

US EPA ARCHIVE DOCUMENT

Appendix C.1. - Data Validation Reports



U-234

U-238

0.999

U-235 0.999 4385.50*

4761.50*

0.991 4184.40* 0.00E+000 +/- 7.17E-001

Sample Des	il c	IOU:	DUP 01 1	JID IV C		-hal Destin-t	-\
Batak Id-	ite:	ation	I JOR-AL	PHAL (Canbe)	rra\ApexAl	pna \koot \bat	a100000649
Batch Iden	ICITIC	ation:	13070991	3-00			
Sample Ide	multi	calion:	V5				
Sample Geo	ometry	Same	Shelf 2				
Proceaure	Descr	iption:	U 1SO				
Detector N	lame:		Alpha_0	¥0			
Chamber Se	rial	Number:	06027396	5B			
Detector S	Serial	Number	: 91135				
Env. Backg	round		System 1	Bkgd 63328			
Reagent Bl	ank:		<not pe<="" th=""><th>erformed></th><th></th><th></th><th></th></not>	erformed>			
Sample Siz	e:		5.000	E-001 +/-	0.000E+00	0 liter	
Sample Dat	e/Tim	e:	7/9/20	013 7:21	8:24 AM		
Acquisitio	n Dat	e/Time:	8/2/2	013 9:4	3:53 AM		
Acquisitio	n Liv	e Time:	-/ -/ -/ -/ -/ -/ -/ -/ -/ -/ -/ -/ -/ -	70.0 minute	es		
Acquisitio	n Rea	1 Time:	1.	70.1 minute	es		
Tracer Cer	tific	ate:	11232 1	JU-10A			
Tracer Oua	ntity		0.606	mL			
Effective	Effic	iencv	0.020	4 +/- 0.01	033		
Counting F	ffici	encv.	0 1900	0 + / - 0.00	033 on 12/	16/2012 5:4	9:33 PM
Chem. Reco	overy	Factor:	0.107	5 +/- 0.03	174	20/2020 0.1	
Peak Match	n Tole	rance:	0.150	MeV			
	-	••••	PEAI	K AREA RI	EPORT		
		the set of the last of the				the second	
	-	nergy	Not	Die Area	Ambiant	Descent	FUL
Nuclide	Е	nergy	Net Pk Area	Pk Area	Ambient	Reagent	FWHM
Nuclide	E	nergy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
Nuclide U-232	E T	nergy (MeV) 5.280	Net Pk Area 39.83	Pk Area Error % 31.13	Ambient Backgnd 0.17	Reagent Backgnd 0.00E+000	FWHM (keV) 7.4
Nuclide U-232 U-234	E T	nergy (MeV) 5.280 4.747	Net Pk Area 39.83 3.00	Pk Area Error % 31.13 130.67	Ambient Backgnd 0.17 0.00	Reagent Backgnd 0.00E+000 0.00E+000	FWHM (keV) 7.4 3.0
Nuclide U-232 U-234 U-235	E T	nergy (MeV) 5.280 4.747 4.398	Net Pk Area 39.83 3.00 -0.17	Pk Area Error % 31.13 130.67 1169.4	Ambient Backgnd 0.17 0.00 0.17	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000	FWHM (keV) 7.4 3.0 0.0
Nuclide U-232 U-234 U-235 U-238	E T	nergy (MeV) 5.280 4.747 4.398 4.148	Net Pk Area 39.83 3.00 -0.17 0.00	Pk Area Error % 31.13 130.67 1169.4 1960.0	Ambient Backgnd 0.17 0.00 0.17 0.00	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000 0.00E+000	FWHM (keV) 7.4 3.0 0.0 0.0
Nuclide U-232 U-234 U-235 U-238	- T T =	nergy (MeV) 5.280 4.747 4.398 4.148 Tracer	Net Pk Area 39.83 3.00 -0.17 0.00 Peak used :	Pk Area Error % 31.13 130.67 1169.4 1960.0 For Effect:	Ambient Backgnd 0.17 0.00 0.17 0.00 ive Effici	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000 0.00E+000 ency	FWHM (keV) 7.4 3.0 0.0 0.0
Nuclide U-232 U-234 U-235 U-238	т Т =	nergy (MeV) 5.280 4.747 4.398 4.148 Tracer	Net Pk Area 39.83 3.00 -0.17 0.00 Peak used :	Pk Area Error % 31.13 130.67 1169.4 1960.0 For Effect:	Ambient Backgnd 0.17 0.00 0.17 0.00 ive Effici	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000 0.00E+000 ency	FWHM (keV) 7.4 3.0 0.0 0.0
Nuclide U-232 U-234 U-235 U-238	T T =	nergy (MeV) 5.280 4.747 4.398 4.148 Tracer	Net Pk Area 39.83 3.00 -0.17 0.00 Peak used : NUCLID	Pk Area Error % 31.13 130.67 1169.4 1960.0 Eor Effect: E ANALYSIS	Ambient Backgnd 0.17 0.00 0.17 0.00 ive Effici RESULTS	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000 0.00E+000 ency	FWHM (keV) 7.4 3.0 0.0 0.0
Nuclide U-232 U-234 U-235 U-238	T T Id	nergy (MeV) 5.280 4.747 4.398 4.148 Tracer En	Net Pk Area 39.83 3.00 -0.17 0.00 Peak used : NUCLID	Pk Area Error % 31.13 130.67 1169.4 1960.0 For Effect: E ANALYSIS Activ	Ambient Backgnd 0.17 0.00 0.17 0.00 ive Effici RESULTS	Reagent Backgnd 0.00E+000 0.00E+000 0.00E+000 0.00E+000	FWHM (keV) 7.4 3.0 0.0 0.0

