPTION

Soil Scientist: Wire your Signal

Field Assistant: Packet Mill

Signature: Madail &

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7	-121-160001-1230-WE	1000-	236	N-M	1	Topographic Position:	tion:	Shoulder		SKESCA	10	Parent material:	terial:	C011-1	N118	over residuum
Date:	6	01/8/16					% Slope:		35%		,		Slope Aspect:	ect:	1700		
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:			Somewl	Somewhat Excessive	V	Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000	,				Depth to Refusal:		26				Slope Failu	Slope Failure or slip:	1		
NRCS Soil Unit:		Lest 1	(89F3)				Bedrock Type :		Fine greened		sand stone		Dip Slope	Dip Slope & Direction:)		Strike:
Mineralogy:							Vegetation:		Ded made chestnot	e ches	touch cake	blusson	y, who	to pino			
Horizon	Depth in	Matrix Color	Texture	% clay	% sand	Rock	Rock Fragment	Plasticky/	Structure Type,	Moist	Horizon Boundary Topography A	Redox Feature	Redox Feature Description	Roots	Podet Penetrometer/	Lab Sample	Notes
>	7.5	16.12 VAS				ype ox 70							-	2635	0		Hory HALL
(,										1.300				2		
20	34.3	1/4 8/11		H	2	111		20	N. S.	To	5	\	1	MAR	.0		
DE.	10-117	My MA	7,5	-	00	20	100	8		-	1 75	1		1	50		
	4	15 2KU	200	M	70	70	7	3	N. S.	T	300	1	1	THE	1.25		
3		511	7.0	1				500		-	2				1		
5	1	10185/6	SIC	75	5	15	9	813	Ü. SIN		2		1	T	5.1		
X	26+	1				ki.	-	8-	hy.	31	١.,						
1	4	Nove	100	6	Vi	1 3	10001	5	1	100	0 1	5					
							Ì										

251

Field Assistant: Rachel Hil TEST PIT DESCRIPTION

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

RETTEW Job #: Job Name: Test Pit ID: Mineralogy: NRCS Soil Unit: Horizon Depth in inches 089962000 BC/ LS mixed Dominion - Atlantic Coast Pipeline Soil Survey P-252-16068-1452-MEL ten surface spies, some sandspie survels in **Matrix Color** 16 AB VGK XGK VGR Texture Class び % clay % sand 5 25 70 25 25 50 Fragment Type & % 0 Rock % Slope: Topographic Position: Rock Fragment Size (inches) Drainage Class: Vegetation: Bedrock Type: Depth to Refusal: d 70 Plasticity/ Stickiness Structure Type, Grade, and Size 20 V. CANS IN Chestnot Oak, Hickory, Mountain Laure 50 Shale Summit 71 Moist USDA BE horizon Redox Feature Color Redox Feature Description Slope Failure or slip: Depth to Water Table: Parent material: Dip Slope & Direction: Slope Aspect: 2FAIC 2 FM 7F M OCCUSSION Roots 45 00 racky 1.0 Sypo Lab Sample Strike: Hypochronic <2 chiama Notes

Other Notes:

unable to usuance beyond

leave shall faces extending up to 29", tow roots, sitt loan vews extending to depth

Field Assistant: Cachel TEST PIT DESCRIPTION
Soil Scientist: Michae ane

Signature:

5 Mineralogy: RETTEW Job #: Job Name: Test Pit ID: 0 IRCS Soil Unit: Horizon Depth in inches 089962000 Dominion - Atlantic Coast Pipeline Soil Survey D-253-160608-0950-MEL 100 Rerks 6/8/16 MIXED 8 12.5/l 9/4 W.C. 104R3/3 **Matrix Color** SF Texture Class r % clay % sand 5 5 4 Fragment Type & % 9.4 Rock % Slope: Rock Fragment Size (inches) Topographic Position: Depth to Refusal: Drainage Class: Vegetation: Bedrock Type: 5 1 0 Sidesdage SOZ WD Structure Type, Moist
Grade, and Size Consistence Red made supling stand USDA 77 Redox Feature Color 1 Slope Aspect: Dip Slope & Direction: Depth to Water Table: Parent material: Redox Feature Description Slope Failure or slip: 35/4 XX Roots 188 85° E Lab Sample ID 4 SS SZ Strike: RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes

Other Notes:

Some surface stommess

Few shall ghos

RADIEDIES

Bun2 of some podiets of silt loans

Soil Scientist: Wichael Lane
Field Assistant: Rechel Mill

Signature Mulds Z

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P	254	-160608-1050-	105	0-N	MEL	Topographic Position:	tion:	nose sl	200			Parent material:	terial:	Colle	J. J. Cum	oltovicus over residuum
Date:	6	0/18/16					% Slope:		, 20E	1			Slope Aspect:	ict:	1200		
Job Name:	Dom	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		CA				Depth to V	Depth to Water Table:	1		
RETTEW Job #:		089962000					Depth to Refusal:		26"				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		Berks, 8D	_				Bedrock Type :		Sundstone	one			Dip Slope	Dip Slope & Direction:	700	A	Strike: 40
Mineralogy:	M						Vegetation:		Hickory,	redu	reducible Suplines						
										USDA		Q					
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Mastchy/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podat Pasetrometer/ pit	Lab Sample ID	Notes
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Soil Scientist: WALL

Field Assistant: 10+2 GEREL ITI

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

est Pit ID:	0-	100	160608-	085	0-15	Z	Topographic Position:	ition:	BACKE	340			Parent material:	terial:	COLLONION			
Date:	19	91/R/					% Slope:		4370				Slope Aspect:	6	9		2 4 4 5	0000000
lob Name:	Domi	Dominioh - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		A				Depth to 1	Depth to Water Table:	10			
RETTEW Job #:	08996	089962000					Depth to Refusal:		401				Slope Fail	Slope Failure or slip:	(
NRCS Soil Unit:	0	BEEKS					Bedrock Type :		51175	SNOT	m		Din Slone	& Direction:				
Mineralogy:	7	M 1×6 D					Vegetation:		8	37	これをとてる	JUT TAV	1	V HICKET				
										USDA			-	1	1116	COMADA!	1	Brack Cold
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Product Penetrumeter/	Lab Sample ID		Notes
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Other Notes:

LINEARY CONCANE

BACKSLOPE

Soil Scientist: JOHN WAIT

Signature:

Test Pit ID:	2	256-16	8090	109	25-	250	Topographic Position:	tion:	SUMM	F			Parent material:	terial:	2000	MUNA	
Date:	6/	8/16					% Slope:		890				Slope Aspect:	ict:	1200		
Job Name:	Domini	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		13 PM	Some	TAKE WHAT	EX1513143	Depth to V	\S \U€Depth to Water Table:	7		
RETTEW Job #:	089962000	2000					Depth to Refusal:		21"				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	JJ.	BARKS					Bedrock Type :		5117	MAL	m		Dip Slope	Dip Slope & Direction:	7	S	Strike:
Mineralogy:	3	MIXED					Vegetation:		HICKO	RY,	CHEST	THUT CAK,		BLUCBERC	AN YA	717	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Harizon Boundary Topography & Distinctness	Redox Feature Color	Radox Feature Description	Roots	Podat Penatrumeter/	Lab Sample	
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Soil Scientist: JOHN WAL

Field Assistant: Joseph 9 428 EA 1711

Signature: 915 110 X

Test Pit ID:	D.	257-160	608-	100	40-3	5 2	Topographic Position:	tion:	3 42 4 4	37076	Nose slope	lope	Parent material:	terial:	Re51	MANA	
Date:	10/	2/18	ŕ				% Slope:		2770				Slope Aspect:	ät:	40		
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	ırvey			Drainage Class:		SOM EWHAL	TX	Excess	301	Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		・ナイ				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	852	アイン					Bedrock Type:		SILTS	70 25	Ti		Dip Slope	Dip Slope & Direction:	12 ES	ESE (176) Strike:	77 04
Mineralogy:	7	くろべい					Vegetation:		ナイスマア	K	CHESTAUT	UT ONK.	P	PITCH PINE	7	BULKER OAK	70
under D	Depth in	Matrix Calar	Texture	R. A.		Rock	Rock Fragment	Plastidity/	Structure Type,	Moist	Horizon Roundary	Redox Feature				Lab Sample	
	5		Cidss			Type & %	size (inches)		Grade, and Size	consistence	Distinctness	Color	cendina		¥	8	10000
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Other Notes:

BACKSLOPE 0 2 SUMBIT てのかだのだ、サイトにして OTT 70 STEEP BATHSLOPS

TEST PIT DESCRIPTION
Soil Scientist: John J

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

IEST PIT ID:	1230	20.100	. 1800081	105	1	MSW	lopographic Position:	tion:	Uncas	Lean Const	A Kakken	Sul Count	raicile illatellal.	Cridi,	2 Total	>	C) I OLI I (UM)
Job Name:	Dominia	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvev			Drainage Class:		Excessive	51/4			Depth to Wate	Depth to Water Table:	>24"		
RETTEW Job #:	089962000	000					Depth to Refusal:		20"				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	8	Berks					Bedrock Type :		5:1456	tone			Dip Slope l	Dip Slope & Direction:	80% 290°		Strike: 200°
Mineralogy:	3	Mixed					Vegetation:		Pitch 1	Pine	Scarle	took	Blac	k ook	Hickory	B1	us beerly
										USDA							A 4
Horizon Ir	Depth in Inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horkron Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podet Penetrometer/	Lab Sample ID	Notes
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Soil Scientist: 1977 27 H

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259 - 110 60X - 1305 - 15 W Tonographic Position	The state of the s			Signature:	>
1 2 2 2 2 2			1,000		2
		Fax: 717-394-1063	Lancaster, PA 17603 Phone: 717-394-3721	3020 Columbia Avenue	

iest Fit ID:			00000	1	2 4 0	20	. opograpina conton	anon.	JAM NO				Parent material:	terial:	S33	ープくこと	
Date:	6	1/8/16					% Slope:		5%				Slope Aspect:	ect:	0		
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		SOMEWHAT	TAH	EXCE	SSIVE	Depth to V	Depth to Water Table:	1		
NECK Soil Hait-	1	BE E K					Depth to Refusal:		1+				Slope Failure or slip:	re or slip:	1		
Mineralogy:		X X X Z					Vegetation:		21712	12			Dip Slope	Dip Slope & Direction:	N	22 Strike:	Ke: 266 X
							Business		USDA USDA		13217	71 201	OFR	ALIHM	PINE	137 AM	BLUEBERTY
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Radox Feature Description	Roots	Podet Penetrometer/	Lab Sample ID	Notes
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Dominio	n - Atlantic Coast F	ipeline Soil Su	IVey			Drainage Class:		37×2	N156	3		Depth to V	Vater Table:	1		
0899620	00					Depth to Refusal:		16"				Slope Fail	re or slip:	1		
N	PKS					Bedrock Type:		SILTS	ファス	M		Dip Siope	& Direction:	277 5	W	ke: 40°
	(134					Vegetation:		FICK	T	C4 8 >	7	AK	P12 00	7	ヤヤンとの	BLUEBERZ
Depth in inches	Matrix Color	Texture Class		% sand		Rock Fragment Size (Inches)	Plastidly/ Stickness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctivess	Redox Feature Color	Redox Feature Description	Roots	Product Penatrometer/	Lab Sample ID	Notes
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2,3	2/2/2/2	2.5	5	ء	ナイ	- 7	00	JAN P	ココト	2 %	f	1	2-45	4 7 75	1	
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		P. 260 - 16 61 9 16 00minion - Atlantic Coast P 089952000 PS EP E S NA 1 X E D NA 1 X E	Matrix Color Texture Class SILTST SILTST SILTST	Matrix Color Texture Class Silvey Matrix Color	1 1 1 2 1 1 2 1 1 2 1 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2	Matrix Color Class Pipeline Soil Survey Matrix Color Class % day % sand Fig. 12 CH Sill 13 19 SILTSTONE SIL 13 19 SILTSTONE FINANCE STONE SILL 13 19	Matrix Color Class Pipeline Soil Survey Matrix Color Class % day % sand Fig. 12 CH STONE SAL 13 19 SILTSTONE SAL 13 19 SILTSTONE SAL 12 19	Solution: Solu	Attantic Coast Pipeline Soil Survey Don Attantic Coast Pipeline Soil Survey Don Rock Matrix Color Texture Class Weight to Refusal: Class Weight to Refusal: Don Rock Rock Fragment Rock Rock Fragment Size [Inches] Size [A T I I I I I I I I I I I I I I I I I I	All b All b AnAluntic Coast Pipeline Soil Survey Dialoge Class: Dialoge Cl	A 1 b No book No by Store No book A 1 b A	1 b	1 b	1 b	

Soil Scientist: JOHN WAN Field Assistant:

Mineralogy:

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Horizon

Depth in inches

Matrix Color

Texture Class

% clay % sand

Fragment

Type & % Rock

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RETTEW Job #: Job Name:

089962000

Dominion Atlantic Coast Pipeline Soil Survey

6/9/16

VRCS Soil Unit:

Test Pit ID:

P-261-160609-0920-25W

Signature:

*Slope: 49 %	Parent material:	erial:	2500	TONI ON	7	
Class:	Depth to Water Table:	ater Table:	'			
#	Slope Failure or slip:	e or slip:	١			
Bedrock Type :	Dip Slope & Direction:	Direction:	١		Strike:	1
Vegetation: HICICORY, MAPLE, WILLIE	3117	3	TULT	しまいだら	40	しいのまちたと
USDA			1			
Rock Fragment namedon/ Structure Type, Molet Namedon Newson Redox Feature Size (Inches) Stations Grade, and Size Consistence Inducedons Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
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		2- 1 1	0.5			2
1-3 25 2xx 1xx 12 Cx	1	r	4.5	1	(CA)	1.28 X
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2-5 55 2m3 6 6 cm	1	1-4,00,0	1	1		
,0			0.5		KAS	SKINS
3-6 55 7650 66 1	1	3 W-1	4.5	1		

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Other Notes:

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Field Assistant: Soil Scientist: ZPS

Signature: (1) & W)

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	0	-262-11	00000	- 11	4	23.8	Topographic Position:	ition:	BACKS	OPE			Parent material:	terial:	10000	COLLONION	OVER	WALLERS A
Date:	6	19/16			ŀ		% Slope:		487				Slope Aspect:	ect:	0 2 4		- 1	7
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		MACC				Depth to \	Depth to Water Table:	1			
RETTEW Job #:	089962000	62000					Depth to Refusal:		400				Slope Failure or slip:	ire or slin:	RIVI	7 0		
NRCS Soil Unit:	190	BERKS					Bedrock Type :		SPRES	りた	4		Din Slone	Dip Slope & Direction:	1 7	17	Steller.	
Mineralogy:	3	DXXI					Vegetation:		よのカントカ	2	1	NOT AK			7		outre.	-
							Call Call			USDA	1	0	1	7	7 4 5	7		
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidhy/ Stidiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID		Notes
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Soil Scientist: John Ward

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Date:	6/0		*		4		% Slope:		- 1				Slope Aspect:	d:	18	000	
lob Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		I n	を手	7	ALESSINE	Denth to I	SSINE Denth to Water Table:			
RETTEW Job #:	089962000	000					Depth to Refusal:						Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:	79	アメンタ					Bedrock Type :		5117	702	M		Din Sione	Din Sione & Direction:	0 0		, ,
Mineralogy:	3	XED					Vegetation:		TORICATO		K	Facility .	2	VITE PILE	PO T	2978	Januar FT O
										P	1	1		-	1	10000	1 SACKEL
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidty/ Stiddness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redax Festure Description	Roots	Probat Penatrometer/	Lab Sample ID	Notes
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Soil Scientist: MAN

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-	264-160	609	114	151	100	Topographic Position:	ition:	BACKT	LOPE	1.		Parent material:	aterial:	collo	COLLUNIUM	OVER RESTANTA
Date:	6/	9/16					% Slope:		267				Slope Aspect:	ect:	3260		- [
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		NE C				Depth to	Depth to Water Table:	1		
RETTEW Job #:	08996	089962000					Depth to Refusal:		1				Slope Fall	Slope Failure or slip:	1		
NRCS Soil Unit:		BEアドン					Bedrock Type :		١				Dip Slope	Dip Slope & Direction:	1		Strike:
Mineralogy:	3	Garin					Vegetation:		FICKOF	4,	1753412	NUT OFF		MAPLE BLUS	ましいそるそをでい	1	CACRAT
		1								USDA							
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podat Pasetroneia/ pit	Lab Sample ID	Notes
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																	CHAN SKINS

Other Notes:

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TEST PIT DESCRIPTION

Soil Scientist: Michael

Field Assistant: Rachel L Pachel Hill

Signature: ///

Test Pit ID:	7.	1-762-100001-1040-WEL	1-100	040	ME	١	Topographic Position:	ion:	Sicesique	X			Parent material:	terial:	res	dul	3	
Date:	6	19/16					% Slope:		555				Slope Aspect:	A	1200	9		
lob Name:	Domini	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil	vey			Drainage Class:		a. J				Depth to V	Depth to Water Table:	1			
RETTEW Job #:	089962000	2000				-	Depth to Refusal:		182				Slope Failure or slip:	re or slip:	1			
NRCS Soil Unit:	Re	Berus (8F				m	Bedrock Type :		Sands	rack			Dip Slope	Dip Slope & Direction:	(St	Strike:	1
Mineralogy:	mixed	be.					Vegetation:		Chestry	1	hickory, wh	the och						
Horizon	Depth in inches	Matrix Color	Texture Class	% clay 9	% sand Fi	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Prodet Pasetrometer/	Lab Sample ID		Notes
000	7	1/4.2 1/18										(1	35/1	40	S		
7 2	in	5/E3/YOI	LE	171	Č,	5	_	10	\$ 50 ps	SA	7 7	MACLUS PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERT		14.38	0.25	52		
2	27-12	10485/6	500	N	6	5	of gr		INTK	77	3		1	3 FAIL	7.25	23		
Sw2	M	okeshoi	TS VG	0	6	Ö	6+		Hork	果	200	a di propini	1	J.M.L	52.	2		
7	4.39	3/6 3/6	TXT TXX		0	0			冗長	5	2	1		Oceasional	N 2 2			
70	39+	fact	Tes.	JMX	3	SMC.												

TEST PIT DESCRIPTION
Soil Scientist: VICAGE
Field Assistant: Reche

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3771 Fax: 717-394-1063

91110	76 SIODE:	1/6		Slope Aspect:	
Dominion - Atlantic Coast Pipeline Soil Survey	Drainage Class	7	Companyat avcassival		
RETTEW Job #: 089962000	Depth to Refusal:	20"	Slope Failure or slip:	Slope Failure or slip:	
NRCS Soil Unit: ROYKS 8D	Bedrock Type :	sittstone/shode	de	Dip Slope & Direction:	_
mixed	Vegetation:	reducible, white	de, withhazel,	blueberry, manitain larger sonce	2
		USDA			
Depth in Matrix Color Class % clay % sand Fi	Fragment Fragment Size (inches)	Structure Type, Moist Grade, and Size Consistence	Horizon houndary Trapography & Color Color	Redox Feature Description Roots	Podet Present
0-18/18/11-0	1	1 /	1	35/	-0.
5 92 B 75 24 M 2-1	S Water S	TO THE TR	2 0	- 3FJ/12	E 9.
= 00 51 70 HOURS	35 04 50	24 MOSAVI COL	100	25	WO.
5-2010/R9/4 XCH	0	M. Shrang O.	0	O cooked	4.9
bedrock ha	ale				

TEST PIT DESCRIPTION
Soil Scientist: Vi chare
Field Assistant: Rachel

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	V	21-160609-1205-MEL	1-600	205	MEL		Topographic Position:	tion:	Sidestope	de	convex		Parent material:	terial:	V.	81017	2000
Date:	3	21/6					% Slope:		16/h				Slope Aspect:	et:	130	0	
Job Name:	Domir	tlant	Pipeline Soil S	urvey			Drainage Class:		500				Depth to V	Depth to Water Table:	1		
RETTEW Job #:		52000					Depth to Refusal:		12				Slope Fail	Slope Failure or slip:	1		
NRCS Soil Unit:		Serks BE					Bedrock Type :		siltstane		shale		Dip Slope	Dip Slope & Direction:	288	(1)	Strike: 65°
Mineralogy:	_						Vegetation:		mixed o	Y	hickory, se	& cores	6			9	
Horizon	Depth in	Matrix Color	Texture	% clay	% sand	Rock	Rock Fragment	Mastidty/	Structure Type,	Moist	Horizon Boundary Topography &	Redox Feature	Redox Feature Description	Roots	Pocket Panetrometar/	Lab Sample	Notes
0	0	5 th 2.81									7			354	200	-	
P	1-2	75 MM	SP	Z.	25	20	_	00	IFGK	E	1	\	1	25.11	5.0		Silt stone
5	8-5	MENTO	2.5	12	20	3	7	200	1F8/4	1	5 6	The state of the s		24.40	5,0		
BUX	11-8	8/5/1/0	2.7 New	N	20	40	+	0.1	1435K	25	9			JW42	5.0		
0	24	3/5/11	7.5 XCN	Z	20	70	5	000	Br. Bleet	3	75			WZ	1,2		
	15-1	3/61/03	J.S.			90+			Sparje	7	5	-	1	-	\	-	
7	31	frech	oved	R	200	7											

267

Other Notes:

Stone in Cr

breaking to 6"+ thags poverlying two of oriented sittsbure C.t.

TEST PIT DESCRIPTION

Soil Scientist: Michael Carre

Field Assistant: Pachel Hill

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	Ų	P-268-160609	-60	142	1430-MEL		Topographic Position:	tion:	Sidos	0,00	2		Parent material:	orial:	7 11/10	Viant	100	Local in a
Date:	6	19/16					% Slope:		38%	,			Slope Aspect:	a	150			- Contract of the Contract of
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		000				Depth to Water Table:	ater Table:	1			
RETTEW Job #:		089962000					Depth to Refusal:		27				Slope Failure or slip:	e or slip:	1			
NRCS Soil Unit:		3) 57	SE)				Bedrock Type :		57/4	290	3		Dip Slope & Direction:	Direction:	1		Strike:	A A STATE OF THE PARTY OF THE P
Mineralogy:	m	mixed					Vegetation:		with .	1000	7 4 4	d wast	0					
										USDA		1						
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horison Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podast Penetrometer/	Lab Sample ID		Notes
00	20	SYR ^{2.5} /									1		1	MAS	4.7			
X	23	3/8/1/0	S. S.	T	5	5	_	POSO	FG	夬	30	\	1	35.41	UT .C.		Same	Mericans m
E	5-9	61876	517	12	20	5	_	PO	TAX	7	3 8		1	2FUIC	0.75			
Bw2	9-21	01/15/8	7.5	5	20	8	+	500	NSBK	1	3 8	1	1	11/31	5.0		ter	few stories
3	4-77	1011/6	S:r XCB			90+		1	MESON		2	1	1	Olevo one !	HOD LOCK			
D	+75	fact	red	Day	50	X												

268

TEST PIT DESCRIPTION

Soil Scientist: Michael Lane

Field Assistant: Pachel Hill

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Other Notes: Job Name: Test Pit ID: E. NRCS Soil Unit: RETTEW Job #: fineralogy: Horizon 0 Depth in inches Berks Dominion - Atlantic Coast Pipeline Soil Survey 089962000 P-269-160609-1320-MEL 6/9/16 54K25 12 NK 01 18×1 Matrix Color 5 800 87 XGR Texture Class # M Do % clay AE UT 2070 % sand n8512017 Fragment Type & % Rock Rock Fragment Size (inches) M Bedrock Type: Depth to Refusal: Drainage Class: Topographic Position: Vegetation: % Slope: 50 10 Plasticky/ Stickiness Rikye summit

3% nearly level

23"

Shale / 92/tstone

white pine chestant cak in NESEX Structure Type, Grade, and Size ancismo broken Moist Consistence 3 Horizon Soundary Topography & Distinctness G Redox Feature Color witchesze Redox Feature Description Dip Slope & Direction: Slope Aspect: Slope Failure or slip: Depth to Water Table: Parent material: SEMIC 2FMC 3 Roots S. IN 0.0 ryge runs Elw slopes H and S 25 residuen Lab Sample ID Strike: Notes

269

0

TEST PIT DESCRIPTION
Soil Scientist: Field Assistant: Rachel H. De Galbruth

RETTEW Associates, Inc. 3020 Columbia Avenue

RETTEW Job #: Test Pit ID: **NRCS Soil Unit:** De ineralogy: Horizon 4.5-1510 YRE/ 10 5-21 Depth in inches P-270-160610-0915-MEL Dominion - Atlantic Coast Pipeline Soil Survey 089962000 M.XEC Berks 5X 25/ 5101R 34 VGR Matrix Color 8F nemiz Texture Class MARK 7 15 10 40 % clay 17 40 75 25 40 % sand Dedv Fragment Type & % Rock Rock Fragment Size (inches) % Slope: Vegetation: Bedrock Type: Depth to Refusal: Drainage Class: Topographic Position: 40 Plasticity/ Stickiness FGR Structure Type, Grade, and Size side slope SVSSW/ Edt Moist Redox Feature Color Slope Aspect: Parent material: Redox Feature Description Slope Failure or slip: Depth to Water Table: Dip Slope & Direction: JAK S 2 FMC Orres ma STY NEW Roots 0.75 recky 53 Lab Sample ID 21 hard sitistine residerin Strike: Lancaster, PA 17603
Phone: 717-394-3721
Pax: 717-394-1063 Notes

800

270

Other Notes:

near

concave

near

ridge summer

above

Field Assistant: Soil Scientist: TEST PIT DESCRIPTION
Soil Scientist: Michael

or Galbrath

Signature:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

							1								#
Test Pit ID:	1-671-16	1-100010-1102-11EL	1105-	INEL	Topographic Position:	ition:	16-8-31	Sho			Parent material:		Super Section	The Co	Over residuali
Date:	6/10/16				% Slope:		1000				Slope Aspect:		1		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	t Pipeline Soil S	urvey		Drainage Class:	~	とし				Depth to Water Table:	ter Table:)		
RETTEW Job #:	089962000				Depth to Refusal:		74				Slope Failure or slip:	or slip:	1	-	
NRCS Soil Unit:	57	84			Bedrock Type :	5	11-80	3			Dip Slope & Direction:	Direction:	35	Z s	Strike: 285
Mineralogy:	paxim				Vegetation:	Fe Fe	Bry D	160,	547700	d May	010,0	Jan Di	2		
							No. of Street, or other Persons and the Person	USDA	1		16	7			
Horizon	Depth in Matrix Color inches	Texture Class	% clay % sand	Rock and Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
000	5-154825			1		(1			1	1		125	4.7	5	
7	1-310483/2	5.00	10 (0 15	1	200	FER	the "		\		3+4	20.00	52	
BW S	8-91/01/25/4	1,5	15	<u>↑</u>	-	35	YESF	K	300	1		MA	5.3	53	
Bw29	9-24/d HZ-1	VGR	2015	60	0,5-3	55 2	P\$K	天	210	1	1	FX	5.2	15	
7	24+ bedrock	Sylve	S	75	MON										

Other Notes:

rench

SPISSOR

18 landing cues

Soil Scientist: Richel Hi

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7	7-112-10000-1210-MIEL	COIO.	1210	120-1	-	Topographic Position:	ition:	Sideslose	3			-		6011		5
Date:	6	110/16					% Slope:		55.83				Slope Aspert	nerial:	0	MAN IN M	Over iscoldin
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		AM				Death to 1	Depth to Water Table:	200	11	
RETTEW Job #:	: 089962000	2000					Depth to Refusal:		22				Slope Fall	Slope Failure or slip:	1		
NRCS Soil Unit:		Berks 8	10				Bedrock Type :		5:165+0	200		Ď.	Dip Slope	Dip Slope & Direction:	82%	300	Strike: 2000
Mineralogy:	M	Mixed					Vegetation:		Mtn. laure	el che	i chestnut a	ak, service	1,00	60/11	700	0/07	121816 20 Ve)
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Pleatidity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Harizon Soundary Topography & Olatinetness	Redox Feature Color	Redox Feature Description	Roots	Podet Peretrometer/	Lab Sample	Notes
0	0-1.5	1/4-245	humi			•	1	(/	1		1		With the second	STATE	000	f	
A	15-2	2/2 MC	CR	00	0	5	^	20	216R	X.V	7	1	1	17	0.0	1	
(m)	27	10425/4	25	N	03	25	6.17	300	ZPSK	E		No.		ZUF-F	2,2	1	
200	11-20	151/67/6	SIL	17	15	55	5 M	25	MBM	R	3 5	1	1	3 VF-VC	5.0	ι	
R	11-43	11/15/4	J.C	20	20	85	9 ex 800	35	MISHI	and of	Ģ	Y-		J-12-C	ò	1	
Cr	43.52	1	1	1)	1)		1			7	į	1			
R	252	1	1	(1	1	j		1	ì		-			j.		

Soil Scientist: Michae Field Assistant:

Dr. Galbaith RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	3-273-16	3-160610-1300-ME	N-005	IEL	Topographic Position:		sidestage		CONVEX MOSES	30/0/250	Parent material:	rial:	Gollow	CM O	Collumba oprosition
Date:	6/10/16				% Slope:		288	,			Slope Aspect:	et	1700		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil Sun	vey		Drainage Class:	1	S S CM		Somewha	Somewhat excessively pepth to Water Table:	Depth to W	ater Table:	1		
RETTEW Job #:	089962000				Depth to Refusal:						Slope Failure or slip:	e or slip:	1		
NRCS Soil Unit:	Berks				Bedrock Type:	~	54/10	ino			Dip Slope & Direction:	Direction:	OCK	7	Strike: 330
Mineralogy:	mixed				Vegetation:		ASCK-TU	, V.	best	nut oa	R			1	
	Approximation of the second							USDA							
Horizon i	Depth in Matrix Color	Texture %	% clay % sand	Rock d Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness G	Structure Type, Grade, and Size	Moist Consistence	Horison Boundary Topography & Obtinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometed/	Lab Sample ID	Notes
0-	JERY25/	1	1	1		1				-	-	NIZ	0.0	-	
Ce.	1/ 1/1/6:	1		1		1	9		?			1.11	44		
AR I	5-3 10 18 4/2	250	12 35	25	6.5		FSBK	Z	2			N 12	20		
1	, , , , ,	380	-	1		00			1			1	4.6		
800	-8 1048%	2000	225	35	_	L CES	188K	3	- 6			3FML	1.25		
7	-JE1-4251	XGR	20	X	upto			B	200			1436	Age		
1	2/10/11/16	7.5	18	10	_	50	Juston 1	107	11			Siris	8.4		
5 5	15-21	i		1		(1	(8			Occasiona			
0	,	1	+	-	1	-									
2 7 2	21+ bed	OCK	(^	114	Sto	Z									
			+							+				-	

Soil Scientist: John J. W.A.L.

1	ートナ	-0140	-	-		Topographic Posi	tion:	NAPS.	1			Parent mat	erial:	1831	MOUN	
-	116					% Slope:						Slope Aspe	#	っトナ		
Dominion	- Atlantic Coast P	ipeline Soil Su	rvey			Drainage Class:		SOMEWI	大天	オメイモリ	3015	Depth to W	ater Table:	1		
08996200	0					Depth to Refusal:		32				Slope Failu	e or slip:	1		
239	7					Bedrock Type :		SILTI	JONE	14		Dip Slope 8	Direction:	1	Strike:	ike:
-	XED					Vegetation:		いけとうてい		P K	HICKORY	J. 30		- OU	CUE BERRY	PY MAPLE
Depth in inches	Matrix Color	Texture Class	% clay	% sand		Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots		Lab Sample ID	Notes
5	1	*	1	i	1	t	('	1	r	25	1	1	2-45,5	4.5	1	
10	16.31	2. C.	-	7	古る	1		1257	237	P. J.	1	1	1-72. L	4.5	1	
7	425/6	9 33	工	~	00	1-3		14/8×	23	0 2	1	1	2.7	4.5	,	
11.37	1	1	1	1	1	Tr.		1	(1	- 1	7	,	, ,	1	
2 276	2111	to			K38	1707										
	Dominion Dominio Dominio Dominio Dominio Dominio Dominio Dominio Dominio Dominio Dominio Dominio Domin	Dominion - Atlantic Coast P 089962000 B 8 2 4 5 1 4 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1	Matrix Color Class SILTS to SILTS to SILTS to	274-160610-171 10/16 nn-Atlantic Coast Pipeline Soil Survey 0000 Texture Class YES VCH VCH VCH VCH VCH VCH VCH VCH VCH VC	274 - 160610 - 1710 - 3 10 / 16 m-Atlantic Coast Pipeline Soil Survey 200 RES WED Texture Class * cay Class * cay * sand O 423 1 CH	274-160610-1210-35W 10/16 Matrix Color Texture Class VED VED VED VED VED VED VED V	274-160610-1710-35W 10/16 Marrix Color Texture Class Yelay Yeard Fragment Type & % O425 6 Sil 14 15 18 CH O425 6 Sil 14 18 CH CH O425 6 Sil 14 18 CH	Topographic Position: Column	The control of the co	Topographic Position: SUM MIT TOPOGRAPHIC Position: SUM MIT MIT TOPOGRAPHIC Position: SUM MIT MIT TOPOGRAPHIC Position: SUM MIT MIT MIT MIT MIT MIT MIT MIT MIT MI	Topographic Position: SUMMIT AnnAthritic Coast Pipeline Soil Survey Drainage Class: Drainage Class: Depth to Refusal: Such Sull Har Exits USDA Machinery LISDA Machinery LISDA Machinery LISDA Machinery LISDA AS Structure Type, Machinery Machinery Machinery AS Sull Har Sull Har Sull Har Size Inches) Structure Type, Machinery Machinery Grade, and Size Conditions Associations Associations Associations LISDA Machinery Machinery Machinery AS Structure Type, Machinery Machiner	Topographic Position: No. Attentic Coast Pipeline Soil Survey No. Attentic C	Parent mate Parent mate	Comparation Construction Const	Control Court Pipeline Sol Survey Topographic Peolites: Survey Stope Stope Appect Survey Stope Stope Appect Survey Stope Appect Survey Stope Appect Survey Stope Appect Survey S	Technic Court Pipeline Sol Survey

Soil Scientist: JOHN WAY

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Signature: () ()

Test Pit ID:	0	6	0610-	10	6-4	38	Topographic Position:	tion:	BACK	400	ra		Parent material:	terial:	RES!	せいいか	
Date:	13	91/01					% Slope:		673				Slope Aspect:	ect:	0		
lob Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		MELL				Depth to \	Depth to Water Table:	1		
RETTEW Job #:	089962000	2000					Depth to Refusal:		30:				Slope Fall	Slope Fallure or slip:	かけこう	7 67	77
NRCS Soil Unit:	850	500					Bedrock Type :		SANDS	TONE	71		Dip Slope	Dip Slope & Direction:	277	100.	Strike. 100
Mineralogy:	3	GAKIN					Vegetation:		サークとっち	1	٤	とチューカ	TRX	d. 21.	. 14	1	Juline:
						190				SDA		F		1	1 40 2020	1	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pucket Paneburneter/	Lab Sample	Notes
000	2	かずかい	1	1	1	1	(, 1	1	1	8	1	1	2- VF	, (1	
>	6	18 3 3	aby of	3	0	200	17	A.	P	P		1		N I	o t		
3,		575				7		PO	13/	1	3			4	5,0	1	
*	6	2/2/2/0/2/2/2	2 Ly	7	59	500		85	1458×	TP 7	2	1	1	2-4,6	54.0	1	IN CITY SKITS
p C	'30	100	大学	J	6	0 4	1-3	50		7	Se Se			7.41	1.0		
	6							40		1	1		1		4.7		
C	3° ×	SANDSTO	570	2	Ca.	かりか	Nock Ca										

Other Notes:

STEEL LINEAR

BALKSLOPE

(ATPROACING

XBAROO

Soil Scientist: Jacquary WARL

nature: MANA

-							2							1	
10/16					% Slope:		4/5				Slope Aspect:	ct:	0000		
n - Atlantic Coast Pi	peline Soil Su	rvey			Orainage Class:		WELL				Depth to V	Vater Table:	41"		
089962000					Depth to Refusal:		1				Slope Failu	re or slip:	1:		
195	317				Bedrock Type :		1				Dip Slope	& Direction:	١		Strike:
MIXED					/egetation:		MEPLE	8	EC1	CHESTA	VTO		ナールキョ		FERY MAYAPPL
Matrix Color	Texture Class				Rock Fragment Size (inches)	Plusticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Prochet Penetrometer/ phi	Lab Sample	Notes
1/5/24-2	1	'	'	1	1	1 1	1	1	C M	(W'z' 3N-E		D N	
				2022	4-6	500	1454	NER	2	1	(3-VE, F, M		2/8	
x15415	75	8	2	and o	4-6	200	1454	756	747	1	J	1-45 V	14	E/A	
6/27/2/2	25x			34000	4 - 8	0 0	1873×	23	cs	(î	3-4,4	5.5	\$ v +	
6/4-2/3	L'S Xdr			0000	4-6	50	150	1	1.	(Ţ	1-C	33 8	_	
W 1 t. 0	2	200	572		12	P	となりた。		3378	STONE STONE	6 X X X	DE. S	177	TE	CORRES
	1 1 X & TO S V 1 1 X & TO S V 1 X & TO S V 1 X & TO S V 1 X & TO S V 1 X & TO S V 2 X 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3	Atlantic Coast Pipeline Atlantic Coast Pipeline Text latrix color Cia Syranyl Syran	Atlantic Coast Pipeline Soil Survey Atlantic Color Texture Texture Texture Class AT 23 2 × 9 R SYR23 3 × 9 R S	Atlantic Coast Pipeline Soil Survey Atlantic Coast Pipeline Soil Survey Texture Texture Class Texture Class YPP3 13 X PP SYPP3 3 X PP	Atlantic Coast Pipeline Soil Survey Atlantic Coast Pipeline Soil Survey Texture T	Atlantic Coast Pipeline Soil Survey Drainage Class: Depth to Refusal Bedrock Type: Vegetation: Texture Class Texture Class Clas	Atlantic Coast Pipeline Soil Survey Coast Pipeline Soil Survey Coast	Atlantic Color Pipeline Soil Survey Color	Atlantic Coast Pipeline Soil Survey Comparison Reck Comparison Revisal: Comparison Revisal: Comparison Revisal: Comparison Revisal: Comparison Reck Comparison	Atlantic Coast Pipoline Soil Survey Coast Pipoline Soil Survey Drainage Class:	Atlantic Coast Pipeline Soil Survey Dainage Class Vice Vice Coast Pipeline Soil Survey Coast Cult	Attentic Coast Popiline Sail Survey	Administ Coast Procedine Soil Surveys Coast Admiticoant Pipeline Soll Survey Donnings Class: Donnings Cl	Additional Processing Control	

16 Other Notes: RETTEW Job #: Mineralogy: NRCS Soil Unit: Job Name: Test Pit ID: 3RC2 Horizon BX 3+ 138 D Depth in inches L W 10 8 0 089962000 Dominion - Atlantic Coast Pipeline Soil Survey 10 YR 4/2 7,5485/6 548 7.5 TR 4/3 1.54R 96 Matrix Color 7-160610 65 Mononaahela 5 50 Texture Class 13.5 5 SI 400 % clay 32 30 24 24 16 -1480 12 25 % sand 0 00 Sold Fragment Type & % 9 CY 75 10 9 65 3 Rock Rock Fragment Size (inches) Bedrock Type : Depth to Refusal: Drainage Class: % Slope: Topographic Position: Vegetation: ragiaquic 2. N N -6 3: 0 4 52 52 PM 70 PM PR PS Plastichy/ Stickiness Structure Type, Grade, and Size 20 (mp) msbk 3 101 55k 8 Subarayo tul, o Moist Consistence 1 + か 7 ootslope lotar SWP poplar 30 Horizon Boundary Topography & Distinctness 0 1 QW Sw 3 240102 Sccriet 7.518 4/2 CMC Redox Feature Color 10x2 3/1 5485/8 1 Sas Dip Slope & Direction: Depth to Water Table: Slope Aspect: Parent material: 1 Redox Feature Description Slope Failure or slip: 1 OM Roots to 1 0 + 3,5 74.20 5.25 -0 1.25 5,25 ,75 4 0 8 Maple XX. 260 Lab Sample ID (1 5 (1) 5 5 E W N 1 FOODY Strike: C0/1 all chromo

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Notes

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Soil Scientist:

Field Assistant:

Dove

SKAPPON

Signature:

TEST PIT DESCRIPTION

TEST PIT DESCRIPTION STRUCE Field Assistant: Soil Scientist:

		5	Bw.	P	Q	Horizon in	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:	U.S. Carlotte
		81	2-	3	2	Depth in inches			089962000	Domini		T	
			10YR 66	IOYR 2/1	5182.51	Matrix Color	3	Ber	000	Dominion - Atlantic Coast Pipeline Soil Survey	190	0278-	
			5.1	5-	. 1	Texture Class	MIXED	53		Pipeline Soil	10/16	16061	
			72	91	Ĭ	% clay				Survey		10-11	
			10	25	1	% clay % sand						1143-500	
			45	30	20	Fragment Type & %						do -	
			1 - 4	h-1	7-1	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
			PS	SS	1 1	Plastidity/ Stickiness						ition:	
			Imsak	1691	4	Structure Type, Grade, and Size	Scar let	S	1				
			7	4	1	Moist Consistence	NOSU N	一大		SED	_	Sho	
			25	98	3	Horizon floundary Topography A. Distinctness	LEG W	tone			8	sulder.	
			(r	1	Redox Feature Color	mople, che			Excessively			
			(1	1	Redox Feature Description	CWESTUNA	Dip Slope	Slope Failure or slip:	Depth to V	Slope Aspect:	Parent material:	
			CC	500	1 3 J	Roots	og is	Dip Slope & Direction:	re or slip:	Depth to Water Table:	ct:	terial:	
			4.5	1.0	4.25	Pocket Penetrumeter/ pH	mounta, n	250	N	NIA	18		
		-1	53	52	51	Lab Sample ID	o laure	×	IA	A	180	residuam	
							(9)	Strike:				MO	
						Notes		225					
			->										S SEE S

Soil Scientist: Duant Trans
Field Assistant: Tour Woults

Test Pit ID:	7	LC 12-1000 10-1221-124	010-1	220-	04	1	Topographic Position:	ition:	Trood D	ain			Parent material:	terial:	20000		
Date:	06	26-10-20					% Slope:						Slope Aspect:	ect:	700000	A. A.	
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		Well	raine	1		Depth to \	Depth to Water Table:	>50.	787	
RETTEW Job #:	089	089962000		1			Depth to Refusal		NIA				Slope Failure or slip:	re or slip:	11/4		
NRCS Soil Unit:	G	raignelle	sand	loan	A.		Bedrock Type:		NIA				Din Slope	Dip Slope & Direction:	2/12		
Mineralogy:	ai	silveren					Vegetation:		Henresca	E W	hite Pine	M	Rite Oak,	Red mark	1		otrike:
						Rock				USDA				1	1	Lawrence of	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample	Notes
00	0.05	2.5/1	1	1	ř	ſ	1	+	1	1	CA	Ī	7	Ţ	A ,	5-14	
7	224	3/1	2	GØ.	24	73	0.25	50	75	(FR	4 A)	1	ww.	and the second	5-24	
AB	4-7	4/2	Al	J.(55	161	3,0	50	1) -1	JUST	54	ŧ	1	W CW	2:0	5-3A	
5	7-18	7.542	CA	7	90	300	0.25-	So So	50)	-	WA	1	1	2m		5-48	
C2	1836	7,542	4	4	9	65%	810	20	06	_	A	1	1	1	25.0	5-5B	
Co	36-50	1512	~	N	92	XCV8	24,0	SO	6°	Г	1	1	1	1	11	1	Abserved along

Other Notes:

Field Assistant: TEST PIT DESCRIPTION FORST MALMEN

Test Pit ID:	-	-819A	- 11006	00-	18	7	OOOO Topographic Position:	ition:	TOFFA	11			Parent material:	arial.	Allvon	N. A. L.	
Date:		6 6	6			1	% Slope:		4				Slope Aspect:	9		0	200000
lob Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	Survey			Drainage Class:		Mod !	Well			Depth to Water Table:	ater Table:	18		
RETTEW Job #:	#: 089962000	2000	1				Depth to Refusal:						Slope Failure or slip:	e or slip:	(
NRCS Soil Unit:		Menongahola	6 636	6)			Bedrock Type :		J				Dip Slope & Direction:	Direction:	1		Chila
Mineralogy:		W: x 01	9				Vegetation:		いけん	Lasy	el. Re	dogle	Nem or	och , Red	Somo	211	to DIM ANT land
Horizon	Depth in Inches	Matrix Color	Texture	% clay % sand	-	Rock Fragment	Rock Fragment Size (inches)	Plantichy/ Stickbees	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample	Notes
>	0-25	2/5 2/2	7.15	0	33	18 33 384	08	Se	SG SMGRNFC AW	NF	AE)	1	26,34	0.25	02	
Bwi	から	E1551	5.	16	29	1 29 361.	37	52	13 XBSW	7	CW	1	1	as,M	0.75	2	Rounded EdysonGF
Bw 2	-5:1	1875 JAS 1	7:5	25	2	25.	14-18"	35	14 YESO11	7	DE	1	(30	1.25	22	<
Sex Sex	28	1/5 /V	5.1 2627 201.	36	7	507.	13:	SS	- Washi	to	1	7.54E66	CP	お	2.25	75	Argulaccat
										,	3	100					
\ \ \		Te -															M

TEST PIT DESCRIPTION
Soil Scientist:
Field Assistant:

Dave Skippon

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Sod

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Signature:

Date: Job Name: RETTEW Job #: NRCS Soil Unit:		Atlantic Coast	26/0-	Survey	150	C	Topographic Position: % Slope: % Slope: Drainage Class: Depth to Refusal: Bedrock Type:	l:	S	SWP /	I I IX	ckslope 21	80	80	80	Slope Aspect: Depth to Water Table: Slope Fallure or slip: Dip Slope & Direction:	Parent material: CO Slope Aspect: 120
NRCS Soil Unit:		Derks					Bedrock Type :			S	+5+0h0			Dip Slope 8	Dip Slope & Direction:	Dip Slope & Direction:	Dip Slope & Direction: Strike:
Mineralogy:		111,180					Vegetation:		black	K oak,	s, red	maple		Scar	scarlet out	scarlet oals	1
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Roundary Topography & Distinctness	Redox Feature Color		Redox Feature Description	Redox Feature Roots	Roots Poder Prestrained	Roots
Oe	7	7.5182.5	1	1	1	20	.5-1	1 1	1	1	aw	1		1	133	52.7 FE	
P	7	104R 3/2	5	6	5	200	1-5.	90 50	1fgr	4	aw	j		1	1 3 4		
8+1	18	101R614	5-	o	5	जुर	1.5	P.S.	2m sbk	4	3	1		1	CW		
28,2	26	7,5486	1.5	25	c	98	7	85	2 msbx	4	Cw	248 SH		cwd	CW C C C	00	00
3843	504 54R5/6		Sid	30	0	25	2-4	PS 89	2msk fr	かか	1	1.548 % 2.548 %		pust pust cmp	5 + pure	7 7	7 7

Soil Scientist: Juane Track
Field Assistant: Taylor Walter

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Common Admit Court Patient Sci Survey Common Admit Court Patient Sci Survey Common Admit Court Patient Sci Survey Common Admit Court Patient Sci Survey Common Admit Court Patient Sci Survey Court Cour	Test Pit ID:	P2	P280-1606	60610-13	308-DAT	A		Topographic Position:	tion:	RACKSCARE	SPE			Parent material:	terial:	Call	1	Don't
Common Common Advance Coast Propries Sci Science Coast Propries Sci Unite Sci Unit	ate:	06						% Slope:		225				Slope Asp	ect:	20001	1	
Colorado Color Cats Start Start Color Cats Start Start Color Cats Start Cats Start Cats Start Cats Start Cats	b Name:	Domini	ion - Atlantic Coast	Pipeline Soil	Survey			Drainage Class:		MADINGS	すれ	XC6537/	Kery	Depth to V	Vater Table:	NA		
15 15 16 16 16 16 16 16	ETTEW Job #:	089962	2000					Depth to Refusal:		186				Slope Fail	are or slip:	N/A		
Depth in Indians Color Texture Wash Stand Fragment Standard Structure Type Anno Structure Type RCS Soil Unit:	Res	4		the		m	Bedrock Type :		S: Itstan	4			Dip Slope	& Direction:	250			
Depth in Matrix Color Techner x cary x sand Fragment Road Fragment	lineralogy:	1.0	2					Vegetation:		Buntap	ine	Chesa	14					-
Depth Martin Color Testure Wash Sanger Fagarina Rock Fragment Martin Color Rock			200000000000000000000000000000000000000				Rock						200					
0.005 25/2		Depth in inches	Matrix Color	Texture Class	% clay		Rock Fragment Type & %	Rock Fragment Size (inches)		Structure Type, Grade, and Size	Moist Consistence			Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
15.25 Apr 10 45 10 45 15.4 0.25 PO GR VIMT SA 0.25 - 0.35 1.2 VIMT SA 0.25 - 0.35 1.2 VIMT SA 0.35 - 0.35 1.2 VIMT SA 0.35 - 0.35 1.2 VIMT SA 0.35 1.2 VIMT SA 0.35 1.2 VIMT SA 0.35 1.2 VIMT SA 1.35 1.35 1.35 1.35 1.35 1.35 1.35 1.35			7.54R 2.5/2	1		1	(t	, ,	1	1	SA	ì	1	1	4 1	1	
0525 A/C 10m 257 1.0 50 1.2 MM 5A 0.75 8:0 566 Ail 16 35 Nock 0.25 PO 50h 1/2 MM 5A 0.75 19- 10xh 20 31 Nock 0.25 PO 50h 5A 1.75 19- 10xh 20 31 Nock 0.5- PO M,O FAT TA 4.6 244 5/6 Ail 16 20 9575 10:0 50 M,O FAT TA 4.6				Q.	2	4	有年		Po	6h	-	>				25.0		
255 10m ail 16 35 462, 4.0 50 1,1 1/ms 54 0.75 8.0- 109 10 16 20 31 xc4 0.25 00 50 1,2 ma 5A 1.75 19. 10x 16 16 20 70c# 0.5- 00 m,0 Fat TA 1.5 24 5/6 11 16 20 705 10:0 50 m,0 Fat TA 4.6		05-25		7	10	+	25%	1.0	05	1,2	141	SA	1	1		44	1	
8:0 5/6 All 16 33 Abr. 4:0 So 1,1 MM SA - A:5 8:0- 108/2 Aid 20 31 XCH 0:25 PO SON MIN SA 1.75 19- 108/2 Aid 16 20 NCH 0:5- PO MIN SA 1.75 24 5/6 Aid 16 20 NCH 0:5- PO MIN FAT TA 4:5		1	1000	1	7	1	VOR	1	00	SOL						0.75		
8.0- 10th 20 31 xch 0.25 po 50h 50h 50h 50h 50h 50h 50h 50h 50h 50h		0 8	2/6	all	6	35	20%	40		1,1	MI	24	- 1	1		45		
19. 10° 20 057, 10:0 50 M,0 FRE JA 4.5 24. 5/6 W 16 20 057, 10:0 50 M,0 FRE JA 4.6		0	1040	0 -	5	2	YC1	0.25	po	san		\	1			1.75		
19. 10xx 16 20 xc+ 0.5- 00 m,0 Fix IA 4.6 24 5/6 will 16 20 95/2 10:0 50 m,0 Fix IA 4.6	1	19	3/6	w	E.	5		8,0	50	1,2	The	JA		1		4.5		
24 5/6 but 16 20 95% 10:0 50 11 12 12 12 4.6		10	1571)	XC+	15.0	PO		1	4				1		
**************************************		724	5/6		6	07	95%	10.0	50		13.4	77	ı	Ī		4.6		
		7		1	1	1	1	Y	1	1	Į.	f	1)	1	1	1	Sillston Broker
		-							1							,		

TEST PIT DESCRIPTION
Soil Scientists
Field Assistant:

Signature: Therefore Joseph

	7	Cr	Bur 13	BAN 7	8F.	Oe 0-	Horizon in	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
	32+	1000	3-100	100	1	-	Depth in inches	4	20	089962000	Domin	06-	2
	1	1	104h	1042	107K	25/2	Matrix Color	licens	Renks Char	2000	Dominion - Atlantic Coast Pipeline Soil Survey	16-10-2016	P181-160610-1744-1)
	1	Ţ	5:2	Sil	8	1	Texture Class	0	1		Pipeline Soil !		-1144-
	Ţ	1	2)	26	14	F	% clay		S. L.		Survey		F
	-y	1	77	26 22	38	ì	% sand		silt loan				
-	A.	T	XCIK WOZ	XC1+	38 VCIT	7	Rock Fragment Type & %		M				
	t	1	0.25	3.0	1540	1	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
	1 1	+ 1	50	25	55		Plasticity/ Stickiness						tion:
	T	ı	58h	1,2 1,2	1,1	1	Structure Type, Grade, and Size	white d	SI/16 have	3211	SOMEWHAT PUORLY DRAY	122	SUMMIT
	1	1	7	7	3	1		USDA			tAT &		7
	1	54	SA	SA	SA	54	Horiton Boundary Topography & Distinctness	Chestern		1	DORLY		
4	1	T	0:104m	1	1	1	Redox Feature Color	not Oak			DRAINGO		
	((0.61	1	1	1	Redox Feature Description	White	Dip Slop	Slope Fa		Slope Aspect:	Parent material:
	(:	1	17	7 - 7	2 2	1	Roots	White time , &	Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	pect:	naterial:
	1 1	1 1	かが	7.75	23	4.7	Pocket Penatrometer/	Berood	180	NIN	NIA	275	1205
	(r	5.42	5-34	5-23	5-1A	Lab Sample ID	77				M	Residence
	filtatore	Laprolitic filber					Notes	ingined time	Strike: 23°				

Other Notes:

TEST PIT DESCRIPTION

Soil Scientist: DU ANG HOUAX

Field Assistant: Taylor Walter

Test Pit ID:	8	8282-1606	160610-0839-0		7		Topographic Position:	ition:	TAESLAPE	3			Parent material:	terial:	C. Demina	/	apidmen
Date:	00		6				% Slope:		320				Slope Aspect:	ect:	1120	1	
Job Name:	Domi	ant	Pipeline Soil !	urvey			Drainage Class:		20	name	1		Depth to V	Depth to Water Table:	4/18		
RETTEW Job #:	089962000	62000					Depth to Refusal:		CA!				Slone Failure or slin:	re or slin:	415		
NRCS Soil Unit:	56	4	run sil	120	am		Bedrock Type :		Sandstone	m			Dip Slope 8	Dip Slope & Direction:	100		Strike: 39/0///
Mineralogy:		2	me 0				Vegetation:		Red mush	1	learly to	ank o	Acet	Restort Bus	White Sah		- Barrie
												T. C.			The same of the sa	1	III P
Horizon	Depth in inches	Matrix Color	Texture Class	% day	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Soundary Topography & Distinctores	Redox Feature Color	Rados Feature Description	Roots	Pocket Penetrometer/ pli	Pocted Penetrometer/ Lab Sample ID	Notes
00	0-1	2/5/2 2/8/2	1	1	1	1	1	7 1)	1	LA	1	1	1	7.2	5-18	
	3	7.54n	0	2		52	-520	00	62					25	0,5	45.5	
7	3	4/2	×	7	£	20%	0.5	50	1,3	164	S A)	1	75	4,9	5-28	
0 7	2-9	1	0	1	1	CF	0.25	00	30h	4015				21 72		5-34	
39		516	~	1	5	-22	1,5	So	1,1	TUTA	SA	1	(Im	4.5	5-38	
0	9-16		0	F		ACK.	-22.0	PS	582		>			115	2.5	5-44	
197	i	514	35	5	00	35%	2,0	50	7,2	103	SA)	1	1,0	4.6	5-48	clay rains
	>			,	1	YCH	135.0	29	584					7/	3.25	5-54	1
177	16-27	316	Sec	10	56	ret	3,0	55	113	100	54	١	1	- m	4.4	5753	day more
	27-44	35		2	1	SC =	0.25-	No de	Sohn	100	7			7	3,5	5-64	Den Shin
8+5		516	CK	31	74	33%	20,0	53	1,3	ma) "	1	,	1 1	4.5	5-63	0 0
7	15-PH	7.542	0 0	>	7	CIK	0125-	50	SBV	1	2	1		7	1,5	14-5	no
30	7		SCL	30	20	202	2,0	25	1,2	124	SR	1	(1.1	2.5	5-7B	clay skin
,	2	7546	0	2	22	×25	->200	20	SAW	TOTI	< 1		\	1	2.0	5-84	budding street
1	64	516	54		(85%	6.0	50	1,2	VERY	Un	1	١		5.7	5.00	0

Soil Scientist: Field Assistant: Taylor TEST PIT DESCRIPTION
Soil Scientist: Hoad block

Test Pit ID: Date: Job Name: RETTEW Job #: NRCS Soil Unit: Mineralogy:		Atlantic Coa	160606 (6 8973	-O-T	4	P	Topographic Position: % Slope: % Drainage Class: Depth to Refusal: Bedrock Type: Vegetation:	" d.	on:	Market Alle	Market Alle	Market Alle	Warryled Dark Marky par	Made Cate by Well Slope A Made Cate by Well Slope A Dip Slope F	Made Cate Mar 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	All A 0'5 log Co. Slope Aspect: Made Chief by Me 11 Dip Slope & Direction: Chartent da K. 1934 (A A A A Col Calk (Ed Ma	All A 0'5 log Ce. Slope Aspect: Made Cate by Me 11 Depth to Water Table: Slope Failure or slip: Dip Slope & Direction: Charlent da K. 193416 how at N. Ced Cat (Ed.
Mineralogy:		N.	Ked	1			Vegetation:		(No. + ru	USDA CI	1/4 PM	Ach has	A F		ed cak	KICEd	KICEd
Horizon	Depth in inches	Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Masticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description		Roots	Roots Product Persettementar/	
00	2.0	7.5%	(1	ſ		1)	ŧ	1	AW	١	7		3+M	3+M 5.2	
P	50,5	5/h 3401	25	6	6	257. CN	21.7	25	IMSAK VEC	NEC	AW	1	1	,	637 2000	1.7 1.0 1.0	7
Ma	18.4	h/a 2056	2:5	1616	16	CN HOV.	C1/2"	35	INSBK	70	CW	1	1	1	030	3¢ 1.0	1_
3	58	h/5 2457	2'CN RXSN	- CO	16	967.	21/2"	55	MARM	7	C	1	1	1	3 45	58.1	
C2	14	1/2	N.S.	-	52	N. S.	C1/2"	35	2 MEBLE	7	CW	7 54/65/18 CMD	- 0	CWD			15
103	405 thr.	7.54	Channes (6:D)	6	2)	0 9 91.	C1/2"	Po	1 M5BK	J.	1	1		1	1	4.8	

Other Notes:

TEST PIT DESCRIPTION
Soil Scientist: DECRETE MOCKET

Soil Scientist: VILEM Walter

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-284-	60606-0748-DEF	0-0	748		Topographic Position:	tion:	Backe	Stern	de		Parent material:	aterial:	Think	ושום ושעיליטור	JOH
Date:	9	16116				% Slope:		1	1.			Slope Aspect:	ect:	355		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	oast Pipeline Soil S	urvey			Drainage Class:		We !				Depth to	Depth to Water Table:	1		
RETTEW Job #:	089962000					Depth to Refusal:		30				Slope Fail	Slope Failure or slip:	١		
NRCS Soil Unit:	Boils	18)				Bedrock Type :		Sharks o	2 5	+0+	- Me	Dip Slope	Dip Slope & Direction:	4005		Strike:
Mineralogy:	からそらの					Vegetation:		-	アリナ	Sal.	Rod Co	11. 0	hod de	A TON B	1	1220
									USDA	-		-		-		0
Horizon ir	Depth in Matrix Color Inches	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Masticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Harlson Boundary Topography & Diadectness	Redox Feature Color	Redox Feeture Description	Roots	Pocket Penetrumeter/ pH	Lab Sample ID	
000	2.5/1	1	1		1	1	1 1	1	1	PE	(1	34	421	5	
P	2.5- long 3	25	7	25	301.	4/17	SOPO	Do Itsur NEL AM	VF	SA	1	1	200	0,25	52	Collusions Red Coff
2Bw1 4-	h/0)	252	I	25	304.	21/2"	55	SP IMSBU Fr	7	CM	1	1	100	10 2	53	Residoum
BW2 16	16- 7.5MR 25 7.5MR	SIL	7	S.	307	13	55	Nosw /	7	3	4	¢	(co	2,0	254	
5	25- 7.54/2 5/6	Cobbly		1	981.	2.6"	1 1	WO	1	CS	k	1.	币	1 1	1	<
S	34- 76 -46	tan Shale	B				1 1	1	-	AS	4)		7-	1 1	1	
JA H	36+ 1	ight Brown	Lind	5	tstone	\$	11	(1	1		1	- 3	1 1	1	

Other Notes:

Thin collusial mantle over 185 during

TEST PIT DESCRIPTION

soil scientist: D. Franche (March Field Assistant: Taylor Walter

Signature:

Test Pit ID:	P-385-	0000000	0.90	757	- DE	70	Topographic Position:	ion:	Pidse 2	tue			Parent material:	rial:	Res.	duck	in over
loh Name:	Dominion - Atlantic Coast Pineline Soil Survey	ntic Coast Pineli	ine Soil Surve	١		0 3	Drainage Class:		me II				Depth to Water Table:	ater Table:	1		
RETTEW Job #:	089962000					D	Depth to Refusal:		37				Slope Failure or slip:	e or slip:	1		
NRCS Soil Unit:	Berky	CL8				В	Bedrock Type :		5,1456	Me-	1.ght	color	Dip Slope & Direction:	Direction:	270 6		Strike:
Mineralogy:	_	W.XIA				V	Vegetation:		Chestro	toa	a ful	te call, 1	2hite	PINR,	blueb	berry	
		-	150							USDA						1	
Horizon De	Depth in Matrix Color inches		Texture % (% clay %	% sand Fi	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podat Penetrometer/	Lab Sample ID	Notes
200	0-1: 7.5 u/c	2.5/1	1	1	1	1	- (11	1	1	1))	24	5.4	15	
D	12 long	5 K/200]	-	<u>_</u>	80	201	17	88	13 46531	13	Aw	1	3.	724	25.0	22	
130	125-104A	2	7	6	20	35.1.	710	55	185M 1	13	CW	1	1	123	5.5	53	
2842	12-7,5u	En	5;CL 33	0	23	1.08	C1/2"	SS 8	JASSA	1	(M)	1	1	130	6.5	15	Redstate Cox
2623	2 805.47	5 2/2/2	23	36	U	1	1	MY	3,45BH	Fo	m			MA	5,50	25	Clay Colms
5	37 2577/1 37 2577/1	177/1 S	125		T	1	1	60	20	7	CK	72	1	1	1 1	1	Rockstice Softerery
P 2	37+	(1	1	,	1	V	1 1	1	1	1	1	l	١	11	1	

Other Notes:

Cr. Very Soft rocks- completely hithochiom.c marky colors. breakdown into Ens w/o Courset Syvania

Soil Scientist: De Moster Machine Field Assistant: Taylor Walte

moure: David Leistrand

		138 198	Bu2 19-	Bui 19	00-1.5	Horizon Depth in Inches	Mineralogy:	NRCS Soil Unit:			Date:	Test Pit ID:	
		1000003	1041/25/14	hJstrol	15 Sup	h in Matrix Color	W.X.	52130	089962000	Dominion - Atlantic Coast Pipeline Soil Survey	10/10/10	7-280-110	
		SICN	25	12	1	Texture Class		DE		st Pipeline Soil	0	00000-08	
		<u>~</u>	17	2	1	% clay				Survey			
		25	20	ō	1	% sand						JY-DEF	
		CN 40%	2009	C. 121.	1	Rock Fragment Type & %							
		13.	1	7.	1	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
		55	P0	05	1 1	Plasticity/ Stickiness						sition:	
	24	165BK Fr	MASMI	50 1882 NER	1	Structure Type, Grade, and Size	15/12/150m	1	1	1001	24	120,00	
		T	7	TH	1	Moist Consistence	USDA L				7.	bac	
		1	CE	CV	CW	Horizon Boundary Topography & Distinctness	1750					LILA	
		1	1	1	1	Redox Feature Color	Pine Re				,	andstone	
		((1	1	Redox Feature Description	COLK	Dip Slop	Slope Fa	Depth to	Slope Aspect:	Parent material:	
		不	38	C 3 %	sing t	Roots	+ Knide	Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	pect:	naterial:	
		2.1	5 N	220	1 18	Podiet Penetrumeter/ pH	endro	1	1	1	239	3	
		75	23	52	5	Lab Sample	13				0	2010	
		Cet.	Noci	Red	6,00		Blueber	Strike:					
		Cot - randomly	9 WIB CAISON	programa	AM AEONEN	Notes	A.	(,

Other Notes:

Field Assistant: Taylor walter

Signature: family flower

	1	1	400						1.00						- 0		
Date:	Dominion	Dominion - Atlantic Coast Pineline Soil Survey	Pineline Soil S	UNPV			Drainage Class:		Me				Depth to Wat	Depth to Water Table:	10		
RETTEW Job #:	089962000	0					Depth to Refusal:		2				Slope Fail	Slope Failure or slip:	1		1
NRCS Soil Unit:	30	Berks.	COR				Bedrock Type :		9; (45	1 town			Dip Slope	Dip Slope & Direction:	280	380	Strike:
Mineralogy:		Mixe					Vegetation:		Chestro	+ conk,	Black	u sum,	wh.	CPIP	Blue	esury	Ruxden
Horizon De	Depth in	Matrix Color	Texture	% clay	% sand		Rock Fragment	Planticity/ Stickiness	Structure Type,	Moist	Herizon Boundary Topography &	Redox Feature	Redox Feature Description	Roots	Pucket Panedrometer, phi	Lab Sample	Notes
00	100	1 2 3 cm	1			Type ox 76	1	1 1	1	1	1	1	1	35	1	1	Thin On underseath
B 20	15.5	6/4 Sup	2,5	16	7	8 isi	1/2	Po	18831	71	S	1	1	150 150 M. F.W.	5.0	1	
Bwa	1257	N/3, 7,8%	2'S Nich	1		28.	12:	55	1825 W	77	CW	1	1	W'te	K.0 7	1	Catorientro
286 2	2000	h/m	S'CN XCN	3210	10	N. 755	751. 2.6"	45	16584 Fr CW	T	CW	1	1	The state	11	1	
5 20	797	1	1	1	1	1	1	, 1	1	1	1	1	1	1	1 1	(
		1															

TEST PIT DESCRIPTION
Soil Scientist: Field Assistant: + and er walter

		1111						000	(3			21		700		
Date:	6 6	8				% Slope:		201	(Siope Aspect:	ect:	1/0		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	Coast Pipeline Soi	Survey			Drainage Class:		1120				Depth to \	Depth to Water Table:	-		
	089962000					Depth to Refusal:		36	7			Slope Fail	Slope Failure or slip:	rimen		
	No. XS	00				Bedrock Type :		Sing a	MARIO	Sard	Istoric	Dip Slope	Dip Siope & Direction:	220	5	Strike: 6/0
Mineralogy:	20	9				Vegetation:		Red oak, chestnut oak, red map	hestnut	oak, red	maple, whit	e pine,	le, white pine, mountain laurel, blueberry (from photos)	aurel, bluek	Derry (from	photos)
Horizon Dep	Depth in inches Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastidity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Obstinctness	Redox Feature Color	Redox Feeture Description	Roots	Podet Penetrometer/	Lab Sample ID	Notes
000	0-2 542	1	1)	1	1	11	1	F	F	1	1	35	4.3	SI	
7	5.5 184	25	7	5	CN 201.	んかっ	200	60 1858K NE AM	F	MA	1	(63 t	9.25	52	
BW 22	0	7,50	5	16 14	B.	50	20	IMSAIL	31	S	1	(3000	0.75	53	
20 Ja	32 7,518		V.S.B 25/2		B 22	00°	55	16.584	T	Cw)		300	1.75	15	mastly Sandstone
	53 +															
2 2 2 2 5 5 2 0 inc	0.000000000000000000000000000000000000	Sico Class	3 6 x 1 x 1 x 2		Rock Fragment Type & %	Depth to Refusal: Bedrock Type: Vegetation: Size (inches)		Red oak, c Grade, and Size	hestnut USDA Moder Conditioners	Sand Oak, red Particular bundary transparate a transference to the control of th	maple, whit Redox Feature Color	Slope Fall Dip Slope e pine, actor feature baseletists	Roots Roots Roots Roots	23° aurel, bluet rate transment 4:3 0.25 4:4 3 1.75 4:4 1.75	S S S Derry (from S S S S S S S S S S S S S S S S S S S	Strike: photos

Field Assistant: Rache TEST PIT DESCRIPTION
Soil Scientist: Michael

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	X-1	7-187-18Q	10000 -1040-M	040	MI	1	Topographic Position:	tion:	SABBON	300			Parent material:	erial:	Collar	127 121	Ser Kes dag on
Date:	61	16/16					% Slope:		901	+			Slope Aspect:	a	270		
Job Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		7				Depth to W	Depth to Water Table:	1		
RETTEW Job #:	089962000	000					Depth to Refusal:		27"				Slope Failure or slip:	re or slip:			
NRCS Soil Unit:	W	Borks 8	M				Bedrock Type :		5:K54	sne		,	Dip Slope 8	Dip Slope & Direction:	25° S		Strike: 100°
Mineralogy:	1	M.xed					Vegetation:		Chestonu	1 00	1 × 3	Mite o	oak	1	dure!	136	200
Horizon	Depth in	Matrix Color	Texture	% clay % sand		Rock Fragment	Rock Fragment	Planticky/ Stickbress	Structure Type,	Moist	Horizon Boundary Topography &	Redox Feature	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample	Notes
>			2			ype & %		0	1						26.5	į	thin O hariron
1	1	104×3/3	5	0	25	7	0.5	80	FGR	K				3HM	5,0		2.5
more .	0	11381	52		7	5	7	09	15021	00	mc			1176	0.5		
INVE	-	916 Wal	5	1	(3)	1	11	50	YOU	TX	111			11/16	2,00		
S C		6/8/8/8	GR	17	30	70	_	20	N. S. K.	33	Da			21712	0.75		
			7.6					10		1.1	111			0	2.0		
K		1078 5/6	VGR	77	80	3	_	3 8	Omerive	T.	000		and the same	2 2	too de		
			7		1	1	-	C	,	1.1.	11		-	-	0,0		
7		N	1		1	1					5						
7	0	Ce	0	-	C	1							-				
					-												
													_				
													-				

Soil Scientist: Rache Field Assistant: Rache File

Signature;

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-7063

est Pit ID:	P-282-12	160606-1445-	45-	ME	1	Topographic Position:	ition:	Ridge/s	SIGESTO	200		Parent material:	terial:	1111	C MAN C	Jar Resdu
late:	6/6/16					% Slope:				1		Slope Aspect:	ä.	270		
ob Name:	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		DD				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000					Depth to Refusal:		1,850				Slope Failure or slip:	re or slip:	1		
VRCS Soil Unit:	Berks 8					Bedrock Type :		Sand	5/00	6		Dip Slope	Dip Slope & Direction:	(Strike:
Mineralogy:	nixed	1				Vegetation:		with la	188	0.6	hite 1	6 12	the shir	7 17 20	nk.	AUTO OF 40
	est i				Rock	Back Francisco			USDA							1
Horizon i	inches Matrix Color	Class	% clay	% sand	8 7	Size (inches)	Pleatidity/ Stickiness	Grade, and Size	Moist	Topography & Distinctness	Color	Redux Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
0	0-2 54RJS/4	1	1	1	j	1	11	1	1	1			1.735	0.25	~	
-		5					5			1		-		1.0		
1	-3.5101R\$/3	55	15	8	15		22	1F6K VFR	MAN	-			36416	2,5	2	
F 3	H/3 SKOID453	22	12	5	27	_	P0 50	YERAI	PFR.	200			3FMC	5,0	5	
32	245 240 PC-1	NOR	77	23	040	-	SP	MBSM	V	2			246	0.75	20	
		-					0			1		-		1		
	16 W/01 BE-	X6R FSL	10	60 70	70	-	Po	0.88.0	X	11/			175			JUSK / 840 11 Juga
*	150 Fracts	me U	1,	1.8	500	>	2 2	D 22	75	3000						
					1							-				
			ū													

TEST PIT DESCRIPTION

Soil Scientist: Michael Lane

Field Assistant: Rachel Hill

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-291-16	160606-	1330	M	EC.	Topographic Position:	ition:	Summ:	+			Parent material:	terial:	00/160	140 M. 7	a over Posidau
Date:	6/6/16					% Slope:		20/2				Slope Aspect:	et:	2150		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	t Pipeline Soil S	Survey			Drainage Class:		DD				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000					Depth to Refusal:		40/0	nach	1920		Slope Failure or slip:	re or slip:	00		
NRCS Soil Unit:	Berks &	7				Bedrock Type :		N3 +1-5	900			Dip Slope	Dip Slope & Direction:	150	35	Strike: 256°
Mineralogy:	mixed	1				Vegetation:		Chastra .	toa!	, scarlet	let sak	6.3	110 pla	400	mapl	E, BrIVET
Horizon	Depth in Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horison Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
A)-1.5 loys 3/2	1.0	5	5	5	-	200	MURR	2)		A COLUMN TO SERVICE AND ADDRESS OF THE PARTY	2FM	5.0	5	13,5° 2 HAZAN
BF (H/2 Xrol 25	2.5 C. S. C.	80	5	25	~	SS	XSISE	天			7.00	JW45	4.7	25	
78	7-18 WAS 81-6	S.S.	30	6/	20	-	S. J.	1991	R	. 8			3 KMC	2.4	22	
20	8-20757K 5/2	VGR S:CL	8	20	40	_	25	Omstare PR-	17 -27	1 6	of the owner particular	MAIL THE THE	NZ	1.75	2	lithichromic
T	10 YR 8/3 7.5/2 5/8	XGR	30 20	20	80		5P	Comessive	FT	+		minunk li	Delasical			
Be	d Ro	X										MACON IN THE TAX				
											Jeron mary 1	-				

Soil Scientist: Michael
Field Assistant: Rachel

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

						l							raicht matchat.	Cildi.	001100	Les Colons	NO NO NO NO NO NO NO NO NO NO NO NO NO N
Date:	6	16/16					% Slope:		255				Slone Aspect:	5	180		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soi	Survey			Drainage Class:		100				Depth to V	Depth to Water Table:	500	Mat e	
RETTEW Job #:	089962000						Depth to Refusal:		42				Slope Failure or slip:	re or slip:	14 0		
NRCS Soil Unit:	TC	Serks BD					Bedrock Type :		shale/	11.5	Store		Dip Slope	Dip Slope & Direction:	60	2	Strike: 250
Mineralogy:	N	mixed					Vegetation:		redoma	cole	hickor	41 ch	hestnat	¥ 00.15			
Horizon	Depth in inches	Matrix Color	Texture Class	% clay 9	% sand	Rock Fragment	Rock Fragment Size (inches)	Plantidity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horton Roundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Podet Prestoneia/	Lab Sample	Notes
A	2-0	8 5/4 YAG	2. v	251 308 25	6.9	50	3/1	FO	IMGR	50				2FM	0.5	1	
Bt 2	2-9	10 8 46 CR	500	206 306	0/3	15%	1/2		MSK	R	188		************	2FM	0.75	1	
386	27-1	1-23 loyk 5/6	5,47 30%		120	201>		SS	MSBK	Z	3			361116	h'h	١	Sove Manie Co
DBC a	3-33	2BC 23-33/W/R G/4 S:CL 28% 15% 40%	25:00	1826	88	305		SS	ZMSBK	云	3			28-11/	5.0	1	Some ye suin do
2CR 35-45	5-45	2,546/3 XCn	SECT XCV			90+			Omassive	R	8			Ollasione!		f	tractured state
Bes	43+	ck											-11				1. the chome C
													~				

SAID

TEST PIT DESCRIPTION
Soil Scientist: Rachel A.

Signature; Alla Mark & Y

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-293-160	606-1056-MEL	Topographic Position:	Λ	Mesage		Parent material:	Sandstone 1	esiduam
Date:	6/6/16		% Slope:	0%	0		Slope Aspect:		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Survey	Drainage Class:	UD			Depth to Water Table:	1	
RETTEW Job #:	089962000		Depth to Refusal:	1961			Slope Failure or slip:		
NRCS Soil Unit:	Hazleton (800	Bedrock Type :	Sandstone	SNO		Dip Slope & Direction:	Could not men	Strike;
Mineralogy:	Mixed		Vegetation:	Chestrutock	HOCK, Scarlett	Oak w	wo Pine Hickory		
							100		
Horizon	Depth in Matrix Color inches	Texture % clay % sand Fra Class Typ	Fragment Fragment Size (inches)	Structure Type, strates Grade, and Size	Moist Horton Boundary Topography & Consistence Distinctness	Redox Feature Color	Redox Feature Roots	Product Personneliss/ Lab Sample	Notes
000	0-1 5422511		1	1	5		75	0,25 51	
A	1-5 WW 2-1	12 60°	1 25	SO IFER WAR	VIR		3FW	25 52.0	
BE	2-5 1048 43	20920 75	15% 1	PO IMJEK VAR	J. SAV		35/1	\$5 52.0	
Bw 1	5-12/0/45/6	SL 120,000 40% 1-3	2-1 %	SS MSBK	VIR IN		JW18	6.55 SH	loany
BC1	12-24 104X 5/4 XGR	XGR 1526528	3% 3	SO OTHERSINE	NAN MAN		I W	4.5 55	
CR	24-46 Santy red	-	-	1 3	1		Very tew		
Bed	rock So	and stor	6						

TEST PIT DESCRIPTION
Soil Scientist:

Signature Munder

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7.7	74-1606	9000-0,02-WE	1-8	UFF		Topographic Position:	tion:	Signesione	NEGO.	1001	20	Parent material:	terial:	Collas	the !	over re	Soun.
Date:	06/	06/16				10	% Slope:		24 6%				Slope Aspect:	ect:	1100			
Job Name:	Dominion	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		610				Depth to V	Depth to Water Table:	Dane			
RETTEW Job #:	089962000						Depth to Refusal:		NY.				Slope Fallure or slip:	re or slip:	70			
NRCS Soil Unit:	Ber	K58	D				Bedrock Type :		fractor	100	Shoele		Dip Slope	Dip Slope & Direction:	550	2	Strike:	00
Mineralogy:	1177	Ko)					Vegetation:		Red ma	2/0	oak Can	160×	to vet	+				
	-	4 000								USDA		, , , ,	400					
Horizon D	Depth in I	Matrix Color	Texture Class	% clay	% clay % sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Hariron Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
)	371	18:0015	1		l		(1	-	1				MIS	0.0			
(567	1				1	(1			2			0111	2,5			
>	1363		SA	100	10 JC	1250	70.5	8	2/36	0	110	-		(N 3 <	4:0	-		
17	101	CKYKNICOCI	713	20	31.7		1	S	1.0	7	2	_		21.1	0.5	_		
7	I I	EVA FA	50	4,04	8	Ear	-	09	103WC	R	70			1	0.75			
DA	2	ITS LEYICHI, CO	775	1/6	86	30	1	53	7 10.17	40	5			11/11	0.0			
1	VI TIL	-ILL IN YR EN GR-NGR	28-18B	631	636	(632	1	SP	1027		6			111/2	1.75			
1	17 10	10 110	735	06	0300	2)6	1	8	LIVI	TI	20			2110	5.2	-		
000	14.7M	3/5 M	73X		0	000					2000		_	Contract of		-	3	Soil Soil
-	1	NR 5/8	SIL			800					notes	5	-	Late of Street			P296 h	4.200
50	6	6		+	3	0	7		0									
000		1	3	1			2.8	1	1									
												-	· ·					
													-					
													_					
	_												-					

Mount from Kerks to Hazlety Serles

TEST PIT DESCRIPTION MOMOR LANC:

Soil Scientist P345 HOOS 1335 PMEL

Field Assistant: Rechel Will Lank F.

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

			A 36 A	OPTRODIC POSITION:		ひくつて くこく て))	bront matorial.	- こしていたい	•
Date:	2/18/2			% Slope:	102	C		Slope Aspect:	11/V	
Job Name:	Dominion - Atlantic C	Dominion - Atlantic Coast Pipeline Soil Survey	Dra	Drainage Class:	14 10 11	しいること		Depth to Water Table:	かってのス	
REFTEW Job #:	089962000		Der	Depth to Refusal:	1. J. C.	The state of the s		Slope Failure or slip:	, 2	
NRCS Soil Unit:	- Control	30)	Bed	Bedrock Type :	Shale			Dip Slope & Direction:	山の。火の	Mustrike:
Mineralogy:	MISYEU		Veg	Vegetation:	li	1500	maste, osh	teory	-	-
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TEST PIT DESCRIPTION Soil Scientist: Dan Long Por Strange Mached

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

			32 394	30 36	28+10	8+12:5	A 2.5	Horizon Depth in inches	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
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TEST PIT DESCRIPTION

soil scientist: NCARC LANGE Field Assistant: ROCARC LANGE LA

Signature:

Date: Joh Name: Dominion Atlantic Coast Pipeline Soil Survey RETTEW Job #: 089962000	% Slope: Drainage Class:	se seemed	Slope Aspect: Depth to Water Table:	270
Dominion - Atlantic Coast Pipeline Soil Survey	Drainage Class:		Depth to Water Table:	
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	Depth to Kerusal:	Portion of	Slope Failure or slip:	
	Bedrock Type :	5045 415 2023	Dip Slope & Direction:	450 NW Strike: 750
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Horizon Depth in Matrix Color Class % day % sand Fragment Type & %	Rock Fragment Pleticht/ Size (inches) Stkiness	Structure Type, Moter Types Moter Types Moter Types Moter Types Moter Types Parket Structure Types Moter Types Typ	Féature Redukseurs Roots	roder Peanstenerary Lab Sample . Notes
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Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist: PENSION (MACMO)

Signature: DOWN)

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RETTEW Job #: 0899	089962000					Depth to Refusal:	_	30				Slope Failure or slip:	ne or slip:	- Charles		0
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Soil Scientist: Field Assistant:

Signature:

Date:							,	4	***************************************						
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RETTEW Job #: 089962000	2000				Depth to Refusal:		55				Slope Failure or slip:	e or slip:	-m-	- 1	
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TEST PIT DESCRIPTION

soil Scientist: 50 ha C Raberts

Field Assistant: Taylor Walter

Date:)	34	Slope Aspect: Depth to Water Table: Slope Failure or slip:	2 gl
Dominion - Atlantic Coast Pipeline Soil Survey Drainage Class: 089962000 Depth to Refusal: Bedrock Type:	340	Depth to Water Table: Slope Failure or slip:	
089962000 · · · · · · · · · · · · · · · · · ·	30	Slope Failure or slip:	شي المارية
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TEST PIT DESCRIPTION

Soil Scientist: 50% C &

Test Pit ID:	1	P-301-160603-1326-JCR	3603-	132	6 -3		Topographic Position:	ition:	lake too		Cornel		Parent material:	erial:	Tr sidona	100			
Date:	-	06-02-2016	O.C.				% Slope:	, y	, 51				Slope Aspect:	11	17/0	`'			
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey			Drainage Class:		35				Depth to Water Table:	ater Table:	ļ				
RETTEW Job #:	089962000	2000					Depth to Refusal:	**	25				Slope Failure or slip:	re or slip:					
NRCS Soil Unit:	مجنور	Rev ks					Bedrock Type :			Ž.			Dip Slope & Direction:	, Direction:	700	797	Strike:	20[
Mineralogy:		Mixed					Vegetation:		Red M	Marke	400 MAY	1 23.00		.	300 00C	- 1		(
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Other Notes:

TEST PIT DESCRIPTION

soil Scientist: M . | M D & D > Field Assistant:

Signature: MbN

RETTEW Job #: M'ineralogy: NR CS Soil Unit: Job Name: Test Pit ID: Dominion - Atlantic Coast Pipeline Soil Survey 389962000 P302-160603-1115-MGW Mixed Sylvag Rock Fragment Type & % Topographic Position: Depth to Refusal: Drainage Class: Bedrock Type: SET BELOW USDA 510TST0,0E RIDGE *** ivi [1 Well Drained Dip Slope & Direction: Depth to Water Table: Slope Aspect: Slope Failure or slip: Parent material: PECSTONA. × 330 Strike:

68000

Horizon

Depth in inches

Matrix Color

Texture Class

% clay

% sand

Rock Fragment Size (inches)

Plantidty/ Stickforms

Structure Type, Grade, and Size

Moést

Hortzon Boundary Topography & Outhickness

Redox Feature Color

Redox Feature Description

Roots

Packet Penetran

Lab Sample

Notes

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Other Notes:

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TEST PIT DESCRIPTION
Soil Scientist: MAX DUGAN

Signature: MSU

Test Pit ID;	<u>ئ</u>	303-160603-0830-MGW	603-	083() - (M/		Topographic Position:	tion:	packslope	000			Parent material:	erial:	Coave	- 10	スペなつろ	これで
Date:		6/3/16					% Slope:		30%	·			Siope Aspect:	7	122"	- 1		Constitution of the Consti
Job Name:	Domin	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		₹.				Depth to Water Table:	ater Table:	11/11	7		
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NRCS Soil Unit:	0	の紹介)					Bedrock Type:		STUTSTONE	はらん	***************************************		Dip Slope & Direction:	Direction:	MA		Strike:	The State of the S
Mineralogy:	Mixed	ed					Vegetation:		β <i>€ L</i> αω									
				•	,					USDA								
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Other Notes:

THE RED MARCE, ATOYORY, WAITE GAR, HOCKER BORRY

TEST PIT DESCRIPTION

Soil Scientist: MITCHARL Woo D

Field Assistant: MAX DUCAN

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P. 303 A-160603-0920-MGW	0603-0	920	MEN		Topographic Position:	tion:	JACKNOH'S	1131	1BACK SLOPE	748	Parent material:	terial:	MUNICIPEST	mud	
Date:	61316			į		% Slope:		16%				Slope Aspect:	ect:	312		
Job Name:	3	t Pipeline Soil :	Survey			Drainage Class:		AMA	- 1	Somewhat excessively	essively	Depth to V	Depth to Water Table:	2	A	
RETTEW Job #:	089962000					Depth to Refusal:		324				Slope Failure or slip:	re or slip:	8	IA	
NRCS Soil Unit:	BERKS					Bedrock Type :		SILTSTANE	BUZZ			Dip Slope	Dip Slope & Direction:	73%5		Strike: 80°
Mineralogy:	MIXET	0				Vegetation:		Red maple	, 500	466 W	1		A STATE OF			
									USDA							
Horizon D	Depth in Matrix Color	Texture Class	% сіау	% sand	Rock Fragment Type & %	Rock Fragment Size (Inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrumeter/	Lab Sample ID	Notes
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Other Notes:

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TEST PIT DESCRIPTION

Soil Scientist: かんないのらり

Field Assistant: かかとかんか

Signature: M&M

		Other Notes:				ECT	8 m 2	Bul	A	Q	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
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WY OA	**************************************	Standing				2,5 2,50	7.5	ð <u>.</u> 25.7	ů.		Texture Class				Pipeline Soil S		-160603 -0815 - MBW
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ARKE	from	0				20	8	ŀΉ	7		% sand						4.5
WM D	6/2	21				Sob	25%	55% 35%	2% 2%		Rock Fragment Type & %					1 1	- 13
CHISTMY JAK, BLACK GUM, DOGWOOD, MTN LAUNCE, HUCKEHGRY	west 5	" - Tain	7	ų, si		24"	ζ2.5 ["]	<1.5"	1.5"		Rock Fragment Size (Inches)	Vegetation:	Bedrock Type:	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
MTA	re,		¥.			000	55 58	00	8 0 8		Pharticity/ Stiddiness			<u>"</u>			ftion:
SLAURE	reking, pr	night b			ge grand	0 M	1M SBIK	2MSBK	27-65 27-65	1.	Structure Type, Grade, and Size	BCLOW	SILTSTO/VE	74.	N PAN	40/2	スポスグ
C, HL	1 & icolon	before				_	Ţ	77	VFX		Moist Consistence	USDA	L		どかと		11,00
CKTEP	Pc+					دس	CW	CM	A\$		Norkey Boundary Topography & Distinctions		ナンスプ				とくだ
CARY	- Alla					j		1	νA		Redox Feature Color		BADWN				USPEC SHOULDES
	ر س/			-		İ	1	\$	МÄ		Radox Fastura Description		Dip Slope	Slope Failure or slip:	Depth to V	Slope Aspect:	Parent material:
	1 water		7.			ニーシー	・ガンカ	1-CO 2-W 5-E/A=	コース	N. S. S. S. S. S. S. S. S. S. S. S. S. S.	Roots		Dip Slope & Direction:	ire or slip:	Depth to Water Table:	Ä	herial:
							77.7	4.4	4.8	7.4	Pocket Punetrameter/ pH		15	1	21	30	7570
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			-			William Willia	THE THE STATE OF T		SMALL POCKETS		e Notes		Strike: N/A		21" (ALE DENIE)		_

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 .