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7.80E-001 +/- 1.05E+000

-5.45E-002 +/- 6.38E-001

1.56E+000 +/- 4.90E-001

1.55E+000 +/- 4.88E-001

1.34E+000 +/- 4.21E-001





Sample Description: Spectrum File: Batch Identification: Sample Identification: Sample Geometry: Procedure Description:			LR-104 U \\OR-AL 13071702 07 Shelf 2 U iso	DIS PHA1\Canber A-UU	rra\ApexAl	pha\Root\Data	a\00000662
Detector	Name		Alpha 0	29			
Chamber .	Seria	1 Number:					
Detector	Seri	al Number:	29				
Env. Bac	kgrou	nd:	System 1	Bkgd 64779			
Reagent 1	Blank	:	<not p<="" td=""><td>erformed></td><td></td><td></td><td></td></not>	erformed>			
Sample S	ize:		1.000	E+000 +/-	0.000E+00	0 liter	
Sample D	ate/T	ime:	7/22/:	2013 12:03	2:00 PM		
Acquisit	ion D	ate/Time:	8/15/:	2013 12:43	1:19 PM		
Acquisit	ion L	ive Time:	1	70.0 minute	es		
Acquisit	ion R	eal Time:	1	70.0 minute	35		
Tracer C	ertif	icate:	U232_1	JU-10A			
Tracer Q	uanti	ty:	0.603	mL			
Effectiv	e Eff	iciency:	0.028	7 +/- 0.00	040	Sector sector sectors	
Counting	Effi	ciency:	0.194	5 +/- 0.00	0.36 on 12/	15/2012 2:30	0:02 PM
Chem. Re	cover	y Factor:	0.147	3 +/- 0.03	205		
Peak Mat	ch To	lerance:	0.150	MeV			
			PEA	K AREA RI	EPORT		
		Freray	Net	Dk Area	Ambient	Descent	DULIM
Nuclide		(MeV)	Pk Area	Error %	Backgnd	Backgnd	(keV)
U-232	т	5.271	55.64	26.65	1.36	0.00E+000	4.1
U-234		4.732	25.32	39.56	0.68	0.00E+000	3,1
U-235		4.394	0.49	416.98	0.51	0.00E+000	3.1
U-238		4.153	13.49	54.53	0.51	0.00E+000	4.7
	т	= Tracer I	Peak used	for Effect:	ive Effici	ency	
			NUCLID	E ANALYSIS	RESULTS		
	Id	Ene	erqy	Activ	vitv		MDA
Nuclide	Con	f. (ke	eV)	(pCi/1:	iter)	(pC:	i/liter)
0-232	0.9	93 5302	2.50* 5.	16E+000 +/-	- 1.39E+00	0 6.36E-001	1 +/- 1.72E-001
0-234	0.9	94 476	1.50* 2.	SSE+000 +/-	- 1.12E+00	0 5.23E-00	1 + 7 - 1.41E - 001
0-235	0.9	4385	5.50* 5.0	50E-002 +/-	- 2.34E-00	1 6.00E-00	1 + / - 1.62E - 001
0-230	0.9	55 418 4	E,40* 1.3	24E+000 +/-	- 7.578-00	1 4.84E-00.	1 +/- 1.31E-001