TEST PIT DESCRIPTION
Soil Scientist: D. F. 8715 +26 maches
Field Assistant:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

,	V	70	5	20	3	T	8	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
		1 50 Es	30,	200	2 1	in I	3-1	Depth in inches			08996	Domii		70
			7,500	7591	h/9.	100 No.	59R 0/5/0	Matrix Color	WAX LA	CON 130		Dominion - Atlantic Coast Pipeline Soil Survey	0/1/0/10	P-305-160602-
			2.7	SiL	2,6	5.7	1	Texture Class				t Pipeline Soil S		02-1145
			18	19)	16	16		% clay				игуеу		5-1
7			00	6	コ	5	. /	% sand						MIT
			201	38	200	167.	1	Rock Fragment Type & %						
- (0		,	1-44	12:	112	11.	1	Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
		1	S. B.	1 2 X	50		17	Plantidity/ Stickiness						tion:
		. 1	MO	189%	16591	gento	B	Structure Type, Grade, and Size	Chestrut	5: 1440	1	Jac 1	22	Shoul
		-1	1	7	15/				USDA	8	3		7/2	N
3		1	CH	CW	CW			Fortron Boundary Topography & B Dictinchess	5 Scorlet	20 54				
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		1	1	1	J	1)	Redox Feature Description	blacksur	Dip Slop	Slope Fa	Depth to	Slope Aspect:	Parent material:
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			1				4	Lab Sample ID		N			0	durin
			2010		4	ing o	3			Strike:				
			thes in c		1		¥	Notes		2300				
	(4.)		serice			1								

TEST PIT DESCRIPTION

soil scientist: (TCOHRELL)

Field Assistant: DEF,

*

Test Pit ID:	P-306-160602-		0.0	1100 - M6W		Topographic Position:	tion:	アイマング				Parent material:	terial:	一つのか	Do fine of the state of	•
Date:	6/2/16					% Slope:		4.10				Slope Aspect:	#	6		
lob Name:	Dominion - Atlantic Coast Pipeline Soil Survey	t Pipeline Soil St	irvey			Drainage Class:		1100				Depth to V	Depth to Water Table:			***************************************
RETTEW Job #:	089962000					Depth to Refusal:		OB				Slope Failure or slip:	re or slip:	الكنا الشهوي		
NRCS Soil Unit:	301 VS					Bedrock Type :		のこれもなり	35% -	く タン・シャンのしゅん		Dip Slope a	Dip Slope & Direction:	20 40%	Che - in Pristike:	Strike:
Mineralogy:						Vegetation:		でをから	1 C	3 K. B.O.	ジャロン	0 3 50	E)	Secretary of the second	Months of Services	***************************************
									USDA		USDA				-	
Horizon Er	Depth in Matrix Color Inches	Texture Class	% day	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plentidty/ Stationers	Structure Type, Grade, and Size	Moist	Herton Boundary Topography & Dirdnomen	Redox Feature Color	Radex Fearupe Description	Roots	Pocket Prostrometer/ pH	Lab Sample ID	Notes
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P	1-2 101/18 SiL			B	107.	12	99 04	2532	And Salar	CW.		1	₹ 6 ch §	20 a	\mathcal{K}	y-
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	***							137				***************************************				TO THE PERSON OF

TEST PIT DESCRIPTION

Soil Scientist: Dan Flans to mached

Field Assistant: Max

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nature: Additional of the state

RETTEW Associates, Inc.
30720 Columbia Avenue
Lancaster, PA 17603
Phone: 737,-394-4710
Faz: 717,-394-1063

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Date:		6/3/10	000		V 10	!	% Slope:			0. (1)			Slape Aspect:	ct:	200		
Job Name:	Dominic	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil St	ırvey			Drainage Class:		Mue 19				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000	000					Depth to Refusal:		Q.				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	55	601 Kg					Bedrock Type :		らいちちゃん	l l	2011/16	raddian Brown	Dip Slope 8	Dip Slope & Direction:	550 5	A	Strike: 60°
Mineralogy:	4	Mixen					Vegetation:		Cheatry and book of oak, a	220	7 10 132	(S)	2 5 5	oak, olack cok	00500 pec		Bluebery Mt laire
000000000000000000000000000000000000000	-10					Rock				USDA			100				
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planddry/ Sibbbnes	Structure Type, Grade, and Size	Moist Consistence	Horton Boundary Topography & Cirthitmes	Redox Feature Color	Redox Feature Omoription	Roots	Packet Panetrameter/ pH	Lab Sample ID	Notes
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P	E 67).	1	ŧ	l l	1	mm;	1 1	/	((1	()		

Other Notes:

TEST PIT DESCRIPTION
Soil Scientist: John C. Roberts
Held Assistant: 7 4//or Wolfer

RETTEW Associates, Inc. 30720 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Faz: 717-394-1063

			Cr 16-53	Bw 8-16	1-8	De 0-1	Horizon Depth in inches	Mineralogy:	COU	Job Name: Dominion -		Test Pit ID: アノ
			16-50 10-18 5/6	8-16 164R 5%	10 YR 8/1		Matrix Color		-ks/	Dominion - Atlantic Coast Pipeline Soil Survey	06-02-2	308-16060Z
a de la company				215	SIL		Texture Class		Veiker7	Pipeline Soil S	-2016	
4				20	Ö		% clay 9		17	urvey		-/23/-
and the second				PU	172		% sand F				1	している
14			S.	40 K	28		Rock Fragment Type & %					
105200			2-6	1-311	7/"		Rock Fragment Size (Inches)	Vegetation:	Bedrock Type :	Drainage Class:	% Slope:	Topographic Position:
No. 1			1 1	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	X 5	90 50	Planicky/ Stickiness					ition:
P. W. 25. 24. 9			1) M SB/C	I MSBK		Structure Type, Moist Grade, and Size Consistence	Red M	Silt Stage	DED	တ္	Back slove
				FR	NEG CS	アガス	Moist Consistence	Maple.	6			5/0,50
				(S)	55	7 5	Horizon Dazzetary Topography & Diethstown	Black (
							Redox Feature Color	Gum, Wh				
						amed in	Redox Feature Description	1. 46 PM	Slope Fall Dip Slope	Depth to 1	Slope Aspect:	Parent material:
				00 2 2 2 3 ± 5	2 m t	5 t	Roots	Pine Chest	Slope Failure or slip: Dip Slope & Direction:	Depth to Water Table:	ect:	terial:
				5.17 32.0	0.75 4.5	7,0	Pocket Penetrometer/ pH	hestmut Oak	80%	1	1110	Pa sidu
			(53	SZ	51	Lab Sample ID	Mockano	2			10.18
100000000000000000000000000000000000000		,	Focks-no sons				Notes	Kicks	Strike: \$ 1.0	***************************************	ATTENDED TO THE PERSON OF THE	

TEST PIT DESCRIPTION

soil scientist: John C Robert S

Field Assistant: Taylor Markey

Test Pit ID:	ָרָ בַּי	ブノ へごひ チェーへ こべ ごケノ	デンベン		シング	L N	タンストルへへ Tonographic Position:	‡; 131	シージング	7		•		and all	3	. `		
Date:	8,-	06-02-2016	0,				% Slope:		5				Slope Aspect:	A	. 11	110	***************************************	
Job Name:	Dominion	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	игvеу			Drainage Class:		500				Depth to W	Depth to Water Table:	1			***************************************
RETTEW Job #:	089962000	0					Depth to Refusal:	••	S				Slope Failure or slip:	re or slip:	1			
NRCS Soil Unit:	Ž	Weikery-	Riks	,			Bedrock Type :		914	STORE			Dip Slope 8	Dip Slope & Direction:	780 15	28.5	Strike:	0 0 2
Mineralogy:							Vegetation:		Dog Lorma	74.00		land in	うながん	M			-	~ 3
	- 1								(USDA					200			
Horizon i	Depth in inches	Matrix Color	Texture Class	% clary	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plantietry/ Stickings	Structure Type, Grade, and Size	Molet	Horizon Soundary Topography & Dirtinethess	Redox Feature Color	Radox Fustura Description	Roots	Podert Panetrumater/ pH	Lab Sample ID		Notes
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Ac	10	1-10 1042%	SIL SIL	14	15	42 CV	45 0.5.3"	हें हें	785WI	Z,	50			43 S	0.75		100 T	Shight seconds O
Bw 10-17 10+185/8	-17 /		812	6	15	CN 75	1-6:	80 53	395W	FR	0 W			3	N 10 2	1		
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Other Notes:		Sking Ridge / Smut	RIG		And mark	± ≈	75-90. Whole	, G		113	16 Forse	Suction		or A	has Zer	3		

TEST PIT DESCRIPTION

soil Scientist: John C Coborts

Field Assistant: Taylor Walter

L	_			
Dominion - Atlantic Coast Pipeline Soil Survey	06-02-2016	P-309-160602 - 1444 -5CR		
Drainage Class:	% Slope:	Topographic Position:	,	
O	200	Rock slope		
Depth to Water Table:	Slope Aspect:	Parent material:		
	177/0	L'A CAPORT		Fax: >1-37-1003
1				u

Ob-02-720/6 Dominion - Atlantic Coast Pipeline Soil Survey 089962000 Egr K3	% Slope: Drainage Class: Depth to Refusal: Bedrock Type:	5 8 0 0 5 W C	Appe -		Slope Aspect: Depth to Water Table: Slope Failure or slip:		
	Drainage Class: Depth to Refusal: Bedrock Type :	25 B D W			Depth to Water Table: Slope Failure or slip:		
	Depth to Refusal: Bedrock Type :	5/7 82	Sant		Slope Failure or slip:		
	Bedrock Type :	5/5	Lines		atalan attached		
			1 500		Dip Slope & Direction:	90% 32	32/0 Strike: 23/0
	Vegetation:	White #	no Hickory		TTTTTVHIA		
	2000	Structure Type Grade, and Size	USDA Moist Consisten	Redox F	Madox Faritire Roots	Podat?enetometa// Lab	Lab Sample Notes
			NEG C	5	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	2002	***************************************
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626 926					1	/	Lould not remone

horizon;	Some of	fixes b	between residing		es within	C , 13	no voots observed
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TEST PIT DESCRIPTION
Soil Scientist: John C Robards
Field Assistant: Tell York (100)

Date:	_	06-03-2	- 20/6		-		% Slope:		76%			To the state of th	Slope Aspect:	ect:	138	1 main	K K >1 CL CHUMA
Job Name:	Domir	N	t Pipeline Soil	Survey			Drainage Class:		ક્				Death to	Depth to Water Table:			
RETTEW Job #:	089962000	2000	-				Depth to Refusal:		× 50°				Slope Fail	Slope Failure or slip:	(
NRCS Soil Unit:	100	plecke-1					Bedrock Type:		1				Dip Slope	Dip Slope & Direction:	1	***************************************	Strike:
Mineralogy:	_	- Mixed					Vegetation:		13/ac/< (7080	tuntery)	2 1 0 Pu	25.46) 30 8			
_	Depth in		Teeting			Rock	DOCK Examples	2333			58933	-		1,883			
Horizon	inches	Matrix Color	Class	% day	% sand	Type & %	Size (Inches)	Stickens (Account	Grade, and Size	Consistance	Yogography & Olednetnam	Color	Judox Pesture Description	Roots	Pocket Penatrometar/ pH	ID Jampie	Notes
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TEST PIT DESCRIPTION IVICUACE LAWS Soil Scientist Dr. (D) (ar Down-Old Laws
Field Assistant: Reschool Will Continued

Signature: Miles Constitution of the Constitut

		7	0 7	\cap	BW 6	<u>y</u>	06	Ö	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:	AMERICA CONTRACTOR OF THE PARTY OF
	<u>.</u>	26 Sitstone of mixed 108x5/8 and 109x %: Difficult	109k	18-225%-% SiL 12 30	BW 6-18 5/6-58 SUL 12 30	2/2-6 1048 SIL 10 25	12-21/2 10yr3/2 Sil	0-2	Depth in Matrix Color	II u kea .	20. Par.	089962000	Dominion - Atlantic	6/2/2016	アショーた	Antonio de la company de la co
		stone of	E.	236	S SYL	1,15/1			Texture Class	Drop van		***************************************	Dominion - Atlantic Coast Pipeline Soil Survey	0/6	P-311-169602-1600-MEL	
		f mixed	17		2 30 2	0 25	8 25 10		% clay % sand Fra	17 / m 12000	J		vey		D-MELL	
		1045/8	5. Itstans (2) 3-6	25 3-6	D 3-6	で 36	10% 3%		Rock Fragment Fragment Size (inches)	→{/// fe Vegetation:	Bedrock Type	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:	
		and 10%	03	OF N	SS \$	NS P	NS 2-F		Planticity/ Stickings	X			" Well			
		7:1%	O TR	J.	SBK FR CW	T	r VFR AS		Structure Type, Moist Grade, and Size Consistence	IVI x ed total moods	Stone		E	8%	upland ri	CHIMI
		1)m)+7+10		CN ra	Cω	cw	AS		Horizon Boundarry Redox Topography & Co Distinctions Co	Stoom P					icactor	
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Other Notes:

Soil reaction will be determined from Samples Description made to assist Rection; Bad weather - heavy rain

Suff did not have Peretrometer

Pretoneer reday

1. 11E-1 + cont of the + T-31-A

Field Assistant: TEST PIT DESCRIPTION
Soil Scientist:

STATE CONSIDER STATE COLOR STA	SCASION
DA Notes Gooden Redox Feature Color	Slope Aspect: Slope Failure or slip: DA DA DA DA DA DOCK, M. CKC M Color Dislope & Direction: Parameter of Slope & Direction: Slope Failure or slip: Dip Slope & Direction: Failure or slip: Dip Slope & Direction: Failure or slip: Da DA Color Dislope & Direction: Parameter or slip: Da DA DA Color Dislope & Direction: Parameter or slip: Dip Slope & Direction:
	rer Table: er Table: rection: Roots Roots

Redox Feature Colors recorded in the "Roots" column for Bw and C horizons, Roots recorded in "Redox Feature Color" column for BE, BW, and C horizons.

Other Notes:

TEST PIT DESCRIPTION
Soil Scientist: Wickap
Field Assistant: Cache

Test Pit ID: Date: Job Name: REITEW Job #: NRCS Soil Unit: Mineralogy:	P-3 4 - 606の2 - 1/5 - ル 6/2 1/6 6 7 1/6 6 7 1/6 1/6	IS - MEL.		Topographic Position: % Slope: % Slope: Drainage Class: Depth to Refusal: Bedrock Type : Vegetation:		skesloe, n 49 5 Who while	6, near sia		merment e	waitstings	whise war	Parent material: Slope Aspect: Depth to Water Table: Slope Fallure or slip: Dip Slope & Direction: Dip Slope & Direction:	whise war
Mineralogy:	Maxim			/egetation:	Ŋ	الله: المالية المارية	S CS	Tet max	ା	10UN	nountain b	lausel.	laviel, sessins
Horizon Dep	Depth in Matrix Color Class	rne % clay % sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Pauldey/ STruc	Structure Type, Grade, and Size	Din #	Harkon Downdary R Topography & Directories	Redox Feature Color		NUTC Redex Funture Description	Bedon Funture Description ROOTS	Redox Fusture Description
O; 0-2	2/89/01	-					V	A.	\			Stac	3 fmc 42
Oe 2-	2-3 101/23/1	:					<i>N</i>	7	\			3 fmc	£ 3
>	1 10/12/1/4 CIR	7	30%	(W,	2000	2 far V	\frac{71}{70}	3	\	$\overline{}$		3 mc.	35 <u>4.2</u> 52
BE 4-11	-11 10/124/6 GR	14 4	30%	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	SP 11	1 Magmi	M ZHÁ	0	,			25mc	25mc 5.0
Bw 11.	Bul 11-20 7. Sheet/6 1	1635	533	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	SS /x	msbx F	FR E	Č				2 fmc	2fmc 5.2
02 ZMS	3m2 20-32 10/125/6 VGR	25 91	45%	Spans was	2 2 2	MSOL 7	77	3				Zóme	25mc 4.00
ZC 32-40	1.5岁5/6 SC)	70 55	60%	1010	SP P	Dwas it to	17 C	ω C					
05-04 172	\$0	5)/15/0	3,	Shelp						-		ocassional	occassional
Other Notes:	Bedrock ai	outcop at	Summer	-guart	site c	Bil	8	(T)		7/4S	Stille 20	Stille 200	Stille 20°
	Hamarty		Stony surface	4	quatre	stones	(%)						
			ł		4	4							C

TEST PIT DESCRIPTION

Field Assistant: TOYCOR WALL

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	ا ا ا	33-16	0621	132	4	シュを	Topographic Position:	tion:	とろってい	COPE	2.0		Parent material:	erial:	COLLUNION		ONEP	アリントロンノス
Date:	-	2)16					% Slope:		0				Slope Aspect:	ct	255	0		
Job Name:	Dominio	Dominion - Atlantic Coast Pipeline Soil Survey	ipeline Soil S	urvey			Drainage Class:		なれてい				Depth to V	Depth to Water Table:	1			
RETTEW Job #:	089962000	00					Depth to Refusal:		1				Slope Failure or slip:	re or slip:	すりた	BENT	TEE	5.8
NRCS Soil Unit:	DAKE	2 - 6	44.44	200	1 12 0	2000	€ \ V N 4 Bedrock Type:		1				Dip Slope	Dip Slope & Direction:	ŗ		Strike:	(
Mineralogy:	N IX	1					Vegetation:		BILLIE	CH	E542	A O IV	r	FERN				
miciaroby.							c			USDA			,					
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Rados Feature Description	Roots	Pocket Pesetrometer/	Lab Sample ID		Notes
000	R	5/22/5/	1	1	1	1	ţ	1	1	Î	as	t	(7 2 4	5.9	1		
P	3 6	104x3/1	J.Sx	10	5	SSR	1-2	0 0	15 p	250	۶	1	Y	1-C	0.25	1		
50	2	40/24/6	75.	7	20	大学	1-1	00	X45.3.	ê	5	1	V	2-5, 1	1 00	1		
130	12,22	xlackolx	5.	5	5	2 P 7	1-2	20 PO	14584	P	2	1	1	2-F, M	6.5	ť		
8×2	23.33	4 20 4	5	18	12	0 8	4	55	78.31	P	2	1	1	- 17	1.0	(C	Crxx Sirings
2863	3,	3/23/6	3.	2	20	2 2	1	25	LA WK	P	1.	ī	Ţ	7	1.25	(CLAY	y skinds

Other Notes:

NICE CHERT

COR

TEST PIT DESCRIPTION
Soil Scientist:

Signature:

gnature: AMMH

Test Pit ID:		P334-11	140622	2 -	1115	-18LL	Topographic Position:	tion:	Bark	5/6	00		Parent material:	erial:	Collus	However or	Ours Residence
Date:		6/22/70	2016				% Slope:		4	50%			Slope Aspect:	#	10	1950	-
Job Name:	Don	Dominion - Atlantic Coast Pipeline Soll Survey	Pipeline Soll	Survey			Drainage Class:			AB			Depth to Water Table:	ater Table:	2	31 + hZ	
RETTEW Job #:		089962000					Depth to Refusal:			24 "			Slope Failure or slip:	e or slip:	1		
NRCS Soil Unit:		1	Becks	Rose	5		Bedrock Type :		5115	5+02			Dip Slope & Direction:	Direction:	NOSEN		Strike: NSSOF
Mineralogy:		Mixe d			0		Vegetation:		Mixed	0-	3 Spoots	Pine			3:		
Horizon	Depth in	Matrix Color	Texture	% clay	% clay % sand	Rock	Rock Fragment	Planticity/	Structure Type,	Moist	Horizon Boundary Topography &	Redox Feature	Redox Feature	Roots	rumated/	Lab Sample	Notes
	-		Cigas			Type & %	featinity are		Orace, and size		Distinctness	Color			1	10	
)								-	0		1			N Z	0		
99	15	84Re 1						1	2101	THE	513	1	1	, ,	45		
11	4	2/1/2		0	QH	100	1/2/1	Po	PO FISEL FR G K	33	5			7	5.5		
		2.3	1					50							5.25		
2	à	was CIL	2	72	5	of to	12"	50	41881 AR 6/S	R	6/8		1	V2 3C	4.5.7		
8		1000	1	9		300		SM							57		
3	24	112 8/8 Air		20	0	100	1/3/4	SP	28	7				Z	4.5.4		
1		101. 1-				010	-	IS.	4.1					* * * *	9		
0																	
7																	
			Ī						4								

Other Notes:

BwI TEST PIT DESCRIPTION Job Name: Field Assistant: Soil Scientist: Bul RETTEW Job #: Test Pit ID: NRCS Soil Unit: 000 Mineralogy: Horizon D 00 18+ Depth in inches 2 Dominion - Atlantic Coast Pipeline Soil Survey 50,25 104RSW SL 104R3/3/ 104Rble SL 335 -MG COVE Matrix Color Mixed 160622 Texture Class MOCACG 0 00 % clay 00 8 20 % sand 86% GR 80% Fragment Type & % G Rock 1/4.3h % Slope: Rock Fragment Size (inches) Bedrock Type : Depth to Refusal: Drainage Class: Topographic Position: Vegetation: 12 1/4 1/ Signature: 50 PO Plasticity/ Stickiness 80 8 F16R FIGR Structure Type, Grade, and Size 250 026 -tream Siltstore 5 Moist Consistence A F 00 1 65 8 5/3 33533a Redox Feature Color Dip Slope & Direction Slope Aspect: Depth to Water Table Parent material: Redox Feature Description Slope Failure or slip: 78 2 M W232 7 Roots 5.25 2.75 25 0 Allunion 0 1 1 0 100k Lab Sample ID 52 5 5 23 1001 Strike:

Other Notes:

over Residuum

N800E

Notes

Field Assistant: Soil Scientist: Test Pit ID: TEST PIT DESCRIPTION Mineralogy: RETTEW Job #: Job Name: NRCS Soil Unit: AI 00 Horizon Depth in inches 20 V Dominion - Atlantic Coast Pipeline Soil Survey 089962000 P336-11-0627-2.548/3 104R813 Deilert 6/22 Matrix Color L XXX Moraca 2016 215 5 Texture Class 1000 100 32 % clay 20 % sand 5 W Fragment Type & % 500 57 5 to Rock % Slope: 1.843" Rock Fragment Size (Inches) Depth to Refusal: Topographic Position: Drainage Class: Vegetation: Bedrock Type: 12 Signature: N MS WE ISBK PR CIW Structure Type, Grade, and Size FIGR Barrs R Moist USDA 7 + SO 615 Redox Feature Color Slope Aspect: Dip Slope & Direction: Redox Feature Description Slope Failure or slip: Depth to Water Table: Parent material: 75 T Roots 1 2 45.4 5,0 0 570°W Collection over Esideum Lab Sample 6 0+ Strike: N200W Notes

Other Notes:

Test Pit ID: Soil Scientist: TEST PIT DESCRIPTION Mineralogy: Job Name: NRCS Soil Unit: RETTEW Job #: M R 0 m: Horizon Depth in inches 354 22 00 N Dominion - Atlantic Coast Pipeline Soil Survey RUSSELL 54225/1 251819 Weikat 10 /R6/16/ SICL Matrix Color 5,5 Moraca Texture 22 02 20 % clay | % sand 1055-0 00 Fragment Type & % 95 RIF % Slope: Topographic Position: Depth to Refusal: Drainage Class: Rock Fragment Size (inches) Vegetation: Bedrock Type: 1/2-1" Signature: 8 MP Plasticity/ Stickiness 35 F256X Structure Type, Grade, and Size 19827 F16R BECKE 2201 200 E R Moist USDA 5 5 Horizon Boundary Topography & Distinctness Redox Feature Color Dip Slope & Direction: Parent material: Slope Failure or slip: Depth to Water Table: Slope Aspect: Redox Feature Description T WI 32 3E3M 100 100 Roots 5,25

5.25 527 4.75 0

52

S

5800F

Strike:

3001 N

240

Lab Sample ID

Notes

5

Colleviam

3000

Resi Lum

3 290

35 ti

Other Notes:

8

TEST PIT DESCRIPTION

Soil Scientist: Field Assistant: C0500

Signature: Luck

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID: Date: Job Name:	P338 Co 2 Dominion - Atlanti	0 10	coast Pipeline Soil Surv	1048-	Buc	Topographic Position: % Slope: Drainage Class:	tion:	Soci	278				Parent mate Slope Aspec Depth to Wa	Parent material: Slope Aspect: Depth to Water Table:	al: Col	al: Co
Job Name:	DOUGSDOOD .	Maillie Coast 15	000	-		Depth to Refusal:			100			Slope	e Failure	Slope Failure or slip:	Failure or slip:	Failure or slip:
NRCS Soil Unit:	Weiket-	B1	SIR	COURT		Bedrock Type :		N	H 54	5000		Dip Slo	pe &	Dip Slope & Direction:	No	No
Mineralogy:		4:100		C		Vegetation:		Maple	000	T					2	0 to
Horizon	Depth in M	Matrix Color	Texture %	% clay % sand	Rock d Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	ance *	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	8 6	Roots	Roots Prodet Prestometel/	Roots Pocket Penetron
00	0.5 syp2.5/1	1/5.5			9/02	1/4 1/1	(FIGR	RO	4		1		7	16 5.25 0	16 0
25	3 184PS/16 SIL 16	125/6	1	-0	30h	1/2×1"	SS OG	FISH FRCOW	70	3				IF2M	1F2M 15	
2	R 3-18+															
													1			
				+												
		,														

Other Notes:

Soil Scientist: TEST PIT DESCRIPTION

Field Assistant: Moraca RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	7	339-160	0627-	1	10×	RIL	Topographic Position:	tion:	COCK SING	300-	Show	200	Parent material:	erial:	Colle	olle vive	1000 Cald
Date:		06/22	12016		á		% Slope:		29%	1			Slope Aspect:	A			
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		5	DA			Depth to Water Table:	ater Table:		yn -	Porches on to
RETTEW Job #:		089962000					Depth to Refusal:		100	n			Slope Failure or slip:	re or slip:	(1	
NRCS Soil Unit:	()	rikert-	Rova	5			Bedrock Type:		X1.15	Silt stone	ie		Dip Slope & Direction:	Direction:		Str	Strike: SSOF
Mineralogy:		Mixed		-			Vegetation:		Dax	15 5	Ja/20	t			5	0	
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Boundary Topography & Distinctorss	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
00	2	1(5,20h5)	1		1	57	1/2"		F1692	R	S			1417	20		
Bu	7	1/29hal	2	2	0	50%	1-2	8 8	FISER	R	P CK		1	25	2.5		
20	12	104R6/6 5,1	51	500	J.	0.000	1 73"	SS	F2584	TO		1548/1 75486/8	(23	27	47.74		
D	- 00 +																
																×	

TEST PIT DESCRIPTION
Soil Scientist: M. WOAD
Field Assistant: R. 1474

													Fax: 717-394-3721
	1		pographic Posit				3011		Darront mat				OCCI NI AIA
			Slope:				-		Slope Aspe	d:	1	+	NA COLON
Coast Pipeline Soil Su	rvey	Dr	ainage Class:		ED				Depth to W	ater Table:			
		De	pth to Refusal:		136				Slope Failur	e or slip:			
T-BERKS-1	1900R	Be	drock Type :			BNE			Dip Slope &	Direction:	co o	240 5	Strike: 344
		Ve	getation:	10	16STMUI	4	D DAIS	HECKO		06WOOD		1	BLUE BERRY
Texture Class			ock Fragment Size (inches)	Planticity/ Str Strickiness Gra		ance a		Redox Feature Color	Redox Feature Description	Roots	Poclet Penetranener/	Lab Sample	Notes
26						1	AS	1	A	2 F-UF	1 2	1	
(1 S,)	00	700%.	10.12	7 (2)	OR OR	v fa	CS	١			0.25	١	
2, 1 VGR	9 30	40% c			UF 3K-6R		CE	1	3	2 F-W		1	
14 ×61	935	90%	6.0"	3 04	N	SHV	5	,	1	100-W	1	1	
	P340-160622-160 6122 16	9 35 30 Sand	600 - MGW - ROUGH - ROUGH - ROCK Rock Pragment Type & % 9 30 40% 9 35 GR 90%	600 - MGW -ROUGH -ROUGH -ROUGH -ROCK Fragment Type & % 9 35 GR 90% 90%	b00 - M6W Topographic Position: % Slope: % Slope: Drainage Class: Depth to Refusal: Bedrock Type: Vegetation: Type & % Size (inches) Rock Fragment Type & % Size (inches) Rock Fragment Size (inches) So Rock Fragment	Salvey Topographic Position: SADDLE Salvey Slope: Solope: Solo	Sold Topographic Position: SADDLE 51DE Stope: IS IS	SADDUE SIDE SUAPE SADDUE SIDE SUAPE SI	Sisterey Topographic Position: SADDLE SIDE SLOPE Sisterey Depth to Refusal: Y	Stope A Stope St	Stope A Stope St	Solution SAD DUE SIDE Superior SAD DUE SIDE Superior Superior SAD DUE SIDE Superior Su	Solution Solution SADDLE SIDE SLOPE

Soil Scientist: Field Assistant: TEST PIT DESCRIPTION
Soil Scientist:

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P-341-	-	1-5851-86909	15-1	DEF	1	Topographic Position:	tion:	LAPPERT	BULL	SIGNE		Parent material:	erial:	Clou	CMAINO	rono	our Rasidour
Date:		(0)22	116			9	% Slope:		-	27	1 4		Slope Aspect:	Ct.	2	0		
Job Name:	Dominion - A	Dominion - Atlantic Coast Pipeline Soil Survey	eline Sail Su	vey			Drainage Class:		1000	Bonewhert		oxossinily	Depth to Water Table:	ater Table:	1			
RETTEW Job #:	089962000						Depth to Refusal:		5,61			1	Slope Failure or slip:	re or slip:	1			
NRCS Soil Unit:		Weile A-Rough Complex	Como		(300)	TP.	Bedrock Type:		5/14	stond		,	Dip Slope & Direction:	Direction:	260	W	Strike:	100
Mineralogy:	, w.	Mired				1	Vegetation:		いいいいい	N (80	3 (11.	hast hut	oak,	20005	anda	aux.	>	29.5
Horizon	Depth in Ma	Matrix Color	Texture	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastichy/ Stickiness	Structure Type, Grade, and Size	Moist	Horizon Soundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID		Notes
000	15 5 LI-0	115.0	(1	1	1	1	11	1	- (AW	1	1	35	5,01	1		
D	E1 OC 7'5 REDION SEB	123/2	7.0	8	ū	92 15x	(S.	50	SOUMED NEW BOS	VFC	AW	1	1	- SAT	0 × 0	1		
BL	235-10402/45.100 13 881 1/2-4" PO	425/4	7.5	90	نو	200%	1/2-4"	55	SS ISSURFICM	7	CW	İ	1	150 WYE	9.75	(
JBW2	19.5 lonephs, 1 38 12 48,	4/932	5/2	22	8)	2001	1/2-8" 30		11658h Fo AW	7	AW	1	(2x	Si Rost	1		
5	19.54	1	(- 1	1	1	1	1 1	1	(1	1	(1	1 1	1		

TEST PIT DESCRIPTION
Soil Scientist:

Soil Scientist: 1 100 P

Signature: M Wall

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Solution	Test Pit ID:	P	342-1606	160627-1040-M	40-1	NEW		Topographic Position:	tion:	SUMMIT				Parent material:	terial:	RESTOW	WW		
Depth March Color Testure Scheduler Mode	Date:	50	122/16			1		% Slope:		N				Slope Aspe	ect:	26			
	ob Name:	Domin	nion - Atlantic Coast	Pipeline Soll S	urvey			Drainage Class:		MD				Depth to V	Vater Table:	1141			
	ETTEW Job #:	08996	52000					Depth to Refusal:		1411				Slope Failu	re or slip:				
PACKED Pack	IRCS Soil Unit:	*	LEGI	SERKS -	ROJ	T &		Bedrock Type :		SILTST	SNO			Dip Slope	& Direction:	Se		Strike:	2510
Depth in Matrix color Texture Matrix Color Texture Matrix Color Texture Matrix Color C	Nineralogy:		13×1					Vegetation:		CHESTAL	TOAK	14	B	9 371	NE				
Depth Matrix Color Testure West State (Inches)							Rock	The Late State of	- 100										
0-1.5 75 1/2		epth in inches	Matrix Color	Texture Class	% clay	% sand	Fragment Type & %	Rock Fragment Size (inches)		Structure Type, Grade, and Size			Redox Feature Color	Radox Feature Description	Roots	ometer/	Lab Sample ID		Notes
15-2 101/23/1 VS/1 8 30 50% <10' 80 1 VF VM CW - 3F-VF 0.25 2-4 104/2/1 51 9 30 30% <1.5" 80 6R VM CW - 200-M 4.4 9-14 104/26/6 51 8 35 85 <70" 50 0 M 25F-VF 0.25 10-M 4.6 10-M 4.6		'n	W.S.+		1	(1		1	١	1			1	3 F-VE		^		
1.5-2 101/23/1 VCR 8 30 GR 210" 80 1 VF VFR CW - 3F-VF 0.25 2-4 104/2/1 51 9 30 30% 21.5" 80 1 VF VFR CW - 3F-VF 0.25 9-14 104/2/6 51 8 35 85 270" 50 0 M 2F-VF - 110-M 4.6 2F-VF - 110-M 4.6		0.5	3/2	1			1	1	(١	1	NO	1	1	20-M	4.	0		
2-4 1040/1 51 9 30 50% C1.5" PO 1VF VFR CW - 35-VF 0.25 4-14 1040/6 51 8 35 85 <70" PO 0 M 25-VF - 100-M 4.6 1 00-M 4.6 1 00-M 4.6 1 00-M 4.6	^	2	10/2 3/101	1997	0		GR.		80	AVI	3	(11)	(į.	3 F-VF		3		
2-4 1040/6 5il 9 30 30% (1.5" 00 1VF VFR CW - 35-VF 0.2 4-14 1040/6 5il 8 35 85 (70" 50 0 M 25-VF - 100-M 4.1	7	7.0	9	211	0		3000)	30	6/2	711	0			2 CO-M	*	1		
4-14 1040 6/6 5i-1 8 35 85 270" 80 0 M 2 F-VF - 100-M 4.			7/2 NO1	2/1	9	000	GR.	2.5.	00	IVE		CK	1	1	35-4	N]		
4-14 10406/6 Sill 8 35 85 670 0 M 2 F-VF -			11,	7			% OC		50	28 x 7615					1 (0-W)	-			
1		1 Z	2/9 2401	SIGR	a	22			Po	3	1		1	1	2 F-VF	1			
\					10			110	30	18.		١			1 (0-M	B.			
	C							,											
	人	1	/	1	1	-1	1									ě			
	-																		

TEST PIT DESCRIPTION

Soil Scientist: M. WOOD

Field Assistant: R. HTLL

Soil Scientist: Field Assistant:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Date:	6/12	2)16	+ Bineline Coil Contest				% Slope:		W 00					Slope Aspe	Slope Aspect:		
Job Name:	Dominion -	Dominion - Atlantic Coast Pipeline Soil Survey	peline Soil Su	rvey			Drainage Class:		MD					Depth to V	Depth to Water Table:	Depth to Water Table: > 36"	er Table:
RETTEW Job #:	089962000						Depth to Refusal:		36"					Slope Failu	Slope Failure or slip:		
NRCS Soil Unit:	MERKERI		-BERKS - ROUGH	#12/CK			Bedrock Type :		SILTSTONE	1 1				Dip Slope I	Dip Slope & Direction:	Dip Slope & Direction: 1 0/0	12
Mineralogy:	35	MIXIN					Vegetation:		WHITE PI	PINE R	RED MAPLE	-	RED (OAK,	OAK,	DAK, BLACK GUM, BLUE	DAK, BLACK GUM, BLUE BERLLY
Horizon	Depth in M	Matrix Color	Texture Class	% clay 9	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Hisrition Boundary Topography & Distinctivess	Redox Feature Color	ē	FB Redox Feature Description		Redox Feature Description	Bedia Federica Roots Peder Peners
000	£ 5.1-9	1/2 Uhst	j.	1)	1)	1	1	1	45	(1	35-VF	3F-VF 3CO-M 1VC 4.4	W. 8
A	1.5-2 loya	3/2	1:5	0	0	120	.5.67	50	SP IVF	HV	cs	1		1	3 F-VF	3 F-VF 0-1	10 M
B A :	2-5 104	4/5 yhol	1.15	0	0	15	5.07	20	CR TVF	VFR	S	1		1	3 F-VF	2 F.VF 0	2 F-VF 0
Bt.	5-10 101	4/3 ULOI	5.1	19	0	20 50	<).0"	0 d	785	F	CM	1		,	3 F-VF 2 00-M	CO-W	CO-WE O
B+21	8 22 10-11 104R 5/6		5.1	41	5	25	230	Po	795 W1	R	SW	1		1	- 1 ro-M	1.4	11-15
er 1	19-31 10485/h		1.5 VOV		28	32	16.0	50	1	1	CW	1		1	2 F-VF	10-W	t-nt
70	36+	1															

TEST PIT DESCRIPTION
Soil Scientist: M. WOOP

Field Assistant: R 1+ILV

Signature: M W

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:		399-11.06	06-22-10	777	1120 - 1201	J	Topographic Position:	tion:	NOSE S	SLOPE			Parent material:	terial:	COLLUN	NO UM /	LAUNG IS OS!
Date:		1122 16	0				% Slope:			100			Slope Aspect:	ect:	1480	1	
Job Name:	Domin	00	Pipeline Soil !	urvey			Drainage Class:		WD				Depth to	Depth to Water Table:	729		
RETTEW Job #:	089962000	52000					Depth to Refusal:		200				Slope Fail	Slope Failure or slip:	10		
NRCS Soil Unit:		V65/161	- BORKS -	5-R	FISUOS		Bedrock Type:		511751	DINE			Dip Slope	Dip Slope & Direction:	170%	1490 5	Strike: 590
Mineralogy:							Vegetation:		CHESKINI	UT 054	不出	CKORY,	BLUE	RIPPOR			
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticky/ Sticktness	Structure Type, Grade, and Size	Moist Consistance	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redos Feature Description	Roots	Pocket Penetrometer/ pH	Lab Sample ID	Notes
00	0-	75 ya	1		1	1	(1	1	J	A	ſ	J	3 F VF	4.0)	
D	2	1/2 Arol	51 - SN	0	57	SR	0 17	PO 50	1 A L	VFA CS	53	,	1	3 P-VF	5.1	1	
BA	2.5	10m2/4	3-1	=	N.	35	0.12	P0	14/	VFR	CW	1	j	2 FWF	1.5	1	
Bu	01-9	5-10 1042 6/4	2 X8x	=	60	40	2.4.0	P6	195	FR	CW.	1	Ī	2 F-UF	2 2	(
CR	10-28	10-20 104P 1/4	21/2×6/	_0	40	St.	0.87	50	785 W 1	FR	CM	1	(1 co-M	5.2	1	
A	284	1	7	1	1	,											
and the second																	

TEST PIT DESCRIPTION
Soil Scientist: M W OOD

Field Assistant: R HFLU

Signature: M WCA

NRCS Soil Unit: RETTEW Job #: Job Name: Test Pit ID: KR De W Mineralogy: 8 83 Horizon A 0 2-4 1-0 _0 1.5.2 0-15 7 Depth in inches -17 Dominion - Atlantic Coast Pipeline Soil Survey 089962000 P345-160622-1025-MGW 19/5/P/ NEIKOU. DENKS - ROUGH 1946/L 7.51/2 6/22 184R4/41 104R Matrix Color 3.×49 SIL 23 Texture % clay 10 中 10 n 30 4 30 % sand 27 25% 45% 705% 20% 62 Fragment Type & % Rock Rock Fragment Size (inches) % Slope: 1 1 Depth to Refusal: Drainage Class: Topographic Position: Vegetation: Bedrock Type: 1 0,0 N .0 0 0 PO 30 50 PO 50 0 50 Po Plantichy/ Stickingss Structure Type, Grade, and Size 785 CHESTAUT + RED 34 350 55 NOSE SY SILTSTONE NW SLOPE MA Moist USDA ZZ, VFR To Sus CW CW 23 AS Horteun Boundary Topography & Distinctness DAK DOOMSON SMILL SULFIN Redox Feature Color 1 1 1 Dip Slope & Direction: Slope Failure or slip: Depth to Water Table: Slope Aspect: Redox Feature Description Parent material: 1 1 1 1 2 F-VF 24-4 W-CD 07.W F-VF 11-10 W-C0 M-10 FVF F-VF Roots BLUEBELRY 0.25 200 90% 57 1.0 5 0.25 COLLONION 323 + i Personal Property Lab Sample ID 196 1 1 Strike: ESTOUNA 100 Notes

Other Notes:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	6	P346-1606	0622-10	20 -	1020 - MGW		Topographic Position:	tion:	MUNUS	717			Parent material:	terial:	ESAS	WOUGTS 38	
Date:		6 122 16					% Slope:		40/6				Slope Aspect:	ic.	303		
Job Name:	Dom	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		Q W				Depth to V	Depth to Water Table:	713		
RETTEW Job #:		089962000					Depth to Refusal:		(8)				Slope Fallure or slip:	re or slip:	1		
NRCS Soil Unit:		WEINELT BERS		ROUGH	1+		Bedrock Type :		SILTSTONE	INOU	CH		Dip Slope	Dip Slope & Direction:	40/0	213 5	Strike: 123
Mineralogy:		Mixed					Vegetation:		HICKORY	-	CHECTNUTOA	K-W	HITE PI	METRUEBERA	851214		
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stichiness	Structure Type, Grade, and Size	Moist	Harbon Boundary Topography & Distinctness	Redox Feature Color	Redox Festure Description	Roots	Pucket Prostrometer/	Lab Sample ID	Notes
00	1-0	7.5 XR 3/2	1)	1		ì	(/	ì	1 .	An	1		1 CO-W	00	1	
4	1-15	1-15 1048 4/1	297		8	25	12.0.1	P0	1 VF	VFR	AS	1		3 F-VF	0.25	1	
E 3	15-13	13-13 10426/6	10 × 05	11	20	04 35	10.97	50	79S	NFR	VFR CW	1		10-02 1 20-12	2.23	1	
P	13.4	13+ 10MR 6/6	1	t	1	1	1										

TEST PIT DESCRIPTION Stynn Che

Field Assistant:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P	2-347-1606	180	140	7-DEF	Topographic Position:	Position:	X	14	1						
Date:		10/2	6						1			Parent material:	rial:	1.05	MAN	
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil S	urvey		Drainage Class:	ass:	F	2200	10		Slope Aspect:			45Ch	
RETTEW Job #:	0					Depth to Refusal:	fusal:	4:1.				Clone Failure or III	iter lable:	1		
NRCS Soil Unit:		Shelocta-Be	Besks Co	xolomo	X (50E	Bedrock Type :	e :	5.	alo			Nin Slone 8 Dinasi	or slip:	in o	VCK ST	gringnold
Mineralogy:	-	1	84	-		Vegetation:		White	Pina	CM	econos	Dip slope & Direction:	3	on my	Strike	Strike: 1540
Horizon	Depth in inches	Matrix Color	Texture Class	% clay % sand	Rock Fragment Type & %	ck Rock Fragment Nent Size (Inches)	ent Plastichy/	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctions	Redox Feature Color	Redox Feature Description	Roots	Pocket Peretumeter/	nple	
D	0-15	-15 1042212 Sil153	5:2	15	0	17 Cli.	500	NABC	2	AL	1)	350	3	2	Surface Channers
Bw	15-	1.52 HOUR 1/5 1/ 100 1	2:5	0	22 28	17.4	50 Po	17 HEST/	7	Se la	\	1	25	0.5	5	
P	44	1														
											ı					
			4													

TEST PIT DESCRIPTION

Soil Scientist: M WOOD

Soil Scientist:

Test Pit ID:	P	348-160621-1115	21-111	1	MGW		Topographic Position:	tion:	IMMUS	T			Parent material:	terial:	RESIDI	MUUK	
Date:	2	6/21/16					% Slope:		20/0				Slope Aspect:	et:	273		
Job Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		S div	omewh	Somewhat Excessivel	Y	Depth to V	Depth to Water Table:	>15	//	
RETTEW Job #:		089962000					Depth to Refusal:						Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:	8	1937 ·	BERKS-ROUGH	2000	H		Bedrock Type :		2NO STONE	NE			Dip Slope	Dip Slope & Direction:	16%	3120 51	Strike: 222
Mineralogy:							Vegetation:		WHITE BING	1	VIRGINIA	PINE, CH	HESTMUT	TOAK H	LUCKURY	, BLUE	4VVJ9
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horton Boundary Topography & Distinctness	Redox Feature Color	Redox feature Descriptions	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
De	0-1	0-1 5423/2	1	1	1	1	1	1	(t	Y.	1	(3M-00	4,3	1	
A	1.5	1-1.5 10 4R 4/2	4/2 500	00	25	30% <6	197	0.3	22 1/F	VAR CS	CS	1)	3 F-VF	言	Ţ	
80	1.5-15	1.5-12 1040 2/4 2 XCM	N XCK	00	55	2st NJ	197 KSt	50	795	VFR	cw	1	1	2 F-VF	10.01	Ì	
A	51	5															
									6								

Other Notes:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

TEST PIT DESCRIPTION
Soil Scientist: M, WOOD
Field Assistant: R, HTLL

RETTEW Associates, inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P	349-160	821-	215-	- MGW	ME	Topographic Position:	ition:	SIDE	39012			Parent material:	aterial:	300	UVIU	M over residuum
Date:		6/21/16					% Slope:		24				Slope Aspect:	ect:	7 R		
Job Name:	Domir	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil	Survey			Drainage Class:		MWD				Depth to	Depth to Water Table:	1	24 =	
RETTEW Job #:	089962000	2000					Depth to Refusal:		602		pa3		Slope Fail	Slope Failure or slip:)		
NRCS Soil Unit:	100	WEIKERT-BERKS-ROUGH	RKS-R	1200	_		Bedrock Type :		0	STANK	CO		Dip Slope	Dip Slope & Direction:	350	3	Strike: 190
Mineralogy:		Mixed					Vegetation:		WHITEP	DINE C	CHESTNUT	NAG	HACKORY	Y DOG WOOD,	JOOD BY	BLUE BERRY	STATES AS
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment	Rock Fragment Size (inches)	Planticity/ Stickings	Structure Type, Grade, and Size	Moist	Horizon Boundary Yopography & Distinctions	Redox Feature	Redos Feature Description	Roots	Pocket Prostrometer/	Lab Sample	Notes
0,	0-1	75483/2	(1	1	1	1,	1	j	1	武	١	\	2 F-VF	4 1	1	
A	2	8.5 2/2 Shal	5,2	19	25	1,0%	1012104	95 BB	1 VE	NA	A	1	1	2 F. VF	0.25	1	
E	2.5	toyR 5/4	512	2	25	7,01	Ch ~ 1.0 "	60	IN.	U.A.	8	1	-1	- 3. Co	0.25	(
86	5-10	E-10 10425/4	×	7	35	9,01	10.17 % OI	55 56	7195 WZ	F)	83	1)	1 F-UF	5.2	I	
Etp	19-19	18-19 10425/6 50l 22 55 15% 21.0	Sel	15	N	15%	0.17	SS	785 17 2	27	CW	1		14-UF	K 0.1.	1,	
39	8-32	M 32 7540 6/8 5 R	SR	00	60	20	120	P6	7185 UN. 1	F	MID	16/2 N/201	6	16-16	大いい	1	RE-DUX 29"
P	32+	1	1	1	١	1	1	,)		1							

TEST PIT DESCRIPTION Soil Scientist: D. Fly Walnumber Fleid Assistant:

Test Pit ID: Date:	0.3	6/21/160	1000-1000-1000	00.00		Topographic Position: % Slope:	sition:	12	3	100		Parent mat Slope Aspe	Parent material: Slope Aspect:	25	Slope Aspect: 290
Job Name:	Dominion	oast P	ipeline Soil Sun	·eγ		Drainage Class:		Mary				Depth to W	Depth to Water Table:	Depth to Water Table:	Depth to Water Table:
RETTEW Job #:	089	5			1	Depth to Refusal:	d:	3 14.				Slope Failu	Slope Failure or slip:	Slope Failure or slip:	1
NKC3 SOII UNIT	1/4	200	100. 1-00	The Paris of the Paris	10	Dediock Type:		_	0	100	NA FIN	Why Blinds	Why Blinds	Why Blinds	Why Blinds
William Singy.		THE WAY				* Bemeron		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	USDA		,	1 1000	7 17	1 1000	1 1000
Horizon	Depth in inches	Matrix Color	Texture 9	% clay % sand	Rock and Fragment Type & %	Rock Fragment Size (inches)	Planticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Harlton Roundary Topography & Distinctness	Redox Feature Color	Redox Feature Redox Feature Color Description		Redox feature ROOTS Profest Featurement of	Redox Feature Roots
8	0:03	25/1	1	1	t	1	1	1	1	AUD	1	1	1 25	- 3f - 4.8	- 2£ -
D	350	1.25/28/201	5.2	14 10	500	, h7	P0	JAN NERG	JIN	MM	1		- 35E	- 3f 0.8 800 JE	- 9th ME -
Bul	2.9	104RSH S/L 16	5/2	6	15 25.	14.	89	1888× NEX CM	N.	M			0)10 W'38	- 2t, M 0.5	10
Bul	19-19	31 2'S OF 3401 41-10 T	12.5	10 M	2 CV	,76.		SB IMSON Fr AW	3	AW)		- 26,M	- 26'W 0:22	. 10
R	191	1	(1	1	1	11	(1	1	1	1	1	1	

Other Notes:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Soil Scientist: The Month of the Field Assistant:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	P351-	12062	1-1140	しつひきに	TI	Topographic Position:	ition:	Balle	lans			Parent material:	terial:	Collinan	mar	Residence
Date:	200	0				% Slope:		82				Slope Aspect:	ect:	1600		
Job Name:	Dominion - Atlantic Coast Pipeline Soil Survey	ic Coast Pipeline	Soil Survey			Drainage Class:		Mell				Depth to V	Depth to Water Table:	1		
RETTEW Job #:	089962000					Depth to Refusal:		35				Slope Failure or slip:	re or slip:	١		
NRCS Soil Unit:	har truing	5	ROUGH	-	11/570	G ADN 8 (57D Bedrock Type:		Shalo-	10			Dip Slope	Dip Slope & Direction:	50 1	1W	Strike: 235
Mineralogy:	M	2				Vegetation:		Cheston	SON L	Hickory	J. Winde	Park .	Spirise 6	ill & be my	TO BUT	actively of
Horizon D	Depth in Matrix Color	Color Class		% clay % sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plastichy/ Stickiness	Structure Type, Grade, and Size		Horizon Boundary Topography & Distinctness	Redox Feature Color	Rados Feature Description	Roots	Pocket Penetrameter/	Lab Sample ID	Notes
P	0-5 10-10	1000 1/2 Sil 20 18 60%	7 20	20	58.	187	50 00	1588 UFF AW	Ufr	AW	1	1	2500	17 SE'0	1	lessiven "4 acomale
Bal 15-	,	5 1/2	2	16	S'L 31 16 601 73.	187	88	30 1856K Fr	77	CW	1	t	300,1	27,0		
Bu 29-	7- WAS	presid 5:1 22 16 851. 284	20	6	CN 85%	187	58	SP 18891 Fr CM	7	CM	1	1	35,00		1	
280	18481 SE	103 21 28 7'S 01/01/01/01	22	Z Z	C. S.		25	165BK FO AW	2	AW	1		1+'W	9.77 Cason	(Bedded Out
P	148	1	1	1	(1	1 1	Ţ	r	1	(1	1) 1	(

Soil Scientist: D. Tengto Moules Field Assistant:

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

316 - 12- 12- DEL		31.	2	Parent material: Slope Aspect:	123°	our collumne
Coast Pipeline Soil Survey	Drainage Class:			Dooth to Water Table:	180	
	Depth to Refusal:	1		Clone Failure or clin:	1	
-		1		Dip Slope & Direction:	١	Strike:
Mixed	Vegetation:	White oak	Sheabank bicke			Do sterraine
Texture	Rock Fragment	Structure Type.	Horizon Boundary Rodox	-		0
% clay % sand	Size (inches)	Structure Type, Grade, and Size	Horizon Boundary Yopography & Distinctness	Redes Feature Roots	Product Pernetrometer/ Lab Sample	Notes
2.511	,	•	AW -	- 3f	6.3 51	highly decompos
3/8 5,2 17 16	16117	1768	MA	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.1 62	
SiL 17 18	41/2	IMSAK	(W	174,0	25 20	
1/2 SIL 1620	710	16834	cs -	1 2 mico	5.2 54	GF hove Kounded
OMR 514 5, L18 28	71.	-	CS -	1 12	55 85	Sort 1. thereberrois to 100 115/8 from want
2.546/2 5.1 18 28	13"	1605011	10-125/16	CP 12	2.0 56	Some Lithochiers
						Cot how ship
						× .
6 9 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	Texture 11 16 SiL 18 28 SiL 18 28	S-DEF Topographic Posit Slape: Drainage Class: Drainage Class: Depth to Refusal: Depth to Refusal: Pragment Size (inches) Type & % Depth to Refusal: Vegetation:	5-PEF Topographic Position: \$100001 \$5 slope: 31. \$20 \(\) \(\sigma \) Depth to Refusal: Pegtation: Pegtat	S-DEF Topographic Position: Lland Plain slope: Stope: Depth to Refusal: Depth to Refusal: Depth to Refusal: Vegetation: Vegetation: Vegetation: Structure Type, Noak Swaahu A. F. Type & x. Size (inches) Size (inches) SSP NGR WF AW 116 GA LIB' SP NGR WF AW 118 GC LIB' SP NGR F C W 118 GC LI	5-PEF Topographic Position: \$\frac{1}{2000} \times \frac{1}{2000}	S-DEF

TEST PIT DESCRIPTION
Soil Scientist: M. WOOD
Field Assistant: R. HIW

Soil Scientist: Field Assistant:

Signature: M. Wal

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	PZ	257 A - 1601	W - W - 1 - 1 / 10"	TV Y	1010		Topographic Position:	TION:	100 0	01017			Parent material.	Cerial:	1	11111	
Date:		-					% Slope:		- 1			ŧ	Slope Aspect:	ect:	460		
lob Name:	Domin	ntic C	Pipeline Soil 9	Survey			Drainage Class:						Depth to V	Depth to Water Table:	+ 05		
RETTEW Job #:		2000					Depth to Refusal:		195				Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		WETKENT-BISPICS-	7045-B	ROUGH			Bedrock Type :		1.				Dip Slope	Dip Slope & Direction:	1	10	Strike:
Mineralogy:	-	۸۸٠ ، ۵۵					Vegetation:		D STEH W	DAK, CI	TUNTS 34	IT DAK, HI		Y			
	Depth in	241.5	Texture				Rock Fragment	Planticity	Structure Type,	USDA	Hariton Boundary	Redox Feature	Redux Feature		Pocket Penetrumeter/	Lab Sample	
0		JAS.4	Class		1	Type & %	ore (mones)	1	Sidue, and size	1	A	1 66	1	T. V.		-	(
De	0-2	3/2	,	1	1	. 1	1	1	1	1	NS	1	1	- VC	60	1	,
A	2-4	1.57h	~	0	8	on 3	0.10	\$6	209 JA 1	VM CS	53	1	1	3 F-Vr 2 M-CO	5.5	١	(
Bwx	4-12	4-12 546	<u></u>	77	35	2 20	027	50	188 1 m	F	MO	J	3	2 F-VF	5.2	1	(
Buz	12-50	Bw2 12-50+5125/9	8	12 65	8	22	120	80	195 WI	F	CW	C	,	1 F-WF	1,28	١	Ī
7	1	1/3/1	4		r		0.11	Q. J.	1	7)-				(-	
						χ=:											

Soil Scientist: The Annual Market Soil Assistant: Max Dug Con

Signature: Hand Me

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Test Pit ID:	70	- 253-110	1-80000	1020	734-C		Topographic Position:	tion:	アンと	ant			Parent material:	erial:	PASIO	200	
Date:		6/22	-				% Slope:		14 15				Slope Aspect:	ct:	2550		
lob Name:	Domi	Dominion - Atlantic Coast Pipeline Soil Survey	Pipeline Soil Su	rvey			Drainage Class:		1100				Depth to V	Depth to Water Table:	ı		
RETTEW Job #:	0899	089962000					Depth to Refusal:		36	13.			Slope Failure or slip:	re or slip:	1		
NRCS Soil Unit:		4	beills Rough		molas	Emplex (570)	Bedrock Type:		Shall	1 - 4+	1		Dip Slope	Dip Slope & Direction:	120 =	St	Strike: 16 4 *
Mineralogy:	H		Mixed				Vegetation:		1 Ministe	P. M	Micke	Mr. on	tave o	OAK, Spe	150 blu	Grade	+ herblog
Horizon	Depth in inches	Matrix Color	Texture Class	% clay	% sand	Rock Fragment Type & %	Rock Fragment Size (inches)	Plasticity/ Stickiness	Structure Type, Grade, and Size	Moist Consistence	Horizon Boundary Topography & Distinctness	Redox Feature Color	Redox Feature Description	Roots	Pocket Penetrometer/	Lab Sample ID	Notes
00	6-1.5	がなっている	ı	1	1	+	,	((1	1	WH	ţ	1	Pr.	()	1	
D	5.50		2.5	万	2	15 22 cm 21	71"	95	2931	VFr	AW	1	1	Sec.	9,4	1	
BE	250	7.542	2.5	16	8	75%	-	38	1855H	7	CW	1	t	JC0 N'ye	9.4	1	
0	36	TOUR	Chambo	1	1	C 281.	1-6"	1 1	Dw O	1	CW		(24,4	18	1	
T	26+	1)	1	1	1)	11	1	1	1	1	1	1	1 1	1	

Soil Scientist: 7 FINST & MAN MAN

Signature:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

	D	20	Bw2	801	P	De	Horizon	Mineralogy:	NRCS Soil Unit:	RETTEW Job #:	Job Name:	Date:	Test Pit ID:
	+16	279	101	0 3	N 32	0.05	Depth in inches		me	089962000	Domir	-	-0
	l	INRULY	7.5412514	75714	bur 211	25/2	Matrix Color	Dext. W	me, le + - Bil	2000	Dominion - Atlantic Coast Pipeline Soil Survey	6 33	P-353A-160022-1035-DF
	Y	Change 5	5,1	512	7.5	(Texture Class		Ks- Rough Complex		Pipeline Soil S	1110	-65000
	1	1	8	Ce	5	1.	% clay		Con		urvey		1039
	1	1	22	00	1,2 1625	1	% sand		-				-DF
	1	CN 081	CN CN	75%	501.	ţ	Rock Fragment Type & %		57E)				7
	(1-6.	74"	7 1/4°	C1/2.	(Rock Fragment Size (inches)	Vegetation:	Bedrock Type :	Depth to Refusal:	Drainage Class:	% Slope:	Topographic Position:
	1	1 1	35	55	50	1 1	Plantichy/ Stiphiness			*			ition:
	1	NO	MASK	INFSBK VF	IMBR	1	Structure Type, Grade, and Size	Wh. 44 0	Shill	ره	1190	400	1 all
	1	1	7	A	VK1	1	Moist Consistence	USDA (- 7 CAY	11			
	1	CW	AW	CW	VET AW	Aw	Horizon Boundary Yopography & Distinctions	M2240V4					back step
	1	1	1	1	1	1	Redox Feature Color	02K h.					
	(i			1	1	Redox Frature Description	Mary	Dip Slope	Slope Fail	Depth to	Slope Aspect:	Parent material:
	1	7	JW.F	Jw.Co	11/10 JE	20	Roots	Janiam 1	Dip Slope & Direction:	Slope Failure or slip:	Depth to Water Table:	ect:	aterial:
	1 (11	5.6	5.4	839	6.5	Pocket Penetrometer/ pH	p.ne	380€)	1	14	Collo
	1))	١	1	1	Lab Sample ID	LV4				00KI	CHUID
		or entrol with Bod Koch	Rundom CForient				Notes	my sparse herb	Strike: 230				avel ies, dwa

Attachment 5 Soil Transect Log

Notes: Notes: Slope & Aspect: Transect Point ID: Horizon Biz 5 Slope & Aspect: AB Transect Point ID: 1 Horizon TO 00 Rettew Job #: 089962000 A p. Soil Scientist: DUANTINAY 12-18-Depth 140-18 2 0-0.5 Depth 0-2 7.0-14.0 2555 î 16 0.70 54.0 502 (ii) June 11 X * mans 2 17. 15 T 2.5% 514/4 5/2/ NY NY 27.50 1.85.1 Color Color TØ 078 11,0620 -TOOK 160620-1 tank 5 Position: (A Texture Sicc Sicu Texture Position: 5 5 and XS3 15.7× VCIE 300 36 500 CoF 25 S F 11 120-DA Ulmotorus 1418-Color Redox 0 Redox Color 1 Redox Descr. PM: Redox PM: Descr. 1 1 1 1 Notes Notes Notes: Transect Point ID: Notes: Slope & Aspect: Horizon Slope & Aspect: Transect Point ID: Horizon Section: Date: 06/20/2016 Depth Depth (ii) (ii) Color Color Texture Position: Texture Position: Cof င္ပန Redox Redox Color Redox Color Descr. PM: Redox Descr. PM: RETTEW Associates, Inc. 3020 Columbia Avenue Phone: 717-394-3721 Lancaster, PA 17603 Fax: 717-394-1063 Notes Notes

TEST PIT DESCRIPTION

Soil Scientist: Ogf 20

Field Assistant: MIGUEL PAPAMES

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

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Notes: Slope & Aspect: Slope & Aspect: 34%, 24% Position: & Notes: Transect Point ID: 1-0278-160617-Horizon Transect Point ID: Horizon Bu Rettew Job #: 089962000 00 Soil Scientist: Depth Depth N (in) (in) co BY(25/ 7.5765/6 Color Color John C Position: Texture Texture 2 5 Roberts CoF CoF ľ Redox Redox Color Color Redox Redox PM: Descr. PM: Descr. Notes Notes Slope & Aspect: Notes: Transect Point ID: Slope & Aspect: Transect Point ID: 7-029-160617-12 Horizon Notes: Section: Horizon E D Date: Depth Depth (in) 6 Œ. 0 20-02 6 9/5/201 12 Just 5YRCT Color Color 136 Position: Beach 1 Texture Position: Texture 020 CoF CoF Redox Redox Redox Redox Color Color PM: Descr. Descr. PM: RETTEW Associates, Inc. 3020 Columbia Avenue Phone: 717-394-3721 Lancaster, PA 17603 Fax: 717-394-1063 Notes Notes

Soil Scientist: Rettew Job # : C Transect Point ID: Slope & Aspect: Horizon Depth (in)	Soil Scientist: Rettew Job #: Insect Point ID pe & Aspect: Depth (in) Oe (10/m 089962	000 045A-16 Position: Texture	COF COF	Redox Color	PM: Redox Descr.	Notes		Section: Transect Slope & / Horizon	Section: 9-6: Transect Point ID Slope & Aspect: Horizon (in)	14-20 3: 7-6 158 29 color	14-20 3: 7-0 57 293 color	14- 2016 27-0421-160614- 157 29 Position: Sum Color Texture Cof	14 - 2016 D: 7 - 042A-160614 - 144/- 158 29 Position: Summer Color Texture CoF Redox Color Color	14- 2016 21- 0424-160614-15 22 Position: Summa Color Texture Cof
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Dominion ACP - Soil Survey

Soil Transect Log

Rettew Job #: 089962000 Soil Scientist: Polywork

Date: - [ho Pho

Section:

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RETTEW Associates, Inc. 3020 Columbia Avenue Phone: 717-394-3721 Lancaster, PA 17603

Slope & Aspect: 1/% Slope & Aspect: 351 Transect Point ID: T-049 A-1606 Bw Transect Point ID: T-047A-160014-1555-DE Notes: Horizon Horizon Oa 1 D 03 about Depth 18-0 Depth (in) 15 CANTED (in) BUC. of 2 6 Et Co S42251 19491 10422 104R3 1152ho 10425 B Color Color Choche 331 30 Position: Wood Bouch Texture Position: \$100 Texture 1,5 CIVE 401618 65/9 30.00 381. 151. 4-14 CoF CoF bottow. 14/0 104RY 1 Redox Redox Color Color 1 Descr. Redox Redox 5.00 PM: PM: Residuin 34 Descr. 8 1 Rolly Hryvier Ar MX 2 Notes CARK Notes 101 Drow Slope & Aspect: Slope & Aspect: Transect Point ID: Transect Point ID: T-6496-Notes: Bul 00 Horizon Horizon P 3 Depth ç Depth 5 Mod (in) Œ, 184 apoure S-12551 10123 1520 Color Color Texture Position: Position: Texture cree Sed in so 1606 2.750 CoF CoF 45 200 Redox Redox Color Color 30-Redox Redox PM: PM: Descr. Descr. 50 P Fax: 717-394-1063 01 Notes Notes 200

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Slope & Aspect: 7/5 Slope & Aspect: Transect Point ID: Transect Point ID: Horizon Notes: Horizon Notes: 00 0 Rettew Job #: 089962000 Soil Scientist: Depth Depth = 12 (in) N (ii) 1094%S, 8.5482.8 109RS/6 5 Russell Color Color 055A1 Texture Position: Texture Position: 1.5 20 24 COF COF 0200 01 1201 Redox Redox Color Descr. Color Redox Redox PM: Descr. PM: 210/0 5/000 Notes Notes Transect Point ID: Slope & Aspect: Notes: Slope & Aspect: Transect Point ID: Section: Horizon Notes: Horizon Date: Depth Depth (in) (in) 6.13.16 Color Color Position: Position: Texture Texture CoF CoF Redox Redox Color Color Redox Redox Descr. PM: Descr. PM: RETTEW Associates, Inc. 3020 Columbia Avenue Phone: 717-394-3721 Lancaster, PA 17603 Fax: 717-394-1063 Notes Notes

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RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721

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Date: 6

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RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603

Rettew Job #: 089962000

Soil Scientist: M , Wood

Notes: Notes: Slope & Aspect: Transect Point ID: 0.5-2 Slope & Aspect: 98% 244 Position: LAT Transect Point ID: T- 121 Horizon Horizon 41-01 4 + Depth Depth 00 D (in) (in) 75.12 y No. E | 5401 1700 Color Color Position: Texture Texture 1831 8 20% CoF CoF 5 Redox Redox Color Color 1 Redox Redox PM: Descr. Descr. PM: COLLUVIUM Notes Notes Notes: Notes: Slope & Aspect: Transect Point ID: Slope & Aspect: Transect Point ID: Horizon Section: Horizon Depth Depth (in) Ē 8121 Color Color Texture Position: Texture Position: COF CoF Color Redox Redox Redox Redox Color Descr. PM: Descr. PM: Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

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Rettew Job #: 089962000 Soil Scientist:

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RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721

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Rettew Job #: 089962000 Soil Scientist: Jahn Waln Section: Date: GNEW-D 0 CO

Slope & Aspect: 54%, 270 Position: LC Transect Point ID: て-187a-Horizon 284 BW2 00 Depth 21-25 11-21 0-3 (in) WARS6 104846 10/R56 54R2.5 Color NGRSIL NGRSCL Texture VERSIL 55 60 5 MSD-9661- +09091 Cof Redox Color Redox Descr. PM: collyvium over ٧ 1 1 clay skins Notes Slope & Aspect: Transect Point ID: Horizon Depth (in) Color Texture Position: CoF Redox Color Redox Descr. PM: RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes

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Soil Scientist:

	Rettew Job #: 089962000	Job #:	089962	000		(0010	1 1		Date: Section:	Θ	6-18	107/16	-			RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063
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Date:

RETTEW Associates, Inc. 3020 Columbia Avenue

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Soil Sc Rettew	ientist: Job#:	Soil Scientist:	00	10				Date: Section:	6/1/	326				RETI 302 1	RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063
Transect Point ID:	Point ID	1-2	260-16	060	1-141	215	00	Transect Point ID:	Point ID					۱	Fax: 717-394-1063
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Date: 6/7/

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603

Soil Scientist: Machael

Slope & Aspect: Notes: Slope & Aspect: 30/10° Position: 5/000 8/0000 Transect Point ID: T-2384-160607-1505-MEL Transect Point ID: Notes: Horizon Horizon 00 Rettew Job #: 089962000 Depth Depth (in) (in) Color Color Texture Texture Position: d CoF CoF Redox Redox Redox Color Color PM: collowhum Descr. Redox PM: Descr. Notes Notes Slope & Aspect: Transect Point ID: Notes: Slope & Aspect: Transect Point ID: Notes: Section: 12-234 Horizon Horizon Depth Depth (in) (in) Color Color Texture Position: Texture Position: P-239 CoF CoF Redox Redox Color Color Redox Redox Descr. Descr. PM: PM: Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

Dominion ACP - Soil Survey

Soil Transect Log

Date:

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603

Soil Scientist: Thomse www

Notes: Slope & Aspect: Notes: Transect Point ID: 7-239A Slope & Aspect: Transect Point ID: 200 Horizon Horizon Rettew Job #: 089962000 Depth Depth 0-2 5 Ē (in) 3 1000 DAYS Color Color Texture Position: Position: Texture 000 CoF CoF 27 Redox Redox Color Color Redox Redox Descr. PM: Descr. PM: A KOUNDEDUCE Notes Notes Notes: Slope & Aspect: Section: Transect Point ID: Slope & Aspect: Transect Point ID: Horizon Notes: Horizon Depth Depth (in) (in) P-239 Color Color Texture Position: Texture Position: CoF CoF Redox Redox Color Descr. Redox Color Color Redox Descr. PM: PM: Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

Slope & Aspect: Slope & Aspect: 34/440 Horizon Transect Point ID: +-BW2 Horizon Transect Point ID: T-247 A Notes: Notes: Rettew Job #: 089962000 P Soil Scientist: Pite 1/5 ter machine 19-6 Depth Depth (in) (in) 6 2/2/2 Jusil 250 PK215 167PS/4 104R5/4 5,1 10423/2 Color Color 640 247 Position: Position: Texture Texture 285 80.50 200 200 Backer CoF CoF 6 Redox Redox Color Color LOH 1 Redox Redox Descr. PM: Descr. PM:(b 16 DE Mixedit Angled Edges Share CO+ ConsoledCox Notes Notes Slope & Aspect: Transect Point ID: Slope & Aspect: 3 Notes: Transect Point ID: 1-24 Notes: Horizon Section: Horizon Bu P Date: Depth Depth 2-14 0.0 (in) Ē 104/23/2 10425/4 58% Color Color 649 Position: Texture Texture Position: 215 N.188 608 CoF CoF 45/0/2 Redox Redox Color Color Redox Redox Descr. PM: PM: Descr. 1 RETTEW Associates, Inc. 3020 Columbia Avenue Phone: 717-394-3721 Fax: 717-394-1063 Matches most Lancaster, PA 17603 Sha Notes Notes n

Date:

6/8/16

RETTEW Associates, Inc. 3020 Columbia Avenue

Soil Scientist: Michael

Slope & Aspect: 347/350 Position: hedslope Notes: Slope & Aspect: Transect Point ID: 2m2 Transect Point ID: 7-2534 -160608-1150-MEL Notes: Horizon Horizon tem coarse transments compared to summerting sidestspes Rettew Job #: 089962000 In concave narrow headslope, Buz w 8-18 Depth 8-1 2-0 Depth (in) Ē 5/12.5/1 101/24/24/CIR 10/125/6 10/12/6 GR-CB Color Color Texture JIN Texture Position: 2017 35% CoF COF Redox Redox Color Color Redox Redox Descr. PM Collovon PM: Descr. / vesy Notes Notes Notes: Slope & Aspect: Slope & Aspect: Transect Point ID: Notes: Horizon Horizon Transect Point ID: Section: 300 Depth Depth E (in) P-250 -(in) 2/1/2 Color Color Texture Position: Position: Texture CoF 011 CoF 285 sandstono < INCIBASAS C.T. W Redox Redox Color Color Redox Redox PM: PM: Descr. Descr. 2 m Phone: 717-394-3721 Fax: 717-394-1063 Lancaster, PA 17603 2 180 N Notes Notes 7

Date: 6/8

RETTEW Associates, Inc. 3020 Columbia Avenue

Soil Scientist: LOFN WAR

Notes: Slope & Aspect: DIP 25 7, NNE(20. Notes: Transect Point ID: Horizon Slope & Aspect: 43/2190 Position: Backs LEPE PM: PE Transect Point ID: T_ レミレム Horizon 8 N 00 Rettew Job #: 089962000 P Depth Depth BEDROCK OUTCROFF ING Ē (in) + 4 Stars 10/24/6 10/R-3/1 SPL7 5+92 Color Color DIPPIN Texture Texture Position: 757 STEIKE: 2900 VARIABILITY 809091 55 CoF S Cof 302632 1 0 1750 BACKSLETE Redox Color Color Redox Redox 10945-500 PE Redox PM: Descr. Descr. REFUSED IN DEPTH TO RECK MENGIL 5 5 CITHIC Notes Notes UDORTHEN Notes: Notes: Slope & Aspect: Transect Point ID: Slope & Aspect: Section: H Transect Point ID: Horizon Horizon Depth Depth (in) (in) Color Color Texture Texture Position: Position: 27 6 CoF CoF Redox Redox Color Color Redox Redox PM: Descr. PM: Descr. Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

Date: 6/ 8

Soil Scientist: レタチン モギエ

Notes: Slope & Aspect: Notes: Transect Point ID: Slope & Aspect: 44/354 Position: Brckscore PM: Coccovion Horizon Transect Point ID: 7 2584 - 160608 - 1257 Horizon 54 do De Rettew Job #: 089962000 P M 4/2 Depth 25.17 Depth (in) 10 (in) spars! 10/25/6 10/25/6 16 3 ho Color Color UN IT Texture Texture Position: 252 ASS. CoF U3 5 CoF 0 O Redox Redox Color Color マリ 3 Redox Descr. Redox Descr. PM: 05 2 S Notes Notes Notes: Notes: Slope & Aspect: Slope & Aspect: Transect Point ID: Transect Point ID: Section: 4 Horizon Horizon Depth Depth (in) (in) Color Color Texture Texture Position: Position: CoF CoF Redox Redox Color Color Redox Redox Descr. Descr. PM: PM: RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

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Slope & Aspect: <53/20° | Position: note Summit | PM: residuem Slope & Aspect: Transect Point ID: Horizon Transect Point ID: T-2694-160609-1405-MEL Notes: Horizon ct in Bu vary to channery, sittstane/shalle Notes: Rettew Job #: 089962000 P Soil Scientist: Michael 8-20 Depth Depth (in) Ē 8 IONESI 104/23/2 Q morizon < 1/2 in Color Color SIL Texture NOP Texture Position: 28 85% CoF Cof So. Redox Redox Redox Color Color diestant oak, white Redox PM: Descr. Descr Notes Notes Horizon Depth Notes: Slope & Aspect: Notes: Compare Slope & Aspect: 45% //85 Position: Sideslape Transect Point ID: land scape some suituce such stone grown ! Transect Point ID: T-2664 - 160609-1525-ME Horizon 3-20 C Section: 15-2 51-13 -7 Date: 6/ BWZ 101896 Depth P (in) (in) 54R2.51 W485/6 16 AK SI MYS 9/8 NO Color Color 4 500 200 Texture Texture Position: V 1-261 269 25 25 75 CoF 6 CoF Redox Redox Redox Redox Color Color T-26A PM: Descr. Descr. PM:Col RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 higher Phone: 717-394-3721 I'm + CF 11 in CF Fax: 717-394-1063 Notes Notes overes d

Date:

RETTEW Associates, Inc.

Soil Scientist:

Steve

Notes: Notes: Slope & Aspect: Transect Point ID: Slope & Aspect: 45/180 Position: Horizon Transect Point ID: Horizon 228 BWZ Rettew Job #: 089962000 BWI P Depth Depth (in) (in) N 2 2 w 4 7,5785/6 75/825 10/R 4/2 Color Color TOYR: X 1-2774-160610-1106 Texture Position: Texture 1 5 paridolip 35 40 CoF CoF 00 13 Redox Redox Color 1 8 PM: Redox Redox Descr. Descr PM: 1 90 1199 legres /res Notes Notes Notes: Notes: Slope & Aspect: Transect Point ID: Slope & Aspect: Transect Point ID: Horizon Horizon Section: Depth Depth (in) (in) Color Color I Texture Position: Texture Position: 27 CoF Cof Redox Redox Color Color Redox Descr. PM: Descr. Redox PM: 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

Dominion ACP - Soil Survey

Soil Transect Log

Soil Scientist: P. Fenster machy

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603

Slope & Aspect: |(gil. 7340 | Position: Shoulder Transect Point ID: 丁- 285A-160406-1233- アピト Rettew Job #: 089962000 7:55 Make 15,501 Color Texture HOI. CoF Redox Redox Color PM: Regi Descr. Clustinas MM Notes Slope & Aspect: Transect Point ID: 1-28 Section: 283-288 Horizon P Date: 6/6/16 BW Depth 0.00 250 アンド (in) 1231.5 DANG 104/21 Color 8 Texture Position: 5:0 CoF Redox Redox Color Descr. PM: Pe Phone: 717-394-3721 Fax: 717-394-1063 Notes

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Rettew Job #: 089962000 Transect Point ID: 1 - 29 Slope & Aspect: 47,200 Pc	62000 29 15 79 Position:	3. S. S. S. S. S. S. S. S. S. S. S. S. S.	+66	PM:	73	Section: \(\bar{V} - 2\epsilon \) Transect Point ID: Slope & Aspect:	7-289 Point ID:	3,00	P-29			PM: RET	RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063
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Date:

RETTEW Associates, Inc. 3020 Columbia Avenue

Lancaster, PA 17603

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Soil Scientist:

Slope & Aspect: Slope & Aspect: 22% Transect Point ID: Transect Point ID: Notes: Horizon Notes: Horizon Rettew Job #: 089962000 0 Depth 20 Depth 0-2 Ē (in) 25 W 00 3 919, #/SUKO! 10YRS/6 101/23/4 Color Color Position: Texture Position: Texture 6 2 0 20% CoF 100 COF 5% 07 5 S. Car Redox B Redox Color Color horizon Redox PM: Descr. PM:C Redox Descr. Notes Notes Slope & Aspect: 4% Transect Point ID: Slope & Aspect: Transect Point ID: T-291A-Notes: SE Horizon Section: Notes: Horizon 137 KE WA 8 > Depth Depth 2-6 6-16 0-15 (in) 1 (in) of orre 729 10725/4 10425/6 1 10/123/2 00 9/SS/KOI 15/23/2 10×25/4 Color Color 180. 292A-294 100 Position: Position: Mondaer GR Texture Texture MOIS 3 SIX Sil 160606-29 Sha V 160606 10% 30% COF CoF 5 200 297 0 500 6 To Redox Redox Redox Color Color 2150 Descr. Redox PM: PM: Descr. SE Saranels Phone: 717-394-3721 Fax: 717-394-1063 3 MUNIN Notes Notes 0

Notes:	Horizon	Slope & Aspect:	Transect Point ID:	Notes:	Bw /	BE 1	A 3	016/6a (Horizon	Slope & Aspect:	Transect Point ID:	Soil Scientist: Wichae Rettew Job #: 089962000
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	Notes								Notes			RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Notes: Slope & Aspect: 32 Slope & Aspect: Transect Point ID: Transect Point ID: 1 Horizon Horizon U 42 5 Rettew Job #: 089 Soil Scientist: Depth Depth 19-10 1-0 19+ 7-7 (in) (in) 10 7 107 KOI 164 107 Color Texture Position: CoF Redox Color Redox Descr. PM: Notes

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Slope & Aspect: Transect Point ID:

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39962000	00					Section:	(,)	301				-p	Lancaster, PA 17603 Phone: 717-394-3721
													Fax: 717-394-1063
7 30	T3011-160603-1350-MEIN	3-13:	W-03	610		Transect Point ID:	Point ID						
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Rettew Job #: 089962000	MAGIL W.	1001				Date: Section:	2/2	307				302 1 PI	3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721
vertew job # : 0055051	000		1430 -	MGIN		Section:		100				P	Phone: 717-394-3721 Fax: 717-394-1063
Transect Point ID: T-307	7A-160602	1	The second			Transect Point ID:	Point ID						
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Soil So	Soil Scientist:	John C	Rok	37.				Date:	6-2-	2016				RETT 302	RETTEW Associates, Inc. 3020 Columbia Avenue
Rettew	/ Job # :	Rettew Job # : 089962000	00					Section:	P-3	000	P-310			₽.	Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063
Transect Point ID:	Point ID	7-30	981606	02	15	SCR		Transect Point ID:	Point ID	D: 7-309	1	160102-	1424	200	
Slope & Aspect: 350	Aspect:	1200	Position: No	Nose s	100	PM: S	115 m Res.	Slope & Aspect: Z	Aspect:	3	ositi	Head	7-31	PM:	ily stone le
Horizon	Depth (in)	Color	Texture	CoF	Redox Color	Redox Descr.	Notes	Horizon	Depth (in)	Color	Texture	CoF	Redox Color	Redox Descr.	Notes
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Slope &	Slope & Aspect:		Position:			PM:		Slope & Aspect:	spect:	*	Position:			PM:	
Horizon	Depth (in)	Color	Texture	CoF	Redox Color	Redox Descr.	Notes	Horizon	Depth (in)	Color	Texture	CoF	Redox Color	Redox Descr.	Notes
Notes:								Notes:							

Notes:	Horizon (i	Slope & Aspect:	Transect Point ID:	Notes: 1		20:	Cr 16-	2	0/10	Horizon (Slope & Aspect:	Rettew Job # : 089962000
	(in)	ect:	nt ID:	in cal		R	20	6	2	(in)	ect: /	b#:0
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	Redox		<u> </u>		2	1	1	1	1	Redox	E	34 75
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X	Redox Color			y solicyn		1	1	1	1	Redox Color	ope	X
	Redox Descr.	PM:		141						Redox Descr.	PM: Sh	302 PI
	Notes									Notes	PM: Stale collemen	3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Date: 6/2/

RETTEW Associates, Inc. 3020 Columbia Avenue

Soil Scientist: Michael Lane

Notes: Slope & Aspect: Lowlying win slide over poorly drained depression Transect Point ID: Slope & Aspect: 82 20° Position Slide Horizon Notes: Grielate to R-013-160510-1505-MPC Transect Point ID: T-3124 160602 -1412 -MEL Horizon W RIE Rettew Job #: 089962000 Depth 10-19 Depth 3-10 10/125/4 CM (in) Ē 107RS/6 CN 162/23/3 See Rachel Hill photo Color Color Texture Texture Position: 17 407 20% 15% COF CoF WYRIOZ munp 10412612 INCP Redox Redox Color Color Redox Redox Descr. PM: PM: Descr. mixed A horidon INVERTE Notes Notes Notes: Slope & Aspect: Transect Point ID: Notes: Horizon Slope & Aspect: Transect Point ID: Horizon Section: P 311 -Depth Depth (in) Œ. Color Color D314 Texture Texture Position: Position: CoF CoF Redox Redox Color Descr. Redox Color Redox Descr. PM: PM: Phone: 717-394-3721 Lancaster, PA 17603 Fax: 717-394-1063 Notes Notes

Date:

RETTEW Associates, Inc.

Soil Scientist: M 1000

Notes: Notes: Slope & Aspect: Slope & Aspect: 55 /39 Position: LINGA Transect Point ID: BW 2 Transect Point ID: 7345A - 166622 Horizon Horizon BE 00 Rettew Job #: 089962000 A Depth Depth 0-1 (in) Ē 4 i 2/2 F 19/62/2 915 MAGI 101/8 Color Color Texture Texture Position: W 120/2 CoF CoF 1920-MGW Redox Redox Redox Over residuum
Color Descr. Notes Descr. Redox PM: Descr. PM: CEICUNION Notes Notes: Notes: Slope & Aspect: Transect Point ID: Slope & Aspect: Transect Point ID: Section: Horizon Horizon Depth Depth (in) (in 0 Color Color Texture Position: Texture Position: CoF CoF Redox Redox Color Color (Redox Redox Descr. Descr. PM: PM: 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063 Notes Notes

RETTEW Associates, Inc. 3020 Columbia Avenue Lancaster, PA 17603 Phone: 717-394-3721 Fax: 717-394-1063

Texture

CoF

Redox

PM: Redox Descr.

Notes

Position:

Slope & Aspect: Notes: Slope & Aspect: Transect Point ID: Transect Point ID: _-Horizon Notes: Horizon BWL Rettew Job #: 089962000 Soil Scientist: D. Janotan Molw Depth Depth (in) (in) Bedrock 75/06/ 16 20 DI 7.5 R614 75186 5-1825 II Color Color ZE 2426 Texture Position: Position: Texture NO.158 99.91 307 CoF CoF 1 3 34-150 Redox Redox Color Color Redox Redox PM: PM: Descr. Descr. 1 かっとするかのべ good with 34743110 BUDGOLH KOU 64 940 1 Notes Notes Slope & Aspect: Section: Slope & Aspect: Transect Point ID: Transect Point ID: Notes: Notes: Horizon Horizon Date: Depth Depth (in) (in) Color Color

Position:

Texture

CoF

Redox

PM: Redox

Notes

Color

Descr.