	KOJECT NAME/NO.	West Lake Landfill Operab	le Unit I	
	AB:	TestAmerica - St. Louis		
	DG:	160-3110		
	TRACTION:	Chloride, Sulfate, Nitrate, I	Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)	
Т	/IEDIA:	GROUNDWATER		
	AMPLES:	PURGE TANK		
	AMPLE DATE(S):	7/24/2013		
איני	CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
2	ata Completeness, Holding	Cooler temp < 6 C.	Coolers received at 2° C.	None
<u>ל</u> ד	imes & Preservation	Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Holding time requirements were met for all samples.	
	Calibration and Continuing Calibration Verification tandards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
A L	lanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods.	None
			CCBs : <u>CCB 160-64282/35</u> Cl (0.0275 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification	
2	aboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Ď	ab Duplicates,	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PURGE TANK - results were in control	None

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ROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
DG:	160-3110
TRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
/IEDIA:	GROUNDWATER
AMPLES:	PURGE TANK
AMPLE DATE(S):	7/24/2013

		TestAmerica - St. Louis		
	DG:	160-3110		
	TRACTION:	Chloride, Sulfate, Nitrate, I	Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)	
Π	/IEDIA:	GROUNDWATER		
	AMPLES:	PURGE TANK		
2	AMPLE DATE(S):	7/24/2013		
	CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
	pike Sample Analysis	MS recovery within lab established limits	MS analysis for I , NO3, Cl, Br, SO4 was performed on PURGE TANK - results were in control	None
Σ	ow Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
RCH	ield Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None
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PROJECT NAME/NO.	West Lake Landfill Operable U	/est Lake Landfill Operable Unit 1						
LAB:	estAmerica - St. Louis							
SDG:	160-3110							
FRACTION:	VOA (SW846 8260C) for the T	arget Compound List only						
MEDIA:	GROUNDWATER	ROUNDWATER						
SAMPLES:	PURGE TANK							
SAMPLE DATE(S):	7/24/2013	24/2013						
			Qualifiers Added?					
	Accentable limits / criteria	Comments/Qualifying Actions						
	Acceptable minus / criteria							
CRITERIA			XT.					
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days	Coolers received at 2° C.	None					
1 rescivation	if HCL preserved).	All holding time criteria met.						
	· · · · · · · · · · · · · · · · · · ·							
System Monitoring Compounds	recoveries within limits (70 - 130%)	System monitoring compound recoveries were in control	None					
	or laboratory established limits							
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	No MS/MSD performed with this SDG	None					
Duplicates	Recoveries and RPDs within lab							
	limits							
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-	LCS 160-63151/4 - results were in control	None					
	130%).							
Blanks	Method blanks: 1 per 12 hours. No	MB 160-63151/2 - no analytes were detected	None					
	analytes detected in MB, 1B, or EB.							
	Trin Disular	an analata mana data ta d	N					
	Trip Blanks	no analytes were detected	None					
			XT.					
	Equipment Blanks	No held blanks were associated to this SDG	ivone					
GC/MS Initial Calibration	%RSD \leq 30%. Average RRFs >	Initial Calibration	None					
	0.050 or lab limits.	Instrument MSY 07/22/2013 23:34						
		All %RSD criteria met.						
		Average RRF meets requirements.						
GC/MS Continuing Calibration	CV performed for every 12 hours per	CCVIS 160-63151/3 - results were in control	None					
	instrument. % D $\leq 20\%$. RRFs ≥ 0.05							
		Kr was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds						
Internal Standards	IS areas of samples & blank within (Standard recovery area within the QC limits for all three standards; and retention times were within 30	None					
	50% to + 100%). RTs < 30 seconds.	seconds of the standard for all samples that were used in this SDG.						
Field Duplicate	Field duplicate: PPD < 35% or	No field duplicates were collected with this sample set	None					
r iciu Duplicate	Absolute Diff < 5XRL when	i to note duplicates were concered with this sample set.	TYONG					
	samp/dup value < 5X RL							