Attachment 6
ACP Soil Mapping Key

Attachment 6 ACP Order 1 Soil Mapping Key

Parent Material	Slope Class	Drainage Class	Diagnostic Subsurface	Restrictive Layer	•	Family Particle Size
1 - Residuum 2 - Alluvium 3 - Colluvium 4 - Colluvium over Residuum 5 - Colluvium over Alluvium 6 - Human Transported Materials (HTM) 7 - Organic Soil Materials 8 - Alluvium over Colluvium	A - 0-3% B - >3-8% C - >8-15% D - >15-25% E - >25-45%	1 - Very Poorly 2 - Poorly 3 - Somewhat Poorly 4 - Moderately Well 5 - Well 6 - Somewhat Excessively 7 - Excessively	Subsurface A - Argillic B - Fragipan C - Cambic D - Spodic E - None	Type 0 – None 1 – Bedrock 2 – Fragipan	Restrictive Layer 1 - ≤12" 2 - >12-24" 3 - >24-36" 4 - >36-48" 5 - >48"	Class A - Coarse Silty B - Fine Silty C - Coarse Loamy D - Fine Loamy E - Sandy F - Fine G - Very Fine H - Sandy-Skeletal
9 – HTM over Colluvium 10 – Alluvium over Residuum						I – Loamy-Skeletal J – Clayey-Skeletal K – Clayey

Attachment 7 Laboratory Results Summary

Attachment 7
Laboratory Results Summary

					Reccomen	dations			-	% Sat	uration	of CEC				Total				Part	icle Siz	e Analysis
Sample ID	Soil pH	P	K	Mg	Limestone	Mg	Ca	Acidity	CEC	.,			Zn	Cu	s	Volatile	TOC	тос	%	%	 	
		(ppm)	(ppm)	(ppm)	(lb/Ac)	(lb/Ac)	(ppm)	(meq/100g)	(meq/100g)	K	Mg	Са	(ppm)	(ppm)	(ppm)	Solids (%)	(mg/kg)	(%)	Sand	Silt	% Clay	Texture Class
P-003-160620-1025-rll-S1A	4.0	9	107	113	20,000	0	1400	20.7	23.2	1.2	4.1	30.1	3.3	1.2	8.9	53.6	374,000	37.4	N/A	N/A	N/A	N/A
P-003-160620-1025-rll-S2A	3.7	12	74	54	20,000	20	549	21.3	18.4	1.0	2.4	14.9	1.8	0.9	12.0	15.8	100,000	10	33.0	38.8	28.2	Clay Loam
P-003-160620-1025-rll-S3A	4.6	3	34	26	14,000	80	157	15.9	16.1	0.5	1.3	4.9	1.8	1.0	15.6	5.0	8,780	0.878	16.9	42.6	40.5	Silty Clay
P-003-160620-1025-rll-S4A	4.5	3	37	35	12,000	50	120	13.5	14.5	0.7	2.0	4.2	1.1	1.0	9.1	3.4	2,270	0.227	22.8	47.2	29.9	Clay Loam
P-010-160620-1315-mgw-S1A	4.8	8	152	128	9,000	0	832	10.5	16.1	2.4	6.6	25.8	4.2	1.3	7.0	86.3	476,000	47.6	N/A	N/A	N/A	N/A
P-010-160620-1315-mgw-S2A	3.6	17	64	33	18,000	50	225	20.1	16.6	1.0	1.7	6.8	2.8	1.4	10.0	41.4	185,000	18.5	64.3	17.2	18.5	Sandy Loam
P-010-160620-1315-mgw-S3A	4.1	7	46	17	18,000	100	72	19.5	15.6	8.0	0.9	2.3	2.4	1.4	21.4	14.8	67,200	6.72	45.4	25.1	29.5	Sandy Clay Loam
P-010-160620-1315-mgw-S4A	4.7	7	25	11	9,000	110	45	11.1	11.5	0.6	0.8	2.0	2.2	1.0	25.5	8.1	30,500	3.05	42.6	25.0	32.4	Clay Loam
P-010-160620-1315-mgw-S5A	4.7	2	17	8	8,000	110	36	9.9	10.2	0.4	0.7	1.8	1.9	1.1	37.4	5.1	7,200	0.72	43.3	22.9	33.8	Clay Loam
P-010-160620-1315-mgw-S6A	4.7	1	25	9	9,000	110	44	10.5	10.9	0.6	0.7	2.0	1.6	1.1	24.3	4.3	3,280	0.328	43.3	21.0	35.7	Clay Loam
P-010-160620-1315-mgw-S7A	4.6	1	23	9	9,000	110	48	10.5	10.9	0.5	0.7	2.2	1.1	1.1	25.5	5.9	2,360	0.236	41.4	20.7	37.9	Clay Loam
P-010-160620-1315-mgw-S8A	4.6	1	30	14	15,000	100	55	17.1	15.5	0.5	0.8	1.8	1.0	0.9	33.3	5.0	2,810	0.281	23.5	19.8	56.7	Clay
P-012-160620-1115-mgw-S1A	5.1	8	158	113	9,000	0	627	11.1	15.6	2.6	6.0	20.1	3.2	1.2	6.7	96.9	484,000	48.4	N/A	N/A	N/A	N/A
P-012-160620-1115-mgw-S2A	3.9	11	119	56	20,000	20	360	21.3	17.6	1.7	2.7	10.2	3.2	1.1	21.1	18.1	147,000	14.7	54.9	27.3	17.8	Sandy Loam
P-012-160620-1115-mgw-S3A	4.3	16	49	22	15,000	80	107	17.1	15.8	8.0	1.2	3.4	3.4	1.0	28.7	16.4	92,400	9.24	55.9	25.5	18.6	Sandy Loam
P-012-160620-1115-mgw-S4A	4.9	7	18	13	8,000	100	54	9.9	10.3	0.4	1.0	2.6	2.4	1.0	37.6	8.7	49,800	4.98	53.7	31.0	15.3	Sandy Loam
P-012-160620-1115-mgw-S5A	4.9	7	20	10	8,000	110	52	9.3	9.7	0.5	0.9	2.7	2.9	1.1	42.6	6.4	21,600	2.16	49.2	24.6	26.2	Sandy Clay Loam
P-022-160614-1050-jsw-S1A	3.3	7	139	37	24,000	50	51	26.1	15.9	2.2	1.9	1.6	2.7	0.9	12.4	64.6	473,000	47.3	N/A	N/A	N/A	N/A
P-022-160614-1050-jsw-S2A	3.5	18	66	18	23,000	80	51	24.3	15.6	1.1	1.0	1.6	2.2	0.9	6.1	33.3	238,000	23.8	57.5	19.4	23.1	Sandy Clay Loam
P-022-160614-1050-jsw-S3A	4.2	5	18	10	4,000	110	41	5.7	6	0.8	1.4	3.4	1.1	0.7	3.6	1.3	5,540	0.554	79.6	12.2	8.2	Loamy Sand
P-022-160614-1050-jsw-S4A	4.3	21	27	9	9,000	110	28	10.5	10.8	0.6	0.7	1.3	1.3	1.2	18.9	4.1	13,000	1.3	66.8	11.4	21.8	Sandy Clay Loam
P-022-160614-1050-jsw-S5A	4.4	7	37	10	6,000	110	48	8.1	8.5	1.1	1.0	2.8	1.2	1.0	18.7	3.2	2,230	0.223	13.6	59.6	26.8	Silt Loam
P-022-160614-1050-jsw-S6A	4.5	1	59	14	11,000	100	31	12.9	13.3	1.1	0.9	1.2	1.0	1.2	24.3	4.3	710	0.071	22.9	31.1	45.9	Clay
P-022-160614-1050-jsw-S7A	4.4	1	53	16	11,000	100	31	12.3	12.7	1.1	1.0	1.2	0.9	1.3	17.3	6.0	1,110	0.111	8.8	37.2	54.0	Clay
P-040-160615-1119-jcr-S1A	4.5	11	147	63	12,000	0	424	13.5	16.5	2.3	3.2	12.8	3.3	1.0	19.8	38.8	411,000	41.1	N/A	N/A	N/A	N/A
P-040-160615-1119-jcr-S2A	4.0	5	92	31	17,000	60	57	18.9	15.8	1.5	1.6	1.8	2.2	1.0	15.5	10.1	75,700	7.57	35.9	46.0	18.1	Loam
P-040-160615-1119-jcr-S3A	4.8	3	49	13	6,000	100	43	8.1	8.5	1.5	1.3	2.5	2.2	1.2	25.7	3.7	7,880	0.788	18.4	51.4	30.2	Silty Clay Loam
P-040-160615-1119-jcr-S4A	4.6	1	53	18	8,000	80	51	9.9	10.4	1.3	1.4	2.4	1.4	0.9	23.2	3.7	1,790	0.179	29.2	39.0	31.8	Clay Loam
P-040-160615-1119-jcr-S5A	4.7	1	44	23	6,000	80	35	8.1	8.6	1.3	2.2	2.0	1.3	1.1	19.6	2.5	1,400	0.14	19.6	44.0	36.4	Silty Clay Loam
P-045-160614-1019-jcr-S1A	4.4	8	127	54	12,000	20	313	13.5	15.8	2.1	2.8	9.9	2.8	1.1	12.0	49.4	273,000	27.3	N/A	N/A	N/A	N/A
P-045-160614-1019-jcr-S2A	4.5	3	63	33	11,000	50	131	12.3	13.4	1.2	2.1	4.9	1.9	1.1	9.1	9.6	53,700	5.37	32.1	42.7	25.2	Loam
P-045-160614-1019-jcr-S3A	4.9	3	65	34	8,000	50	80	9.9	10.7	1.6	2.6	3.7	1.9	1.2	7.1	3.2	4,230	0.423	24.3	51.2	24.5	Silt Loam
P-045-160614-1019-jcr-S4A	5.3	2	83	122	7,000	0	443	8.7	12.1	1.8	8.4	18.2	1.3	1.2	5.2	3.8	3,480	0.348	27.0	45.4	27.6	Clay Loam
P-063-160614-0950-rll-S1A	6.5	57	151	97	0	0	2,839	3.9	19.3	2.0	4.2	73.6	2.8	1.9	10.6	11.1	49,800	4.98	34.8	41.0	24.2	Loam
P-063-160614-0950-rll-S2A	5.8	2	43	66	3,000	0	1,092	4.5	10.6	1.0	5.2	51.4	1.1	0.9	7.3	3.5	2,470	0.247	21.7	37.6	40.7	Clay
P-063-160614-0950-rll-S3A	4.8	1	75	207	9,000	0	76	10.5	12.8	1.5	13.5	3.0	2.2	1.9	5.6	2.7	1,100	0.11	8.8	48.7	42.4	Silty Clay
P-068-160614-1338-sdd-S1A	6.1	119	139	232	4,000	0	3,230	5.1	22.4	1.6	8.6	67.0	15.8	1.3	17.0	60.3	270,000	27	N/A	N/A	N/A	N/A
P-068-160614-1338-sdd-S2A	5.3	263	67	60	8,000	0	952	9.9	15.3	1.1	3.3	31.0	6.8	1.2	23.1	8.8	62,900	6.29	74.1	16.6	9.3	Sandy Loam
P-068-160614-1338-sdd-S3A	4.8	85	39	23	8,000	80	87	93	10	1.0	1.9	4.3	1.3	0.7	9.6	1.9	2,280	0.228	53.5	25.1	21.4	Sandy Clay Loam
P-068-160614-1338-sdd-S4A	5.2	10	46	44	7,000	30	414	8.7	11.3	1.0	3.3	18.4	1.4	0.9	8.6	2.7	4,200	0.42	37.3	32.7	30.0	Clay Loam
P-069-160614-1158-sdd-S1A	4.9	67	154	127	10,000	0	1,289	11.7	19.6	2.0	5.4	32.9	6.8	1.9	23.6	47.3	123,000	12.3	N/A	N/A	N/A	, N/A
P-069-160614-1158-sdd-S2A	4.2	35	75	27	14,000	80	79	15.9	15.8	1.2	1.4	2.5	2.7	1.9	22.6	11.4	72,000	7.2	48.7	36.0	15.3	Loam
P-069-160614-1158-sdd-S3A	4.6	27	51	21	9,000	80	77	10.5	11.2	1.2	1.6	3.4	3.2	0.8	24.1	5.5	37,600	3.76	40.9	39.0		Loam

Attachment 7
Laboratory Results Summary

			14	D.4.	Reccomen	dations	Ca	۸ ما ماند .	CEC	% Satu	uration o	of CEC				Total				Part	icle Size	Analysis
Sample ID S	Soil pH	(ppm)	K (ppm)	Mg (ppm)	Limestone	Mg	Ca (ppm)	Acidity (meq/100g)	CEC (mea/100g)	к	Mg	Са	Zn	Cu	S	Volatile	тос	TOC	%	%	% Clay	Texture Class
		(PP)	(PP)	(PP)	(lb/Ac)	(lb/Ac)	((9/ = 0.8/	(8		(ppm)	(ppm)	(ppm)	Solids (%)	(mg/kg)	(%)	Sand	Silt	70 Ciay	
P-069-160614-1158-sdd-S4A	4.6	10	27	16	7,000	100	52	8.7	9.2	0.8	1.5	2.8	1.5	0.8	17.6	2.2	1,630	0.163	50.3	31.1	18.6	Loam
P-069-160614-1158-sdd-S5A	4.7	3	39	35	7,000	50	62	8.7	9.4	1.1	3.1	3.3	1.4	0.8	20.3	2.5	1,530	0.153	64.3	22.4	13.2	Sandy Loam
P-077-160617-1035-sdd-S1A	5.1	34	144	188	11,000	0	1,497	12.3	21.7	1.7	7.2	34.5	10.3	1.5	17.1	87.2	194,000	19.4	N/A	N/A	N/A	N/A
P-077-160617-1035-sdd-S2A	4.9	25	60	28	10,000	60	103	11.7	12.6	1.2	1.9	4.1	4.1	1.5	14.1	8.7	68,700	6.87	50.3	32.5	17.1	Loam
P-077-160617-1035-sdd-S3A	5.1	3	38	57	10,000	20	281	11.7	13.7	0.7	3.5	10.3	1.3	1.3	7.4	3.6	6,160	0.616	32.9	37.0	30.2	Clay Loam
P-077-160617-1035-sdd-S4A	5.1	2	48	86	10,000	0	299	11.7	14.0	0.9	5.1	10.6	1.3	1.4	8.6	3.7	5,130	0.513	44.7	33.5	21.9	Loam
P-077-160617-1035-sdd-S5A	4.9	1	63	80	14,000	0	170	15.3	16.7	1.0	4.0	5.1	1.3	1.4	12.6	3.7	1,300	0.13	32.8	34.5	32.7	Clay Loam
P-100-160609-1105-def-S1A	3.8	8	149	101	21,000	0	445	23.1	18.4	2.1	4.6	12.1	3.7	0.9	16.3	93.0	522,000	52.2	N/A	N/A	N/A	N/A
P-100-160609-1105-def-S2A	4.0	7	177	35	18,000	80	59	19.5	16	2.8	1.8	1.8	2.0	0.7	11.6	56.5	292,000	29.2	48.8	38.7	12.5	Loam
P-100-160609-1105-def-S3A	4.8	8	61	16	11,000	100	42	12.9	13.4	1.2	1.0	1.6	3.7	1.0	23.9	12.2	17,000	1.7	25.2	37.8	37.0	Clay Loam
P-121-160616-0950-mgw-S1A	6.0	41	227	207	5,000	0	1,829	6.3	17.8	3.3	9.7	51.5	5.4	1.2	29.2	77.2	362,000	36.2	N/A	N/A	N/A	N/A
P-121-160616-0950-mgw-S2A	4.7	6	142	132	11,000	0	515	12.9	16.9	2.1	6.5	15.2	2.0	0.9	11.1	4.2	33,800	3.38	48.8	33.5	17.7	Loam
P-121-160616-0950-mgw-S3A	5.1	4	90	227	1,000	0	568	12.9	17.9	1.3	10.6	15.9	1.5	1.6	9.3	6.0	18,900	1.89	25.5	43.4	31.0	Clay Loam
P-121-160616-0950-mgw-S4A	4.8	2	74	244	9,000	0	578	10.5	15.6	1.2	13.0	18.5	1.3	1.5	8.1	4.4	13,300	1.33	39.4	34.0	26.6	Loam
P-126-160615-1410-mgw-S1A	5.1	39	161	101	9,000	0	381	11.1	14.3	2.9	5.9	13.4	4.3	0.9	24.3	59.5	322,000	32.2	N/A	N/A	N/A	N/A
P-126-160615-1410-mgw-S2A	4.1	6	92	46	18,000	30	107	20.1	16.2	1.5	2.4	3.3	2.4	0.8	17.3	10.9	106,000	10.6	39.2	38.0	22.7	Loam
P-126-160615-1410-mgw-S3A	4.5	4	49	23	11,000	80	66	12.3	12.9	1.0	1.5	2.5	2.0	0.9	18.0	4.6	14,600	1.46	21.6	51.2	27.2	Clay Loam
P-126-160615-1410-mgw-S4A	4.8	22	35	26	10,000	80	47	11.7	12.2	0.7	1.8	1.9	1.4	0.9	15.1	4.1	7,330	0.733	31.4	41.4	27.1	Clay Loam
P-126-160615-1410-mgw-S5A	4.8	4	49	45	11,000	50	106	12.3	13.3	0.9	2.8	4.0	1.2	0.8	10.9	3.7	3,310	0.331	43.2	32.8	24.1	Loam
P-134-160615-1506-sdd-S1A	3.9	8	107	95	24,000	0	392	26.1	18.0	1.5	4.4	10.9	5.9	1.2	10.8	78.2	388,000	38.8	N/A	N/A	N/A	N/A
P-134-160615-1506-sdd-S2A	4.6	6	112	53	14,000	20	380	15.9	17.6	1.6	2.5	10.8	3.5	1.1	18.6	18.4	113,000	11.3	40.0	34.4	25.6	Loam
P-134-160615-1506-sdd-S3A	4.8	2	76	30	9,000	60	54	11.1	11.8	1.6	2.1	2.3	1.7	0.8	28.4	3.8	5,700	0.57	26.0	40.4	33.6	Clay Loam
P-134-160615-1506-sdd-S4A	4.7	1	67	81	11,000	0	52	12.3	13.4	1.3	5.0	1.9	1.2	0.6	24.8	3.3	1,720	0.172	49.9	23.1	27.0	Sandy Clay Loam
P-134-160615-1506-sdd-S5A	5.0	1	89	100	9,000	0	53	10.5	11.8	1.9	7.0	2.2	1.2	0.8	20.1	3.1	1,650	0.165	55.9	22.5	21.7	Sandy Clay Loam
P-156-160606-1355-dat-S1A	3.7	5	151	62	18,000	0	169	19.5	16.7	2.3	3.1	5.0	2.4	0.7	12.5	80.2	373,000	37.3	N/A	N/A	N/A	N/A
P-156-160606-1355-dat-S2A	4.0	5	54	19	8,000	80	59	9.9	10.5	1.3	1.5	2.8	1.3	0.7	7.5	6.1	42,000	4.2	65.6	23.5	10.9	Sandy Loam
P-156-160606-1355-dat-S3A	5.0	3	29	10	4,000	110	38	5.7	6.0	1.2	1.4	3.1	2.9	0.8	36.0	1.7	2,830	0.283	56.7	22.5	20.8	Sandy Clay Loam
P-156-160606-1355-dat-S4A	4.9	2	30	11	4,000	110	36	5.7	6.0	1.3	1.5	3.0	2.4	0.8	40.4	1.5	1,610	0.161	56.9	21.9	21.2	Sandy Clay Loam
P-157-160606-1512-dat-S1A	4.1	9	151	54	14,000	20	137	15.3	16.5	2.3	2.7	4.1	2.9	0.8	12.7	78.0	355,000	35.5	N/A	N/A	N/A	N/A
P-157-160606-1512-dat-S2A	4.3	5	61	27	12,000	80	93	13.5	14.3	1.1	1.6	3.2	2.0	1.1	15.7	7.9	42,800	4.28	55.5	29.6	14.9	Sandy Loam
P-157-160606-1512-dat-S3A	4.8	4	46	13	6,000	100	35	7.5	7.9	1.5	1.4	2.2	2.4	1.0	26.2	2.9	8,340	0.834	45.6	24.7	29.7	Sandy Clay Loam
P-157-160606-1512-dat-S4A	4.6	2	62	16	7,000	100	40	8.7	9.2	1.7	1.5	2.2	1.4	1.2	33.5	2.6	4,370	0.437	37.6	26.2	36.2	Clay Loam
P-157-160606-1512-dat-S5A	4.7	1	88	28	9,000	60	34	10.5	11.1	2.0	2.1	1.5	1.1	1.8	40.9	3.4	1,540	0.154	12.1	23.3	64.6	Clay
P-157-160606-1512-dat-S6A	4.5	1	84	29	9,000	60	37	11.1	11.7	1.8	2.1	1.6	1.0	1.7	27.0	3.2	2,300	0.23	12.6	25.0	62.4	Clay
P-157-160606-1512-dat-S7A	4.7	1	50	15	8,000	100	45	9.9	10.4	1.2	1.2	2.1	0.9	1.6	18.8	3.9	2,320	0.232	28.4	18.0	53.6	Clay
P-162-160606-1040-jsw-S1A	4.4	9	161	35	15,000	80	214	17.1	16.8	2.5	1.7	6.4	2.8	1.4	15.3	84.2	501,000	50.1	N/A	N/A	N/A	N/A
P-162-160606-1040-jsw-S2A	4.4	4	82	16	14,000	100	32	15.3	15.5	1.4	0.9	1.0	2.1	1.6	20.4	9.5	42,500	4.25	48.8	26.1	25.2	Sandy Clay Loam
P-162-160606-1040-jsw-SA3	4.6	6	72	27	10,000	80	51	11.7	12.4	1.5	1.8	2.1	1.6	1.5	58.8	5.7	12,600	1.26	34.0	25.8	40.2	Clay
P-162-160606-1040-jsw-SA4	4.8	1	59	35	9,000	80	53	10.5	11.2	1.3	2.6	2.4	1.1	1.4	62.2	3.5	1,100	0.11	45.7	19.8	34.5	Sandy Clay Loam
P-162-160606-1040-jsw-SA5	4.6	5	69	30	8,000	60	61	9.9	10.6	1.7	2.4	2.9	1.2	1.4	23.9	3.0	670	0.067	43.5		33.9	Clay Loam
P-170-160620-1122-def-S1A	3.7	5	98	31	17,000	60	209	18.9	16.6	1.5	1.6	6.3	2.7	1.1	7.4	95.8	507,000	50.7	N/A	N/A	N/A	N/A
P-170-160620-1122-def-S2A	3.6	11	100	22	17,000	80	50	18.3	15.7	1.6	1.2	1.6	2.1	1.1	8.4	56.5	264,000	26.4	84.9	9.0	6.2	Loamy Sand
P-170-160620-1122-def-S3A	3.9	7	22	14	9,000	100	40	10.5	10.9	0.5	1.1	1.8	1.3	1.4	6.8	3.2	14,700	1.47	76.6		8.4	Sandy Loam

Attachment 7
Laboratory Results Summary

		_	.,	24-	Reccomen	dations	C-	مانان	656	% Sati	uration	of CEC				Total				Part	icle Size	e Analysis
Sample ID	Soil pH	(ppm)	(nnm)	Mg (ppm)	Limestone	Mg	Ca (nnm)	Acidity (meq/100g)	CEC (meg/100g)	K	Mg	Ca	Zn	Cu	S	Volatile	TOC	тос	%	%	% Clay	Texture Class
		(ррііі)	(ppm)	(ррііі)	(lb/Ac)	(lb/Ac)	(ррііі)	(illeq/ 100g)	(ineq/ 100g)	K	ivig	Ca	(ppm)	(ppm)	(ppm)	Solids (%)	(mg/kg)	(%)	Sand	Silt	70 Clay	Texture Class
P-170-160620-1122-def-S4A	4.4	4	25	11	10,000	110	34	11.7	12.0	0.5	8.0	1.4	1.5	1.3	26.9	4.7	21,300	2.13	67.1	14.3	18.6	Sandy Loam
P-170-160620-1122-def-S5A	4.7	8	26	10	5,000	110	33	6.3	6.6	1.0	1.3	2.5	1.4	1.2	23.1	3.2	3,050	0.305	65.2	13.9	20.9	Sandy Clay Loam
P-170-160620-1122-def-S6A	4.8	6	20	9	4,000	110	32	5.7	6.0	0.9	1.3	2.7	1.2	1.1	22.0	1.7	2,340	0.234	75.5	8.9	15.6	Sandy Loam
P-173-160620-1112-def-S1A	6.7	5	104	128	0	0	2,224	2.2	14.7	1.8	7.3	75.9	3.1	1.5	6.8	76.3	370,000	37	N/A	N/A	N/A	N/A
P-173-160620-1112-def-S2A	5.2	4	88	87	10,000	0	1,332	11.7	19.3	1.2	3.8	34.5	3.6	1.5	12.7	9.0	48,400	4.84	28.6	37.4	34.0	Clay Loam
P-173-160620-1112-def-S3A	5.2	1	75	46	7,000	30	600	8.7	12.3	1.6	3.1	24.5	1.5	1.4	9.8	4.3	8,220	0.822	20.0	40.8	39.2	Silty Clay Loam
P-173-160620-1112-def-S4A	6.5	1	125	147	0	0	3,246	3.9	20.4	1.6	6.0	73.4	1.0	1.5	7.4	5.7	6,020	0.602	5.9	22.3	71.9	Clay
P-176-160621-1155-rll-S1A	5.8	15	161	181	4,000	0	1,844	5.7	16.8	2.5	9.0	54.7	6.9	1.6	10.3	74.7	389,000	38.9	N/A	N/A	N/A	N/A
P-176-160621-1155-rll-S2A	4.9	7	154	74	5,000	0	260	6.9	9.2	4.3	6.7	14.1	3.7	1.0	10.9	12.2	57,700	5.77	62.7	27.2	10.1	Sandy Loam
P-176-160621-1155-rll-S3A	5.6	1	60	63	2,000	0	131	3.4	4.7	3.3	11.1	13.8	1.3	1.3	4.7	1.0	1,080	0.108	65.8	18.2	16.0	Sandy Loam
P-176-160621-1155-rll-S4A	5.2	1	147	150	9,000	0	1,122	11.1	18.3	2.1	6.8	30.6	1.0	1.0	63.4	7.0	2,220	0.222	28.2	11.8	60.0	Clay
P-187-160607-1427-jsw-S1A	4.7	24	175	46	12,000	30	138	14.1	15.6	2.9	2.5	4.4	9.5	1.2	40.1	52.5	311,000	31.1	N/A	N/A	N/A	N/A
P-187-160607-1427-jsw-S2A	4.8	5	103	32	12,000	60	140	13.5	14.7	1.8	1.8	4.7	2.9	1.5	21.2	9.4	60,300	6.03	25.6	38.4	35.9	Clay Loam
P-187-160607-1427-jsw-S3A	4.8	5	64	22	8,000	80	48	9.9	10.5	1.6	1.7	2.3	1.9	1.5	15.8	5.1	14,600	1.46	37.3	39.6	23.1	Loam
P-215-160602-1037-jsw-S1A	3.8	16	148	32	17,000	60	150	18.3	16.4	2.3	1.6	4.6	2.3	1.2	9.6	82.7	505,000	50.5	N/A	N/A	N/A	N/A
P-215-160602-1037-jsw-S2A	3.8	4	49	16	12,000	100	52	13.5	14.0	0.9	1.0	1.9	1.5	1.2	12.3	4.3	35,800	3.58	58.3	22.5	19.3	Sandy Loam
P-215-160602-1037-jsw-S3A	3.8	13	45	13	12,000	100	51	13.5	14.0	0.8	0.8	1.8	1.3	1.1	8.9	6.9	39,900	3.99	64.6	23.5	11.9	Sandy Loam
P-215-160602-1037-jsw-S4A	4.6	5	33	9	6,000	110	30	8.1	8.4	1.0	0.9	1.8	1.5	0.9	28.0	4.2	13,500	1.35	49.0	23.8	27.3	Sandy Clay Loam
P-215-160602-1037-jsw-S5A	4.6	3	34	9	6,000	110	33	8.1	8.4	1.0	0.9	1.9	1.4	1.0	31.7	2.6	3,700	0.37	46.6	24.8	28.6	Sandy Clay Loam
P-215-160602-1037-jsw-S6A	4.3	1	15	8	4,000	110	36	5.7	6.0	0.6	1.1	3.0	0.9	8.0	37.5	1.1	< 500	< 0.05	75.5	9.9	14.6	Sandy Loam
P-222-160607-1055-dat-S1A	3.8	9	79	34	20,000	50	175	20.7	16.4	1.2	1.7	5.3	2.5	1.1	18.5	16.0	183,000	18.3	39.1	43.1	17.7	Loam
P-222-160607-1055-dat-S2A	4.7	4	56	16	7,000	100	66	8.7	9.3	1.5	1.4	3.6	3.2	1.5	18.8	5.4	20,300	2.03	30.0	40.2	29.8	Clay Loam
P-222-160607-1055-dat-S3A	4.7	2	44	14	6,000	100	41	8.1	8.5	1.3	1.4	2.4	1.3	1.1	23.3	4.5	5,660	0.566	33.8	36.8	29.4	Clay Loam
P-222-160607-1055-dat-S4A	4.7	1	55	32	6,000	60	56	8.1	8.8	1.6	3.0	3.2	1.1	1.0	19.6	4.2	2,790	0.279	49.1	28.6	22.3	Loam
P-222-160607-1055-dat-S5A	4.9	1	56	52	6,000	20	70	7.5	8.4	1.7	5.1	4.2	1.3	1.1	14.8	4.2	1,830	0.183	46.2	30.9	22.9	Loam
P-225-160601-1130-mel-S1A	5.0	3	75	60	8,000	0	197	9.9	11.6	1.7	4.3	8.5	1.4	1.4	15.7	8.6	34,100	3.41	23.2	43.1	33.7	Clay Loam
P-225-160601-1130-mel-S2A	5.0	3	52	111	11,000	0	164	12.3	14.2	0.9	6.5	5.8	1.2	1.1	28.1	4.3	3,960	0.396	18.6	33.7	47.6	Clay
P-225-160601-1130-mel-S3A	5.0	2	73	113	8,000	0	164	9.9	11.8	1.6	7.9	6.9	1.1	1.0	11.9	3.7	1,740	0.174	45.7	19.0	35.3	Sandy Clay
P-225-160601-1130-mel-S4A	5.0	1	66	107	11,000	0	145	12.3	14.1	1.2	6.3	5.1	1.1	1.2	24.6	4.4	3,260	0.326	32.9	28.0	39.1	Clay Loam
P-225-160601-1130-mel-S5A	4.8	1	41	105	12,000	0	83	13.5	14.9	0.7	5.9	2.8	1.1	1.1	57.9	4.1	1,910	0.191	12.0	44.2	43.9	Silty Clay
P-225-160601-1130-mel-S6A	4.9	1	37	101	11,000	0	81	12.3	13.6	0.7	6.2	3.0	1.0	1.2	66.7	3.9	2,070	0.207	20.3	43.9	35.8	Clay Loam
P-225A-160601-1130-jcr-S1A	5.1	6	141	197	7,000	0	882	8.7	15.1	2.4	10.9	29.2	40.1	2.1	7.7	10.7	55,300	5.53	41.7	33.4	24.9	Loam
P-225A-160601-1130-jcr-S2A	5.1	3	97	165	7,000	0	277	8.7	11.7	2.1	11.7	11.8	2.4	1.5	7.1	11.2	4,780	0.478	61.8	18.5	19.7	Sandy Loam
P-225A-160601-1130-jcr-S3A	5.4	2	58	167	6,000	0	382	7.5	11.0	1.4	12.7	17.4	1.3	1.3	9.5	4.2	4,040	0.404	48.6	25.1	26.3	Sandy Clay Loam
P-225B-160601-1312-sdd-S1A	4.8	17	99	148	9,000	0	608	10.5	15.0	1.7	8.2	20.2	7.4	1.4	10.5	21.8	140,000	14	40.3	36.5	23.2	Loam
P-225B-160601-1312-sdd-S2A	4.8	3	61	49	8,000	20	65	9.3	10.2	1.5	4.0	3.2	1.9	1.2	13.0	3.4	3,990	0.399	23.8	43.0	33.1	Clay Loam
P-225B-160601-1312-sdd-S3A	4.7	1	50	49	8,000	20	39	9.9	10.6	1.2	3.8	1.8	1.3	1.2	24.1	3.2	2,070	0.207	23.5	41.3	35.2	Clay Loam
P-225B-160601-1312-sdd-S4A	4.9	1	31	68	8,000	0	33	9.3	10.1	0.8	5.6	1.6	1.1	1.1	24.6	2.9	790	0.079	20.7	39.3	40.0	Clay Loam
P-227-160601-1500-jsw-S1A	4.2	7	101	85	21,000	0	664	22.5	19.3	1.3	3.7	17.2	3.5	1.4	7.8	59.1	233,000	23.3	N/A	N/A	N/A	N/A
P-227-160601-1500-jsw-S2A	4.1	8	89	39	20,000	50	103	21.3	16.1	1.4	2.0	3.2	4.2	1.5	14.6	32.5	119,000	11.9	34.3		27.3	Clay Loam
P-227-160601-1500-jsw-S3A	4.6	11	63	27	8,000	80	65	9.9	10.6	1.5	2.1	3.1	2.3	1.2	13.1	5.9	20,000	2	42.4	33.1	24.5	Loam
P-227-160601-1500-jsw-S4A	4.6	21	39	25	9,000	100	64	11.1	11.7	0.9	1.8	2.7	1.5	1.4	11.5	3.7	2,860	0.286	40.1	33.9	26.0	Loam
P-239-160607-1427-def-S1A	4.9	5	112	85	10,000	0	481	11.7	15.1	1.9	4.7	15.9	3.0	1.4	11.1	13.8	70,900	7.09	53.1		16.6	Sandy Loam

Attachment 7
Laboratory Results Summary

		_			Reccomen	dations	_			% Sat	uration	of CEC				Total				Part	icle Size	Analysis
Sample ID	Soil pH	, P	K	Mg 、	Limestone	Mg	, Ca	Acidity	CEC				Zn	Cu	s	Volatile	тос	тос	%	%	l	
1		(ppm)	(ppm)	(ppm)	(lb/Ac)	(lb/Ac)	(ppm)	(meq/100g)	(meq/100g)	K	Mg	Ca	(ppm)	(ppm)	(ppm)	Solids (%)	(mg/kg)	(%)	Sand	Silt	% Clay	Texture Class
P-239-160607-1427-def-S2A	5.0	4	46	101	9,000	0	147	11.1	12.8	0.9	6.6	5.8	1.4	1.4	21.9	4.6	5,050	0.505	45.0	30.8	24.2	Loam
P-239-160607-1427-def-S3A	4.9	6	68	198	5,000	0	174	6.3	9.0	1.9	18.3	9.7	1.5	1.2	11.5	3.9	980	0.098	66.8	15.0	18.2	Sandy Loam
P-239-160607-1427-def-S4A	4.9	7	83	176	11,000	0	134	12.9	15.2	1.4	9.6	4.4	2.0	1.4	12.2	3.8	24,800	2.48	46.3	23.4	30.3	Sandy Clay Loam
P-239A-160607-1430-def-S1A	4.6	14	151	156	13,000	0	602	14.7	19.4	2.0	6.7	15.5	7.5	1.5	30.6	10.6	69,900	6.99	49.9	32.8	17.3	Loam
P-239A-160607-1430-def-S2A	4.8	3	119	61	9,000	0	63	10.5	11.6	2.6	4.4	2.7	2.2	1.5	12.6	4.0	6,120	0.612	38.0	32.4	29.6	Clay Loam
P-239A-160607-1430-def-S3A	4.9	2	104	111	8,000	0	75	9.9	11.5	2.3	8.1	3.3	1.3	1.2	12.4	2.6	2,990	0.299	57.9	18.6	23.6	Sandy Clay Loam
P-239A-160607-1430-def-S4A	5.4	2	93	211	5,000	0	251	6.3	9.6	2.5	18.4	13.2	1.2	1.4	6.7	4.1	4,190	0.419	35.6	32.1	32.3	Clay Loam
P-239A-160607-1430-def-S5A	5.1	2	76	145	5,000	0	130	6.9	9.0	2.2	13.5	7.2	1.2	1.6	7.8	4.3	4,350	0.435	36.5	34.1	29.4	Clay Loam
P-253-160608-0950-mel-S1A	5.6	23	144	134	7,000	0	1,539	8.7	17.9	2.1	6.2	43.0	6.2	1.5	17.4	27.6	273,000	27.3	N/A	N/A	N/A	N/A
P-253-160608-0950-mel-S2A	5.0	11	110	43	9,000	30	277	11.1	13.1	2.1	2.7	10.6	2.2	1.7	15.6	6.7	35,400	3.54	57.1	27.5	15.4	Sandy Loam
P-253-160608-0950-mel-S3A	4.6	3	40	17	8,000	100	49	9.3	9.8	1.0	1.4	2.5	1.2	1.4	17.7	4.1	9,800	0.98	62.4	17.7	19.9	Sandy Loam
P-253-160608-0950-mel-S4A	4.8	15	39	26	7,000	80	50	8.7	9.3	1.1	2.3	2.7	1.3	1.4	11.6	2.8	4,740	0.474	57.6	20.7	21.7	Sandy Clay Loam
P-254-160608-1050-mel-S1A	6.6	23	145	267	0	0	3,605	2.0	19.6	1.9	11.4	76.5	16.3	1.8	20.6	67.8	300,000	30	N/A	N/A	N/A	N/A
P-254-160608-1050-mel-S2A	5.8	17	138	162	5,000	0	1,908	6.9	18.1	2.0	7.4	52.6	9.7	1.5	16.5	8.7	29,400	2.94	45.8	33.2	21.0	Loam
P-254-160608-1050-mel-S3A	4.9	7	85	32	9,000	60	130	11.1	12.2	1.8	2.2	5.3	1.2	1.4	8.9	4.4	10,800	1.08	36.6	38.0	25.5	Loam
P-254-160608-1050-mel-S4A	5.1	19	81	83	8,000	0	359	9.9	12.6	1.6	5.5	14.3	1.2	1.4	7.7	4.4	6,940	0.694	45.0	29.4	25.6	Loam
P-276-160610-0838-jsw-S1A	5.1	4	95	187	8,000	0	943	9.9	16.4	1.5	9.5	28.7	5.1	1.9	10.3	20.8	86,500	8.65	N/A	N/A	N/A	N/A
P-276-160610-0838-jsw-S2A	5.1	4	81	235	7,000	0	648	8.7	14.1	1.5	13.9	23.0	3.0	1.7	9.0	4.5	25,700	2.57	56.3	20.8	22.8	Sandy Clay Loam
P-276-160610-0838-jsw-S3A	5.4	2	48	233	3,000	0	430	4.5	8.7	1.4	22.3	24.7	1.7	1.7	3.9	3.2	7,530	0.753	74.7	11.9	13.4	Sandy Loam
P-276-160610-0838-jsw-S4A	5.6	2	66	290	4,000	0	502	5.1	10.2	1.7	23.7	24.6	1.6	2.0	4.9	4.9	11,000	1.1	61.0	20.9	18.1	Sandy Loam
P-276-160610-0838-jsw-S5A	5.9	2	54	214	2,000	0	414	2.8	6.8	2.0	26.3	30.5	1.0	1.1	2.3	3.1	2,800	0.28	75.6	6.8	17.6	Sandy Loam
P-279-160610-1359-dat-S1A	4.7	7	140	126	13,000	0	557	14.7	18.9	1.9	5.6	14.7	5.1	1.1	15.2	36.3	212,000	21.2	N/A	N/A	N/A	N/A
P-279-160610-1359-dat-S2A	4.4	6	101	85	16,000	0	296	17.7	17.4	1.5	4.1	8.5	2.6	1.4	12.5	17.3	92,400	9.24	50.5	29.1	20.3	Loam
P-279-160610-1359-dat-S3A	4.8	5	104	64	9,000	0	80	11.1	12.3	2.2	4.3	3.3	1.4	1.6	8.5	4.5	19,400	1.94	63.7	19.9	16.4	Sandy Loam
P-279-160610-1359-dat-S4A	4.8	2	72	46	8,000	30	48	9.3	10.1	1.8	3.8	2.4	1.1	1.4	8.2	2.8	3,870	0.387	77.5	10.2	12.2	Sandy Loam
P-279-160610-1359-dat-S5A	5.0	10	80	133	5,000	0	134	6.9	8.9	2.3	12.5	7.5	2.7	4.1	6.9	2.7	2,050	0.205	77.7	10.6	11.7	Sandy Loam
P-279A-160610-1450-def-S1A	4.2	5	74	39	13,000	50	257	14.7	16.5	1.2	2.0	7.8	2.2	1.3	13.6	11.4	83,900	8.39	50.2	33.6	16.2	Loam
P-279A-160610-1450-def-S2A	4.8	2	48	22	6,000	80	61	7.5	8.1	1.5	2.3	3.8	1.4	1.1	7.6	3.2	5,870	0.587	44.1	32.1	23.8	Loam
P-279A-160610-1450-def-S3A	5.1	1	63	71	6,000	0	117	8.1	9.4	1.7	6.3	6.2	1.3	1.1	7.0	3.0	2,880	0.288	61.6	15.3	23.1	Sandy Clay Loam
P-279A-160610-1450-def-S4A	5.0	1	62	152	9,000	0	107	10.5	12.5	1.3	10.2	4.3	1.3	1.3	35.8	3.6	1,040	0.104	45.7	22.2	32.1	Sandy Clay Loam
P-283-160606-0743-def-S1A	4.7	10	149	95	12,000	0	1,071	14.1	20.6	1.9	3.8	26.0	6.5	1.5	9.6	89.8	453,000	45.3	N/A	N/A	N/A	N/A
P-283-160606-0743-def-S2A	4.5	3	40	26	13,000	80	58	14.7	15.3	0.7	1.4	1.9	1.9	1.4	18.8	7.6	35,600	3.56	31.5	44.2	24.2	Loam
P-283-160606-0743-def-S3A	4.7	2	44	30	8,000	60	55	9.3	9.9	1.1	2.5	2.8	1.5	1.3	13.8	3.8	6,890	0.689	44.9	31.0	24.1	Loam
P-283-160606-0743-def-S4A	4.9	1	62	59	8,000	0	75	9.3	10.3	1.5	4.8	3.6	1.1	1.2	13.6	4.2	1,360	0.136	52.7	23.5	23.7	Sandy Clay Loam
P-283-160606-0743-def-S5A	4.7	1	69	109	9,000	0	56	10.5	11.9	1.5	7.7	2.4	1.1	1.0	30.2	4.3	1,030	0.103	50.5	25.7	23.8	Sandy Clay Loam
P-283-160606-0743-def-S6A	5.0	2	67	105	9,000	0	48	10.5	11.8	1.5	7.4	2.0	1.2	1.2	17.1	3.7	1,610	0.161	62.2	16.3	21.5	Sandy Clay Loam
P-286-160606-0808-def-S1A	3.9	7	142	81	22,000	0	372	23.7	17.9	2.0	3.8	10.4	2.6	1.0	10.1	91.1	470,000	47	N/A	N/A	N/A	N/A
P-286-160606-0808-def-S2A	4.8	2	46	12	6,000	110	49	7.5	8.0	1.5	1.3	3.1	1.5	1.0	40.7	3.8	6,910	0.691	32.4	39.7	27.9	Clay Loam
P-286-160606-0808-def-S3A	4.7	1	71	21	9,000	80	55	10.5	11.1	1.6	1.6	2.5	1.0	1.0	49.0	1.8	1,450	0.145	31.8	37.2	31.0	Clay Loam
P-286-160606-0808-def-S4A	4.8	1	69	31	8,000	60	37	9.9	10.5	1.7	2.5	1.8	1.2	1.1	22.4	3.6	1,950	0.195	32.4	37.2	30.5	Clay Loam
P-290-160606-1445-mel-S1A	3.1	5	136	36	30,000	50	236	30.9	16.8	2.1	1.8	7.0	4.0	1.1	11.8	97.1	526,000	52.6	N/A	N/A	N/A	N/A
P-290-160606-1445-mel-S2A	3.5	9	58	20	15,000	80	111	17.1	15.9	0.9	1.1	3.5	2.0	1.1	11.1	8.2	36,800	3.68	40.9	43.5	15.7	Loam
P-290-160606-1445-mel-S3A	4.7	2	40	10	6,000	110	39	7.5	7.9	1.3	1.1	2.4	1.3	1.0	18.2	2.7	7,620	0.762	33.6	41.7	24.6	Loam

Attachment 7
Laboratory Results Summary

			1 /	D4-	Reccomer	dations	Co	A ai alitu.	CEC	% Sat	uration	of CEC				Total				Part	icle Size	Analysis
Sample ID	Soil pH	(ppm)	(ppm)	Mg (ppm)	Limestone (lb/Ac)	Mg (lb/Ac)	Ca (ppm)	Acidity (meq/100g)		К	Mg	Са	Zn (ppm)	Cu (ppm)	S (ppm)	Volatile Solids (%)	TOC (mg/kg)	TOC (%)	% Sand	% Silt	% Clay	Texture Class
P-290-160606-1445-mel-S4A	4.5	1	42	11	7,000	110	44	8.7	9.1	1.2	1.0	2.4	1.0	0.9	23.7	3.4	2,730	0.273	40.0	35.9	24.1	Loam
P-291-160606-1330-mel-S1A	4.3	4	65	33	16,000	50	143	17.7	16.2	1.0	1.7	4.4	1.7	1.1	10.2	11.8	82,800	8.28	35.1	43.5	21.4	Loam
P-291-160606-1330-mel-S2A	4.5	1	37	11	9,000	110	37	11.1	11.5	0.8	0.8	1.6	1.1	1.4	12.3	4.1	10,300	1.03	24.3	40.5	35.2	Clay Loam
P-291-160606-1330-mel-S3A	4.6	3	52	36	14,000	50	95	15.9	15.9	0.8	1.9	3.0	1.8	1.6	20.2	5.5	4,500	0.45	14.8	30.9	54.3	Clay
P-291-160606-1330-mel-S4A	4.7	1	58	41	12,000	50	33	14.1	14.8	1.0	2.3	1.1	1.7	1.7	12.6	3.3	1,260	0.126	27.9	35.3	36.8	Clay Loam
P-293-160606-1056-mel-S1A	4.6	10	175	98	14,000	0	405	15.3	18.3	2.5	4.5	11.1	4.0	0.9	18.2	66.7	333,000	33.3	N/A	N/A	N/A	N/A
P-293-160606-1056-mel-S2A	3.9	6	100	33	12,000	50	54	14.1	14.9	1.7	1.8	1.8	2.1	0.9	12.4	11.5	57,100	5.71	5.5	42.0	52.4	Silty Clay
P-293-160606-1056-mel-S3A	4.7	2	27	12	6,000	110	42	8.1	8.5	0.8	1.2	2.5	1.4	0.9	12.0	4.0	9,790	0.979	61.8	28.1	10.1	Sandy Loam
P-293-160606-1056-mel-S4A	4.7	2	27	11	6,000	110	35	8.1	8.4	0.8	1.1	2.1	1.5	1.0	15.0	3.7	5,700	0.57	48.7	26.0	25.3	Sandy Clay Loam
P-293-160606-1056-mel-S5A	4.7	1	26	29	9,000	60	40	10.5	11.0	0.6	2.2	1.8	1.3	1.0	24.9	2.5	3,740	0.374	60.1	16.9	23.0	Sandy Clay Loam
P-347-160621-1409-def-S1A	4.2	8	133	131	18,000	0	378	19.5	18.3	1.9	6.0	10.3	4.6	1.5	13.2	17.9	198,000	19.8	59.2	18.4	22.4	Sandy Clay Loam
P-347-160621-1409-def-S2A	4.7	5	63	37	11,000	50	48	12.3	13.0	1.2	2.4	1.9	2.3	1.9	15.9	6.1	14,100	1.41	50.9	19.8	29.3	Sandy Clay Loam
P-352-160621-1145-def-S1A	5.0	13	155	189	12,000	0	1,217	13.5	21.6	1.8	7.3	28.2	8.9	1.7	17.7	66.8	324,000	32.4	N/A	N/A	N/A	N/A
P-352-160621-1145-def-S2A	5.0	6	94	152	9,000	0	631	11.1	15.8	1.5	8.0	20.0	2.0	1.5	11.6	10.7	54,800	5.48	37.3	31.8	30.9	Clay Loam
P-352-160621-1145-def-S3A	5.2	4	66	131	9,000	0	262	11.1	13.7	1.2	8.0	9.6	1.5	2.2	9.6	5.5	17,600	1.76	20.6	32.7	46.8	Clay
P-352-160621-1145-def-S4A	5.4	3	98	216	8,000	0	280	9.9	13.3	1.9	13.5	10.5	1.4	2.3	8.3	4.9	15,700	1.57	26.4	29.5	44.1	Clay
P-352-160621-1145-def-S5A	5.3	2	117	276	5,000	0	278	6.3	10.3	2.9	22.3	13.5	1.1	1.8	6.3	10.8	5,570	0.557	48.4	11.5	40.1	Sandy Clay
P-352-160621-1145-def-S6A	5.3	1	112	260	6,000	0	262	8.1	11.9	2.4	18.3	11.0	1.0	2.0	7.5	5.8	6,060	0.606	36.7	21.6	41.7	Clay

Attachment 8 AASLAB Nutrient Analysis Results



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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		AI	DITIONA	AL COPY TO:	
RE 302	N FENSTERM TTEW ASSOC 20 COLUMBIA NCASTER PA	ATES INC AVE			RE7 302	ANE TRUAX ITEW ASSOCIATES 0 COLUMBIA AVE NCASTER PA 17603	
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL
7/7/2016	S16-32384		Lancaster			P-003-160620-1025-rll-S1A	A
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m Above	Optimum
¹ Soil pH	4.0						
¹ Soil pH ² Phosphorus		ppm					
_	s (P) 9	ppm ppm					
² Phosphorus	s (P) 9 K) 107						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 20000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:					Optional T	ests:	² Trace	Elemen	ts		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm			
1400	20.7	23.2	1.2	4.1	30.1				3.3	1.2	8.9		
Test Method	Test Methods: 1:1 soil:water pH. 2Mehlich 3 (ICP). 3Mehlich Buffer pH. 4Summation of Cations												

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Recommendation Messages

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops-Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

Nitrogen Ritrogen recommendations on this report are not based on a soil test. They are based on crop requirements for the expected yield of the crop to be grown. The pre-sidedress nitrate soil tests (PSNT) and the Chlorophyll meter test are both available for improving nitrogen recommendations on corn especially when manure is being applied. See: Agronomy Facts 17 "Pre-sidedress Soil Nitrate Test for Corn" and Agronomy Facts 53 "The Early-season Chlorophyll Meter Test for Corn". For optimum efficiency, N should be applied as close to the time of crop need as practical. For corn apply 50-90% of the N when the corn is 10-20" tall. For winter grains apply the N in the spring prior to growth stage 5. For forage grasses split the recommended N for each cutting.

<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Z	n, Cu and S in Pennsylvani	a Soils (Mehlich 3)
Zn (ppm)	Cu (ppm)	S (ppm)
1.1 - 9.4	1.2 - 5.5	10 - 25

<u>Distribution of Soil Test Results</u> Summaries of soil test results may be used in educational programs. However, individual results will not be released outside of Penn State without permission of the client. Electronic copies of your results are available to you, contact the lab for more information.

For additional information on these topics please see the current **Penn State Agronomy Guide** or the **AASL website**: www.aasl.psu.edu. This soil test is part of an ongoing research and extension program of Penn State. If you have any questions or comments about this program or would like copies of publications referenced here, please contact your Penn State County Extension agent.



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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:				
DA	N FENSTERM	IACHER			DU	ANE 7	ΓRUAX				
RE	TTEW ASSOC	IATES INC			RE	TTEW	ASSOCIATES				
302	20 COLUMBIA	AVE			302	20 COL	UMBIA AVE				
LA	NCASTER PA	17603			LA	NCAS'	ΓER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID]	FIELD ID	SOIL			
7/7/2016	S16-32385		Lancaster			P-003-1	.60620-1025-rll-S2A				
SOIL NUTE	RIENT LEVEL	Below Opti	mum	Optimu	m	Above C)ptimum				
¹ Soil pH	3.7										
² Phosphorus	s (P) 12	ppm									
² Potassium (K) 74	ppm									
² Magnesium	(Mg) 54	ppm									
RECOMME	RECOMMENDATIONS: (See back messages for important information)										
I imestone	*• 20000 lb/A	A for a target	pH of 6.5.	ľ	Magnesiı	ım (M	Ig): 20 lb/A				

*Calcium Carbonate equivalent

Limestone containing .1% Mg (.2 % MgO) will satisfy the magnesium requirement

Plant N	cordingly. See ba	ck of report.)				
Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:				Optional Tests:		² Trace Elements						
² Calcium (ppm) 549	³ Acidity (meq/100 g) 21.3	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 2.4	the CEC Ca 14.9	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 1.8	ck for com Copper ppm 0.9	Sulfur ppm 12.0	
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Recommendation Messages

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)				
1.1 - 9.4	1.2 - 5.5	10 - 25				

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For additional information on these topics please see the current **Penn State Agronomy Guide** or the **AASL website**: www.aasl.psu.edu. This soil test is part of an ongoing research and extension program of Penn State. If you have any questions or comments about this program or would like copies of publications referenced here, please contact your Penn State County Extension agent.



Year

1 Other

(814) 863-0841

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SOIL TES	T REPORT FO	R:		AI	DITION	AL COPY TO:		
	N FENSTERM TTEW ASSOCI			DUANE TRUAX RETTEW ASSOCIATES				
	20 COLUMBIA NCASTER PA			3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SO	OIL
7/7/2016	S16-32386		Lancaster			P-003-160620-1025-	-rll-S3A	
SOIL NUTE	RIENT LEVEL	S	Below Opti	imum	Optimum Above Optimum			
¹Soil pH	4.6							
² Phosphorus	s (P) 3	ppm						
Potassium (K) 34	ppm						
Magnesium	(Mg) 26	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)			
Limestone [:]	*: 14000 lb/A	A for a target	pH of 6.5.	Magnesium (Mg): 80 lb/A				
Calcium Carbo	nate equivalent				Limestone	containing .6% Mg	(.9 % MgO) w	ill satisfy the

magnesium requirement

recommendations

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
-----------	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 15.9	⁴ CEC (meq/100 g)	K 0.5	Mg 1.3	the CEC Ca 4.9	Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.8	Ck for come Copper ppm 1.0	Sulfur ppm 15.6	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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Zn (ppm) Cu (ppm) S (ppm)										
1.1 - 9.4	1.2 - 5.5	10 - 25								

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SOIL TES	T REPORT FO)R:		AI	DDITION	AL COPY TO:			
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COLUMBIA AVE	E		
LA	NCASTER PA	17603			LA	NCASTER PA 1760)3		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32387		Lancaster			P-003-160620-1025-rll	I-S4A		
SOIL NUTI	RIENT LEVEL	S	Below Opti	mum	Optimu	ove Optimum			
¹ Soil pH	4.5								
Phosphorus	s (P) 3	ppm							
Potassium (K) 37	ppm							
Magnesium	(Mg) 35	ppm							
RECOMME	NDATIONS:	(See bac	ck messages for importa	nt informatio	on)				

Limestone*: 12000 lb/A for a target pH of 6.5.

*Calcium Carbonate equivalent

Magnesium (Mg): 50 lb/A

Limestone containing .4% Mg (.7 % MgO) will satisfy the

magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	К	Mg	the CEC Ca	Organic Matter %	Nitrate-N ppm	mmhos/am		See back for comments Zinc Copper Sulfur ppm ppm		
120 13.5 14.5 0.7 2.0 4.2 1.1 1.0 9.1 Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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SOIL TES	T REPO	ORT FOI	R:			Al	DDITION	AL CO	OPY TO:		
DA	N FEN	ISTERM <i>A</i>	ACHER			DUANE TRUAX					
RE	TTEW.	ASSOCIA	ATES INC			RETTEW ASSOCIATES					
302	20 COL	UMBIA A	AVE				302	O COL	LUMBIA AVE		
LA	NCAST	ΓER PA 1	17603				LA	NCAS	TER PA 17603		
DATE	LAI	R #	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32				ancaster				-160620-1115-mgw- S1A	W V ==	
SOIL NUTI	RIENT	LEVELS	, <u> </u>		Below Opti			Above C	ptimum		
¹Soil pH		5.1									
² Phosphorus	s (P)	8	ppm								
² Potassium (K)	158	ppm								
² Magnesium	(Mg)	113	ppm								
RECOMME	NDATI	IONS:	(See bac	ck messe	ages for importa	nt informati	on)				

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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² Calcium (ppm)	³ Acidity (meq/100 g)	(meq/100 g)	К	% Saturation of the CEC K Mg Ca			Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm		
627 11.1 15.6 2.6 6.0 20.1 3.2 1.2 6.7 Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	T REPORT FO	OR:		ADDITIONAL COPY TO:						
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD	ID	SOIL		
7/7/2016	S16-32389		Lancaster			P-012-160620-1115-mgw- S2A				
SOIL NUTRIENT LEVELS		S	Below Opti	imum	num Optimum		Above Optimum			
¹Soil pH	3.9									
² Phosphorus	s (P) 11	ppm								
² Potassium (K) 119	ppm								
² Magnesium	(Mg) 56	ppm								
magnesium	, 0,			RECOMMENDATIONS: (See back messages for important information)						
Li Company	NDATIONS:	(See ba	ck messages for importa	nt informati	on)					

Limestone*: 20000 lb/A for a target pH of 6.5.

Magnesium (Mg): 20 lb/A

*Calcium Carbonate equivalent

Limestone containing .1% Mg (.2 % MgO) will satisfy the magnesium requirement

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. Se							ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur		
360	21.3	21.3 17.6 1.7 2.7 10.2 %									
Test Methoda	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations										

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops-Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)							
Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25					

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-012-160620-1115-mgw-7/7/2016 S16-32390 Lancaster S3A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.3 ¹Soil pH ²Phosphorus (P) 16 ppm 49 ²Potassium (K) ppm 22 ppm ²Magnesium (Mg)

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 15000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .5% Mg (.9 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 1 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com	Sulfur	
107 17.1 15.8 0.8 1.2 3.4 %												
Test Method	est Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)										
Zn (ppm) Cu (ppm) S (ppm)										
1.1 - 9.4	10.25									

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SOIL TES	T REPORT FO	R:		Al	DDITION	AL COP	Y TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COLU	MBIA AVE		
LA	NCASTER PA	17603			LA	NCASTI	ER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FI	ELD ID	SOIL	
7/7/2016	S16-32391		Lancaster			P-012-16	60620-1115-mgw-		
							S4A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimum Abov			ptimum	
¹ Soil pH	4.9								
² Phosphorus	s (P) 7	ppm							
² Potassium (K) 18	ppm							
² Magnesium	(Mg) 13	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)				
Limestone [:]	*: 8000 lb/A	for a target p	H of 6.5.	I	Magnesiu	ım (Mg	g): 100 lb/A		
*Calcium Carbo	nate equivalent				Limestone	containir	ng 1.3% Mg (2 % M	IgO) will satisfy the	
					magnesiur		-	<i>5</i> ,	
Dlant Muts	rianta. (It	f manure will he	annlied adjust the	se recom	mendation	s accord	ingly See hack o	f report)	

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)

Expected Nitrogen **Phosphate Potash** Year Crop Yield (lb P₂O₅/A) (lb N/A) $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 for other crop}{recommendations}$

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 0.4	ration of Mg 1.0	the CEC Ca 2.6	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.4	ck for com Copper ppm 1.0		
Test Method	s: ¹ 1:1 soil:wate	er pH. ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH. ⁴ Sumr	nation of Cat	ions				

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm) Cu (ppm) S (ppm)										
1.1 - 9.4	10.25									

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RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.4% Mg (2.2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba	ck for com		
(ppiii)	(meq/100 g)	(meq/100 g)	17	Wig	Ca	%			ppm	ppm	ppm	
52	9.3	9.7	0.5	0.9	2.7				2.9	1.1	42.6	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		Al	DDITION	AL COPY	TO:					
DA	N FENSTERM	IACHER		DUANE TRUAX								
RE	TTEW ASSOC	IATES INC			RE'	TTEW ASS	SOCIATES					
302	20 COLUMBIA	AVE			302	0 COLUM	BIA AVE					
LA	NCASTER PA	17603			LA	NCASTER	PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIEI	LD ID	SOIL				
7/7/2016	S16-32393		Lancaster			P-022-160	614-1050-jsw-					
							S1A					
SOIL NUTI	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimum Above Optimum)ptimum				
¹ Soil pH	3.3											
² Phosphorus	s (P) 7	ppm										
² Potassium (K) 139	ppm										
² Magnesium	Magnesium (Mg) 37 ppm											
RECOMME	NDATIONS:	(See bac	ck messages for importa	nt informati	on)							
	. 24000 1b/	ECOMMENDATIONS: (See back messages for important information) limestone*: 24000 lb/A for a target pH of 6.5. Magnesium (Mg): 50 lb/A										

*Calcium Carbonate equivalent

Limestone containing .2% Mg (.3 % MgO) will satisfy the magnesium requirement

Plant Nu	itrients:	(If manure w	e will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:					Optional T	ests:	² Trace	Elemen	its	
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bad Zinc ppm	ck for com Copper ppm		
51	26.1	15.9	2.2	1.9	1.6				2.7	0.9	12.4	
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP). ³ Mehli	ch Buffer	pH. ⁴ Sumr	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops-Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

Nitrogen Ritrogen recommendations on this report are not based on a soil test. They are based on crop requirements for the expected yield of the crop to be grown. The pre-sidedress nitrate soil tests (PSNT) and the Chlorophyll meter test are both available for improving nitrogen recommendations on corn especially when manure is being applied. See: Agronomy Facts 17 "Pre-sidedress Soil Nitrate Test for Corn" and Agronomy Facts 53 "The Early-season Chlorophyll Meter Test for Corn". For optimum efficiency, N should be applied as close to the time of crop need as practical. For corn apply 50-90% of the N when the corn is 10-20" tall. For winter grains apply the N in the spring prior to growth stage 5. For forage grasses split the recommended N for each cutting.

<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Z	n, Cu and S in Pennsylvani	a Soils (Mehlich 3)
Zn (ppm)	Cu (ppm)	S (ppm)
1.1 - 9.4	1.2 - 5.5	10 - 25

<u>Distribution of Soil Test Results</u> Summaries of soil test results may be used in educational programs. However, individual results will not be released outside of Penn State without permission of the client. Electronic copies of your results are available to you, contact the lab for more information.



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SOIL TES	T REPORT FO	R:		AΙ	DITIONA	AL CO	PY TO:	
DA	N FENSTERM	IACHER			DU	ANE 7	ΓRUAX	
RE	TTEW ASSOCI	IATES INC					ASSOCIATES	
	20 COLUMBIA						UMBIA AVE	
LA	NCASTER PA	17603			LA	NCAS.	TER PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID]	FIELD ID	SOIL
7/7/2016	S16-32394		Lancaster			P-022	-160614-1050-jsw-	
							S2A	
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m	Above C	Optimum
¹ Soil pH	3.5							
² Phosphorus	(P) 18	ppm						
² Potassium (K) 66	ppm						
² Magnesium	(Mg) 18	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)			
Limestone ³	*: 23000 lb/A	A for a target	pH of 6.5.	N	Aagnesiu	ım (M	Ig): 80 lb/A	
*Calcium Carbo	nate equivalent				Limestone	contair	ning .3% Mg (.6 % M	(gO) will satisfy the

magnesium requirement

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other 0 0	O See ST2 for other crop recommendations
--------------------	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:					Optional T	ests:	² Trace	Elemen	ts	
² Calcium (ppm)	³ Acidity (meq/100 g) 24.3	⁴ CEC (meq/100 g)	% Satu K 1.1	ration of Mg 1.0	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.2	ck for com Copper ppm 0.9	Sulfur ppm 6.1	
Test Methods	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Z	n, Cu and S in Pennsylvani	a Soils (Mehlich 3)
Zn (ppm)	Cu (ppm)	S (ppm)
1.1 - 9.4	1.2 - 5.5	10 - 25

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SOIL TES	T REPORT FO	OR:		AI	DITIONA	L CO	PY TO:		
DA	N FENSTERM	IACHER			DU.	ANE '	TRUAX		
RE	TTEW ASSOC	IATES INC			RE	ΓTEW	ASSOCIATES		
302	20 COLUMBIA	AVE			302	0 COL	UMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS'	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32395		Lancaster			P-022	-160614-1050-jsw-		
SOIL NUTI	RIENT LEVEL	S	Below Opti	imum	Optimu	n	S3A Above ()ptimum	
¹ Soil pH	4.2								
² Phosphorus	s (P) 5	ppm							
² Potassium (K) 18	ppm							
² Magnesium	(Mg) 10	ppm							
		(San has	ok massagas for importa	nt informati	om)				

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 2.8% Mg (4.4 % MgO) will satisfy

the magnesium requirement

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	ccordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
41	5.7	6.0	0.8	1.4	3.4				1.1	0.7	3.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25						

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SOIL TEST	T REPORT FO	R:		Al	DDITIONA	L COPY T	O:			
RE' 302	N FENSTERM ITEW ASSOC O COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELI) ID	SOIL		
7/7/2016	S16-32396		Lancaster				14-1050-jsw- 4A			
SOIL NUTR	RIENT LEVEL	S	Below Opt	imum	Optimu	m	Above C)ptimum		
¹ Soil pH	4.3									
² Phosphorus (P) 21 ppm										
² Potassium ()		ppm								

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.2% Mg (2 % MgO) will satisfy the

magnesium requirement
(If manure will be applied, adjust these recommendations accordingly. See back of report.)

Plant Nu	itrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year Crop			Expected Nitrogen Yield (lb N/A)		Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other			0	0	0	0	See ST2 for other crop recommendations					

No crop was specified. Therefore no recommendation is given.

ppm

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
28	10.5	10.8	0.6	0.7	1.3	70			1.3	1.2	18.9	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

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Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-022-160614-1050-jsw-7/7/2016 S16-32397 Lancaster S5A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.4 ¹Soil pH ²Phosphorus (P) 7 ppm 37 ppm

RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

10

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.8% Mg (2.9 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 1 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

See ST2 for other crop 0 0 0 2 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 3 Other 0 0 0 0 recommendations

ADDITION	ADDITIONAL RESULTS:						Optional To	² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g) 8.1	⁴ CEC (meq/100 g) 8.5	% Satu K 1.1	Mg 1.0	the CEC Ca 2.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.2	Copper ppm 1.0		
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	ATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID FIELD ID SOI						
7/7/2016	S16-32398		Lancaster			P-022-160	0614-1050-jsw- S6A			
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	n Optimum		Above Optimum			
¹ Soil pH	4.5									
² Phosphorus (P) 1 ppm										
² Potassium (ppm								

RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

14

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing .9% Mg (1.5 % MgO) will satisfy the magnesium requirement

Plant Nu	itrients:	(If manure wil	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop]	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

ppm

ppm

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See ba	ck for com	ments	
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper		
						%			ppm	ppm	ppm	
31	12.9	13.3	1.1	0.9	1.2				1.0	1.2	24.3	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL COPY TO:			
DA	N FENSTERM	IACHER			DU	ANE TRUAX			
RE	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COLUMBIA AVE			
	NCASTER PA				LA	NCASTER PA 17603			
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32399		Lancaster			P-022-160614-1050-jsw- S7A			
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m Above	Optimum		
Soil pH	4.4								
Phosphorus	s (P) 1	ppm							
Potassium (K) 53	ppm							
Magnesium	(Mg) 16	ppm							
RECOMME	NDATIONS:	(See ba	ack messages for importa	nt informatio	on)				
Limestone	*: 11000 lb/A	A for a target	pH of 6.5.	N	Magnesiu	Im (Mg): 100 lb/A			
Calcium Carbo	nate equivalent					containing .9% Mg (1.5 % n requirement	MgO) will satisfy the		
Plant Nuti	rients: (If	f manure will be	e applied, adjust the	se recom	mendation	s accordingly. See back o	of report.)		
Year (Cron	Ex	pected Nitrogen	ı P	hosphate	Potash			

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 for other crop}{recommendations}$

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
31	12.3	12.7	1.1	1.0	1.2				0.9	1.3	17.3	
Test Method	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT F	OR:		AI	DDITION	AL CO	OPY TO:	
DA	N FENSTER	MACHER		DUANE TRUAX				
RE	TTEW ASSOC	CIATES INC			RE'	TTEW	ASSOCIATES	
302	20 COLUMBIA	AVE			302	O COI	LUMBIA AVE	
LA	NCASTER PA	A 17603			LA	NCAS	TER PA 17603	
DATE LAR# SERIAL# COUNTY			ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32400		Lancaster			P-04	0-160615-1119-jcr-	
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				<u> </u>			S1A	
SOIL NUTI	RIENT LEVE	LS	Below Opti	imum	Optimu	m	Above C	Optimum
¹Soil pH	4.5							
² Phosphorus	s (P) 11	ppm						
² Potassium (K) 147		ppm						
² Magnesium (Mg) 63 ppm								
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)			

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	:	Optional Tests:			² Trace Elements							
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K				Nitrate-N ppm	See back for comments Zinc Copper Sulfur ppm ppm ppm				
424	13.5	16.5	2.3	3.2	12.8				3.3	1.0	19.8	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-040-160615-1119-jcr-7/7/2016 S16-32401 Lancaster S2A SOIL NUTRIENT LEVELS **Above Optimum Below Optimum Optimum** 4.0 ¹Soil pH ²Phosphorus (P) 5 ppm

RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 17000 lb/A for a target pH of 6.5.

92

31

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Plant Nutrients:

Limestone containing .4% Mg (.6 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.)

Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

ppm

ppm

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:	Optional Tests:			² Trace Elements						
² Calcium	³ Acidity	⁴ CEC		Saturation of the CEC C			Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper, Sulfur			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm		ppm	ppm	ppm	
57	18.9	15.8	1.5	1.6	1.8				2.2	1.0	15.5	
Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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SOIL TES	T REP	ORT FO	R:			Al	DDITION	AL CO	OPY TO:			
DA	N FEN	NSTERM	ACHER			DUANE TRUAX						
RE	TTEW	ASSOCI	ATES INC			RETTEW ASSOCIATES						
302	20 COL	UMBIA .	AVE				302	0 COI	LUMBIA AVE			
LA	NCAS'	TER PA	17603				LA	NCAS	TER PA 17603			
DATE	T A	B#	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
			SERIAL #			ACKES	ASCSID		0-160615-1119-jcr-	SOIL		
7/7/2016 S16-32402				Lancaster				S3A				
SOIL NUTRIENT LEVELS					Below Opti	mum Optimum			Above Optimum			
¹Soil pH		4.8										
² Phosphorus	s (P)	3	ppm									
Potassium (K)	49	ppm									
Magnesium	(Mg)	13	ppm									
PECOMME	NIDAT	TONG.	(See ba	ck messe	ages for importai	nt informati	on)					

*Calcium Carbonate equivalent

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 100 lb/A

Limestone containing 1.7% Mg (2.7 % MgO) will satisfy

the magnesium requirement

Plant Nu	itrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other			0	0	0	0	See ST2 for other crop recommendations					

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K				Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
43 Test Methods	8.1 s: ¹ 1:1 soil:wate	8.5	1.5 3 (ICP)	1.3	2.5 ch Buffer	pH. ⁴ Sumn	nation of Cat	ions	2.2	1.2	25.7	
Test Methods	s: ¹1:1 soil:wate	er pH, Mehlich	3 (ICP)), Mehli	ch Buffer	pH, Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	DR:		ADDITIONAL COPY TO:						
DAN FENSTERMACHER RETTEW ASSOCIATES INC					DUANE TRUAX RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COL	UMBIA AVE			
LA	NCASTER PA	17603			LA	NCAS'	TER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32403		Lancaster			P-040)-160615-1119-jcr- S4A			
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above C	Optimum		
Soil pH	4.6									
Phosphorus	(P) 1	ppm								
Potassium (K) 53	ppm								
Magnesium	(Mg) 18	ppm								
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)					
Limestone ³	*: 8000 lb/A	for a target p	H of 6.5.	N	Aagnesiu	ım (M	Ig): 80 lb/A			
Calcium Carbo	nate equivalent				Limestone magnesium		ning 1% Mg (1.6 % M	IgO) will satisfy the		

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Phosphate Expected** Nitrogen **Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ (lb K₂O/A) See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
51 Tast Mathod	1 9.9 10.4 1.3 1.4 2.4 1.4 0.9 23.2 Methods: \(^{1}1:1\) soil: water pH, \(^{2}\)Mehlich 3 (ICP), \(^{3}\)Mehlich Buffer pH, \(^{4}\)Summation of Cations											
1est Methods: 1:1 soil:water pH, Mennich 3 (ICP), Mennich Butter pH, Summation of Cations												

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SOIL NUTRIENT LEVELS

Below Optimum
Optimum
Above Optimum

Phosphorus (P) 1 ppm
Potassium (K) 44 ppm
Magnesium (Mg) 23 ppm

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Plant Nutrients:

Limestone containing 1.3% Mg (2.1 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.)

Expected Nitrogen Phosphate Potash

Year	Crop	Yield	(lb N/A)	(lb P ₂ O ₅ /A)	(lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.3	ration of Mg 2.2	Cthe CEC Ca 2.0	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 1 1	~	
Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO		ADDITIONAL COPY TO:						
RE 302	IACHER IATES INC AVE 17603		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE LAR#		SERIAL#	C	OUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016 S16-32405			Lancaster			P-063-160614-0950-1			
SOIL NUTRIENT LEVELS		S		Below Opti	mum	Optimu	m	Above C	Optimum
¹ Soil pH 6.5									
² Phosphorus (P) 57		ppm							
² Potassium (K) 151		ppm							
² Magnesium (Mg) 97		ppm							
RECOMME	NDATIONS:	(See ba	ck messa _¿	ges for importa	nt informati	on)			

Limestone*: NONE

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS: Optional Tests: ² Trace Elements								
² Calcium	Calcium ³ Acidity ⁴ CEC ⁹ Saturation of the CEC Organic Nitrate-N Salts ^{See back for comments}								
(ppm)	Motter mmhos/cm Zinc Conner Sulfur								
(ppin)	ppm ppm ppm ppm ppm								
2839 3.9 19.3 2.0 4.2 73.6 2.8 1.9 10.6									
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations									

Enclosures

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SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC			RE'	TTEW ASSOCIATES			
302	20 COLUMBIA	AVE			302	0 COLUMBIA AVE			
LANCASTER PA 17603					LA	NCASTER PA 17603			
DATE LAB# SERIAL# COUNTY				ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016 S16-32406 Lancaster						P-063-160614-0950-rll-S2	Λ		
SOIL NUTRIENT LEVELS		S	Below Opti	mum	Optimu	m Above	Optimum		
¹ Soil pH 5.8									
² Phosphorus (P) 2		ppm							
² Potassium (K) 43		ppm							
² Magnesium (Mg) 66 ppm									

Limestone*: 3000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 5.2	the CEC Ca 51.4	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 0.9		
Test Methods	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT F	OR:		ADDITIONAL COPY TO:				
DA	N FENSTER	MACHER		DUANE TRUAX				
RE'	TTEW ASSOC	CIATES INC				TTEW ASSOCIATES		
	20 COLUMBIA					0 COLUMBIA AVE		
LA	NCASTER PA	A 17603			LA.	NCASTER PA 17603		
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL	
7/7/2016	7/7/2016 S16-32407 Lancaster		Lancaster	P-063-160614-0950-rll-S3A				
SOIL NUTR	RIENT LEVE	LS	Below Opti	imum	Optimu	m Abov	e Optimum	
SOIL NUTR ¹ Soil pH	RIENT LEVE	LS	Below Opti	imum	Optimu	m Abov	e Optimum	
	4.8	LS	Below Opti	imum	Optimu	m Abov	e Optimum	
¹Soil pH	4.8 (P) 1		Below Opti	imum	Optimu	m Abov	e Optimum	
¹ Soil pH ² Phosphorus	4.8 s(P) 1 K) 75	ppm	Below Opti	imum	Optimu	m Abov	e Optimum	

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
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|--|

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---------	---	---	---	---	--

ADDITION	AL RESULTS	:					Optional Tests:				² Trace Elements		
² Calcium	³ Acidity	⁴CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts mmhos/cm	See back for comments Zinc Copper, Sulfur				
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	minios/cm	Zinc Copper Sulfur ppm ppm ppm				
76	10.5	12.8	1.5	13.5	3.0				2.2	1.9	5.6		
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions					

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SOIL TES	SOIL TEST REPORT FOR:							ADDITIONAL COPY TO:					
DAN FENSTERMACHER									ΓRUAX				
RETTEW ASSOCIATES INC									ASSOCIATES				
3020 COLUMBIA AVE									UMBIA AVE				
LA	NCAST	TER PA	17603				LA	NCAS'	TER PA 17603				
DATE	DATE LAR# SERIAL# COUNTY		ACRES	ASCS ID]	FIELD ID	SOIL						
7/7/2016 \$16-32408			Lancaster		P-06		P-068	-160614-1338-sdd-					
									S1A				
SOIL NUTI	RIENT	LEVEL	\mathbf{S}		Below Opti	mum	Optimu	m	Above C	ptimum			
¹ Soil pH 6.1													
² Phosphorus (P) 119			ppm										
² Potassium (K) 139		ppm											
² Magnesium	232	ppm											
		ONG	/G 1	1	ages for importan		. ,						

RECOMMENDATIONS: (See)

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

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Year	ear Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
------------------	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
3230	5.1	22.4	1.6	8.6	67.0	, 0			15.8	1.3	17.0	
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP). ³ Mehli	ch Buffer	pH. ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT	Γ FOR:				A	DDITION	AL CO	OPY TO:		
	N FENSTI TTEW ASS	_				DUANE TRUAX RETTEW ASSOCIATES					
3020 COLUMBIA AVE LANCASTER PA 17603						3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#		SERIAL#	COUNTY		ACRES	S ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32409			L	ancaster			P-068	8-160614-1338-sdd- S2A		
SOIL NUTE	RIENT LEV	VELS			Below Opt	imum	Optimum		Above (Optimum	
¹ Soil pH	5.3										
² Phosphorus	s (P) 263	3	ppm								
² Potassium (K) 67		ppm									
² Magnesium		ppm									
RECOMME	NDATION	S:	(See ba	ck mess	ages for importa	nt informa	tion)				

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nutrients:		(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	ear Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations	
---------	---	---	---	---	--	--

ADDITION	DDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
952	9.9	15.3	1.1	3.3	31.0	70			6.8	1.2	23.1	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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SOIL TES	T REPORT FO	R:		Al	DDITIONA	AL COPY	TO:			
	N FENSTERM			DUANE TRUAX						
RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIE	ELD ID	SOIL		
7/7/2016	S16-32411		Lancaster			0614-1338-sdd- S3A				
OIL NUTRIENT LEVELS		\mathbf{S}	Below Opti	mum	ım Optimum		Above Optimum			
Soil pH	4.8									
Phosphorus (P) 85		ppm								
Potassium (K) 39		ppm								

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing 1% Mg (1.6 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

ppm

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm) 87	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 1.9	the CEC Ca 4.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.3	ck for com Copper ppm 0.7		
Test Method	Fest Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-068-160614-1338-sdd-7/7/2016 S16-32412 Lancaster S4A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 5.2 ¹Soil pH ²Phosphorus (P) 10 ppm 46 ²Potassium (K) ppm 44 ppm ²Magnesium (Mg)

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): 30 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 8.7	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 3.3	the CEC Ca 18.4	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 0.9		
Test Methods	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CC	OPY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RF	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES					
3020 COLUMBIA AVE						LUMBIA AVE			
						TER PA 17603			
LANCASTER PA 17603				LA	NCAS	1EK 1A 17005			
DATE	LAB#	AB# SERIAL# COUNTY		ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32413		Lancaster			P-069	0-160614-1158-sdd-		
////2010	510-52415		Lancaster				S3A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m		Optimum	
Soil pH	4.6								
Phosphorus	(P) 27	ppm							
Potassium (1	K) 51	ppm							
Magnesium	(Mg) 21	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
Limestone [,]	•: 9000 lb/A	for a target p	H of 6.5.	N	Aagnesi u	ım (N	4g): 80 lb/A		
Calcium Carboi	nate equivalent				Limestone magnesiur		ning .9% Mg (1.4 % I	MgO) will satisfy the	
Plant Nutr	rients: (I)	f manure will be	e applied, adjust the	se recomi	• • •			f report.)	

Year Cı	rop	Expected Yield	(lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potasn (lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other cre recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm			
77	10.5	11.2	1.2	1.6	3.4				3.2	0.8	24.1	
Test Method:	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-069-160614-1158-sdd-7/7/2016 S16-32414 Lancaster S4A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.6 ¹Soil pH ²Phosphorus (P) 10 ppm 27 ²Potassium (K) ppm

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 7000 lb/A for a target pH of 6.5.

16

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.4% Mg (2.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	· · · · ·			
52	8.7	9.2	0.8	1.5	2.8				1.5	0.8	17.6		
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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RECOMMENDATIONS: (See back messages for important information)

ppm

ppm

Limestone*: 7000 lb/A for a target pH of 6.5.

39

35

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

²Potassium (K)

²Magnesium (Mg)

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
62	8.7	9.4	1.1	3.1	3.3	%0			1.4	0.8	20.3	
Test Methods	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REP	ORT FO	R:			ADDITIONAL COPY TO:						
DA	N FEN	NSTERM	IACHER			DUANE TRUAX						
RE	TTEW	ASSOCI	IATES INC				RE'	TTEW	ASSOCIATES			
302	20 COL	UMBIA	AVE				302	0 COI	LUMBIA AVE			
LANCASTER PA 17603							LA	NCAS	TER PA 17603			
DATE LAB# S			SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32	2416		L	ancaster		P-100-160609-1					
SOIL NUTRIENT LEVELS Below Opt					Below Opti	mum	Optimu	m				
¹Soil pH		3.8										
² Phosphorus (P) 8		ppm										
² Potassium (K) 149			ppm									
² Magnesium (Mg) 101 ppm												
RECOMME	NDAT	IONS:	(See bac	ck messe	ages for importar	ıt informati	on)					

Limestone*: 21000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	DDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 23.1	⁴ CEC (meq/100 g)	% Satu K 2.1	ration of Mg 4.6	the CEC Ca 12.1	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 3.7	Copper ppm 0.9	Sulfur ppm	
Test Method	est Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 18000 lb/A for a target pH of 6.5.

ppm

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
59	19.5	16.0	2.8	1.8	1.8				2.0	0.7	11.6	
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP). ³ Mehli	ch Buffer	pH. ⁴ Sumr	nation of Cat	ions				

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

	1 7								
SOIL TES	T REPORT FO	R:		Al	DDITIONA	AL CO	PY TO:		
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603				DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID SOIL		
7/7/2016	S16-32418		Lancaster			P-100	0-160609-1105-def- S3A		
OIL NUTE	RIENT LEVEL	S	Below Opti	imum	Optimu	m	Above C	ptimum	
Soil pH	4.8								
Phosphorus	(P) 8	ppm							
Potassium (1	K) 61	ppm							

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

16

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing .9% Mg (1.5 % MgO) will satisfy the magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

ppm

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:					² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 12.9	⁴ CEC (meq/100 g)	% Satu K 1.2	ration of Mg 1.0	the CEC Ca 1.6	Organic Matter %	Optional To Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 3.7	ck for com Copper ppm 1.0		
Test Method	Fest Methods: 11:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-121-160616-0950-mgw-7/7/2016 S16-32419 Lancaster S₁A SOIL NUTRIENT LEVELS **Below Optimum Optimum Above Optimum** 6.0 ¹Soil pH ²Phosphorus (P) 41 ppm ²Potassium (K) 227 ppm

RECOMMENDATIONS:

²Magnesium (Mg)

-- --

(See back messages for important information)

ppm

Magnesium (Mg):

NONE

Limestone*: 5000 lb/A for a target pH of 6.5.

207

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper		
1829	6.3	17.8	3.3	9.7	51.5	%			5.4	ppm 1.2	29.2	
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	T REPORT FO	OR:		A]	DDITION	AL CO	PY TO:		
DA	N FENSTERM	MACHER			DU	ANE 7	ΓRUAX		
RE	TTEW ASSOC	IATES INC			RE	TTEW	ASSOCIATES		
302	20 COLUMBIA	AVE		3020 COLUMBIA AVE					
LA	NCASTER PA	17603			LANCASTER PA 17603				
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32420		Lancaster			P-121-	160616-0950-mgw-		
77772020	510 02 120		Buildington	<u> </u>			S2A		
SOIL NUTE	RIENT LEVEL	LS	Below Op	timum	Optimu	m	Above (Optimum	
¹Soil pH	4.7								
² Phosphorus	s(P) 6	ppm							
² Potassium (K) 142		ppm							
² Magnesium	(Mg) 132	ppm							
		(5. 1.							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
515	12.9	16.9	2.1	6.5	15.2				2.0	0.9	11.1	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP), ³ Mehli	ch Buffer	pH, ⁴Sumn	nation of Cat	ions				

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ADDITIONAL COPY TO:

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SOIL TEST REPORT FOR:

SOIL IES	I KEI	OKI FU	IX.			ADDITION	AL COL I	10.			
	DAN FENSTERMACHER RETTEW ASSOCIATES INC					DUANE TRUAX RETTEW ASSOCIATES					
	3020 COLUMBIA AVE					3020 COLUMBIA AVE					
LANCASTER PA 17603					LANCASTER PA 17603						
DATE	LA	B #	SERIAL#	COUNTY	ACRE	S ASCS ID	FIE	LD ID	SOIL		
				Lancaster			P-121-160	616-0950-mgw-			
SOIL NUTRIENT LEVELS		Below	Optimum	Optimu	m	Above (Optimum				
¹ Soil pH	¹ Soil pH 5.1										
² Phosphorus (P) 4 ppm											
Potassium (K) 90 ppm											
² Magnesium	(Mg)	227	ppm								

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.							
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2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium ³ Acidity ⁴ CEC [%] Saturation of the CEC						Organic	Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
568 12.9 17.9 1.3 10.6 15.9 1.5 1.6 9.3												
Test Method:	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

¹ Soil pH 4.8 ² Phosphorus (P) 2 ppm ² Potassium (K) 74 ppm	DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603 DATE LAR # SERIAL # COUNTY ACRES ASCS ID FIELD ID 7/7/2016 S16-32422 Below Optimum Optimum Above Optimum Soil pH 4.8 Phosphorus (P) 2 ppm Potassium (K) 74 ppm											
RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603 DATE	RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603 DATE LAR # SERIAL # COUNTY ACRES ASCS ID FIELD ID 7/7/2016 S16-32422 Lancaster Below Optimum Optimum Optimum Optimum Above Optimum Phosphorus (P) 2 ppm Potassium (K) 74 ppm	SOIL TES	T REPORT FO	R:			Al	DDITION	AL COPY	Y TO:		
3020 COLUMBIA AVE LANCASTER PA 17603 DATE LAB # SERIAL # COUNTY ACRES ASCS ID FIELD ID SOIL	3020 COLUMBIA AVE LANCASTER PA 17603 DATE LAB # SERIAL # COUNTY ACRES ASCS ID FIELD ID SOIL 7/7/2016 S16-32422 Lancaster P-121-160616-0950-mgw- Soil pH 4.8 Phosphorus (P) 2 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 3020 COLUMBIA AVE LancaSTER PA 17603 SOIL PIELD ID SOIL P-121-160616-0950-mgw- SAA SAA Phosphorus (P) 2 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm Potassium (K)	DA	N FENSTERM	IACHER			DUANE TRUAX					
LANCASTER PA 17603 LANCASTER PA 17603	LANCASTER PA 17603 LANCASTER PA 17603	RE'	TTEW ASSOCI	IATES INC								
DATE	DATE LAB # SERIAL # COUNTY ACRES ASCS ID FIELD ID SOIL											
NUTRIENT LEVELS Below Optimum Optimum Above Optimum	T/7/2016 S16-32422 Lancaster P-121-160616-0950-mgw-S4A	LA	NCASTER PA	17603		LANCASTER PA 17603						
SOIL NUTRIENT LEVELS Below Optimum Optimum Above Optimum Phosphorus (P) 2 ppm Potassium (K) 74 ppm	OIL NUTRIENT LEVELS Soil pH 4.8 Phosphorus (P) 2 ppm Potassium (K) 74 ppm Potassium (K) 74 ppm	DATE	LAB#	SERIAL #	С	OUNTY	ACRES	ACRES ASCS ID FIELD ID SOIL				
SOIL NUTRIENT LEVELS Below Optimum Optimum Above Optimum Phosphorus (P) 2 ppm Potassium (K) 74 ppm Optimum Optimum Above Optimum	OIL NUTRIENT LEVELS Below Optimum Optimum Above Optimum Phosphorus (P) 2 ppm Optimum (K) 74 ppm	7/7/2016	S16-32422		Lancaster							
mugnesium (mg)	viagnesium (wg) 277 ppm	¹ Soil pH ² Phosphorus ² Potassium (1	4.8 (P) 2 (K) 74	ррт		Below Opti	mum	Optimu	m		Optimum	

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

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ADDITIONAL RESULTS:							Optional Tests:				² Trace Elements		
² Calcium ³ Acidity ⁴ CEC ⁸ Saturation of the CEC							Nitrate-N	Salts mmhos/cm	See back for comments Zinc , Copper, Sulfur				
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm		ppm	ppm	ppm		
578 10.5 15.6 1.2 13.0 18.5 1.3 1.5 8.1													
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

Enclosures

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SOIL TES	T REPORT FO	OR:		AI	DDITIONA	AL COPY	ТО:					
DA	N FENSTERN	MACHER		DUANE TRUAX								
RETTEW ASSOCIATES INC					RE'	TTEW ASS	SOCIATES					
3020 COLUMBIA AVE					302	0 COLUM	BIA AVE					
LA	NCASTER PA	17603			LA	NCASTER	PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIEI	LD ID	SOIL				
7/7/2016 S16-32423			Lancaster			P-126-1606	15-1410-mgw-					
77772010	510 32423		Duneuster				S1A					
SOIL NUTI	RIENT LEVEI	LS	Below Opti	mum	Optimu	m	Above C	ptimum				
¹ Soil pH	5.1											
² Phosphorus	s (P) 39	ppm										
² Potassium (K) 161	ppm										
² Magnesium (Mg) 101 ppm												
DEGG101	RECOMMENDATIONS: (See back messages for important information)											

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
381	11.1	14.3	2.9	5.9	13.4	/6			4.3	0.9	24.3	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		A	DDITION	AL COP	Y TO:	
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FI	IELD ID	SOIL
7/7/2016	S16-32424		Lancaster			P-126-10	60615-1410-mgw- S2A	
SOIL NUTRIENT LEVELS Below Opt				imum	Optimum Above (ptimum	
¹Soil pH	4.1							
² Phosphorus	s(P) 6	ppm						
² Potassium (K) 92	ppm						
² Magnesium	(Mg) 46	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importe	ant informat	ion)			
Limestone	*: 18000 lb/A	A for a target	pH of 6.5.	Magnesium (Mg): 30 lb/A				
*Calcium Carbo	nate equivalent			Limestone containing .2% Mg (.3 % MgO) will satisfy the				

Limestone containing .2% Mg (.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

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---------	---	---	---	---	--

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ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 20.1	⁴ CEC (meq/100 g)	K 1.5	Mg 2.4	the CEC Ca 3.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.4	Copper ppm 0.8		
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

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1.1 - 9.4	1.2 - 5.5	10 - 25							

<u>Distribution of Soil Test Results</u> Summaries of soil test results may be used in educational programs. However, individual results will not be released outside of Penn State without permission of the client. Electronic copies of your results are available to you, contact the lab for more information.



Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802

www.aasl.psu.edu **SOIL TEST REPORT FOR: ADDITIONAL COPY TO:** DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL P-126-160615-1410-mgw-

7/7/2016	S16-32425		Lancaster			P-126	-160615-1410-mgw- S3A	
SOIL NUTRI	IENT LEVEL	S	Below Opt	imum	Optimu	m	Above (Optimum
¹ Soil pH	4.5							
² Phosphorus ((P) 4	ppm						
² Potassium (K	(a) 49	ppm						
² Magnesium (1	Mg) 23	ppm						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .7% Mg (1.2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 12.3	⁴ CEC (meq/100 g) 12.9	% Satu K 1.0	ration of Mg 1.5	the CEC Ca 2.5	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.0	ck for com Copper ppm 0.9		
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

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RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .8% Mg (1.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 0.7	ration of Mg 1.8	the CEC Ca 1.9	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 0.9		
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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1.1 - 9.4	1.2 - 5.5	10 - 25						

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RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

45

ppm

ppm

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .5% Mg (.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 0 0 0 2 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 3 Other 0 0 0 0 recommendations

ADDITION	:	Optional Tests:			² Trace Elements							
² Calcium (ppm)	³ Acidity (meq/100 g) 12.3	⁴ CEC (meq/100 g)	% Satu K 0.9	ration of Mg 2.8	the CEC Ca 4.0	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.2	ck for com Copper ppm 0.8		
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL COP	Y TO:	
RE' 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FI	IELD ID	SOIL
7/7/2016	S16-32428		Lancaster		P-134-160615-1506-so S1A			
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m	Above C	ptimum
¹Soil pH	3.9							
² Phosphorus	s (P) 8	ppm						
² Potassium (1	K) 107	ppm						
² Magnesium	(Mg) 95	ppm						
DECOMME	NDATIONS.	(See ha	ck messages for importa	nt informati	on)			

RECOMMENDATIONS:

Magnesium (Mg): NONE

Limestone*: 24000 lb/A for a target pH of 6.5.

*Calcium Carbonate equivalent

Plant Nu	Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm			
392	26.1	18.0	1.5	4.4	10.9				5.9	1.2	10.8		
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP)). ³ Mehli	ch Buffer	pH. ⁴ Sumn	nation of Cat	ions					

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SOIL TES	T REPORT FO	R:		A	DDITION	L COPY	TO:	
DA	AN FENSTERM	IACHER		DUANE TRUAX				
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	20 COLUMBIA						MBIA AVE R PA 17603	
LA	NCASTER PA	1/603			LA	NCASTE.	K PA 17005	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FII	ELD ID	SOIL
7/7/2016	S16-32429		Lancaster	P-134-160615-1506-sdd-				
	l			<u> </u>	<u> </u>		S2A	
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimum		Above Optimum	
¹ Soil pH	4.6							
² Phosphorus	s (P) 6	ppm						
² Potassium (K) 112	ppm						
² Magnesium	(Mg) 53	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informai	ion)			
Limestone	imestone*: 14000 lb/A for a target pH of 6.5. Magnesium (Mg): 20 lb/A							

*Calcium Carbonate equivalent

Limestone containing .1% Mg (.2 % MgO) will satisfy the magnesium requirement

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.					ck of report.)		
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other	_		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm			
380	15.9	17.6	1.6	2.5	10.8				3.5	1.1	18.6		
Test Method	s: 1:1 soil:wate	er nH. ² Mehlich	3 (ICP)). ³ Mehli	ch Buffer	pH. ⁴ Sumr	nation of Cat	ions					

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)							
Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25					

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO)R:		A)	<u>DDITION A</u>	AL CO	OPY TO:			
DA	N FENSTERM	IACHER			DU	ANE	TRUAX			
RE	TTEW ASSOC	IATES INC			RE	ΓΤΕW	' ASSOCIATES			
302	20 COLUMBIA	AVE					LUMBIA AVE			
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32430		Lancaster			P-134	4-160615-1506-sdd-			
							S3A			
SOIL NUTRIENT LEVELS		\mathbf{S}	Below Opti	mum	n Optimum		Above (Optimum		
¹ Soil pH	4.8									
² Phosphorus	s (P) 2	ppm								
² Potassium (K) 76	ppm								
² Magnesium	(Mg) 30	ppm								
RECOMME	RECOMMENDATIONS: (See back messages for important information)									

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)						ck of report.)	
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.6	ration of Mg 2.1	the CEC Ca 2.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.7	Copper Ppm 0.8		
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25						

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SOIL TES	T REPORT FO	OR:		AI	DDITION	AL CC	PY TO:	
DA	N FENSTERN	MACHER		DUANE TRUAX				
RE	TTEW ASSOC	TATES INC		RETTEW ASSOCIATES				
302	20 COLUMBIA	AVE			302	O COI	LUMBIA AVE	
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603	
DATE	LAB#	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32431		Lancaster	P-134-160615-1506-sdd- S4A				
SOIL NUTI	RIENT LEVEI	LS	Below Opti)ptimum	
¹Soil pH	4.7							
² Phosphorus	s (P) 1	ppm						
² Potassium (K) 67 ppm								
² Magnesium	(Mg) 81	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)			

Magnesium (Mg):

NONE

Limestone*: 11000 lb/A for a target pH of 6.5. *Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report							ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.3	ration of Mg 5.0	the CEC Ca 1.9	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 0.6		
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm) Cu (ppm) S (ppm)								
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SOIL TES	T REPORT FO	R:		AI	DDITION	AL COPY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX				
RE	TTEW ASSOC	IATES INC			RE'	TTEW ASSOCIAT	ΓES	
302	20 COLUMBIA	AVE				0 COLUMBIA A		
LA	NCASTER PA	17603			LA	NCASTER PA 17	(603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL	
7/7/2016	S16-32432		Lancaster			P-134-160615-150 S5A	6-sdd-	
SOIL NUTE	RIENT LEVEL	S	Below Opti	imum	mum Optimum Above O		Above Optimum	
¹Soil pH	5.0							
² Phosphorus	(P) 1	ppm						
² Potassium (K) 89	ppm						
² Magnesium	(Mg) 100	ppm						
		(C 1	al and a con four i auto	: (::)			

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of repo						ck of report.)	
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	17	Wig	Ca	%	• • • • • • • • • • • • • • • • • • • •		ppm	ppm	ppm	
53	10.5	11.8	1.9	7.0	2.2				1.2	0.8	20.1	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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Zn (ppm)	Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST	T REPORT FO)R:		AI	DDITION	AL CO	PY TO:	
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID FIELD ID				SOIL
7/7/2016	S16-32433		Lancaster			P-156-160606-1355-dat- S1A		
				•			SIA	
SOIL NUTR	RIENT LEVEL	S	Below Opti	imum	Optimu	m		Optimum
SOIL NUTR	RIENT LEVEL	S	Below Opti	imum	Optimu	m		Optimum
	3.7	S	Below Opti	imum	Optimu	m		Optimum
¹Soil pH	3.7 (P) 5		Below Opti	imum	Optimu	m		Optimum
¹ Soil pH ² Phosphorus	3.7 (P) 5 K) 151	ppm	Below Opti	imum	Optimu	m		Optimum

Limestone*: 18000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com	Sulfur	
169	19.5	16.7	2.3	3.1	5.0	%			ppm 2.4	ppm 0.7	ppm 12.5	
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP)). ³ Mehli	ch Buffer	pH. ⁴ Sumr	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

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Zn (ppm)	Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT

SOIL TES	T REPORT FO	OR:		AI	DITIONA	AL CC	OPY TO:		
DA	N FENSTERN	MACHER		DUANE TRUAX					
RE	TTEW ASSOC	CIATES INC			RE	ΓΤΕW	ASSOCIATES		
302	20 COLUMBIA	AVE			302	0 COI	LUMBIA AVE		
LANCASTER PA 17603					LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32434		Lancaster			P-150	6-160606-1355-dat-		
							S2A		
SOIL NUTRIENT LEVELS Below Opt				mum	Optimu	m	n Above Optimum		
¹ Soil pH	4.0								
² Phosphorus	s (P) 5	ppm							
² Potassium (1	K) 54	ppm							
² Magnesium	(Mg) 19	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
		for a target p	H of 6.5.	N	Aagnesiu	ım (N	(1g): 80 lb/A		

*Calcium Carbonate equivalent

Limestone containing 1% Mg (1.6 $\,\%$ MgO) will satisfy the

magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g)	% Satu K 1.3	Mg 1.5	the CEC Ca 2.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.3	Ck for com Copper ppm 0.7	Sulfur ppm 7.5	
Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

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<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

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Zn (ppm)	Cu (ppm)	S (ppm)						
1.1 - 9.4	1.2 - 5.5	10 - 25						

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	131									
SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
DA	N FENSTERM	ACHER		DUANE TRUAX						
RETTEW ASSOCIATES INC					RE'	TTEW	ASSOCIATES			
302	20 COLUMBIA	AVE					LUMBIA AVE			
LANCASTER PA 17603					LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID FIELD ID		SOIL				
7/7/2016	S16-32435		Lancaster			P-15	6-160606-1355-dat-			
					l		S3A			
SOIL NUTRIENT LEVELS		Below Opti	mum	Optimum		Above (Optimum			
¹ Soil pH	5.0									
•										

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 2.8% Mg (4.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Satu			Organic	Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
38	5.7	6.0	1.2	1.4	3.1	,•			2.9	0.8	36.0	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	OR:		AI	DDITIONA	L CO	PY TO:			
DA	N FENSTERN	MACHER		DUANE TRUAX						
RETTEW ASSOCIATES INC					RETTEW ASSOCIATES					
3020 COLUMBIA AVE					302	0 COL	UMBIA AVE			
LA	NCASTER PA	17603		LANCASTER PA 17603						
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32436		Lancaster			P-156	5-160606-1355-dat-			
77772010							S4A			
SOIL NUTE	RIENT LEVEL	LS	Below Opti	mum Optimum		Above Optimum				
¹Soil pH	4.9									
² Phosphorus	s (P) 2	ppm								
Potassium (K) 30	ppm								
Magnesium	(Mg) 11	ppm								
PECOMME	NDATIONS:	(See bac	ck messages for importai	ıt informati	on)					

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 2.8% Mg (4.4 % MgO) will satisfy the magnesium requirement

Plant Nu	trients:	(If manure w	ill be applied	l, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
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No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC			the CEC	Organic Matter	Nitrate-N	Salts mmhos/cm	See bac Zinc	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppm		ppm	ppm	ppm	
36	5.7	6.0	1.3	1.5	3.0				2.4	0.8	40.4	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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Zn (ppm)	S (ppm)							
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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ΑI	DITIONA	AL CO	PY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC					ASSOCIATES		
	20 COLUMBIA						UMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32438		Lancaster			P-157	'-160606-1512-dat-		
				<u> </u>			S1A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	imum	Optimum Above Optimum			Optimum	
¹ Soil pH	4.1								
² Phosphorus	s(P) 9	ppm							
Potassium (K) 151	ppm							
Magnesium	(Mg) 54	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
Limestone [:]	*: 14000 lb/A	A for a target	pH of 6.5.	Magnesium (Mg): 20 lb/A					
Calcium Carbo	nate equivalent				Limestone		ning .1% Mg (.2 % M	(gO) will satisfy the	

magnesium requirement

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g) 15.3	⁴ CEC (meq/100 g) 16.5	% Satu K 2.3	ration of Mg 2.7	the CEC Ca 4.1	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 2.9	ck for com Copper ppm 0.8	Sulfur ppm 12.7	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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Zn (ppm)	S (ppm)							
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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CO	PY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC					ASSOCIATES		
	20 COLUMBIA						UMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS'	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32439		Lancaster			P-157	'-160606-1512-dat-		
			•	<u> </u>			S2A		_
SOIL NUTE	<u>RIENT LEVEL</u>	\mathbf{S}	Below Opti	imum	Optimum Above Optimum			Optimum	
¹ Soil pH	4.3								
Phosphorus	s (P) 5	ppm							
Potassium (K) 61	ppm							
Magnesium	(Mg) 27	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
Limestone ³	*: 12000 lb/A	A for a target	pH of 6.5.	N	Aagnesiu	ım (N	Ig): 80 lb/A		
Calcium Carbo	nate equivalent				Limestone	contair	ning .7% Mg (1.1 % N	MgO) will satisfy t	the

magnesium requirement

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	ccordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

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ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium	³ Acidity	⁴ CEC			the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppm		ppm	ppm	ppm	
93	13.5	14.3	1.1	1.6	3.2				2.0	1.1	15.7	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-157-160606-1512-dat-7/7/2016 S16-32440 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.8

¹Soil pH 4.8

²Phosphorus (P) 4 ppm

²Potassium (K) 46 ppm

²Magnesium (Mg) 13 ppm

Below Optimum Optimum Above Optimum

Above Optimum Optimum Above Optimum Above Optimum Above Optimum Optimum Optimum Optimum Optimum Optimum Optimum Above Optimum

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.7% Mg (2.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
35	7.5	7.9	1.5	1.4	2.2	,,,			2.4	1.0	26.2	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TEST REPORT FOR:

DAN FENSTERMACHER
RETTEW ASSOCIATES INC
3020 COLUMBIA AVE
LANCASTER PA 17603

The Pennsylvania S
University Park, PA
www.aasl.psu.edu

ADDITIONAL COPY TO:

DUANE TRUAX
RETTEW ASSOCIATES
3020 COLUMBIA AVE
LANCASTER PA 17603

 LANCASTER PA 17603
 LANCASTER PA 17603

 DATE
 LAB #
 SERIAL #
 COUNTY
 ACRES ASCS ID
 FIELD ID
 SOIL

 7/7/2016
 S16-32441
 Lancaster
 P-157-160606-1512-dat-S4A

SOIL NUTRIENT LEVELS

Below Optimum
Optimum
Above Optimum

Phosphorus (P) 2 ppm
Potassium (K) 62 ppm
Magnesium (Mg) 16 ppm

RECOMMENDATIONS: (See back messages for important information)

Magnesium (Mg): 100 lb/A

Limestone*: 7000 lb/A for a target pH of 6.5.

Limestone containing 1.4% Mg (2.3 % MgO) will satisfy

*Calcium Carbonate equivalent

the magnesium requirement

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report							
Year	Crop	Expect Yield	0	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)		
1 Other		0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 for other crop}{recommendations}$

ADDITIONAL RESULTS:							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 8.7	⁴ CEC (meq/100 g)	% Satu K 1.7	ration of Mg 1.5	the CEC Ca 2.2	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	Copper ppm		
Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4 1.2 - 5.5 10 - 25									

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	1.1										
SOIL TES	T REPORT FO	R:		1	ADDITION	AL CC	PY TO:				
DA	N FENSTERM	IACHER			DUANE TRUAX						
RE'	TTEW ASSOC		RETTEW ASSOCIATES								
302	20 COLUMBIA			302	O COI	LUMBIA AVE					
LA	NCASTER PA	17603		LANCASTER PA 17603							
DATE	LAB#	SERIAL#	COUNTY	ACRE	S ASCS ID	FIELD ID		SOIL			
7/7/2016	S16-32442		Lancaster		P-157-160606-1512-dat-		7-160606-1512-dat- S5A				
OIL NUTE	RIENT LEVEL	S	Below C	Optimum	Optimum		Above Optimum				
Soil pH	4.7										
Phosphorus (P) 1 ppm											
Potassium (1	K) 88	ppm									

RECOMMENDATIONS:

*Calcium Carbonate equivalent

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

Limestone containing .7% Mg (1.1 $\,\%$ MgO) will satisfy the

magnesium requirement

			A											
Plant Nu	utrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)											
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)								
1 Other			0	0	0	0	See ST2 for other crop recommendations							

No crop was specified. Therefore no recommendation is given.

ppm

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium	lcium ³ Acidity ⁴ CEC % Saturation of the CEC		Organic	Nitrate-N	Salts	See back for comments						
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper		
						%			ppm	ppm	ppm	
34	10.5	11.1	2.0	2.1	1.5				1.1	1.8	40.9	
Test Mathed	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											
Test Methods	s: 1:1 soii:wate	er pri, Mennen	3 (ICP)	, Menn	ch buller	pn, Suiiii	nation of Cat	10118				

Enclosures

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Zn (ppm)	S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802

Fax: (814) 863-4540

www.aasl.psu.edu **SOIL TEST REPORT FOR: ADDITIONAL COPY TO:** DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-157-160606-1512-dat-7/7/2016 S16-32443 Lancaster

l l					S6A
SOIL NUTRIENT	LEVELS	S	Below Optimum	Optimum	Above Optimum
¹ Soil pH	4.5				
² Phosphorus (P)	1	ppm			
² Potassium (K)	84	ppm			
² Magnesium (Mg)	29	ppm			

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
------------------	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	(ppm) (meq/100 g) (meq/100 g) K Mg Ca 37 11.1 11.7 1.8 2.1 1.6				Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 1.0	ck for com Copper ppm 1.7				
Test Methods	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.3% Mg (2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 1 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

See ST2 for other crop 0 0 0 2 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 3 Other 0 0 0 0 recommendations

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g)	% Satu K 1.2	ration of Mg 1.2	the CEC Ca 2.1	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 0.9	Copper ppm 1.6			
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴Sumn	nation of Cat	ions					

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SOIL TES	T REPOR	Γ FOR:				A	DDITION	AL COP	Y TO:	
DA	N FENST	ERMAC	HER			DUANE TRUAX				
	TTEW ASS								SSOCIATES	
3020 COLUMBIA AVE								MBIA AVE		
LANCASTER PA 17603						LA	NCASTI	ER PA 17603		
DATE	LAB#		SERIAL#	(COUNTY	ACRES	ASCS ID	F	ELD ID	SOIL
7/7/2016	S16-32445			L	ancaster			P-162-1	60606-1040-jsw-	
SOIL NUTE	RIENT LE	VELS		Below Opti		mum	m Optimum		Above Optimum	
¹Soil pH	4.4									
² Phosphorus	s (P) 9		ppm							
² Potassium (K) 161		1	ppm							
² Magnesium (Mg) 35 ppm										
RECOMME	NDATION	IS:	(See bac	ck messe	ages for importa	nt informat	ion)			

Limestone*: 15000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .5% Mg (.9 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
------------------	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 2.5	ration of Mg 1.7	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.8	Copper ppm		
Test Method	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CC	PY TO:	
RE	N FENSTERM TTEW ASSOCI 20 COLUMBIA	IATES INC		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE				
LANCASTER PA 17603							TER PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32446		Lancaster			P-162	2-160606-1040-jsw- S2A	
SOIL NUTRIENT LEVELS Below O			Below Opti	mum	Optimum Above Optimum)ptimum
¹ Soil pH	4.4							
² Phosphorus	s (P) 4	ppm						
² Potassium (K) 82	ppm						
² Magnesium	(Mg) 16	ppm						
RECOMMENDATIONS: (See back messages for important information)								
Limestone	*: 14000 lb/A	A for a target	pH of 6.5.	Magnesium (Mg): 100 lb/A				
*Calcium Carbo	nate equivalent			Limestone containing 7% Mg (1.1.% MgO) will satisfy the				

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

Plant N	utrients:	trients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop	Expec Yiel	8	- · · · ·				
1 Other		0	0	0	0	See ST2 for other crop		

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 15.3	⁴ CEC (meq/100 g)	% Satu K 1.4	Mg 0.9	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.1	ck for com Copper ppm 1.6		
Test Method:	Cest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Zn (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	OR:		ADDITIONAL COPY TO:				
	N FENSTERN			DUANE TRUAX				
302	TTEW ASSOC 20 COLUMBIA	AVE		RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
LA	NCASTER PA	1/603			LA.	NCAS	OIEK FA 1/005	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32447		Lancaster			P-162	2-160606-1040-jsw- SA3	
SOIL NUTE	RIENT LEVEL	LS	Below Opti	mum	Optimu	m	Above (Optimum
¹ Soil pH	4.6							
² Phosphorus	s (P) 6	ppm						
² Potassium (K) 72		ppm						
² Magnesium	(Mg) 27	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	ıt informati	ion)			

Limestone*: 10000 lb/A for a target pH of 6.5. Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .8% Mg (1.3 % MgO) will satisfy the

magnesium requirement

					• • • • • • • • • • • • • • • • • • • •	•	
Plant N	utrients:	(If manure w	ill be applied	l, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements				
² Calcium	³ Acidity	⁴CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts mmhos/cm	See back for comments Zinc Copper, Sulfur				
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mminos/em	ppm	ррт	ppm		
51	11.7	12.4	1.5	1.8	2.1				1.6 1.5 58.8				
Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-162-160606-1040-jsw-7/7/2016 S16-32448 Lancaster SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.8 ¹Soil pH ²Phosphorus (P) 1 ppm 59 ²Potassium (K) ppm 35 ppm ²Magnesium (Mg)

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .9% Mg (1.4 % MgO) will satisfy the

magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm		
53											
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations										

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1 8 5 5

SOIL TES	T REP	ORT FO	R:			ADDITIONAL COPY TO:						
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603							DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	B #	SERIAL#	(COUNTY	ACRES	S ASCS ID		FIELD ID	SOIL			
7/7/2016					ancaster	P-162-160606-1040-jsw- SA5						
SOIL NUTE	RIENT	LEVEL	\mathbf{S}	Below Opti		mum Optimui		m Above (Optimum		
¹ Soil pH 4.6												
² Phosphorus (P) 5			ppm									
² Potassium (K) 69		ppm										
² Magnesium (Mg) 30 ppm												
			(Can ba	.1		. 4 :	4i a.e.)					

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .8% Mg (1.2 % MgO) will satisfy the magnesium requirement

Plant Nu	itrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year Crop			Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other	_		0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

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No crop was specified. Therefore no recommendation is given.

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.7	Mg 2.4	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	Ck for com Copper ppm 1 4		
Test Method	s: ¹ 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions			. == , ,	

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		AI	DDITION	AL COPY TO:			
DA	AN FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COLUMBIA AVE			
LA	NCASTER PA	17603			LA	NCASTER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	SOIL			
7/7/2016	S16-32450		Lancaster			P-170-160620-1122-de	f-		
				<u> </u>		S1A			
SOIL NUTRIENT LEVELS		C							
BOIL NUIT	KIENI LEVEL	3	Below Opti	imum	Optimu	m Abov	ve Optimum		
Soil pH	3.7	5	Below Opti	imum	Optimu	m Abov	ve Optimum		
	3.7	ppm	Below Opti	imum	Optimu	m Abov	ve Optimum		
¹Soil pH	3.7 s (P) 5		Below Opti	mum	Optimu	m Abov	ve Optimum		
¹ Soil pH ² Phosphorus	3.7 s (P) 5 K) 98	ррт	Below Opti	mum	Optimu	m Abov	ve Optimum		
¹ Soil pH ² Phosphorus ² Potassium (² Magnesium	3.7 s (P) 5 K) 98	ppm ppm ppm	Below Opti			m Abov	ve Optimum		

Limestone*: 17000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.6 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 18.9	⁴ CEC (meq/100 g)	% Satu K 1.5	ration of Mg 1.6	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.7	Copper ppm	Sulfur ppm 7.4	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-170-160620-1122-def-7/7/2016 S16-32451 Lancaster S2A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 3.6 ¹Soil pH ²Phosphorus (P) 11 ppm ²Potassium (K) 100 ppm 22 ppm ²Magnesium (Mg) (See back messages for important information)

RECOMMENDATIONS:

Limestone*: 17000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .5% Mg (.8 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 2 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 3 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc	ck for com Copper		
(ppm)	(meq/100 g)	(ilicq/100 g)	17	wig	Ca	%			ppm	ppm	ppm	
50	18.3	15.7	1.6	1.2	1.6				2.1	1.1	8.4	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

3071

Agronomy

Enclosures

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	1.1 *									
SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	Fl	ELD ID	SOIL		
7/7/2016	S16-32452		Lancaster			P-170-1	60620-1122-def- S3A			
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimum		Above Optimum			
¹ Soil pH	3.9									
² Phosphorus (P) 7 ppm										
Potassium (K) 22 ppm										

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

14

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

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No crop was specified. Therefore no recommendation is given.

ppm

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other 0 0 0 See ST2 for other crop recommendations

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 10.5	⁴ CEC (meq/100 g)	% Satu K 0.5	ration of Mg 1.1	the CEC Ca 1.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm	ck for com Copper ppm 1.4		
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO	R:		AI	DITIONA	L CC	OPY TO:				
DA	N FENSTERM	IACHER		DUANE TRUAX							
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES							
3020 COLUMBIA AVE					302	0 COI	LUMBIA AVE				
LANCASTER PA 17603					LA	NCAS	TER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL			
7/7/2016	S16-32453		Lancaster			P-17	0-160620-1122-def-				
							S4A				
SOIL NUTRIENT LEVELS Below Opt					Optimum Above Optimum						
¹Soil pH	4.4										
² Phosphorus	s (P) 4	ppm									
Potassium (K) 25	ppm									
Magnesium	(Mg) 11	ppm									
RECOMME	RECOMMENDATIONS: (See back messages for important information)										
Limestone	*: 10000 lb/A	A for a target	pH of 6.5.	N	Magnesiu	m (N	(1g): 110 lb/A				

*Calcium Carbonate equivalent

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No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	K	Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	Copper ppm	Sulfur ppm	
34 11.7 12.0 0.5 0.8 1.4 1.5 1.3 26.9 Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-170-160620-1122-def-7/7/2016 S16-32454 Lancaster S5A

SOIL NUTRIENT	LEVELS		Below Optimum	Optimum	Above Optimum
¹ Soil pH	4.7				
² Phosphorus (P)	8	ppm			
² Potassium (K)	26	ppm			
² Magnesium (Mg)	10	ppm			

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 2.2% Mg (3.5 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N Salts mmhos/cm		See back for comments Zinc Copper Sulfur ppm ppm ppm			
33	6.3	6.6	1.0	1.3	2.5				1.4	1.2	23.1	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 4000 lb/A for a target pH of 6.5.

20

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 2.8% Mg (4.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm ppm

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 \text{ for other crop}}{recommendations}$

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g) 5.7	⁴ CEC (meq/100 g) 6.0	% Satu K 0.9	Mg 1.3	the CEC Ca 2.7	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.2	Ck for come Copper ppm 1.1		
Test Method	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	SOIL TEST REPORT FOR:						ADDITIONAL COPY TO:					
DA	N FEN	STERM	ACHER			DUANE TRUAX						
RETTEW ASSOCIATES INC					RETTEW ASSOCIATES							
3020 COLUMBIA AVE					3020 COLUMBIA AVE							
LANCASTER PA 17603					LANCASTER PA 17603							
DATE	LAB	ß #	SERIAL#	(COUNTY	ACRES	ASCS ID]	FIELD ID	SOIL		
7/7/2016	S16-32	456		Lancaster				P-173	-160620-1112-def-			
1,1,1,1,1,1									S1A			
SOIL NUTRIENT LEVELS			S		Below Opti	mum	Optimu	m	Above (Optimum		
¹ Soil pH		6.7]					
² Phosphorus (P) 5		ppm										
² Potassium (K) 104		ppm]						
² Magnesium (Mg) 128			ppm									
DECC. D. CE		ONIG	(Saa ha	ak mass	agas for importa	nt informat	ion)					

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: NONE

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

|--|

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2224	2.2	14.7	1.8	7.3	75.9				3.1	1.5	6.8	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL COPY TO:		
RE 302	N FENSTERM TTEW ASSOCI O COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL	
7/7/2016 S16-32457 Lancasta		Lancaster			P-173-160620-1112 S2A	2-def-		
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m A	bove Optimum	
¹ Soil pH	5.2							
² Phosphorus	(P) 4	ppm						
² Potassium (K) 88	ppm						
² Magnesium	(Mg) 87	ppm						
RECOMME	NDATIONS:	(See bac	ck messages for importa	nt informati	on)			

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

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Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com Copper	Sulfur	
1332	11.7	19.3	1.2	3.8	34.5	%			ppm 3.6	ppm 1.5	ppm 12.7	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL COPY	Y TO:		
DA	N FENSTERM	IACHER			DU	ANE TR	UAX		
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
	20 COLUMBIA			3020 COLUMBIA AVE					
LA	NCASTER PA		LANCASTER PA 17603						
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FII	ELD ID	SOIL	
7/7/2016	S16-32458		Lancaster			P-173-16	60620-1112-def-		
							S3A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m	Above	Optimum	
Soil pH	5.2								
Phosphorus	s (P) 1	ppm							
Potassium (K) 75	ppm							
Magnesium	(Mg) 46	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): 30 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.7 % MgO) will satisfy the magnesium requirement

Plant N	utrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc	ck for com		
600	8.7	12.3	1.6	3.1	24.5	%			ppm 1.5	ppm 1.4	ppm 9.8	
Test Method	Cest Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPO	ORT FO	R:			A]	DDITION	AL CO	PY TO:		
DA	N FEN	STERM	ACHER			DUANE TRUAX					
RETTEW ASSOCIATES INC							RE	TTEW	ASSOCIATES		
3020 COLUMBIA AVE							302	0 COL	UMBIA AVE		
LANCASTER PA 17603							LA	NCAS'	TER PA 17603		
DATE	LAF	3 #	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32	459		L	ancaster			P-173	3-160620-1112-def-		
									S4A		
SOIL NUTI	RIENT I	LEVEL	S	Below Opti		mum	Optimu	m	Above C	ptimum	
¹ Soil pH		6.5									
² Phosphorus	s (P)	1	ppm								
² Potassium (K)	125	ppm								
² Magnesium	(Mg)	147	ppm								
DECOMME	NID A TIT	ONG.	(See ha	ck messi	ages for importa	nt informati	ion)				

RECOMMENDATIONS:

0 0 1 0 /

Limestone*: NONE
*Calcium Carbonate equivalent

Magnesium (Mg): NONE

Plant N	lutrients:	(If manure will	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year	Crop	E	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other	•		0	0	0	0	See ST2 for other crop					

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

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ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	% Saturation of the CEC K Mg Ca		Organic Matter	Nitrate-N ppm	mmhos/om		See back for comments Zinc Copper Sulfur			
3246	3.9	20.4	1.6	6.0	73.4	%			ppm 1.0	ppm 1.5	ppm 7.4		
Test Methods: 1:1 soil:water pH. 2Mehlich 3 (ICP), 3Mehlich Buffer pH. 4Summation of Cations													

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SOIL TES	T REPORT FO	OR:		AI	DDITION	AL COPY TO:				
DA	N FENSTERM	IACHER		DUANE TRUAX						
RETTEW ASSOCIATES INC					RETTEW ASSOCIATES					
3020 COLUMBIA AVE						0 COLUMBIA AV	_			
LANCASTER PA 17603					LA	NCASTER PA 170	503			
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID FIELD		FIELD ID	SOIL			
7/7/2016	S16-32460		Lancaster	Lancaster P-176-160621-1155-rll-S						
SOIL NUTRIENT LEVELS Be		Below Opti	mum	Optimu	m A	bove Optimum				
¹Soil pH	5.8									
² Phosphorus	s (P) 15	ppm								
² Potassium (K) 161	ppm								
² Magnesium	(Mg) 181	ppm								
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)					

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper	Sulfur	
(47)	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		0		%			ppm	ppm	ppm	.
1844	5.7	16.8	2.5	9.0	54.7				6.9	1.6	10.3	.
'												
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	T REPORT I	FOR:		AI	DITION	AL COPY TO):		
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					ADDITIONAL COPY TO: DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	COUNTY ACRES ASCS ID FIELD ID			SOIL		
7/7/2016	S16-32461		Lancaster			P-176-160621-	1155-rll-S2A		
SOIL NUTRIENT LEVELS		CLS	Below Opti	mum	Optimu	m	Above C	Optimum	
¹ Soil pH	4.9								
² Phosphorus	s (P) 7	ppm							
² Potassium (1	K) 154	ppm							
² Magnesium	(Mg) 74	ppm							
RECOMME	NDATIONS:	(See bo	ack messages for importa	nt informatio	on)				

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	ccordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
-----------	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
260	6.9	9.2	4.3	6.7	14.1	/0			3.7	1.0	10.9	
Test Method	Γest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

	1.7									
SOIL TEST REPORT FOR:						ADDITIONAL COPY TO:				
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB	#	SERIAL#	C	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-324	62		L	ancaster			P-176-	160621-1155-rll-S3A	
SOIL NUTI	RIENT L	EVELS	S		Below Opti	mum	Optimu	m	Above C	Optimum
¹Soil pH	5	5.6								
² Phosphorus	s (P) 1	l	ppm							
² Potassium (K) 6	50	ppm							
² Magnesium	(Mg) 6	53	ppm							

RECOMMENDATIONS:

Limestone*: 2000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accord							ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

(See back messages for important information)

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
131	3.4	4.7	3.3	11.1	13.8				1.3	1.3	4.7	
Test Method:	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TEST	<u>Γ REPORT FO</u>)R:		ADDITIONAL COPY TO:				
RE7 302	N FENSTERM ITEW ASSOCI O COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	DATE LAB# SERIAL# COUNTY					FIELD ID	SOIL	
7/7/2016						P-176-160621-1155-rll-S4	1A	
				-				
SOIL NUTR	RIENT LEVEL	S	Below Opti	imum	Optimu	m Abov	e Optimum	
SOIL NUTR	SIENT LEVEL 5.2	S	Below Opti	imum	Optimu	m Abovo	e Optimum	
	5.2	S ppm	Below Opti	imum	Optimu	m Above	e Optimum	
¹Soil pH	5.2 (P) 1		Below Opti	imum	Optimu	m Above	e Optimum	
¹ Soil pH ² Phosphorus	5.2 (P) 1 K) 147	ppm	Below Opti	imum	Optimu	m Above	e Optimum	

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	ecommendations ac	mmendations accordingly. See back of report.)			
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)		
1 Other			0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	ments Sulfur ppm	
1122	11.1	18.3	2.1	6.8	30.6				1.0	1.0	63.4	
Test Method:	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA			302	O COL	LUMBIA AVE			
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32464		Lancaster			P-187	7-160607-1427-jsw-		
							S1A		
OIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above (Optimum	
OIL NUTE Soil pH	RIENT LEVEL 4.7	S	Below Opti	mum	Optimu	m	Above (Optimum	
	4.7	ppm	Below Opti	mum	Optimu	m	Above (Optimum	
Soil pH	4.7 s (P) 24		Below Opti	mum	Optimu	m	Above (Optimum	
Soil pH Phosphorus	4.7 s (P) 24 K) 175	ррт	Below Opti	mum	Optimu	m	Above (Optimum	
Soil pH Phosphorus Potassium (Magnesium	4.7 s (P) 24 K) 175	ppm ppm ppm	Below Opti			m	Above	Optimum	

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): 30 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	K	Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm		Sulfur ppm	
138 14.1 15.6 2.9 2.5 4.4 9.5 1.2 40.1 Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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SOIL TEST	T REPORT FO	R:		ADDITIONAL COPY TO:					
RE7 302	N FENSTERM ITEW ASSOCI O COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOII	L	
7/7/2016	S16-32465		Lancaster			P-187-160607-1427 S2A	'-jsw-		
SOIL NUTR	RIENT LEVEL	S	Below Opti	imum	Optimu	m A	bove Optimun	1	
¹Soil pH	4.8								
² Phosphorus	(P) 5	ppm							
² Potassium (I	K) 103	ppm							

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 12000 lb/A for a target pH of 6.5.

32

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .5% Mg (.8 % MgO) will satisfy the magnesium requirement

Plant Nu	itrients:	(If manure wil	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop]	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

ppm

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	:		² Trace Elements									
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.8	ration of Mg 1.8	the CEC Ca 4.7	Organic Matter %	Optional To Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.9	ck for com Copper ppm 1.5		
Test Method	s: ¹ 1:1 soil:wate	Test Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations										

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

Nitrogen Ritrogen recommendations on this report are not based on a soil test. They are based on crop requirements for the expected yield of the crop to be grown. The pre-sidedress nitrate soil tests (PSNT) and the Chlorophyll meter test are both available for improving nitrogen recommendations on corn especially when manure is being applied. See: Agronomy Facts 17 "Pre-sidedress Soil Nitrate Test for Corn" and Agronomy Facts 53 "The Early-season Chlorophyll Meter Test for Corn". For optimum efficiency, N should be applied as close to the time of crop need as practical. For corn apply 50-90% of the N when the corn is 10-20" tall. For winter grains apply the N in the spring prior to growth stage 5. For forage grasses split the recommended N for each cutting.

<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)									
Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REP	ORT FO	R:		AI	DDITIONA	AL CC	PY TO:		
DA	N FEN	ISTERM	ACHER		DUANE TRUAX					
RE'	TTEW	ASSOCI	ATES INC			RE'	ΓΤEW	ASSOCIATES		
302	0 COL	UMBIA	AVE			302	0 COL	LUMBIA AVE		
LA	NCAS	ΓER PA	17603			LA	NCAS	TER PA 17603		
DATE	LA	B #	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32	2466		Lancaster			P-187	7-160607-1427-jsw-		
77772010	510 52	1400		Euneuster				S3A		
SOIL NUTE	RIENT	LEVEL	S	Below Opti	imum	Optimu	m	Above Optimum		
¹Soil pH		4.8								
² Phosphorus	(P)	5	ppm							
² Potassium (1	K)	64	ppm							
² Magnesium	(Mg)	22	ppm							
RECOMME	NDAT	IONS:	(See bad	ck messages for importa	nt informati	on)				
Limestone ⁵	*: 800	00 lb/A	for a target pl	H of 6.5.	ľ	Magnesiu	ım (M	1g): 80 lb/A		

*Calcium Carbonate equivalent

Limestone containing 1% Mg (1.6 % MgO) will satisfy the magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate Potash (lb P ₂ O ₅ /A) (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g)	% Satu K 1.6	ration of Mg 1.7	the CEC Ca 2.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.9	Copper ppm 1.5		
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

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<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm)	Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25						

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-215-160602-1037-jsw-7/7/2016 S16-32467 Lancaster S₁A SOIL NUTRIENT LEVELS **Above Optimum Below Optimum Optimum** 3.8 ¹Soil pH ppm ²Phosphorus (P) 16 148 ²Potassium (K) ppm ²Magnesium (Mg) 32 ppm

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 17000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Plant Nutrients:

Limestone containing .4% Mg (.6 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.)

Expected Nitrogen Phosphate Potash

Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	C Organic Nitrate-N Salts Matter ppm mmhos/cm		See back for comments Zinc Copper Sulfur				
	. 1	. 1 6,				%			ppm	ppm	ppm	
150	18.3	16.4	2.3	1.6	4.6				2.3	1.2	9.6	
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CO	PY TO:				
DA	N FENSTERM	IACHER		DUANE TRUAX							
RE	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES							
302	20 COLUMBIA	AVE			302	0 COL	LUMBIA AVE				
LA	NCASTER PA	17603			LA	NCAS'	TER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL			
		GERRI II		HCKLD	ASCS ID		5-160602-1037-jsw-	SOIL			
7/7/2016	2016 S16-32468 Lancaster				1 210	S2A					
SOIL NUTRIENT LEVELS Below Opt					Optimum Above Opt		Optimum				
¹ Soil pH	3.8										
² Phosphorus	(P) 4	ppm									
² Potassium (K) 49	ppm									
² Magnesium	(Mg) 16	ppm									
RECOMME	RECOMMENDATIONS: (See back messages for important information)										
Limestone ³	Limestone*: 12000 lb/A for a target pH of 6.5. Magnesium (Mg): 100 lb/A										
*Calcium Carbo	nate equivalent				Limestone	contain	ning .8% Mg (1.3 %]	MgO) will satisfy the			

magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year Crop			Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	K	Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	Copper ppm	Sulfur ppm	
Test Method:	13.5 s: ¹ 1:1 soil:wate	14.0 er pH, ² Mehlich	0.9 3 (ICP)	1.0), ³ Mehli	1.9 ch Buffer	pH, ⁴ Sumn	nation of Cat	ions	1.5	1.2	12.3	

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1.1 - 9.4	1.2 - 5.5	10 - 25						

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-215-160602-1037-jsw-7/7/2016 S16-32469 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 3.8 ¹Soil pH ²Phosphorus (P) 13 ppm 45 ²Potassium (K) ppm

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 12000 lb/A for a target pH of 6.5.

13

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing .8% Mg (1.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴CEC	% Saturation of the CEC		Organic Nitrate-N Salts		Salts	See back for comments				
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	. Ca	Matter	ppm	mmhos/cm	Zinc	Copper	Sulfur	
(ррш)	(ineq/100 g)	(med/100 g)		-11-6	- Cu	%			ppm	ppm	ppm	
51	13.5	14.0	0.8	0.8	1.8				1.3	1.1	8.9	
<u>'</u>	<u>'</u>		<u>' '</u>	<u> </u>		'						
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

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Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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	1.0								
SOIL TEST	T REPORT FO	OR:		A	DDITION	AL CC	PY TO:		
RE ⁷ 302	N FENSTERM ITEW ASSOC 0 COLUMBIA NCASTER PA	IATES INC AVE			RE' 302	TTEW 20 COL	TRUAX ASSOCIATES LUMBIA AVE TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	S ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32471		Lancaster			P-215	5-160602-1037-jsw- S4A		
OIL NUTR	RIENT LEVEL	S	Below O	ptimum	Optimu	m	Above (Optimum	
Soil pH	4.6								
Phosphorus	(P) 5	ppm							
Potassium (1	K) 33	ppm							
Magnesium	(\mathbf{Mg}) 9	ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.8% Mg (2.9 % MgO) will satisfy the magnesium requirement

recommendations

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 8.1	⁴ CEC (meq/100 g) 8.4	% Satu K 1.0	ration of Mg 0.9	Ca 1.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm 1.5	ck for com Copper ppm 0.9		
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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	1.1								
SOIL TES	T REPORT FO	OR:		AI	DDITIONA	L CC	PY TO:		
RE 302	N FENSTERM TTEW ASSOC 20 COLUMBIA NCASTER PA	IATES INC AVE			RE7	TTEW 0 COI	TRUAX ASSOCIATES LUMBIA AVE TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32472		Lancaster			P-215	5-160602-1037-jsw- S5A		
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above C	Optimum	
¹ Soil pH	4.6								
² Phosphorus	s (P) 3	ppm							
² Potassium (K) 34	ppm							
² Magnesium	(Mg) 9	ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

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*Calcium Carbonate equivalent

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No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations	
---------	---	---	---	---	--	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See ba	ck for com	ments	
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg Ca Matter ppm mmhos/cm Z						Copper	Sulfur	
(FF)	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		% ppm ppm ppm ppm							ppm	
33	33 8.1 8.4 1.0 0.9 1.9 1.4 1.0 31.7											
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC			RE'	TTEW	' ASSOCIATES		
302	20 COLUMBIA	AVE					LUMBIA AVE		
LA	NCASTER PA	17603		LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32473		Lancaster			P-215	5-160602-1037-jsw-		
				<u> </u>			S6A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	imum	Optimu	m	Above C	Optimum	
¹Soil pH	4.3								
² Phosphorus	(P) 1	ppm							
Potassium (K) 15	ppm							
Magnesium	(Mg) 8	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)				
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Calcium Carbo	nate equivalent				Limestone	contai	ning 2.8% Mg (4.4 %	MgO) will satisfy	
					the magne	sium re	equirement	•	
DI 4 NT 4	• 4 /1	C 11 1.			1		udinal. Cashual	£ \	

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)

Year Crop Expected Nitrogen Phosphate Potash

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 \text{ for other crop}}{recommendations}$

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements		
² Calcium (ppm)	(ppm) (meq/100 g) (meq/100 g) K Mg Ca Matter % ppm mmhos/cm Zinc ppm Copper ppm Sulfur ppm 36 5.7 6.0 0.6 1.1 3.0 0.9 0.9 0.8 37.5									
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations										

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Z	Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DAN FENSTERMACHER						ANE TRUAX	PDG		
	TTEW ASSOC 20 COLUMBIA					TTEW ASSOCIAT O COLUMBIA AV	· ·		
	NCASTER PA					NCASTER PA 17			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32474		Lancaster			P-222-160607-105 S1A	5-dat-		
SOIL NUTI	RIENT LEVEL	S	Below Opti	imum	Optimu	m A	Above Optimum		
¹Soil pH	3.8								
² Phosphorus	s (P) 9	ppm							
² Potassium (K) 79	ppm							
² Magnesium	(Mg) 34	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)				

Limestone*: 20000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g) 20.7	⁴ CEC (meq/100 g)	% Satu K 1.2	ration of Mg 1.7	the CEC Ca 5.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm 2.5	Ck for come Copper ppm	Sulfur ppm 18.5	
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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1.1 - 9.4	1.2 - 5.5	10 - 25						

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR:					ADDITIONAL COPY TO:				
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE LAR# SERIAL# COUNTY				ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016 S16-32475 Lancaster				P-222-160607-1055-dat- S2A					
SOIL NUTRIENT LEVELS Below Opt			Below Opti	imum Optimum Above Optimum					
¹ Soil pH	4	1.7							
² Phosphorus	s (P) 4	1	ppm						
² Potassium (K) 5	56	ppm						
² Magnesium (Mg) 16 ppm									

RECOMMENDATIONS:

*Calcium Carbonate equivalent

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): 100 lb/A

Limestone containing 1.4% Mg (2.3 % MgO) will satisfy

the magnesium requirement

					the magnesian					
Plant Nu	itrients:	(If manure v	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of							
66											
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations										

Enclosures

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SO	п тест	DEDOD'

SOIL TES	SOIL TEST REPORT FOR: ADDITIONAL COPY TO:									
DA	AN FENSTERM	IACHER		DUANE TRUAX						
RETTEW ASSOCIATES INC					RE	ГТЕW	ASSOCIATES			
3020 COLUMBIA AVE							LUMBIA AVE			
LANCASTER PA 17603					LA	NCAS	TER PA 17603			
DATE LAR# SERIAL#			COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32476		Lancaster			P-222	2-160607-1055-dat-			
7772010 510 52170 510 52170							S3A			
SOIL NUTI	RIENT LEVEL	$d\mathbf{S}$	Below Opti	imum Optimum Above Optimum)ptimum			
¹ Soil pH	4.7									
² Phosphorus (P) 2 ppm										
² Potassium (K) 44 ppm										
² Magnesium (Mg) 14 ppm										
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)					

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 100 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.7% Mg (2.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 8.1	⁴ CEC (meq/100 g) 8.5	% Satu K 1.3	ration of Mg 1.4	the CEC Ca 2.4	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.3	ck for com Copper ppm 1.1			
Test Method:	Γest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)							
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SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					RE7 302	ANE TRUAX ITEW ASSOCIA' 0 COLUMBIA A' NCASTER PA 17	VE			
DATE	LAB#	SERIAL#	COUNTY	ACRES	S ASCS ID	FIELD ID		SOIL		
7/7/2016	S16-32477		Lancaster			P-222-160607-105 S4A	55-dat-			
SOIL NUTE	RIENT LEVEL	S	Below Opti	imum	Optimu	n .	Above C	Optimum		
¹ Soil pH ² Phosphorus	4.7	ppm								
² Potassium (ppm								

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

32

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing 1% Mg (1.6 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 1 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper			
56	8.1	8.8	1.6	3.0	3.2	%			ppm 1.1	ppm 1.0	ppm 19.6		
Test Method:	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-222-160607-1055-dat-7/7/2016 S16-32478 Lancaster S₅A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.9 ¹Soil pH ²Phosphorus (P) 1 ppm

RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

56

52

Magnesium (Mg): 20 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.5 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

ppm

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴CEC	% Saturation of the CEC			Organic	Nitrate-N	Salts mmhos/cm				
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmmos, em	ppm	ррт	ppm	
70	7.5	8.4	1.7	5.1	4.2				1.3	1.1	14.8	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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SOIL TES	T REPORT	FOR:				A	DDITION	AL CO	OPY TO:		
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603							ADDITIONAL COPY TO: DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	9	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016 S16-32479					ancaster			P-225	5-160601-1130-mel- S1A		
SOIL NUTE	RIENT LEV	ELS			Below Opti	mum	Optimu	m	Above C	Optimum	
¹Soil pH	5.0										
² Phosphorus (P) 3 ppm											
² Potassium (K) 75 ppm											
² Magnesium	(Mg) 60		ppm								
RECOMME	NDATIONS	:	(See ba	ck mess	ages for importa	nt informati	ion)				

Magnesium (Mg):

NONE

Limestone*: 8000 lb/A for a target pH of 6.5. *Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
197 9.9 11.6 1.7 4.3 8.5 1.4 1.4 15.7 Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												
Test Methods	5. 1.1 SOII.Wate	i pri, ivicinici	1 3 (ICI ,), IVICIIII	ch Bullet	pri, Suiii.	nation of Cat	10115				

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	17									
SOIL TES	T REPOR	T FOR:			Al	DDITION	AL CO	OPY TO:		
DA	N FENST	ERMAC	HER			DUANE TRUAX				
RE'	TTEW AS	SOCIAT	ES INC					ASSOCIATES		
	20 COLUM		_					LUMBIA AVE		
LA	NCASTER	PA 176	503		LANCASTER PA 17603					
DATE	LAB#		SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32480			Lancaster			P-225	5-160601-1130-mel-		
SOIL NUTR	RIENT LE	VELS]	Below Opti	mum	Optimu	m	S2A Above C	Optimum	
¹Soil pH	5.0)								
² Phosphorus	(P) 3		ppm							
² Potassium (1	K) 52		ppm							
² Magnesium	(Mg) 11	1	ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

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164	164 12.3 14.2 0.9 6.5 5.8 1.2 1.1 28.1											
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	ACT THE TOTAL TOTA										
SOIL TES	<u>T REPORT F</u>	OR:		AI	<u>DDITION</u>	AL COPY T	:O:				
DA	N FENSTERI	MACHER		DUANE TRUAX							
RE	TTEW ASSOC	CIATES INC			RE'	TTEW ASS	OCIATES				
	20 COLUMBIA				302	0 COLUME	BIA AVE				
						NCASTER					
LANCASTER PA 17603					L/1.	TOTISTER	171 17003				
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	FIEL	D ID	SOIL			
7/7/2016	S16-32481		Lancaster			P-225-1606	01-1130-mel-				
7/7/2010	310-32401		Lancaster			S	3A				
SOIL NUTRIENT LEVELS		LS	Below Opti	mum	Optimu	m	Above (Optimum			
¹ Soil pH	5.0										
² Phosphorus	s (P) 2	ppm									
² Potassium (K) 73	ppm									
² Magnesium	(Mg) 113	ppm									
~ ~	Seconments Tions. (See back messages for important information)										

RECOMMENDATIONS:

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

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recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC		Saturation of the CEC Organic Nitrate-N Salts See back for comments K Mg Ca Matter ppm mmhos/cm Zinc Copper Sulfur								
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppin		ppm	ppm	ppm	
164	9.9	11.8	1.6	7.9	6.9				1.1	1.0	11.9	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603				DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32482		Lancaster			P-225	-160601-1130-mel- S4A		
SOIL NUTRIENT LEVELS Below Opti		mum	Optimum Above		Optimum				
¹ Soil pH ² Phosphorus		ppm		•					
² Potassium (K) 66	ppm							

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

ppm

107

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)		6 Saturation of the CEC Organic Nitrate-N Salts See back for comments K Mg Ca Matter ppm mmhos/cm Zinc Copper Sulfur								
(ppiii)	(meq/100 g)	(meq/100 g)	1,7	K Nig Ca % Nig ppm ppm ppm ppm								
145	12.3	14.1	1.2	6.3	5.1				1.1	1.2	24.6	
Test Methods	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE LAB# SERIAL# COUNTY				ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32483 Lancaster				P-225	5-160601-1130-mel- S5A			
	SOIL NUTRIENT LEVELS Below Opt						1,2//		
SOIL NUTR	RIENT LEVEL	S	Below Opti	mum	Optimu	m		Optimum	
SOIL NUTR	RIENT LEVEL 4.8	S	Below Opti	mum	Optimu	m		Optimum	
	4.8	S ppm	Below Opti	mum	Optimu	m		Optimum	
¹Soil pH	4.8 (P) 1		Below Opti	mum	Optimu	m		Optimum	
¹ Soil pH ² Phosphorus	4.8 s (P) 1 K) 41	ppm	Below Opti	mum	Optimu	m		Optimum	

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

|--|

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴CEC	% Satu	% Saturation of the CEC		Organic	Nitrate-N	Salts mmhos/cm	See bac Zinc	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mminos/em	ppm	ррт	ppm	
83	13.5	14.9	0.7	5.9	2.8				1.1	1.1	57.9	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603						DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#		SERIAL#	COUNTY		ACRES	S ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32484			Lancaster				P-225			
SOIL NUTE	RIENT LEV	ELS			Below Opti	mum	Optimu	m	Above C)ptimum	
¹Soil pH	4.9										
² Phosphorus (P) 1		ppm									
² Potassium (K) 37		ppm									
² Magnesium (Mg) 101		ppm									
DECOMME	NDATION	ç.	(See ba	ck messe	ages for importa	nt informa	tion)				

RECOMMENDATIONS:

(See back messages for important inje

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)		% Saturation of the CEC K Mg Ca			Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur			
	. 1 0,	. 1 0,				%			ppm	ppm	ppm	
81 12.3 13.6 0.7 6.2 3.0 1.0 1.2 66.7												
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT F	OR:		ADDITIONAL COPY TO:						
DA	N FENSTERN	MACHER		DUANE TRUAX						
RE	TTEW ASSOC	CIATES INC			RE'	TTEW ASS	OCIATES			
302	20 COLUMBIA	AVE			302	0 COLUM	BIA AVE			
LA	NCASTER PA	A 17603			LA	NCASTER	PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIEL	D ID	SOIL		
7/7/2016	S16-32485		Lancaster				601-1312-sdd-			
SOIL NUTE	RIENT LEVEI	LS	Below Opti	imum	Optimu		Above (Optimum		
¹Soil pH	4.8									
² Phosphorus	s (P) 17	ppm								
² Potassium (K) 99	ppm								
² Magnesium	(Mg) 148	ppm								
DEGG. 0.45		(Saa ha	ok massagas for importa	nt informati	on)					

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	If manure will be applied, adjust these recommendations accordingly. See back of report.)								
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2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace	² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	Sulfur		
608	10.5	15.0	1.7	8.2	ppm 10.5								
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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1.1 - 9.4	10 - 25								

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		AI	DITION	AL CC	OPY TO:		
	N FENSTERM TTEW ASSOCI			DUANE TRUAX RETTEW ASSOCIATES					
	20 COLUMBIA NCASTER PA						LUMBIA AVE TER PA 17603		
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32486		Lancaster						
OIL NUTRIENT LEVELS			Below Opti	mum	Optimu	m	Above C	ptimum	
Soil pH	4.8								
Phosphorus	(P) 3	ppm							
Potassium (K) 61	ppm							
Magnesium	(Mg) 49	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
	*: 8000 lb/A	for a target p	H of 6.5.	Magnesium (Mg): 20 lb/A					

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) (lb P₂O₅/A) (lb K₂O/A) See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 9.3	⁴ CEC (meq/100 g)	% Satu K 1.5	ration of Mg 4.0	the CEC Ca 3.2	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.9	Copper ppm		
Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-225B-160601-1312-sdd-7/7/2016 S16-32487 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.7 ¹Soil pH ²Phosphorus (P) 1 ppm

RECOMMENDATIONS:

²Potassium (K)

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

50

Magnesium (Mg): 20 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)

Year Crop Expected Nitrogen Phosphate Potash
Yield (lb N/A) (lb P₂O₅/A) (lb K₂O/A)

1 Other 0 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

ppm ppm

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 \text{ for other crop}}{recommendations}$

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g) 10.6	% Satu K 1.2	ration of Mg 3.8	the CEC Ca 1.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 1.3	Copper ppm 1.2			
Test Method:	¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REPORT FO	R:			Al	DDITION	AL CC	PY TO:		
DA	N FENSTERM	IACHER			DUANE TRUAX					
RE	TTEW ASSOC	IATES INC						ASSOCIATES		
302	20 COLUMBIA	AVE						LUMBIA AVE		
LA	NCASTER PA	17603				LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	CO	UNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32488		Lancaster				P-225	B-160601-1312-sdd-		
SOIL NUTE	RIENT LEVEL	S]	Below Opti	imum	Optimu	m	S4A Above C	Optimum	
¹ Soil pH	4.9									
² Phosphorus	s (P) 1	ppm								
² Potassium (Potassium (K) 31									
² Magnesium	(Mg) 68	ppm								
		/C 1	1	<i>c</i> · ·						

RECOMMENDATIONS:

*Calcium Carbonate equivalent

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

Plant N	Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other	•	0	0	0	0	See ST2 for other crop			

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

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---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.3	⁴ CEC (meq/100 g)	% Satu K 0.8	Mg 5.6	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 1.1		
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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SOIL TEST	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:	
RE ⁷ 302	N FENSTERM TTEW ASSOCI O COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID]	FIELD ID	SOIL
7/7/2016	S16-32489		Lancaster			P-227	-160601-1500-jsw-	
I		SOIL NUTRIENT LEVELS Below					S1A	
SOIL NUTR	RIENT LEVEL	S	Below Opti	imum	Optimu	m		Optimum
SOIL NUTR	RIENT LEVEL 4.2	S	Below Opti	imum	Optimu	m		Optimum
	4.2	S ppm	Below Opti	imum	Optimu	m		Optimum
¹Soil pH	4.2 (P) 7		Below Opti	imum	Optimu	m		Optimum
¹ Soil pH ² Phosphorus	4.2 (P) 7 K) 101	ppm	Below Opti	mum	Optimu	m		Optimum

Limestone*: 21000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	lant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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ADDITIONAL RESULTS:							Optional Tests:				² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm				
664	22.5	19.3	1.3	3.7	17.2				3.5	1.4	7.8			
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP). ³ Mehli	ch Buffer	pH. ⁴ Sumn	nation of Cat	ions						

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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SOIL TES	R:			ADDITIONAL COPY TO:							
DA	ACHER			DUANE TRUAX							
RETTEW ASSOCIATES INC							RETTEW ASSOCIATES				
302	20 COL	UMBIA	AVE			3020 COLUMBIA AVE					
LA	NCAS	TER PA	17603				LA	NCAS	TER PA 17603		
DATE	LA	В#	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016 S16-32490			Lancaster				P-22'	7-160601-1500-jsw- S2A			
SOIL NUTI	RIENT	LEVEL	S		Below Opti	mum	Optimu	m)ptimum	
¹Soil pH		4.1									
² Phosphorus	s (P)	8	ppm								
Potassium (K)	89	ppm								
Magnesium	(Mg)	39	ppm								
RECOMME	NDAT	IONS:	(See ba	ck mess	ages for importar	ıt informatio	on)				

Limestone*: 20000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.4	ration of Mg 2.0	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 4.2	Copper ppm		
Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

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SOIL TES	T REPORT FO	R:		ΑI	DITION	AL CC	PY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	0 COI	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32491		Lancaster			P-227	7-160601-1500-jsw-		
.,,,,2010	510 52 151		Durieuster				S3A		
SOIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m	Above (Optimum	
¹Soil pH	4.6								
Phosphorus	s (P) 11	ppm							
Potassium (K) 63	ppm							
Magnesium	(Mg) 27	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
Limestone*: 8000 lb/A for a target pH of 6.5. Magnesium (Mg): 80 lb/A									
Calcium Carbo	nate equivalent				Limestone	contai	ning 1% Mg (1.6 % N	ΛσΩ) will satisfy the	
					magnesiur			igo, um sausiy tic	
Plant Nuti	ionts. (It	f manure will h	e applied, adjust the	se recomi	• • • • • • • • • • • • • • • • • • • •	•		f report.)	
I IAIII INIIII	151115. \4/		appula, aujust iito			,	will be built of	, ,	

Plant Ni	utrients:	(15 manure wiii ve appiied	i, aajust tnese	recommenaations ac	coraingly. See back	oj report.
Year	Crop	Expected	Nitrogen	Phosphate	Potash	
	•	Yield	(lb N/A)	$(lb P_2O_5/A)$	(lb K ₂ O/A)	

1 Other 0 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 for other crop}{recommendations}$

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65	9.9	10.6	1.5	2.1	3.1	70			2.3	1.2	13.1	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CO)PY TO:					
	N FENSTERM TTEW ASSOCI	_		DUANE TRUAX RETTEW ASSOCIATES								
	0 COLUMBIA NCASTER PA						LUMBIA AVE STER PA 17603					
DATE LAB# SERIAL# COUNTY				ACRES ASCS ID		FIELD ID		SOIL				
7/7/2016	S16-32492		Lancaster			P-227	7-160601-1500-jsw- S4A					
SOIL NUTRIENT LEVELS Below Optimum Optimum Above Optimum								Optimum				
¹Soil pH	4.6											
Phosphorus	(P) 21	ppm										
Potassium (K) 39	ppm										
Magnesium	(Mg) 25	ppm										
RECOMME	NDATIONS:	(See ba	ack messages for importa	nt informatio	on)							
Limestone*: 9000 lb/A for a target pH of 6.5. Magnesium (Mg): 100 lb/A												
Calcium Carbo	nate equivalent						ining 1.1% Mg (1.8 % equirement	MgO) will satisfy				
Plant Nutr	rients: (I)	f manure will be	e applied, adjust the	se recomi			•	f report.)				

					* * * * * * * * * * * * * * * * * * * *					
Plant N	utrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other	•		0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

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SOIL TEST	T REPORT FO	R:		AD	DITIONA	AL CO	PY TO:		
RE'	N FENSTERM TTEW ASSOCI 20 COLUMBIA	IATES INC		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE					
LA	NCASTER PA	17603			LA	NCAS7	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	J	FIELD ID	SOIL	
7/7/2016	S16-32493		Lancaster	D 220 160607 1427 dof					
SOIL NUTR	RIENT LEVEL	S	Below Opti	mum	Optimu	m		Optimum	
SOIL NUTR	RIENT LEVEL 4.9	S	Below Opti	mum	Optimu	m)ptimum	
_	4.9	S ppm	Below Opti	mum	Optimui	m		Optimum	
¹Soil pH	4.9 s(P) 5		Below Opti	mum	Optimur	m		Optimum	
¹ Soil pH ² Phosphorus	4.9 5 (P) 5 K) 112	ppm	Below Opti	mum	Optimu	m		Optimum	

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report						ck of report.)	
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	:		Optional Tests:			² Trace Elements						
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.9	ration of Mg 4.7	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
481 11.7 15.1 1.9 4.7 15.9 3.0 1.4 11.1 Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25						

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	1.1 4								
SOIL TES	T REPORT FO	R:			ADDITIONAL COPY TO:				
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE			DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL #	C	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32494		L	ancaster			P-23	9-160607-1427-def- S2A	
SOIL NUTE	RIENT LEVEL	S		Below Opti	imum Optimum Above Optin			Optimum	
¹ Soil pH	5.0								
² Phosphorus	s (P) 4	ppm							
² Potassium (K) 46	ppm							
² Magnesium	(Mg) 101	ppm							

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

(See back messages for important information)

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	% Saturation of the CEC K Mg Ca			Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
147	11.1	12.8	0.9 6.6 5.8 %									
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

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Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

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1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REPORT FO	OR:		AI	ADDITIONAL COPY TO:							
RE 302	N FENSTERM TTEW ASSOC 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603								
DATE	LAB#	SERIAL#	ACRES	ASCS ID	FIF	CLD ID	SOIL					
DATE LAR # SERIAL # COUNTY 7/7/2016 S16-32495 Lancaster						P-239-16	39-160607-1427-def- S3A					
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m	Above C	ptimum				
¹ Soil pH	4.9											
² Phosphorus	s(P) 6	ppm										
² Potassium (K) 68		ppm										
² Magnesium	(Mg) 198	ppm										
		/C 1	. 1	: C ::	1							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC	% Satu	Saturation of the CEC O		Organic	Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
174	6.3	9.0	1.9	18.3	9.7	, ,			1.5	1.2	11.5	
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT	FOR:				Al	DDITION	AL COPY	TO:				
DA	N FENSTI	ERMAC	HER			DUANE TRUAX							
RETTEW ASSOCIATES INC							RE'	TTEW AS	SOCIATES				
3020 COLUMBIA AVE							302	0 COLUM	IBIA AVE				
LANCASTER PA 17603							LA	NCASTER	R PA 17603				
	I												
DATE	LAB#		SERIAL#	CC	DUNTY	ACRES	ASCS ID	FIE	LD ID	SOIL			
7/7/2016	S16-32496			Lancaster				P-239-16					
.,,,,,,,,									S4A				
SOIL NUTE	RIENT LEV	ELS]	Below Opti	mum Optimum			Above Optimum				
¹ Soil pH 4.9													
² Phosphorus (P) 7			ppm										
² Potassium (K) 83			ppm										
² Magnesium (Mg) 176 ppm													
	FCOMMENDATIONS. (See back messages for important information)												

Limestone*: 11000 lb/A for a target pH of 6.5.

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Plant Nu	trients:	cordingly. See bac	ck of report.)			
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|--|

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---------	---	---	---	---	--

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SOIL TES	T REP	ORT FO	R:			ADDITIONAL COPY TO:					
		,	IACHER IATES INC			DUANE TRUAX RETTEW ASSOCIATES					
3020 COLUMBIA AVE LANCASTER PA 17603						3020 COLUMBIA AVE LANCASTER PA 17603					
DATE LAB# SERIAL#					COUNTY	ACDES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-3		SERIAL#	COUNTY Lancaster		ACKES	ASCS ID		A-160607-1430-def- S1A	SOIL	
SOIL NUTRIENT LEVELS			S		Below Opti	mum	Optimu	m		Optimum	
¹Soil pH		4.6									
² Phosphorus (P) 14		ppm									
² Potassium (K) 151		ppm									
² Magnesium (Mg) 156			ppm								
DECOMME	NID A T	TONG.	(See ha	ck mess	ages for importa	nt informati	on)				

RECOMMENDATIONS:

Limestone*: 13000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nutrients:		(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
602	14.7	19.4	2.0	6.7	15.5				7.5	1.5	30.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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COTT TETC	·									
SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
DA	N FENSTERM	IACHER		DUANE TRUAX						
RE'	TTEW ASSOC	IATES INC			RE'	TTEW A	SSOCIATES			
302	0 COLUMBIA	AVE			302	0 COLU	MBIA AVE			
LA	NCASTER PA	17603			LA	NCASTI	ER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID		Fl	IELD ID	SOIL		
7/7/2016 S16-32499			Lancaster			P-239A-	160607-1430-def-			
77772010	510 62199		Zuncuster				S2A			
SOIL NUTRIENT LEVELS		\mathbf{S}	Below Opti	mum	Optimu	m	Above C	Intimum		
			F		Opumu	111	110010	pumum		
¹Soil pH	4.8				Optimu		Above 0	, ptimum		
¹ Soil pH ² Phosphorus		ppm			Optimu		Andre o	ptimum		
_	(P) 3	ppm ppm			Орини		Andre C	, pennum		
² Phosphorus	(P) 3 K) 119	••			Optimu		Andre C	, permuni		

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant N	utrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	К	Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm	ck for com Copper ppm	Sulfur ppm	
I	63 10.5 11.6 2.6 4.4 2.7 2.2 1.5 12.6 Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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	17										
SOIL TES	T REPOR	T FOR	:			ADDITIONAL COPY TO:					
DA	N FENST	ΓERMA	CHER				DUANE TRUAX				
RE'	TTEW AS	SOCIA	TES INC				RE'	TTEW	ASSOCIATES		
302	20 COLUN	MBIA A	VE						LUMBIA AVE		
LA	NCASTE	R PA 17	7603				LA	NCAS	TER PA 17603		
DATE	LAB#		SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-3250	0		L	ancaster			P-239	A-160607-1430-def- S3A		
SOIL NUTR	RIENT LE	EVELS		Below Opti		mum Optimum		Above C	Optimum		
¹Soil pH	4.	9									
² Phosphorus	(P) 2		ppm								
² Potassium (1	K) 10)4	ppm								
² Magnesium	(Mg) 11	1	ppm								

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	mmhos/om		See back for comments Zinc Copper Sulfur ppm ppm ppm		
75 9.9 11.5 2.3 8.1 3.3 1.2 12.4												
Test Method:	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TEST REPORT FOR:						ADDITIONAL COPY TO:				
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603						DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LA	В#	SERIAL#	COUNTY	ACRES	ASCS ID	FIE	ELD ID	SOIL	
7/7/2016 S16-32501 Lancaster							P-239A-1	60607-1430-def- S4A		
SOIL NUTRIENT LEVELS Below O				Below Opt	imum	Optimu	m	Above C	ptimum	
¹Soil pH		5.4								
² Phosphorus	s (P)	2	ppm							
² Potassium (K)	93	ppm							
² Magnesium	(Mg)	211	ppm							

RECOMMENDATIONS:

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

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	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

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Test Method:	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO	R:			A	DDITION	AL CO	PY TO:	
DA	N FENSTERM	IACHER				DU	ANE 7	ΓRUAX	
RETTEW ASSOCIATES INC								ASSOCIATES	
3020 COLUMBIA AVE								UMBIA AVE	
LANCASTER PA 17603						LA	NCAST	ΓER PA 17603	
DATE	LAB#	SERIAL#	C	OUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32502		La	ncaster			P-239A	A-160607-1430-def-	
SOIL NUTE	RIENT LEVEL	S	Т	Below Opti	mum	Optimu	m	S5A A hove (Optimum
¹Soil pH	5.1			Delow Opti		Optimu		Hoove) pumum
² Phosphorus	(P) 2	ppm							
² Potassium (1	K) 76	ppm							
² Magnesium	(Mg) 145	ppm							
		/G 1							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	AL RESULTS	:					Optional T	ests:	² Trace	Elemen	ts	
² Calcium	³ Acidity	⁴CEC			the CEC	Organic	Nitrate-N	Salts mmhos/cm	See bac Zinc	ck for com		
(ppm) (meq/100 g) (meq/100 g) K Mg Ca Matter ppm mmnos/cm Zinc Copper Sultur ppm ppm ppm ppm												
130 6.9 9.0 2.2 13.5 7.2 1.2 1.6 7.8												
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Normal ranges of Z	n, Cu and S in Pennsylvani	a Soils (Mehlich 3)		
Zn (ppm)	Cu (ppm)	S (ppm)		
1.1 - 9.4	1.2 - 5.5	10 - 25		

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SOIL TES	T REP	ORT FO	R:			AI	DDITION	AL CC	PY TO:	
DA	N FEN	ISTERM	ACHER				DU	ANE	TRUAX	
RETTEW ASSOCIATES INC									ASSOCIATES	
3020 COLUMBIA AVE									LUMBIA AVE	
LANCASTER PA 17603							LA	NCAS	TER PA 17603	
DATE	LAI	B #	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32	2503 Lancaster				P-253	3-160608-0950-mel-			
					S1A					
SOIL NUTRIENT LEVELS		S		Below Opti	mum	Optimu	m	Above C	ptimum	
¹ Soil pH		5.6								
² Phosphorus (P) 23		ppm								
² Potassium (K) 144		ppm								
² Magnesium (Mg) 134		ppm								
DECOMME	NID A IDI	ronia.	(See ha	ck moss	ages for importa	nt informati	on)			

RECOMMENDATIONS:

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

Calcium (ppm) Acidity (meq/100 g) 4CEC (meq/100 g) % Saturation of the CEC K Organic Matter % Nitrate-N ppm Salts mmhos/cm See back for comments 1539 8.7 17.9 2.1 6.2 43.0 - <t< th=""><th>ADDITION</th><th>AL RESULTS</th><th>:</th><th></th><th></th><th colspan="3">Optional Tests:</th><th colspan="3">²Trace Elements</th></t<>	ADDITION	AL RESULTS	:			Optional Tests:			² Trace Elements			
1539 8.7 17.9 2.1 6.2 43.0 6.2 1.5 17.4	(ppm)	(meq/100 g)	(meq/100 g)	Mg	Ca	Matter			Zinc	Copper	Sulfur	
Test Methods: 11:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm)	Cu (ppm)	S (ppm)		
1.1 - 9.4	1.2 - 5.5	10 - 25		

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DA RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IACHER IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32504		Lancaster			P-253-160608-0950-mel- S2A			
SOIL NUTRIENT LEVELS Below Optimum Optimum		m Abo	ve Optimum						
¹ Soil pH	5.0								
² Phosphorus	s (P) 11	ppm							
² Potassium (4.4.0	ppm							

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

43

Magnesium (Mg): 30 lb/A

*Calcium Carbonate equivalent

Limestone containing .3% Mg (.5 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

ppm

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium	A REGIONAL STREET OF THE STREET		Salts	See back for comments								
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper	Sulfur	
(ррш)	(meq/100 g)	(med/100 g)		-11-8	- Cu	%			ppm	ppm	ppm	
277	11.1	13.1	2.1	2.7	10.6				2.2	1.7	15.6	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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1 8 5 5

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOCI	IATES INC			RE'	TTEW	ASSOCIATES		
302	20 COLUMBIA	AVE			302	0 COL	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32505		Lancaster			P-253	-160608-0950-mel-		
77772010	510-52505		Lancaster				S3A		
SOIL NUTRIENT LEVELS Below Opt					Optimum Above C		Optimum		
¹ Soil pH	4.6								
² Phosphorus	(P) 3	ppm							
² Potassium (K) 40	ppm							
² Magnesium	(Mg) 17	ppm							
RECOMMENDATIONS: (See back messages for important information)									
Limestone [:]	Limestone*: 8000 lb/A for a target pH of 6.5. Magnesium (Mg): 100 lb/A								
*Calcium Carbo	alcium Carbonate equivalent								

*Calcium Carbonate equivalent Limestone containing 1.3% Mg (2 % MgO) will satisfy the

magnesium requirement
(If manure will be applied, adjust these recommendations accordingly. See back of report.)

Plant Nutrients: Phosphate Expected Nitrogen **Potash** Year Crop Yield (lb P₂O₅/A) (lb K₂O/A) (lb N/A)See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:			Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper		
49	9.3	9.8	1.0	1.4	2.5	%			1.2	ppm 1.4	17.7	
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REP	ORT FO	R:			Al	DDITION	AL CO	OPY TO:	
DA	N FEI	NSTERM	ACHER			DUANE TRUAX				
RETTEW ASSOCIATES INC							RE'	TTEW	' ASSOCIATES	
3020 COLUMBIA AVE							302	O COI	LUMBIA AVE	
LA	LANCASTER PA 17603						LA	NCAS	TER PA 17603	
DATE	I T A	B#	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-3		SERIAL II		ancaster	ACKES	ASCSID	P-253	3-160608-0950-mel-	SOIL
////2010	310-3	2500		L	ancaster				S4A	
SOIL NUTRIENT LEVELS			S	Below Opti		mum Optimum		Above Optimum		
¹Soil pH		4.8								
² Phosphorus	s (P)	15	ppm							
Potassium (K)	39	ppm							
Magnesium	(Mg)	26	ppm							
PECOMME	NDAT	TONG.	(See ba	ck messe	ages for importai	ıt informati	on)			

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.1% Mg (1.8 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
50	8.7	9.3	1.1	2.3	2.7	, ,			1.3	1.4	11.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT I	OR:		Al	DDITION	AL COPY	TO:			
DA	N FENSTER	MACHER		DUANE TRUAX						
RE	TTEW ASSO	CIATES INC			RETTEW ASSOCIATES					
302	20 COLUMBI	A AVE					IBIA AVE			
LA	NCASTER P	A 17603			LA	NCASTEF	R PA 17603			
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID	FIE	LD ID	SOIL		
7/7/2016	S16-32507		Lancaster			P-254-160	608-1050-mel-			
				<u> </u>			S1A			
SOIL NUTI	RIENT LEVE	LS	Below Opti	imum	Optimu	m	Above	Optimum		
¹Soil pH	6.6									
² Phosphorus	s (P) 23	ppm								
² Potassium (K) 145	ppm								
² Magnesium	(Mg) 267	ppm								
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)					

Limestone*: NONE

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
3605	2.0	19.6	1.9	11.4	76.5	%			16.3	1.8	20.6	
Test Method	s: 1:1 soil:wate	er pH. ² Mehlich	3 (ICP)). ³ Mehli	ch Buffer	pH. ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPO	ORT FO	R:			Al	DDITION	AL CC	OPY TO:	
RE 302	TTEW . 20 COL					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAI	B #	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32	2508		L	ancaster			P-254	1-160608-1050-mel- S2A	
SOIL NUTE	RIENT	LEVEL	\mathbf{S}		Below Opti	mum	Optimu	m	Above C	Optimum
¹Soil pH		5.8								
² Phosphorus	s (P)	17	ppm							
² Potassium (K)	138	ppm							
² Magnesium	(Mg)	162	ppm							
DECOMME	NIDATI	ONG.	(See ba	ck messi	ages for importa	nt informati	ion)			

RECOMMENDATIONS:

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:					Optional To	² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	Copper	Sulfur	
1908 6.9 18.1 2.0 7.4 52.6 % 9.7 1.5 16.5												
Test Method	Γest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-254-160608-1050-mel-7/7/2016 S16-32509 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.9 ¹Soil pH ²Phosphorus (P) 7 ppm

RECOMMENDATIONS:

3.5 (3.5) (0.11

Limestone*: 9000 lb/A for a target pH of 6.5.

85

32

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

²Potassium (K)

²Magnesium (Mg)

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 1 Other 0 0 0 0 recommendations

(See back messages for important information)

No crop was specified. Therefore no recommendation is given.

ppm

ppm

2 Other 0 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 \text{ for other crop}}{recommendations}$

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.8	ration of Mg 2.2	the CEC Ca 5.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.2	Copper ppm	~	
Test Method:	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)									
Zn (ppm)	Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPO	ORT FOR	₹:			A]	DDITION	AL CO	OPY TO:			
DAN FENSTERMACHER RETTEW ASSOCIATES INC							DUANE TRUAX					
RETTEW ASSOCIATES INC 3020 COLUMBIA AVE									ASSOCIATES LUMBIA AVE			
LANCASTER PA 17603							LA	NCAS	TER PA 17603			
DATE	LAB	R #	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32	510		L	ancaster			P-254	4-160608-1050-mel- S4A			
SOIL NUTI	RIENT I	LEVELS			Below Opti	mum	Optimu	m	Above C	Optimum		
¹ Soil pH		5.1										
² Phosphorus	s (P)	19	ppm									
² Potassium (K)	81	ppm									
² Magnesium (Mg) 83 ppm												
RECOMME	NDATI	ONS:	(See bac	ck mess	ages for importa	nt informati	on)					

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g) 12.6	% Satu K 1.6	ration of Mg 5.5	the CEC Ca 14.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm 1.2	ck for com Copper ppm 1.4		
Test Method:	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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Zn (ppm)	Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REP	ORT FO	R:			AI	DDITION	AL CC	PY TO:			
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603							DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LA	B #	SERIAL#	(COUNTY	ACRES ASCS ID FIELD ID SOIL						
7/7/2016	S16-32	2511		L	ancaster							
SOIL NUTE	RIENT	LEVEL	\mathbf{S}		Below Opti	mum	Optimu	m	Above (Optimum		
¹Soil pH		4.9										
² Phosphorus	ppm											
² Potassium (K)	154	ppm									
² Magnesium (Mg) 127 ppm												
DECOMME	NDAT	IONG.	(See ba	ck messi	ages for importa	nt informati	on)					

RECOMMENDATIONS:

(See back messages for important information

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter	Nitrate-N ppm				Sulfur	
1289	11.7	19.6	2.0	5.4	32.9	%			ppm 6.8	ppm 1.9	ppm 23.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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SOIL TES	T REPORT FO	R:			AI	DDITION	AL CO	OPY TO:	
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	ATES INC AVE			DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	CC	DUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016 S16-32512 Lancaster							P-069	9-160614-1158-sdd- S2A	
SOIL NUTE	RIENT LEVEL	S]	Below Opti	mum Optimum		Above C	Optimum	
¹ Soil pH	4.2								
² Phosphorus									
² Potassium (
² Magnesium	(Mg) 27	ppm							
RECOMME	NDATIONS:	(See bac	ck messag	es for importar	ıt informati	on)			

Limestone*: 14000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .6% Mg (.9 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	CEC	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
79	15.9	15.8	1.2	1.4	2.5				2.7	1.9	22.6	
Test Method	s: 1:1 soil:wate	er nH. ² Mehlich	3 (ICP). ³ Mehli	ch Buffer	pH. ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL COPY TO:			
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOCI	IATES INC			RE	TTEW ASSOCIATES			
302	20 COLUMBIA	AVE				0 COLUMBIA AVE			
LA	NCASTER PA	17603			LA	NCASTER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32709		Lancaster	P-276-160610-0838-jsw-					
			<u> </u>			S1A			
SOIL NUTI	RIENT LEVEL	\mathbf{S}	Below Opti	imum Optimum Above Optimum			Optimum		
¹ Soil pH	5.1								
² Phosphorus	s (P) 4	ppm							
² Potassium (K) 95	ppm							
² Magnesium	(Mg) 187	ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur			
(ppiii)	(meq/100 g)	(meq/100 g)	17	IVI S	Ca	%			ppm	ppm	ppm	
943	9.9	16.4	1.5	9.5	28.7				5.1	1.9	10.3	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)									
Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

<u>Distribution of Soil Test Results</u> Summaries of soil test results may be used in educational programs. However, individual results will not be released outside of Penn State without permission of the client. Electronic copies of your results are available to you, contact the lab for more information.



Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR:						ADDITIONAL COPY TO:					
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603						DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB	#	SERIAL#	C	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-327	710		Lancaster				P-276	-160610-0838-jsw- S2A		
SOIL NUTRIENT LEVELS				Below Opti		imum Optimum		Above C	ptimum		
¹ Soil pH	4	5.1									
² Phosphorus	s (P)	4	ppm								
² Potassium (K) 8	81	ppm								
Magnesium (Mg) 235 ppm											
			/G 1	1	agas for importa						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	l, adjust these r	ecommendations ac	ccordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC		Saturation of the CEC Organic Nitrate-N Matter ppm m					See ba	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppin		ppm	ppm	ppm	
648	8.7	14.1	1.5	13.9	23.0				3.0	1.7	9.0	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

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Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REP	ORT FO	R:			ADDITIONAL COPY TO:					
			IACHER			DUANE TRUAX RETTEW ASSOCIATES					
		ASSOC! LUMBIA	IATES INC AVE						UMBIA AVE		
LANCASTER PA 17603							LA	NCAS'	TER PA 17603		
DATE	LA	B #	SERIAL#	RIAL # COUNTY			ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-3	2711		L	ancaster	P-276-160610-0838-jsw- S3A					
SOIL NUTE	RIENT	LEVEL	S		Below Opti	imum Optimum		m	Above Optimum		
¹ Soil pH		5.4									
² Phosphorus (P) 2		ppm									
² Potassium (K) 48		ppm									
² Magnesium	(Mg)	233	ppm								
			/G 1	1	c · ·						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 3000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper		
						%			ppm	ppm	ppm	
430	4.5	8.7	1.4	22.3	24.7				1.7	1.7	3.9	
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												
Total Memory 11 Boundary 11 Bo												

Enclosures

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REP	ORT FO	R:			ADDITIONAL COPY TO:					
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE	LA	B #	SERIAL#	COUNTY		ACRES	ASCS ID	FIELD ID		SOIL	
7/7/2016	S16-32	2712		Lancaster				P-276			
SOIL NUTE	RIENT	LEVEL	S		Below Opti	mum	Optimu	m	Above (Optimum	
¹ Soil pH		5.6									
² Phosphorus (P) 2		ppm									
² Potassium (K) 66		ppm									
² Magnesium (Mg) 290		ppm									
DECOMME	NID A (D)	IONIC	(See ha	ck moss	ages for importa	nt informa	ion)				

RECOMMENDATIONS:

Limestone*: 4000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC	% Saturation of the CEC Organic Nitrate-N Salts See back; Matter ppm mmhos/cm Zinc Co			ck for com						
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	PP		ppm	ppm	ppm	
502	5.1	10.2	1.7	23.7	24.6				1.6	2.0	4.9	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

Enclosures

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SOIL TES	T REPORT FO	R:			ADDITION.	AL COPY TO:			
DA	N FENSTERM	IACHER			DUANE TRUAX				
RE	TTEW ASSOC	IATES INC				TTEW ASSOCIAT			
	20 COLUMBIA					20 COLUMBIA AV			
LANCASTER PA 17603					LA	NCASTER PA 17	603		
DATE	DATE LAB# SERIAL# COUNTY		NTY ACR	ES ASCS ID	FIELD ID	SOIL			
7/7/2016	2016 S16-32713 Lancaster		aster		P-276-160610-083	8-jsw-			
SOIL NUTRIENT LEVELS		S	Ве	elow Optimum	Optimu	m S5A	Above Optimum		
¹Soil pH	5.9								
² Phosphorus (P) 2		ppm							
² Potassium (K) 54		ppm							
² Magnesium (Mg) 214		ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 2000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 2.0	K Mg Ca		Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
	414 2.8 6.8 2.0 26.3 30.5 1.0 1.1 2.3 Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:	
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32714		Lancaster			P-279	9-160610-1359-dat- S1A	
SOIL NUTRIENT LEVELS		\mathbf{S}	Below Opti	mum Optimur		m	Above C	Optimum
¹Soil pH	4.7							
² Phosphorus	s(P) 7	ppm						
² Potassium (K) 140		ppm						
² Magnesium	(Mg) 126	ppm						
DECOMME		(Saa ha	ck messages for importa		·			

RECOMMENDATIONS:

Limestone*: 13000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium	³ Acidity	⁴CEC	% Saturation of the CEC					Salts mmhos/cm	See back for comments Zinc , Copper, Sulfur .			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	minios/cm	ppm	ррт	ppm	
557	14.7	18.9	1.9	5.6	14.7				5.1	1.1	15.2	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REP	ORT FO	R:			AI	DDITION	AL CO	OPY TO:	
DA	N FEI	NSTERM	IACHER			DUANE TRUAX				
RE	TTEW	ASSOCI	IATES INC				RE'	TTEW	ASSOCIATES	
3020 COLUMBIA AVE							302	0 COI	LUMBIA AVE	
LANCASTER PA 17603							LA	NCAS	TER PA 17603	
DATE	LA	B #	SERIAL#	(COUNTY	ACRES	ASCS ID	FIELD ID		SOIL
7/7/2016	S16-3	2715		L	Lancaster			P-279-160610-1359-dat- S2A		
SOIL NUTE	RIENT	LEVEL	S	Below Opti		mum Optimum		Above Optimum		
¹Soil pH		4.4								
² Phosphorus	s (P)	6	ppm							
² Potassium (K)	101	ppm							
² Magnesium (Mg) 85 ppm										
RECOMME	NDAT	IONS:	(See ba	ck messe	ages for importar	ıt informati	on)			

Limestone*: 16000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Saturation of the CEC K Mg Ca			Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
296	17.7	17.4	1.5	4.1	8.5				2.6	1.4	12.5	
Test Methods	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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SOIL TES	T REPORT FO	OR:		AI	DDITIONA	L COP	Y TO:	
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FI	ELD ID	SOIL
7/7/2016	S16-32716		Lancaster			P-279-1	60610-1359-dat- S3A	
SOIL NUTE	RIENT LEVEL	LS	Below Opti	mum	Optimu	m	Above	Optimum
¹Soil pH	4.8							
² Phosphorus	s (P) 5	ppm						
² Potassium (K) 104		ppm						
² Magnesium (Mg) 64		ppm						
PECOMME.	NDATIONS:	(See bac	ck messages for importa	nt informati	on)			

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC		% Saturation of the CEC		Organic Matter	mmhos/om		See back for comments Zinc , Copper, Sulfur			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppm		ppm	ppm	ppm	
80	11.1	12.3	2.2	4.3	3.3				1.4	1.6	8.5	
Test Methods	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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DAN FENSTERMACHER RETTEW ASSOCIATES INC					DUANE TRUAX RETTEW ASSOCIATES					
3020 COLUMBIA AVE LANCASTER PA 17603					3020 COLUMBIA AVE LANCASTER PA 17603					
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7/7/2016	S16-32717		Lancaster			P-279	9-160610-1359-dat- S4A			
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above ()ptimum		
¹Soil pH	4.8									
² Phosphorus	(P) 2	ppm								
² Potassium (K) 72	ppm								
² Magnesium	(Mg) 46	ppm								
RECOMME	RECOMMENDATIONS: (See back messages for important information)									

Limestone*: 8000 lb/A for a target pH of 6.5. *Calcium Carbonate equivalent

Magnesium (Mg): 30 lb/A

Limestone containing .4% Mg (.6 % MgO) will satisfy the

magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
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2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.3	⁴ CEC (meq/100 g)	% Satu K 1.8	ration of Mg 3.8	the CEC Ca 2.4	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm 1.4		
Test Method	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)										
Zn (ppm)	Cu (ppm)	S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25								

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT	FOR:			AI	DDITION	AL CO	PY TO:		
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	(COUNTY		ASCS ID	FIELD ID		SOIL	
7/7/2016	S16-32718		L	Lancaster			P-279	-160610-1359-dat- S5A		
SOIL NUTE	RIENT LEV	ELS		Below Opti	mum	Optimu	m	Above C	Optimum	
¹ Soil pH	5.0									
² Phosphorus (P) 1		ppm								
² Potassium (K) 80		ppm								
² Magnesium	(Mg) 133	ppm								

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	ments Sulfur ppm	
134	6.9	8.9	2.3	12.5	7.5				2.7	4.1	6.9	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DITION	AL CO	PY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
	TTEW ASSOC			RETTEW ASSOCIATES					
	20 COLUMBIA			3020 COLUMBIA AVE LANCASTER PA 17603					
LA	NCASTER PA	17603			LA	NCAS	1EK FA 17005		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32719		Lancaster			P-279	A-160610-1450-def-		
	l			<u> </u>			S1A		
SOIL NUTI	RIENT LEVEL	\mathbf{S}	Below Opt	imum	Optimu	m	Above C	ptimum	
¹ Soil pH	4.2								
Phosphorus	s (P) 5	ppm							
Potassium (K) 74	ppm							
Magnesium	(Mg) 39	ppm							
RECOMME	ECOMMENDATIONS: (See back messages for important information)								
Limestone	*: 13000 lb/A	A for a target	pH of 6.5.	Magnesium (Mg): 50 lb/A					
Calcium Carbo	nate eauivalent				Limostona	aontai	ning 40/ Mg (6 0/ M	a() will satisfy	th a

Limestone containing .4% Mg (.6 % MgO) will satisfy the magnesium requirement

Plant N	utrients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts mmhos/cm	See bac Zinc	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mminos/em	ppm	ррт	ppm	
257	14.7	16.5	1.2	2.0	7.8				2.2	1.3	13.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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SOIL TEST	T REPORT FO	R:		AI	DDITION	AL CO	OPY TO:		
DA	N FENSTERM	IACHER			DU	ANE	TRUAX		
RET	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
3020	0 COLUMBIA	AVE					LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32720		Lancaster			P-279A-160610-1450-def- S2A			
SOIL NUTR	IENT LEVEL	S	Below Opti	mum	Optimu	m	Above C)ptimum	
¹ Soil pH	4.8								
$^2 Phosphorus \\$	(P) 2	ppm							
² Potassium (K) 48		ppm							
² Magnesium ((Mg) 22	ppm							

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.3% Mg (2.1 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur ppm ppm ppm			
61	7.5	8.1	1.5	2.3	3.8	70			1.4	1.1	7.6	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		A	DDITION	AL CO	PY TO:			
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE			DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	S ASCS ID	FIELD ID		SOIL		
7/7/2016	S16-32721		Lancaster			P-279A	9A-160610-1450-def- S3A			
SOIL NUTE	RIENT LEVEL	S	Below Op	timum	um Optimum		Above C)ptimum		
¹Soil pH	5.1									
² Phosphorus	(P) 1	ppm								
² Potassium (K) 63		ppm								
² Magnesium	(Mg) 71	ppm								
RECOMME	NDATIONS:	(See ba	ck messages for impor	tant informa	ion)					

RECOMMENDATIONS:

.

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen Phosphate (lb N/A) (lb P ₂ O ₅ /A)		Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:				² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g) 8.1	⁴ CEC (meq/100 g)	% Satu K 1.7	Mg 6.3	the CEC Ca 6.2	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.3	ck for com Copper ppm 1.1	Sulfur ppm 7.0		
Test Method	Fest Methods: 1:1 soil:water pH, Mehlich 3 (ICP), Mehlich Buffer pH, Summation of Cations												

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REP	ORT FO	R:			A	DDITION	AL CO	PY TO:			
DA	N FEN	ISTERM	ACHER			DUANE TRUAX						
RETTEW ASSOCIATES INC							RE	TTEW	ASSOCIATES			
3020 COLUMBIA AVE							302	0 COL	UMBIA AVE			
LA	NCAS	TER PA	17603				LA	NCAS.	ΓER PA 17603			
DATE	LA	B #	SERIAL#	COUNTY		ACRES	S ASCS ID	FIELD ID		SOIL		
7/7/2016 \$16-32722			Lancaster				P-279A	A-160610-1450-def-				
									S4A			
SOIL NUTF	RIENT	LEVEL	S		Below Opti	mum	Optimum		Above Optimum			
¹ Soil pH		5.0										
² Phosphorus	s (P)	1	ppm									
² Potassium (K) 62		ppm										
² Magnesium (Mg) 152			ppm									
DECOMP.	N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TONIC	(Saa ha	ak mass	ages for importa	nt informa	tion)					

RECOMMENDATIONS:

,,

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
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No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Optional To Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com Copper	Sulfur	
107	10.5	12.5	1.3	10.2	4.3	%			ppm 1.3	ppm 1.3	ppm 35.8	
Test Method	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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Zn (ppm)	Cu (ppm)	S (ppm)						
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID		SOIL	
7/7/2016	S16-32724		Lancaster			P-283			
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m	Above ()ptimum	
¹Soil pH	4.7								
² Phosphorus	(P) 10	ppm							
² Potassium (K) 149		ppm							
² Magnesium (Mg) 95		ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	ınt informati	on)				

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	ck for com Copper ppm		
1071	14.1	20.6	1.9	3.8	26.0	,,			6.5	1.5	9.6	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL CC	OPY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES					
3020 COLUMBIA AVE					302	0 COL	LUMBIA AVE		
LANCASTER PA 17603					LA	NCAS	TER PA 17603		
DATE	LAR# SERIAL# COUNTY			ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32725		Lancaster			P-283	3-160606-0743-def- S2A		
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above (Optimum	
Soil pH	4.5								
Phosphorus	s (P) 3	ppm							
Potassium (K) 40	ppm							
Magnesium	(Mg) 26	ppm							
RECOMME	NDATIONS:	(See ba	ack messages for importa	nt informati	on)				
Limestone ³	*: 13000 lb/A	A for a target	pH of 6.5.	I	Magnesiu	ım (N	4g): 80 lb/A		
Calcium Carbo	Limestone containing .6% Mg (1 % MgO) will satisfy the magnesium requirement								
Plant Nutr	rients: (If	f manure will be	e applied, adjust the	se recom	mendation	s accor	rdingly. See back o	f report.)	
Year (Crop	Exp	pected Nitrogen	. P	Phosphate		Potash		

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

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---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
58	14.7	15.3	0.7	1.4	1.9				1.9	1.4	18.8	
Test Methods	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL COPY TO:		
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL	
7/7/2016	S16-32726		Lancaster			P-283-160606-0743-def S3A	-	
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m Abov	e Optimum	
¹Soil pH	4.7							
² Phosphorus	s (P) 2	ppm						
² Potassium (K) 44	ppm						
² Magnesium	(Mg) 30	ppm						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5. **Calcium Carbonate equivalent*

Magnesium (Mg): 60 lb/A

Limestone containing .8% Mg (1.2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc	ck for com Copper		
55	9.3	9.9	1.1	ppm ppm ppm								
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT F	OR:		ADDITIONAL COPY TO:					
RE 302	AN FENSTER TTEW ASSO 20 COLUMBL NCASTER P	CIATES INC A AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32727		Lancaster	P-283-160606-0743-def- S4A					
SOIL NUTE	RIENT LEVE	LS	Below Opti	mum	Optimu	m	Above (Optimum	
¹Soil pH	4.9								
² Phosphorus	s (P) 1	ppm							
² Potassium (K) 62		ppm							
² Magnesium	(Mg) 59	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)				

RECOMMENDATIONS:

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): NO

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	:			² Trace Elements								
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)		· ·		Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See back for comments Zinc Copper Sulfur			
(ppiii)	(meq/100 g)	(meq/100 g)		1116	Cu	%			ppm	ppm	ppm	
75	9.3	10.3	1.5	4.8	3.6				1.1	1.2	13.6	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REPO	ORT FO	R:			AI	DDITIONA	AL CO	OPY TO:									
DA	N FEN	STERM	IACHER			DUANE TRUAX												
RETTEW ASSOCIATES INC							RE'	TTEW	ASSOCIATES									
3020 COLUMBIA AVE							302	0 COI	LUMBIA AVE									
LANCASTER PA 17603							LA	NCAS	TER PA 17603									
DATE LAB# SERIAL# COUNTY						ACRES	ASCS ID		FIELD ID SOIL									
7/7/2016	S16-32	728		La	ncaster		P-283-160606-0743-def- S5A											
SOIL NUTI	RIENT 1	LEVEL	S		Below Opti				Optimum									
¹Soil pH		4.7																
² Phosphorus	s (P)	1	ppm															
² Potassium (K) 69 ppm																		
² Magnesium (Mg) 109 ppm																		
RECOMME	NDATI	ONS:	(See ba	ck messag	ges for importai	ıt informati	on)											

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

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3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:					² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	K	Mg	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	Sulfur ppm	
Test Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REP	ORT FO	R:			A	DDITION	AL CO	OPY TO:		
			ACHER			DUANE TRUAX					
RETTEW ASSOCIATES INC 3020 COLUMBIA AVE							RETTEW ASSOCIATES 3020 COLUMBIA AVE				
LANCASTER PA 17603									TER PA 17603		
DATE	LA	8 # SERIAL # COUNTY			ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32	2729		L	ancaster	P-283-160606-0743-def- S6A					
SOIL NUTE	RIENT	LEVEL	S		Below Opti				ptimum		
¹Soil pH		5.0									
² Phosphorus (P) 2		ppm									
² Potassium (K) 67		ppm									
² Magnesium (Mg) 105 ppm											
DECOMME	NID A (D)	IONIC	(See ha	ck moss	ages for importa	nt informati	ion)				

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

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---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
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48	10.5	11.8	1.5	7.4	2.0				1.2	1.2	17.1	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	SOIL TEST REPORT FOR:					ADDITIONAL COPY TO:				
DA	DAN FENSTERMACHER					DUANE TRUAX				
RE	TTEW ASSOC				ASSOCIATES					
302	20 COLUMBIA	AVE					LUMBIA AVE			
LANCASTER PA 17603					LA	NCAS	TER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32730		Lancaster			P-286	5-160606-0808-def-			
		SOIL NUTRIENT LEVELS Belo								
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	S1A Above C	Optimum		
SOIL NUTE	RIENT LEVEL 3.9	S	Below Opti	mum	Optimu	m		Optimum		
	3.9	S	Below Opti	mum	Optimu	m		Optimum		
¹Soil pH	3.9 s(P) 7		Below Opti	mum	Optimu	m		Optimum		
¹ Soil pH ² Phosphorus	3.9 5 (P) 7 K) 142	ррт	Below Opti	mum	Optimu	m		Optimum		

Limestone*: 22000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)					
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
372	23.7	17.9	2.0	3.8	10.4				2.6	1.0	10.1	
Test Method	Fest Methods: 1:1 soil:water pH. 2Mehlich 3 (ICP), 3Mehlich Buffer pH. 4Summation of Cations											

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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Zn (ppm)	Cu (ppm)	S (ppm)					
1.1 - 9.4	1.2 - 5.5	10 - 25					

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

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SOIL TEST REPORT FOR:					ADDITIONAL COPY TO:						
DAN FENSTERMACHER						DUANE TRUAX					
RETTEW ASSOCIATES INC								ASSOCIATES			
302	20 COLUME	OLUMBIA AVE					3020 COLUMBIA AVE				
LANCASTER PA 17603							LA	NCAS	TER PA 17603		
DATE	LAB#	S	ERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32731			L	ancaster			P-280	6-160606-0808-def- S2A		
SOIL NUTE	RIENT LEV	ELS			Below Opti	mum	Optimu	m	Above C	ptimum	
¹Soil pH	4.8										
² Phosphorus	s (P) 2		ppm								
² Potassium (K) 46		ppm								
² Magnesium	(Mg) 12		ppm								

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.8% Mg (2.9 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.5	Mg	the CEC Ca 3.1	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm	Copper ppm		
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Normal ranges of Z	n, Cu and S in Pennsylvani	a Soils (Mehlich 3)
Zn (ppm)	Cu (ppm)	S (ppm)
1.1 - 9.4	1.2 - 5.5	10 - 25

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-286-160606-0808-def-7/7/2016 S16-32732 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum**

SOIL NUTRIENT LEVELS

Below Optimum
Optimum
Above Optimum

Phosphorus (P) 1 ppm
Potassium (K) 71 ppm
Magnesium (Mg) 21 ppm

RECOMMENDATIONS: (See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 80 lb/A

*Calcium Carbonate equivalent

Limestone containing .9% Mg (1.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 10.5	⁴ CEC (meq/100 g)	% Satu K 1.6	ration of Mg 1.6	the CEC Ca 2.5	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 1.0	Copper ppm		
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	tions				

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .8% Mg (1.2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g)	% Satu K 1.7	Mg 2.5	the CEC Ca 1.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.2	ck for com Copper ppm 1.1				
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions						

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SOIL TES	T REPORT FO)R:		AI	DITIONA	L CO	PY TO:		
RE	N FENSTERM TTEW ASSOC 20 COLUMBIA	IATES INC		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE					
LA	NCASTER PA	17603		LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES ASCS ID FIELD ID		SOIL			
7/7/2016						P-290-	P-290-160606-1445-mel- S1A		
SOIL NUTE	RIENT LEVEL	S	Below Opti	imum Optimum		m	Above Optimum		
¹ Soil pH	3.1								
Phosphorus	s (P) 5	ppm							
Phosphorus (P) 5 ppn Potassium (K) 136 ppn									
Magnesium	(Mg) 36	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importar	nt informatio	on)				

Limestone*: 30000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .2% Mg (.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:							Optional Tests:				
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bad Zinc ppm	ck for com Copper ppm		
236	30.9	16.8	2.1	1.8	7.0				4.0	1.1	11.8	
Test Method	s· 11·1 soil·wate	er nH ² Mehlich	3 (ICP)) ³ Mehli	ch Ruffer	nH ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

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Zn (ppm)	S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:		
	AN FENSTERM ETTEW ASSOC			DUANE TRUAX RETTEW ASSOCIATES					
	20 COLUMBIA NCASTER PA			3020 COLUMBIA AVE LANCASTER PA 17603					
DATE LAB#		SERIAL#	COUNTY	ACRES	ACRES ASCS ID FIELD 1		FIELD ID	SOIL	
7/7/2016	S16-32735				P-290-160606-1445-mel- S2A				
SOIL NUTI	RIENT LEVEL	S	Below Opti	mum Optimum		Above C	Optimum		
¹Soil pH	3.5								
² Phosphorus	s (P) 9	ppm							
² Potassium (K) 58	ppm							
² Magnesium	(Mg) 20	ppm							
RECOMME	ENDATIONS:	(See bac	ck messages for importa	nt informati	on)				

Magnesium (Mg): 80 lb/A

Limestone*: 15000 lb/A for a target pH of 6.5. *Calcium Carbonate equivalent

Limestone containing .5% Mg (.9 % MgO) will satisfy the

magnesium requirement

Plant Nu	utrients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 17.1	⁴ CEC (meq/100 g)	% Satu K 0.9	ration of Mg 1.1	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.0	Ck for come Copper ppm 1.1	ments Sulfur ppm 11.1	
Test Methods	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³Mehli	ch Buffer	pH, ⁴Sumn	nation of Cat	ions				

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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1 8 5 5

		SOIL TEST REPORT FOR: ADDITIONAL COPY TO:										
SOIL TES	T REPORT				ADDITIONAL COPY TO:							
DA	N FENSTE	RMACHE	ER			DUANE TRUAX						
RE	TTEW ASSO	INC				RI	ETTEW	ASSOCIATES				
3020 COLUMBIA AVE							30	20 COI	LUMBIA AVE			
LA	LANCASTER PA 17603						LANCASTER PA 17603					
DATE	LAB#	SE	RIAL#	C	OUNTY	ACRES	ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32736			La	ancaster			P-290	0-160606-1445-mel-			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									S3A			
SOIL NUTE	SOIL NUTRIENT LEVELS				Below Opti	mum	Optim	ım	Above C)ptimum		
¹Soil pH	4.7											
² Phosphorus	s (P) 2	l	ppm	ļ								
² Potassium (Potassium (K) 40											
² Magnesium	Magnesium (Mg) 10 ppm											
				ck messa								

RECOMMENDATIONS:

*Calcium Carbonate equivalent

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

Limestone containing 1.8% Mg (2.9 % MgO) will satisfy

the magnesium requirement

Plant Nutrients: (If manure			ill be applied	, adjust these r	ecommendations ac	ccordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:				² Trace Elements		
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm		
39	7.5	7.9	1.3	1.1	2.4	70			1.3	1.0	18.2		
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REPORT FO	R:		AI	DITIONA	L COPY	TO:		
DA	N FENSTERM	IACHER			DU.	ANE TRI	UAX		
RE	TTEW ASSOCI	IATES INC			RE7	TTEW AS	SOCIATES		
302	20 COLUMBIA	AVE			302	0 COLUM	IBIA AVE		
LA	NCASTER PA	17603			LAI	NCASTE	R PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIE	CLD ID	SOIL	
7/7/2016	S16-32737		Lancaster			P-290-160	0606-1445-mel- S4A		
SOIL NUTI	RIENT LEVEL	S	Below Opti	mum	Optimu	n	Above O	ptimum	
¹Soil pH	4.5								
Phosphorus	s (P) 1	ppm							
Potassium (K) 42	ppm							
Magnesium	(Mg) 11	ppm							
RECOMME	NDATIONS:	(See bac	ck messages for importar	ıt informatio	on)				

*Calcium Carbonate equivalent

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

Limestone containing 1.6% Mg (2.5 % MgO) will satisfy

the magnesium requirement

					the magnesian	requirement	
Plant Nu	itrients:	(If manure v	vill be applied	l, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See ba	ck for com	ments	
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper	Sulfur	
(FF)	· 1 2/	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				%			ppm	ppm	ppm	
44	8.7	9.1	1.2	1.0	2.4				1.0	0.9	23.7	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	10.25							

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Fax: (814) 863-4540

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SOIL TES	T REP	ORT FO	R:			AI	DITION	AL CO	OPY TO:	
DA	N FEN	NSTERM	IACHER			DUANE TRUAX				
RE'	TTEW	ASSOC	IATES INC			RETTEW ASSOCIATES				
3020 COLUMBIA AVE							302	O COI	LUMBIA AVE	
LANCASTER PA 17603						LA	NCAS	TER PA 17603		
DATE	LA	B #	SERIAL#	C	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32	2738		L	ancaster			P-291	l-160606-1330-mel-	
1,1,2020									S1A	
SOIL NUTE	\mathbf{S}		Below Opti	mum	Optimu	timum Above Optimum				
¹Soil pH		4.3								
² Phosphorus	(P)	4	ppm							
² Potassium (1	K)	65	ppm							
² Magnesium	(Mg)	33	ppm							
RECOMME	NDAT	IONS:	(See ba	ck messa	ages for importar	nt informati	on)			
Limestone ³	*: 160	000 lb/A	A for a target	pH of	6.5.	N	Magnesiu	ım (N	(1g): 50 lb/A	
*Calcium Carboi	nate equi	ivalent					Limestone	contai	ning .3% Mg (.5 % M	(gO) will satisfy the
							magnesiur	n requi	rement	

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$

See ST2 for other crop 1 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 0 0 0 0 2 Other recommendations

No crop was specified. Therefore no recommendation is given.

See ST2 for other crop 3 Other 0 0 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for come Copper ppm		
143	17.7	16.2	1.0	1.7	4.4				1.7	1.1	10.2	
Tost Mathad	o: 11.1 coil:wate	nu nU 2Mahliah	2 (ICD)	³ Mahli	oh Duffor	nH ⁴ Cumn	nation of Cat	ions				

Test Methods: 1:1 soil:water pH, Mehlich 3 (ICP), Mehlich Buffer pH, Summation of Cations

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DITION	AL COI	PY TO:	
DA	AN FENSTERM	IACHER			DU	ANE T	RUAX	
RE	RETTEW ASSOCIATES INC RETTEW ASSOCIATES							
302	20 COLUMBIA	AVE	3020 COLUMBIA AVE					
LANCASTER PA 17603			LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	F	TELD ID	SOIL
7/7/2016	S16-32739		Lancaster			P-291-	160606-1330-mel-	
							S2A	
SOIL NUTI	RIENT LEVEL	S	D-1 04		O4:		A hove ()ti
	CIETTI EBYEE		Below Opti	mum	Optimu	111	Above)ptimum
	4.5	5	Below Opti	mum	Opumu	111	Above	<i>y</i> pumum
Soil pH Phosphorus	4.5	ppm	Below Opti	mum	Opumu	"	Above	optimum
¹ Soil pH Phosphorus	4.5 s (P) 1		Below Opti	mum	Opumu	111	Above	, punum
Soil pH	4.5 s (P) 1 K) 37	ррт	Below Opti	mum	Opumu	111	Above	optimum
Soil pH Phosphorus Potassium (Magnesium	4.5 s (P) 1 K) 37	ppm ppm ppm	ck messages for importati				Above	Jennum

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.2% Mg (2 % MgO) will satisfy the magnesium requirement

Plant Nu	itrients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)		
1 Other			0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	:		Optional Tests:			² Trace Elements						
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com Copper	Sulfur	
37	11.1	11.5	0.8	0.8	1.6	%			ppm 1.1	ppm 1.4	ppm 12.3	
Test Method	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	10.25							

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	OPY TO:	
RE 302	AN FENSTERM TTEW ASSOC 20 COLUMBIA ANCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32740		Lancaster			P-291	1-160606-1330-mel- S3A	
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimum Above Optimum			Optimum
¹Soil pH	4.6							
² Phosphorus	s (P) 3	ppm						
² Potassium (K) 52	ppm						
² Potassium (K) 52 ppm ² Magnesium (Mg) 36 ppm								
`		ppm						
² Magnesium			ck messages for importa	nt informati	on)			

Limestone*: 14000 lb/A for a target pH of 6.5.

Magnesium (Mg):

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.6 % MgO) will satisfy the magnesium requirement

Plant Nu	Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)						ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other 0	0	0	0	See ST2 for other crop recommendations
------------------	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
95	95 15.9 15.9 0.8 1.9 3.0 1.8 1.6 20.2											
Test Method	est Methods: 1:1 soil:water pH, Mehlich 3 (ICP), Mehlich Buffer pH, Summation of Cations											

Enclosures

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-291-160606-1330-mel-7/7/2016 S16-32741 Lancaster SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 4.7 ¹Soil pH ²Phosphorus (P) 1 ppm 58 ppm ²Potassium (K) 41 ppm ²Magnesium (Mg)

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 1 Other 0 0 0 0 recommendations

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Test Method	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)									
Zn (ppm) Cu (ppm) S (ppm)									
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TEST	SOIL TEST REPORT FOR:							AL CO	PY TO:	
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603						DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAI	R#	SERIAL#	COUN	NTY .	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32	2742		Lancaster				P-347-160621-1409-def- S1A		
SOIL NUTR	RIENT	LEVELS	S	Below Opti		mum Optimum		Above Optimum		
¹ Soil pH		4.2								
² Phosphorus	(P)	8	ppm							
Potassium (K) 133 ppm										
² Magnesium (Mg) 131 ppm										
DEGG. 10 (E)			(See ba	ak massagas fa	on important	:f				· ·

RECOMMENDATIONS:

Limestone*: 18000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	cordingly. See bad	ck of report.)			
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.9	ration of Mg 6.0	the CEC Ca 10.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 4.6	Copper ppm		
	Fest Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	OR:		ADDITIONAL COPY TO:					
DA	N FENSTERN	MACHER		DUANE TRUAX					
RE'	TTEW ASSOC	CIATES INC			RE.	ΓΤΕW	ASSOCIATES		
302	0 COLUMBIA	AVE			302	0 COI	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32743		Lancaster			P-347	7-160621-1409-def-		
		<u> </u>					S2A		
SOIL NUTE	RIENT LEVEL	LS	Below Opti	mum	Optimu	m	Above (Optimum	
¹Soil pH	4.7								
Phosphorus	(P) 5	ppm							
Potassium (K) 63	ppm							
Magnesium	(Mg) 37	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
Limestone ³	*: 11000 lb/	A for a target	pH of 6.5.	N	Aagnesiu	ım (N	(1g): 50 lb/A		
Calcium Carbonate equivalent					Limestone	contai	ning .5% Mg (.7 % M	(gO) will satisfy the	
					magnesiun	n requi	rement		

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)

Expected Nitrogen **Phosphate Potash** Year Crop Yield (lb P₂O₅/A) (lb K₂O/A) (lb N/A)See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 for other crop}{recommendations}$

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm) 48	³ Acidity (meq/100 g) 12.3	⁴ CEC (meq/100 g)	% Satu K 1.2	Mg 2.4	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm 2.3	Ck for come Copper ppm 1.9		
Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REPO	ORT FO	R:			A	DDITION	AL COP	PY TO:		
DA	N FENS	STERM	ACHER			DUANE TRUAX					
RETTEW ASSOCIATES INC							RE'	TTEW A	ASSOCIATES		
302	20 COLU	JMBIA A	AVE			3020 COLUMBIA AVE					
LA	NCAST	ER PA	17603				LA	NCAST	ER PA 17603		
DATE	LAB	s #	SERIAL#	(COUNTY	ACRES	ASCS ID	F	IELD ID	SOIL	
7/7/2016 S16-32744 Lancaster						P-352-	160621-1145-def-				
7772010 S10 52744 Editedser								S1A			
SOIL NUTRIENT LEVELS				Below Opti	mum	Optimu	m	Above C	ptimum		
¹ Soil pH		5.0									
² Phosphorus	s (P)	13	ppm								
² Potassium (K)	155	ppm								
² Magnesium (Mg) 189 ppm											
DECOMB (E		ONG	(See ha	ck mass	gaes for importan	nt informat	ion)				

RECOMMENDATIONS:

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): N

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)				
1 Other			0	0	0	0	See ST2 for other crop recommendations			

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts	See ba	ck for com	ments	
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc	Copper	Sulfur	
(FF)	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				%			ppm	ppm	ppm	
1217	13.5	21.6	1.8	7.3	28.2				8.9	1.7	17.7	
Test Methods: 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REPO	RT FOR	:			Al	DDITION	AL CO	PY TO:		
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603							DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB	#	SERIAL#	CO	UNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	7/7/2016 S16-32745 Lancaster							P-352	R-160621-1145-def- S2A		
SOIL NUTRIENT LEVELS Below Op					Below Optio	mum	Optimu	m	Above C	ptimum	
¹ Soil pH	4	5.0									
² Phosphorus	s (P)	6	ppm								
² Potassium (K)	94	ppm								
² Magnesium (Mg) 152 ppm											
² Magnesium	(Mg)								_		

RECOMMENDATIONS:

(See back messages for important inform

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

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Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴CEC			the CEC	Organic Matter	Nitrate-N	Salts mmhos/cm	See ba	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm		ppm	ррт	ppm	
631	11.1	15.8	1.5	8.0	20.0				2.0	1.5	11.6	
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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SOIL TES	T REPORT FO	R:		AI	DDITION	AL CO	PY TO:		
DA	N FENSTERM	IACHER			DU	ANE 7	ΓRUAX		
RE	TTEW ASSOC	IATES INC			RE'	ΓΤΕW	ASSOCIATES		
302	20 COLUMBIA	AVE		3020 COLUMBIA AVE					
LA	NCASTER PA	17603			LA	NCAST	ΓER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID]	FIELD ID	SOIL	
7/7/2016 S16-32746 Lancaster						P-352	-160621-1145-def-		
SOIL NUTI	RIENT LEVEL	S	Below Opti	imum	Optimu	m	S3A Above C	ptimum	
¹ Soil pH	5.2								
² Phosphorus	s (P) 4	ppm							
² Potassium (K) 66	ppm							
² Magnesium	(Mg) 131	ppm							
		/5. 1			,				

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)							
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITIONAL RESULTS:							Optional Tests:				² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	ments Sulfur ppm		
262	11.1	13.7	1.2	8.0	9.6				1.5	2.2	9.6		
Test Method	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

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SOIL TES	T REPO	ORT FO	R:			Al	DDITION	AL CO	PY TO:		
		ISTERM. ASSOCI	ACHER ATES INC			DUANE TRUAX RETTEW ASSOCIATES					
3020 COLUMBIA AVE LANCASTER PA 17603							3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAI	3 #	SERIAL#	C	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016 S16-32747 Lancaster							P-352	2-160621-1145-def- S4A			
SOIL NUTRIENT LEVELS Below				Below Opti							
¹Soil pH		5.4									
² Phosphorus	s (P)	3	ppm								
² Potassium (K)	98	ppm								
² Magnesium	(Mg)	216	ppm								

RECOMMENDATIONS:

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)		
1 Other			0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Saturation of the CEC			Organic Matter	Salts mmhos/cm	See bac Zinc	ck for com			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppm		ppm	ppm	ppm	
280	9.9	13.3	1.9	13.5	10.5				1.4	2.3	8.3	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TEST REPORT FOR:							ADDITIONAL COPY TO:					
DAN FENSTERMACHER								—	TRUAX			
RETTEW ASSOCIATES INC							RE	TTEW	ASSOCIATES			
302	20 COL	UMBIA	AVE				302	O COL	LUMBIA AVE			
LA	NCAS'	TER PA	17603				LA	NCAS	TER PA 17603			
DATE	LA	B #	SERIAL#	(COUNTY ACRES ASCS ID FIELD ID					SOIL		
7/7/2016	S16-32	2748		Lancaster				P-352-160621-1145-def-				
						<u> </u>	<u> </u>		S5A			
SOIL NUTRIENT LEVELS		\mathbf{S}		Below Opti	mum Optimum		Above (Optimum				
¹Soil pH		5.3										
² Phosphorus	s (P)	2	ppm									
² Potassium (K)	117	ppm									
² Magnesium	(Mg)	276	ppm									
DEGG. 0.45	N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TONG	(See ha	ak mass	agas for importa	nt informat	ion)					

RECOMMENDATIONS:

(See such messages jet unpertant unj

Limestone*: 5000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

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Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	K	Mg	the CEC Ca	Organic Matter %	Optional To Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	Sulfur ppm	
278 6.3 10.3 2.9 22.3 13.5 1.1 1.8 6.3 Test Methods: \(^121\) soil:water pH, \(^2\)Mehlich 3 (ICP), \(^3\)Mehlich Buffer pH, \(^4\)Summation of Cations												

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SOIL TES	T REPORT F	OR:		ADDITIONAL COPY TO:				
DA	N FENSTERN	MACHER		DUANE TRUAX				
RE	TTEW ASSOC	CIATES INC					SSOCIATES	
302	20 COLUMBIA	AVE					MBIA AVE	
LA	NCASTER PA	A 17603			LA	NCASTE	ER PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID		SOIL
7/7/2016	7/2016 S16-32749 Lancaster				P-352-1	60621-1145-def-		
				<u> </u>			S6A	
SOIL NUTRIENT LEVELS		LS	Below Opti	imum	Optimu	m	Above C	ptimum
¹ Soil pH 5.3								
² Phosphorus (P) 1		ppm						
² Potassium (K) 112		ppm						
² Magnesium (Mg) 260		ppm						
DECOLO E	NID A PERONIC	(See be	ck massagas for importa	nt informati	on)			

RECOMMENDATIONS:

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

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Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)		
1 Other			0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:					² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	Optional To Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com Copper	Sulfur	
262	8.1	11.9	2.4	18.3	11.0	%			ppm 1.0	ppm 2.0	ppm 7.5	
Test Method	Γest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT F	OR:			Al	DDITION	AL CO	PY TO:	
DA	N FENSTER	MACHER			DUANE TRUAX				
RETTEW ASSOCIATES INC						RE	TTEW.	ASSOCIATES	
3020 COLUMBIA AVE						302	0 COL	UMBIA AVE	
LANCASTER PA 17603						LA	NCAST	TER PA 17603	
DATE	LAB#	SERIAL #	(COUNTY	ACRES	ASCS ID	I	FIELD ID	SOIL
7/7/2016 \$16-32750		L	ancaster			P-010-	160620-1315-mgw-		
				-				S1A	
SOIL NUTI	RIENT LEVE	LS		Below Opti	mum Optimun		m	Above (Optimum
¹Soil pH	4.8								
² Phosphorus (P) 8		ppm							
² Potassium (K) 152		ppm							
² Magnesium (Mg) 128		ppm							
DECOMME	NIDATIONS.	(See ha	ck messa	ages for importa	nt informati	ion)			

RECOMMENDATIONS:

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	ill be applied	, adjust these r	ecommendations ac	cordingly. See bad	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:			Optional Tests: ² Trace Elements				ts			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of	the CEC	Organic Matter	ppm mmhos/cm Zin		See bac Zinc ppm	.		
832	10.5	16.1	2.4	6.6	25.8				4.2	1.3	7.0	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:		Al	DDITION	AL CO	PY TO:		
DA	DAN FENSTERMACHER				DUANE TRUAX				
RE	TTEW ASSOC	IATES INC					ASSOCIATES		
	20 COLUMBIA						UMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	ΓER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32751		Lancaster			P-010-	160620-1315-mgw-		
							S2A		
SOIL NUTI	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m	Above C)ptimum	
¹Soil pH	3.6								
² Phosphorus	s (P) 17	ppm							
² Potassium (K) 64	ppm							
² Magnesium	(Mg) 33	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	ion)				
Limestone	*: 18000 lb/A	A for a target	pH of 6.5.	I	Magnesiu	ım (M	Ig): 50 lb/A		
*Calcium Carbo	nate equivalent								

*Calcium Carbonate equivalent Limestone containing .39

Limestone containing .3% Mg (.4 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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ADDITION	AL RESULTS	:					Optional To	ests:	² Trace	Elemen	ts	
² Calcium (ppm)	³ Acidity (meq/100 g) 20.1	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 1.7	the CEC Ca 6.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.8	ck for com Copper ppm 1.4		
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

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SOIL TES	T REPORT FO	R:		AI	DITION	AL CO	PY TO:	
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE			RE' 302	TTEW 20 COL	TRUAX ASSOCIATES LUMBIA AVE TER PA 17603	
DATE	LAR#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32752		Lancaster			P-010-	-160620-1315-mgw- S3A	
SOIL NUTE	RIENT LEVEL	S	Below Opti	imum	Optimu	m	Above C)ptimum
¹Soil pH	4.1							
² Phosphorus	s (P) 7	ppm						
² Potassium (1	K) 46	ppm						
² Magnesium	(Mg) 17	ppm						
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	on)			
Limestone ³	*: 18000 lb/A	A for a target	pH of 6.5.	I	Magnesiu	ım (N	Ig): 100 lb/A	
*Calcium Carbon	nate equivalent				Limestone	e contair	ning 6% Mg (9 % M	σO) will satisfy the

Limestone containing .6% Mg (.9 % MgO) will satisfy the magnesium requirement

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No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 0.8	Mg 0.9	the CEC Ca 2.3	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.4	ck for come Copper ppm 1.4	Sulfur ppm 21.4	
Test Method	s: ¹ 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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SOIL TES	T REPORT FO	R:			A.	DDITION	AL CO	PY TO:	
DA	N FENSTERM	IACHER				DU	ANE	TRUAX	
RE	TTEW ASSOC	IATES INC				RE	TTEW	ASSOCIATES	
302	20 COLUMBIA	AVE						LUMBIA AVE	
LA	NCASTER PA	17603				LA	NCAS	TER PA 17603	
DATE	LAB#	SERIAL#	(COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32753		L	ancaster			P-010	-160620-1315-mgw- S4A	
SOIL NUTE	RIENT LEVEL	\mathbf{S}		Below Opti	mum	Optimu	m	Above (Optimum
¹ Soil pH	4.7								
² Phosphorus	(P) 7	ppm							
² Potassium (K) 25	ppm							

ppm (See back messages for important information) **RECOMMENDATIONS:**

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

²Magnesium (Mg)

Limestone containing 1.2% Mg (2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 1 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
45	11.1	11.5	0.6	0.8	2.0				2.2	1.0	25.5	
Test Method:	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)	, ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)								
Zn (ppm) Cu (ppm) S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25						

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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802

SOIL TEST REPORT FOR:

DAN FENSTERMACHER
RETTEW ASSOCIATES INC
3020 COLUMBIA AVE
LANCASTER PA 17603

LINIVERSITY Park, PA 16802
www.aasl.psu.edu

ADDITIONAL COPY TO:

DUANE TRUAX
RETTEW ASSOCIATES
3020 COLUMBIA AVE
LANCASTER PA 17603

 DATE
 LAB #
 SERIAL #
 COUNTY
 ACRES ASCS ID
 FIELD ID
 SOIL

 7/7/2016
 S16-32754
 Lancaster
 P-010-160620-1315-mgw-S5A

SOIL NUTRIENT	LEVELS		Below Optimum	Optimum	Above Optimum
¹Soil pH	4.7				
² Phosphorus (P)	2	ppm			
² Potassium (K)	17	ppm			
² Magnesium (Mg)	8	ppm			

RECOMMENDATIONS: (See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.4% Mg (2.2 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other 0 0 0 See ST2 for other crop recommendations

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 9.9	⁴ CEC (meq/100 g)	% Satu K 0.4	ration of Mg 0.7	the CEC Ca 1.8	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.9	Ck for come Copper ppm		
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT FO)R:		A	DDITIONA	AL CO	OPY TO:		
DA	N FENSTERM	IACHER			DU	ANE	TRUAX		
RE	TTEW ASSOC	IATES INC		RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	O COI	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32755		Lancaster			P-010	-160620-1315-mgw- S6A		
SOIL NUTI	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above C	ptimum	
¹Soil pH	4.7								
² Phosphorus	s (P) 1	ppm							
Potassium (K) 25	ppm							
Magnesium	(Mg) 9	ppm							
RECOMME	ECOMMENDATIONS: (See back messages for important information)								
	000011 /4	C 4 4 1		-		(3	/T. \ 110.11 /A		

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

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No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

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ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g) 10.5	⁴ CEC (meq/100 g)	% Satu K 0.6	ration of Mg 0.7	the CEC Ca 2.0	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.6	ck for com Copper ppm 1.1			
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CC	PY TO:	
DA	N FENSTERM	IACHER		DUANE TRUAX				
RE	TTEW ASSOCI	IATES INC			RE'	TTEW	ASSOCIATES	
302	20 COLUMBIA	AVE			302	O COL	LUMBIA AVE	
LANCASTER PA 17603					LA	NCAS	TER PA 17603	
DATE LAR# SERIAL# COUNTY					ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32756		Lancaster			P-010	-160620-1315-mgw-	
77772010	510 52/50		Luneuster				S7A	
SOIL NUTRIENT LEVELS Below Opt					Optimu	Optimum Above C		Optimum
¹Soil pH	4.6							
² Phosphorus	s (P) 1	ppm						
² Potassium (K) 23	ppm						
² Magnesium	(Mg) 9	ppm						
RECOMME	RECOMMENDATIONS: (See back messages for important information)							
Limestone ³	*: 9000 lb/A	for a target p	H of 6.5.	Magnesium (Mg): 110 lb/A				
*C-1-: C1								

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2 Other	0	0	0	0	See ST2 for other crop recommendations

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Test Method	Cest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL CO	OPY TO:		
	AN FENSTERM TTEW ASSOCI	-		DUANE TRUAX RETTEW ASSOCIATES					
3020 COLUMBIA AVE LANCASTER PA 17603							LUMBIA AVE STER PA 17603		
DATE	LAB#	SERIAL #	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32758		Lancaster			P-010	-160620-1315-mgw- S8A		
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above (Optimum	
¹ Soil pH	4.6								
² Phosphorus	s (P) 1	ppm							
² Potassium (K) 30	ppm							
² Magnesium	(Mg) 14	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informati	ion)				
Limestone	*: 15000 lb/A	A for a target	pH of 6.5.	ľ	Magnesiu	ım (N	(Ig): 100 lb/A		
*Calcium Carbo	nate equivalent		ning .7% Mg (1.1 % I rement	MgO) will satisfy the					
Plant Nuti	rients: (I)	f manure will be	e applied, adjust the	se recom	mendation:	s acco	rdingly. See back o	f report.)	
Veer	Cron	Ext	pected Nitrogen	P	Phosphate		Potash		

Plant Nu	trients:	(1) manure win ve appned	mure win be applied, adjust these recommendations accordingly. See back of repor					
Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other		0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations	
-----------------	---------	---	---	---	---	--	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm		
55	17.1	15.5	0.5	0.8	1.8	70			1.0	0.9	33.3		
Test Method:	Cest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm)	Cu (ppm)	S (ppm)					
1.1 - 9.4	1.2 - 5.5	10 - 25					

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL CC	PY TO:		
DA	N FENSTERM	IACHER			DU.	ANE	TRUAX		
RE	TTEW ASSOC	IATES INC			RE	ΓΤΕW	ASSOCIATES		
302	20 COLUMBIA	AVE			302	0 COI	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32759		Lancaster			P-04	5-160614-1019-jcr-		
SOIL NUTI	RIENT LEVEL	S	Below Opt	imum	Optimu	m	S1A Above ()ptimum	
¹Soil pH	4.4				· F			• • • • • • • • • • • • • • • • • • • •	
² Phosphorus	s (P) 8	ppm							
Potassium (K) 127	ppm							
Magnesium	(Mg) 54	ppm							
		/G 1	1		,				

RECOMMENDATIONS:

Limestone*: 12000 lb/A for a target pH of 6.5. **Calcium Carbonate equivalent*

Magnesium (Mg): 20 lb/A

Limestone containing .2% Mg (.3 % MgO) will satisfy the

magnesium requirement

Plant Nu	utrients:	(If manure w	vill be applied	l, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴CEC	% Satu	% Saturation of the CEC		Organic Nitrate-N Salts			See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter ppm	mmhos/cm	Zinc	Copper	Sulfur		
(ppiii)	(meq/100 g)	(meq/100 g)	1.	R Nig Ca								
313	13.5	15.8	2.1	2.8	9.9				2.8	1.1	12.0	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REPORT FO	R:		Al	DDITIONA	AL COPY TO:			
DA	N FENSTERM	IACHER		DUANE TRUAX					
RETTEW ASSOCIATES INC					RE'	ΓΤΕW ASSOCIATES			
3020 COLUMBIA AVE					302	0 COLUMBIA AVE			
LANCASTER PA 17603					LA	NCASTER PA 17603			
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIELD ID	SOIL		
7/7/2016	S16-32760		Lancaster			P-045-160614-1019-jcr- S2A			
SOIL NUTRIENT LEVELS		Below Opti	imum	Optimu	m Above	Optimum			
¹ Soil pH	4.5								
² Phosphorus	s(P) 3	ppm							
² Potassium (1	K) 63	ppm							

RECOMMENDATIONS:

*Calcium Carbonate equivalent

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 11000 lb/A for a target pH of 6.5.

33

Magnesium (Mg): 50 lb/A

Limestone containing .5% Mg (.7 % MgO) will satisfy the

magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 0 1 Other 0 recommendations

No crop was specified. Therefore no recommendation is given.

ppm

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements		
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 1.2	ration of Mg 2.1	the CEC Ca 4.9	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 1.9	ck for com Copper ppm 1.1		
Test Method	Fest Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-045-160614-1019-jcr-7/7/2016 S16-32761 Lancaster

SOIL NUTRIENT	LEVELS		Below Optimum	Optimum	Above Optimum
¹ Soil pH	4.9				
² Phosphorus (P)	3	ppm			
² Potassium (K)	65	ppm			
² Magnesium (Mg)	34	ppm			

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 8000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .6% Mg (1 % MgO) will satisfy the

magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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---------	---	---	---	---	--

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² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
80	9.9	10.7	1.6	2.6	3.7				1.9	1.2	7.1	
Test Method:	s: ¹1:1 soil:wate	er pH, ² Mehlich	3 (ICP)	, ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions				

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Zn (ppm)	Cu (ppm)	S (ppm)							
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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST	T REP	ORT FO	R:			A	DDITION	AL CO	OPY TO:	
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603						DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LA	B #	SERIAL#	COUNTY		ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32	2762		Lancaster		P-045-160614-1019-jcr- S4A				
SOIL NUTRIENT LEVELS		S		Below Opti	mum	Optimu	m	Above C	Optimum	
¹Soil pH		5.3								
² Phosphorus (P)		2	ppm							
² Potassium (K)		83	ppm							
² Magnesium (Mg) 122		ppm								
			/C 1	1	<i>c</i>		. ,			

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

*Calcium Carbonate equivalent

Plant Nutrients:		(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other			0	0	0	0	See ST2 for other crop recommendations					

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	:	Optional Tests:			² Trace Elements							
² Calcium (ppm)	³ Acidity (meq/100 g) 8.7	⁴ CEC (meq/100 g)	% Satu K 1.8	Mg 8.4	Cthe CEC Ca 18.2	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 1 3	ck for com Copper ppm 1.2		
	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

ST-4 Interpreting Soil Tests for Agronomic Crops - Explains the soil test report and provides additional information on the recommendations.

Soil Nutrient Levels Soil nutrient levels are given as parts per million (ppm) elemental P, K, and Mg. As a rule of thumb to convert ppm to lb/A multiply ppm x 2.

The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

Above Optimum-The nutrient is more than adequate. Not only will there not be a yield response but the soil nutrient levels are also adequate to accommodate crop removal.

Recommendations N,P, and K recommendations are made for three crop years on this field. New samples should be taken after 3 years. The recommendations for the 2nd and 3rd year assume that the earlier recommendations were followed. These recommendations are based on the results of the soil test and the information provided with the sample. If you think that there is an error on the report, contact the lab at the address on the front of the report. Tables that can be used to adjust or change recommendations for all crops based on the soil test can be found on the web at: www.aasl.psu.edu.

<u>Limestone Recommendations</u> The recommended limestone application should be adequate for 3 years. Limestone recommendations are based on 100% calcium carbonate equivalent limestone and assume "Fine-sized" limestone with 95% passing 20 mesh, 60% passing 60 mesh and 50% passing 100 mesh. Use "ST-2 Liming Materials Conversion Table (enclosed) to adjust for limestone quality. Also see Agronomy Facts #3 "Soil Acidity and Aglime".

<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

Starter Fertilizer Starter fertilizer is important to get a corn crop off to a good start when planting in cold, wet conditions. However, on optimum or higher testing soils, as planting dates get later and soils warm up, the benefit from starter fertilizer goes down. An N only starter is often adequate when soil test levels are above optimum. The correct material, rate, and placement for starter fertilizer are critical to be effective. See Agronomy Facts #51 "Starter Fertilizer".

Nitrogen Ritrogen recommendations on this report are not based on a soil test. They are based on crop requirements for the expected yield of the crop to be grown. The pre-sidedress nitrate soil tests (PSNT) and the Chlorophyll meter test are both available for improving nitrogen recommendations on corn especially when manure is being applied. See: Agronomy Facts 17 "Pre-sidedress Soil Nitrate Test for Corn" and Agronomy Facts 53 "The Early-season Chlorophyll Meter Test for Corn". For optimum efficiency, N should be applied as close to the time of crop need as practical. For corn apply 50-90% of the N when the corn is 10-20" tall. For winter grains apply the N in the spring prior to growth stage 5. For forage grasses split the recommended N for each cutting.

<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

<u>Very High Soil Test Levels</u> Very high soil test levels should be avoided as much as possible. High soil nutrient levels might not only represent an economic loss but they may also indicate potential crop, animal or environmental problems.

Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)										
Zn (ppm)	Cu (ppm)	S (ppm)								
1.1 - 9.4	1.2 - 5.5	10 - 25								

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	SOIL TEST REPORT FOR:							ADDITIONAL COPY TO:					
DAN FENSTERMACHER RETTEW ASSOCIATES INC						DUANE TRUAX RETTEW ASSOCIATES							
3020 COLUMBIA AVE							302	20 COL	UMBIA AVE				
LANCASTER PA 17603							LANCASTER PA 17603						
DATE	LAB#		SERIAL#	COUNTY		ACRES	S ASCS ID	FIELD ID		SOIL			
7/7/2016	S16-32763			Lancaster		P-077-16		-160617-1035-sdd- S1A					
SOIL NUTRIENT LEVELS		VELS			Below Opti	mum	num Optimum		Above (Optimum			
¹ Soil pH	5.1												
² Phosphorus (P) 34		ppm											
² Potassium (K) 144		ppm											
² Magnesium	(Mg) 188	}	ppm										
DECOMBE	NID A EXCON	C	(See ha	ck mass	ages for importa	nt informa	tion)						

RECOMMENDATIONS:

Limestone*: 11000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nutrients:		(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)									
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)						
1 Other			0	0	0	0	See ST2 for other crop recommendations					

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴CEC	% Satu	% Saturation of the CEC			Nitrate-N	Salts	See back for comments			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter	ppm	mmhos/cm	Zinc Copper Sulfur		,	
(ppiii)	(meq/100 g)	(meq/100 g)	1.	1115	Cu	%			ppm	ppm	ppm	
1497	12.3	21.7	1.7	7.2	34.5				10.3	1.5	17.1	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DITIONA	AL CO	OPY TO:		
DA	N FENSTERM	IACHER		DUANE TRUAX					
RE	TTEW ASSOCI	IATES INC		RETTEW ASSOCIATES					
302	0 COLUMBIA	AVE			302	0 COI	LUMBIA AVE		
LA	NCASTER PA	17603			LA	NCAS	TER PA 17603		
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32764		Lancaster			P-077	7-160617-1035-sdd-		
							S2A		
OIL NUTE	RIENT LEVEL	\mathbf{S}	Below Opti	mum	Optimu	m	Above C	Optimum	
Soil pH	4.9								
Phosphorus	(P) 25	ppm							
Potassium (K) 60	ppm							
Magnesium	(Mg) 28	ppm							
RECOMME	NDATIONS:	(See ba	ck messages for importa	nt informatio	on)				
imestone [;]	*: 10000 lb/A	A for a target	pH of 6.5.	N	Magnesiu	ım (N	/Ig): 60 lb/A		
Calcium Carbo	nate equivalent				Limestone	contai	ning .6% Mg (1 % Mg	gO) will satisfy the	
					magnesiun	n requi	rement	•	
	• /7.	.11 1	1. 1 1		1 , 1		1. 1 0 1 1	C ()	

Plant Nutrients: (If manure will be applied, adjust these recommendations accordingly. See back of report.)

Year Crop Expected Nitrogen Phosphate Potash

No crop was specified. Therefore no recommendation is given.

2 Other 0 0 0 See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other $0 0 0 \frac{See ST2 \text{ for other crop}}{recommendations}$

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	(meq/100 g)	K	Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm	Sulfur ppm		
103	11.7	12.6	1.2	1.9	4.1	4			4.1	1.5	14.1		
Test Method:	Fest Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-077-160617-1035-sdd-7/7/2016 S16-32765 Lancaster S₃A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum**

SOIL NUTRIENT LEVELS

Below Optimum
Optimum
Above Optimum

Phosphorus (P) 3 ppm
Potassium (K) 38 ppm
Magnesium (Mg) 57 ppm

Below Optimum
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RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): 20 lb/A

*Calcium Carbonate equivalent

Limestone containing .2% Mg (.3 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
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ADDITION	AL RESULTS	:				Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Matter	Nitrate-N ppm	Salts mmhos/cm	Zinc	ck for com	Sulfur	
281	11.7	13.7	0.7	3.5	10.3	%			ppm 1.3	ppm 1.3	ppm 7.4	
Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations												

Enclosures

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Zn (ppm)	Cu (ppm)	S (ppm)							
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Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		1	ADDITIONAL COPY TO:						
RE 302	N FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE			DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603						
DATE	LAB#	SERIAL#	COUNTY	ACRE	S ASCS ID	FII	FIELD ID SOIL				
7/7/2016	S16-32766		Lancaster			P-077-16	50617-1035-sdd- S4A				
SOIL NUTE	RIENT LEVEL	S	Below	Optimum	Optimu	m	Above C)ptimum			
¹Soil pH	5.1										
² Phosphorus	s (P) 2	ppm									
² Potassium (1	K) 48	ppm									
² Magnesium	(Mg) 86	ppm									
DECOMME	NDATIONS.	(See ba	ck messages for im	portant inform	ation)						

RECOMMENDATIONS:

(See back messages for important inform

Limestone*: 10000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	vill be applied	, adjust these r	ecommendations ac	cordingly. See bac	ck of report.)
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

recommendations	2 Other	0	0	0	0	See ST2 for other crop recommendations
-----------------	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

ADDITION	AL RESULTS	:				Optional Tests: ² Tra				Frace Elements		
² Calcium	³ Acidity	⁴ CEC			the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See ba	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppin		ppm	ppm	ppm	
299	11.7	14.0	0.9	5.1	10.6				1.3	1.4	8.6	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:					
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL	
7/7/2016	S16-32767		Lancaster		P-077-160617-1035-sdd- S5A				
SOIL NUTRIENT LEVELS Below Opti		mum	Optimu	Optimum Above Optimum					
¹ Soil pH 4.9									
² Phosphorus	s (P) 1	ppm							
² Potassium (1	K) 63	ppm							
² Magnesium	(Mg) 80	ppm							
RECOMME	RECOMMENDATIONS: (See back messages for important information)								

Limestone*: 14000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)					
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations	١
---------	---	---	---	---	--	---

ADDITIONAL RESULTS:					Optional Tests:			² Trace Elements				
² Calcium (ppm)	³ Acidity (meq/100 g) 15.3	⁴ CEC (meq/100 g)	% Satu K 1.0	ration of Mg 4.0	the CEC Ca 5.1	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	Zinc ppm 1.3	Copper ppm 1.4		
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

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SOIL TES	T REPORT FO	R:		AI	DDITIONA	AL COPY	TO:	
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA NCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIE	LD ID	SOIL
7/7/2016	S16-32768		Lancaster	P-293-1600			0606-1056-mel- S1A	
	•						UIA I	
SOIL NUTE	RIENT LEVEL	S	Below Opti	mum	Optimu			Optimum
SOIL NUTE	RIENT LEVEL 4.6	S	Below Opti	mum	Optimu)ptimum
	4.6	S ppm	Below Opti	mum	Optimu			Optimum
¹Soil pH	4.6 s(P) 10		Below Opti	mum	Optimu			Optimum
¹ Soil pH ² Phosphorus	4.6 s (P) 10 K) 175	ppm	Below Opti	mum	Optimu			Optimum

Limestone*: 14000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations	l
---------	---	---	---	---	--	---

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm) 405	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K 2.5	ration of Mg 4.5	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See ba Zinc ppm 4.0	ck for com Copper ppm 0.9		
Test Methods	s: ¹ 1:1 soil:wate	er pH, ² Mehlich	3 (ICP)), ³ Mehli	ch Buffer	pH, ⁴ Sumn	nation of Cat	ions			'	

The high acidity of this sample indicates that a portion of the acidity is not in the exchangeable form. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable acidity of 15 meq/100 g.

Enclosures

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SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER **RETTEW ASSOCIATES** RETTEW ASSOCIATES INC 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE SERIAL# COUNTY ACRES ASCS ID FIELD ID SOIL LAB# P-293-160606-1056-mel-7/7/2016 S16-32769 Lancaster S2A SOIL NUTRIENT LEVELS **Below Optimum Above Optimum Optimum** 3.9 ¹Soil pH ²Phosphorus (P) 6 ppm 100 ppm ²Potassium (K) 33 ppm

RECOMMENDATIONS:

²Magnesium (Mg)

(See back messages for important information)

Limestone*: 12000 lb/A for a target pH of 6.5.

Magnesium (Mg): 50 lb/A

*Calcium Carbonate equivalent

Limestone containing .4% Mg (.7 % MgO) will satisfy the magnesium requirement

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb N/A) $(lb P_2O_5/A)$ $(lb K_2O/A)$ See ST2 for other crop 0 0 1 Other 0 0 recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITION	AL RESULTS	:		Optional Tests:			² Trace Elements					
² Calcium (ppm)	³ Acidity (meq/100 g) 14.1	⁴ CEC (meq/100 g)	% Satu K 1.7	Mg	the CEC Ca	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm 2.1	ck for com Copper ppm 0.9	Sulfur ppm 12.4	
Test Method	s: 1:1 soil:wate	er pH, ² Mehlich	3 (ICP), ³ Mehli	ch Buffer	pH, ⁴ Sumr	nation of Cat	ions				

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The elemental results in lb/A can be converted to oxide forms using the following conversions: P x 2.3=P₂O₅, K x 1.2=K₂O, Mg x 1.6=MgO

Below Optimum-Nutrient is deficient. There should be an economic response to adding the recommended nutrient.

Optimum-Nutrient is adequate. There will be no yield response to adding more of a nutrient but a recommendation is made to replace what the crop removes and thus maintain the soil test in the optimum range.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)									
Zn (ppm)	Cu (ppm)	S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25							

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SOIL TES	T REPORT FO	R:		Al	DDITIONA	AL CO	OPY TO:	
RE 302	AN FENSTERM TTEW ASSOCI 20 COLUMBIA ANCASTER PA	IATES INC AVE		DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32770		Lancaster			P-293-160606-1056-me S3A		
SOIL NUTI	RIENT LEVEL	S	Below Opti	mum	Optimu	m	Above (Optimum
¹ Soil pH	4.7							
² Phosphorus	s (P) 2	ppm						
_	` '							
² Potassium (ppm						
² Potassium (² Magnesium	K) 27	ppm ppm						
² Magnesium	K) 27	ppm	ck messages for importa	nt informati	on)			

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.8% Mg (2.9 % MgO) will satisfy

the magnesium requirement

Plant Nu	trients:	(If manure w	(If manure will be applied, adjust these recommendations accordingly. See back of report.)								
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)					
1 Other			0	0	0	0	See ST2 for other crop recommendations				

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC			the CEC	Organic Matter	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc	ck for com			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppin		ppm ppm ppm				
42	8.1	8.5	0.8	1.2	2.5				1.4	0.9	12.0		
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations												

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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Zn (ppm)	Cu (ppm)	S (ppm)						
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	177									
SOIL TES	T REPORT FO	R:		ADDITIONAL COPY TO:						
DA	N FENSTERM	ACHER		DUANE TRUAX						
RE	TTEW ASSOCI	ATES INC			RETTEW ASSOCIATES					
302	20 COLUMBIA	AVE			302	O COI	LUMBIA AVE			
LA	NCASTER PA	17603			LANCASTER PA 17603					
DATE	LAB#	SERIAL#	COUNTY	ACRES	S ASCS ID		FIELD ID	SOIL		
7/7/2016	S16-32771		Lancaster		P-293-160606-1056-mel- S4A					
OIL NUTRIENT LEVELS Below O				imum			Optimum			
Soil pH	4.7					•				

¹Soil pH 4.7

²Phosphorus (P) 2 ppm

²Potassium (K) 27 ppm

²Magnesium (Mg) 11 ppm

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): 110 lb/A

*Calcium Carbonate equivalent

Limestone containing 1.8% Mg (2.9 $\,\%$ MgO) will satisfy

the magnesium requirement

Plant Nu	ck of report.)					
Year	Crop	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other		0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium	³ Acidity	⁴ CEC	% Satu	ration of	the CEC	Organic	Nitrate-N	Salts		ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmhos/cm	Zinc ppm	Copper ppm	Sulfur ppm	
35	8.1 8.4 0.8 1.1 2.1 1.5 1.0 15.0											
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

Enclosures

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SOIL TEST	T REPORT FO	OR:		ADDITIONAL COPY TO:				
RE' 302	N FENSTERN TTEW ASSOC O COLUMBIA NCASTER PA	IATES INC AVE			RE7	TTEW 0 COL	TRUAX ASSOCIATES UMBIA AVE TER PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID		FIELD ID	SOIL
7/7/2016	S16-32772		Lancaster	P-293-160606-1056-mel- S5A				
SOIL NUTR	RIENT LEVEL	LS	Below Opti	mum	Optimu	m	Above C	Optimum
¹ Soil pH	4.7							
² Phosphorus	(P) 1	ppm						
² Potassium (1	K) 26	ppm						
² Magnesium	(Mg) 29	ppm						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 9000 lb/A for a target pH of 6.5.

Magnesium (Mg): 60 lb/A

*Calcium Carbonate equivalent

Limestone containing .7% Mg (1.1 % MgO) will satisfy the magnesium requirement

Plant Nu	ck of report.)						
Year	Crop]	Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations	

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

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ADDITIONAL RESULTS:							Optional Tests:			² Trace Elements		
² Calcium	³ Acidity	⁴ CEC			the CEC	Organic Matter	Nitrate-N	Salts mmhos/cm	See bac Zinc	ck for com		
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	%	ppm		ppm	ppm	ppm	
40	10.5	11.0	0.6	2.2	1.8				1.3	1.0	24.9	
Test Methods	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations											

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SOIL TES	T REPORT F	OR:			Al	DDITION	AL COPY	TO:	
DAN FENSTERMACHER RETTEW ASSOCIATES INC 3020 COLUMBIA AVE LANCASTER PA 17603					DUANE TRUAX RETTEW ASSOCIATES 3020 COLUMBIA AVE LANCASTER PA 17603				
DATE	LAB#	SERIAL #		COUNTY	ACRES	ASCS ID	FIE	LD ID	SOIL
7/7/2016	S16-32773		L	ancaster			P-225A-10	50601-1130-jcr- S1A	
SOIL NUTE	LS		Below Opti	mum	Optimum		Above (Optimum	
¹ Soil pH	5.1								
² Phosphorus	(P) 6	ppm							
² Potassium (K) 141	ppm							
² Magnesium	(Mg) 197	ppm							
DECOMME	NIDATIONS.	(See ha	ck messe	ages for importa	nt informati	ion)			

RECOMMENDATIONS:

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg):

NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure w	will be applied, adjust these recommendations accordingly. See back of report.)						
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)			
1 Other			0	0	0	0	See ST2 for other crop recommendations		

No crop was specified. Therefore no recommendation is given.

2 Other	0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations	
---------	---	---	---	---	--	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:						Optional Tests:			² Trace Elements			
² Calcium (ppm)	³ Acidity (meq/100 g)	⁴ CEC (meq/100 g)	% Satu K	ration of Mg	the CEC	Organic Matter %	Nitrate-N ppm	Salts mmhos/cm	See bac Zinc ppm	ck for com Copper ppm		
882	8.7	15.1	2.4	10.9	29.2				40.1	2.1	7.7	
Test Methods	Test Methods: 1:1 soil:water pH, 2Mehlich 3 (ICP), 3Mehlich Buffer pH, 4Summation of Cations											

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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<u>Manure</u> Manure is a very important part of a fertility program. Manure applications may supply all or most of the nutrients recommended and in some cases may apply significantly more than the crop requires. Manure nutrients should be taken into account in developing your fertility program. For details on how to do this see the Penn State Agronomy Guide. Manure analysis kits are available through your county agent.

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Very high pH can results in micronutrient deficiencies and may affect the activity of some pesticides resulting in injury or poor pest control.

<u>Very high phosphorus</u> levels in the soil may lead to crop production problems especially with no manure and may result in potentially harmful P loss to the environment. Best management practices may be necessary to reduce the potential for environmental problems with P.

Zinc, Copper and Sulfur Results The normal ranges for zinc (Zn) copper (Cu), and sulfur (S) in Pennsylvania soils are listed below. Cu, Zn and S deficiencies are uncommon in PA, but may occur on soils testing below the normal range. Cu, Zn and S toxicities may occur at levels testing well above the normal range, but have not been observed in Pennsylvania in agronomic crops even on soils testing 2 to 3 times above the normal range. For additional information, see ST4.

Normal ranges of Zn, Cu and S in Pennsylvania Soils (Mehlich 3)							
Zn (ppm) Cu (ppm) S (ppm)							
1.1 - 9.4	1.2 - 5.5	10 - 25					

<u>Distribution of Soil Test Results</u> Summaries of soil test results may be used in educational programs. However, individual results will not be released outside of Penn State without permission of the client. Electronic copies of your results are available to you, contact the lab for more information.



Fax: (814) 863-4540

Agricultural Analytical Services Laboratory The Pennsylvania State University University Park, PA 16802 www.aasl.psu.edu

SOIL TES	T REPORT FO	OR:		AI	DITION	AL COPY	TO:	
DA	N FENSTERM	IACHER		DUANE TRUAX				
RE	TTEW ASSOC	IATES INC			RE'	TTEW AS	SSOCIATES	
302	20 COLUMBIA	AVE			302	0 COLUN	MBIA AVE	
LA	NCASTER PA	17603			LA	NCASTE	R PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIF	ELD ID	SOIL
7/7/2016	S16-32774		Lancaster	P-225A-1		-160601-1130-jcr-		
							S2A	
SOIL NUTRIENT LEVELS		S	Below Opti	mum	Optimum		Above C)ptimum
¹ Soil pH	5.1							
² Phosphorus	s (P) 3	ppm						
² Potassium (K) 97	ppm						
² Magnesium	(Mg) 165	ppm						

RECOMMENDATIONS:

*Calcium Carbonate equivalent

(See back messages for important information)

Limestone*: 7000 lb/A for a target pH of 6.5.

Magnesium (Mg): **NONE**

(If manure will be applied, adjust these recommendations accordingly. See back of report.) **Plant Nutrients: Expected** Nitrogen **Phosphate Potash** Year Crop Yield (lb P₂O₅/A) (lb K₂O/A) (lb N/A)See ST2 for other crop 0 0 0 0 1 Other recommendations

No crop was specified. Therefore no recommendation is given.

	2 Other	0	0	0	0	See ST2 for other crop recommendations
--	---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:					² Trace Elements			
² Calcium (ppm)	(ppm) (meq/100 g) (meq/100 g) K Mg Ca Matter ppm mmhos/cm Zinc Copper Sulfur ppm ppm ppm							
Test Method	Test Methods: ¹ 1:1 soil:water pH, ² Mehlich 3 (ICP), ³ Mehlich Buffer pH, ⁴ Summation of Cations							

Enclosures

ST-2 Fertilizer Recommendation Table- Guidelines for making recommendations for other crops and for adjusting for a different expected yield.

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<u>Magnesium</u> Only one Mg Recommendation is made for three years. Magnesium is most economically applied by using a limestone containing Mg. Low Mg levels in soils may result in low Mg levels in forage crops especially if a significant amount of N and/or K fertilizer is applied. This can result in potentially fatal grass tetany in animals. Use caution if grazing. Apply the recommended Mg and be sure your feed rations are properly balanced.

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RE	TTEW ASSOC	IATES INC				TTEW ASS		
3020 COLUMBIA AVE						0 COLUME		
LA	NCASTER PA	17603			LA	NCASTER	PA 17603	
DATE	LAB#	SERIAL#	COUNTY	ACRES	ASCS ID	FIEL	D ID	SOIL
7/7/2016	S16-32775		Lancaster				601-1130-jcr- 33A	
SOIL NUTE	RIENT LEVEL	S	Below Opt	imum	Optimu	m	Above C	Optimum
¹ Soil pH	5.4							
² Phosphorus	(P) 2	ppm						
² Potassium (1	K) 58	ppm						
² Magnesium	(Mg) 167	ppm						

RECOMMENDATIONS:

(See back messages for important information)

Limestone*: 6000 lb/A for a target pH of 6.5.

Magnesium (Mg): NONE

*Calcium Carbonate equivalent

Plant Nu	trients:	(If manure will be applied, adjust these recommendations accordingly. See back of report.)					
Year	Crop		Expected Yield	Nitrogen (lb N/A)	Phosphate (lb P ₂ O ₅ /A)	Potash (lb K ₂ O/A)	
1 Other			0	0	0	0	See ST2 for other crop recommendations

No crop was specified. Therefore no recommendation is given.

|--|

No crop was specified. Therefore no recommendation is given.

3 Other	0	0	0	0	See ST2 for other crop recommendations
---------	---	---	---	---	--

No crop was specified. Therefore no recommendation is given.

ADDITIONAL RESULTS:				Optional Tests:			² Trace	² Trace Elements														
² Calcium	³ Acidity	CEC M-4	^														Nitrate-N	mmhos/am	See back for comments Zinc Copper, Sulfur			
(ppm)	(meq/100 g)	(meq/100 g)	K	Mg	Ca	Matter %	ppm	mmmos, em	ppm	ррт	ppm											
382																						
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1.1 - 9.4 1.2 - 5.5 10 - 25								

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Attachment 9 AASLAB Particle Size Analysis Results



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SOIL TEST REPORT FO	R:	ADDITIONAL COPY TO:		
DAN FENSTERMACHE	R	DUANE TRUAX		
RETTEW ASSOCIATES I	NC	RETTEW ASSOCIATES		
3020 COLUMBIA AVE		3020 COLUMBIA AVE		
LANCASTER PA 17603		LANCASTER PA 17603		
DATE RECEIVED	DATE COMPLETE	COUNTY		
07/05/2016	7/7/2016	Lancaster		

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-003-160620-1025-rll- S2A	S16-32385	33.0	38.8	28.2	Clay Loam
P-003-160620-1025-rll- S3A	S16-32386	16.9	42.6	40.5	Silty Clay
P-003-160620-1025-rll- S4A	S16-32387	22.8	47.2	29.9	Clay Loam
P-012-160620-1115- mgw-S2A	S16-32389	54.9	27.3	17.8	Sandy Loam
P-012-160620-1115- mgw-S3A	S16-32390	55.9	25.5	18.6	Sandy Loam
P-012-160620-1115- mgw-S4A	S16-32391	53.7	31.0	15.3	Sandy Loam
P-012-160620-1115- mgw-S5A	S16-32392	49.2	24.6	26.2	Sandy Clay Loam
P-022-160614-1050- jsw-S2A	S16-32394	57.5	19.4	23.1	Sandy Clay Loam
P-022-160614-1050- jsw-S3A	S16-32395	79.6	12.2	8.2	Loamy Sand
P-022-160614-1050- jsw-S4A	S16-32396	66.8	11.4	21.8	Sandy Clay Loam
P-022-160614-1050- jsw-S5A	S16-32397	13.6	59.6	26.8	Silt Loam



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DATE RECEIVED	DATE COMPLETE	COUNTY		
07/05/2016	07/11/2016	Lancaster		

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-022-160614-1050- jsw-S6A	S16-32398	22.9	31.1	45.9	Clay
P-022-160614-1050- jsw-S7A	S16-32399	8.8	37.2	54.0	Clay
P-040-160615-1119-jcr S2A	- S16-32401	35.9	46.0	18.1	Loam
P-040-160615-1119-jcr S3A	- S16-32402	18.4	51.4	30.2	Silty Clay Loam
P-040-160615-1119-jcr S4A	- S16-32403	29.2	39.0	31.8	Clay Loam
P-040-160615-1119-jcr S5A	- S16-32404	19.6	44.0	36.4	Silty Clay Loam
P-063-160614-0950-rll- S1A	S16-32405	34.8	41.0	24.2	Loam
P-063-160614-0950-rll- S2A	S16-32406	21.7	37.6	40.7	Clay
P-063-160614-0950-rll- S3A	S16-32407	8.8	48.7	42.4	Silty Clay
P-068-160614-1338- sdd-S2A	S16-32409	74.1	16.6	9.3	Sandy Loam
P-068-160614-1338- sdd-S3A	S16-32411	53.5	25.1	21.4	Sandy Clay Loam



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LANCASTER PA 17603		LANCASTER PA 17603
DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	07/12/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-068-160614-1338- sdd-S4A	S16-32412	37.3	32.7	30.0	Clay Loam
P-069-160614-1158- sdd-S3A	S16-32413	40.9	39.0	20.1	Loam
P-069-160614-1158- sdd-S4A	S16-32414	50.3	31.1	18.6	Loam
P-069-160614-1158- sdd-S5A	S16-32415	64.3	22.4	13.2	Sandy Loam
P-100-160609-1105- def-S2A	S16-32417	48.8	38.7	12.5	Loam
P-100-160609-1105- def-S3A	S16-32418	25.2	37.8	37.0	Clay Loam
P-121-160616-0950- mgw-S2A	S16-32420	48.8	33.5	17.7	Loam
P-121-160616-0950- mgw-S3A	S16-32421	25.5	43.4	31.0	Clay Loam
P-121-160616-0950- mgw-S4A	S16-32422	39.4	34.0	26.6	Loam
P-126-160615-1410- mgw-S2A	S16-32424	39.2	38.0	22.7	Loam
P-126-160615-1410- mgw-S3A	S16-32425	21.6	51.2	27.2	Clay Loam



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DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	07/12/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-126-160615-1410- mgw-S4A	S16-32426	31.4	41.4	27.1	Clay Loam
P-126-160615-1410- mgw-S5A	S16-32427	43.2	32.8	24.1	Loam
P-134-160615-1506- sdd-S2A	S16-32429	40.0	34.4	25.6	Loam
P-134-160615-1506- sdd-S3A	S16-32430	26.0	40.4	33.6	Clay Loam
P-134-160615-1506- sdd-S4A	S16-32431	49.9	23.1	27.0	Sandy Clay Loam
P-134-160615-1506- sdd-S5A	S16-32432	55.9	22.5	21.7	Sandy Clay Loam
P-156-160606-1355- dat-S2A	S16-32434	65.6	23.5	10.9	Sandy Loam
P-156-160606-1355- dat-S3A	S16-32435	56.7	22.5	20.8	Sandy Clay Loam
P-156-160606-1355- dat-S4A	S16-32436	56.9	21.9	21.2	Sandy Clay Loam
P-157-160606-1512- dat-S2A	S16-32439	55.5	29.6	14.9	Sandy Loam
P-157-160606-1512- dat-S3A	S16-32440	45.6	24.7	29.7	Sandy Clay Loam



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RETTEW ASSOCIATES I	NC	RETTEW ASSOCIATES
3020 COLUMBIA AVE		3020 COLUMBIA AVE
LANCASTER PA 17603		LANCASTER PA 17603
DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	7/14/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-157-160606-1512- dat-S4A	S16-32441	37.6	26.2	36.2	Clay Loam
P-157-160606-1512- dat-S5A	S16-32442	12.1	23.3	64.6	Clay
P-157-160606-1512- dat-S6A	S16-32443	12.6	25.0	62.4	Clay
P-157-160606-1512- dat-S7A	S16-32444	28.4	18.0	53.6	Clay
P-162-160606-1040- jsw-S2A	S16-32446	48.8	26.1	25.2	Sandy Clay Loam
P-162-160606-1040- jsw-SA3	S16-32447	34.0	25.8	40.2	Clay
P-162-160606-1040- jsw-SA4	S16-32448	45.7	19.8	34.5	Sandy Clay Loam
P-162-160606-1040- jsw-SA5	S16-32449	43.5	22.6	33.9	Clay Loam
P-170-160620-1122- def-S2A	S16-32451	84.9	9.0	6.2	Loamy Sand
P-170-160620-1122- def-S3A	S16-32452	76.6	15.0	8.4	Sandy Loam
P-170-160620-1122- def-S4A	S16-32453	67.1	14.3	18.6	Sandy Loam





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DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	07/15/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-170-160620-1122-	S16-32454	65.2	13.9	20.9	Sandy Clay Loam
def-S5A					



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LANCASTER PA 17603		LANCASTER PA 17603
DATE RECEIVED	DATE COMPLETE	COUNTY
		COCKII
07/05/2016	7/18/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-170-160620-1122- def-S6A	S16-32455	75.5	8.9	15.6	Sandy Loam
P-173-160620-1112- def-S2A	S16-32457	28.6	37.4	34.0	Clay Loam
P-173-160620-1112- def-S3A	S16-32458	20.0	40.8	39.2	Silty Clay Loam
P-173-160620-1112- def-S4A	S16-32459	5.9	22.3	71.9	Clay
P-176-160621-1155-rll- S2A	S16-32461	62.7	27.2	10.1	Sandy Loam
P-176-160621-1155-rll- S3A	S16-32462	65.8	18.2	16.0	Sandy Loam
P-176-160621-1155-rll- S4A	S16-32463	28.2	11.8	60.0	Clay
P-187-160607-1427- jsw-S2A	S16-32465	25.6	38.4	35.9	Clay Loam
P-187-160607-1427- jsw-S3A	S16-32466	37.3	39.6	23.1	Loam
P-215-160602-1037- jsw-S2A	S16-32468	58.3	22.5	19.3	Sandy Loam
P-215-160602-1037- jsw-S3A	S16-32469	64.6	23.5	11.9	Sandy Loam



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3020 COLUMBIA AVE		3020 COLUMBIA AVE
LANCASTER PA 17603		LANCASTER PA 17603
DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	07/19/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-215-160602-1037- jsw-S4A	S16-32471	49.0	23.8	27.3	Sandy Clay Loam
P-215-160602-1037- jsw-S5A	S16-32472	46.6	24.8	28.6	Sandy Clay Loam
P-215-160602-1037- jsw-S6A	S16-32473	75.5	9.9	14.6	Sandy Loam
P-222-160607-1055- dat-S1A	S16-32474	39.1	43.1	17.7	Loam
P-222-160607-1055- dat-S2A	S16-32475	30.0	40.2	29.8	Clay Loam
P-222-160607-1055- dat-S3A	S16-32476	33.8	36.8	29.4	Clay Loam
P-222-160607-1055- dat-S4A	S16-32477	49.1	28.6	22.3	Loam
P-222-160607-1055- dat-S5A	S16-32478	46.2	30.9	22.9	Loam
P-225-160601-1130- mel-S1A	S16-32479	23.2	43.1	33.7	Clay Loam
P-225-160601-1130- mel-S2A	S16-32480	18.6	33.7	47.6	Clay
P-225-160601-1130- mel-S3A	S16-32481	45.7	19.0	35.3	Sandy Clay



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DATE RECEIVED	DATE COMPLETE	COUNTY
07/05/2016	07/20/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-225-160601-1130- mel-S4A	S16-32482	32.9	28.0	39.1	Clay Loam
P-225-160601-1130- mel-S5A	S16-32483	12.0	44.2	43.9	Silty Clay
P-225-160601-1130- mel-S6A	S16-32484	20.3	43.9	35.8	Clay Loam
P-225B-160601-1312- sdd-S1A	S16-32485	40.3	36.5	23.2	Loam
P-225B-160601-1312- sdd-S2A	S16-32486	23.8	43.0	33.1	Clay Loam
P-225B-160601-1312- sdd-S3A	S16-32487	23.5	41.3	35.2	Clay Loam
P-225B-160601-1312- sdd-S4A	S16-32488	20.7	39.3	40.0	Clay Loam
P-227-160601-1500- jsw-S2A	S16-32490	34.3	38.4	27.3	Clay Loam
P-227-160601-1500- jsw-S3A	S16-32491	42.4	33.1	24.5	Loam
P-227-160601-1500- jsw-S4A	S16-32492	40.1	33.9	26.0	Loam
P-239-160607-1427- def-S1A	S16-32493	53.1	30.3	16.6	Sandy Loam



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07/05/2016

SOIL TEST REPORT FOR: ADDITIONAL COPY TO: DUANE TRUAX DAN FENSTERMACHER RETTEW ASSOCIATES INC **RETTEW ASSOCIATES** 3020 COLUMBIA AVE 3020 COLUMBIA AVE LANCASTER PA 17603 LANCASTER PA 17603 DATE RECEIVED DATE COMPLETE **COUNTY**

Particle Size Analysis

07/21/2016

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-239-160607-1427- def-S2A	S16-32494	45.0	30.8	24.2	Loam
P-239-160607-1427- def-S3A	S16-32495	66.8	15.0	18.2	Sandy Loam
P-239-160607-1427- def-S4A	S16-32496	46.3	23.4	30.3	Sandy Clay Loam
P-239A-160607-1430- def-S1A	S16-32498	49.9	32.8	17.3	Loam
P-239A-160607-1430- def-S2A	S16-32499	38.0	32.4	29.6	Clay Loam
P-239A-160607-1430- def-S3A	S16-32500	57.9	18.6	23.6	Sandy Clay Loam
P-239A-160607-1430- def-S4A	S16-32501	35.6	32.1	32.3	Clay Loam
P-239A-160607-1430- def-S5A	S16-32502	36.5	34.1	29.4	Clay Loam
P-253-160608-0950- mel-S2A	S16-32504	57.1	27.5	15.4	Sandy Loam
P-253-160608-0950- mel-S3A	S16-32505	62.4	17.7	19.9	Sandy Loam
P-253-160608-0950- mel-S4A	S16-32506	57.6	20.7	21.7	Sandy Clay Loam



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RETTEW ASSOCIATES INC		RETTEW ASSOCIATES	
3020 COLUMBIA AVE		3020 COLUMBIA AVE	
LANCASTER PA 17603		LANCASTER PA 17603	
DATE RECEIVED	DATE COMPLETE	COUNTY	
07/05/2016	07/22/2016	Lancaster	

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-254-160608-1050- mel-S2A	S16-32508	45.8	33.2	21.0	Loam
P-254-160608-1050- mel-S3A	S16-32509	36.6	38.0	25.5	Loam
P-254-160608-1050- mel-S4A	S16-32510	45.0	29.4	25.6	Loam
P-069-160614-1158- sdd-S2A	S16-32512	48.7	36.0	15.3	Loam
P-276-160610-0838- jsw-S2A	S16-32710	56.3	20.8	22.8	Sandy Clay Loam
P-276-160610-0838- jsw-S3A	S16-32711	74.7	11.9	13.4	Sandy Loam
P-276-160610-0838- jsw-S4A	S16-32712	61.0	20.9	18.1	Sandy Loam
P-276-160610-0838- jsw-S5A	S16-32713	75.6	6.8	17.6	Sandy Loam
P-279-160610-1359- dat-S2A	S16-32715	50.5	29.1	20.3	Loam
P-279-160610-1359- dat-S3A	S16-32716	63.7	19.9	16.4	Sandy Loam
P-279-160610-1359- dat-S4A	S16-32717	77.5	10.2	12.2	Sandy Loam



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LANCASTER PA 17603		LANCASTER PA 17603
DATE RECEIVED	DATE COMPLETE	COUNTY
07/06/2016	07/22/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-279-160610-1359- dat-S5A	S16-32718	77.7	10.6	11.7	Sandy Loam
P-279A-160610-1450- def-S1A	S16-32719	50.2	33.6	16.2	Loam
P-279A-160610-1450- def-S2A	S16-32720	44.1	32.1	23.8	Loam
P-279A-160610-1450- def-S3A	S16-32721	61.6	15.3	23.1	Sandy Clay Loam
P-279A-160610-1450- def-S4A	S16-32722	45.7	22.2	32.1	Sandy Clay Loam
P-283-160606-0743- def-S2A	S16-32725	31.5	44.2	24.2	Loam
P-283-160606-0743- def-S3A	S16-32726	44.9	31.0	24.1	Loam
P-283-160606-0743- def-S4A	S16-32727	52.7	23.5	23.7	Sandy Clay Loam
P-283-160606-0743- def-S5A	S16-32728	50.5	25.7	23.8	Sandy Clay Loam
P-283-160606-0743- def-S6A	S16-32729	62.2	16.3	21.5	Sandy Clay Loam
P-286-160606-0808- def-S2A	S16-32731	32.4	39.7	27.9	Clay Loam



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DATE RECEIVED	DATE COMPLETE	COUNTY
07/06/2016	07/25/2016	Lancaster

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-286-160606-0808- def-S3A	S16-32732	31.8	37.2	31.0	Clay Loam
P-286-160606-0808- def-S4A	S16-32733	32.4	37.2	30.5	Clay Loam
P-290-160606-1445- mel-S2A	S16-32735	40.9	43.5	15.7	Loam
P-290-160606-1445- mel-S3A	S16-32736	33.6	41.7	24.6	Loam
P-290-160606-1445- mel-S4A	S16-32737	40.0	35.9	24.1	Loam
P-291-160606-1330- mel-S1A	S16-32738	35.1	43.5	21.4	Loam
P-291-160606-1330- mel-S2A	S16-32739	24.3	40.5	35.2	Clay Loam
P-291-160606-1330- mel-S3A	S16-32740	14.8	30.9	54.3	Clay
P-291-160606-1330- mel-S4A	S16-32741	27.9	35.3	36.8	Clay Loam
P-347-160621-1409- def-S1A	S16-32742	59.2	18.4	22.4	Sandy Clay Loam
P-347-160621-1409- def-S2A	S16-32743	50.9	19.8	29.3	Sandy Clay Loam



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DATE RECEIVED	DATE COMPLETE	COUNTY	
07/06/2016	07/26/2016	Lancaster	

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-352-160621-1145- def-S2A	S16-32745	37.3	31.8	30.9	Clay Loam
P-352-160621-1145- def-S3A	S16-32746	20.6	32.7	46.8	Clay
P-352-160621-1145- def-S4A	S16-32747	26.4	29.5	44.1	Clay
P-352-160621-1145- def-S5A	S16-32748	48.4	11.5	40.1	Sandy Clay
P-352-160621-1145- def-S6A	S16-32749	36.7	21.6	41.7	Clay
P-010-160620-1315- mgw-S2A	S16-32751	64.3	17.2	18.5	Sandy Loam
P-010-160620-1315- mgw-S3A	S16-32752	45.4	25.1	29.5	Sandy Clay Loam
P-010-160620-1315- mgw-S4A	S16-32753	42.6	25.0	32.4	Clay Loam
P-010-160620-1315- mgw-S5A	S16-32754	43.3	22.9	33.8	Clay Loam
P-010-160620-1315- mgw-S6A	S16-32755	43.3	21.0	35.7	Clay Loam
P-010-160620-1315- mgw-S7A	S16-32756	41.4	20.7	37.9	Clay Loam



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DATE RECEIVED	DATE COMPLETE	COUNTY	
07/06/2016	07/26/2016	Lancaster	

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-010-160620-1315- mgw-S8A	S16-32758	23.5	19.8	56.7	Clay
P-045-160614-1019-jcr S2A	- S16-32760	32.1	42.7	25.2	Loam
P-045-160614-1019-jcr S3A	- S16-32761	24.3	51.2	24.5	Silt Loam
P-045-160614-1019-jcr S4A	- S16-32762	27.0	45.4	27.6	Clay Loam
P-077-160617-1035- sdd-S2A	S16-32764	50.3	32.5	17.1	Loam
P-077-160617-1035- sdd-S3A	S16-32765	32.9	37.0	30.2	Clay Loam
P-077-160617-1035- sdd-S4A	S16-32766	44.7	33.5	21.9	Loam
P-077-160617-1035- sdd-S5A	S16-32767	32.8	34.5	32.7	Clay Loam
P-293-160606-1056- mel-S2A	S16-32769	5.5	42.0	52.4	Silty Clay
P-293-160606-1056- mel-S3A	S16-32770	61.8	28.1	10.1	Sandy Loam
P-293-160606-1056- mel-S4A	S16-32771	48.7	26.0	25.3	Sandy Clay Loam





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LANCASTER PA 17603		LANCASTER PA 17603	
DATE RECEIVED	DATE COMPLETE	COUNTY	
07/06/2016	07/27/2016	Lancaster	

Customer ID	Serial Number Lab ID	Sand %	Silt %	Clay %	Soil Textural Class
P-293-160606-1056- mel-S5A	S16-32772	60.1	16.9	23.0	Sandy Clay Loam
P-225A-160601-1130- jcr-S1A	S16-32773	41.7	33.4	24.9	Loam
P-225A-160601-1130- jcr-S2A	S16-32774	61.8	18.5	19.7	Sandy Loam
P-225A-160601-1130- jcr-S3A	S16-32775	48.6	25.1	26.3	Sandy Clay Loam

Attachment 10 ALS Environmental TOC and LOI Results





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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156362
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

ALS Environmental Laboratory Locations Across North America

Canada: Burlington · Calgary · Centre of Excellence · Edmonton · Fort McMurray · Fort St. John · Grande Prairie · London · Mississauga · Richmond Hill · Saskatoon · Thunder Bay Vancouver Waterloo · Winnipeg · Yellowknife United States: Cincinnati · Everett · Fort Collins · Holland · Houston · Middletown · Salt Lake City · Spring City · York Mexico: Monterrey

Report ID: 2156362 - 7/18/2016 Page 1 of 27





34 Dogwood Lane Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430 www.alsglobal.com

NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156362 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156362001	P-003-160620-1025-rll-S1B	Solid	6/20/2016 10:25	7/5/2016 13:19	Collected by Client
2156362002	P-003-160620-1025-rll-S2B	Solid	6/20/2016 10:25	7/5/2016 13:19	Collected by Client
2156362003	P-003-160620-1025-rll-S3B	Solid	6/20/2016 10:25	7/5/2016 13:19	Collected by Client
2156362004	P-003-160620-1025-rll-S4B	Solid	6/20/2016 10:25	7/5/2016 13:19	Collected by Client
2156362005	P-012-160620-1115-mgw-S1B	Solid	6/20/2016 11:15	7/5/2016 13:19	Collected by Client
2156362006	P-012-160620-1115-mgw-S2B	Solid	6/20/2016 11:15	7/5/2016 13:19	Collected by Client
2156362007	P-012-160620-1115-mgw-S3B	Solid	6/20/2016 11:15	7/5/2016 13:19	Collected by Client
2156362008	P-012-160620-1115-mgw-S4B	Solid	6/20/2016 11:15	7/5/2016 13:19	Collected by Client
2156362009	P-012-160620-1115-mgw-S5B	Solid	6/20/2016 11:15	7/5/2016 13:19	Collected by Client
2156362010	P-022-160614-1050-jsw-S1B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362011	P-022-160614-1050-jsw-S2B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362012	P-022-160614-1050-jsw-S3B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362013	P-022-160614-1050-jsw-S4B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362014	P-022-160614-1050-jsw-S5B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362015	P-022-160614-1050-jsw-S6B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362016	P-022-160614-1050-jsw-S7B	Solid	6/14/2016 10:50	7/5/2016 13:19	Collected by Client
2156362017	P-040-160615-1119-jcr-S1B	Solid	6/15/2016 11:19	7/5/2016 13:19	Collected by Client
2156362018	P-040-160615-1119-jcr-S2B	Solid	6/15/2016 11:19	7/5/2016 13:19	Collected by Client
2156362019	P-040-160615-1119-jcr-S3B	Solid	6/15/2016 11:19	7/5/2016 13:19	Collected by Client
2156362020	P-040-160615-1119-jcr-S4B	Solid	6/15/2016 11:19	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156362 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
 DL DoD Detection Limit
- Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362001 Date Collected: 6/20/2016 10:25 Matrix: Solid

Sample ID: P-003-160620-1025-rII-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	55.8		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	53.6	3	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	374000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	44.2	1,2	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362002 Date Collected: 6/20/2016 10:25 Matrix: Solid

Sample ID: P-003-160620-1025-rII-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	33.7		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	15.8	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	100000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	66.3	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362003 Date Collected: 6/20/2016 10:25 Matrix: Solid

Sample ID: P-003-160620-1025-rII-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	19.1		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	5.0	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	8780		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	80.9	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362004 Date Collected: 6/20/2016 10:25 Matrix: Solid

Sample ID: **P-003-160620-1025-rII-S4B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.1		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	3.4	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	2270		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	87.9	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362005 Date Collected: 6/20/2016 11:15 Matrix: Solid

Sample ID: P-012-160620-1115-mgw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	57.6		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	96.9	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	484000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	42.4	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362006 Date Collected: 6/20/2016 11:15 Matrix: Solid

Sample ID: P-012-160620-1115-mgw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	34.6		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	18.1	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	147000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	65.4	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362007 Date Collected: 6/20/2016 11:15 Matrix: Solid

Sample ID: P-012-160620-1115-mgw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	34.0		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	16.4	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	92400		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	66.0	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362008 Date Collected: 6/20/2016 11:15 Matrix: Solid

Sample ID: P-012-160620-1115-mgw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	25.8		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	8.7	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	49800		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	74.2	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362009 Date Collected: 6/20/2016 11:15 Matrix: Solid

Sample ID: P-012-160620-1115-mgw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	22.9		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	6.4	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	21600		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	77.1	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362010 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	57.8		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	64.6	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	473000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	42.2	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362011 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	40.0		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	33.3	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	238000		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	60.0	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362012 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	10.6		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	1.3	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	5540		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	89.4	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362013 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: **P-022-160614-1050-jsw-S4B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.9		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	13000		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	87.1	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362014 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.0		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	2230		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	85.0	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362015 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.3		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	710		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	81.7	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362016 Date Collected: 6/14/2016 10:50 Matrix: Solid

Sample ID: P-022-160614-1050-jsw-S7B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	19.1		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	6.0	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	1110		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	80.9	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362017 Date Collected: 6/15/2016 11:19 Matrix: Solid

Sample ID: P-040-160615-1119-jcr-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	44.8		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	38.8	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	411000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	55.2	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362018 Date Collected: 6/15/2016 11:19 Matrix: Solid

Sample ID: P-040-160615-1119-jcr-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.3		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	10.1	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	75700		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	78.7	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362019 Date Collected: 6/15/2016 11:19 Matrix: Solid

Sample ID: P-040-160615-1119-jcr-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.5		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	7880		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	81.5	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156362 89962000

Lab ID: 2156362020 Date Collected: 6/15/2016 11:19 Matrix: Solid

Sample ID: P-040-160615-1119-jcr-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.3		%	0.1	S2540G-11			7/8/16 13:58	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/8/16 13:58	SLC	Α
Total Organic Carbon (TOC)	1790		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	84.7	1	%	0.1	S2540G-11			7/8/16 13:58	SLC	Α

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Project Coordinator

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PARAMETER QU	ALIFIER	S		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156362001	1	P-003-160620-1025-rll-S1B	S2540G-11	Total Solids
Analyte was analy	zed pas	the 7 day holding time.		
2156362001	2	P-003-160620-1025-rll-S1B	S2540G-11	Total Solids
		•	The RPD is outside method a	cceptance limits of 5.0%. The results used to
calculate the RPD			005400 44	Outlife Terral Valentie
2156362001	3	P-003-160620-1025-rll-S1B	S2540G-11	Solids, Total Volatile
2156362002		t the 7 day holding time.	S2540G-11	Total Calida
	1	P-003-160620-1025-rll-S2B	52540G-11	Total Solids
	•	t the 7 day holding time.	\$2540C 11	Colido Total Valatila
2156362002	2 zod pos	P-003-160620-1025-rll-S2B	S2540G-11	Solids, Total Volatile
2156362003	zea pas 1	the 7 day holding time. P-003-160620-1025-rll-S3B	S2540G-11	Total Solids
	=	t the 7 day holding time.	32340G-11	Iotal Julius
2156362003	2 2	P-003-160620-1025-rll-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	020 4 00-11	Johns, Total Volatile
2156362004	1	P-003-160620-1025-rll-S4B	S2540G-11	Total Solids
	=	t the 7 day holding time.	320400 11	iotal collac
2156362004	2	P-003-160620-1025-rll-S4B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.	320.00 17	Condo, Total Volatilo
2156362005	1	P-012-160620-1115-mgw-S1B	S2540G-11	Total Solids
	=	t the 7 day holding time.	020.00	1000.00
2156362005	2	P-012-160620-1115-mgw-S1B	S2540G-11	Solids, Total Volatile
	zed pas	the 7 day holding time.		,
2156362006	1	P-012-160620-1115-mgw-S2B	S2540G-11	Total Solids
Analyte was analy	zed pas	the 7 day holding time.		
2156362006	2	P-012-160620-1115-mgw-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	the 7 day holding time.		
2156362007	1	P-012-160620-1115-mgw-S3B	S2540G-11	Total Solids
Analyte was analy	zed pas	the 7 day holding time.		
2156362007	2	P-012-160620-1115-mgw-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	the 7 day holding time.		
2156362008	1	P-012-160620-1115-mgw-S4B	S2540G-11	Total Solids
Analyte was analy	zed pas	the 7 day holding time.		
2156362008	2	P-012-160620-1115-mgw-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	the 7 day holding time.		
2156362009	1	P-012-160620-1115-mgw-S5B	S2540G-11	Total Solids
Analyte was analy	zed pas	the 7 day holding time.		
2156362009	2	P-012-160620-1115-mgw-S5B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.		
2156362010	1	P-022-160614-1050-jsw-S1B	S2540G-11	Total Solids
		the 7 day holding time.		
2156362010	2	P-022-160614-1050-jsw-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	the 7 day holding time.		

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ANALYTICAL RESULTS

Workorder: 2156362 89962000

2156362011	1 P-022-160614-1050-jsw-S2B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362011	2 P-022-160614-1050-jsw-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362012	1 P-022-160614-1050-jsw-S3B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362012	2 P-022-160614-1050-jsw-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362013	1 P-022-160614-1050-jsw-S4B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362013	2 P-022-160614-1050-jsw-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362014	1 P-022-160614-1050-jsw-S5B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362014	2 P-022-160614-1050-jsw-S5B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362015	1 P-022-160614-1050-jsw-S6B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362015	2 P-022-160614-1050-jsw-S6B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362016	1 P-022-160614-1050-jsw-S7B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362016	2 P-022-160614-1050-jsw-S7B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362017	1 P-040-160615-1119-jcr-S1B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362017	2 P-040-160615-1119-jcr-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362018	1 P-040-160615-1119-jcr-S2B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362018	2 P-040-160615-1119-jcr-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362019	1 P-040-160615-1119-jcr-S3B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362019	2 P-040-160615-1119-jcr-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		
2156362020	1 P-040-160615-1119-jcr-S4B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156362020	2 P-040-160615-1119-jcr-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed past the 7 day holding time.		

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Rev 10/14 State Samples c S Collected In Receipt Information (completed by Receiving Lab). 935 8660 13 Indial Rental Equipment ō S Labo PA ž 3 ₹ 1 × Pickup Sample/COC Comments 362 Diem 10: Special Processing Sample Disposal Special USACE Navy Lab Custody Seals Present? (if present) Seals Intact? Correct Sample Volumes 3-Correct Preservation? Headspace/Volatiles? Received on Ice? COCILobels Complete/Accurate? Correct Containers? Courier/Tracking #: 7534 Cont. in Good Cond. Composite Sampling ALS Field Services: "Mainx - Al=Air, DW=Drinking Water, GW - Groundwater, Ol=Oit, OL=Other Liquid; SL=Sludge, SO=Soit; WP=Wipe, WW=Wastewater Cooler Temp: No. of Coolers: Other Reportable to PADEP X Standard CLP-like USACE EDDS: Format Type 8 A Yes # OISMd ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057 Deliverables Data Enter Number of Containers Per Sample or Field Results Below 5/8 Time THE CLIENT X प्राधि Oate ANALYSES/METHOD REQUESTED SAMPLER, INSTRUCTIONS ON THE BACK ALL SHADED AREAS MUST BE COMPLETED BY REQUEST FOR ANALYSI CHAIN OF CUSTODY/ A Received By / Company Name (nothing) no sect × × × O- pinggio) spilos eliteloV lato OC. × × × REVIEWED BY(signature): 11:00 8 8 Time 8 xintsM. 8 8 8 8 8 8 8 OGGED BY(signature): Prospriging Container Container 100 9 Ö 9 G 0 10 D O 9 O O G O Date Time Rush-Subject to ALS approval and surcharges. 1050 1115 1115 1115 1025 1025 1025 6/20/2016 1025 6/20/2016 1115 6/20/2016 1115 X Normal-Standard TAT is 10-12 business days. Middletown, PA 17057 P. 717-944-5541 F.717-944-1430 G=Grab; C=Composite Samples in 2 Bins. 6/14/2016 6/20/2016 6/20/2016 6/20/2016 6/20/2016 620/2016 Approved By: 6/20/2016 Date Dfenstermacher@rettew.com Refer Relinquished By / Company Name Dan Fenstermacher or Duane Truax 412-275-2219 or 717-205-2228 Client Name: RETTEW Associates, Inc. ple Description/Location LANGHAMA (as it will appear on the lab report) P-012-160620-1115-mgw-S1B P-012-160620-1115-mgw-S4B P-012-160620-1115-mgw-S2B P-012-160620-1115-mgw-S3B P-012-160620-1115-mgw-S5B P-022-160614-1050-jsw-S1B Lancaster, PA 17603 P-003-160620-1025-rll-S4B P-003-160620-1025-rl-S1B P-003-160620-1025-ril-S3B P-003-160620-1025-III-S2B Address: 3020 Columbia Ave Environmental Project Name/#: 89962000 Y No.: × Project Comments: Date Required: Contact: Phone#: TAT Email? Bill To Fax?

ALS

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(STA)	P. 717-944-5541 F.717-944-1430			ALL	ALL SHAD	ED AREAS	MUSTB	ADED AREAS MUST BE COMPLETED BY THE CLIENT /	TED BY	HECLE	/IN	AL	ALS Quote #	#	19
Environmental				ı	7	AMPLER.	INSTRUC	SAMPLER. INSTRUCTIONS ON THE BACK	THEBA	X.					
Client Name: RETTEW Associates, Inc.	es, Inc.		Type										Несеф	Receipt Information (completed by Receiving Lab)	(eceiving Lab)
Address: 3020 Columbia Ave			State State	in .									Cooler 1	Cooler Temp: 20 2 Therm ID:	14-353
Lancaster, PA 17603		1	Preservative	evite	F			4	F3	Ī	Γ		No. of Coolers:	y Y	N Initial
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TAT X Normal-Standard Rush-Subject to / Date Required: 13-Jul-16 Email? X -Y Dienstermac	Normal-Standard TAT is 10-12 business days. Rush-Subject to ALS approval and surcharges. 1: 13-Jul-16 Approved By: -Y Dienstermacher@rettew.com	days.		-		O) abiloS elilsk (noilingi								Correct Containers? Correct Sample Volumes? Correct Preservation?	
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(as it will appear on the lab report)	rd Date	Time				Enter	Number of	Enter Number of Containers Per Sample or Field Hesuits Below	er Sample o	I Field Her	ults belo	-		Sample Commen	2
P-022-160614-1050-jsw-S2B	6/14/2016	1050	5	SO	×	×									A
P-022-160614-1050-jsw-S3B	8/14/2016	1050	9	so	×	×							4		
P-022-160614-1050-jsw-S4B	6/14/2016	1050	5	os	×	×									
P-022-160614-1050-jsw-S5B	6/14/2016	1050	9	So	×	×									
P-022-160614-1050-jsw-S6B	6/14/2016	1050	9	So	×	×									7
P-022-160614-1050-jsw-S7B	6/14/2016	1050	9	So	×	×									Ī
P-040-160615-1119-jcr-S1B	6/15/2016	1119	9	so	×	×									
P-040-160615-1119-jcr-S2B	6/15/2018	1119	9	SO	×	×	Ç								
P-040-160615-1119-jcr-S3B	6/15/2016	1119	9	So	×	×	/	9					A P	ALS Field Services: Pickup	ickup Labor
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Relinquished By / Company Name	mpany Name	Date	Time	ne		/Received	By / Com	Received By / Company Name	-	Oate	Time	elive	USACE	Navy	ž ;
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	* G=Grab; C=Composite		- xute	AlleAir	DW=Dat	Wing Waler,	3W=Groun	dwater, OHC	III. OL-CINE	Liquid: St.	=Sludge;	"Maink - All-Air DW-Edming Water, GW-Groundwater, Ol-Other Liquid; SL-Sludge; SO-Soll; WP-Wips; WW-Wastewater	Vipe; Ww=wa	stewater	Deu 10/14





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July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156363
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156363 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156363001	P-040-160615-1119-jcr-S5B	Solid	6/15/2016 11:19	7/5/2016 13:19	Collected by Client
2156363002	P-063-160614-0950-rll-S1B	Solid	6/14/2016 09:50	7/5/2016 13:19	Collected by Client
2156363003	P-063-160614-0950-rll-S2B	Solid	6/14/2016 09:50	7/5/2016 13:19	Collected by Client
2156363004	P-063-160614-0950-rll-S3B	Solid	6/14/2016 09:50	7/5/2016 13:19	Collected by Client
2156363005	P-068-160614-1338-sdd-S1B	Solid	6/14/2016 13:38	7/5/2016 13:19	Collected by Client
2156363006	P-068-160614-1338-sdd-S2B	Solid	6/14/2016 13:38	7/5/2016 13:19	Collected by Client
2156363007	P-068-160614-1338-sdd-S3B	Solid	6/14/2016 13:38	7/5/2016 13:19	Collected by Client
2156363008	P-068-160614-1338-sdd-S4B	Solid	6/14/2016 13:38	7/5/2016 13:19	Collected by Client
2156363009	P-069-160614-1158-sdd-S1B	Solid	6/14/2016 11:58	7/5/2016 13:19	Collected by Client
2156363010	P-069-160614-1158-sdd-S2B	Solid	6/14/2016 11:58	7/5/2016 13:19	Collected by Client
2156363011	P-069-160614-1158-sdd-S3B	Solid	6/14/2016 11:58	7/5/2016 13:19	Collected by Client
2156363012	P-069-160614-1158-sdd-S4B	Solid	6/14/2016 11:58	7/5/2016 13:19	Collected by Client
2156363013	P-069-160614-1158-sdd-S5B	Solid	6/14/2016 11:58	7/5/2016 13:19	Collected by Client
2156363014	P-100-160609-1105-def-S1B	Solid	6/9/2016 11:05	7/5/2016 13:19	Collected by Client
2156363015	P-100-160609-1105-def-S2B	Solid	6/9/2016 11:05	7/5/2016 13:19	Collected by Client
2156363016	P-100-160609-1105-def-S3B	Solid	6/9/2016 11:05	7/5/2016 13:19	Collected by Client
2156363017	P-121-160616-0950-mgw-S1B	Solid	6/16/2016 09:50	7/5/2016 13:19	Collected by Client
2156363018	P-121-160616-0950-mgw-S2B	Solid	6/16/2016 09:50	7/5/2016 13:19	Collected by Client
2156363019	P-121-160616-0950-mgw-S3B	Solid	6/16/2016 09:50	7/5/2016 13:19	Collected by Client
2156363020	P-121-160616-0950-mgw-S4B	Solid	6/16/2016 09:50	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156363 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363001 Date Collected: 6/15/2016 11:19 Matrix: Solid

Sample ID: **P-040-160615-1119-jcr-S5B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.0		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	2.5	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	1400		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	85.0	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363002 Date Collected: 6/14/2016 09:50 Matrix: Solid

Sample ID: **P-063-160614-0950-rII-S1B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	26.8		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	11.1	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	49800		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	73.2	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363003 Date Collected: 6/14/2016 09:50 Matrix: Solid

Sample ID: **P-063-160614-0950-rII-S2B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.0		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	3.5	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	2470		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	83.0	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363004 Date Collected: 6/14/2016 09:50 Matrix: Solid

Sample ID: P-063-160614-0950-rII-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.7		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	2.7	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	1100		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	86.3	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363005 Date Collected: 6/14/2016 13:38 Matrix: Solid

Sample ID: **P-068-160614-1338-sdd-S1B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	43.7		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	60.3	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	270000		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	56.3	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363006 Date Collected: 6/14/2016 13:38 Matrix: Solid

Sample ID: P-068-160614-1338-sdd-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.7		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	8.8	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	62900		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	83.3	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363007 Date Collected: 6/14/2016 13:38 Matrix: Solid

Sample ID: P-068-160614-1338-sdd-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	7.3		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	1.9	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	2280		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	92.7	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363008 Date Collected: 6/14/2016 13:38 Matrix: Solid

Sample ID: **P-068-160614-1338-sdd-S4B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.1		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	2.7	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	4200		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	85.9	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363009 Date Collected: 6/14/2016 11:58 Matrix: Solid

Sample ID: P-069-160614-1158-sdd-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	48.4		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	47.3	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	123000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	51.6	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363010 Date Collected: 6/14/2016 11:58 Matrix: Solid

Sample ID: P-069-160614-1158-sdd-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	28.1		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	11.4	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	72000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	71.9	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363011 Date Collected: 6/14/2016 11:58 Matrix: Solid

Sample ID: P-069-160614-1158-sdd-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.2		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	5.5	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	37600		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	82.8	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363012 Date Collected: 6/14/2016 11:58 Matrix: Solid

Sample ID: P-069-160614-1158-sdd-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.0		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	2.2	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	1630		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	89.0	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363013 Date Collected: 6/14/2016 11:58 Matrix: Solid

Sample ID: P-069-160614-1158-sdd-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.7		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	2.5	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	1530		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	90.3	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363014 Date Collected: 6/9/2016 11:05 Matrix: Solid

Sample ID: P-100-160609-1105-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	67.0		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	93.0	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	522000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	33.0	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363015 Date Collected: 6/9/2016 11:05 Matrix: Solid

Sample ID: P-100-160609-1105-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	62.2		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	56.5	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	292000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	37.8	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363016 Date Collected: 6/9/2016 11:05 Matrix: Solid

Sample ID: P-100-160609-1105-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.3		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	12.2	3	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	17000	1	mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	83.7	2	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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Report ID: 2156363 - 7/18/2016





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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363017 Date Collected: 6/16/2016 09:50 Matrix: Solid

Sample ID: P-121-160616-0950-mgw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	66.3		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	77.2	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	362000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	33.7	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363018 Date Collected: 6/16/2016 09:50 Matrix: Solid

Sample ID: P-121-160616-0950-mgw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.6		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	33800		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	87.4	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363019 Date Collected: 6/16/2016 09:50 Matrix: Solid

Sample ID: P-121-160616-0950-mgw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.8		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	6.0	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	18900		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	78.2	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156363 89962000

Lab ID: 2156363020 Date Collected: 6/16/2016 09:50 Matrix: Solid

Sample ID: P-121-160616-0950-mgw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.5		%	0.1	S2540G-11			7/8/16 14:56	SLC	Α
Solids, Total Volatile	4.4	2	%	1.0	S2540G-11			7/8/16 14:56	SLC	Α
Total Organic Carbon (TOC)	13300		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	85.5	1	%	0.1	S2540G-11			7/8/16 14:56	SLC	Α

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

PARAMETER QU	ALIFIEF	RS		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156363001	1	P-040-160615-1119-jcr-S5B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156363001	2	P-040-160615-1119-jcr-S5B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156363002	1	P-063-160614-0950-rll-S1B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156363002	2	P-063-160614-0950-rll-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156363003	1	P-063-160614-0950-rll-S2B	S2540G-11	Total Solids
Analyte was analy		t the 7 day holding time.		
2156363003	2	P-063-160614-0950-rll-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156363004	1	P-063-160614-0950-rll-S3B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156363004	2	P-063-160614-0950-rll-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156363005	1	P-068-160614-1338-sdd-S1B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156363005	2	P-068-160614-1338-sdd-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156363006	1	P-068-160614-1338-sdd-S2B	S2540G-11	Total Solids
		t the 7 day holding time.	227.22.44	0 II II
2156363006	2	P-068-160614-1338-sdd-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	005400 44	Total Oalida
2156363007	1	P-068-160614-1338-sdd-S3B	S2540G-11	Total Solids
		t the 7 day holding time.	C0540C 44	Calida Tatal Valatila
2156363007	2	P-068-160614-1338-sdd-S3B	S2540G-11	Solids, Total Volatile
2156363008	/zeu pas 1	t the 7 day holding time. P-068-160614-1338-sdd-S4B	S2540G-11	Total Solids
	=		323400-11	Iotal Solids
2156363008	/zeu pas 2	t the 7 day holding time. P-068-160614-1338-sdd-S4B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	323400-11	Solids, Total Volatile
2156363009	72eu pas 1	P-069-160614-1158-sdd-S1B	S2540G-11	Total Solids
	•	t the 7 day holding time.	020400-11	iotal dollas
2156363009	2 2	P-069-160614-1158-sdd-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	020400 11	Condo, Total Volume
2156363010	1	P-069-160614-1158-sdd-S2B	S2540G-11	Total Solids
		t the 7 day holding time.	320.00	
2156363010	2	P-069-160614-1158-sdd-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	,	
2156363011	1	P-069-160614-1158-sdd-S3B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156363011	2	P-069-160614-1158-sdd-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		,
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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156363 89962000

2156363012	1	P-069-160614-1158-sdd-S4B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363012	2	P-069-160614-1158-sdd-S4B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363013	1	P-069-160614-1158-sdd-S5B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363013	2	P-069-160614-1158-sdd-S5B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363014	1	P-100-160609-1105-def-S1B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363014	2	P-100-160609-1105-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363015	1	P-100-160609-1105-def-S2B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363015	2	P-100-160609-1105-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363016	1	P-100-160609-1105-def-S3B	SW846 9060A	Total Organic Carbon (TOC)
The recovery of t	he Matrix	Spike (MS) associated to this analyt	e was outside of the established	control limits.
2156363016	2	P-100-160609-1105-def-S3B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363016	3	P-100-160609-1105-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363017	1	P-121-160616-0950-mgw-S1B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363017	2	P-121-160616-0950-mgw-S1B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363018	1	P-121-160616-0950-mgw-S2B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363018	2	P-121-160616-0950-mgw-S2B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363019	1	P-121-160616-0950-mgw-S3B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363019	2	P-121-160616-0950-mgw-S3B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363020	1	P-121-160616-0950-mgw-S4B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156363020	2	P-121-160616-0950-mgw-S4B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		

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Lancaster, PA 17603	Ī	Preservative	90	÷								No. of Coolers:	ers:	N Initial
Contact: Dan Fenslermacher or Duane Truax					AN	LYSESA	ANALYSES/METHOD REQUESTED	EQUEST	ED	1	100		Custody Seals Present?	13/1
Phone#: 412-275-2219 or 717-205-2228		-	_	-				1					(if present) Seals Intact7	(
Project Name/#: 89952000)- oi									Received on log?	X
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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156364
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156364 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156364001	P-126-160615-1410-mgw-S1B	Solid	6/15/2016 14:10	7/5/2016 13:19	Collected by Client
2156364002	P-126-160615-1410-mgw-S2B	Solid	6/15/2016 14:10	7/5/2016 13:19	Collected by Client
2156364003	P-126-160615-1410-mgw-S3B	Solid	6/15/2016 14:10	7/5/2016 13:19	Collected by Client
2156364004	P-126-160615-1410-mgw-S4B	Solid	6/15/2016 14:10	7/5/2016 13:19	Collected by Client
2156364005	P-126-160615-1410-mgw-S5B	Solid	6/15/2016 14:10	7/5/2016 13:19	Collected by Client
2156364006	P-134-160615-1506-sdd-S1B	Solid	6/15/2016 15:06	7/5/2016 13:19	Collected by Client
2156364007	P-134-160615-1506-sdd-S2B	Solid	6/15/2016 15:06	7/5/2016 13:19	Collected by Client
2156364008	P-134-160615-1506-sdd-S3B	Solid	6/15/2016 15:06	7/5/2016 13:19	Collected by Client
2156364009	P-134-160615-1506-sdd-S4B	Solid	6/15/2016 15:06	7/5/2016 13:19	Collected by Client
2156364010	P-134-160615-1506-sdd-S5B	Solid	6/15/2016 15:06	7/5/2016 13:19	Collected by Client
2156364011	P-156-160606-1355-dat-S1B	Solid	6/6/2016 13:55	7/5/2016 13:19	Collected by Client
2156364012	P-156-160606-1355-dat-S2B	Solid	6/6/2016 13:55	7/5/2016 13:19	Collected by Client
2156364013	P-156-160606-1355-dat-S3B	Solid	6/6/2016 13:55	7/5/2016 13:19	Collected by Client
2156364014	P-156-160606-1355-dat-S4B	Solid	6/6/2016 13:55	7/5/2016 13:19	Collected by Client
2156364015	P-157-160606-1512-dat-S1B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156364016	P-157-160606-1512-dat-S2B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156364017	P-157-160606-1512-dat-S3B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156364018	P-157-160606-1512-dat-S4B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156364019	P-157-160606-1512-dat-S5B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156364020	P-157-160606-1512-dat-S6B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156364 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
 DL DoD Detection Limit
- Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364001 Date Collected: 6/15/2016 14:10 Matrix: Solid

Sample ID: P-126-160615-1410-mgw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	41.5		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	59.5	3	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	322000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	58.5	1,2	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364002 Date Collected: 6/15/2016 14:10 Matrix: Solid

Sample ID: P-126-160615-1410-mgw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	24.5		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	10.9	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	106000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	75.5	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364003 Date Collected: 6/15/2016 14:10 Matrix: Solid

Sample ID: P-126-160615-1410-mgw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.2		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	4.6	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	14600		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	84.8	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364004 Date Collected: 6/15/2016 14:10 Matrix: Solid

Sample ID: P-126-160615-1410-mgw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.0		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	7330		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	86.0	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364005 Date Collected: 6/15/2016 14:10 Matrix: Solid

Sample ID: P-126-160615-1410-mgw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.4		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	3310		mg/kg	500	SW846 9060A			7/8/16 08:30	CF	Α
Total Solids	85.6	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364006 Date Collected: 6/15/2016 15:06 Matrix: Solid

Sample ID: P-134-160615-1506-sdd-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	58.8		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	78.2	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	388000		mg/kg	500	SW846 9060A			7/7/16 09:00	CF	Α
Total Solids	41.2	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364007 Date Collected: 6/15/2016 15:06 Matrix: Solid

Sample ID: P-134-160615-1506-sdd-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	36.2		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	18.4	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	113000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	63.8	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364008 Date Collected: 6/15/2016 15:06 Matrix: Solid

Sample ID: P-134-160615-1506-sdd-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.3		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.8	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	5700		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	81.7	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364009 Date Collected: 6/15/2016 15:06 Matrix: Solid

Sample ID: P-134-160615-1506-sdd-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.8		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.3	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	1720		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	86.2	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364010 Date Collected: 6/15/2016 15:06 Matrix: Solid

Sample ID: P-134-160615-1506-sdd-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.3		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.1	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	1650		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	87.7	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364011 Date Collected: 6/6/2016 13:55 Matrix: Solid

Sample ID: P-156-160606-1355-dat-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	75.6		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	80.2	3	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	373000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	24.4	1,2	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364012 Date Collected: 6/6/2016 13:55 Matrix: Solid

Sample ID: P-156-160606-1355-dat-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	26.1		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	6.1	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	42000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	73.9	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364013 Date Collected: 6/6/2016 13:55 Matrix: Solid

Sample ID: P-156-160606-1355-dat-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.3		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	1.7	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	2830		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	83.7	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364014 Date Collected: 6/6/2016 13:55 Matrix: Solid

Sample ID: P-156-160606-1355-dat-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.1		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	1.5	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	1610	3	mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	84.9	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364015 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	72.4		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	78.0	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	355000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	27.6	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364016 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	30.1		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	7.9	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	42800		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	69.9	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364017 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.2		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	2.9	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	8340		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	81.8	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364018 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.1		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	2.6	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	4370		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	84.9	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364019 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	19.9		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.4	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	1540		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	80.1	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156364 89962000

Lab ID: 2156364020 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.1		%	0.1	S2540G-11			7/8/16 17:06	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/8/16 17:06	SLC	Α
Total Organic Carbon (TOC)	2300		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	79.9	1	%	0.1	S2540G-11			7/8/16 17:06	SLC	Α

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PARAMETER QUA	LIFIER	s		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156364001	1	P-126-160615-1410-mgw-S1B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156364001	2	P-126-160615-1410-mgw-S1B	S2540G-11	Total Solids
The RPD associated	d with t	his sample was recovered at 17.8%.	The RPD is outside method acceptance	ce limits of 5.0%. The results used to
calculate the RPD w				
2156364001	3	P-126-160615-1410-mgw-S1B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.	005400 44	T . 10 " !
2156364002	1	P-126-160615-1410-mgw-S2B	S2540G-11	Total Solids
	-	the 7 day holding time.	005400 44	0.51.74.174.69
2156364002	2	P-126-160615-1410-mgw-S2B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.	C2E40C 44	Total Calida
2156364003	1	P-126-160615-1410-mgw-S3B	S2540G-11	Total Solids
	-	the 7 day holding time.	C2540C 44	Colido Total Volatila
2156364003	2	P-126-160615-1410-mgw-S3B	S2540G-11	Solids, Total Volatile
2156364004	ed past 1	the 7 day holding time.	S2540G-11	Total Solids
	•	P-126-160615-1410-mgw-S4B	32340G-11	Total Solius
2156364004	eu pasi 2	the 7 day holding time. P-126-160615-1410-mgw-S4B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.	32340G-11	Solids, Total Volatile
2156364005	eu pasi 1	P-126-160615-1410-mgw-S5B	S2540G-11	Total Solids
	•	the 7 day holding time.	323400-11	Total Solius
2156364005	eu pasi 2	P-126-160615-1410-mgw-S5B	S2540G-11	Solids, Total Volatile
	_	the 7 day holding time.	323400-11	Solius, Total Volatile
2156364006	tu pasi 1	P-134-160615-1506-sdd-S1B	S2540G-11	Total Solids
	•	the 7 day holding time.	020400-11	rotal Collas
2156364006	2 2	P-134-160615-1506-sdd-S1B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.	020400-11	Conds, Total Volatile
2156364007	1	P-134-160615-1506-sdd-S2B	S2540G-11	Total Solids
		the 7 day holding time.		
2156364007	2	P-134-160615-1506-sdd-S2B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.		
2156364008	1	P-134-160615-1506-sdd-S3B	S2540G-11	Total Solids
		the 7 day holding time.		
2156364008	2	P-134-160615-1506-sdd-S3B	S2540G-11	Solids, Total Volatile
		the 7 day holding time.		
2156364009	1	P-134-160615-1506-sdd-S4B	S2540G-11	Total Solids
	ed past	the 7 day holding time.		
2156364009	2	P-134-160615-1506-sdd-S4B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156364010	1	P-134-160615-1506-sdd-S5B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156364010	2	P-134-160615-1506-sdd-S5B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

0450004044		D 450 400000 4055 1 4 0 5	005400 44	T / 10 "1
2156364011	1	P-156-160606-1355-dat-S1B	S2540G-11	Total Solids
	-	the 7 day holding time.	C0E40C 44	Total Calida
2156364011	2	P-156-160606-1355-dat-S1B	S2540G-11	Total Solids
calculate the RPD w	ere 28.	8 and 24.2%.		d acceptance limits of 5.0%. The results used to
2156364011	3	P-156-160606-1355-dat-S1B	S2540G-11	Solids, Total Volatile
•	•	the 7 day holding time.		
2156364012	1	P-156-160606-1355-dat-S2B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364012	2	P-156-160606-1355-dat-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364013	1	P-156-160606-1355-dat-S3B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364013	2	P-156-160606-1355-dat-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364014	1	P-156-160606-1355-dat-S4B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364014	2	P-156-160606-1355-dat-S4B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364014	3	P-156-160606-1355-dat-S4B	SW846 9060A	Total Organic Carbon (TOC)
Due to sample matrix 7-17-16	x, an a	verage of four individual injections v	vere used to calculate the fin	nal result. No two injections met method criteria. JWB
2156364015	1	P-157-160606-1512-dat-S1B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364015	2	P-157-160606-1512-dat-S1B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364016	1	P-157-160606-1512-dat-S2B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364016	2	P-157-160606-1512-dat-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364017	1	P-157-160606-1512-dat-S3B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364017	2	P-157-160606-1512-dat-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364018	1	P-157-160606-1512-dat-S4B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364018	2	P-157-160606-1512-dat-S4B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		
2156364019	1	P-157-160606-1512-dat-S5B	S2540G-11	Total Solids
Analyte was analyze	d past	the 7 day holding time.		
2156364019	2	P-157-160606-1512-dat-S5B	S2540G-11	Solids, Total Volatile
Analyte was analyze	d past	the 7 day holding time.		

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156364 89962000

2156364020	1	P-157-160606-1512-dat-S6B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156364020	2	P-157-160606-1512-dat-S6B	S2540G-11	Solids, Total Volatile

Analyte was analyzed past the 7 day holding time.

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156365
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

ALS Environmental Laboratory Locations Across North America

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156365 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156365001	P-157-160606-1512-dat-S7B	Solid	6/6/2016 15:12	7/5/2016 13:19	Collected by Client
2156365002	P-162-160606-1040-jsw-S1B	Solid	6/6/2016 10:40	7/5/2016 13:19	Collected by Client
2156365003	P-162-160606-1040-jsw-S2B	Solid	6/6/2016 10:40	7/5/2016 13:19	Collected by Client
2156365004	P-162-160606-1040-jsw-SA3	Solid	6/6/2016 10:40	7/5/2016 13:19	Collected by Client
2156365005	P-162-160606-1040-jsw-SA4	Solid	6/6/2016 10:40	7/5/2016 13:19	Collected by Client
2156365006	P-162-160606-1040-jsw-SA5	Solid	6/6/2016 10:40	7/5/2016 13:19	Collected by Client
2156365007	P-170-160620-1122-def-S1B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365008	P-170-160620-1122-def-S2B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365009	P-170-160620-1122-def-S3B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365010	P-170-160620-1122-def-S4B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365011	P-170-160620-1122-def-S5B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365012	P-170-160620-1122-def-S6B	Solid	6/20/2016 11:22	7/5/2016 13:19	Collected by Client
2156365013	P-173-160620-1112-def-S1B	Solid	6/20/2016 11:12	7/5/2016 13:19	Collected by Client
2156365014	P-173-160620-1112-def-S2B	Solid	6/20/2016 11:12	7/5/2016 13:19	Collected by Client
2156365015	P-173-160620-1112-def-S3B	Solid	6/20/2016 11:12	7/5/2016 13:19	Collected by Client
2156365016	P-173-160620-1112-def-S4B	Solid	6/20/2016 11:12	7/5/2016 13:19	Collected by Client
2156365017	P-176-160621-1155-rll-S1B	Solid	6/21/2016 11:55	7/5/2016 13:19	Collected by Client
2156365018	P-176-160621-1155-rll-S2B	Solid	6/21/2016 11:55	7/5/2016 13:19	Collected by Client
2156365019	P-176-160621-1155-rll-S3B	Solid	6/21/2016 11:55	7/5/2016 13:19	Collected by Client
2156365020	P-176-160621-1155-rll-S4B	Solid	6/21/2016 11:55	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156365 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365001 Date Collected: 6/6/2016 15:12 Matrix: Solid

Sample ID: P-157-160606-1512-dat-S7B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.3		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	3.9	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	2320		mg/kg	500	SW846 9060A			7/15/16 11:30	CF	Α
Total Solids	78.7	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365002 Date Collected: 6/6/2016 10:40 Matrix: Solid

Sample ID: P-162-160606-1040-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	74.2		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	84.2	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	501000		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	25.8	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365003 Date Collected: 6/6/2016 10:40 Matrix: Solid

Sample ID: P-162-160606-1040-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	29.8		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	9.5	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	42500		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	70.2	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365004 Date Collected: 6/6/2016 10:40 Matrix: Solid

Sample ID: P-162-160606-1040-jsw-SA3 Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.6		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	5.7	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	12600		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	78.4	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365005 Date Collected: 6/6/2016 10:40 Matrix: Solid

Sample ID: P-162-160606-1040-jsw-SA4 Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.0		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	3.5	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	1100		mg/kg	500	SW846 9060A			7/11/16 15:00	CF	Α
Total Solids	82.0	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365006 Date Collected: 6/6/2016 10:40 Matrix: Solid

Sample ID: P-162-160606-1040-jsw-SA5 Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.1		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	3.0	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	670		mg/kg	500	SW846 9060A			7/15/16 11:30	CF	Α
Total Solids	85.9	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365007 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	61.1		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	95.8	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	507000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	38.9	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365008 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	55.3		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	56.5	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	264000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	44.7	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365009 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.9		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	14700		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	88.1	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365010 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.4		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	4.7	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	21300		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	84.6	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365011 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.2		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	3050		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	88.8	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365012 Date Collected: 6/20/2016 11:22 Matrix: Solid

Sample ID: P-170-160620-1122-def-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.8		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	1.7	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	2340		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	90.2	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365013 Date Collected: 6/20/2016 11:12 Matrix: Solid

Sample ID: P-173-160620-1112-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	45.2		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	76.3	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	371000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	54.8	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365014 Date Collected: 6/20/2016 11:12 Matrix: Solid

Sample ID: P-173-160620-1112-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.1		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	9.0	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	48400		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	78.9	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365015 Date Collected: 6/20/2016 11:12 Matrix: Solid

Sample ID: P-173-160620-1112-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.5		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	8220		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	85.5	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365016 Date Collected: 6/20/2016 11:12 Matrix: Solid

Sample ID: P-173-160620-1112-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	19.0		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	5.7	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	6020		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	81.0	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365017 Date Collected: 6/21/2016 11:55 Matrix: Solid

Sample ID: P-176-160621-1155-rII-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	31.4		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	74.7	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	389000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	68.6	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365018 Date Collected: 6/21/2016 11:55 Matrix: Solid

Sample ID: P-176-160621-1155-rII-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	29.1		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	12.2	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	57700		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	70.9	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365019 Date Collected: 6/21/2016 11:55 Matrix: Solid

Sample ID: P-176-160621-1155-rII-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.5		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	1.0	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	1080		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	87.5	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

Lab ID: 2156365020 Date Collected: 6/21/2016 11:55 Matrix: Solid

Sample ID: P-176-160621-1155-rII-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	27.4		%	0.1	S2540G-11			7/8/16 19:06	SLC	Α
Solids, Total Volatile	7.0	2	%	1.0	S2540G-11			7/8/16 19:06	SLC	Α
Total Organic Carbon (TOC)	2220		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	72.6	1	%	0.1	S2540G-11			7/8/16 19:06	SLC	Α

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PARAMETER QU	ALIFIEF	RS		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156365001	1	P-157-160606-1512-dat-S7B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156365001	2	P-157-160606-1512-dat-S7B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156365002	1	P-162-160606-1040-jsw-S1B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156365002	2	P-162-160606-1040-jsw-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156365003	1	P-162-160606-1040-jsw-S2B	S2540G-11	Total Solids
Analyte was analy		t the 7 day holding time.		
2156365003	2	P-162-160606-1040-jsw-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156365004	1	P-162-160606-1040-jsw-SA3	S2540G-11	Total Solids
		t the 7 day holding time.		
2156365004	2	P-162-160606-1040-jsw-SA3	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156365005	1	P-162-160606-1040-jsw-SA4	S2540G-11	Total Solids
		t the 7 day holding time.		
2156365005	2	P-162-160606-1040-jsw-SA4	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156365006	1	P-162-160606-1040-jsw-SA5	S2540G-11	Total Solids
		t the 7 day holding time.	22-122 11	0.11. =
2156365006	2	P-162-160606-1040-jsw-SA5	S2540G-11	Solids, Total Volatile
•	•	t the 7 day holding time.	005400 44	Taral Oallala
2156365007	1	P-170-160620-1122-def-S1B	S2540G-11	Total Solids
		t the 7 day holding time.	COE 40C 44	Calida Tatal Valatila
2156365007	2	P-170-160620-1122-def-S1B	S2540G-11	Solids, Total Volatile
2156365008	/zeu pas 1	t the 7 day holding time. P-170-160620-1122-def-S2B	S2540G-11	Total Solids
	=	t the 7 day holding time.	32340G-11	Total Solids
2156365008	zeu pas 2	P-170-160620-1122-def-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	32340G-11	Solius, Total Volatile
2156365009	1	P-170-160620-1122-def-S3B	S2540G-11	Total Solids
	•	t the 7 day holding time.	020400 11	Total Golius
2156365009	2 2	P-170-160620-1122-def-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	023400 11	Johns, Total Volatile
2156365010	1	P-170-160620-1122-def-S4B	S2540G-11	Total Solids
		t the 7 day holding time.	320.00	.5.6.
2156365010	2	P-170-160620-1122-def-S4B	S2540G-11	Solids, Total Volatile
		at the 7 day holding time.	320.00	Condo, Total Condition
2156365011	1	P-170-160620-1122-def-S5B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156365011	2	P-170-160620-1122-def-S5B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
and and	- F 40			

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ANALYTICAL RESULTS

Workorder: 2156365 89962000

2156365012	1	P-170-160620-1122-def-S6B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365012	2	P-170-160620-1122-def-S6B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365013	1	P-173-160620-1112-def-S1B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365013	2	P-173-160620-1112-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365014	1	P-173-160620-1112-def-S2B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365014	2	P-173-160620-1112-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365015	1	P-173-160620-1112-def-S3B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365015	2	P-173-160620-1112-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365016	1	P-173-160620-1112-def-S4B	S2540G-11	Total Solids
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365016	2	P-173-160620-1112-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365017	1	P-176-160621-1155-rll-S1B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365017	2	P-176-160621-1155-rll-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365018	1	P-176-160621-1155-rll-S2B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365018	2	P-176-160621-1155-rll-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365019	1	P-176-160621-1155-rll-S3B	S2540G-11	Total Solids
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365019	2	P-176-160621-1155-rll-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	st the 7 day holding time.		
2156365020	1	P-176-160621-1155-rll-S4B	S2540G-11	Total Solids
Analyte was anal	yzed pas	st the 7 day holding time.		
2156365020	2	P-176-160621-1155-rll-S4B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	st the 7 day holding time.		

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July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156366
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 2156366 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156366001	P-187-160607-1427-jsw-S1B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156366002	P-187-160607-1427-jsw-S2B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156366003	P-187-160607-1427-jsw-S3B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156366004	P-215-160602-1037-jsw-S1B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366005	P-215-160602-1037-jsw-S2B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366006	P-215-160602-1037-jsw-S3B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366007	P-215-160602-1037-jsw-S4B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366008	P-215-160602-1037-jsw-S5B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366009	P-215-160602-1037-jsw-S6B	Solid	6/2/2016 10:37	7/5/2016 13:19	Collected by Client
2156366010	P-222-160607-1055-dat-S1B	Solid	6/7/2016 10:55	7/5/2016 13:19	Collected by Client
2156366011	P-222-160607-1055-dat-S2B	Solid	6/7/2016 10:25	7/5/2016 13:19	Collected by Client
2156366012	P-222-160607-1055-dat-S3B	Solid	6/7/2016 10:25	7/5/2016 13:19	Collected by Client
2156366013	P-222-160607-1055-dat-S4B	Solid	6/7/2016 10:25	7/5/2016 13:19	Collected by Client
2156366014	P-222-160607-1055-dat-S5B	Solid	6/7/2016 10:25	7/5/2016 13:19	Collected by Client
2156366015	P-225-160601-1130-mel-S1B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156366016	P-225-160601-1130-mel-S2B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156366017	P-225-160601-1130-mel-S3B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156366018	P-225-160601-1130-mel-S4B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156366019	P-225-160601-1130-mel-S5B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156366020	P-225-160601-1130-mel-S6B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156366 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366001 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-187-160607-1427-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	55.5		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	52.5	3	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	311000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	44.5	1,2	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366002 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-187-160607-1427-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.6		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	9.4	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	60300		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	79.4	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366003 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-187-160607-1427-jsw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.2		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	5.1	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	14600		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	87.8	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366004 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	66.7		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	82.7	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	505000		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	33.3	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366005 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.0		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	35800		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	80.0	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366006 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	22.9		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	6.9	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	39900		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	77.1	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366007 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	19.8		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	13500		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	80.2	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366008 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.1		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	2.6	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	3700		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	83.9	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366009 Date Collected: 6/2/2016 10:37 Matrix: Solid

Sample ID: P-215-160602-1037-jsw-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.7		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	1.1	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	ND		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	88.3	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366010 Date Collected: 6/7/2016 10:55 Matrix: Solid

Sample ID: P-222-160607-1055-dat-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	31.4		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	16.0	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	183000		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	68.6	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366011 Date Collected: 6/7/2016 10:25 Matrix: Solid

Sample ID: P-222-160607-1055-dat-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.6		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	5.4	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	20300		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	82.4	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366012 Date Collected: 6/7/2016 10:25 Matrix: Solid

Sample ID: P-222-160607-1055-dat-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.6		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.5	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	5660		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	82.4	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366013 Date Collected: 6/7/2016 10:25 Matrix: Solid

Sample ID: P-222-160607-1055-dat-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.7		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	2790		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	85.3	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366014 Date Collected: 6/7/2016 10:25 Matrix: Solid

Sample ID: P-222-160607-1055-dat-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.6		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	1830		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	84.4	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366015 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	29.1		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	8.6	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	34100		mg/kg	500	SW846 9060A			7/12/16 04:00	CF	Α
Total Solids	70.9	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366016 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.2		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	3960		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	81.8	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366017 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.7		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	1740		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	90.3	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366018 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.3		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.4	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	3260		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	82.7	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366019 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.1		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	1910		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	79.9	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156366 89962000

Lab ID: 2156366020 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225-160601-1130-mel-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.1		%	0.1	S2540G-11			7/11/16 12:36	SLC	Α
Solids, Total Volatile	3.9	2	%	1.0	S2540G-11			7/11/16 12:36	SLC	Α
Total Organic Carbon (TOC)	2070		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	79.9	1	%	0.1	S2540G-11			7/11/16 12:36	SLC	Α

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Lab ID	PARAMETER QUAL	LIFIER	s		
Analyte was analyzed past the 7 day holding time. 215366001 2 P-187-160607-1427-jsw-S1B S2540G-11 Total Solids The RPD associated with this sample was recovered at 12.3%. The RPD is outside method acceptance limits of 5.0%. The results used to calculate the RPD were 50.3 and 44.5%. 2156366001 3 P-187-160607-1427-jsw-S1B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366002 1 P-187-160607-1427-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-187-160607-1427-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-187-160607-1427-jsw-S3B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-187-160607-1427-jsw-S3B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366004 1 P-215-160602-1037-jsw-S1B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366004 1 P-215-160602-1037-jsw-S1B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366005 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S3B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366007 1 P-215-160602-1037-jsw-S4B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time.	Lab ID	#	Sample ID	Analytical Method	Analyte
2156366001	2156366001	1	P-187-160607-1427-jsw-S1B	S2540G-11	Total Solids
The RPD associated with this sample was recovered at 12.3%. The RPD is outside method acceptance limits of 5.0%. The results used to calculate the RPD were 50.3 and 44.5%. 2156366001 3 P-187-160607-1427-jsw-S1B S2540G-11 Solids, Total Volatile 2156366002 1 P-187-160607-1427-jsw-S2B S2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366002 2 P-187-160607-1427-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-187-160607-1427-jsw-S3B S2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366003 2 P-187-160607-1427-jsw-S3B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-215-160602-1037-jsw-S1B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366004 1 P-215-160602-1037-jsw-S1B S2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366004 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366005 1 P-215-160602-1037-jsw-S2B S2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S2B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366006 1 P-215-160602-1037-jsw-S3B S2540G-11 Solids Analyte was analyzed past the 7 day holding time. 2156366007 1 P-215-160602-1037-jsw-S4B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366008 1 P-215-160602-1037-jsw-S4B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366008 1 P-215-160602-1037-jsw-S4B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366008 1 P-215-160602-1037-jsw-S5B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding tim	Analyte was analyze	ed past	the 7 day holding time.		
calculate the RPD were 50.3 and 44.5%. \$2540G-11 Solids, Total Volatile 2156366001 3 P-187-160607-1427-jsw-S2B \$2540G-11 Total Solids 2156366002 1 P-187-160607-1427-jsw-S2B \$2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366002 2 P-187-160607-1427-jsw-S2B \$2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 1 P-187-160607-1427-jsw-S3B \$2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366003 2 P-187-160607-1427-jsw-S3B \$2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time. 2156366004 1 P-215-160602-1037-jsw-S1B \$2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. 2156366004 2 P-215-160602-1037-jsw-S1B \$2540G-11 Total Solids 2156366005 1 P-215-160602-1037-jsw-S2B \$2540G-11 Total Solids Analyte was analyzed past the 7 day holding time. \$2540G-11 Solids, Total Volatile 2156366005 1	2156366001	2	P-187-160607-1427-jsw-S1B	S2540G-11	Total Solids
2156366001			•	The RPD is outside method acceptance	ce limits of 5.0%. The results used to
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21563660081P-215-160602-1037-jsw-S5BS2540G-11Total SolidsAnalyte was analyzed past the 7 day holding time.S2540G-11Solids, Total VolatileAnalyte was analyzed past the 7 day holding time.S2540G-11Solids, Total Volatile			•	320100 11	Condo, Total Volatilo
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2156366008 2 P-215-160602-1037-jsw-S5B S2540G-11 Solids, Total Volatile Analyte was analyzed past the 7 day holding time.			•	02010011	rotal Collac
Analyte was analyzed past the 7 day holding time.		-	-	S2540G-11	Solids, Total Volatile
			•	02010011	Condo, Total Volume
				S2540G-11	Total Solids
Analyte was analyzed past the 7 day holding time.			•		
2156366009 2 P-215-160602-1037-jsw-S6B S2540G-11 Solids, Total Volatile		-	-	S2540G-11	Solids, Total Volatile
Analyte was analyzed past the 7 day holding time.			•		,
2156366010 1 P-222-160607-1055-dat-S1B S2540G-11 Total Solids				S2540G-11	Total Solids
Analyte was analyzed past the 7 day holding time.		-			
2156366010 2 P-222-160607-1055-dat-S1B S2540G-11 Solids, Total Volatile	•	•	, ,	S2540G-11	Solids, Total Volatile
Analyte was analyzed past the 7 day holding time.		ed past			

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156366 89962000

2156366011	1 P-222-160607-1055-dat-S2B	S2540G-11	Total Solids
Analyte was analy	zed past the 7 day holding time.		
2156366011	2 P-222-160607-1055-dat-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366012	1 P-222-160607-1055-dat-S3B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366012	2 P-222-160607-1055-dat-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366013	1 P-222-160607-1055-dat-S4B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366013	2 P-222-160607-1055-dat-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366014	1 P-222-160607-1055-dat-S5B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366014	2 P-222-160607-1055-dat-S5B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366015	1 P-225-160601-1130-mel-S1B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366015	2 P-225-160601-1130-mel-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366016	1 P-225-160601-1130-mel-S2B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366016	2 P-225-160601-1130-mel-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366017	1 P-225-160601-1130-mel-S3B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366017	2 P-225-160601-1130-mel-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366018	1 P-225-160601-1130-mel-S4B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366018	2 P-225-160601-1130-mel-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		
2156366019	1 P-225-160601-1130-mel-S5B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366019	2 P-225-160601-1130-mel-S5B	S2540G-11	Solids, Total Volatile
	yzed past the 7 day holding time.		
2156366020	1 P-225-160601-1130-mel-S6B	S2540G-11	Total Solids
Analyte was analy	yzed past the 7 day holding time.		
2156366020	2 P-225-160601-1130-mel-S6B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed past the 7 day holding time.		

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Lancaster, PA 17603			Preservative	ě							9 10 16	H			No. of	No. of Coolers:	y N Initial
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P-215-160602-1037-jsw-S2B	6/2/2016	1037	9	SO	×	×	ij						П				
P-215-160602-1037-jsw-S3B	8/2/2016	1037	9	SO	×	×											
P-215-160602-1037-jsw-S4B	6/2/2016	1037	9	So	×	×				-							
P-215-160602-1037-jsw-S5B	6/2/2016	1037	9	So	×	×					H						
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Rev 10/14 State Samples Collected In Receipt Information (completed by Receiving Lab) 19 2 Rental Equipment ō Labor & S X 3 2 Sample/COC Comments Pickup Gooler Temps 2 Therm ID: Special Processing Sample Disposal USACE Navy Special rap Correct Preservation? Correct Containers? Correct Sample Volumos? Headspace/Volatiles? Custody Seals Present? (if present) Seals Intact? Received on loe? COC/Labels Complete/Accurate? Cont. in Good Cand.? Composite Sampling ALS Field Services: Courier/Tracking #: No. of Coolers: **Matrix - Al=Air, DW=Drinking Water, GW=Groundwater, Ol=Cit; OL=Citier Liquid; SL=Sludge; SO=Soil; WP=Wipa; WW=Wastewater Other: ALS Quote # Reportable to PADEP? Standard CLP-like USACE EDDS: Format Type COC #: PWSID# Yes ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057 Deliverables Data Enter Number of Containers Per Sample or Field Results Below Time ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT Date ANALYSES/METHOD REQUESTED SAMPLER, INSTRUCTIONS ON THE BACK \$ CHAIN OF CUSTODY/ Received By / Company Name (oca ou ¡duigou) × × × × × × O-pinegro) spilos eliteloV leto × 20. × × REVIEWED BY(signature): 08 9 100 8 8 8 S 8 8 8 8 8 LOGGED BY(signature): Preservative KINSM. Time Container Container G G COLC O Ü g G U U 9 0 Date Time Rush-Subject to ALS approval and surcharges. 1130 X Normal-Standard TAT is 10-12 business days. 1025 1025 1025 1025 1130 1130 1130 1130 1130 Middletown_PA_L205,7 P. 717-944-5541 F.717-944-1430 G=Grab; C=Compostle Approved By: 6/1/2016 6/1/2016 34 Dogwood Lane 6/1/2016 6/1/2016 677/2016 677/2016 6/7/2016 6772016 6/1/2016 6/1/2016 Date Dienstermacher@rettew.com Luben Relinquished By / Company Name Contact: Dan Fenstermacher or Duane Truax Phone#: 412-275-2219 or 717-205-2228 Client Name: RETTEW Associates, Inc. Sample Description/Location everyone (as it will appear on the lab report) P-225-160601-1130-mel-S6B P-225-160601-1130-mal-S1B P-225-160601-1130-mel-S2B P-225-160601-1130-mel-S3B P-225-160601-1130-mel-S4B P-225-160601-1130-mel-S5B P-222-160607-1055-dat-S4B P-222-160607-1055-dat-S5B P-222-160607-1055-dat-S2B P-222-160607-1055-dat-S3B Lancaster, PA 17603 Address: 3020 Columbia Ave 13-Jul-16 Environmental Project Name/#: 89952000 -Y No.: ×.X roject Comments: Date Required: TAT Email? Bill To: Fax?





NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 21, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Revised Report - 7/21/2016 9:59:53 AM - See workorder comment section for explanation

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156367
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156367 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156367001	P-225B-160601-1312-sdd-S1B	Solid	6/1/2016 13:12	7/5/2016 13:19	Collected by Client
2156367002	P-225B-160601-1312-sdd-S2B	Solid	6/1/2016 13:12	7/5/2016 13:19	Collected by Client
2156367003	P-225B-160601-1312-sdd-S3B	Solid	6/1/2016 13:12	7/5/2016 13:19	Collected by Client
2156367004	P-225B-160601-1312-sdd-S4B	Solid	6/1/2016 13:12	7/5/2016 13:19	Collected by Client
2156367005	P-227-160601-1500-jsw-S1B	Solid	6/1/2016 15:00	7/5/2016 13:19	Collected by Client
2156367006	P-227-160601-1500-jsw-S2B	Solid	6/1/2016 15:00	7/5/2016 13:19	Collected by Client
2156367007	P-227-160601-1500-jsw-S3B	Solid	6/1/2016 15:00	7/5/2016 13:19	Collected by Client
2156367008	P-239-160607-1427-def-S1B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156367009	P-239-160607-1427-def-S2B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156367010	P-239-160607-1427-def-S3B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156367011	P-239-160607-1427-def-S4B	Solid	6/7/2016 14:27	7/5/2016 13:19	Collected by Client
2156367012	P-239A-160607-1430-def-S1B	Solid	6/7/2016 14:30	7/5/2016 13:19	Collected by Client
2156367013	P-239A-160607-1430-def-S2B	Solid	6/7/2016 14:30	7/5/2016 13:19	Collected by Client
2156367014	P-239A-160607-1430-def-S3B	Solid	6/7/2016 14:30	7/5/2016 13:19	Collected by Client
2156367015	P-239A-160607-1430-def-S4B	Solid	6/7/2016 14:30	7/5/2016 13:19	Collected by Client
2156367016	P-239A-160607-1430-def-S5B	Solid	6/7/2016 14:30	7/5/2016 13:19	Collected by Client
2156367017	P-253-160608-0950-mel-S1B	Solid	6/8/2016 09:50	7/5/2016 13:19	Collected by Client
2156367018	P-253-160608-0950-mel-S2B	Solid	6/8/2016 09:50	7/5/2016 13:19	Collected by Client
2156367019	P-253-160608-0950-mel-S3B	Solid	6/8/2016 09:50	7/5/2016 13:19	Collected by Client
2156367020	P-253-160608-0950-mel-S4B	Solid	6/8/2016 09:50	7/5/2016 13:19	Collected by Client
2156367021	P-227-160601-1500-jsw-S4B	Solid	6/1/2016 15:00	7/5/2016 13:19	Collected by Client

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SAMPLE SUMMARY

Workorder: 2156367 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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PROJECT SUMMARY

Workorder: 2156367 89962000

Workorder Comments

This report was modified on 7/21/16 correct the Sample ID on 021. BWK

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367001 Date Collected: 6/1/2016 13:12 Matrix: Solid

Sample ID: P-225B-160601-1312-sdd-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	50.0		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	21.8	3	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	140000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	50.0	1,2	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367002 Date Collected: 6/1/2016 13:12 Matrix: Solid

Sample ID: P-225B-160601-1312-sdd-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.2		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	3.4	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	3990		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	82.8	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367003 Date Collected: 6/1/2016 13:12 Matrix: Solid

Sample ID: P-225B-160601-1312-sdd-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.7		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	2070		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	83.3	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367004 Date Collected: 6/1/2016 13:12 Matrix: Solid

Sample ID: P-225B-160601-1312-sdd-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.2		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	2.9	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	790		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	84.8	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367005 Date Collected: 6/1/2016 15:00 Matrix: Solid

Sample ID: P-227-160601-1500-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	56.8		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	59.1	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	233000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	43.2	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367006 Date Collected: 6/1/2016 15:00 Matrix: Solid

Sample ID: P-227-160601-1500-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	36.4		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	32.5	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	119000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	63.6	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367007 Date Collected: 6/1/2016 15:00 Matrix: Solid

Sample ID: P-227-160601-1500-jsw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.8		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	5.9	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	20000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	84.2	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367008 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-239-160607-1427-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	34.0		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	13.8	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	70900		mg/kg	500	SW846 9060A			7/15/16 11:30	CF	Α
Total Solids	66.0	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367009 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-239-160607-1427-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.8		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	4.6	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	5050		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	85.2	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367010 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-239-160607-1427-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	8.8		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	3.9	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	980		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	91.2	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367011 Date Collected: 6/7/2016 14:27 Matrix: Solid

Sample ID: P-239-160607-1427-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.9		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	3.8	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	24800	3	mg/kg	500	SW846 9060A			7/15/16 11:30	CF	Α
Total Solids	88.1	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367012 Date Collected: 6/7/2016 14:30 Matrix: Solid

Sample ID: P-239A-160607-1430-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	28.5		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	10.6	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	69900		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	71.5	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367013 Date Collected: 6/7/2016 14:30 Matrix: Solid

Sample ID: P-239A-160607-1430-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.9		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	4.0	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	6120		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	87.1	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367014 Date Collected: 6/7/2016 14:30 Matrix: Solid

Sample ID: P-239A-160607-1430-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	7.5		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	2.6	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	2990		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	92.5	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367015 Date Collected: 6/7/2016 14:30 Matrix: Solid

Sample ID: P-239A-160607-1430-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.8		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	4190		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	78.2	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367016 Date Collected: 6/7/2016 14:30 Matrix: Solid

Sample ID: P-239A-160607-1430-def-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	24.4		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	4350		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	75.6	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367017 Date Collected: 6/8/2016 09:50 Matrix: Solid

Sample ID: P-253-160608-0950-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	46.7		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	27.6	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	273000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	53.3	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367018 Date Collected: 6/8/2016 09:50 Matrix: Solid

Sample ID: P-253-160608-0950-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.3		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	6.7	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	35400		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	79.7	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367019 Date Collected: 6/8/2016 09:50 Matrix: Solid

Sample ID: P-253-160608-0950-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.0		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	9800		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	86.0	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367020 Date Collected: 6/8/2016 09:50 Matrix: Solid

Sample ID: P-253-160608-0950-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.0		%	0.1	S2540G-11			7/11/16 14:42	SLC	Α
Solids, Total Volatile	2.8	2	%	1.0	S2540G-11			7/11/16 14:42	SLC	Α
Total Organic Carbon (TOC)	4740		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	89.0	1	%	0.1	S2540G-11			7/11/16 14:42	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

Lab ID: 2156367021 Date Collected: 6/1/2016 15:00 Matrix: Solid

Sample ID: P-227-160601-1500-jsw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.9		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	2860		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	87.1	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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PARAMETER QUA	LIFIER	es.		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156367001	1	P-225B-160601-1312-sdd-S1B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367001	2	P-225B-160601-1312-sdd-S1B	S2540G-11	Total Solids
		•	The RPD is outside method acc	ceptance limits of 5.0%. The results used to
calculate the RPD			005400 44	Out the Transit Value (In
2156367001	3	P-225B-160601-1312-sdd-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	COE 40C 44	Total Calida
2156367002	1	P-225B-160601-1312-sdd-S2B	S2540G-11	Total Solids
	•	t the 7 day holding time.	205400 44	Calida Tatal Valatila
2156367002	2	P-225B-160601-1312-sdd-S2B	S2540G-11	Solids, Total Volatile
2156367003	ed pasi	t the 7 day holding time. P-225B-160601-1312-sdd-S3B	S2540G-11	Total Solids
		t the 7 day holding time.	323400-11	Total Sullus
2156367003	ed pasi 2	P-225B-160601-1312-sdd-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	02040 0 -11	Solius, Iotal Volatile
2156367004	.eu pasi	P-225B-160601-1312-sdd-S4B	S2540G-11	Total Solids
	•	t the 7 day holding time.	020400 11	Total Golias
2156367004	eu pasi 2	P-225B-160601-1312-sdd-S4B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	520700 II	Condo, rotal voluno
2156367005	.cu pasi	P-227-160601-1500-isw-S1B	S2540G-11	Total Solids
	-	t the 7 day holding time.	020400 11	Total Collab
2156367005	2	P-227-160601-1500-jsw-S1B	S2540G-11	Solids, Total Volatile
	_	t the 7 day holding time.	32010011	Condo, Total Volatile
2156367006	1	P-227-160601-1500-jsw-S2B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367006	2	P-227-160601-1500-jsw-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		•
2156367007	1	P-227-160601-1500-jsw-S3B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367007	2	P-227-160601-1500-jsw-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyz	ed past	t the 7 day holding time.		
2156367008	1	P-239-160607-1427-def-S1B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367008	2	P-239-160607-1427-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was analyz	ed past	t the 7 day holding time.		
2156367009	1	P-239-160607-1427-def-S2B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367009	2	P-239-160607-1427-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyz	ed past	t the 7 day holding time.		
2156367010	1	P-239-160607-1427-def-S3B	S2540G-11	Total Solids
Analyte was analyz	ed past	t the 7 day holding time.		
2156367010	2	P-239-160607-1427-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyz	ed past	t the 7 day holding time.		

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156367 89962000

2156367011	1	P-239-160607-1427-def-S4B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367011	2	P-239-160607-1427-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367011	3	P-239-160607-1427-def-S4B	SW846 9060A	Total Organic Carbon (TOC)
Due to sample 7-17-16	matrix, an a	average of four individual injections v	vere used to calculate the final result	. No two injections met method criteria. JWB
2156367012	1	P-239A-160607-1430-def-S1B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367012	2	P-239A-160607-1430-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367013	1	P-239A-160607-1430-def-S2B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367013	2	P-239A-160607-1430-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367014	1	P-239A-160607-1430-def-S3B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367014	2	P-239A-160607-1430-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367015	1	P-239A-160607-1430-def-S4B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367015	2	P-239A-160607-1430-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367016	1	P-239A-160607-1430-def-S5B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367016	2	P-239A-160607-1430-def-S5B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367017	1	P-253-160608-0950-mel-S1B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367017	2	P-253-160608-0950-mel-S1B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367018	1	P-253-160608-0950-mel-S2B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367018	2	P-253-160608-0950-mel-S2B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
156367019	1	P-253-160608-0950-mel-S3B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367019	2	P-253-160608-0950-mel-S3B	S2540G-11	Solids, Total Volatile
Analyte was an	alyzed pas	t the 7 day holding time.		
2156367020	1	P-253-160608-0950-mel-S4B	S2540G-11	Total Solids
Analyte was an	alyzed pas	t the 7 day holding time.		

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ANALYTICAL RESULTS

Workorder: 2156367 89962000

2156367020	2	P-253-160608-0950-mel-S4B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		
2156367021	1	P-227-160601-1500-jsw-S4B	S2540G-11	Total Solids
Analyte was anal	yzed pas	t the 7 day holding time.		
2156367021	2	P-227-160601-1500-jsw-S4B	S2540G-11	Solids, Total Volatile
Analyte was anal	yzed pas	t the 7 day holding time.		

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CALS) P. 717-944-5341 Enutronmental Client Name: RETTEW Associates, Inc. Address: 3020 Columbia Ave Lancaster, PA 17603 Contact: Dan Fenstermacher or Duane Truax Phone#: 412-275-2219 or 717-205-2228			AS IN	100										1	THE REAL PROPERTY AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO IN COLUM	
Address: 3020 Columbia Ave Lancaster, PA 17603 Contact: Dan Fenstermacher or Duane Truax Phone#: 412-275-2219 or 717-205-2228		+	i.	S	D AREA MPLER	SMUS	ADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.	IPLETEC S ON TH	BY THE BACK	E CLIEP	11/		ALS Qu	* 2 1	5 6 3 6	6 * 2
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Contact: Dan Fenstermacher or Duane Truax Phone#: 412-275-2219 or 717-205-2228		Presentable	angue		Ħ	T	1	T					No. c	No. of Coolers:	<u>-</u>	N Initial
Phone#: 412-275-2219 or 717-205-2228						ANAL	ANALYSES/METHOD REQUESTED	THOD RE	DUESTE	0				Custody S	Custody Seals Present?	13
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TAT X Normal-Standard TAT is 10-12 business days. TAT Aush-Subject to ALS approval and surcharges. Date Required: 13-Jul-16 Approved By: Email? X-Y Dienstermacher@rettew.com	ss days. urcharges. iy:			- 2 - (*in \$6 mid*)	o) sbilo Solital (notling)				_					Correct Sam Correct Correct Correct Sam	Cornect Containers? Correct Sample Volumes? Correct Preservation?	-
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Murie Signo 17.266-2228	Contact: Dan Fenstermacher of	ir Duane Truax	+	Ł				MALY	SESMET	IOD REOL	ESTED.				Custody Seals Present?	3
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July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156368
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156368 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156368001	P-254-160608-1050-mel-S1B	Solid	6/8/2016 10:50	7/5/2016 13:19	Collected by Client
2156368002	P-254-160608-1050-mel-S2B	Solid	6/8/2016 10:50	7/5/2016 13:19	Collected by Client
2156368003	P-254-160608-1050-mel-S3B	Solid	6/8/2016 10:50	7/5/2016 13:19	Collected by Client
2156368004	P-254-160608-1050-mel-S4B	Solid	6/8/2016 10:50	7/5/2016 13:19	Collected by Client
2156368005	P-276-160610-0838-jsw-S1B	Solid	6/10/2016 08:38	7/5/2016 13:19	Collected by Client
2156368006	P-276-160610-0838-jsw-S2B	Solid	6/10/2016 08:38	7/5/2016 13:19	Collected by Client
2156368007	P-276-160610-0838-jsw-S3B	Solid	6/10/2016 08:38	7/5/2016 13:19	Collected by Client
2156368008	P-276-160610-0838-jsw-S4B	Solid	6/10/2016 08:38	7/5/2016 13:19	Collected by Client
2156368009	P-276-160610-0838-jsw-S5B	Solid	6/10/2016 08:38	7/5/2016 13:19	Collected by Client
2156368010	P-279-160610-1359-dat-S1B	Solid	6/10/2016 13:59	7/5/2016 13:19	Collected by Client
2156368011	P-279-160610-1359-dat-S2B	Solid	6/10/2016 13:59	7/5/2016 13:19	Collected by Client
2156368012	P-279-160610-1359-dat-S3B	Solid	6/10/2016 13:59	7/5/2016 13:19	Collected by Client
2156368013	P-279-160610-1359-dat-S4B	Solid	6/10/2016 13:59	7/5/2016 13:19	Collected by Client
2156368014	P-279-160610-1359-dat-S5B	Solid	6/10/2016 13:59	7/5/2016 13:19	Collected by Client
2156368015	P-279A-160610-1450-def-S1B	Solid	6/10/2016 14:50	7/5/2016 13:19	Collected by Client
2156368016	P-279A-160610-1450-def-S2B	Solid	6/10/2016 14:50	7/5/2016 13:19	Collected by Client
2156368017	P-279A-160610-1450-def-S3B	Solid	6/10/2016 14:50	7/5/2016 13:19	Collected by Client
2156368018	P-279A-160610-1450-def-S4B	Solid	6/10/2016 14:50	7/5/2016 13:19	Collected by Client
2156368019	P-283-160606-0743-def-S1B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client
2156368020	P-283-160606-0743-def-S2B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156368 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368001 Date Collected: 6/8/2016 10:50 Matrix: Solid

Sample ID: P-254-160608-1050-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	59.9		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	67.8	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	300000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	40.1	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368002 Date Collected: 6/8/2016 10:50 Matrix: Solid

Sample ID: P-254-160608-1050-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.1		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	8.7	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	29400		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	79.9	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368003 Date Collected: 6/8/2016 10:50 Matrix: Solid

Sample ID: P-254-160608-1050-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.4		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.4	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	10800		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	85.6	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368004 Date Collected: 6/8/2016 10:50 Matrix: Solid

Sample ID: P-254-160608-1050-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.2		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.4	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	6940		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	86.8	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368005 Date Collected: 6/10/2016 08:38 Matrix: Solid

Sample ID: P-276-160610-0838-jsw-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	40.3		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	20.8	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	86500		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	59.7	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368006 Date Collected: 6/10/2016 08:38 Matrix: Solid

Sample ID: P-276-160610-0838-jsw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.9		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.5	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	25700		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	86.1	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368007 Date Collected: 6/10/2016 08:38 Matrix: Solid

Sample ID: P-276-160610-0838-jsw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.6		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	7530		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	90.4	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368008 Date Collected: 6/10/2016 08:38 Matrix: Solid

Sample ID: P-276-160610-0838-jsw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.0		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.9	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	11000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	84.0	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368009 Date Collected: 6/10/2016 08:38 Matrix: Solid

Sample ID: P-276-160610-0838-jsw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	8.6		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.1	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	2800		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	91.4	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368010 Date Collected: 6/10/2016 13:59 Matrix: Solid

Sample ID: P-279-160610-1359-dat-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	47.4		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	36.3	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	212000		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	52.6	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368011 Date Collected: 6/10/2016 13:59 Matrix: Solid

Sample ID: P-279-160610-1359-dat-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	31.3		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	17.3	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	92400		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	68.7	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368012 Date Collected: 6/10/2016 13:59 Matrix: Solid

Sample ID: P-279-160610-1359-dat-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.4		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.5	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	19400		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	85.6	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368013 Date Collected: 6/10/2016 13:59 Matrix: Solid

Sample ID: P-279-160610-1359-dat-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	10.7		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	2.8	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	3870		mg/kg	500	SW846 9060A			7/12/16 16:00	CF	Α
Total Solids	89.3	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368014 Date Collected: 6/10/2016 13:59 Matrix: Solid

Sample ID: P-279-160610-1359-dat-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	6.9		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	2.7	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	2050		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	93.1	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368015 Date Collected: 6/10/2016 14:50 Matrix: Solid

Sample ID: P-279A-160610-1450-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	26.6		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	11.4	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	83900		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	73.4	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368016 Date Collected: 6/10/2016 14:50 Matrix: Solid

Sample ID: P-279A-160610-1450-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.1		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	5870		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	84.9	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368017 Date Collected: 6/10/2016 14:50 Matrix: Solid

Sample ID: P-279A-160610-1450-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.9		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.0	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	2880		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	90.1	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368018 Date Collected: 6/10/2016 14:50 Matrix: Solid

Sample ID: P-279A-160610-1450-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.1		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.6	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	1040		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	84.9	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368019 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	72.8		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	89.8	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	453000		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	27.2	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156368 89962000

Lab ID: 2156368020 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	23.0		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	7.6	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	35600		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	77.0	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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PARAMETER QUA	ALIFIER	RS		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156368001	1	P-254-160608-1050-mel-S1B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156368001	2	P-254-160608-1050-mel-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	005400 44	T / 10 E1
2156368002	1	P-254-160608-1050-mel-S2B	S2540G-11	Total Solids
2156368002	zed pas 2	t the 7 day holding time. P-254-160608-1050-mel-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	32340G-11	Solids, Total Volatile
2156368003	1	P-254-160608-1050-mel-S3B	S2540G-11	Total Solids
	-	t the 7 day holding time.	020400 11	Total Collab
2156368003	2	P-254-160608-1050-mel-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyz	zed pas	t the 7 day holding time.		,
2156368004	1	P-254-160608-1050-mel-S4B	S2540G-11	Total Solids
Analyte was analyz	zed pas	t the 7 day holding time.		
2156368004	2	P-254-160608-1050-mel-S4B	S2540G-11	Solids, Total Volatile
WETC-103				
2156368005	1	P-276-160610-0838-jsw-S1B	S2540G-11	Total Solids
		t the 7 day holding time.	005400 44	Ostile Tetal Valotie
2156368005	2	P-276-160610-0838-jsw-S1B	S2540G-11	Solids, Total Volatile
2156368006	eu pas 1	t the 7 day holding time. P-276-160610-0838-jsw-S2B	S2540G-11	Total Solids
		t the 7 day holding time.	32340G-11	Total Solius
2156368006	2	P-276-160610-0838-jsw-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156368007	1	P-276-160610-0838-jsw-S3B	S2540G-11	Total Solids
Analyte was analyz	zed pas	t the 7 day holding time.		
2156368007	2	P-276-160610-0838-jsw-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyz	zed pas	t the 7 day holding time.		
2156368008	1	P-276-160610-0838-jsw-S4B	S2540G-11	Total Solids
		t the 7 day holding time.	005400 44	
2156368008	2	P-276-160610-0838-jsw-S4B	S2540G-11	Solids, Total Volatile
2156368009	zeu pas 1	t the 7 day holding time. P-276-160610-0838-jsw-S5B	S2540G-11	Total Solids
		t the 7 day holding time.	323400-11	Total Solids
2156368009	2	P-276-160610-0838-jsw-S5B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156368010	1	P-279-160610-1359-dat-S1B	S2540G-11	Total Solids
Analyte was analyz	zed pas	t the 7 day holding time.		
2156368010	2	P-279-160610-1359-dat-S1B	S2540G-11	Solids, Total Volatile
	zed pas	t the 7 day holding time.		
2156368011	1	P-279-160610-1359-dat-S2B	S2540G-11	Total Solids
•		t the 7 day holding time.	005400 44	Oalida Taral Maladia
2156368011	2	P-279-160610-1359-dat-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyz	ed pas	t the 7 day holding time.		

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156368 89962000

2156368012	1	P-279-160610-1359-dat-S3B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368012	2	P-279-160610-1359-dat-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368013	1	P-279-160610-1359-dat-S4B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368013	2	P-279-160610-1359-dat-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368014	1	P-279-160610-1359-dat-S5B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368014	2	P-279-160610-1359-dat-S5B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368015	1	P-279A-160610-1450-def-S1B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368015	2	P-279A-160610-1450-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368016	1	P-279A-160610-1450-def-S2B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368016	2	P-279A-160610-1450-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368017	1	P-279A-160610-1450-def-S3B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368017	2	P-279A-160610-1450-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368018	1	P-279A-160610-1450-def-S4B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368018	2	P-279A-160610-1450-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368019	1	P-283-160606-0743-def-S1B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368019	2	P-283-160606-0743-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368020	1	P-283-160606-0743-def-S2B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156368020	2	P-283-160606-0743-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		

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ame: RETTEW Associates, Inc. 3: 3020 Columbia Ave Lancaster, PA 17603 3: Dan Fenstermacher or Duane Truax 4: 412-275-2219 or 717-205-2228 Name/#: 89962000 X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. Yell-16 Approved By:					- 2	ĺ	2 *	* 0000	
s: 3020 Columbia Ave Lancaster, PA 17603 Dan Fenstermacher or Duane Truax 412-275-2219 or 717-205-229 Name/#: 89992000 X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. Y Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days.							<u>.</u> 	A commence of the second secon	Receiving Lab)
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Contact: Dan Fenstermacher or Duane Fruax Phone#: 412-275-2218 or 717-205-228 Project Name/#: 89962000 Bill To: TAT Rush-Subject to ALS approved By: Date Required: 13-Jul-16 Approved By: Frasion Y. Monetermacher@rethou.com							No.	No. of Coolers: Y	N (niftal
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P-254-160608-1050-mel-S38 682016 1050 G SO	×	×							
P-254-160608-1050-mel-S48 6982016 1050 G SO	×	×							1
P-276-160610-0838-jsw-518 6/10/2016 838 G SO	×	×							
P-276-160610-0838-jsw-528 6/10/2016 838 G SO	×	X				Ť			
P-276-160610-0838-jsw-S3B 6/10/2016 838 G SO	×	X							
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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156369
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 2156369 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156369001	P-283-160606-0743-def-S3B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client
2156369002	P-283-160606-0743-def-S4B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client
2156369003	P-283-160606-0743-def-S5B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client
2156369004	P-283-160606-0743-def-S6B	Solid	6/6/2016 07:43	7/5/2016 13:19	Collected by Client
2156369005	P-286-160606-0808-def-S1B	Solid	6/6/2016 08:08	7/5/2016 13:19	Collected by Client
2156369006	P-286-160606-0808-def-S2B	Solid	6/6/2016 08:08	7/5/2016 13:19	Collected by Client
2156369007	P-286-160606-0808-def-S3B	Solid	6/6/2016 08:08	7/5/2016 13:19	Collected by Client
2156369008	P-286-160606-0808-def-S4B	Solid	6/6/2016 08:08	7/5/2016 13:19	Collected by Client
2156369009	P-290-160606-1445-mel-S1B	Solid	6/6/2016 14:45	7/5/2016 13:19	Collected by Client
2156369010	P-290-160606-1445-mel-S2B	Solid	6/6/2016 14:45	7/5/2016 13:19	Collected by Client
2156369011	P-290-160606-1445-mel-S3B	Solid	6/6/2016 14:45	7/5/2016 13:19	Collected by Client
2156369012	P-290-160606-1445-mel-S4B	Solid	6/6/2016 14:45	7/5/2016 13:19	Collected by Client
2156369013	P-291-160606-1330-mel-S1B	Solid	6/6/2016 13:30	7/5/2016 13:19	Collected by Client
2156369014	P-291-160606-1330-mel-S2B	Solid	6/6/2016 13:30	7/5/2016 13:19	Collected by Client
2156369015	P-291-160606-1330-mel-S3B	Solid	6/6/2016 13:30	7/5/2016 13:19	Collected by Client
2156369016	P-291-160606-1330-mel-S4B	Solid	6/6/2016 13:30	7/5/2016 13:19	Collected by Client
2156369017	P-347-160621-1409-def-S1B	Solid	6/21/2016 14:09	7/5/2016 13:19	Collected by Client
2156369018	P-347-160621-1409-def-S2B	Solid	6/21/2016 14:09	7/5/2016 13:19	Collected by Client
2156369019	P-352-160621-1145-def-S1B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client
2156369020	P-352-160621-1145-def-S2B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client

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SAMPLE SUMMARY

Workorder: 2156369 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369001 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.2		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.8		%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	6890		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	86.8	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369002 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.9		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	1360		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	88.1	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369003 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.3		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	1030		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	86.7	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369004 Date Collected: 6/6/2016 07:43 Matrix: Solid

Sample ID: P-283-160606-0743-def-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	9.7		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	1610		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	90.3	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369005 Date Collected: 6/6/2016 08:08 Matrix: Solid

Sample ID: P-286-160606-0808-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	65.1		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	91.1	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	470000		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	34.9	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369006 Date Collected: 6/6/2016 08:08 Matrix: Solid

Sample ID: P-286-160606-0808-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.3		%	0.1	S2540G-11			7/7/16 10:31	SLC	Α
Solids, Total Volatile	3.8	2	%	1.0	S2540G-11			7/7/16 10:31	SLC	Α
Total Organic Carbon (TOC)	6910		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	81.7	1	%	0.1	S2540G-11			7/7/16 10:31	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369007 Date Collected: 6/6/2016 08:08 Matrix: Solid

Sample ID: P-286-160606-0808-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.5		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	1.8	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	1450		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	86.5	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369008 Date Collected: 6/6/2016 08:08 Matrix: Solid

Sample ID: P-286-160606-0808-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	12.7		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	3.6	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	1950		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	87.3	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369009 Date Collected: 6/6/2016 14:45 Matrix: Solid

Sample ID: P-290-160606-1445-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	67.5		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	97.1	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	526000		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	32.5	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369010 Date Collected: 6/6/2016 14:45 Matrix: Solid

Sample ID: P-290-160606-1445-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	27.9		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	8.2	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	36800		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	72.1	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369011 Date Collected: 6/6/2016 14:45 Matrix: Solid

Sample ID: P-290-160606-1445-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.2		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	2.7	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	7620		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	79.8	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369012 Date Collected: 6/6/2016 14:45 Matrix: Solid

Sample ID: P-290-160606-1445-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.4		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	3.4	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	2730		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	82.6	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369013 Date Collected: 6/6/2016 13:30 Matrix: Solid

Sample ID: P-291-160606-1330-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	29.1		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	11.8	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	82800		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	70.9	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369014 Date Collected: 6/6/2016 13:30 Matrix: Solid

Sample ID: P-291-160606-1330-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	20.4		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	4.1	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	10300		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	79.6	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369015 Date Collected: 6/6/2016 13:30 Matrix: Solid

Sample ID: P-291-160606-1330-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.8		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	5.5	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	4500		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	78.2	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369016 Date Collected: 6/6/2016 13:30 Matrix: Solid

Sample ID: P-291-160606-1330-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.9		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	3.3	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	1260		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	88.1	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369017 Date Collected: 6/21/2016 14:09 Matrix: Solid

Sample ID: P-347-160621-1409-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.5		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	17.9	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	198000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	82.5	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369018 Date Collected: 6/21/2016 14:09 Matrix: Solid

Sample ID: P-347-160621-1409-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.6		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	6.1	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	14100		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	84.4	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369019 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	69.6		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	66.8	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	324000		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	30.4	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156369 89962000

Lab ID: 2156369020 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	28.1		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	10.7	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	54800		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	71.9	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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PARAMETER QU	JALIFIEF	RS		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156369001	1	P-283-160606-0743-def-S3B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369002	1	P-283-160606-0743-def-S4B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369002	2	P-283-160606-0743-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369003	1	P-283-160606-0743-def-S5B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369003	2	P-283-160606-0743-def-S5B	S2540G-11	Solids, Total Volatile
Analyte was analy		t the 7 day holding time.		
2156369004	1	P-283-160606-0743-def-S6B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156369004	2	P-283-160606-0743-def-S6B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156369005	1	P-286-160606-0808-def-S1B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156369005	2	P-286-160606-0808-def-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156369006	1	P-286-160606-0808-def-S2B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156369006	2	P-286-160606-0808-def-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	222.22	T
2156369007	1	P-286-160606-0808-def-S3B	S2540G-11	Total Solids
		t the 7 day holding time.	005400 44	Out to Taral Valority
2156369007	2	P-286-160606-0808-def-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	005400 44	Total Calida
2156369008	1	P-286-160606-0808-def-S4B	S2540G-11	Total Solids
2156369008	yzeu pas 2	t the 7 day holding time. P-286-160606-0808-def-S4B	S2540G-11	Solids, Total Volatile
			32340G-11	Solids, Total Volatile
2156369009	yzeu pas 1	t the 7 day holding time. P-290-160606-1445-mel-S1B	S2540G-11	Total Solids
	•	t the 7 day holding time.	323400-11	Total Solius
2156369009	yzeu pas 2	P-290-160606-1445-mel-S1B	S2540G-11	Solids, Total Volatile
	_	t the 7 day holding time.	020400-11	Collas, Total Volatile
2156369010	yzou pas 1	P-290-160606-1445-mel-S2B	S2540G-11	Total Solids
		t the 7 day holding time.	020400-11	Total Golids
2156369010	yzou pas 2	P-290-160606-1445-mel-S2B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	3=0.00	33.33, 13.33.
2156369011	, 200 pao 1	P-290-160606-1445-mel-S3B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156369011	2	P-290-160606-1445-mel-S3B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156369012	1	P-290-160606-1445-mel-S4B	S2540G-11	Total Solids
		t the 7 day holding time.		
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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156369 89962000

2156369012	2	P-290-160606-1445-mel-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369013	1	P-291-160606-1330-mel-S1B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369013	2	P-291-160606-1330-mel-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369014	1	P-291-160606-1330-mel-S2B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369014	2	P-291-160606-1330-mel-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369015	1	P-291-160606-1330-mel-S3B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369015	2	P-291-160606-1330-mel-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369016	1	P-291-160606-1330-mel-S4B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369016	2	P-291-160606-1330-mel-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369017	1	P-347-160621-1409-def-S1B	S2540G-11	Total Solids
The RPD associa calculate the RPD			The RPD is outside method	d acceptance limits of 5.0%. The results used to
2156369017	2	P-347-160621-1409-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369018	1	P-347-160621-1409-def-S2B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369018	2	P-347-160621-1409-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369019	1	P-352-160621-1145-def-S1B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369019	2	P-352-160621-1145-def-S1B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369020	1	P-352-160621-1145-def-S2B	S2540G-11	Total Solids
Analyte was analy	yzed pas	t the 7 day holding time.		
2156369020	2	P-352-160621-1145-def-S2B	S2540G-11	Solids, Total Volatile
Analyte was analy	yzed pas	t the 7 day holding time.		

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(ALS) F.717-	P. 717-944-5541 F.717-944-1430	260		ALL SH	₹	ADED AREAS MUST BE COMPLETED BY THE SAMPLER. INSTRUCTIONS ON THE BACK.	STRE	COMPIL CONS OF	THE B	THE CLIENT ACK.	IENT/	¥	* *	5 6 3 6 9 4	19
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Address: 3020 Columbia Ave			Container	類			1						Cooler Temp:	emp: Therm ID:	74.353
Lancaster, PA 17603			Preservative	awp									No. of Coalers:	olers:	聖(
Contact: Dan Fenstermacher or Duane Truax	NEX					AN	4LYSES	METHO	ANALYSES/METHOD REQUESTED	STED		E		Custody Seals Present?	3
Phone#: 412-275-2219 or 717-205-2228				-		- 42								(if present) Seals Intact?	+
Project Name/#: 89962000				_		j- oji								Received on Ice?	7
Bill To:						negr							7000	COC/Lebels Complete/Accurate?	
TAT Normal-Standard TAT is 10-12 business days. TAT Nush-Subject to ALS approval and surcharges. Date Required: 13-Jul-16 Approved By: Email? X Y Dienstermacher@rettew.com	0-12 business roval and surc Approved By: tew.com	days.				O) abilo2 eliselo (noilingi								Correct Containers? Correct Sample Volumes? Correct Preservation?	
Fax? -Y No.:			_	_	Ö									Headspace/Votatiles?	+1
Sample Description/Location	Sample	Time	10 0,	usM"	101	SSOI	ber of Co	ntainers	er Sample	or Field	Enter Number of Containers Per Sample or Field Results Below.	low.	Caurier/	Courier/Tracking #: Sample/COC Comments	shis
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P-283-160606-0743-def-S4B	6/6/2016	743	G	SO	×	×							2		
P-283-160606-0743-def-S5B	6/6/2016	743	9	so	×	×		4	j.			-			
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P-286-160606-0808-def-S3B	6/6/2016	808	9	so	×	×			Ц			E			
P-286-160606-0808-def-S4B	6/6/2016	808	GS	os	×	×									
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ame: RETTEW Associates, Inc. s: 3020 Columbia Ave Lancaster, PA 17603 : Dan Fenstermacher or Duane Truex : 412-275-2219 or 717-205-2228 Name#: 89962000 X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X -y Dfenstermacher@rettew.com	All Type Container Size Size	ALL SHAD	DED AREAS MUST BE COMPLETED BY THI SAMPLER, INSTRUCTIONS ON THE BACK	ADED AREAS MUST BE COMPLETED BY THE CLIENT!	3Y THE CLIENT		ALS Quote #:	19
ame: RETTEW Associates, Inc. s: 3020 Columbia Ave Lancaster, PA 17603 : Dan Fenstermacher or Duane Truax : 412-275-2219 or 717-205-2228 Name/#: 89962000 X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days.	Continue Typo Containe Size Size reservable	1			HACK			
s: 3020 Columbia Ave Lancaster, PA 17603 : Dan Fenstermacher or Duane Truax : 412-275-2219 or 717-205-2228 Name/#: 89962000 X Normal-Standard TAT is 10-12 business days. Tall-16 Approval and surcharges. X -Y Dfenstermacher@rettew.com	Sze Sze reservable			all the children of the	The state of the s		Receipt Information (completed by Receiving Lab)	y Receiving Lab)
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: Dan Fenstermacher or Duane Truax : 412-275-2219 or 717-205-2228 Name/#: 89962000 X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business days. X Normal-Standard TAT is 10-12 business d							No. of Coolers:	N fnitial
Namel#: 89962000 Namel#: 89962000 X Normal-Standard TAT is 10-12 business days. Guired: 13-Jul-16 Approved By: X -Y Dienstermacher@rettew.com			A	ANALYSES/METHOD REQUESTED	JESTED		Custody Seals Present?	Y
Name#: 89962000 X Normal-Standard TAT is 10-12 business days. Rush-Subject to ALS approval and surcharges. quired: 13-Jul-16 Approved By: X -Y Dienstermacher@rettew.com			30				(if present) Seals Intact?	1
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Rush-Subject to ALS approval and surcharges. quired: 13-Jul-16 Approved By: X -Y Dienstermacher@rettew.com			Je61				COC/Labels Complete/Accurate?	
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REVIEWED BY(signature):	(signature).			ane.	जता.		5	Collected in
pany Name Date	Time 1/00	6	Received By	Received By / Company Name	Date 7/1/C	vilad	USACE	2 2
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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 21, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156370
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156370 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156370001	P-352-160621-1145-def-S3B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client
2156370002	P-352-160621-1145-def-S4B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client
2156370003	P-352-160621-1145-def-S5B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client
2156370004	P-352-160621-1145-def-S6B	Solid	6/21/2016 11:45	7/5/2016 13:19	Collected by Client
2156370005	P-010-160620-1315-mgw-S1B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370006	P-010-160620-1315-mgw-S2B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370007	P-010-160620-1315-mgw-S3B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370008	P-010-160620-1315-mgw-S4B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370009	P-010-160620-1315-mgw-S5B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370010	P-010-160620-1315-mgw-S6B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370011	P-010-160620-1315-mgw-S7B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370012	P-010-160620-1315-mgw-S8B	Solid	6/20/2016 13:15	7/5/2016 13:19	Collected by Client
2156370013	P-045-160614-1019-jcr-S1B	Solid	6/14/2016 10:19	7/5/2016 13:19	Collected by Client
2156370014	P-045-160614-1019-jcr-S2B	Solid	6/14/2016 10:19	7/5/2016 13:19	Collected by Client
2156370015	P-045-160614-1019-jcr-S3B	Solid	6/14/2016 10:19	7/5/2016 13:19	Collected by Client
2156370016	P-045-160614-1019-jcr-S4B	Solid	6/14/2016 10:19	7/5/2016 13:19	Collected by Client
2156370017	P-077-160617-1035-sdd-S1B	Solid	6/17/2016 10:35	7/5/2016 13:19	Collected by Client
2156370018	P-077-160617-1035-sdd-S2B	Solid	6/17/2016 10:35	7/5/2016 13:19	Collected by Client
2156370019	P-077-160617-1035-sdd-S3B	Solid	6/17/2016 10:35	7/5/2016 13:19	Collected by Client
2156370020	P-077-160617-1035-sdd-S4B	Solid	6/17/2016 10:35	7/5/2016 13:19	Collected by Client

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156370 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
- DL DoD Detection Limit
- I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370001 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	15.9		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	5.5	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	17600		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	84.1	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370002 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.3		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	4.9	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	15700		mg/kg	500	SW846 9060A			7/13/16 17:15	CF	Α
Total Solids	81.7	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370003 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	8.9		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	10.8	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	5570		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	91.1	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370004 Date Collected: 6/21/2016 11:45 Matrix: Solid

Sample ID: P-352-160621-1145-def-S6B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.2		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	5.8	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	6060		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	85.8	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370005 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: **P-010-160620-1315-mgw-S1B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	60.8		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	86.3	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	476000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	39.2	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370006 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	52.4		%	0.1	S2540G-11			7/7/16 13:00	SLC	Α
Solids, Total Volatile	41.4	2	%	1.0	S2540G-11			7/7/16 13:00	SLC	Α
Total Organic Carbon (TOC)	185000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	47.6	1	%	0.1	S2540G-11			7/7/16 13:00	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370007 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	36.0		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	14.8	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	67200		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	64.0	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370008 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	29.6		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	8.1	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	30500		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	70.4	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370009 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.7		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	5.1	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	7200		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	78.3	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370010 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: **P-010-160620-1315-mgw-S6B** Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.9		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	4.3	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	3280		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	83.1	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370011 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S7B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	17.0		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	5.9	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	2360		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	83.0	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370012 Date Collected: 6/20/2016 13:15 Matrix: Solid

Sample ID: P-010-160620-1315-mgw-S8B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.0		%	0.1	S2540G-11			7/20/16 08:13	VKB	Α
Solids, Total Volatile	5.0	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	2810		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	84.0		%	0.1	S2540G-11			7/20/16 08:13	VKB	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370013 Date Collected: 6/14/2016 10:19 Matrix: Solid

Sample ID: P-045-160614-1019-jcr-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	44.4		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	49.4	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	273000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	55.6	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370014 Date Collected: 6/14/2016 10:19 Matrix: Solid

Sample ID: P-045-160614-1019-jcr-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	18.5		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	9.6	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	53700		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	81.5	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370015 Date Collected: 6/14/2016 10:19 Matrix: Solid

Sample ID: P-045-160614-1019-jcr-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	8.6		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	3.2	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	4230		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	91.4	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370016 Date Collected: 6/14/2016 10:19 Matrix: Solid

Sample ID: P-045-160614-1019-jcr-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	10.0		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	3.8	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	3480		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	90.0	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370017 Date Collected: 6/17/2016 10:35 Matrix: Solid

Sample ID: P-077-160617-1035-sdd-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	66.9		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	87.2	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	194000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	33.1	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370018 Date Collected: 6/17/2016 10:35 Matrix: Solid

Sample ID: P-077-160617-1035-sdd-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	21.5		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	8.7	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	68700		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	78.5	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370019 Date Collected: 6/17/2016 10:35 Matrix: Solid

Sample ID: P-077-160617-1035-sdd-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.0		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	3.6	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	6160		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	89.0	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156370 89962000

Lab ID: 2156370020 Date Collected: 6/17/2016 10:35 Matrix: Solid

Sample ID: P-077-160617-1035-sdd-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	11.8		%	0.1	S2540G-11			7/12/16 13:51	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/12/16 13:51	SLC	Α
Total Organic Carbon (TOC)	5130		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	88.2	1	%	0.1	S2540G-11			7/12/16 13:51	SLC	Α

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PARAMETER QU	ALIFIEF	RS		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156370001	1	P-352-160621-1145-def-S3B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156370001	2	P-352-160621-1145-def-S3B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156370002	1	P-352-160621-1145-def-S4B	S2540G-11	Total Solids
Analyte was analy	zed pas	t the 7 day holding time.		
2156370002	2	P-352-160621-1145-def-S4B	S2540G-11	Solids, Total Volatile
Analyte was analy	zed pas	t the 7 day holding time.		
2156370003	1	P-352-160621-1145-def-S5B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156370003	2	P-352-160621-1145-def-S5B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156370004	1	P-352-160621-1145-def-S6B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156370004	2	P-352-160621-1145-def-S6B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156370005	1	P-010-160620-1315-mgw-S1B	S2540G-11	Total Solids
		t the 7 day holding time.		
2156370005	2	P-010-160620-1315-mgw-S1B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.		
2156370006	1	P-010-160620-1315-mgw-S2B	S2540G-11	Total Solids
		t the 7 day holding time.	007/00//	0 W. T. 11/1 W
2156370006	2	P-010-160620-1315-mgw-S2B	S2540G-11	Solids, Total Volatile
	•	t the 7 day holding time.	005400 44	Total Oalida
2156370007	1	P-010-160620-1315-mgw-S3B	S2540G-11	Total Solids
		t the 7 day holding time.	005400 44	Calida Tatal Valatila
2156370007	2	P-010-160620-1315-mgw-S3B	S2540G-11	Solids, Total Volatile
2156370008	/zeu pas 1	t the 7 day holding time.	S2540G-11	Total Solids
		P-010-160620-1315-mgw-S4B at the 7 day holding time.	32340G-11	Total Solius
2156370008	zeu pas 2	P-010-160620-1315-mgw-S4B	S2540G-11	Solids, Total Volatile
		t the 7 day holding time.	32340G-11	Solids, Total Volatile
2156370009	1	P-010-160620-1315-mgw-S5B	S2540G-11	Total Solids
	-	t the 7 day holding time.	020400-11	Total Collus
2156370009	2 2	P-010-160620-1315-mgw-S5B	S2540G-11	Solids, Total Volatile
		at the 7 day holding time.	020400 11	Condo, Total Volatile
2156370010	1	P-010-160620-1315-mgw-S6B	S2540G-11	Total Solids
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ALS Environmental Laboratory Locations Across North America

Canada: Burlington · Calgary · Centre of Excellence · Edmonton · Fort McMurray · Fort St. John · Grande Prairie · London · Mississauga · Richmond Hill · Saskatoon · Thunder Bay Vancouver Waterloo · Winnipeg · Yellowknife United States: Cincinnati · Everett · Fort Collins · Holland · Houston · Middletown · Salt Lake City · Spring City · York Mexico: Monterrey

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156370 89962000

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

July 18, 2016

Mr. Duane Truax Rettew Associates Inc. 3020 Columbia Avenue Lancaster, PA 17603

Certificate of Analysis

Project Name: 2016-TOC AND LOI ON SOILS Workorder: 2156371
Purchase Order: Workorder ID: 89962000

Dear Mr. Truax:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, July 5, 2016.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Mr. Brad W Kintzer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

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ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Dan Fenstermacher, Rettew

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Mr. Brad W Kintzer Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

SAMPLE SUMMARY

Workorder: 2156371 89962000

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
2156371001	P-077-160617-1035-sdd-S5B	Solid	6/17/2016 10:35	7/5/2016 13:19	Collected by Client
2156371002	P-293-160606-1056-mel-S1B	Solid	6/6/2016 10:56	7/5/2016 13:19	Collected by Client
2156371003	P-293-160606-1056-mel-S2B	Solid	6/6/2016 10:56	7/5/2016 13:19	Collected by Client
2156371004	P-293-160606-1056-mel-S3B	Solid	6/6/2016 10:56	7/5/2016 13:19	Collected by Client
2156371005	P-293-160606-1056-mel-S4B	Solid	6/6/2016 10:56	7/5/2016 13:19	Collected by Client
2156371006	P-293-160606-1056-mel-S5B	Solid	6/6/2016 10:56	7/5/2016 13:19	Collected by Client
2156371007	P-225A-160601-1130-jcr-S1B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156371008	P-225A-160601-1130-jcr-S2B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client
2156371009	P-225A-160601-1130-jcr-S3B	Solid	6/1/2016 11:30	7/5/2016 13:19	Collected by Client

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SAMPLE SUMMARY

Workorder: 2156371 89962000

Notes

- -- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 Field Services Sampling Plan).
- -- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- -- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- -- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- -- The Chain of Custody document is included as part of this report.
- -- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
- -- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
- -- Method references listed on this report beginning with the prefix "S" followed by a method number (such as S2310B-97) refer to methods from "Standard Methods for the Examination of Water and Wastewater".
- -- For microbiological analyses, the "Prepared" value is the date/time into the incurbator and the "Analyzed" value is the date/time out the incubator.

Standard Acronyms/Flags

- J Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
- U Indicates that the analyte was Not Detected (ND)
- N Indicates presumptive evidence of the presence of a compound
- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- RDL Reporting Detection Limit
- ND Not Detected indicates that the analyte was Not Detected at the RDL
- Cntr Analysis was performed using this container
- RegLmt Regulatory Limit
- LCS Laboratory Control Sample
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- DUP Sample Duplicate
- %Rec Percent Recovery
- RPD Relative Percent Difference
- LOD DoD Limit of Detection
- LOQ DoD Limit of Quantitation
 DL DoD Detection Limit
 - I Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
- (S) Surrogate Compound
- NC Not Calculated
- * Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371001 Date Collected: 6/17/2016 10:35 Matrix: Solid

Sample ID: P-077-160617-1035-sdd-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.3		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	1300		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	85.7	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

Mr. Brad W Kintzer
Project Coordinator

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NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: A2LA 0818.01 State Certifications: DE ID 11 , MA PA0102 , MD 128 , VA 460157 , WV 343

ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371002 Date Collected: 6/6/2016 10:56 Matrix: Solid

Sample ID: P-293-160606-1056-mel-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	69.7		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	66.7	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	333000		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	30.3	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371003 Date Collected: 6/6/2016 10:56 Matrix: Solid

Sample ID: P-293-160606-1056-mel-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	32.2		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	11.5	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	57100		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	67.8	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371004 Date Collected: 6/6/2016 10:56 Matrix: Solid

Sample ID: P-293-160606-1056-mel-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	16.6		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	4.0	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	9790		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	83.4	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371005 Date Collected: 6/6/2016 10:56 Matrix: Solid

Sample ID: P-293-160606-1056-mel-S4B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.2		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	3.7	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	5700		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	86.8	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371006 Date Collected: 6/6/2016 10:56 Matrix: Solid

Sample ID: P-293-160606-1056-mel-S5B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	13.0		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	2.5	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	3740		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	87.0	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371007 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225A-160601-1130-jcr-S1B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	31.3		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	10.7	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	55300		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	68.7	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371008 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225A-160601-1130-jcr-S2B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	7.4		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	11.2	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	4780		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	92.6	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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ANALYTICAL RESULTS

Workorder: 2156371 89962000

Lab ID: 2156371009 Date Collected: 6/1/2016 11:30 Matrix: Solid

Sample ID: P-225A-160601-1130-jcr-S3B Date Received: 7/5/2016 13:19

Parameters	Results	Flag	Units	RDL	Method	Prepared	Ву	Analyzed	Ву	Cntr
WET CHEMISTRY										
Moisture	14.9		%	0.1	S2540G-11			7/12/16 14:37	SLC	Α
Solids, Total Volatile	4.2	2	%	1.0	S2540G-11			7/12/16 14:37	SLC	Α
Total Organic Carbon (TOC)	4040		mg/kg	500	SW846 9060A			7/14/16 17:00	CF	Α
Total Solids	85.1	1	%	0.1	S2540G-11			7/12/16 14:37	SLC	Α

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PARAMETER QUAL	LIFIER	S		
Lab ID	#	Sample ID	Analytical Method	Analyte
2156371001	1	P-077-160617-1035-sdd-S5B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371001	2	P-077-160617-1035-sdd-S5B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371002	1	P-293-160606-1056-mel-S1B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371002	2	P-293-160606-1056-mel-S1B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371003	1	P-293-160606-1056-mel-S2B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371003	2	P-293-160606-1056-mel-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371004	1	P-293-160606-1056-mel-S3B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371004	2	P-293-160606-1056-mel-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371005	1	P-293-160606-1056-mel-S4B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371005	2	P-293-160606-1056-mel-S4B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371006	1	P-293-160606-1056-mel-S5B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371006	2	P-293-160606-1056-mel-S5B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371007	1	P-225A-160601-1130-jcr-S1B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371007	2	P-225A-160601-1130-jcr-S1B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371008	1	P-225A-160601-1130-jcr-S2B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371008	2	P-225A-160601-1130-jcr-S2B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		
2156371009	1	P-225A-160601-1130-jcr-S3B	S2540G-11	Total Solids
Analyte was analyze	ed past	the 7 day holding time.		
2156371009	2	P-225A-160601-1130-jcr-S3B	S2540G-11	Solids, Total Volatile
Analyte was analyze	ed past	the 7 day holding time.		

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P-293-160606-1056-mel-S5B 6/8/2016 1056 G	So	×	×							
P-225A-160601-1130-jcr-S1B 6/12016 1130 G	30	×	×							
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Attachment 11 ACP Soil Mapping Key – Observation Summary

Attachment 11
Order 1 Soil Mapping Key - Observation Summary

Parer	nt Material	Types		Slope Class	5	D	rainage Cla	iss	Diagnosti	c Subsurfac	ce Horizon	Restr	ictive Laye	r Type	Depth t	o Restrictiv	ve Layer	Family	Particle Siz	ze Class
PM	MNF	GWNF	Slope	MNF	GWNF	Class	MNF	GWNF	Symbol	MNF	GWNF	Туре	MNF	GWNF	Class	MNF	GWNF	Class	MNF	GWNF
1	33	101	Α	10	14	1	0	0	Α	22	73	0	22	83	1	2	9	Α	0	0
2	0	4	В	9	46	2	0	1	В	0	1	1	62	186	2	11	78	В	0	0
3	5	42	С	12	31	3	3	14	С	55	180	2	1	6	3	32	83	С	13	45
4	45	120	D	21	53	4	6	23	D	1	1				4	16	37	D	21	45
5	0	1	E	24	88	5	73	174	E	0	12				5	24	68	E	0	0
6	0	0	F	8	43	6	3	56	C/A	5	3							F	2	4
7	0	0	G	1	0	7	0	7	AB	1	5							G	0	0
8	0	6							D/A	1	0							н	0	3
9	2	0																I	47	176
10	0	1																J	0	0
																		K	0	0
																		E/D/K	1	0
																		I/K	0	1
																		C/K	0	1
																		C/B	1	0

ACP Order 1 Soil Mapping Key

Parent Material	Slope Class	Drainage Class	Diagnostic Subsurface	Restrictive Layer Type	Depth to Restrictive Layer	Family Particle Size Class
1 – Residuum	A - 0-3%	1 - Very Poorly	A – Argillic	0 - None	1 - ≤12"	A - Coarse Silty
2 – Alluvium 3 – Colluvium	B - >3-8% C - >8-15%	2 – Poorly 3 – Somewhat Poorly	B – Fragipan C – Cambic	1 – Bedrock 2 – Fragipan	2 - >12-24" 3 - >24-36"	B – Fine Silty C – Coarse Loamy
4 - Colluvium over Residuum	D ->15-25%	4 – Moderately Well	D - Spodic		4 - >36-48"	D – Fine Loamy
5 - Colluvium over Alluvium	E ->25-45%	5 – Well	E - None		5 ->48"	E - Sandy
6 - Human Transported Materials (HTM)	F - >45-70%	6 – Somewhat Excessively				F - Fine
7 - Organic Soil Materials	G ->70%	7 - Excessively				G - Very Fine
8 - Alluvium over Colluvium						H – Sandy-Skeletal
9 - HTM over Colluvium						I – Loamy-Skeletal
10 – Alluvium over Residuum						J - Clayey-SkeletalK - Clayey

Supplemental Document A ACP Soil Survey Protocols

Prepared for:

Dominion Transmission, Inc.

707 East Main Street Richmond, VA 23219

ATLANTIC COAST PIPELINE ORDER 1 SOIL SURVEY PROTOCOLS

MONONGAHELA NATIONAL FOREST, WV AND GEORGE WASHINGTON NATIONAL FOREST, VA

April 2016 Updated May 23, 2016 Addendum 1 – June 30, 2106

Prepared by:



engineers | scientists | innovators

Reviewed by:

The Nicholas Putnam Group

U.S. Forest Service, Monongahela National Forest and George Washington National Forest

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1.0 INTRODUCTION

Addendum: A June 30, 2016 Addendum to The Order 1 Soil Survey Protocols, dated April 2016, and Revised May 23, 2016 for the Atlantic Coast Pipeline Project includes the resume of an additional soil scientist that participated in the Order 1 Soil Survey. This resume is an addendum to "Attachment 2 – Soil Scientist Resumes" of the Soil Survey Protocols. The soil scientist resume was submitted and approved by the U.S. Forest Service on June 14, 2016.

Updated: The Order 1 Soil Survey Protocols for the Atlantic Coast Pipeline Project have been updated based on meetings with the U.S. Forest Service to reflect new information gathered during the Preliminary Field Reconnaissance conducted May 9-13, as well as recent personnel changes. The report sections with updated information are as follows:

- 1.0 Introduction: updated special use permits
- 1.2 Soil Survey Team: updated Soil Scientist Team Project Manager/Team Lead
- 2.2 Preliminary Field Reconnaissance: updated language regarding transects and taxonomic groups
- 2.2 Soil Test Pit Excavation: included language for encountering water table
- 2.3.4 Soil Logging: addition of profile descriptors
- 2.3.5 Chemical Analysis: addition of alternative soil test laboratory
- 4.0 Schedule: updated language and timeline to reflect activities completed to date
- Attachment 1 Organizational Charts: updated Soil Scientist Team Project Manager/Team Lead
- Attachment 4 Figures: updated figures to reflect updated schedule

An Order 1 Soil Survey will be performed along the approximately 20-mile portion of the Rev 10 reroute between MP 47 and MP 115 on the proposed Atlantic Coast Pipeline (ACP) route that crosses through parts of the Marlinton Ranger District in the Monongahela National Forest (MNF) and parts of the Warm Springs, North River, and Pedlar Ranger Districts in the George Washington National Forest (GWNF). Approximately 5.42 miles of the Rev 10 reroute crosses parts of the MNF and about 14.47 miles crosses parts of the GWNF.

The soil survey activities have been planned to be compliant with the requirements outlined in special use permit #GBR205003, dated April 22, 2015 issued by U.S. Forest Service for surveys in the MNF, and the requirements outlined in special use permit #GWP433201T, dated March 31, 2015 issued by the U.S. Forest Service for surveys in the GWNF. The MNF special use permit #GBR2050003 was updated by special use permit #MAR205001 issued by the U.S.

Forest Service on April 13, 2016. The GWNF special use permit #GWP433201T was updated by special use permit #GWP433202T issued by the U.S. Forest Service on April 11, 2016. The Order 1 Soil Survey will follow the methods outlined in the U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Soil Survey Manual for an Order 1 Survey (Soil Survey Division Staff. 1993. Soil Survey Manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18).

The certified professional soil scientists (CPSSs) or North Carolina (NC) or Virginia (VA) licensed soil scientists (LSSs) pre-approved by the Forest Service for this project will be responsible for the Order 1 Soil Survey including selection of excavation locations, observation, logging, and description of excavations, photographic documentation of the excavations, collection and laboratory assignment of samples, interpretation of findings, and preparation of the Order 1 Soil Survey Report. It is understood that although Geosyntec is serving in the role of Program Manager, it will not influence, provide interpretations or edit the soil data or data collection efforts. All technical soil activities that affect the outcome and results of the Order 1 Soil Survey will be conducted by the soil survey team listed in this survey protocol. These activities include soil pit location identification, determination of pit dimensions, number of soil pits to be excavated, all soil classification determinations, data interpretations, and principle technical authorship of the Order 1 Soil Survey report.

Geosyntec personnel will provide field support for the soil survey team, but will not conduct technical soil activities that affect the outcome and results of the Order 1 Soil Survey. Geosyntec's team will also be observing the Order 1 Soil Survey activities in support of ACP's geohazard program.

1.1 Purpose

The purpose of the Order 1 Soil Survey is to provide more site-specific soil data for the proposed pipeline corridor to support construction of the 42-inch diameter pipeline. The site-specific soil data will be used to update the Soil Resource Section for the Final Environmental Impact Statement (EIS), and to make more informed decisions related to design, construction, restoration, and maintenance of the proposed pipeline, right-of-way, and other project components. The Order 1 Soil Survey is not intended to replace the published soil survey information, but rather to supplement it.

1.2 Soil Survey Team

The soil survey will be conducted by a team of CPSSs or NC or VA LSSs. Daniel Fenstermacher, CPSS with RETTEW will serve as the Soil Scientist Team Project Manager/Team Lead. John Stipe III, CPSS will serve as the Soil Scientist Team QA/QC Lead. Dr. John Galbraith will act as the Technical Advisor. Stephen Carpenter and Charles Delp with the Nicholas Putnam Group will provide Third Party Review. Kathleen Harrison, PG with Geosyntec Consultants Inc. (Geosyntec) will serve as the overall Program Manager and programmatic liaison between Dominion and the soil scientist team and associated subcontractors. The soils scientist team will be supported by Triple H Enterprises providing laborers to assist with soil pit excavation. Organizational charts are presented in Attachment 1. Soil Scientist resumes are presented in Attachment 2.

If during the project there is a need to include other qualified professional soil scientist on the soil survey team, the names and resumes for those individuals will be provided to the Forest Service for review and acceptance prior to their involvement on the project.

2.0 SOIL SURVEY PROTOCOLS

This section outlines the protocols that will be used to complete the Order 1 Soil Survey. Soil units will be mapped at a scale appropriate to capture inclusions and not-to-exceed a scale of 1:12,000. The minimum soil polygon area will be 2.5 acres or less, with no minimum delineation size. Special symbols will be used to identify restrictive features such as wet spots, caves, sinkholes, rock outcrop, etc. and to identify ephemeral drainage ways to perennial waters across the entire width of the corridor, as defined in the Soil Survey Manual. Hydric soils will be identified across the entire width of the corridor following the National Technical committee for Hydric Soil (NTCHS) Field Indicators of Hydric Soils Ver. 7.0.

2.1 Desktop Survey

A preliminary desktop evaluation will be conducted using the collected topographic data, detailed geologic maps, existing SSURGO soil map unit boundaries, aerial photography, and other pertinent remotely- sensed data to highlight potential landscape trends and to aid in field location of test pits.

Preliminary GIS-generated maps will be developed that include topographic contours, SSURGO map units, the pipeline centerline, and the limits of the 300-foot survey corridor. Preliminary survey sample locations will be identified along the center line of the pipeline at 350-foot

intervals to assess initial map unit coverage. Actual soil pit locations will be field determined by the soil scientist.

The findings of the desktop evaluation will be shared with the Forest Service, the Technical Advisors, and the Nicholas Putnam Group.

2.2 Preliminary Field Reconnaissance

The soil team leads under the direction of the Team Lead and advised by the Technical Advisor and the Nicholas Putnam Group, will conduct a preliminary field reconnaissance along the pipeline corridor to do a coarse evaluation of the soil resources using select test pit locations based on the desktop evaluation to help develop preliminary, reconnaissance-level soil-landscape relationships for the project area.

Results of the field reconnaissance will be used to generate a list of the main soil taxonomic groups and a draft mapping unit legend for the project personnel to use when conducting mapping exercises. The preliminary soil pit location map developed during the desktop study will be developed into a more refined soil test pit sampling plan based on the preliminary field reconnaissance. The 350-foot spacing interval of the soil pits may be modified by the soil scientist. The actual spacing and location of the test pits will be determined based on field conditions (e.g. topography, vegetation trends). If any modifications are made to the location of test pits, it will be for the purpose of gathering more data where necessary. At no point will the modifications result in fewer test pits sampled or result in a less intensive assessment of soil properties.

The Forest Service, the Technical Advisor, and the Nicholas Putnam Group will review the results of the reconnaissance findings and the proposed soil test pit sampling plan prior to commencement of the remainder of the soil survey.

2.3 Soil Survey

2.3.1 Training

Prior to the start of the full-scale mapping effort, the soil scientist field teams will be provided with in-field training led by the Team Lead and supported by the Technical Advisor, and the Nicholas Putnam Group. The purpose of the training is to highlight unique soil properties that might be encountered, provide guidance on soil profile description best practices, develop a map unit identification matrix and naming system, discuss the soil-landscape relationships that are

likely to be encountered during the soil survey, and to discuss other pertinent information gathered during the reconnaissance phase, including criteria for identifying the soil map unit boundaries and composition.

All training materials will be provided to the Forest Service, the Technical Advisor, and the Nicholas Putnam Group for review and comment prior to the initiation of any training activities.

2.3.2 Soil Test Pit Placement

Proposed soil test pits will be field located within the 300-foot wide corridor and mapped with a GPS (sub-meter accuracy). In the field, soil scientists will confirm the soil test pit locations and modify the location as required based on changes in topography, vegetation, geology, rock outcrops, or other features that would indicate a change in soil type. All sample locations will be located in the field using a mapping grade hand-held GPS device (sub-meter accuracy).

Based on a minimum of one sampling location per 2.5 acres, it is anticipated that up to 290 soil test pits will be observed; with 80 soil test pits in the MNF and 210 test pits in the GWNF. Additional soil test pits may be required to ensure survey accuracy along the centerline. In addition to the soil test pits, periodic additional shovel excavations or auger holes may be required to confirm the continued presence and/or boundary of a specific soil type.

The tables below summarize the approximate number of soil sampling locations (soil test pits) per soil map unit in the MNF and GWNF. These estimates are based on the SSURGO mapped soil series traversed by the proposed pipeline center line. The actual number of soil test pits in each soil series will vary based on the actual placement of the soil test pits within the 300-foot wide corridor and placement of soil test pits based on field observations.

Monongahela NF Map Units	Number of Sampling Locations
Berks	39
Berks-Weikert	3
Calvin-Dekalb-Berks	4
Cateache	16
Dekalb-Hazelton	1
Elliber	2
Weikert	15

Monongahela NF Map Units	Number of Sampling Locations
Total	80

George Washington NF Map Units	Number of Sampling Locations				
Berks-Weikert	7				
Berks	82				
Caneyville	3				
Cataska	4				
Craigsville	3				
Dekalb-Alticrest	2				
Dekalb-Lily-McClung	1				
Dekalb-Watahala-McClung	4				
Gilpin	2				
Hartleton	1				
Hazleton	6				
Lehew-Berks	2				
Lew	12				
Lily-McClung-Dekalb	1				
Macove-Berks	2				
Macove	3				
Madsheep	1				
McClung-Watahala-Dekalb	5				
Monongahela	3				
Oriskany-Murrill	2				
Oriskany	10				
Shelocta-Berks	1				
Weikert-Berks-Rough	20				
Weikert-Berks	31				
Weikert	2				
Total	210				

2.3.3 Soil Test Pit Excavation

Soil test pits will be excavated to bedrock, a water table, or 50 inches, whichever is encountered first, to expose the soil profile. Soil test pits will be excavated with hand tools by laborers. The soil scientist will confirm the adequacy of the depth of the soil test pit.

2.3.4 Soil Logging

The exposed soil profile and site properties will be described using the USDA-NRCS protocols in accordance with the Field Book for Describing and Sampling Soils, Version 3.0 (Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff, 2012, Natural Resources Conservation Service, Natural Resources Conservation Service, National Soil Survey, Lincoln NE). Additional reference is the NRCS National Soil Survey Handbook Section 629 Glossary of Landform and Geomorphic Terms. Photographs of all test pits will be taken and categorized with the descriptions.

Soil profile descriptions will be prepared for all excavated test pits. Soil profile descriptions will not be recorded for any supplemental shovel probes or auger holes—used for the purpose of refining the placement of soil map unit boundaries unless the soil scientist deems the information necessary or they are part of a transect. Soil profile descriptions of master horizons will be recorded in shovel probes or auger holes related to transect. The location of supplemental testing and special symbols such as rock outcrops will be recorded with a GPS with sub-meter accuracy in either case

Soil profile descriptions within soil test pits will include the following:

- Horizon depth and thickness
- o Horizon nomenclature
- Matrix color (moist)
- o Rock fragment type, size, and abundance (surface and subsurface)
- o Rock outcrops
- o USDA soil texture class
- o Soil structure type, grade, and size
- o Moist consistence (e.g. friable, firm, very firm, etc.)
- Boundary topography and distinctness
- o Depth to, abundance, and contrast of redoximorphic features

- o Soil pH (field determination at select locations)
- o Fragipans or water-restrictive subsoil features
- Slope and Aspect
- o Estimate of soil mineralogy
- Soil stickiness and plasticity estimates
- o Root size and abundance
- o Parent material type
- Bedrock type and characteristics
- o Depth to bedrock and bedrock structure/ dip slope and strike
- o Determination of drainage class
- Topographic position
- o Indications of past shallow slope failures both natural and those attributed to anthropogenic disturbance such as road building, logging, mining and other activities
- Presence of apparent subsurface water tables. Seasonal water tables will be indicated by drainage class or wetness class
- o Dominant vegetation
- Observations of special features (wet spots, springs, etc.)
- o Pocket penetrometer measurements

Upon completion of soil observations, the excavated soil pits and supplemental shovel probes or auger holes will be backfilled with the excavated soil.

2.3.5 Chemical Analysis

In addition to the soil profile descriptions logged at each test pit location, soil samples will be collected from representative soil profiles for each major soil unit, soils representative of identified potentially problematic areas, and soils that are representative of the geologic or parent material changes along the proposed pipeline route. The collected soil samples will be prepared for shipment to Virginia Tech Soil Testing Laboratory, the Penn State Agricultural Analytical Laboratory, or another accredited laboratory. Once mapping commences, a determination will be made on the number of soil units present in the pipeline corridor, the location of any potentially problematic areas, and the location of major geologic landform changes. Based on a preliminary review of the SSURGO database, approximately 35 soil series are located along the proposed

pipeline route within the MNF and GWNF. Assuming five horizons per soil series, an estimated 175 to 200 soil samples will be submitted for laboratory analysis and evaluated for effectiveness in use for reclamation such as vegetation establishment. The intent of the laboratory analysis is to characterize the soil chemical properties associated with the differing soil and geologic conditions along the proposed pipeline route as well as to identify any potentially problematic conditions that may be encountered and provide data that will help determine the appropriate seed mixtures and application rates for lime and fertilizer.

Soil samples will be analyzed for:

- o Total organic carbon (TOC), and loss on ignition (LOI)
- Soil texture classification
- Soil pH
- Standard soil fertility analysis

The laboratory methodologies are included Attachment 3 to this Soil Survey Protocols document.

2.3.6 Quality Assurance/Quality Control

The following quality assurance/quality control (QA/QC) protocols will be implemented:

- The findings of the soil survey will be reviewed by the Technical Advisor. Reviews will occur at 10%, 50%, and 100% completion at a minimum.
- Independent verification and review of soil classification by third-party review (Nicholas Putnam Group).
- The Forest Service will be provided access to all information shared with the Technical Advisor and the Nicholas Putnam Group, as well as the review comments generated by those parties.

3.0 REPORTING

The field collected data will be used to further refine the soil-landscape relationships to aid in developing the soil map unit polygons. Field data will be shared with the Technical Advisor, the Nicholas Putnam Group, and the Forest Service on at least a weekly basis.

A soil survey report will be completed that will provide information on the soil map units and the collected data to accompany the soil survey map. The soil survey report will be formatted similar to the guidance provided in the Standards and Procedures for Site Specific Soil Mapping in Rhode Island (Stolt, 2007).

4.0 SCHEDULE

The anticipated schedule for completion of the Order 1 Soil Survey is outlined below.

Kick-Off Meeting with Forest Service: 1 day (March 9, 2016 - completed).

<u>Desktop Survey (completed)</u>: The desktop survey will be conducted a minimum of two weeks prior to the Field Reconnaissance phase.

<u>Preliminary Field Reconnaissance (completed)</u>: The preliminary field reconnaissance was following the completion of the desktop survey. Three days were spent in the GWNF and two days were spent in the MNF.

<u>Soil Scientist Team Training (June 1, 2016):</u> Soil scientist team members will be provided site-specific soil training by the Team Lead supported by the team's Technical Advisor and the Nicholas Putnam Group. Soil training will be conducted on June 1, 2016 on a site in the GWNF and may be supplemented with written information. All training materials will be provided to the Forest Service, the Technical Advisor, and the Nicholas Putnam Group for review and comment.

<u>Soil Survey (June 2 – 22, 2016)</u>: Eight soil scientists have been identified to conduct the soil survey. For the purposes of determining the project schedule, it is assumed that five soil scientists will operate in any given week. Additionally, if needed, one soil scientist will be dedicated to locating the soil pits to be dug and staying with the digging crews until they can be sure each pit is representative of the soil and is not disturbed, substandard, or non-representative. To account for time needed to access the test pit locations, excavation time by the laborers, and the potential need for confirmatory augering/digging, it is assumed that each soil scientist will be able to describe four test pits and map approximately six to seven acres per day. Based on five soil scientists per day and travel time, it is assumed that the field work can be conducted in approximately three weeks, weather permitting. During the soil survey investigation, field data will be sent to the team's Technical Advisor, to the Nicholas Putnam Group, and to the Forest Service for review. If necessary, the soil survey field work may be paused to address areas of concern or additional investigations may be warranted based on the reviewer's feedback. Soil

samples will be submitted for laboratory analysis periodically throughout the duration of the soil survey.

<u>Deliverable:</u> The findings of the field investigation will be used to generate a GIS based Order 1 soil survey map with accompanying written documentation detailing the composition of map units, the results of the laboratory data, and other pertinent information. The GIS attribute data will include parameters specific to the analysis of the feasibility of constructing a natural gas pipeline, such as, but not be limited to, depth to bedrock, depth of topsoil, soil acidity, indications of soil slippage, soil wetness issues, etc. The map and report will be reviewed, at a minimum, by the Soil Scientist Team Lead, the QA/QC Lead, the Technical Advisor and the Nicholas Putnam Group prior to submission to the Forest Service for review.

Timeline

- Kick-Off Meeting: March 9, 2016
- Desktop Survey: April 25 May 6, 2016
- Preliminary Field Reconnaissance: May 9 13, 2016
- Update Protocols and Prepare Field Training Program based on Field Reconnaissance Findings: May 16 May 27, 2016
- Soil Training: June 1, 2016
- Soil Survey: June 2 June 22, 2016 (assuming completion of soil survey in 3 weeks)

A preliminary schedule of the soil survey by milepost is outlined in the table below and illustrated on Figures 1 and 2 in Attachment 4.

Survey Date	Date	Team 1	Team 2	Team 3	Team 4	Team 5	Forest
Training	6/1/2016	All Teams			GWNF/MNF		
1	6/2/2016	Mile 154-158				GWNF	
2	6/3/2016	Mile 121.75-123				GWNF	
3	6/6/2016	Mile 120-121.75					GWNF
4	6/7/2016	Mile 118.75-120				GWNF	
5	6/8/2016	Mile 117.25-118.75			GWNF		
6	6/9/2016	Mile 106	e 106 Mile 115.75-117.25			GWNF	
7	6/10/2016	Mile 9	Mile 96.5-97.5 Mile			99.25-99.75	GWNF
8	6/13/2016	Mile 86.5-87	Mile 93.5-94.		4.5	Mile 96-96.25	GWNF

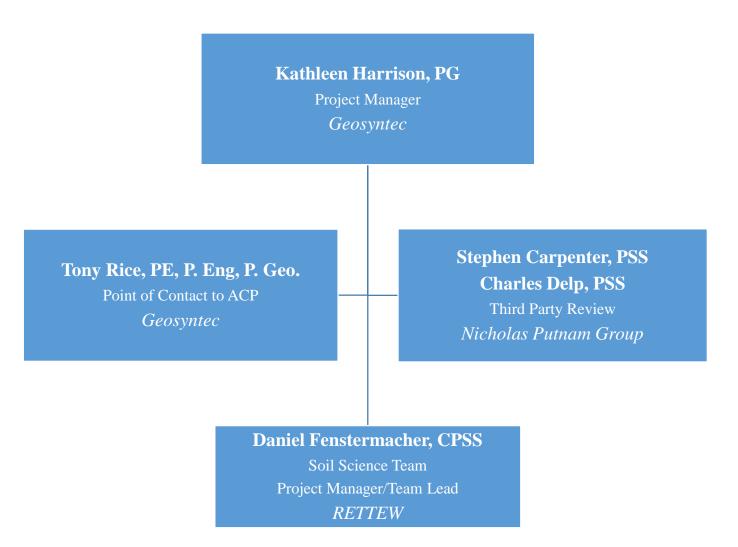
Survey Date	Date	Team 1	Team 2	Team 3	Team 4	Team 5	Forest
9	6/14/2016	Mile 85.75-86.75			GWNF		
10	6/15/2016	Mile 84.75-85.75			GWNF		
11	6/16/2016	Mile 83.75-84	75-84 Mile 84-84.75			GWNF/MNF	
12	6/17/2016	Mile 82.75-83.75			MNF		
13	6/20/2016	Mile 81.75-82.75			MNF		
14	6/21/2016	Mile 80-81		Mile 81.25-81.75		MNF	
15	6/22/2016	Mile 71-72		Mile 73-74		MNF	

ATTACHMENTS

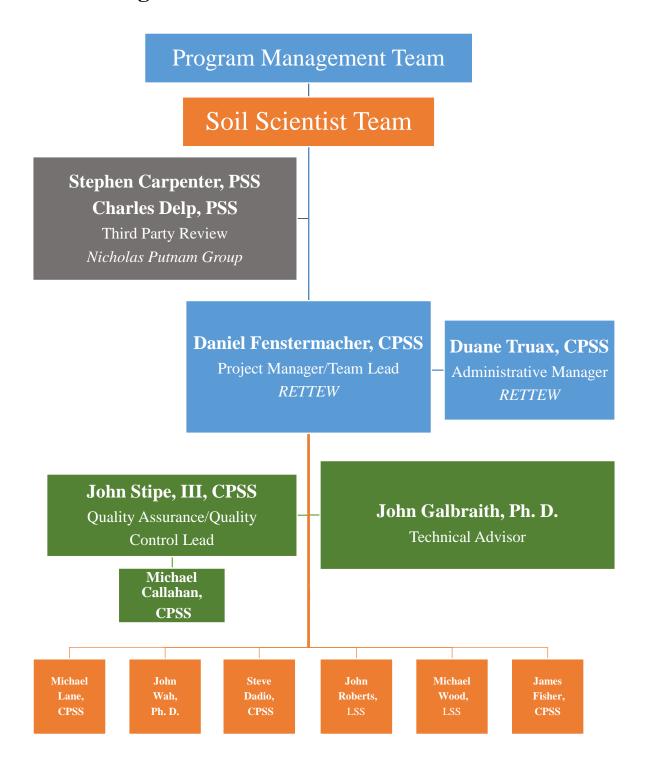
- 1. Organizational Charts
- 2. Soil Scientist Resumes
- 3. Laboratory Methodologies
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Attachment 1 Organizational Charts

Atlantic Coast Pipeline Project Order 1 Soil Survey Organizational Chart – Management Team



Atlantic Coast Pipeline Project Order 1 Soil Survey Organizational Chart – Soil Science Team



Attachment 2 Soil Scientist Resumes

John B. Stipe III, CPSS Director of Geosciences



Education

B.S., Environmental Resource Management, 1998, The Pennsylvania State University Post Baccalaureate Studies in Geology and Soil Science, 2004-2006, Millersville University

Affiliations

SSSA - Soil Science Society of America PAPSS - Pennsylvania Association of Professional Soil Scientists Air and Waste Management Association Marcellus Shale Coalition (MSC)

Training

OSHA, 40-Hour HAZWOPER
OSHA, 8-Hour HAZWOPER Supervisor
SafeLandUSA, First Aid/CPR
PA DEP, Advanced Soils Training
Dauphin County Conservation District, Site Evaluation, Soil Testing, and Infiltration: Applying the PA
Stormwater BMP Manual
PAPSS, Interim Regional Supplement to the USACE Wetland Delineation Manual

Certifications

SSSA, Certified Professional Soil Scientist (CPSS) PA Sewage Enforcement Officer (SEO)

Experience

Mr. Stipe is the Director of Geosciences at RETTEW with more than 17 years of experience as an environmental consultant. As a consulting soil scientist, Mr. Stipe provides detailed evaluations for site development including site evaluations for stormwater management and infiltration best management practices (BMPs), infiltration testing, geologic and karst hazard evaluations, soil mapping and classification, site investigations for on-site sewage disposal, soil permeability and percolation testing, on-lot septic system design, soil investigations for sewage sludge disposal, and soil investigations for hazardous waste disposal. With his understanding of the land development process and state and local policies, Mr. Stipe provides recommendations to consulting engineers and developers for planning, site feasibility, and design.

Mr. Stipe also serves the firm's energy clients engaged in the exploration of the Marcellus and Utica Shale Plays in Pennsylvania, Ohio, and West Virginia. Services provided to both exploration and production and midstream clients include the design and implementation of baseline water quality sampling programs, large-scale Phase I and II ESAs, soil quality investigations, remedial actions, environmental permitting, waste reporting, geotechnical investigations related to oil and gas field development and appurtenances, landslide and slip repair, surface and groundwater water source development, and SPCC plans.

Related experience includes the following projects:

Soil Mapping Investigation, Lancaster County, PA. Completed a soil mapping exercise to evaluate the accuracy of soil boundaries mapped by the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) in the Soil Survey of Lancaster County. The client intended to construct a commercial building in a floodplain soil type. However, because of ordinance restrictions, construction in the soil type was not permitted. The investigation confirmed the soils at the site differed from the floodplain soil type indicated by the County soil survey. Following review of the soils report, the Township issued the client a building permit.

Soil Mapping Investigation, Chester County, PA. Completed a soil mapping exercise to evaluate the accuracy of soil boundaries mapped by USDA-NRCS in the Soil Survey of Chester County. The client intended to construct a stormwater infiltration BMP (rain garden) in a floodplain soil type. However, because of ordinance restrictions, construction in the soil type was not permitted. The investigation confirmed the soils at the site differed from the floodplain soil type indicated by the County soil survey. Following review of the soils report, the local municipality approved the stormwater management plan.

Soil Investigations for Stormwater Management, Multiple Clients, Multiple Locations, PA. Served as Project Manager and technical lead for hundreds of feasibility studies to evaluate soil and geologic suitability for the design and construction of stormwater BMPs in karst and non-karst areas. Field activities included infiltration testing, soil classification, mapping and interpretation, field view, and field truthing of mapped soil and geologic features. Infiltration testing procedures included double-ring infiltrometer tests, permeameter tests, and standpipe tests.

Soil Investigation for Community On-Site Sewage Disposal, Drip Irrigation of Wastewater, Chester County, PA. While serving as Project Manager, conducted an investigation to evaluate large agricultural tracts for drip irrigation of 40,000 gpd of wastewater from a proposed athletic training facility. Coordinated the investigation closely with PA DEP and the County Health Department. Project included soil mapping, soil morphology evaluations, permeability testing, percolation testing, preparation of water balance calculations, and calculation of hydraulic loading rates for disposal.

Geotechnical Investigations, Proposed Natural Gas Facilities, Confidential Natural Gas Clients, Marcellus Shale Play, PA and WV. Provided technical oversight for the completion of multiple geotechnical investigations at multiple proposed natural gas facilities including well pads, compressor stations, metering sites, and pipeline facilities. Completed the investigations to evaluate subsurface conditions and site constraints to facilitate construction activities.

Soil Investigation for Community On-Site Sewage Disposal, Drip Irrigation of Wastewater, Chester County, PA. While serving as Project Manager, conducted an investigation to evaluate a 3-acre site for drip irrigation of 6,000 gpd of wastewater from an educational facility. Coordinated the investigation closely with PA DEP and the County Health Department. Project included a soil morphology evaluation, soil mapping exercise, and permeability testing. Prepared water balance calculations and assigned loading rates for disposal based on the observed soil morphology and measured soil hydraulic conductivities. Worked closely with environmental engineers to provide input for the system design and obtain the needed sewage permit from PA DEP.

Daniel E. Fenstermacher, CPSS

Soil Scientist



Education

B.S., Environmental Biology, 2009, Delaware Valley College M.S., Soil and Watershed Science, 2012, University of Maryland

Affiliations

MAHSC - Mid-Atlantic Hydric Soils Committee MAPSS - Mid-Atlantic Association of Professional Soil Scientists SSSA - Soil Science Society of America SWS - Society of Wetland Scientists

Training

Excavation and Trenching Awareness
MAPSS, Field Indicators of Hydric Soils in the Northern Piedmont
OSHA, 40-Hour HAZWOPER
OSHA, 8-Hour HAZWOPER Refresher
SafeLandUSA

Certifications

SSSA, Certified Professional Soil Scientist (CPSS)

Experience

Mr. Fenstermacher is a Soil Scientist in RETTEW's Geosciences group with five years of environmental consulting experience. Mr. Fenstermacher conducts soil classification, stormwater testing, geotechnical investigations, wetland delineations, and water sampling for the firm's oil and gas exploration and production clients. Through this experience, as well as his wetland restoration involvement, he has built relationships with numerous regulatory agencies including PA DEP and USDA's Agricultural Research Service.

Related experience includes the following projects:

Delmarva Bay Carbon Study, University of Maryland, Caroline County, MD. Led research to assess the impact of the historical conversion to agriculture on soil carbon and how that impact has altered the Delmarva Bay landscape. Examined the soils of Delmarva Bay wetlands under natural and agricultural land uses, including prior converted cropland, to determine if the conversion to agriculture affected carbon stocks and the potential for carbon sequestration through ecosystem restoration.

Conservation Effects Assessment Project, USDA, Multiple Counties, Multiple States. Conducted research to assess the effectiveness of depressional wetland restoration along the coastal plain. Focused on carbon sequestration and sedimentation as a component of a much larger collaborative study. Examined and determined carbon stocks for soils of natural, agricultural, and restored wetlands and analyzed data for these groups to examine the effects of land use change and restoration techniques.

Delmarva Bay Hydroperiod Study, USDA, Caroline County, MD. Examined soils and carbon stocks of

wetlands to determine if soils influenced the hydroperiod and how the hydroperiod influenced carbon stocks.

Well Pad, Confidential Natural Gas Client, Columbiana County, OH. Served as Environmental Scientist responsible for conducting geotechnical investigations including soil classification via test pits and soil core borings.

Natural Gas Well Pad and Impoundment Wetland Delineations, Confidential Natural Gas Client, Multiple Counties, PA. Served as Environmental Scientist for conducting wetland delineations, habitat assessments, and top soil surveys for multiple oil and gas well pads and impoundments.

Cellular Tower Sites, Verizon Wireless, Multiple Counties, PA. Served as Soil Scientist for multiple proposed cell phone towers. Conducted soil classification and stormwater infiltration testing for stormwater management plans.

Natural Gas Well Pads Geotechnical Investigations, Confidential Natural Gas Client, Multiple Counties, WV. Served as Environmental Scientist for conducting geotechnical investigations for multiple oil and gas projects. Work included soil penetration testing, rock coring, logging bores, and collection of samples.

Well Pad, Confidential Natural Gas Client, Mercer County, PA. Served as Environmental Scientist responsible for conducting soil characterization and infiltration testing for designing stormwater management features.

Michael Callahan, CPSS Senior Soil Scientist



Education

B.S., Environmental Soil Science, 2001, The Pennsylvania State University M.S., Soil Science, 2004, The Pennsylvania State University

Affiliations

NOWRA - National On-Site Wastewater Recycling Association PAPSS - Pennsylvania Association of Professional Soil Scientists POWRA - Pennsylvania On-Site Wastewater Recycling Association SSSA - Soil Science Society of America

Training

SafeLandUSA

Certifications

SSSA, Certified Professional Soil Scientist (CPSS) Sewage Enforcement Officer (SEO)

Experience

Mr. Callahan is a Certified Professional Soil Scientist, with more than ten years of experience evaluating soils and landscapes in multiple locations in the U.S. His responsibilities include the classification and interpretation of soil morphological properties, the implementation of field data collection, analysis of field and laboratory data, and the preparation of environmental permits. Mr. Callahan has mapped soils on sites ranging from less than 1 acre to more than 1,000 acres. He has coupled his soil morphology experience with remote data technologies to facilitate more accurate findings and more focused investigations. He also has extensive experience in soil phosphorous. Mr. Callahan has served as an officer for many professional organizations; participated in industry workgroups on special topics of concern; and routinely interacts with federal, state, and local agency personnel in the soil science and environmental science arenas. He also serves as an Adjunct Professor of Soil Science at the Delaware Valley University.

Related experience includes the following projects:

Soil Investigations for Community On-Site Sewage Disposal Systems, West Penn Township, Schuylkill County, PA. To evaluate the potential for a community land application option as a long-term solution for sewage disposal, evaluated a prioritized list of 53 potential land application sites with Township officials and PA DEP to complete detailed investigations at the ten highest-priority sites. Investigations included soil classification, soil mapping, permeability testing, and percolation testing. Following the completion of the detailed investigations, completed a cost benefit analysis to determine if public sewer or a land-based application is the best long-term solution for community sewage disposal.

Soil and Site Evaluation for Community-Scale Septic System, Haywood County, NC. As Lead Soil Scientist, conducted a preliminary soil and site evaluation for an 800-acre property. The investigation

characterized the soil in site conditions in relation to their suitability to serve as an infiltration drain field for residential sewage effluent. Based on the results of the preliminary study, conducted an additional detailed soil and site evaluation on 8 acres to gather the data needed to properly locate and size the drain field. During this phase of testing, examined backhoe-excavated soil test pits, conducted constant head-saturated hydraulic conductivity tests, and analyzed collected data in a comprehensive environmental and regulatory framework that balanced the needs of the facility with the natural constraints of the landscape. The analysis included an agronomic analysis of the soil and water balance for the site that incorporated the effluent volume.

Hydric Soil Investigation, Union County, NC. Conducted a detailed soil mapping of hydric soil boundary on several potential stream and wetland restoration sites. The focus was to accurately determine the extent of hydric and relict hydric soils on the properties to determine the potential for stream and wetland restoration for a mitigation banking company. Incorporated results into a decision support matrix to aid the client in determining the most effective sites to pursue.

Stormwater Feasibility, Fort Bragg, Cumberland County, NC. Evaluated potential stormwater infiltration sites to determine potential depth of infiltration structure and design loading rate. Analyzed backhoe-excavated soil test pits and conducted saturated hydraulic conductivity measurements according to the results of the morphological evaluation. Relayed results to the project design engineer to aid in overall site design.

General Permit, Forsyth County, NC. Worked in conjunction with field biologist to delineate jurisdictional streams and wetlands on the site and prepared the permit applications for federal and state agencies for an abandoned firing range. The need for the removal of lead- and chromium-contaminated soil behind an abandoned firing range prompted an evaluation of the environmental resources of the site. Field investigations revealed the presence of a wetland in the vicinity of the contaminated soil. Prepared general permit for removal of the contaminated soil and placement of fill material. Used GPS in the field to collect data points and in the office to prepare map products for the client and permit application.

PA. Served as the Project Support Scientist. Aided in the design, construction, implementation, data analysis, and preparation of results of a bench-scale soil incubation study. The study investigated the efficacy of various industrial byproducts to increase the retention time of soil phosphorus in high phosphorus concentration agricultural soils. Analyzed results in the context of the bench-scale study as well as in relation to separate plot- and field-scale studies to determine efficacy across scales.

Curriculum Vitae John M. Galbraith

Education

•	Ph. D.	Cornell University	1997	Soil Science, Agronomy, Geomorphology
•	M.S.	Texas Tech University	1983	Range Science
•	B.S.	Texas Tech University	1978	Range and Wildlife Management

Professional appointments (60% teaching, 30% extension, 10% research)

- Associate Professor, Crop and Soil Envir Sci, Virginia Tech, Blacksburg, VA, 2005-present
- Assistant Professor, Crop and Soil Envir Sci, Virginia Tech, Blacksburg, VA, 1999-2005
- Post-Doctoral Associate, Soil and Water Science, Univ. of Florida, Gainesville, FL, 1998-1999
- Post- Doctoral Associate, Crop, Soil, and Atmos. Sci., Cornell University, Ithaca, NY, 1997-1998
- Research Support Specialist, Crop, Soil, and Atmos. Sci., Cornell Univ., Ithaca, NY, 1990-1997
- Supervisory Soil Scientist, USDA-SCS, Havre, MT, 1987-1990
- Soil Scientist, USDA-SCS, Pearsall and Kenedy, TX, 1983-1987
- Range Conservationist, USDA-SCS, Menard and Andrews, TX, 1977-1979

Awards

- Elected Fundamental Soil Sci. Group, Repr. to the Soil Sci. Soc. Am. Board Directors. 2013-2016.
- Elected Chair, Div. 1.4 Soil Classification, Int. Union Soil Sci. 2010-2014.
- Elected Chair, Div. S-5 (Pedology), Soil Sci. Soc. Am. 2008.
- NE Cooperative Soil Survey Conference Silver Spade Award presented for outstanding regional and/or national service to soil survey. 2008.
- Harry A. McDonald Award for Excellence in Teaching, Dept. Soil, Crop, and Atmospheric Sci., Cornell University. 1997.

Publications (refereed journal articles since 2006) * indicates student author. (10 of 23 total)

- Mikhailova, E., Post, C., Schlautman, M.A., and J.M. Galbraith. 2013. Potential Contribution of Combined Atmospheric Ca²⁺ and Mg²⁺ Wet deposition within the Continental U.S. to Soil Inorganic Carbon Sequestration. Pedosphere. Accepted Aug. 2013.
- Kayastha, N., Thomas, V.A., and J.M. Galbraith. 2012. Monitoring wetland change using inter annual Landsat timeseries data. Wetlands 32:1149–1162. DOI 10.1007/s13157-012-0345-1
- Galbraith, J.M. 2012. Shepherding Undergraduate Students Through a Research Experience. No. Am. Col. Teach. Agric. J. 56 (2): 76-82
- Galbraith, J.M. 2012. Using Student Competition Field Trips to Increase Teaching and Learning Effectiveness. J. Nat. Res. Life Sci. Edu. 41(1): 54-58
- Chakraborty, S., Weindorf, D.C., Zhu, Y., Li, B., Morgan, C.L.S., Ge, Y., and J.M. Galbraith.
 2012. Assessing spatial variability of soil petroleum contamination using visible near-infrared diffuse reflectance spectroscopy. J. Envir. Monit. 14: 2886-2892. DOI 10.1039/c2em30330b
- Chakraborty, S., Weindorf, D.C., Zhu, Y., Li, B., Morgan, C.L.S., Ge, Y., and J.M. Galbraith. 2012. Spectral reflectance variability from soil physicochemical properties in oil contaminated soils. Geoderma 177-178: 80-89. DOI 10.1016/
- Chakraborty, S., Weindorf, D.C., Morgan, C.L.S., Ge, Y., Galbraith, J.M., Li, B., and C.S. Kahlon. 2010. Rapid Identification of Oil-Contaminated Soils Using Visible Near-Infrared Diffuse Reflectance Spectroscopy. J. Environ. Qual. Vol 39(4): 1378-1387.

- Goddard, M.A.*, Mikhailova, E.M., Post, C.J., Schlautman, M.A., and J.M. Galbraith. 2009. Continental United States Atmospheric Wet Calcium Deposition and Soil Inorganic Carbon Stocks. Soil Sci. Soc. Am. J. 73:989-994.
- Pantaleoni, E.*, R. Wynne, J. Galbraith, and J. Campbell. 2009. A logit model for predicting wetland location using ASTER and GIS. Inter. J. of Rem. Sens. 30(9): 2215-2236
- Pantaleoni, E.*, R. Wynne, J. Galbraith, and J. Campbell. 2009. A comparison of CART and logistic regression for mapping wetland types in the Coastal Plain of Virginia using the ASTER sensor. Inter. J. of Rem. Sens. 30(13): 3423-3440.
- Showalter, J.M.*, J.A. Burger, C.E. Zipper, J.M. Galbraith, and P.F. Donovan. 2007. Influence of Mine Soil Properties on White Oak Seedling Growth: A Proposed Mine Soil Classification Model. So. J. Appl. For. 31(2): 99-107.
- Galang*, J., C.Zipper, S. Prisley, J. Galbraith, and P. Donovan. 2006. Evaluating Terrestrial Carbon Sequestration Options for Virginia. Env. Mngmnt. 39(2):139-150
- Casselman*, C.N., T.R. Fox, Burger, J.A., Jones, A.T., and J.M. Galbraith. 2006. Effects of silvicultural treatments on survival and growth of trees planted on reclaimed mine lands in the Appalachians. For. Ecol. and Mngmnt. 223:403-414.
- Burdt*, A.C., J.M. Galbraith, and J.P. Megonigal. 2006. CO₂ efflux rates by land-use treatment in wet flats of Southeast Virginia. Wetl. Ecol. and Mngmnt. 14(2):133–145.

Competitive grants (current)

- J. Galbraith, 100%, USDA-NRCS, \$11,089, 9/01/13 to 8/30/15, Soil Taxonomy Forum Update, maintenance, and Hosting (CESU).
- J. Galbraith, 100%, NPS, \$10,000, 7/30/12 to 9/30/13, Geological and Soils Study of Mound Sites, Canaveral National Seashore (CESU).
- Fike J., J. Galbraith, 20%, DOE/Sungrant, \$175,999, 4/1/10 to 3/31/15, Switchgrass Feedstock Research.
- Fike J., J. Galbraith, 20%, NC Sungrant/DOE, \$106,499, 4/1/10 to 3/31/15, Miscanthus Feedstock Research
- Sanders, K., J. Galbraith, A. Abaye, S. Cook, J. McKenna, B. Potter, 25%, Terry Lynn Poerner Charitable Foundation, \$50,000, 10/01/08 to 09/30/13, Virginia Indians Pre-College Outreach Initiative.

Courses taught (100% involvement unless otherwise indicated)

Soils (40%)
 Soil Description and Interpretation
 Soil Description and Sampling
 Soil Genesis and Classification
 Wetland Soils and Mitigation

• Advanced Wetland Soils (70%) Advanced Wetland Soils [on-line] (70%)

Student advising (summary)

- Co-major advisor for doctoral candidates [Kayastha]; on four other committees [Bartens; Chakraborty; Zheng; Severson].
- Major or co-major advisor for master's candidates [Liu; Troyer; Morrow; Stephenson; Teany; Morgan; Templeton]; on one other M.S. committee [Bonzey].
- Former Advisor to 15 undergraduates, now to all CSES Soil and Land Rehabilitation students
- Major advisor to one Doctoral and five Masters students who completed their degree.

Diversity initiatives or contributions (selected)

- Developed relationship to assist Oglala Lakota College (Tribal College, 1994 Land Grant) in reestablishing Basic Soils and add a summer school Wetlands class
- Voluntary teacher for one-week at Red Cloud Indian School, Pine Ridge, SD 2014
- Member of Virginia Indians Pre-College Outreach Initiative Planning Team
- Member Native @ VT student organization
- Attendee, Virginia Indian Nations Summit on Higher Education (VINSHE)
- Successfully co-authored a \$50,000 grant from a private foundation for initial funding of the Virginia Indians Pre-College Outreach Initiative
- Association of Women Soil Scientists 2008-present

Outreach and professional service (summary, arranged by date)

•	Appointed representative to Virginia Sewage Handling and Disposal	
	Advisory Committee	2013-present
•	Meeting Associate Editor for Divisions S-10 and S-5. Soil Sci. Soc. Am. J.	2005-2008
•	Appointed by the Virginia Governor's Office for the Board	
	for Professional Soil Scientists and Wetland Professionals	2004-2007
•	Associate Editor for the Southern Region. Soil Survey Horizons	
	(published by the American Society of Agronomy)	2002-2006
•	Member of one international, four national, four regional, five state, one	
	university, and two departmental committees	1998-present
•	Nine outreach-related publications and nine outreach-related websites	1999-present
•	Appointed to Comm. to develop Universal Soil Classification System	2010-2018
•	Appointed to Comm. to write a simplified version of Soil Taxonomy	2011-present
•	Appointed William H. Patrick Lectureship selection committee	2008-present
•	Southeast Region representative - Soil Judging Committee	1999-2002
•	Soil Judging Committee	1999-2002
•	Soil Geomorphology Committee	2002-present
•	Northeast Region - Research Needs Committee	2000-present
•	Northeast Region – Standards and Procedures/Soil Tax. Committee	1996-present

Associations and society memberships (arranged alphabetically, appointed positions indicated)

•	Affiliated Faculty – Conservation Management Inst., Center for Geospatial Info.	
	Technologies, and Center for Envir. Applications of Remote Sensing	2006 -present.
•	Association of Women Soil Scientists	2008-present
•	International Union of Soil Scientists (formerly ISSS)	1977-present
•	North American Colleges and Teachers of Agriculture	1999-present
•	Soil Science Society of America	1977-present
•	Society of Wetland Scientists	2000-present
•	Virginia Association of Professional Soil Scientists	1999-present
•	Virginia Association of Wetland Professionals	2000-present
•	Wetland Mapping Consortium co-founder, web site manager	2008-present

Duane A. Truax, CPSS

Senior Soil Scientist



Education

B.S., Soil Science, 2000, The Pennsylvania State University B.S., Turfgrass Science, 2000, The Pennsylvania State University

Affiliations

ASA - American Society of Agronomy CSSA - Crop Science Society of America MAPSS - Maryland Association of Professional Soil Scientists PAPSS - Pennsylvania Association of Professional Soil Scientists PTC - Pennsylvania Turfgrass Council SSSA - Soil Science Society of America

Training

Maryland E&S Control SafeLandUSA USACE, Wetland Delineation

Certifications

SSSA, Certified Professional Soil Scientist (CPSS)
PDA, Licensed Pennsylvania Pesticide Applicator, Category No. 7

Experience

Mr. Truax is a Soil Scientist in RETTEW's Geosciences group with 15 years of experience in soils and geotechnical consulting. His geotechnical engineering experience includes proposal preparation, project management, drilling inspection, test pit monitoring and documentation, soil classification and logging, in situ infiltration testing, data analysis and evaluation, and report preparation. He has worked with single and multistory commercial buildings, warehouses, freshwater impoundments for natural gas production, stormwater management facilities, retaining walls, and roadways. Mr. Truax manages testing and inspection for construction materials including soils, foundation subgrade, rebar reinforcement, concrete, masonry, structural steel, precast-concrete, sprayed-on fire-resistive materials, and intumescent paint projects.

Related experience includes the following projects:

Commercial Site Development, High Real Estate Group, Lancaster County, PA. Provided on-site test pit observation and infiltration testing for the proposed commercial development of a parcel of land located in East Lampeter Township. Based on the requirements of the Township stormwater management ordnance, the bottoms of stormwater BMPs must be located a minimum of 4 feet above any observed limiting zone such as bedrock and seasonal high water tables. Assisted with identifying limiting zones in the soil profiles at the site and completed full soil profile descriptions based on USDA soil classification system.

Tanger Outlet Center Lancaster Expansion, Tanger Outlet Centers, Lancaster County, PA. Served as Senior Soil Scientist on both the geotechnical investigation and stormwater infiltration testing phases at this site. Proposed improvements included construction of three single-story retail buildings and associated parking and access areas, as well as stormwater management facilities to accommodate the new construction. The majority of this expansion project is proposed on the property adjacent to the existing outlet retail center. This site is underlain by karst (carbonate) geology, which is susceptible to sinkhole development.

Proposed Townhouse Development Soil and Geotechnical Investigation, Hovnanian Enterprises, Chester County, PA. Served as Senior Soil Scientist for the soils investigation. Proposed improvements included construction of townhouses and associated access roads and stormwater management facilities. Client used the results of site investigation, consisting of test pits, and subsequent analysis, to plan for the proposed townhouse foundations as well as other earthwork requirements related to the project.

Signature Senior Living Community Development, SDR Development, Inc., Lancaster County, PA. Served as Senior Soil Scientist on both the geotechnical investigation and stormwater infiltration testing phases at this site. Project included construction of a new single-story, assisted-living facility with associated parking and access areas. Stormwater management facilities are also proposed to accommodate the new construction. The site is underlain by karst (carbonate) geology, which is susceptible to sinkhole development.

SpringHill Suites at Saucon Valley, High Hotels, Ltd., Lehigh County, PA. Served as Senior Soil Scientist on both the geotechnical investigation and stormwater infiltration testing phases at this site. Proposed improvements included two hotels with associated parking and access areas, as well as stormwater management facilities to accommodate the new construction. This site posed several unique challenges to the proposed development including its underlying karst (carbonate) geology, which is susceptible to sinkholes and subsidence. Investigated a historic quarry at the site using geotechnical borings and geophysical techniques to determine its extent.

Geotechnical and Soil Investigations, Confidential Natural Gas Client, Multiple Counties, PA.

Completed site investigations and analyses on an accelerated schedule while maintaining a high level of accuracy. Conducted soil investigations for proposed freshwater impoundments and provided on-site documentation of test pit and drill logging during the site investigation. Prepared detailed reports including findings, conclusions, and recommendations relative to the construction of freshwater impoundments.

Freshwater Impoundment, Confidential Natural Gas Client, Hunt Marcellus Operating Co., LLC, Marcellus Shale Play, PA. As Project Soil Scientist, provided a subsurface investigation and evaluation of this proposed freshwater impoundment in support of natural gas operations. Used data obtained from the test pit observations and laboratory analysis of soil samples obtained at the site to provide recommendations for the design and construction of the impoundment.

Natural Gas Well Pad, Confidential Natural Gas Client, Shell Exploration & Production Company, Utica Shale Play, PA. As Project Soil Scientist, performed test pits and infiltration testing at this future natural gas well pad site. Used the data obtained from the test pit observations and infiltration testing to provide recommendations for the design and construction of stormwater management BMPs.

JOHN S. WAH

P.O. Box 186, Shippensburg, PA 17257 : (240) 604-6639 matapeake.soil@gmail.com

Summary of Experience

Trained in pedology and archaeology. Over 10 years post-Ph.D. experience in soil/geomorphological investigations for archaeological research and cultural resource management with a focus on the Northeast and Mid-Atlantic regions including PA, NY, NJ, MD, DE, VA and WV. Experience in the physical, chemical, and mineralogical laboratory characterization of soils. Preparation of technical and scientific reports and presentations. Teaching in field, laboratory, and classroom settings.

Education

Ph.D. (2003), Soil Science, University of Maryland, College Park.

Dissertation: "Origin and Pedogenic History of Quaternary Silts on the Maryland

Coastal Plain."

Advisor: Dr. M.C. Rabenhorst

M.S. (1998), Soil Science, University of Tennessee, Knoxville.

Thesis: "Characteristics of Soils along the Elk River, Southcentral Tennessee:

Implications for Soil and Landscape Genesis, and Archaeology."

Advisor: Dr. J.E. Foss

B.A. (1993), Anthropology and Medieval Studies, Pennsylvania State University, University Park.

Experience

Soil Scientist, Principal Investigator, Matapeake Soil and Environmental Consultants, LLC, Shippensburg, PA (2008 to present)

- Responsible for project design, budgeting, and implementation
- Performed soil/geomorphological field research in archaeological investigations
- Prepared technical and scientific reports and presentations
- Laboratory analysis of physical and mineralogical soil properties
- Provided soils training for Penn State, Juniata College, Washington College, and PBS
 Time Team America archaeological Field Schools

Research Collaborator, Smithsonian Institution National Museum of Natural History, Washington, D.C. (2010 to present)

• Soils and geomorphological research in interdisciplinary archeological investigations

Assistant Professor, Adjunct, Shippensburg University, Department of Geography & Earth Science, Shippensburg, PA (2008, 2010, 2011).

- Developed and taught ESS393/594 'Environmental Field Soils' a field, laboratory, and classroom course for graduate and undergraduate students
- Developed and taught ESS594-21 'Soils, Sediments, and Landscapes: Processes and the Archaeological Record' a graduate seminar course

Assistant Professor, Adjunct, Wilson College, Department of Environmental Sciences, Chambersburg, PA (2011)

• Developed and taught ENV370 'Stewardship of Watershed Ecosystems'

Soil Scientist, Principal Investigator, AXIS Research, Inc., James Creek, PA (2005 to 2008)

- Responsible for project design, budgeting, and implementation.
- Performed soil/geomorphological field research in archaeological investigations.
- Prepared technical and scientific reports and presentations.
- Managed soil research laboratory, physical and chemical soil analysis.
- Guest instructor for Field Methods course at Shippensburg University and Archaeological Field Schools at Penn State and Washington College.

Soil Scientist, Geo-Sci Consultants, Inc., University Park, MD (2001 to 2006).

- Performed field research in soil-archaeology investigations.
- Detailed soil mapping and hydraulic conductivity testing for spray irrigation.

Research Assistant, Department of Natural Resource Sciences, University of Maryland, College, Park, MD (1998 to 2003).

- Performed field and laboratory research in examination of soil genesis, morphology, classification, hydric soils, and soils in archaeology.
- Oversaw daily operations of pedology laboratory: physical, chemical, and mineralogical analysis of soils.
- Assistant coach University of Maryland Soil Judging Team (1998-2001).
- Teaching assistant for NRSC 424: Field Study in Soil Morphology (Summer 2000, 2002).

Research Assistant, Department of Plant and Soil Science, University of Tennessee, Knoxville (1994 to 1998).

- Performed field and laboratory research in examination of soil genesis, soil geomorphology, and soils in archaeology.
- Instructor for PSS 211: Introduction to Soil Science Lab (Fall 1997).

Field and Teaching Assistant, State Museum of Pennsylvania/Elizabethtown College, Ephrata, PA (June 1995 to August 1995 and June 1994 to August 1994)

- Oversaw daily excavation activities at field school in historical archaeology at Ephrata Cloister.
- Instructed students in field and laboratory techniques.

Archaeologist, Archaeological and Historical Consultants, Inc., Centre Hall, PA (1994).

• Performed phase I and II cultural resource survey.

Archaeologist, Heberling Associates, Huntingdon, PA (1993).

• Performed phase I and II cultural resource survey.

Archaeologist, Friends of the State Museum, Harrisburg, PA (June 1993 to August 1993)

• Assistant on the State Museum of Pennsylvania/Pennsylvania State University field school in historical archaeology at Ephrata Cloister.

Publications, Abstracts, and Presentations

- Lowery, D.L., T.C. Rick, M. Barber, J.S. Wah, and M. Madden. 2015. Meadowood South of the Mason-Dixon Line: An Early Woodland Meadowood presence on the Delmarva Peninsula. Archaeology of Eastern North America (In press).
- Rick, T.C., M. Barber., D.L. Lowery, J.S. Wah, and M. Madden. 2015. Early Woodland coastal foraging at the Savage Neck Shell Midden (44NH478), Chesapeake Bay, Virginia. Archaeology of Eastern North America 43:23-38 (In press).
- Wah, J.S., D.L. Lowery, and D.P. Wagner. 2014. Loess, Landscape Evolution, and Pre-Clovis on the Delmarva Peninsula. p. 32-48. *In* D.J. Stanford and A.T. Stenger (eds.) Pre-Clovis in the Americas, International Science Conference Proceedings, Smithsonian Institution, Washington, D.C.
- Lowery, D.L., D.J. Stanford, D.P. Wagner, and J.S. Wah. 2013. Paleo-Americans on the Coastal Plain: A Perspective from the Middle Atlantic and Delmarva Peninsula (Part II). Paleoamerican Odyssey Conference, Santa Fe, New Mexico, October 17-19.
- Rick, T.C., J.S. Wah, and J.M. Erlandson. 2012. Re-evaluating the origins of late Pleistocene fire areas on Santa Rosa Island, California, USA. Quaternary Research 78:353-362.
- Lowery, D.L., J.S. Wah, and T.C. Rick. 2011. Post-Last Glacial Maximum Dune Sequence for the "Parsonburg" Formation at Elliots Island, Maryland. Current Research in the Pleistocene 28:103-104.
- Rick, T.C., D.L. Lowery, G.A. Henkes, and J.S. Wah. 2011. A Late Holocene radiocarbon chronology for the shell middens of Fishing Bay, Maryland. Archaeology of Eastern North America, 39:153-167.
- Wah, J.S. (editor). 2011. Michaux State Forest Soils, Sediments, and Landscapes Field Tour. Guidebook for the Mid-Atlantic Association of Professional Soil Scientists Soils Field Tour, September 10-11, 2011. Shippensburg, PA.
- Blewett, W.L. and J.S. Wah. 2011. Geology, Landscape, Soils of Michaux State Forest and South Mountain, Pennsylvania. p. 3-15. *In* J.S. Wah (ed.) Michaux State Forest Soils, Sediments, and Landscapes Field Tour. Guidebook for the Mid-Atlantic Association of Professional Soil Scientists Soils Field Tour, September 10-11, 2011. Shippensburg, PA.
- Wah, J.S. 2010. A tale of two soils: Soil morphology and physical, chemical, and mineralogical characteristics to reconstruct landscape evolution on the Delmarva. 40th Annual Middle Atlantic Archaeological Conference, Ocean City, MD, March 18-21.
- Lowery, D.L., M.A. O'Neal, J.S. Wah, D.P. Wagner and D.J. Stanford. 2010. Late Pleistocene upland stratigraphy of the western Delmarva Peninsula, USA. Quaternary Science Reviews, 29: 1472-1480
- Wah, J.S. 2009. The use of landforms, sediments, and soils in the interpretation of archaeological sites. 76th Annual Meeting of the Eastern States Archaeological Federation, Johnstown, PA, November 5-8, 2009.
- Wah, J.S. D.P. Wagner, D.L. Lowery, and M.C. Rabenhorst. 2008. Paleosols, Prehistory, and Climate Change in Late Quaternary Loess on the Delmarva Peninsula. p. 216. *In* American Quaternary Association Program and Abstracts of the 2008 Biennial Meeting. Pennsylvania State University, State College, PA.

- Wagner, D.P., D.L. Lowery, J. Gingerich, and J.S. Wah. 2008. Soil and landscape modification during the Younger Dryas chronozone and the demise of Clovis: Evidence from Cactus Hill, the Delmarva Peninsula, and Shawnee Minisink. A Symposium to Honor the Work of William M. Gardener, Shepherdstown, WV, September 26-28.
- Burns, J.A., J.S. Wah, and R.E. Kruchoski. 2007. The Madness Behind the Method: Interdisciplinary Rockshelter Research in the Northeastern United States. *In M. Kornfeld*, S. Vasil'ev, and L. Miotti (eds.) On Shelter's Ledge: Histories, Theories and Methods of Rockshelter Research. Proceedings of the XV World Congress (Lisbon, 4-9 September 2006). Archaeopress, Oxford, England.
- Wah, J.S. and J.A. Burns. 2006. An introduction to the cultural history of Pennsylvania and the Mid-Atlantic. p. 36-42. *In* D.S. Fanning (ed.) Acid Sulfate Soils of the U.S. Mid-Atlantic/Chesapeake Bay Region. Guidebook for the 18th World Congress of Soil Science Acid Sulfate Soils Tour, July 6-8, 2006. College Park, MD.
- Wagner, D.P., J.S. Wah., D.L. Lowery, and J. Gingerich. 2005. Burial of Clovis surfaces during the Younger Dryas A discussion of three locations: Cactus Hill, the Delmarva Peninsula, and Shawnee Minisink. Clovis in the Southeast, Columbia, SC, October 26-29, 2005.
- Kruchoski, R.E., J.S. Wah, and J.A. Burns. 2005. Interdisciplinary science at Camelback Rockshelter (36MR180), Monroe County, Pennsylvania. 35th Annual Meeting of the Middle Atlantic Archaeological Conference. Rehoboth Beach, DE, March 11-13, 2005.
- Fanning, D.S., J.S. Wah, and P.K. Zurheide. 2004. Characteristics of an extremely glauconitic soil from Burlington County, NJ. Annual Meeting, Northeastern Branch ASA-SSSA. Bordentown, NJ, July 11-14, 2004.
- Wah, J.S. 2003. Introduction to biogenic opal in soils and archaeology. West Virginia Association of Professional Soil Scientists Annual Meeting, Shepherdstown, WV. June 6-7, 2003. (Invited).
- Wah, J.S. 2003. Biogenic opal in soils on the Delmarva Peninsula, Maryland. West Virginia Association of Professional Soil Scientists Annual Meeting, Shepherdstown, WV. June 6-7, 2003. (Invited).
- Wah, J.S. and M.C. Rabenhorst. 2002. Light mineral assessment of soils formed in Quaternary silts in Maryland. *In* 2002 Agronomy abstracts (CD-ROM). ASA, Madison, WI.
- Wah, J.S. 2002. Origin and pedogenic history of Quaternary silts on the Delmarva Peninsula, MD. Maryland/Delaware Soil Survey Work Planning Conference, Wye Mills, Maryland. April 2-3, 2002.
- Wah, J.S. and M.C. Rabenhorst. 2001. Origin and pedogenic history of Quaternary silts on the Maryland Coastal Plain. *In* 2001 Agronomy abstracts (CD-ROM). ASA, Madison, WI.
- Wagner, D.P., D.L. Lowery, J.E. Foss and J.S. Wah. 2001. A time of dust: Paleoindians and loess on the Eastern Shore of Maryland. p. 22-23. *In* Abstracts, Mid-Atlantic Archaeological Conference, Ocean City, Maryland. March 23-25, 2001.
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Reports

- Wah, J.S. Soils and geomorphology through the Pine Barrens for the Southern Reliability Link, NJNG, Ocean County, New Jersey. Report submitted to URS Corporation, Burlington, NJ. 35 p.
- Wah, J.S. 2014. Soils and geomorphology at the confluence of the Driftwood Branch and Bennett Branch of Sinnemahoning Creek, Driftwood, Cameron County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 16 p.
- Wah, J.S. 2014. Soils and geomorphology for the Pequea Lane Bridge Replacement over Pequea Creek northeast of Paradise, Lancaster County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 16 p.
- Wah, J.S. 2013. Soils, sediments, and landforms west of Ischua Creek, Cattaraugus County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 26 p.
- Wah, J.S. 2013. Soils and landscapes northwest of Lycoming Creek for the Lycoming Creek Frozen Run Surface Water Withdrawal, Lycoming County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 16 p.
- Wah, J.S. 2013. Soils and geomorphology for the proposed Hungry Pipeline, Armstrong County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 23 p.
- Wah, J.S. 2013. An investigation of soils, sediments, and landforms east and west of the Tioga River, Steuben County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 23 p.
- Wah, J.S. 2013. Soils, sediments, and landforms along the Susquehanna River East of Towanda, Bradford County, Pennsylvania. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 19 p.
- Wah, J.S. 2013. Soils and geomorphology for the proposed Ohio River to Annie Waterline, Tyler, Pleasants, and Ritchie Counties, West Virginia. Report submitted to Rettew Associates, Inc., Lancaster, PA. 47 p.
- Wah, J.S. 2012. Soils and geomorphology west of the Hudson River, Greene County, New York. Report submitted to Historical Archaeological Zoological Explorations, Ithaca, NY. 20 p.
- Wah, J.S. 2012. Soils on a Pleistocene Susquehanna River terrace, Lycoming County, Pennsylvania. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 17 p.
- Wah, J.S. 2012. Soils and geomorphology north of the West Branch of the Delaware River, Delaware County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 17 p.
- Wah, J.S. 2012. Soils and geomorphology for the proposed Hungry Pipeline, Armstrong County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 23 p.
- Wah, J.S. 2012. Soils and geomorphology for the proposed Wickward Pipeline, Bradford County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 10 p.

- Rick, T.C., J.S. Wah, and D.L. Lowery. 2012. Archaeological investigations at the Savage Neck Shell Midden (44NH478), Northampton County, Virginia. A Report Prepared for the Virginia Department of Historic Resources Threatened Sites Program. 23 p.
- Wah, J.S. 2012. Assessment of soils and landscapes northeast of Meshoppen, Susquehanna County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 14 p.
- Wah, J.S. 2012. An investigation of soils and geomorphology along Middle Spring Creek at 73 West King Street, Shippensburg, Cumberland County, Pennsylvania Shippensburg Public Library. 16 p.
- Wah, J.S. 2012. Soils and geomorphology along Chickies Creek southwest of Manheim, Lancaster County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 16 p.
- Wah, J.S. 2012. Soils and geomorphology in the Little Muncy Creek valley for the Arthur-Warner Waterline, Lycoming County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 11p.
- Wah, J.S. 2012. Assessment of soils and geomorphology along the proposed Monroe Pipeline, Bradford County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 11 p.
- Wah, J.S. 2012. Soils and geomorphology along Pine Creek, Potter County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 14 p.
- Wah, J.S. 2012. Soils and geomorphology along Satterlee Creek, Bradford County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 13 p.
- Wah, J.S. 2012. An assessment of soils and geomorphology along a proposed pipeline corridor in the Allegheny National Forest, Elk County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 17 p.
- Wah, J.S. 2011. Soils and geomorphology assessment at two perennial streams in the Allegheny National Forest, Elk County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 15 p.
- Wah, J.S. 2011. Soils and geomorphology along the WB Linden to Seeley Trunkline, Lycoming County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 14 p.
- Wah, J.S. 2011. Soils and geomorphology along Lycoming Creek for the Huff Surface Water Withdrawal, Lycoming County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 12 p.
- Wah, J.S. 2011. Investigation of soils and geomorphology along the Marsh Creek Water Line Corridor on Oak Ridge, Tioga County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 9 p.
- Wah, J.S. 2011. Investigation of soils and geomorphology along the Oelschlager Lateral Pipeline, Westmoreland County, Pennsylvania. Report submitted to Rettew Associates, Inc., Lancaster, PA. 24 p.
- Wah, J.S. 2011. Soils and landscape evaluation along Swatara Creek, Dauphin County, Pennsylvania. Report submitted to Heberling Associates, Inc., Alexandria, PA. 31 p.

- Wah, J.S. 2010. An evaluation of soils and the potential for deeply buried cultural materials on the floodplain of the Susquehanna River southeast of Wyalusing, Bradford County, Pennsylvania. Report submitted to Environment & Archaeology, Florence, KY. 15 p.
- Wah, J.S. 2010. An evaluation of soils and the potential for deeply buried cultural materials along the Chemung River South of Corning, Steuben County, New York. Report submitted to Environment & Archaeology, Florence, KY. 29 p.
- Wah, J.S. 2008. An evaluation of soils and the potential for deeply buried landscapes along Catharine Creek south of Montour Falls, Schuyler County, New York. Report submitted to Historical Archaeological Zoological Explorations, Ithaca, NY. 10 p.
- Wah, J.S. 2008. Soils and geomorphology along the Canisteo River, Steuben County, New York. Report submitted to Environment & Archaeology, Florence, KY. 33 p.
- Wah, J.S. 2007. Soils and geomorphology along the Tioga River at Lindley, Steuben County, New York. Report submitted to Historical Archaeological Zoological Explorations, Ithaca, NY. 13 p.
- Wah, J.S. 2007. Investigation of soils and landscapes at the confluence of the Seneca and Oneida rivers, Onondaga County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 15 p.
- Wah, J.S. 2007. Investigation of soils and landscapes along Conewago Creek, East Berlin, York County, Pennsylvania. Report submitted to McCormick Taylor, Inc., Harrisburg, PA. 12 p.
- Wah, J.S. 2006. Investigation of soils and geomorphology along a tributary of Skippack Creek, Montgomery County, Pennsylvania. Report submitted to McCormick Taylor, Inc., Harrisburg, PA. 10 p.
- Wah, J.S. 2006 An investigation of soils along Steele, Fulmer, and Moyer creeks, Herkimer County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 14 p.
- Wah, J.S. 2006. Soil and geomorphologic testing along the Chadakoin River in Jamestown, Chautauqua County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 7 p.
- Wah, J.S. 2006. Soil and geomorphic investigation of the proposed site of the Ambassador Niagara Signature Bridge in Buffalo, Erie County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 12 p.
- Wah, J.S. 2006. Soils and geomorphology deep testing on the floodplain of Ganargua Creek, Ontario County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 15 p.
- Wah, J.S. 2006. Soils and geomorphology of Avon Park Business Property, Livingston County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 15 p.
- Wah, J.S. 2006. Soils and geomorphology deep testing along the South Branch of the Raritan River, Somerset County, New Jersey. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 11 p.

- Wah, J.S. 2006. Soils and geomorphology of the H.E. Ervin WRP project area along the Ohio River, Union County, Kentucky. Report submitted to Environment & Archaeology, Florence, KY. 15 p.
- Wah, J.S. 2006. Soils and geomorphology of the Phillip English WRP project, Crittenden County, Kentucky. Report submitted to Environment & Archaeology, Florence, KY. 13 p.
- Wah, J.S. 2006. Soils and geomorphology of the Mitchell Steward WRP project area, Webster County, Kentucky. Report submitted to Environment & Archaeology, Florence, KY. 11 p.
- Wah, J.S. 2006. An investigation of soils for the Oriskany Ecosystem Restoration Project, Oneida County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 14 p.
- Wah, J.S. 2006. An initial investigation of soils and landforms at stream crossings of the proposed route of the Empire Pipeline, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 19 p.
- Wah, J.S. 2005. Soils and geomorphology along the proposed route of the Neshanic Loop pipeline, Somerset County, New Jersey, Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 22 p.
- Wah, J.S. 2005. Soils of the Akzo property, Genesee River Valley, Livingston County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 13 p.
- Wah, J.S. 2005. An Investigation of Soils at Fishing Bay Wildlife Management Area and Fairmount Wildlife Management Area, Maryland. Report submitted to Washington College, Chestertown, MD. 34 p.
- Wah, J.S. 2004. Investigation of soils and geomorphology for the Hudson River Project, Rensselaer County, New York. Report submitted to Panamerican Consultants, Inc., Buffalo, NY. 15 p.
- Wah, J.S. 2003. Report of soils investigation in the East Trappe Annexation Project Area, Talbot County, Maryland. Report submitted to the Chesapeake Bay Watershed Archaeological Research Foundation, Inc., Tilghman, MD. 14 p.
- Foss, J.E. and J.S. Wah. 1998. Soils of the Gully Archaeological Site. Report submitted to the South Carolina Institute of Archaeology and Anthropology, Columbia, South Carolina. 12 p.
- Wah, J.S. and J.E. Foss. 1998. Characteristics of alluvial soils at the Cheek Site (40CE28), Claiborne County, Tennessee. Report submitted to the Tennessee Department of Transportation, Knoxville, Tennessee. 18 p.
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Professional Societies

Pennsylvania Association of Professional Soil Scientists Mid-Atlantic Association of Professional Soil Scientists (2011 President) The American Quaternary Association

References

Dr. Martin C. Rabenhorst
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MICHAEL E. LANE, CPSS SENIOR SOIL SCIENTIST

Education:

B.S., Environmental Resource Management, The Pennsylvania State University, 1994

Professional Licenses and Certifications:

SSSA Certified Professional Soil Scientist 34591

Certified Sewage Enforcement Officer, Pennsylvania 02679

OSHA 40 Hour Health and Safety Training and Annual Refresher

Memberships:

Pennsylvania Association of Professional Soil Scientists,

President 2011-2012, Treasurer 2013-2016, Board of Directors 2008-present

Soil Science Society of America

Continuing Education:

PA Association of Sewage Enforcement Officers Annual Conference, presenter 2009, 2013

PA Septage Management Association Annual Conference, presenter 2006

PA Association of Professional Soil Scientists Technical Sessions, 2005-2015

40-Hour U.S. Army Corps Wetland Delineator Certification Preparatory Training

U.S. Army Corps Wetland Delineation Regional Supplement Training, 2010-2015

Publications:

White, Ruble, and Lane. The effect of changes in land use on nitrate concentration in water supply wells in southern Chester County, Pennsylvania. <u>Environmental Monitoring and Assessment</u>, March 6, 2012.

Lane, Which Came First? The License or the Rules? Soil Science Licensing. <u>Soil Survey Horizons</u>, Spring 2010, v51 no1.

References:

Ms. Karen Vickers, KV Excavating, Aston, PA 610-494-8600

Mr. Thomas Quinn, Chester County Health Department, 610-344-6526

Mr. Lane is a Senior Soil Scientist with Brickhouse Environmental. He is experienced in the evaluation of the physical properties of soils and interpretation of those properties for soil mapping and site characterization. His project experience ranges from wastewater and stormwater investigations for land development projects, to identification and mapping of hydric and alluvial soils, to groundwater and soil sampling for environmental remediation projects, to landfill monitoring and permitting. He has provided testimony before Township boards and commissions and has presented expert testimony before the Pennsylvania Environmental Hearing Board.

Mr. Lane has completed Phase I and Phase II environmental site assessments, environmental impact assessments, sewage facilities planning and design, wetland delineation and permitting, tree surveys, and habitat assessments for endangered and threatened species.



MICHAEL E. LANE, CPSS

PROJECT EXPERIENCE

Artesian Water Company, Sussex County, DE

Developed and implemented a soil mapping plan comprising soil sampling for nutrients, backhoe test pits, infiltration tests, and several hundred auger borings to create detailed soil mapping of 1,600 acres. Responsible for preparation of a Site Investigation Report for a proposed spray irrigation wastewater disposal system to service 4,000 homes generating 7 million gallons of wastewater per day. The Site Investigation Report was approved by the Delaware Department of Natural Resources and Environmental Control.

Qualified Professional Soil Science Consultant, Chester County Health Department, PA

On behalf of Chester County, responsible for examination of soils for suitability for onlot sewage disposal systems and submission of written reports for subdivisions of more than 10 lots, for multi-residential and commercial projects where sewage flows are greater than 4,000 gallons per day, and for morphological evaluations of soils as required by the PA DEP. Also responsible for providing technical resolution of soils evaluation disputes for all individual lots at the request of the Health Department.

Expert Report in Support of Litigation, Lycoming County, PA

On behalf of a pipeline construction company, prepared an expert rebuttal report related to the construction of a 30-mile natural gas transmission pipeline and appurtenant facilities. Brickhouse was retained by the construction company in support of their efforts to collect over \$17 million in unpaid invoices. The pipeline owner alleged that errors in erosion and sedimentation control and obtaining environmental permits by the construction company and its subcontractors directly resulted in project delays and significant additional costs. Brickhouse found that the wetland delineation and permitting was proper and was conducted in accordance with the industry standard. Brickhouse used detailed reviews of the plan drawings and daily precipitation records, along with a flyover site inspection, to confirm that the construction conformed to accepted practices. The expert rebuttal report and real-time trial support provided by Brickhouse resulted in a court victory for the construction company on all counts, with a total award in excess of \$20 million.

Southeastern Chester County Refuse Authority (SECCRA), Chester County, PA

Responsible for detailed soils mapping of hydric and alluvial soils and preparation of a water budget for constructed wetland and stream recharge components of stormwater management system for permitted landfill expansion. Responsible for detailed soils testing, spray irrigation design, and water quality permitting for land application of treated landfill leachate. Assists with quarterly groundwater surface water and leachate sampling events for compliance with PADEP solid waste regulations and SECCRA's solid waste permit.

Artesian Water Company, New Castle County, DE

Responsible for preparation of a Site Investigation Report for a proposed rapid infiltration basin (RIB) wastewater system capable of disposing of 1.5 million gallons of wastewater per day. Developed and implemented a site testing plan comprising soil borings, test pits, and infiltration tests on multiple disposal sites. Provided oversight during construction of four full-sized test RIBs. Preliminary dosing of the test RIBs has confirmed the results of the investigation.

Crane Property Soil Mapping, Delaware County, PA

Conducted deep test pit evaluations along proposed roadway to determine ease of excavation and depth to bedrock for proposed residential development.

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MICHAEL E. LANE, CPSS

Kemblesville Wastewater, Franklin Township, Chester County, PA

Responsible for soils evaluations and permeability testing for a proposed drip irrigation sewage disposal system for combined sewage flows of 128,000 gallons per day. The detailed testing plan involved multiple sites and coordination with the PADEP soil scientist and the Township's wastewater engineer.

Anson B. Nixon Park and Cloud Landfill, Chester County, PA

Responsible for soils evaluation and reporting for stormwater facilities and wetland delineation for beneficial reuse of closed sanitary trench landfills located in southeastern Pennsylvania.

Kennett Development Group, Kennett Township, Chester County, PA

Completed wetland delineation, tree survey, soils testing for stormwater management, sewage facilities planning, and pump station design for a 500,000-square foot office complex.

Pennsylvania Emergency Management Headquarters, Dauphin County, PA

Responsible for wetland delineation and jurisdictional determination submission for the proposed 100,000-square foot state-wide emergency operations facility.

Swatara Creek Bridge Replacement (SR 1022, Section 001), Lebanon County, PA

Performed wetland delineation and categorical exclusion evaluation for the replacement of an existing twinspan bridge over Swatara Creek.

M.O.T. Water Farm No. 1 and Lea Eara Farms, New Castle County, DE

Developed and implemented a soil sampling and vegetation sampling plan for two spray irrigation wastewater disposal sites. Provide annual reporting for soil fertility and vegetation monitoring, including recommendations to optimize treatment and crop yield. The two facilities are permitted to provide 165 acres of spray irrigation disposal for 1.2 million gallons per day of treated residential, commercial, and industrial sewage.

Smith Memorial Playhouse and Playground, Philadelphia, PA

Responsible for site selection, test pit evaluations, percolation testing, system design, and permitting for the replacement onlot sewage disposal system for the 100-year-old children's playhouse and playground in Fairmount Park. Tree removal was minimized through the use of directional boring techniques and conveyors to place the system aggregate.

Heritage Building Group, Warwick Township, Chester County, PA

Provided testimony before the Township planning commission, and provided expert testimony before the Environmental Hearing Board for the proposed on-site community wastewater disposal system.

Delaware Solid Waste Authority, DE

Assists with coordination and implementation of the groundwater, surface water, landfill gas migration, and leachate monitoring programs for four municipal waste landfills operated by the Delaware Solid Waste Authority. These extensive monitoring programs include monthly leachate monitoring and landfill inspections, as well as quarterly monitoring of groundwater. Groundwater sampling includes the collection of groundwater samples for dissolved methane gas analysis from select monitoring wells using low-flow well purging techniques.

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Stephen D. Dadio, CPSS - Environmental Manager

CEDARVILLE Engineering Group, LLC

EDUCATION

M.S. – Soil Science Pennsylvania State University

> B.S. - Soil Science Cornell University

PROFESSIONAL CERTIFICATIONS

SSSA (ARCPACS)
Certified Professional
Soil Scientist

SSSA (ARCPACS)
Certified Professional
Soil Classifier

PAPSS Registered
Professional Soil Scientist

Delaware DNREC Licensed Class D Soil Classifier

Pennsylvania Licensed Sewage Enforcement Officer

NICET Certified in Highway Construction and E&S Control

SUMMARY OF EXPERIENCE

Mr. Dadio, Environmental Manager at CEDARVILLE Engineering Group, LLC, has 17 years of professional experience and leads our environmental department. He has used his extensive technical knowledge in ecological and hydrological fields for wetland delineations, watershed studies, environmental site assessments, and nonpoint source pollution prevention programs. Mr. Dadio has extensive experience in the field of soil science for a wide variety of land uses. Specializing in urban and disturbed landscapes, his career has focused on green infrastructure solutions in maintaining natural hydrologic conditions. He also regularly serves as a Construction Manager, with experience in estimating, field management, site inspection and quality control.

PROFESSIONAL AFFILIATIONS

- · Adjunct Faculty, Delaware Valley University, Doylestown, PA
- Pennsylvania Association of Professional Soil Scientists, President 2009, 2010
- Member, DEP Stormwater Loading Re-Write Workgroup
- Member, Soil Science Society of America
- Member, W.B. Saul Agricultural High School (Philadelphia) Natural Resources Curriculum Advisory Board

CEDARVILLE EXPERIENCE

United States Environmental Protection Agency, Cincinnati, Ohio – CEDARVILLE Engineering Group, LLC conducted detailed soil surveys and hydrologic investigations in the cities of Phoenix, AZ, Atlanta, GA, New Orleans, LA, Portland, ME, Detroit, MI, Omaha, NE, Camden, NJ, Cincinnati, OH, Cleveland, OH, San Juan, PR, and Tacoma, WA to determine the stormwater management potential for the soils in vacant lots in order to mitigate Combined Sewer Overflow (CSO) events. The urbanized soils collected from the sites were analyzed to identify feature classifications that are similar to native material, to develop a database of soil information on a regional basis for planning.

NPDES Program Manager-City of Coatesville – Plan all stormwater activities required to maintain compliance with the MS-4; PAG Permit. This includes the development of a TMDL plan for sediments, nitrogen, and phosphorous. Also served on the Christina Basin TMDL Improvement Committee (CTIP) as a municipal representative.

NPDES Program Manager-Westtown Township – Plan all stormwater activities required to maintain compliance with the MS-4; PAI Permit. This includes the development of a TMDL plan for phosphorous.

CONTACT

1033 S. Hanover Street Suite 300 North Coventry, PA 19465

P: 610.705.4500 · F: 610.705.4900 sdadio@cedarvilleeng.com

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NPDES Program Manager-West Norriton Township – Plan all stormwater activities required to maintain compliance with the MS-4; PAG Permit. This includes the development of a Pollutant Reduction Plan for impaired waters.

On-Lot Sewage Sewage Management Program, Newlin Township – Developed a Sewage Management Program for Newlin Township. This program involves the implementation of an ordinance, resident education, and associated record documentation.

Grant Writing, City of Coatesville—Successfully procured two grants for the City of Coatesville to repair aging infrastructure, particularly stormwater inlets. These grants totaled \$277,500 from both the PA DCED WRPP Program (\$127,500) and PA DEP Growing Greener (\$150,000).





Stephen D. Dadio, CPSS - Environmental Manager

CEDARVILLE Engineering Group, LLC

Construction Manager, Several Municipalities—Supervised three construction inspectors working on various land development projects throughout southeastern Pennsylvania. Coordinated work with both municipal officials as well as private construction managers.

Timber Harvest Reviewer, West Nantmeal Township—Review and inspect timber harvests in accordance with local regulations. Interact with Chester County Conservation District in the facilitation of these unique permits.

Stargazer Road land acquisition, Newlin Township – Conducted Phase 1 Environmental Site Assessment for property that was purchased by Newlin Township.

305 Kimberton Road Phase 1 and Phase 2, Schuylkill Township – Conducted Phase 1 and Phase 2 Environmental Site Assessment for property that was purchased for a private land development. These tasks include detailed site characterization for possible contaminants.

USDA Agricultural Research Service (USDA-ARS) – Completed detailed evaluation of soils in central Pennsylvania to determine the presence of dense, brittle soil horizons (fragipans). This project involved detailed site characterization and sampling to assist with the greater research project.

Valley Forge Distribution Center – Supervised the design of a water line extension from an existing facility to the main several hundred feet away. This involved the design of a water meter pit and also required extensive coordination with PA American.

Wetland Delineation for Giant, Lower Paxton Township, Dauphin County – Completed a wetland delineation for the construction of a supermarket. This included field delineation and submission of a completed wetland report.

Geotechnical Borings, 827 Carpenter Street, Philadelphia, PA – Completed geotechnical borings and produced soil bearing capacity calculations for the construction of a 3-story residence in South Philadelphia.

Historic Resources Evaluation, Whitehall Inn, Spring City, PA – Completed all forms and documentation as required by the PHMC for this redevelopment project.

On-Site Sewage System Testing and Design, West Bradford Township – Completed detailed soil testing to determine the suitability of on-site sewage disposal. Completed a design for an in-ground system that was required by the Chester County Health Department in order to receive a permit.

Stormwater Management and Loading Rate Determination, Phoenxiville, PA - Completed soil testing for a stormwater infiltration basin. Produced report with a justification of enhanced loading rates in accordance with PADEP guidance. When the basin encountered problems, completed a forensics investigation to determine the problem source (compaction); developed a remediation strategy to restore the functionality of the basin.

Stormwater Streetscape Project in Port Richmond, Philadelphia, PA - Completed detailed soil and stormwater evaluation for a PWD-funded streetscape project in the Port Richmond section of Philadelphia. This involved detailed urban soil investigation as well as permeability testing in accordance with PWD regulations.

Environmental Permitting, Brandywine Branch Distillery, Elverson, PA - Completed detailed soil and stormwater evaluation, wetland determination, PNDI clearance, and archaeological screening for the repurposing of a barn to a craft distillery. Interacted with local, state, and federal agencies to gain approvals.

Environmental Permitting, Flourtown Road Project, Lafayette Hill, PA - Completed detailed soil and geologic investigation for stormwater evaluation and wetland investigation for proposed land development.

Environmental Permitting, Brandywine, Lower Moreland High School, Huntington Valley, PA - Completed detailed soil and stormwater evaluation, wetland determination, and PNDI clearance for the redevelopment of Lower Moreland High School. Interacted with local, state, and federal agencies to gain approvals.

Construction Supervision, Barley Sheaf Apartment Complex, Coatesville, PA - Completed evaluation of failing stormwater infrastructure at this complex. Prepared bid documents and solicited bids from local contractors. Inspected remediation work and approved quantities in accordance with the contract.



Stephen D. Dadio, CPSS - Environmental Manager

CEDARVILLE Engineering Group, LLC

RECENT PUBLICATIONS & PRESENTATIONS

- 2015. Dadio S., Barkasi, A. Urban Soils: The Foundation for Green Infrastructure. Villanova Urban Stormwater Partnership Symposium, VUSP, Villanova, PA.
- 2014. Shuster W., Dadio, S., Urban fingerprints on soil morphology and hydrology a summary of field investigations in US cities, across different soil orders. Soils in the City Conference. IEWA, Chicago, Illinois.
- 2012. Dadio S., Drohan, P.J., Utilizing Ground Penetrating Radar and EM to Supplement Deep Borings in Urban Soil Surveys. Abstract 287-1, Soil Science Society of America, Cincinnati, Ohio, poster presentation and abstract.
- 2012. Losco, R., S, Dadio., A Contrasting Study of Ohio Urban Soils Cleveland Vs. Cincinnati. Abstract 287-2, Soil Science Society of America, Cincinnati, Ohio, poster presentation and abstract.
- 2011. Barkasi, A, S. Dadio, W. Shuster, R. Losco. Urban Soils and Vacant Land as an Urban Stormwater Resource, Abstract 89, ASCE-EWRI World Environmental and Water Resources Congress, Albuquerque, New Mexico, oral presentation (published)
- 2011. Shuster, W., A. Barkasi, S. Dadio, P.J. Drohan, T. Gerber, T. Houser, R. Losco, K. Reinhold, J. Wander, and M. Wigington. Moving beyond the udorthent a proposed protocol for surveying urban soils to service contemporary urban ecosystem management data needs. Soil Survey Horizons, 52:1-8.
- 2010. Drohan, P.J., Ciolkosz, E.J., Lindeburg, K. S.; Waltman, W.J.; Dadio, S.D. Last glacial aeolian deposits in the conterminous U.S. Abstract 227-4 E. Soil Science Society of America, Long Beach, CA. Poster presentation.
- 2010. Drohan, P.J. A Pedologist's perspective of the Critical Zone. Abstract 111-5. Soil Science Society of America, Long Beach, CA. Poster presentation.
- 2009. Drohan, P., Dadio, S., Lindbo, D., Ciolkosz, E., Waltman, W., Braun, D., and S. Waltman. The Unified Theory of Fragipan Genesis. Soil Science Society of America, Pittsburgh, PA. #2009.52729, oral presentation and abstract.
- 2009. Dadio, S., Waltman, W., Drohan, P., Lindbo, D., Ciolkosz, E., and S. Waltman. Testing the Unified Theory of Fragipan Genesis: Geomorphic Trends Between Fragipans, Eolian Affected Soils, and Periglacial Landscapes. Soil Science Society of America, Pittsburgh, PA. #2009.5341, poster and abstract.
- 2009. Lindeburg, K., Young, A., Drohan, P., Waltman, W., Ciolkosz, E., Dadio, S., Lupton, M., and E. Erich. Mineralogical and Geochemical Trends Associated with Fragipan Prism Morphology in a Late Wisconsinan Glacial till. Soil Science Society of America, Pittsburgh, PA. #2009.52773, poster and abstract.
- Drohan, P.J., Waltman, S., and S. Dadio. Identifying marginal lands suitable for biofuels production in the North-Central Appalachian region, USA.
- Drohan, P.J., Ciolkosz, E., Dadio, S., Waltman, S., and K. Lindeburg. Extent and depth of loess additions to soils across the lower 48 U.S.
- 2008. Drohan, P.J., Bills, B., Miller, D., Waltman, S., Dadio, S., and E. White. Soil Science Society of America, Houston, TX: Geomorphic Relationships in the Fragi taxon across Pennsylvania: Clues to Genesis and Cementation Mechanisms. 140938. Oral presentation. (published).
- 2008. Dadio, S., Drohan, P. J., Clark, T., and S. Ogden. Soil Science Society of America, Houston, TX: Chemical and mineralogical cementing agents in fragipans from Pennsylvania parent materials. 140920. Oral presentation. (published).
- 2008. Drohan, P.J., Waltman, S., Bills, B., Miller, D., Foster, C., Dadio, S., and E. White. Soil Science Society of America, Houston, TX: Extent of fragi taxons on CRP/CREP lands and potential environmental, management and economic effects on biofuels production due to fragipan soil limitations. 141041. Oral presentation. (published).

RUSSELL L. LOSCO, M.A., P.G., C.P.S.S.

Principal Fields of Expertise:

Applied Soil Science Investigation, Applied Geomorphology, Soil Mapping and Classification, Indicators of Seasonal High Water Tables, Permeability Testing, Characterization of Soils for Recycling of Treated Wastewater and Stormwater, Innovative Solutions to Wastewater Recycling on Challenging Sites, Mapping and Characterization of Alluvial, Upland and Urban Soils, Anthropogenic Influences on Soil Development, Paleo-geomorphology and Periglacial Features, Environmental Site Remediation, Wetlands, Karst Analysis, Hydrogeology, Urban Soils, Green Infrastructure.

Qualifications:

Mr. Losco is a seasoned soil scientist and geologist with over 29 years of experience in soil mapping, site investigation, geomorphology, soil testing, on-site wastewater disposal and recycling testing and design, environmental investigation and soil and geologic research. He is active in numerous professional organizations and has served on advisory working groups to aid regulatory agencies in Pennsylvania and Delaware to draft sound, science-based regulations. He freely donates time to train both regulators and peer scientists and consultants and is an adjunct faculty member at the Delaware County Community College. He is active in research and publishes regularly and is the lead author of the **PAPSS Manual for Soil Investigation in Pennsylvania**.

Mr. Losco has handled high definition soil mapping and geomorphological analysis projects ranging in size from less than one acre to several thousand acres. He has accurately and consistently mapped upland, urban and alluvial soils, correcting and updating published maps. Through original research he has discovered unique geologic features in the Delmarva Peninsula and previously unknown processes in soil development. He has handled projects ranging from single residential lot septic systems to 7 million gallon per day wastewater recycling projects. He has spearheaded the use of new and innovative technologies for efficient and environmentally sound solutions to wastewater disposal and recycling. In collaboration with the United States Environmental Protection Agency, he has developed and implemented a protocol for characterizing and mapping urban soils for use in green infrastructure and urban renewal. He is a member of the Board of Directors of the Pennsylvania Stormwater Technical Working Group and has spearheaded the development of soil testing protocols for stormwater management and is co-author of the proposed **Pennsylvania Stormwater Best Management Practices Manual** (in prep.).

PROFESSIONAL EXPERIENCE:

Adjunct Professor
West Chester University of PA

August 2015 to Present West Chester, PA

Teach ESS 490/590, Fundamentals of Soil.

Adjunct Professor

Delaware County Community College, Pennocks Bridge Campus

August 2011 to Present

West Grove, PA

Teach ESS 100, Introduction to Earth Science. I have based the content of this class upon the model of West Chester University's ESS 101 and structured the class so that they would be equivalent to each other.

<u>Principal Soil Scientist & Geologist</u> Lanchester Soil Consultants, Inc. July 1993 to Present West Grove, PA

Conduct soil profile description, evaluation, mapping, and classification. Perform soil and geomorphological analysis of land development sites. Perform site evaluations and morphological soil assessments for individual and community drip irrigation sewage disposal systems and ABS systems in Pennsylvania and for all systems in Delaware. Perform feasibility studies and site investigation reports for individual and community on-site sewage disposal systems. Perform wetland delineations. Design individual and community on-lot sewage disposal systems including drip irrigation and

ABS systems in both Pennsylvania and Delaware. Perform topographic survey, layout, stakeout, and inspection and installation supervision of sewage disposal systems. Perform percolation and soil permeability testing for on-lot sewage disposal and stormwater infiltration. Assist in design of land developments, green infrastructure, stormwater infiltration structures and sewage treatment plants. Represent clients at municipal, county and state meetings. Provide expert testimony in the fields of soil science, geology and wastewater treatment and disposal. Conduct urban soil assessments as a sub-contractor to Cedarville Engineering for the United States Environmental Protection Agency, Office of Research and Development. Delineate wetlands. Planned and supervised rehabilitation of Penn Township municipal Rapid Infiltration Basins (RIBs). Assist in development of science-based regulations and ordinances for Delaware and Pennsylvania. Conduct Environmental Site Remediation and Hydrogeologic analysis and groundwater monitoring. Conduct urban soils mapping and assessment. Conduct hydrogeological analyses for quantity and quality of groundwater. Conduct site remediation (Act 2). Conduct karst analysis for sinkholes in carbonate bedrock areas.

Served on the Board of Directors of the Pennsylvania Association of Professional Soil Scientists (PAPSS), the Pennsylvania On-Site Wastewater Recycling Association (POWRA) and Pennsylvania Association of Sewage Enforcement Officers (PASEO). Instrumental in organizing successful Technical Conferences for PAPSS and POWRA. Provided commentary on proposed regulatory changes in sewage disposal regulations and stormwater infiltration regulations in PA. Member of London Grove Township Environmental Advisory Committee.

Consulting soil scientist for Penn Township, Chester County from 2001 to present. Sewage Enforcement Officer for East Earl Township, Lancaster County from 1996 to 1997. Alternate Sewage Enforcement Officer Edgmont Township, Delaware County from 1994 to 1996. Perform sewage needs study for Sadsbury Township, Chester County.

Environmental Designer/ Soil Scientist
James C. Kelly & Associates, Inc.

July 1989 to July 1993 Glen Mills, PA

Conducted soil profile description, classification, mapping, and percolation testing. Designed on-lot sewage disposal systems ranging from individual lots to large-volume community systems. Inspected and supervised installation of on-lot sewage disposal systems ranging from individual systems to large-volume community systems. Assisted in design of stream discharge sewage treatment plants ranging from 400 to 40,000 gallons per day. Performed wetlands delineations and determinations. Designed wetlands for mitigation and stormwater treatment. Sewage Enforcement Officer for Birmingham Township, Delaware County from November 1989 to December 1993. Alternate S.E.O. for Upper Providence Township, Delaware County from November 1989 to July 1993. Wrote Act 537 Sewage Facilities Plans. Worked under direction of staff Geologist.

Environmental Health Specialist
Chester County Health Department

March 1987 to July 1989 West Chester, PA

Sewage Enforcement Officer for up to 15 municipalities. Evaluate and describe soil profiles to determine suitability for on-lot sewage disposal. Describe soil profiles on subdivisions in cooperation with county's consulting soil scientists. Enforce County Health Code as pertained to sewage disposal, water wells, and environmental health. Cooperated with federal, state, county, and municipal governments and agencies. Instrumental in revising county environmental health regulations, employee job descriptions, and policies.

<u>Project Manager</u> Federated Medical Resources September 1985 to March 1987 Honey Brook, PA

Manage breeding colony of approximately 550 African Green monkeys. Supervise 30+ employees. Responsible for overseeing daily medical care of monkeys, ordering supplies, monitoring blood pressure and maintaining records for research project.

Research Instructor

Hahnemann University Medical School

March 1982 to September 1985

Philadelphia, PA

Conduct blood pressure monitoring of 30-50 African Green monkeys as part of long-term research project funded by the National Institute of Health. Conduct blood chemistry analysis and maintain records. Lecture on selected topics in the School of Allied Health.

EDUCATION:

Indiana	University	of Pennsylvania
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Bachelor of Arts in Anthropology/Archaeology

1981

West Chester University

Master of Arts in Physical Science-Earth Science

2009

Graduate Assistant in Department of Geology and Astronomy

2007-2009

Research Focus:

- Soil genesis
- Anthropogenic influences on soil development
- Paleo-geomorphology
- Indicators of seasonal high water tables

University of Delaware

Graduate Coursework in Soil Science

1995-96

Delaware Valley College

Coursework in Soil Science

1992-93

Temple University

Coursework in Plant Science

1996-97

Gloucester County College

Coursework in Chemistry

1983-84

Glassboro State College (now Rowan University)

Graduate Coursework in Genetics

1985

Cecil Community College

Coursework in AutoCAD

2001

CREDENTIALS:

SSSA Certified Professional Soil Scientist

#22586

Pennsylvania Professional Geologist

#PG004953

Delaware Department of Natural Resources

And Environmental Control

Class 'A' Percolation Tester License

#2202

Class 'B' Sewage System Designer License

#2202

Class 'D' Site Evaluator License

#2202

(Soil Scientist) License

Pennsylvania Department of Environmental Resources

Certified Sewage Enforcement Officer #01941

Pennsylvania Registered Sanitarian #255

Pennsylvania Nutrient Management Program

Certified Commercial Nutrient Management Consultant #1714-NMC

PROFESSIONAL AFFILIATIONS:

Member - Sigma Gamma Epsilon - National Honor Society for Earth Sciences - Beta Zeta Chapter

Pennsylvania Association of Professional Soil Scientists

Associate Member 1994 to 1997

Professional Member 1997 to Present

Board of Directors Member 2003 to 2012

Vice President 2004, 2012

President 2005, 2006

Chairman of Committee to review Best Management Practices in Stormwater Management - 2004 to 2009 Chairman of Committee to Draft a State Manual for Standardized Soil Investigations - 2008 to Present Chairman of Licensing Committee – 2010 to 2015

Soil Science Society of America / American Society of Agronomy

Member 1994 to Present

Member of SSSA S493 Hubert J. Byrd Sr. Scholarship Committee 2012-Present Chair of SSSA S493 Hubert J. Byrd Sr. Scholarship Committee 2012-2014

Pennsylvania Council of Professional Geologists

Member 2008 to Present

Board of Directors Member 2015 to present

Member of Education Committee 2012 to present

National Society of Consulting Soil Scientists (Now part of SSSA)

Affiliate Member 1995 to 1997

Professional Member 1997 to Present

Pennsylvania Association of Sewage Enforcement Officers

Member 1988 to 2008

Director-At-Large for Delaware and Philadelphia Counties February 1993 to February 1997

Geological Society of America

Member 2006 to Present

Pennsylvania Stormwater Technical Working Group

Charter Member 2009 to Present

Board of Directors Member 2009 to Present

Chair of Subgroup for Infiltration and Site Evaluation 2009 to Present

Chair of Subgroup for Karst 2015 to Present

DISTINCTIONS AND ACHIEVEMENTS:

Awarded 2015 United States Environmental Protection Agency Scientific and Technological Achievement Award – Honorable Mention for Research on Understanding the Nature of Urban Soils and Their Role in Stormwater and Sewer Management

Member of Soil Certification Task Force to Develop New Soil Credentialing Program for the Soil Science Society of America, 2016

Associate Editor <u>Soil Survey Horizons</u> 2008 to 2012

Member of West Chester University of Pennsylvania Professional Science Master's Program Advisory Board

Assistant Coach of West Chester University of Pennsylvania Soil Judging Team 2010 & 2014

Member of Advisory Committee to Develop Performance Objectives for Soil Scientist Examinees – Soil Science Society of America, 2012

Nominated for the Gould Award for Teaching Excellence at Delaware County Community College - 2012

1993 Northeast Regional Collegiate Soil Judging Contest Individual High Score - 10th Place

Proficient in following computer applications:

MS Excel
MS Word
MS Powerpoint
AutoCAD 2007
Corel Paint Shop Pro X
DraftSight
WebStudy Certified

SELECTED PUBLICATIONS:

Shuster, W., Burkman, C., Grosshans, J., Dadio, S., and Losco, R. (2015). **Green Residential Demolitions: Case Study of Vacant Land Reuse in Storm Water Management in Cleveland.** J. Constr. Eng. Manage., 141(3), 06014011. March 2015.

Shuster, W.D., Dadio, S. Drohan, P. Losco, R. and Shaffer, J. **Residential demolition and its impact on vacant lot hydrology: Implications for the management of stormwater and sewer system overflows.** Landscape and Urban Planning, Volume 125, May 2014, Pages 48–56

Helmke, M.F. and Losco, R.L. **Soil, Water and Human Health**, a chapter in **Soil and Human Health**, ed. E. Brevik & L. Burgess, 2013 published by CRC Press.

Barkasi, A., Dadio, S., Losco, R., and Shuster, W. (2012) **Urban Soils and Vacant Land As Stormwater Resources**. World Environmental and Water Resources Congress 2012: pp. 569-579. doi: 10.1061/9780784412312.061

D. Nikitina, L. Remizove, and R. Losco; **A Preliminary Investigation of the Soils and Geomorphology of a Portion of the Madre de Dios Region, Peru.** Soil Survey Horizons, Volume 52, Number 2, Summer 2011.

W.D. Shuster, A. Barkasi, P. Clark, S. Dadio, P. Drohan, T. Gerber, T. Houser, A. Kelty, R. Losco, K. Reinhold, J. Shaffer and J. Wander; **Moving Beyond the Udorthent, a Proposed Protocol for Surveying Urban Soils to Service Data Needs for Contemporary Urban Ecosystem Management** Soil Survey Horizons, Volume 52, Number 1, Spring 2011.

Losco, R.L., Whitman, C., Drohan, P. and Cronce, R.; **The Manual for Site Specific Soil Investigation in Pennsylvania.** September 19, 2010 A publication of the Pennsylvania Association of Professional Soil Scientists.

Losco, R.L., Stephens, W., and Helmke, M. F.; **Periglacial Features and Landforms in the Subsurface of the Delmarva Peninsula,** Southeastern Geology, Volume 47, No. 2, p. 85-94, May 2010.

Losco, R.L. and Helmke, M. F.; **Tillage-Enhanced Argillic Horizon Development in Piedmont Soils,** Soil Survey Horizons, Volume 51, Number 2, p. 53-55, Summer 2010.

Losco, R.L.; Soil Science and Martial Arts, Soil Survey Horizons, Volume 49, Number 4, Winter 2008.

Losco, R.L.; Soil Science on Vacation...Or Soil Science with a (Minor) Language Barrier Soil Survey Horizons, Volume 49, Number 3, Fall 2008.

Losco, R.L.; **Soil Science on Vacation – North to Alaska** Soil Survey Horizons, Volume 49, Number 2, Summer 2008.

Losco, R.L.; Soil Science on Vacation Soil Survey Horizons, Volume 48, Number 2, Summer 2007.

Losco, R.L.; Soil Science and Antique Houses or Where Have All the Albic Horizons Gone? Soil Survey Horizons, Volume 48, Number 1, Spring 2007.

Losco, R.L.; Soil Science and Antique Houses or Where Have All the Albic Horizons Gone? Pennsoils, Fall 2005.

Losco, R.L.; Losco, C.T.; Ibach, J.R. Jr.; and Green, A.A. A Report of Existing On-Lot Sewage Systems in Sadsbury Township, Chester County. 1996.

Kelly, J.C.; Losco, R.L.; Ibach, J.R. Official Sewage Facilities (Act 537) Plan for Upper Providence Township, Delaware County (Draft). 1993.

Kelly, J.C.; Sech, K.R.; Losco, R.L.; Morrison, L.B. Official Sewage Facilities (Act 537) Plan for Birmingham Township, Delaware County. 1991.

SELECTED PRESENTATIONS:

Losco, R.L. **Soil Science: A Brief Introduction to the Stuff Underfoot** Guest lecture at Bryn Mawr College March 26, 2015.

Losco, R.L. **Morphological Soil Investigations, A Guide for Sewage Enforcement Officers** PADEP Approved Training Course for Sewage Enforcement Officers ID# 110-00005, Presented 7 times to Sewage Enforcement Officers 2014-2016.

Losco, R.L. Biochar: An Ancient Solution To The New Problems of Climate Change and Food Security, Delaware County Community College STEM Speaker Series, November 26, 2013.

Losco, R.L., Kribbs, G., and Witouski, B. **Soil Science: Basic and Practical Field Methodologies and Applications,** Professional Development Course for the Pennsylvania Council of Professional Geologists, July 23, 2013 & June 20, 2014.

- Losco, R.L., Dadio, S. & Barkasi, A. **Urban Soil Survey to Facilitate Green Infrastructure to Alleviate Combined Sewer Overflows in Urban Settings,** Presentation to the 2013 Association for Environmental Studies & Sciences Meeting, June 19-22, 2013.
- Losco, R.L. and Dadio, S. **A Contrasting Study of Ohio Urban Soils Cleveland Vs. Cincinnati,** Poster Presentation to the 2012 Agronomy Society of America, Crop Science Society of America, Soil Science Society of America Meeting, October 22-24, 2012.
- S. Brown, S. Cannon, R. Losco and J. Sturniolo **The Good, the Bad and the Ugly A panel discussion on Stormwater Best Management Practices**, 20th Annual Pennsylvania Housing and Land Development Conference, Pennsylvania Housing Research Council, Penn State University, February 22, 2012.
- Field trainer at 2011 PAPSS Army Corps of Engineers Wetland Delineation Training Conference, June 27-28, 2011 at Raystown Lake, Huntingdon County, PA.
- R. Losco, **Determination of Seasonal High Water Tables.** A Webinar presented to the Soil Science Society of America, April 27, 2011.
- S. Dadio, A. Barkasi, R. Losco and W.D. Shuster; **Urban Soil Investigations for Ecosystem Management: Vacant Lots, Soils and the Sustainable Management of Stormwater.** Poster Presentation to the Brownfields 2011 Conference, Philadelphia, PA. April 3-5, 2011.
- Losco, R.L.; **Soil Evaluation for Effective Stormwater Infiltration and Management.** Educational Seminar presented to the Pennsylvania Society of Professional Engineers, September 24, 2010.
- Losco, R.L.; Critical Aspects of Stormwater Infiltration: Getting it Right From the Ground Up. Educational Seminar presented to the Adams County Conservation District, May 5, 2010.
- Losco, R.L.; Critical Aspects of Stormwater Infiltration: Getting it Right From the Ground Up. Educational Seminar presented to the Chester County Engineers, March 24, 2010.
- Losco, R.L.; Critical Aspects of Stormwater Infiltration: Starting From the Ground Up. Educational Seminar presented to the Pennsylvania Department of Environmental Protection and the Staffs of the County Conservation Districts of Southeastern Pennsylvania, December 10, 2009.
- Losco, R.L., Whitman, C., Drohan, P. and Cronce, R.; **A Manual for Site Specific Soil Investigation in Pennsylvania.** Poster Presentation to the 2009 Agronomy Society of America, Crop Science Society of America, Soil Science Society of America Meeting, November 3, 2009.
- Losco R. L. and Helmke, M. F.; **Drip Irrigation for On-Site Disposal of Wastewater in Serpentine Derived Soil.** Oral Presentation to the 2009 Agronomy Society of America, Crop Science Society of America, Soil Science Society of America Meeting, November 4, 2009.
- Helmke, M. F, Losco R. L. and Reed, A.M.; **Application of Soil Physics to Improve Efficiency of Ground-Source Heat Pumps in Fractured Saprolite.** Poster Presentation to the 2009 Agronomy Society of America, Crop Science Society of America, Soil Science Society of America Meeting, November 2, 2009.
- Losco, R.L.; Critical Aspects of Stormwater Infiltration: Getting it Right from the Start. Presentation to the 2009 Pennsylvania Stormwater Management Symposium, Villanova University, October 14, 2009.
- Losco, R.L.; **Perspectives From Another State Drip Irrigation Installations in Delaware**. Presentation to the 2009 Pennsylvania Association of Professional Soil Scientists Summer Technical Session, July 9, 2009.

Losco R. L. and Helmke, M. F.; **Tillage as a Mechanism for Enhancement of Clay Translocation and Argillic Horizon Development,** Oral Presentation to the 2008 Joint Geological Society of America, Agronomy Society of America, Crop Science Society of America, Soil Science Society of America, Gulf Coast Association of Geological Societies and Houston Geological Society Meeting, October 6, 2008.

Losco R. L., Helmke, M. F. and Stephens, W. J., Jr; Correlation of Redoximorphic Features with Seasonal Water Tables in the Coastal Plain of Delaware, Poster Presentation to the 2008 Joint Geological Society of America, Agronomy Society of America, Crop Science Society of America, Soil Science Society of America, Gulf Coast Association of Geological Societies and Houston Geological Society Meeting, October 7, 2008.

Stephens, W. J., Jr and Losco R. L.; Late Pliocene (?) Landforms in the Subsurface, Sussex County Delaware, Oral Presentation to the 2008 Joint Geological Society of America, Agronomy Society of America, Crop Science Society of America, Soil Science Society of America, Gulf Coast Association of Geological Societies and Houston Geological Society Meeting, October 8, 2008.

Field Trip 20, "New Frontiers of Soil Science" at 18th World Congress of Soil Science, co-presenter.

Losco, R.L.; Neiley, M.; **The Four Year Fill Fiasco or I Spent Four Years Waiting and All I Have to Show For It is This Pile of Dirt.** Presentation to the 2005 Pennsylvania Association of Sewage Enforcement Officers Conference. February 28, 2005. Re-presented as an instructional seminar to the Chester County Health Department, Bureau of Environmental Protection May 2, 2005.

Losco, R.L.; **The Sewage Enforcement Officer's Role in the Morphological Assessment Process**. Presentation to the 2004 Pennsylvania Association of Sewage Enforcement Officers Conference March 2, 2004.

Losco, R.L.; Valentine, J.A. **Stormwater Infiltration and the Soil-Landscape Connection**. Pennsylvania Stormwater Management Symposium, Villanova University. 2003.

Losco, R.L.: **Fear of Pressure Dosing**. Instructional seminar on evaluation of pressure-dosed sewage system designs presented to the Chester County Health Department, Bureau of Environmental Protection. June 5, 1996.

Losco, R.L. **Community On-Lot Sewage Disposal, Beyond the Written Regulations**. Presentation to Seventh Annual On-Site Sewage Treatment Conference, Penn State University, 2/15/93.

PERSONAL:

Married with two step-children and one grandchild

Nidan (Second Degree Black Belt) in Shotokan Karate

Hobbies: Fishing

Hiking

History & Archaeology

Member:

International Shotokan Karate Federation Chester County Shotokan Karate Club West Chester University Shotokan Karate Club

Co-Advisor of West Chester University Shotokan Karate Club

Curriculum Vitae

James D. Fisher, M.Sc. Soil Science, CPSS

P.O. Box 203 Birchrunville, PA 19421

fisher.soils@gmail.com

610-656-2936

SUMMARY

Accomplished soil scientist, pedologist, agronomist. Experienced field program officer and agricultural advisor with proficiency mapping soils and working in USAID programs. Experienced project manager of vineyard design, vineyard establishment, and vineyard management. Skilled communicator – both written and oral.

Currently holds Secret security clearance (USA).

Field experience in Afghanistan, Panamá, Ecuador, Brasíl, North America, Australia.

AGRIBUSINESS OVERVIEW

- Focus on agricultural value chain activities, soil conservation, and sustainable irrigation techniques.
- Language skills in order of increasing proficiency: Portuguese, French, Spanish.
- Agronomic and environmental consultation to viticulture, irrigation, forage, grains, livestock, cover-cropping, pomegranate, pistachio, almond, apricot, and general agriculture.
- International development focusing on environmentally sustainable methods.

ACADEMIC DEGREES

M.Sc., Soil science, University of Delaware B.Sc., Plant science, University of Delaware

PROFESSIONAL CERTIFICATIONS

- Certified Professional Soil Scientist, Certified Professional Agronomist, Certified Nutrient Consultant, Certified Pesticide Applicator, Certified Irrigation Evaluator, Cal-Poly Tech.
- Secret Security Clearance.
- Field training for Afghanistan: RS415, AR421, Civ-Mil RS510, FACT OT610, ADAPT

RESEARCH FIELDWORK

- Mornington Peninsula Vigneron Association, Victoria, Australia. Viticultural consultant and lead trainer in soil benchmark program.
- Kandahar Province, Afghanistan. Lead project designer of soil salinization assessment.
- Zhari District, Afghanistan. Developed low-volume / high-frequency irrigation management program to mitigate soil salinization, and improve crop production.
- IDIAP, Piriati, Panama, 2005. Participant in hydrogeology project providing fresh water to community of 700 people.
- Zapallo Grande Medical Center, Ecuador, 2002-2003. Participant in onchocerciasis research, location of the vector *Simuliides exiguum*.
- Yasuni Research Station, Amazon jungle, 2003. Participant in research of forest ecology and ethnobotany.
- Research cruise with USNS H.H. Hess, OCUNIT 6, Merchant Seaman, US Merchant Marines, 1988.

James D. Fisher, M.Sc. Soil Science, CPSS

PROFESSIONAL EXPERIENCE

2015:

Soil Scientist / Agronomist: Soil Solutions, LLC - Malvern PA

• Viticultural pedologist, soil mapping, agronomic consultant.

2014:

Viticultural consultant: MPVA - Victoria, Australia

• Lead trainer in soil benchmark program. Viticultural consultation to 42 individual vineyards.

2012-2013:

Agricultural advisor: USDA-FAS-OFSO, Washington, DC

- Agricultural advisor in Zhari District, Kandahar Province, Afghanistan.
- Developed sustainable irrigation methodologies to mitigate the effects of soil salinization, crop loss, and desertification.
- Developed counternarcotics program by promoting cultivation of licit crops, improving productivity, and enhancing associated ag value chains.
- Provided technical expertise to entire Southern Regional Platform (pomegranate, livestock, vineyard, irrigation, pistachio, agricultural value chain operations, post-harvest processing, livelihood augmentation, and general agriculture).
- Skilled communicator (written and oral). Experience working extensively with USAID programs, proficiency with reporting, monitoring, and evaluation.

2005-2012:

Soil Scientist / Agronomist: Soil Solutions, LLC - Malvern PA

- Viticultural consultant specializing in pedology, soil chemistry, irrigation, soil biology, soil physics, hydrogeology, geospatial mapping via electromagnetic induction (EMI), integrated pest management, crop quality, soil potential index.
- Client base in California, Washington, New York, Maryland, Pennsylvania

Soil Consultant, Self-employed

Specializing in pedology, forensic agronomy, fertility programs, irrigation design.

2002-2003:

2003-2005:

Field researcher, Amazon Forest and Zapallo Grande Medical Center

• Conducted field research locating nesting sites of *Simuliides exiguum*, vector for onchocerciasis.

AWARDS

- Non-Article 5 NATO Medal for civilian service for ISAF Operations
- Certificate of excellence from Afghanistan Regional Platform South
- Medal of excellence from 3rd BAT, 41st ID, OEF 2013, for Civ-Mil collaboration on agricultural development and counternarcotics programs
- Medal of excellence USDA soil salinization project southern Afghanistan

James D. Fisher, M.Sc. Soil Science, CPSS

INDUSTRY HIGHLIGHTS

November 4, 2013: Presented an oral presentation at the SSSA annual meeting in Tampa, FL, entitled "Promoting Food Security and Environmental Quality in Afghanistan;" and a research poster entitled "Uniting cross-cutting objectives with capacity-building in Afghanistan" – both of which depicted the use of sound soil science as a foundational tool in capacity building. October 17-19, 2011: Presented research entitled "Using NASA Data for Viticulture: Measuring *Terroir* from Space" at NASA's presentation in the Crop Science Society of America's annual meetings in San Antonio, TX, highlighting remote sensing techniques which are both rapid and effective in viticultural site selection.

February 23, 2011: Presented research entitled "Mapping Vineyard *Terroir*" to a joint meeting of Maryland Association of Professional Soil Scientists (MAPSS) and Maryland Wineries Association (MWA), highlighting soil mapping techniques which are both rapid and effective in viticultural site selection.

November 4, 2010: Presented research entitled "Pedogenetic Indicators of *Terroir*" at the Soil Science Society of America annual meeting at Long Beach, CA.

August 6, 2010: Presented research "Geospatial mapping of vineyard soils via electromagnetic induction and scaling of terroir" at the 19th World Congress of Soil Science, Brisbane, Australia. April 15, 2010: Presented in session entitled "Sustainable wine: Carbon neutrality, organic, biodynamic production and *terroir*" to American Association of Geographers, entitled "Assessing vineyard *terroir* via geospatial mapping"

November 19, 2009: Leading speaker at <u>Congressional Soils Caucus</u> briefing, entitled "Pedogenesis & *Terroir*," addressing the issues of winegrowing to 500 Congressional staff members in the Gold Room at Rayburn House Office Building, Washington, D.C. November 4, 2009: Two (2) oral presentations to Soil Science Society of America (SSSA) annual meeting in Pittsburgh PA, entitled "Orogeny and Pedogenesis of Southeastern Pennsylvania Viticultural *Terroir*" and "*Terroir* of Southeastern Pennsylvania Viticulture: An Analytical Hierarchy in a Udic Soil Moisture Regime", and poster presentation "Electromagnetic induction (EMI) methods for Geospatial Mapping of Vineyard Soils".

January 15, 2009: Oral presentations in educational seminar hosted by Penn State University Viticultural Program, co-hosted by Cornell University Dept. of Viticulture at the annual Pennsylvania Association of Winegrowers (PAW) meeting, entitled "Soil Chemistry in Viticulture" (A case study using adjustments of soil chemistry to initiate chemical reaction mechanisms favorable to the deprotonation of previously unavailable nutrients.), and "Hydrogeology in Viticulture" (A discussion of hydrologic flux within the soil-plant-atmospheric continuum using a mathematical treatment to illustrate the association of solar flux and soil water flux.)

July 1998: Authored article on equine nutrition published in national publication: <u>Rocky Mountain Horse</u> entitled, "Equine Nutrition."

ACTIVITIES & HOBBIES

 Horsemanship, Kitesurfing, Cooking, Snowkiting, Rock climbing ("trad-style" leadclimber), Paragliding (advanced P-4 paragliding license), SCUBA (open-water certification), Watercolors, Rugby (University of Delaware Rugby Club, USARUsanctioned Brandywine Rugby), Sailing, Gardening, Fitness, Fishing, Nature hiking.

James D. Fisher, M.Sc. Soil Science, CPSS

REFERENCES

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John C. Roberts, LSS

Soil Scientist

General Qualifications

Education

M.S., Soil Science, North Carolina State University, 2005 B.S., Natural Resources - Soil Science, North Carolina State University, 2001

Licenses/Certifications/Affiliations

North Carolina Licensed Soil Scientist #1292

South Carolina Professional Soil Classifier #97

NCDWR/NCSU Surface Water Identification and Training Class (SWITC) version 4.11. 06/2012 Stormwater BMP Inspection & Maintenance Certification (NCSU Biological & Ag. Engineering) 05/2012

NCDOT/NCSU Level I: Certified Erosion and Sediment Control/Stormwater Installer 06/2013
NCDOT/NCSU Level II: Certified Erosion and Sediment Control/Stormwater Site Manager 06/2013

Previous Work History

09/10-Present. Soil Scientist, The Catena Group/Three Oaks Engineering, Hillsborough, NC 04/10 – 09/10 Research Technician, NC Department of Agriculture – Agronomics Division. Raleigh, NC 07/05 – 4/10. Soil Scientist, Hal Owen & Associates, Inc. – Soil and Environmental Scientists. Lillington, NC

7/02-5/15. Research Assistant, North Carolina State University. Raleigh, NC

Experience & Qualifications

John is a Licensed Soil Scientist/Project Manager for Three Oaks Engineering. His primary duties include managing soil and site investigations using knowledge in soil classification and morphology throughout the mountain, piedmont and coastal plain regions of North Carolina. His soil investigation experience includes determining suitable areas for surface/subsurface wastewater systems, stormwater structures, wetland delineations and hydric soil determinations. John is proficient in interpreting soil and landscape relationships crucial for creating detailed soil suitability maps. He is experienced in designing and permitting on-site septic systems and performing saturated hydraulic conductivity tests. He is also knowledgeable in Nutrient Management Planning and is certified for NuMASS software and the Phosphorus Loss Assessment Tool.

Project Experience

Midlands Tract - Soil & Site Evaluation, Cabarrus County, North Carolina. Served as Project Manager; conducted a detailed Soil & Site Evaluation on the 640+ acre project site to map soil units suitable for subsurface wastewater disposal.



Elm City Wastewater Treatment Plant - Receiving Fields, Elm City, Nash and Wilson Counties, North Carolina. Served as Project Manager; conducted a detailed Soil & Site Evaluation on 250+ acres of the existing wastewater receiving fields and potential expansion fields; collected soil data (physical and chemical) to determine appropriate wastewater application rates and cover crops.

Shepherds Tree Mitigation Site - Hydric Soil Delineation and Classification, Iredell County, North Carolina. Served as Project Manager, delineated hydric soil units within 160+ acres of an existing wetland mitigation site in the close-out in order to more accurately determine mitigation credits; created a site specific hydric soil indicator using onsite groundwater gage data and soil characteristics.



Michael G. Wood, LSS

Principal and Soil Scientist

General Qualifications

Education

M.S. Soil Science, 1996, University of Rhode Island at Kingston B.S. Recreation Management, 1986, University of Vermont

Licenses/Certifications/Affiliations

North Carolina Licensed Soil Scientist #1219

North Carolina Freshwater Mussel Survey and Collection Permit - NC-2011 ES 34

USACE Wetland Delineation Training

Soil Science Society of North Carolina

National Society for Consulting Soil Scientists

Michael is a principal and soil scientist at Three Oaks Engineering, with over 20 years experience working in both the public and private sector. He worked for the North Carolina Division of Coastal Management and the North Carolina Department of Transportation before founding The Catena Group. At Three Oaks Engineering, Michael's responsibilities include environmental permitting, wetland delineation and mitigation, evaluation of hydric soils, detailed soil mapping and interpretation, groundwater modeling, threatened and endangered species surveys (Permit NC-2010 ES 34), as well as project oversight/compliance. A former permit coordinator for NCDOT, Michael has garnered every type of roadway permit, including federal 404 permits, state 401 certifications, and CAMA Major Permits. As project manager, he has demonstrated the ability to work with both regulatory personnel and project designers on methods to avoid and minimize impacts to significant natural areas while still meeting the purpose and needs of the project. Michael has taken projects from the early design phase to final submission of permit applications and provided environmental monitoring throughout construction to ensure compliance with project commitments and permit conditions. He is well versed in the NEPA Merger Process, as well as the unique challenges posed by Design-Build projects.

Project Experience

USACE Regional Supplement – Eastern Mountains and Piedmont Region.

Michael Wood of Three Oaks was selected by the U.S. Army Corps of Engineers (USACE) to be part of the part of the peer review team for the Regional Supplement to the Corps of Engineers Wetland Delineation Manual. The supplement is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland delineation procedures. Michael was selected particularly for his years of experience in wetland delineations combined with his knowledge of soils with regards to wetland delineations, especially problem wetland sites.



Monroe Bypass: 22-miles of new location in Union County, North Carolina. North Carolina Department of Transportation. Michael performed the wetland and stream delineations on approximately half the project (11 miles), and obtained necessary environmental permits and monitored compliance during the development and construction of a new toll road extending from Mecklenburg County to Union County; provided assistance to federal and state agencies during permit reviews and modifications.

Mitigation Site Monitoring, Throughout North Carolina. *North Carolina Department of Mitigation Services.* Provided yearly vegetation and hydrologic monitoring of multiple DMS (formerly Ecosystem Enhancement Program) stream and wetland mitigation sites. Work included development of recommendations to enhance/improve site performance relative to compliance success criteria.

White Irisette Soil Mapping, Polk County, North Carolina. North Carolina Department of Transportation. In an effort to find appropriate relocation sites for the federally Endangered white irisette (Sisyrinchium dichotomum) due to a roadway project, Michael investigated, mapped, and rated over 80 acres. Each site was rated based upon soil texture, horizon depths, and parent material.

Previous Work History

08/96 – 08/01 North Carolina Department of Transportation, Environmental Specialist, Soils

Rover

03/95 – 08/96 North Carolina Division of Coastal Management, Soil Scientist

Stephen G. Carpenter

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Provide Consulting Services on Soil and Soil-related Issues for Industry, Forestry, and Agriculture

Education

May 1977 | BS West Virginia University, College of Agriculture and Forestry May 1999 | MS West Virginia University, Eberly College, Division of Geology and Geography

Experience

June 1977 - January 2011 | Soil Scientist
U.S. Department of Agriculture | Natural Resources Conservation Service

January 2011 - Present | Soil Scientist

The Nicholas Putnam Group, LLC

Positions held: Field Soil Scientist, Survey Project Leader, GIS Specialist, State Soil Scientist, MLRA Regional Staff Leader/Technical Staff Supervisor

Skills and Affiliations

- Detailed Soil Mapping
- Soil Interpretation for Agriculture and Industry
- Soil Classification and Genesis
- Forest Soils
- Geomorphology
- Soil Monolith Extraction and Finishing
- GIS and Remote Sensing
- American Society of Agronomy and Soil Science Society of America Affiliate

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Education

May 1969 – BS Soil Science West Virginia University, College of Agriculture and Forestry

May 1975 – MS Soil Genesis and Classification, West Virginia University, College of Agriculture and

Forestry

Experience

May 1968 to December 2011 – Soil Scientist U.S. Department of Agriculture – Natural Resources Conservation Service

December 2011 to Present –Soil Scientist The Nicholas Putnam Group, LLC

<u>Positions Held</u> – Field Soil Scientist, Survey Project Leader, Assistant State Soil Scientist, Supervisor Map Compilation and Finishing Unit

Skills

- Detailed Soil Mapping
- Soil Interpretation for Agriculture and Industry
- Soil Genesis and Classification
- Forest Soils
- Geomorphology
- Soil Forensics
- GIS and Remote Sensing
- Soil Geography
- Soil Monolith Extraction and Finishing
- Soil Map Compilation and Finishing
- Technical Staff Supervision

Attachment 3 Laboratory Methodologies



Laboratory Procedures



Virginia Tech Soil Testing Laboratory

Rory O. Maguire, Extension Nutrient Management Specialist, Virginia Tech Steven E. Heckendorn, Manager, Soil Testing Laboratory, Virginia Tech

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Virginia Cooperative Extension





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Introduction

Most of the procedures for soil analysis used in the Soil Testing Laboratory were established in the early 1950s*. Although the chemical principles have not changed, procedures have been revised over the years to utilize advances in instrumentation which allow more accurate and rapid chemical determinations.

A routine test, consisting of eleven analyses, is performed on all samples. In addition, two separate tests are offered on a request basis. These tests are applicable only under certain conditions for which research and calibration work has been conducted. The routine and special tests consist of the following:

Routine Test

soil/water pH (WpH) buffer index/ pH (BpH) phosphorus (P) potassium (K) calcium (Ca) magnesium (Mg) zinc (Zn) manganese (Mn) copper (Cu) iron (Fe) boron (B)

Special Tests soluble salts organic matter

*Rich, C.I., 1955. Rapid soil testing procedures used at Virginia Polytechnic Institute. Virginia Agriculture Experiment Station. Bull. 475, p. 8.

Sample Preparation

Soil samples arrive in 1/2-pint cardboard cartons. Generally, Soil Sample Information Sheets (SSIS) are packaged with the samples. The cartons are opened in a separate preparation area and placed in drying trays. Twenty-eight unknown samples plus two control samples are placed in each drying tray. The two control samples are one known internal reference sample and either a blank or replicate sample. At this time, each sample is assigned a laboratory number which, along with the year, is stamped on the SSIS. The samples are numbered consecutively each calendar year, beginning with 1 on January 1.

The trays of samples are placed in a cross-flow forcedair drying cabinet through which room-temperature filtered air is drawn. The air can be heated 5° to 8°C above the ambient temperature for drying extremely wet samples. Samples remain in the drying cabinet overnight or until air dry.

Air-dried (at 20° to 40°C) samples are crushed with a stainless steel hammer mill-type crushing machine and passed through a 10-mesh (2-mm opening) stainless steel sieve. The samples are then returned to the original sample boxes until the various subsamples are measured out.

Water pH (WpH) Determination

Buffer Solutions: Color-coded buffer solutions of pH 4.0, 7.0, and 10.0 are purchased from commercial sources.

Electrode Internal Filling Solution: Use Thermo Orion's 3 M KCl, (with <u>no</u> silver), RossTM Sure-Flow[®] Internal Filling Solution, Cat. No. 810007.

Procedure:

Daily, do a two-point calibration of the pH meter using fresh buffer solutions of pH 4 and 7, and ensure the calibration before starting every batch of samples.

Scoop 10 cm³ of soil from the prepared sample into a 50-ml beaker. With an automatic pipetting machine add 10 ml of distilled water for a 1:1 (vol/vol) ratio. Thoroughly mix the solution with a glass/plastic rod or mechanical stirrer and allow it to sit for a minimum of 10 minutes and a maximum of 2 hours.

The automated pH analyzer is set to stir solutions for a 5-second equilibration delay before starting to take pH readings. It then continues to stir the soil suspension while the software waits for 10 readings to be stable within 0.02 pH units. Probes are automatically washed after a pH reading greater than 8.0 or less than 4.0. Readings are electronically recorded to the 0.01 pH unit. The pH readings of quality-control soil samples are manually checked before uploading the sample data to verify that they are within current expected values.

Notes:

- For fine-textured soils containing a high level of organic matter, it may be necessary to add an additional 10 ml of distilled water to make a suspension.
- The TPS pH meter has a temperature sensor for automatic temperature compensation (ATC). This ATC probe should sit in a flask of ambient temperature water within the LabFit pH Analyser next to the soil samples being measured.
- If a pH probe's reading becomes sluggish, unstable, or not reproducible (possibly indicating that the liquid reference junction has become clogged), depress the electrode's top cap to flush the junction.

Buffer Index/ pH (BpH) Determination

Mehlich Buffer Preparation:

Using a 4-liter volumetric flask, add:

~ 2 liters of distilled water (DW);

10 ml of glacial acetic acid, CH3COOH, 99.5%, 17.4N;

39 ml of 50% triethanolamine (1 TEA: 1 DW);

72.0 g of sodium glycerophosphate, hydrate, $C_3H_5(OH)_2PO_4Na_2\cdot xH_2O$, FW=216.04(anhy.); or 1,2,3-Propanetiol mono (dihydrogen phosphate) disodium salt, (HOCH₂)₂CHOPO₃Na₂; or Glycerol phosphate Disodium salt Hydrate, $C_3H_7O_6PNa_2$, CAS #: 154804-51-0 or 1555-56-2 for alpha structure {Gallard-Schlesinger's 50 kg GSODGLYERO via Doe & Ingalls, or City Chemical's 2.5 kg S8040, or Sigma's 1 kg G 6501};

172.0 g of ammonium chloride (NH₄Cl);

48.0 g of calcium chloride dihydrate (CaCl₂· 2H₂O); {or alternatively use 80.0 g BaCl₂· 2H₂O}.

Stir using a stir-bar and stir-plate until all salts are dissolved and allow the solution to warm up to room tempera-

Bring to the 4-liter volume with distilled water.

Adjust to pH 6.60 ± 0.04 when diluted 1:1 with distilled water. Use drops of acetic acid to lower the pH or drops of 1:1 aqueous TEA to raise the pH.

Use an acid standard to check the preparation of the buffer mixture as follows: combine 10 ml of buffer, 10 ml of distilled water, and 10 ml of commercially prepared 0.05N HCl solution. This mixture should drop the initial buffer pH by 1.40±0.1 units. If the pH is not within these limits, check the preparation of the buffer reagent to make certain that all ingredients were added properly.

Make only what will be needed for a week to prevent microbial growth in storage. When calcium chloride is used instead of barium chloride, containers and dispensers may need to be disinfected with dilute (10%) chlorine bleach (sodium hypochlorite) between batches of solution. Rinse very well with distilled water.

Procedure:

On samples with a WpH \leq 6.94, add 10 \pm 0.2 ml of the Mehlich buffer solution using the 1:1 (vol/vol) soil-water mix from the water pH determination. Thoroughly mix the solution with a glass/plastic rod and allow it to sit for a minimum of 30 minutes. Stir the solution again immediately before reading and while the pH probe is equilibrating in the soil suspension. Record the first stable pH reading to the nearest 0.01 unit. Verify calibration of pH electrodes before measuring buffer pH's. Check the pH of the buffer solution on the daily blank sample. A rise in its pH indicates fungal growth in the buffer.

Determination of P, K, Ca, Mg, Zn, Mn, Cu, Fe, B, and Al Extracting Solution (Mehlich 1, 0.05N HCl in 0.025N H₂SO₄):

Measure approximately 15 liters of distilled water into a 20-liter plastic container. Add 14.0 ml of concentrated sulfuric acid (H_2SO_4), 82.0 ml of concentrated hydrochloric acid (HCl), and distilled water to make a 20-liter volume and mix thoroughly.

Extraction Procedure:

Measure one 4-cm³ scoop of prepared soil into a 60-ml straight-walled plastic extracting beaker, and add 20 ml of the Mehlich 1 extracting solution with an automatic pipetting machine. The samples are shaken on a reciprocating shaker with a stroke length of 3.8 cm for 5 minutes at 180 oscillations per minute and filtered through Whatman No. 2 (or equivalent), 11-cm filter paper soon after the shaking stops.

Analysis Procedure:

All elements are analyzed in the same extract by an ICP (inductively coupled plasma atomic emission spectrometer). Transfer filtrate from the extraction beaker to an ICP autosampler cup by using a disposable polyethylene pipette. The transfer is a two-step procedure with the first aliquot being a rinse and the second aliquot for the actual transfer. Pipette 4 ml of filtrate and discard into a waste beaker. Pipette another 4 ml of the same filtrate into the autosampler rack's polystyrene sample cups.

Once all sample filtrates have been transferred, cover the autosampler rack with plastic wrap to prevent air-borne contaminants (dust, lint, etc.) from getting into the solutions. This is important to prevent ICP nebulizer clogging and contamination.

Samples may be stored overnight by covering them with plastic wrap, parafilm, or capping and placing them in a refrigerator. After refrigeration, allow the samples to equilibrate to room temperature before ICP analysis.

Elemental Analysis by ICP:

An ICP instrument, equipped with an autosampler, is set up to analyze 30 samples for 10 elements in about 20 minutes. Each sample has a 24 second preflush with a 10 second integration time to read the element and background spectral lines, and there is approximately a 10 second rinse that mainly occurs during the integration time. A quality control solution is read and verified after every tray of 30 samples.

ICP Working Standards:

The ICP is calibrated with the following series of standards (Note: atomic absorption standards are not sufficiently pure for ICP standards; use only spectrally pure, plasma-quality standards).

Soil #1: Final solution concentration: 0.05 N HCl and 0.025 N H₂SO₄.

Use the Mehlich 1 (M1) extracting solution or to approximately 250 ml of deionized water in a half-liter volumetric flask, add 2 ml of concentrated reagent grade HCl, and 0.35 ml of concentrated reagent grade H₂SO₄, dilute to volume with deionized water and mix well.

Soil #2: Final elemental concentration in solution: 30 µg ml⁻¹ P, 2 µg ml⁻¹ Zn, 2 µg ml⁻¹ B.

To approximately 250 ml of M1 extracting solution in a half-liter volumetric flask, add 15 ml of 1000 μg ml⁻¹ P calibration standard, 1 ml of 1000 μg ml⁻¹ Zn calibration standard, 1 ml of 1000 μg ml⁻¹ B calibration standard and dilute to volume with extracting solution and mix.

Soil #3: Final elemental concentration in solution: 300 μg ml⁻¹ Ca, 100 μg ml⁻¹ K, 50 μg ml⁻¹ Mg, 10 μg ml⁻¹ Al, 10 μg ml⁻¹ Mn.

Add to a half-liter volumetric flask with approximately 250 ml of M1 extracting solution 15 ml of 10,000 μg ml⁻¹ Ca calibration standard, 5 ml of 10,000 μg ml⁻¹ K calibration standard, 2.5 ml of 10,000 μg ml⁻¹ Mg calibration standard, 5 ml of 1,000 μg ml⁻¹ Al calibration standard, and 5 ml of 1000 μg ml⁻¹ Mn calibration standard; dilute to volume with extracting solution and mix.

Soil #4: Final elemental concentration in solution: 10 μg ml⁻¹ Cu, 25 μg ml⁻¹ Fe.

Add to a half-liter volumetric flask with approximately 250 ml of M1 extracting solution 5 ml of 1000 μ g ml⁻¹ Cu calibration standard and 12.5 ml of 1000 μ g ml⁻¹ Fe calibration standard; dilute to volume with extracting solution and mix.

ICP Quality Control Standard:

The quality control solution is prepared with spectrally pure, ICP-quality, calibration stock solutions. (Note: For the elements P, K, Ca, and Mg, use standard stock solutions from a manufacturing source other than the one used to prepare the working standards.) Add to a half-liter volumetric flask with approximately 250 ml of Mehlich 1 extracting solution the following amounts of each stock solution then dilute to volume with extracting solution and mix well:

Element	Final Concentration (μg ml ⁻¹)	High Purity Reference Solution
Р	10	5 ml of 1,000 μg ml ⁻¹
K	30	1.5 ml of 10,000 µg ml ⁻¹
Ca	200	10 ml of 10,000 μg ml ⁻¹
Mg	20	1 ml of 10,000 µg ml ⁻¹
Zn	1	0.5 ml of 1,000 μg ml ⁻¹
Mn	1	0.5 ml of 1,000 μg ml ⁻¹
Cu	1	0.5 ml of 1,000 μg ml ⁻¹
Fe	5	2.5 ml of 1,000 μg ml ⁻¹
В	1	0.5 ml of 1,000 μg ml ⁻¹

Calculation of Elemental Concentrations:

To convert from ppm (wt. basis) to lbs/acre the equation is: ppm in soil x 2 = lbs/acre where weight of an acre furrow slice (6 2/3-inch depth) is assumed to be 2 million pounds.

Estimation of CEC by Summation

Theory:

The Cation Exchange Capacity (CEC) can be reasonably estimated by summation of the Mehlich 1 extractable bases, or non-acid generating cations (Ca, Mg and K), plus the acidity estimated from the Mehlich soil-buffer pH after conversion of all analytical results to meq/100 cm³ or cmol(+)/kg.

This calculated method is closer to an Effective CEC, which is measured at the present pH of the soil, than it is to the soil's potential CEC, which is measured in solutions buffered at pH 7.0 or higher.

This method is inappropriate for soils with a high soluble salts level or for alkaline soils because these soils may be over-fertilized, calcareous, gypsiferous, or relatively unweathered and could result in an erroneously high CEC value by the release of nonexchangeable cations.

Calculation:

```
Estimated Soil CEC = Acidity + Ca + Mg + K (in the units of meq/100 \text{ g} soil or cmol/kg)
```

```
Acidity (meq/100 g of soil) = 37.94 - (5.928 \times BpH) where BpH = Mehlich soil-buffer pH reading for an individual soil sample.
```

```
meq Ca/100 g = lb Ca per Acre \div 401
meq Mg/100 g = lb Mg per Acre \div 243
meq K/100 g = lb K per Acre \div 782
```

Sodium is not included in the equations since it is not routinely determined in the Mehlich 1 extract in routine analysis. Since exchangeable Na is usually at a very low concentration, its omission is not considered to be a cause of error in the calculated CEC. If sodium was included , then the calculation would be meq Na/100 g = lb Na per Acre \div 460.

The commonly used unit of $\frac{100}{g}$ is equivalent to the SI accepted unit of cmol/kg. $1 \frac{100}{g} = 1 \frac{1}{g}$

Soluble Salts

Conductivity Standard:

Use a commercially prepared NIST traceable conductivity standard of 1,000 or 1,420 µsiemens/cm.

or

Prepare potassium chloride standard solution (0.01 N KCl): Dissolve 0.7456 g of potassium chloride (KCl) in deionized water in a 1-liter volumetric flask. Mix well and dilute to volume. The conductivity of this solution at 25°C is 1,412 µsiemens/cm.

Procedure:

Measure one 20-cm³ scoop of prepared soil into a 50-ml beaker, add 40 ml of distilled water for a soil:water ratio of 1:2 (vol/vol). Include at least one internal soil reference ("test") sample per batch of unknown soil samples. Stir the solution and allow the suspension to settle for at least 1 hour. Check the conductivity meter's calibration against the conductivity standard. At 25°C, the standard has an electrical conductivity of 1.00 or 1.41 mmho/cm (or mS/cm). Set the meter in the Temperature Compensation Conductivity mode, and cell constant (C) to 1.00/cm. The electrical conductivity (EC) of the supernatant liquid of the soil-water solution is determined with the meter set on the μS/cm scale. Use the bulb to draw the supernatant into the cell. Dispose of this aliquot into a waste beaker. Draw a second aliquot of the sample into the cell and when the meter stabilizes, record the EC as one tenth of the meter's reading, (move the decimal one place to the left on the meter's display), in order to give the results in mhos x 10⁻⁵ units. The ppm soluble salts in the soil are calculated from the following equation:

ppm soluble salts in soil = EC x
$$6.4 \times 2$$

In this equation, EC represents the conductivity reading in mhos x 10⁻⁵, 6.4 is the factor for converting the conductivity measurement to ppm soluble salts, and 2 represents the water volume dilution factor. Report as ppm soluble salts in soil.

Useful Equations:

```
EC (mho x 10<sup>-5</sup>/cm) / 100 = mmho/cm
ppm (mg salt/liter) / 1280 = mmho/cm
0.1 S/m = 1 dS/m = 1 mS/cm = 1 mmho/cm
```

Resistance of a solution is the reciprocal of the electrical conductivity; therefore,

$$0.1 \mu mho = 10.0 Mohm.$$

Soil Organic Matter (SOM) by Walkley-Black (WB)

Reagent A: Sodium dichromate solution (0.67M): Dissolve 500 g of reagent grade sodium dichromate (Na₂Cr₂O₇

• 2H₂O) in tap water to a volume of 2 1/2 liters.

Reagent B: Concentrated reagent grade sulfuric acid (H₂SO₄).

Procedure:

The procedure is a modified Walkley-Black method. Measure one 1.5-cm³ scoop of prepared soil into a 200-ml test tube. Under a hood, add 20 ml of Reagent A to the soil followed by 20 ml of Reagent B. Allow the solution to cool at least 40 minutes. After cooling, add 100 ml of tap water, mix the solution, and allow to stand overnight (or at least 8 hours). After incubation, withdraw an aliquot of the supernatant using a syringe-type pipette and transfer it to a colorimeter vial. Take readings using a colorimeter set to a 645 nm wavelength. The percentage of organic matter is determined by reference to the following table.

Colorimeter readings and percent organic matter.

Colorimeter Reading	Organic Matter, %	Colorimeter Reading	Organic Matter, %	Colorimeter Reading	Organic Matter, %
100	0.0	56	2.6	30	6.4
99-95	0.1	55	2.7	29	6.6
94-91	0.2	54	2.8	28	6.8
90-88	0.3	53	2.9	27	7.0
87-86	0.4	52	3.0	26	7.2
85	0.5	51	3.1	25	7.4
84-83	0.6	50	3.2	24	7.6
82	0.7	49	3.3	23	7.8
81-80	0.8	48	3.4	22	8.0
79	0.9	47	3.5	21	8.3
78-77	1.0	46	3.6	20	8.7
76	1.1	45	3.7	19	9.0
75-74	1.2	44	3.8	18	9.4
73	1.3	43	3.9	17	9.7
72-71	1.4	42	4.0	16	10.1
70	1.5	41	4.2	15	10.4
69-68	1.6	40	4.4	14	10.8
67	1.7	39	4.6	13	11.1
66-65	1.8	38	4.8	12	11.5
64	1.9	37	5.0	11	11.8
63-62	2.0	36	5.2	10	12.2
61	2.1	35	5.4	9	12.5
60	2.2	34	5.6	8	13.0
59	2.3	33	5.8	7	13.5
58	2.4	32	6.0	6	14.0
57	2.5	31	6.2	5-1	15.0

Soil Organic Matter (SOM) by Weight Loss On Ignition (LOI) Procedure:

Tare balance and weigh 50-mL beakers. Scoop 5 cm³ of air-dried, 2-mm sieved soil into a beaker. Dry for a minimum of two hours at 150°C ±5°C. Maintain at 100°C until weighing. Record the weight of the beaker plus the warm soil sample to ±1 mg. Heat at 360°C for two hours after the temperature reaches 360°C ±5°C. Cool to 105°C and maintain at 105°C until weighing. Weigh the beaker and warm ash in a draft-free environment to ±1 mg. Calculate and report %LOI as percent organic matter to the nearest tenth of a percent.

Calculations:

Dried Soil (Soil_d) = (Wt of Beaker + Wt of Soil at 150°C) - Wt of Beaker

Ashed Soil (Soil_a) = (Wt of Beaker + Wt of Soil at 360° C) - Wt of Beaker

Percent weight loss on ignition (%LOI):

$$LOI (\%) = \frac{Soil_{d} - Soil_{a}}{oil_{d} - S} \times 100$$

Note:

The LOI (a gravimetric, dry oxidation) method is used to estimate the soil organic matter content for all samples except for those coming from commercial farmland in the Piedmont counties of Virginia. The Walkley-Black (a wet, chemical oxidation) method is used in those cases, due to the presence of gibbsite ($Al_2O_3 \cdot 3H_2O$) in the clay fraction of soil material in that area of the state. Gibbsite has been reported to lose substantial amounts of water at around 300°C.

Instruments for Soil Analyses

Analysis	Instrument
Soil Drying	Cross-flow forced-air soil drying cabinet, developed at Virginia Tech
Soil Grinding	Agvise soil grinder
pH Auto-analyzer	LabFit Pty Ltd, model AS-3000 Automated Dual pH Analyser
pH Meter	TPS Pty Ltd, model WP-80D, Dual pH-mV and temp. meter
pH Electrode	Thermo Orion model 8165BNWP, Ross™ combination pH electrode, Sure-Flow®, with epoxy body and BNC connector
Nutrient Extraction	Eberbach Reciprocating, Variable Speed Shaker No. 6000
Elemental Analysis of P, K, Ca, Mg, Zn, Mn, Cu, Fe, B & Al	ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectrometer), CirOS VISION model with a SOP (radial) view of the plasma, made by Spectro Analytical Instruments and equipped with a CETAC ASX520-HS autosampler.
Soluble Salts	YSI 3100 Conductivity Instrument with a YSI 3254 Pyrex 5-ml Fill Cell
Organic Matter - WB	Thermo Scientific Genesys 20 Colorimete
Organic Matter – LOI	Blue M Electric High Temperature (up to 704°C), Ultra-Temp, forced-air drying oven, model CW-6680F, with Pro 550 microprocessor-based controller.
Organic Matter – LOI	PG503-SDR Mettler Toledo (MT) analytical balance controlled by MT's BalanceLink software (v2.20).

ICP Parameters

The ICP is housed in an instrument room maintained at 21° C (70° F) \pm 1°C (2° F). Extreme swings in both temperature and humidity can affect the analytical results. Solutions are introduced to a cross flow nebulizer and Scott spray chamber with a peristaltic pump.

The following analytical lines are used:

Element	Wavelength (nm)
Р	178.287
K	766.491
Са	373.690
Mg	279.079
Zn	213.856
Mn	257.610
Cu	324.754
Fe	259.940
В	249.678
Al	308.215

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SOP Title: Volatile (or Fixed) Solids

04-VS

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1 Scope and Application

1.1 This method is for the determination of volatile solids on solids and waters and also volatile suspended solids. Volatile solids, when measured in mg, is the weight of material combustible at 550°C.

Applicable matrices include drinking, surface, and saline waters, domestic and industrial wastes, as well as soils, sludges, solid waste samples, river and lake sediments, and sludge cakes.

- 1.2 This method is adapted from the U.S. EPA Method 160.4 1971, "Residue, Volatile (Gravimetric, Ignition at 550°C)", Standard Methods for the Examination of Water and Wastewater Method 2540E 2011, "Fixed and Volatile Solids Ignited at 550°C," and 2540G 2011, "Total, Fixed and Volatile Solids in Solid and Semisolid Samples."
- 1.3 This document states the laboratory's policies and procedures established in order to meet the requirements of all certifications/accreditations currently held by the laboratory, including the most current standards in effect for the National Environmental Laboratory Accreditation Program (NELAP).
- 1.4 Individual project requirements may override criteria listed in this SOP.

2 Summary of Method

- 2.1 The residue obtained from the determination of TDS, TS, or TSS is ignited at 550°C in a muffle furnace. The loss of weight on ignition is reported as volatile residue. Volatile residue is a combination of organic matter and volatile inorganic salts
- 2.2 The remaining solids represent the fixed total, dissolved, or suspended solids. The determination is useful in control of wastewater treatment plant operation because it offers a rough approximation of the amount of organic matter present in the solid fraction of wastewater, activated sludge, and industrial wastes.

3 Interferences

- 3.1 The principal source of error in the determination is failure to obtain a representative sample. When running this test, the analyst shall do their best to obtain as representative a sample as possible.
- 3.2 The test is subject to errors due to loss of water of crystallization, loss of volatile organic matter prior to combustion, incomplete oxidation of certain complex organics, and decomposition of mineral salts during combustion. Therefore, the results shall not be considered an accurate measure of organic carbon in the sample, but may be useful in the control of plant operations.





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3.3 Determination of low concentrations of volatile solids in the presence of high fixed solids concentrations may be subject to considerable error. In such cases, measure for suspect volatile components by another test, for example, total organic carbon.

4 Safety

- 4.1 ALS-Middletown maintains Safety Data Sheets (SDSs) on all chemicals used in this procedure. ALS-Middletown recommends that all individuals performing this SOP familiarize themselves with the SDSs associated with the procedure prior to SOP performance. SDSs are available to all staff and are located in hard copy in the QA reference library and electronically on the ALS-Middletown server in the Common>Health & Safety>SDS folder.
- 4.2 All possible steps shall be taken to limit the analyst contact with chemicals and samples. The minimum personal protective equipment (PPE) requirements are appropriate chemical resistant gloves, safety glasses and a fully buttoned lab coat. This PPE shall reduce the possibility of contact to a safe level, but the analyst shall not limit themselves to these PPE minimums. Refer to SOP 90-PPE-PROTOCOL for detailed PPE information.
- 4.3 Injuries from glass cuts are a serious concern in the laboratory. Several types of cut-resistant gloves are available in all the laboratory work areas. Wells Lamont part# Y1700 or equivalent should be worn as an under glove to provide cut protection when nitrile, latex or vinyl gloves are worn for chemical protection. The use of cut-resistant gloves is mandatory throughout the entire laboratory when handling glass sample containers and reusable labware constructed of glass. The handling of VOA and extract vials does not require cut-resistant gloves unless a cut hazard is evident. For example, loading capped vials unto an instrument does not require the use of cut-resistant gloves, but capping extract vials does.
- 4.4 In addition to the PPE minimums required above, a face shield shall be worn at all times while dispensing, diluting or handling any quantity of concentrated acid.
- 4.5 Analysts should always exercise caution when handling samples since the chemical and biological composition of the samples is unknown.
- 4.6 The health hazards of each substance used in this method may not have been fully established. Each substance shall be regarded as a potential health hazard and exposure shall be as low as reasonably achievable.

5 Apparatus and Materials

5.3 Muffle furnace, operation temperature 550°C ± 50°C- Vulcan, serial #3-1750 NEY, or equivalent.





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- 5.4 Wax pencils- Fisher Scientific #S45652, or equivalent.
- 5.5 Tongs, extra long- VWR scientific # 62452-045, or equivalent.
- 5.4 Evaporating dishes, porcelain, 125-mL- VWR Scientific #25310-132, or equivalent. Vycor or platinum dishes may be substituted and smaller size dishes may be used if required. Dishes must be cooked for a minimum of one hour at 550°C and stored in a desiccator prior to use.
- 5.5 Analytical Balance, capable of weighing to 0.0001g- OHaus Adventurer AR 2140, or equivalent.
- 5.6 Desiccator- VWR #24982-000, or equivalent.
- 5.7 Aluminum weighing dishes- VWR #25433-008, or equivalent.
- 5.8 Pre-weighed 47 mm volatile fiber filters- Environmental Express #F93447VOL, or equivalent.
- 5.9 Computer software capable of processing all associated tasks- Microsoft Excel and Access, or equivalent; Horizon LIMS, version 11, or equivalent.
- 5.10 Computer hardware capable of processing all associated software- Dell Dimension 8800, or equivalent.

6 Reagents

6.1 Not applicable.

7 Instrument Calibration

7.1 The balances must be calibrated daily. See the appropriate balance SOP for procedures regarding balance calibrations and verifications. The balances must be calibrated by an outside source annually.

8 Quality Control

- 8.1 All policies and procedures in the most current revision of the ALS-Middletown QA Manual shall be followed when performing this procedure.
- 8.2 Demonstration of Capability (DOC)
 - 8.2.1 Initial Demonstration of Capability (IDOC): Each analyst shall complete a successful IDOC to become a qualified analyst and work independently to conduct this method.
 - 8.2.1.1 Select four representative samples for the type of analysis being performed (total volatile solids aqueous, total volatile solids





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non-aqueous, volatile suspended solids, or volatile dissolved solids). Analyze these samples and compare the results with the results for the same samples obtained by an experienced analyst who has already completed the demonstration of capability requirements for the selected analysis.

8.2.1.2 Acceptance Criterion

Precision: Each RPD shall be $\leq 10\%$.

If this acceptance criterion is met, performance is judged acceptable and independent sample analysis may begin. If data is not acceptable, find and correct the source of the problem, then repeat the analysis. The DOC must be acceptable before independent analysis begins.

- 8.2.2 Continuing DOC (DOC): Each qualified analyst shall perform an annual DOC for ongoing proficiency or when significant changes in instrumentation are made.
 - 8.2.2.1 Use the same procedure and acceptance criterion as the IDOC or the successful analysis of a blind performance sample (PT).

If this acceptance criterion is met, performance is judged acceptable and independent sample analysis may continue. If data is not acceptable, analyst shall work under supervision of a qualified analyst, find and correct the source of the problem, then repeat the analysis. The DOC must be acceptable before independent analysis begins.

8.3 Quality Control Requirements

Quality Control Requirements

(Specific Project Requirements may override these requirements)

Parameter	Concentration	Frequency	Control Limits	Corrective Action
Method Blank (Aqueous Samples Only)		One per twenty samples with a minimum of one per batch	mg/L)	Reanalyze the blank and any associated samples. If reanalysis is not possible report with a qualifying statement.
Duplicate		1 per 10 samples with a minimum of one per batch		Reanalyze once. If reanalysis is not possible or if RPD is still unacceptable report with a qualifying statement.

- 8.4 Method Blank- Analysis required with aqueous samples only.
 - 8.4.1 If the Method Blank concentration is greater than or equal to the





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reporting limit AND is greater than $^1/_{10}$ the sample concentration, the source of contamination must be investigated and measures taken to minimize or eliminate the problem and affected samples reanalyzed. If reanalysis is not possible, data shall be reported with a qualifying statement.

8.5 Duplicate

- 8.5.1 Samples selected for duplicate analysis shall be rotated among client samples so that various matrix problems may be noted and/or addressed. Poor performance in a duplicate or spike may indicate a problem with the sample composition and shall be reported to the client whose sample produced the poor recovery.
- 8.6 Acceptance limits were developed based on the reference methods and control charts.

9 Sample Collection, Preservation and Handling

- 9.1 Sample collection, preservation, and handling is performed according to SOP-20 Field Services Plan for Sample Collection.
- 9.2 Samples shall be collected in glass or plastic containers. A minimum of 200 mL is required for aqueous samples and a minimum of 25 grams is required for solid samples.
- 9.3 Preserve samples by storing above the freezing point of water up to 6 °C.
- 9.4 The maximum holding time is seven days.

10 Procedure

- 10.1 Prepare the solids by following the appropriate procedure for TS, TDS or TSS. The same dish can be used for both analyses.
- 10.2 Volatile Total Solids on Solids:
 - 10.2.1 Transfer the dish containing the dried residue to a cool muffle furnace.
 - 10.2.2 Heat the furnace to 550°C ± 50°C allowing the sample to come up to temperature at the same speed as the furnace and ignite the sample for one hour after the furnace first reaches 550 °C.

NOTE: On the first burn, place a watch glass over the dish to contain particles that may pop out of the dish due to the expansion of air trapped in the sample matrix. After temperature of 550 °C is achieved and 15 minutes have passed, the watch glass can be removed. Let the dish cool partially in air until most of the heat has dissipated and then transfer to a desiccator.





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- 10.2.3 Weigh the dish as soon as it has cooled to room temperature.
- 10.2.4 Repeat igniting (1 hour), cooling, desiccating, and weighing steps until the weight change is less than 4% or 50 mg, whichever is less.
- 10.3 Volatile Total Solids on Waters & Volatile Suspended Solids:
 - 10.3.1 Preheat muffle furnace to 550°C ± 50°C.
 - 10.3.2 Place the sample in the preheated oven and ignite for 15 minutes.
 - 10.3.3 Let the dish cool partially in air until most of the heat has dissipated and then transfer to a desiccator.
 - 10.3.4 Weigh the dish as soon as it has cooled to room temperature, which takes approximately 2 hours.
 - 10.3.5 Repeat igniting (15 minutes), cooling, desiccating, and weighing steps until the weight change is less than 4% or 0.5 mg, whichever is less.
- 10.4 Record the appropriate sample information from the original procedure for TS, TDS or TSS to the appropriate Volatile Solids spreadsheet, see Appendices.

11 Calculations

11.1 mg/L Volatile Solids (Aqueous) = $\frac{\text{(A-B)} \times 10^6}{\text{mL sample}}$

mg/L Fixed Solids (Aqueous) = $(B-C) \times 10^6$ mL sample

where: A = weight of residue and dish before ignition (grams)

B = weight of residue and dish after ignition (grams)

C = weight of dish (grams)

11.2 % Volatile Solids (Solids) = $\frac{\text{(A-D)}}{\text{(A-B)}}$ x 100

% Fixed Solids (Solids) = $\frac{\text{(D-B)}}{\text{(A-B)}} \times 100$

where: A = weight of dried residue and dish (grams)

B = weight of dish

C = weight of wet sample and dish (grams)

D = weight of residue and dish after ignition (grams)



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11.3 Precision, Relative Percent Difference (RPD):

RPD = $\frac{\text{Difference between results}}{\text{Average}} \times 100$

12 Reporting Results

- 12.1 All raw data used for reporting results must be dated and initialed by the qualified laboratory personnel performing first and second review.
- 12.2 When entering data into Horizon LIMS do not round off results: Horizon will automatically perform rounding appropriate to the method. Horizon LIMS results are reported to three significant figures but limited to the number of decimal places in the reporting limit for the individual compound or analyte.
- 12.3 Report the actual result, even if it is less than the reporting limit. Any sample with a result less than the reporting limit is reported as ND (non-detectable); LIMS will automatically report the appropriate detection limit.

13 Waste Management

13.1 Refer to ALS-Middletown SOP 19-Waste Disposal

14 Pollution Prevention

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. Management shall consider pollution prevention a high priority. Extended storage of unused chemicals increases the risk of accidents. The laboratory shall consider smaller quantity purchases which will result in fewer unused chemicals being stored and reduce the potential for exposure by employees. ALS-Middletown tracks chemicals when received by recording their receipt in a traceable logbook. Each chemical is then labeled according to required procedures and stored in assigned locations for proper laboratory use.

15 Definitions

15.1 Refer to ALS-Middletown QA Manual for general definitions.

16 Maintenance and Troubleshooting

16.1 Refer to maintenance logs and instrument manuals for guidance in troubleshooting specific problems related to the instrumentation used in this method.





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Appendix A

Appendix A

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Appendix B

Appendix B

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		Time out/ Date/ Initials															
	108°C	Temp out °C														Approved By:	pproved:
	, 10±	Temp in °C														App.	Date P
		Time in/ Date/ Initials					!										
		Temp out °C													50		
SCIIDS	104°C	Temp in °C													3000.0 sr		
/ED SC		Time In													s or min.		1
TOTAL DISSOLVED SOLIDS		Date/ Technician													e blank is plu	# 0	rage ⊭
TOTAL		TDS (mg/l)													mperatur		
		weight dish and sample (g)													mments. Solids cannot be reweighed until the temperature blank is plus or minus 0.0005g.		
		Volume Weight dish and sample (ml) (g) (g)													not be reweig		
		Volume (ml)													olids can		
		Sample Number													mments: 5	Contractor 7.009	cevision //03



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Appendix C

Appendix C

				_	_		 		_	_						
2nd Temp Out (C)														_		
2nd Time																
2nd Temp In (C)																
2nd Time In																
1st 2nd Znd Temp Out (C) Time in in (C)																
蓝鱼	ŧI.		-													
Tempin T	2															
st Time In																
Date/Tech 1st Time In		,,,							•							
TSS (mg/L)																
Final Net Wt. (g)																
Vol (mL) Initial WL 1st Final Wt. 2nd Final W. (9) (9) (9)																
1st Final Wt. (g)											-					
Initial Wt. (9)																
Vol (m∟)																
Sample							- "									

Section to

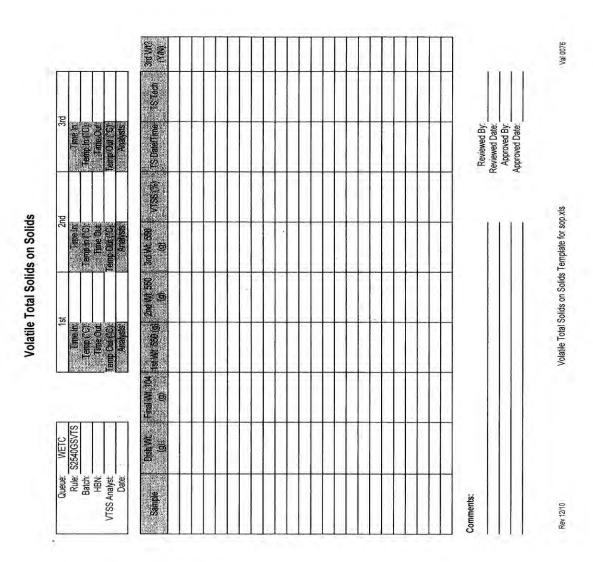
TOTAL SUSPENDED SOLIDS



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Appendix D

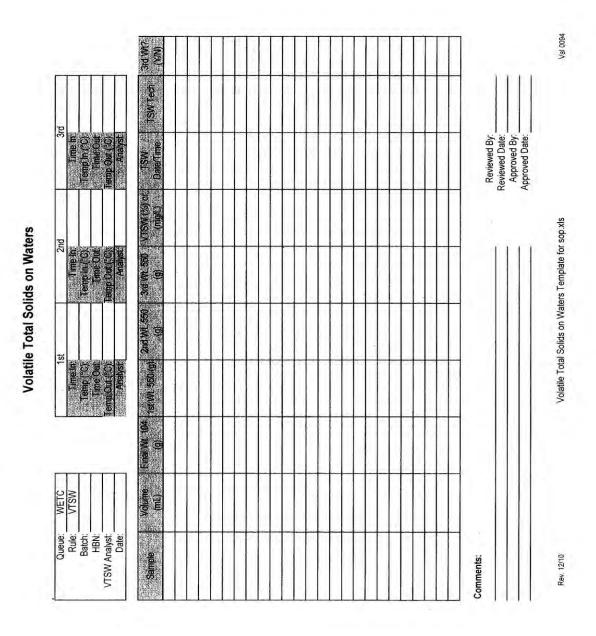




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Appendix E







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Appendix F

Val 0095 3rd WP? TSS Tech Reviewed By:
Reviewed Date:
Approved By:
Approved Date: SSA (TIBILI) Volatile Suspended Solids Template for sop.xls Volatile Suspended Solids 3rd Wt. 550 (g) 2nd Wt: 550 (g) 1st Wt. 550 (g) Final Wt. 104 (9) Volume (mt.) Queue Rule Batch: HBN: VSS Analyst Date: Sample Rev 12/10 Comments:





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Summary of Changes

Revision 7

IXCVISION 7	1	
Section	Section	Description of Change
Number		
Spelling,	grammar, and formatting ch	anges may have been made throughout SOP for clarity,
correctne	ss, and conformity.	
	Footer	Updated to Corporate format
	Signature page	Updated Validator, QA Manager
1.2	Scope & Application	Added reference method years
4.16	Safety	Updated Safety standard verbiage
5.8	Apparatus and Materials	Updated filters
5.9	Apparatus and Materials	Updated LIMS version
8.2	Quality Control	Added DOC standard verbiage
	Concurrence Form	Removed due to change in procedure



Concurrence Form

I acknowledge that I have read, undersood, and I concur with the standard operating procedure (SOP) listed below.

Employee Name	
SOP	
Revision	
E-mail	
Date Concurred	





DETERMINATION OF TOTAL & DISSOLVED ORGANIC CARBON

AND TOTAL CARBON IN WATER

SOP ID: 07–TOC

REVISION NUMBER: 14

REVISION DATE: 05/11/20105

INSTITUTED DATE: 09/03/2015

DOC. CONTROL#:

ARCHIVAL DATE:

DOCUMENT TITLE:



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- Method: 07-TOC Revision: 14

Date: 05/11/2015

Page: 2 of XX 17 ASD 9/3/15

SOP Title: The Determination of Total & Dissolved Organic Carbon and Total Carbon in Water

SOP ID: 07-1	C Revision #: 14	
Approved By:	Validato) - Patrick Glaser	Date: 9-3-15
Approved By:	Wer Chemistry, Supervisor- Jason Badman	Date: 7/20/15
Approved By:	Quality Assurance Manager- Anna Milliken	Date: 8/25/2015
Annual Review:		
Reviewed By:		Date:





Method: 07-TOC Revision: 14

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1 Scope and Application

1.1 This method is used to estimate the total amount of non-purgeable organic carbon present in drinking, surface, and saline waters, as well as domestic and industrial wastes. This method can be modified to estimate the dissolved organic carbon of a sample. This method also outlines steps to be performed to determine total carbon and inorganic carbon.

This TOC method is independent of the oxidation state of the organic matter and does not measure other organically bound elements, such as nitrogen and hydrogen, and inorganics that can contribute to the oxygen demand measured by BOD and COD.

- 1.2 This method is adapted from the U.S. EPA Method 415.1 1974, "Organic Carbon, Total (Combustion or Oxidation)", and Standard Methods for the Examination of Water and Wastewater, Method 5310 B 2011. The quality control requirements specified in Standard Methods for the Examination of Water and Wastewater, 5310B 2011 are implemented for drinking water samples. This method, when analyzed in quadruplicate, is adapted from U.S. EPA SW-846, Method 9060A rev 1 2004, Total Organic Carbon.
- 1.3 This document states the laboratory's policies and procedures established in order to meet requirements of all certifications/accreditations currently held by the laboratory, including the most current standards in effect for the National Environmental Laboratory Accreditation Program (NELAP).
- 1.4 This method is restricted for use by or under the supervision of analysts experienced in the use of the total organic carbon analyzer.
- 1.6 Individual project requirements may override criteria listed in this SOP.

2 Summary of Method

- 2.1 Combustion (as performed by the Elementor Vario TOC Cube) Initially any inorganic carbon compounds present are removed from the sample by purging with oxygen. The sample is then injected into a heated reaction chamber packed with an oxidative catalyst and vaporized. The organic carbon is then oxidized to CO₂ and H₂O. The CO₂ is transported in the carrier gas stream and measured by means of a non-dispersive infrared analyzer specifically tuned to the absorptive wavelengths of CO₂. The instrument calculates the area of the peaks produced by the analyzer, compares them to the peak area of the calibration standards, and prints out a calibrated organic carbon value in mg/L. The amount of CO₂ is directly proportional to the concentration of carbonaceous material in the sample.
- 2.2 Carbon measurement assesses the potential oxygen- demanding load of organic material on a receiving stream. This statement applies whether the carbon measurement is made on a sewage plant effluent, industrial waste, or on water





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taken directly from the stream. In this light, carbonate and bicarbonate carbon are not a part of the oxygen demand in the stream and therefore shall be discounted in the final calculation or removed prior to analysis. The manner of preliminary treatment of the sample and instrument settings defines the types of carbon which are measured. Instrument manufacturer's instructions shall be followed.

3 Interferences

- 3.1 Carbonate and bicarbonate carbon represent an interference under the terms of this test and must be removed or accounted for in the final calculation. Removal of carbonates and bicarbonates by acidification and purging with purified gas may result in the loss of volatile organic substances.
- 3.2 Volatiles can also be lost during sample blending, particularly if the temperature is allowed to rise.
- 3.3 A loss can occur if large carbon-containing particles fail to enter the syringe used for injection.
- 3.4 Chloric acids and salines will omit chlorine when injected into the combustion tube. If these components are contained in a very high concentration, they may not be removed completely by the IC solution in the reaction vessel. These samples shall be diluted.
- 3.5 Contamination during sample handling and treatment is a likely source of interference. Extreme care shall be taken when sampling, handling, and analyzing, particularly for trace analysis of samples below 1 mg TOC/L.
- 3.6 The carbonaceous analyzer measures all of the carbon in a sample. Because of various properties of carbon-containing compounds in liquid samples, preliminary treatment of the sample prior to analysis dictates the definition of the carbon as it is measured. Forms of carbon that are measured by the method are:
 - 3.6.1 Soluble, nonvolatile organic carbon; for instance, natural sugars.
 - 3.6.2 Soluble, volatile organic carbon; for instance, mercaptans.
 - 3.6.3 Insoluble, partially volatile carbon; for instance, oils.
 - 3.6.4 Insoluble, particulate carbonaceous materials; for instance, cellulose fibers.
 - 3.6.5 Soluble or insoluble carbonaceous materials absorbed or entrapped on insoluble inorganic suspended matter; for instance, oily matter absorbed on silt particles.





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4 Safety

4.1 ALS-Middletown maintains Safety Data Sheets (SDSs) on all chemicals used in this procedure. ALS-Middletown recommends that all individuals performing this SOP familiarize themselves with the SDSs associated with the procedure prior to SOP performance. SDSs are available to all staff and are located in hard copy in the QA reference library and electronically on the ALS-Middletown server in the Common>Health & Safety>SDS folder.

- 4.2 All possible steps shall be taken to limit the analyst contact with chemicals and samples. The minimum personal protective equipment (PPE) requirements are appropriate chemical resistant gloves, safety glasses and a fully buttoned lab coat. This PPE shall reduce the possibility of contact to a safe level, but the analyst shall not limit themselves to these PPE minimums. Refer to SOP 90-PPE-PROTOCOL for detailed PPE information.
- 4.3 Injuries from glass cuts are a serious concern in the laboratory. Several types of cut-resistant gloves are available in all the laboratory work areas. Wells Lamont part# Y1700 or equivalent should be worn as an under glove to provide cut protection when nitrile, latex or vinyl gloves are worn for chemical protection. The use of cut-resistant gloves is mandatory throughout the entire laboratory when handling glass sample containers and reusable labware constructed of glass. The handling of VOA and extract vials does not require cut-resistant gloves unless a cut hazard is evident. For example, loading capped vials unto an instrument does not require the use of cut-resistant gloves, but capping extract vials does.
- 4.4 In addition to the PPE minimums required above, a face shield shall be worn at all times while dispensing, diluting or handling any quantity of concentrated acid.
- 4.5 Analysts should always exercise caution when handling samples of unknown composition.
- 4.6 The health hazards of each substance used in this method may not have been fully established. Each substance shall be regarded as a potential health hazard and exposure shall be as low as reasonably achievable.

5 Apparatus and Materials

- 5.1 Total Organic Carbon Analyzer- Elementar TOC Vario Cube, or equivalent.
- 5.2 Syringe, 5 mL- Hamilton Gastight Syringe, Elementar #38.00-0068, or equivalent.
- 5.3 Assorted Class A pipets and volumetric flasks.
- 5.4 Filters, 0.45-μm glass fiber syringe filters- Whatman #6894-2504, or equivalent.





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- 5.5 10-mL interchangeable syringe- Micro-Mate, or equivalent.
- 5.6 Sample Vials, 40 mL precleaned amber- Scientific Specialties, or equivalent.
- 5.7 Automatic Pipets- various sources. If an automatic pipet is used, it must be calibrated monthly according to the protocol listed SOP 99-AP for calibration checks for Autopipetters and Dispensers.
- 5.8 Computer software-
 - 5.8.1 Microsoft Excel, or equivalent
 - 5.8.2 Horizon LIMS, version 11, or equivalent
 - 5.8.3 Vario TOC Software V2.2.3(ef16cd0),2012-06-18, or equivalent.
- 5.9 Computer hardware- Dell Dimension 9200, or equivalent.

6 Reagents

NOTE: Unless otherwise noted in this section all chemicals are stored at room temperature and labeled with an expiration date of five years from receipt. Manufacturer's labeled expiration dates, when provided, take precedent over all other expiration dates.

- 6.1 Reagent Water ALS-MIDDLETOWN uses a Filson Water Purification System which provides analyte-free, greater than 16.0 megohm-cm DI water on demand. Ion exchanged waters are not recommended because of possible contamination with organics from resin materials.
- 6.2 Potassium biphthalate (KHP), ACS grade- VWR catalog #JT2958-0, or equivalent.
 - 6.2.1 Total Carbon Standard (1000 mg/L) Dissolve 2.1254 g KHP into 1 L of reagent water. Store above the freezing point of water up to 6 °C for up to 2 weeks.
- 6.3 Hydrochloric acid (HCl), Reagent Grade- Baker, VWR catalog #JT9535-33, or equivalent.
- 6.4 Stock Standard Solution (1000 mg carbon/L) NIST Traceable purchased from Lab Chem Catalog #LC12910-1 or equivalent. Store refrigerated above the freezing point of water up to 6 °C.
- 6.5 Working Standard Solutions (7) Prepare 7 Working Standard Solutions according to the directions below in reagent water. Acidify with HCl to pH < 2 and store above the freezing point of water up to 6 °C for up to one month.
 - Solution 1 (100 mg/L) 50 mL Stock Standard Solution in 500-mL volumetric flask.
 - Solution 2 (10 mg/L) 50 mL Working Standard Solution 1 in 500-mL volumetric flask.
 - Solution 3 (5 mg/L) 25 mL Working Standard Solution 1 in 500-mL volumetric flask.





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• Solution 4 (1 mg/L) - 5 mL Working Standard Solution 1 in 500-mL volumetric flask.

- Solution 5 (0.5 mg/L) 2.5 mL Working Standard Solution 1 in 500-mL volumetric flask.
- 6.6 Second Source Stock Standard Solution (1000 mg/L) NIST Traceable purchased from Lab Chem catalog #LC12910-1. NOTE: must be a separate lot number from section 6.4.
 - 6.6.1 Second Source Check Standard #1 (100 mg/L) Pipet 50 mL of Second Source Stock Standard Solution into a 500-mL volumetric flask and acidify with HCl to pH < 2. Dilute to volume with reagent water. Store refrigerated above the freezing point of water up to 6 °C for up to one month.
 - 6.6.2 Second Source Check Standard #2 (1 mg/L) Pipet 5 mL of Second Source Check Standard #1 (6.8.1) into a 500-mL volumetric flask and acidify with HCl to pH < 2. Dilute to volume with reagent water. Store refrigerated above the freezing point of water up to 6 °C for up to one month.
 - 6.6.3 Second Source QC Sample (5 mg/L) Pipet 25 mL of Second Source Check Standard #1 (6.8.1) into a 500-mL volumetric flask and acidify with HCl to pH < 2. Dilute to volume with reagent water. Store refrigerated above the freezing point of water up to 6 °C for up to one month.
 - 6.6.4 Second Source QC Sample (8 mg/L) Pipet 40 mL of Second Source Check Standard #1 (6.8.1) into a 500-mL volumetric flask and acidify with HCl to pH < 2. Dilute to volume with reagent water. Store refrigerated above the freezing point of water up to 6 °C for up to one month.
- 6.7 Carrier Gas Purified oxygen or air, CO₂ free and containing less than 1 ppm hydrocarbon (as methane). All gases are purchased from Airgas or equivalent. The oxygen used is UHP oxygen. A standard 220 cubic foot cylinder will provide continuous operation for approximately fifty days of manual operation, based on eight-hour daily usage. Consistent pressure of 30 psig is necessary for proper operation.

7 Instrument Calibration

- 7.1 Calibrate the instrument once per month, after instrument catalyst changeout or as necessary. The instrument is capable of generating a 4-point calibration curve. The r value must be 0.995 or greater for each curve. The calibration curve is validated with a Second Source 1.0 QC Standard that must be within +/-15% of the true value.
- 7.2 Calibration curve- Place the following standards in the appropriate hole positions on the carousel autosampler:
 - 7.3.1 10 mg/L (Working Standard Solution 2)





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- 7.3.2 5 mg/L (Working Standard Solution 3)
- 7.3.3 1 mg/L (Working Standard Solution 4)
- 7.3.4 0.5 mg/L (Working Standard Solution 5)
- 7.3 Calibration for Total Inorganic Carbon TIC is typically determined by calculation (see section 11.5).

8 Quality Control

- 8.1 All policies and procedures in the most current revision of the ALS-Middletown QA Manual shall be followed when performing this procedure.
- 8.2 Method Detection Limit (MDL)
 - 8.2.1 For this method, the MDL study must be conducted and evaluated annually according to SOP 99-MDL.
 - 8.2.2 Analyze seven (7) replicates of the MDL standard according to the sample preparation and analysis procedure. The spiking level can be adjusted to achieve optimal results. The MDL (for each analyte) shall be calculated from the collected results.
 - 8.2.3 The analytical department shall provide the MDL study to the QA Department. The detection limit for a specific sample may differ from those listed due to the nature of interferences in a particular sample matrix.
- 8.3 Demonstration of Capability (DOC)
 - 8.3.1 Each analyst shall complete a successful Initial Demonstration of Capability (IDOC) before working independently to conduct this method. Each qualified analyst shall perform an annual DOC for ongoing proficiency as specified in the QA Manual, Technical Training.
 - 8.3.2 Analyze four replicates of the 1 mg/L Working Standard Solution (6.6.2) according to the sample preparation and analysis procedure. Calculate the recovery and the relative standard deviation (RSD) for each analyte.
 - 8.3.3 Acceptance Criteria:

Accuracy: All four results shall be within ± 15% of the true value.

Precision: RSD shall be <15% for all analytes.

If this acceptance criteria is met, performance is judged acceptable and sample analysis may begin. If the results do not meet these requirements, the DOC shall be repeated before independent analysis of





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samples begins. If for recertification, this process is repeated until the DOCs are completed successfully.

8.4 Quality Control Requirements:

(Specific project requirements may override these requirements.)

Parameter	Concentration	Frequency	Control Limits	Corrective Action
Method Blank		Beginning of the run, every 10 samples, and at	<0.5 mg/L	If the method blank concentration is greater than or equal to the reporting limit AND is greater than
		the end of the run	DoD samples: <1/2 the LOQ	'/ ₁₀ the sample concentration, the source of contamination must be investigated and measures taken to minimize or eliminate the problem and affected samples reanalyzed. If reanalysis is not possible, data shall be reported with a qualifying statement.
Second Source		After each		Rerun. If it fails again, recalibrate
Check Standard	1.0 mg/L	applicable calibration curve	± 15% of true value.	and rerun.
		When reporting		Rerun. If it fails again, recalibrate
Check Standard	0.5 mg/L	DEP samples, After each	± 20% of true value.	and rerun.
		applicable calibration curve		
Second Source QC Sample	5.0 mg/L or	Every ten samples (or 10 quadruplicates).	± 10% of true value.	If fails, reanalyze all samples run since last acceptable QC Sample. DoD: Recalibrate, and reanalyze
	8.0 mg/L	Alternate between		all affected samples since the last
		5.0 mg/L and 8.0		acceptable SS QC Sample OR
		mg/L standards.		Immediately analyze two additional consecutive SS QC
				Samples. If both pass, samples
				may be reported without re-
				analysis. If either fails, take
				corrective action and re-calibrate;
				then re-analyze all affected samples since the last acceptable
				SS QC Sample.





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Parameter	Concentration	Frequency	Control Limits	Corrective Action
Matrix Spike	6.0 mg/L	Every ten samples (or 10 quadruplicates), minimum 1 per batch.	± 15% of true value.	Rerun. If fails again, report with a comment indicating matrix interference. If the LCS is acceptable and the specific matrix interference is identified, report with a qualifying statement. If the specific matrix interference is unknown, reanalyze the sample and matrix spike to determine matrix effect or analytical error.
Matrix Spike Duplicate	6.0 mg/L	Every ten samples (or 10 quadruplicates), minimum 1 per batch.	RPD ≤ 15%	Rerun. If fails again, report with a comment.
Filtered Blank		Every 20 DOC samples, minimum 1 per DOC batch.	<0.5 mg/L	Rerun. If fails again, refilter. Also refilter all samples in the batch with acceptable filter.

- 8.5 Samples selected for MS and MSD analysis shall be rotated among client samples so that various matrix problems may be noted and/or addressed. Poor performance in a duplicate or spike may indicate a problem with the sample composition and shall be reported to the client whose sample produced the poor recovery.
- 8.6 To prepare a MS/MSD, pipet 300 μ L of the Stock Standard Solution (6.4) into a 50-mL volumetric flask containing the sample to be spiked, shake well. This is the sample to be analyzed as the spike.
 - 8.6.1 To prepare a Total Carbon MS/MSD, pipet 300 μ L of the Total Carbon Standard (6.2.1.) into a50-mL volumetric flask containing the sample. Shake well. This is the sample to be analyzed as the spike.
- 8.7 DoD accreditation requires the quarterly verification of the LOD and a LOQ.

9 Sample Collection, Preservation and Handling

- 9.1 Refer to SOP 20-Field Services Sampling Plan for sampling information.
- 9.2 Sampling and storage of samples in amber glass bottles is preferred. All bottles for TOC analysis shall be preserved to a pH <2 with HCl. The minimum sample required shall be two 40 mL vials filled to zero headspace. Do not preserve samples submitted for total carbon, inorganic carbon, or dissolved carbon determination.





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9.3 Because of possibility of decomposition of some components of aqueous samples, the lapse of time between collection and analysis shall be kept to a minimum. Samples shall be kept refrigerated above the freezing point of water up to 6 °C and protected from sunlight and atmospheric conditions. Analyze preserved samples within 28 days. Unpreserved samples submitted for total carbon and inorganic carbon shall be analyzed within 7 days.

10 Procedure

- 10.1 Start-up and calibration of the Elementar Vario TOC Cube.
 - 10.1.1 Turn on the power switch located on the right side of the analyzer.
 - 10.1.2 Activate the Vario TOC software by clicking the icon on the computer desktop. After communication is established between the software and the instrument, wait until the furnace reaches set temperature of 850° C and the IR detector reaches stabilization. This is indicated when the "IR" icon stops flashing on the desktop.
 - 10.1.3 Confirm the oxygen carrier gas is set at 1100 to 1200 mbar on the software desktop. Adjust if necessary at the valve on top of the oxygen cylinder. Since peak area varies inversely to carrier gas flow rate, do not change the flow rate during measurement.
 - 10.1.4 After initialization and the calibration standards have been placed on the autosampler carousel, click MATH on the top toolbar followed by COEFFICIENTS. Pick an old curve from the list on the left side of the window. Rename the curve in the lower left box with the current date followed by an underscore and the word "CAL". Example: 022613_CAL. Type the required run-in, liquid blanks, standard names, qc checks, and initial calibration blank onto the software run sheet. Click the green "START ANALYSIS" button on the top toolbar and calibration will proceed automatically.
 - 10.1.5 After calibration is completed, Click MATH followed by CALIBRATE. Click the NEXT button and then click NPOC and "OK". Print the calibration curve. Click MATH and then click STATISTICS. Print the statistics page for the calibration run. Click the open new file button followed by MATH and then COEFFICIENTS. Select the DEFAULT curve in the box on the left of the window. Click NPOC and then click the COPY button. Select the calibration curve with the current date in the left window that was set up earlier. Click paste and then "OK". The calibration curve is now designated for the current date.
 - 10.1.6 For specific start -up and calibration procedures please see the Vario TOC Cube operating instructions available on the computer desktop.
- 10.2 Measurement of samples





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10.2.1 Place samples to be analyzed in the appropriate hole positions on the autosampler carousel. Type the run-in, liquid blanks, initial qc checks, initial calibration blanks, sample numbers, matrix spikes and continuing calibration verification standards and blanks onto the software run-sheet. Designate the required method from the drop-down menu in the middle column of the run sheet. Select the current applicable calibration curve from the drop-down menu on the right hand column. Click FILE and then SAVE AS. Designate the sample batch with the current date followed by an underscore and the word "RUN". Example: 022613_RUN. Click the green START ANALYSIS button and sample analysis will proceed automatically.

- 10.2.2 For specific analysis procedures please refer to the Vario TOC Cube operating instructions available on the computer desktop.
- 10.2.3 Each standard and sample is analyzed in triplicate or quadruplicate as required by client request. A replicate value can be rejected if misinjection is obvious. A minimum of two injections must be usable and all usable injections must yield a relative standard deviation of less than 10%. If a deviation less than 10% cannot be obtained, the standard or sample must be rerun. The average of all acceptable injections is reported as the result.
- 10.2.4 All standards and samples are sparged with $\rm O_2$ for 10 minutes prior to TOC Analysis.
- 10.2.5 All samples shall be diluted so that results fall within calibration range.
- 10.3 Total Carbon is determined using the same working standards that are utilized for Total Organic Carbon and following the steps listed in sections 10.1 and 10.2, except that all samples requiring Total Carbon analysis shall be submitted without HCl acid preservative and the samples shall not require sparging with oxygen during the analysis procedure.
- 10.4 Total Inorganic Carbon shall be determined, as necessary, by subtracting the TOC result from the TC result; see section 11.5.
- 10.5. To prepare dissolved samples, filter an un-acidified sample through a 0.45-µm glass microfiber syringe filter. Prepare filtered blanks at a frequency of one per 20 samples with a minimum of one per batch using reagent water. Acidify with HCl to a pH below 2 and keep refrigerated above the freezing point of water up to 6 °C

11 Calculations

- 11.1 If a dilution was performed, the sample result and RL must be multiplied by the dilution factor.
- 11.2 LCS Recovery





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 $\% R = \frac{C_m}{C_n} \times 100$

Where: $C_n = measured$ concentration of LCS $C_n^m = spiking$ concentration

11.3 Spike Recovery

$$\% Recovery = \frac{(C_s - C_s)}{C_n} \times 100$$

Where: C_s = measured concentration of spiked sample aliquot C_n^u = measured concentration of unspiked sample aliquot C_n^u = spiking concentration

11.4 Precision (RPD)

$$\% RPD = \frac{|(R_1 - R_2)|}{(R_1 + R_2) \div 2} \times 100$$

Where: R_1 = sample or spike result R_2 = duplicate or spike duplicate result

11.5 Total Inorganic Carbon

Total Inorganic Carbon = Total Carbon - Total Organic Carbon

12 Reporting Results

- 12.1 All raw data used for reporting results must be initialed and dated by the qualified laboratory personnel performing first and second review.
- 12.2 When entering data into Horizon LIMS, do not round off results: Horizon will automatically perform rounding appropriate to the method. Horizon LIMS results are reported to three significant figures but limited to the number of decimal places in the reporting limit for the individual compound or analyte.
- 12.3 Report the actual result, even if it is less than the reporting limit. Any sample with a result less than the reporting limit is reported as ND (non-detectable); LIMS will automatically report the appropriate detection limit.

13 Waste Disposal

13.1 Refer to SOP 19 - Waste Disposal



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14 Pollution Prevention

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. Management shall consider pollution prevention a high priority. Extended storage of unused chemicals increases the risk of accidents. The laboratory shall consider smaller quantity purchases which will result in fewer unused chemicals being stored and reduce the potential for exposure by employees. ALS-MIDDLETOWN tracks chemicals when received by recording their receipt in a traceable logbook. Each chemical is then labeled according to required procedures and stored in assigned locations for proper laboratory use.

15 Definitions

15.1 Refer to ALS-MIDDLETOWN QA Manual for general definitions.

16 Maintenance and Troubleshooting

16.1 Refer to maintenance logs and instrument manuals for guidance regarding general maintenance and troubleshooting specific problems related to instrumentation used in this method.



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Appendix A Run Log

Document: 020215_CAL (varioTOC) from: --.-- (modified)

analytic functional testing varioTOC cube serial number: 38133026

Statistic report

No. Name	NPOC [mg/l]	TC [mg/l]
1 RUN IN 1	0.660	0.000
2 RUN IN 1	0.434	0.000
3 RUN IN 1	0.360	0.000
4 RUN IN 1	0.230	0.000
Mean value	0.421	0.000
Deviation, abs.	0.180	-1.#10
Deviation, rel. [%]	42.849	0.000
5 RUN IN 2	0.362	0.000
6 RUN IN 2	0.337	-0.000
7 RUN IN 2	0.319	0.000
8 RUN IN 2	0.269	0.000
Mean value	0.322	0.000
Deviation, abs.	0.039	-1.#IC
Deviation, rel. [%]	12.171	0.000
9 RUN IN 3	0.244	0.000
10 RUN IN 3	0.136	0.000
11 RUN IN 3	0.172	0.000
12 RUN IN 3	0.176	0.000
Mean value	0.182	0.000
Deviation, abs.	0.045	-1.#IC
Deviation, rel. [%]	24.768	0.000
13 RUN IN 4	0.239	0.000
14 RUN IN 4	0.088	0.000
15 RUN IN 4	0.093	0.000
16 RUN IN 4	0.093	0.000
Mean value	0.128	0.000
Deviation, abs.	0.074	-1.#IC
Deviation, rel. [%]	57.554	0.000
17 RUN IN 5	0.216	0.000
18 RUN IN 5	0.116	0.000

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Summary of Changes

Revision 14

Section	Section	Description of Change	
Number			
Spelling, g	Spelling, grammar, and formatting changes may have been made throughout SOP for clarity		
correctnes	ss, and conformity.		
5	Apparatus and Materials	Added 'or equivalent' in places	
5.6	Apparatus and Materials	Changed jars to 40 mL vials	
5.8.2	Apparatus and Materials	Updated LIMS version	
6.5	Reagents & Standards	Changed Solution 2 to Solution 1	
7.1	Instrument Calibration	Added validation with Second Source	
8.4	Quality Control	Added DoD requirement	
8.7	Quality Control	Added DoD LOD LOQ verification requirement	
9.2	Sample Coll, Pres, Hand	Added minimum sample amount requirement; added	
		dissolved organic carbon	
10.1.3	Procedure	Changed gas setting	
10.1.3	Procedure	Clarified injection evaluation, RSD requirement and	
		reporting procedure	
	Appendix A	Removed General Conditions, Added Run Log	



Concurrence Form

I acknowledge that I have read, undersood, and I concur with the standard operating procedure (SOP) listed below.

Employee Name	
SOP	
Revision	
E-mail	
Date Concurred	



Attachment 4 Figures