 RT = Retention Time;
 %D = Percent Deviation;
 %RPD = Relative Percent Difference;
 %RSD = Percent Relative Standard Deviation;
 RRF = Relative Response Factor;
 CCV = Continuing Calibrat

 TCL = Target Compound List;
 TIC = Tentatively Identified Compound
 TIC = Tentatively Identified Compound
 CCV = Continuing Calibrat

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1							
LAB:	TestAmerica - St. Louis	TestAmerica - St. Louis						
SDG:	160-3110	160-3110						
FRACTION:	Metals (SW846 6010B and 7470A/7471A)							
MEDIA:	GROUNDWATER (TOT	AL)						
SAMPLES:	PURGE TANK							
SAMPLE DATE(S):	7/24/2013							
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?					
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None					
Calibration	Calibration every 24 hours Hg r^2 \geq 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90- 110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None					
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: <u>MB 160-63421/1-A (total and dissolved)</u> - no analytes detected <u>MB 160-64080/1-A: Hg (Total)</u> - no analytes detected <u>MB 160-64081/1-A: Hg (dissolved)</u> - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: Metals CCBs - no detects Hg CCBs - no detects	None					

PROJECT NAME/NO.	West Lake Landfill Opera	ble Unit 1				
LAB:	TestAmerica - St. Louis					
SDG:	160-3110					
FRACTION:	Metals (SW846 6010B an	nd 7470A/7471A)				
MEDIA:	GROUNDWATER (TOT	'AL)				
SAMPLES:	PURGE TANK					
SAMPLE DATE(S):	7/24/2013					
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?			
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None			
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80- 120%.	LCS results within limits for total and dissolved metals	None			
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None			
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75- 125%	MS/MSDs performed on PURGE TANK for dissolved Hg - results were in control	None			
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None			
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None			
Serial Dilution	Performed on samples of a similar matrix or 1 per 20samples. $\%D \le 10\%$ conc \ge 50xDL for 5-fold dilution.	Serial dilutions were performed on PURGE TANK for dissolved Hg - results were in control	None			

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1						
LAB:	TestAmerica - St. Louis						
SDG:	160-3110						
FRACTION:	Metals (SW846 6010B an	d 7470A/7471A)					
MEDIA:	GROUNDWATER (TOT	AL)					
SAMPLES:	PURGE TANK						
SAMPLE DATE(S):	7/24/2013						
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?				
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None				

RT = Retention Time;% D = Percent Deviation;% RPD = Relative Percent Difference;% RSD = Percent Relative Standard Deviation;RRF = Relative ResponseTCL = Target Compound List;MS = Matrix Spike;MSD = Matrix Spike Duplicate;% RSD = Percent Relative Standard Deviation;RRF = Relative Response

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3079
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-100-KS

SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Standards			
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	 Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs 	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PZ-100-KS - results were in control Lab duplicate for I was performed on PZ-102R-SS - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for I, NO3, Cl, Br, SO4 was performed on PZ-100-KS - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3079
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-100-KS
SAMPLE DATE(S):	7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Low Level Control Sample	recovery within 80-	Performed on alkalinity only. Results were in control.	None
	120%		
Field Duplicate	Field duplicate: RPD <	No field duplicates were collected with this sample set.	None
	35% or Absolute Diff		
	< 5XRL when		
	samp/dup value < 5X		
	RL		

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nt 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3079			
FRACTION:	VOA (SW846 8260C) for the Ta	arget Compound List only		
MEDIA:	GROUNDWATER			
SAMPLES:	PZ-100-KS			
SAMPLE DATE(S):	7/23/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifie Added	
Data Completeness, Holding Times,	Cooler temp < 6 °C. Samples	Coolers received at 3° C.	None	
Preservation	holding time requirement < 7 days			
	(<14 days if HCL preserved).	All holding time criteria met.		
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None	
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	MS/MSD performed on a sample from another project	None	
Duplicates	Recoveries and RPDs within lab			
	limits			
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-62847/4</u> - results were in control	None	
Blanks	Method blanks: 1 per 12 hours. No	MB 160-62847/2 - no analytes were detected	None	
	analytes detected in MB, TB, or EB.			
	Trip Blanks	no analytes were detected	None	
	Equipment Blanks	No field blanks were associated to this SDG	None	
GC/MS Initial Calibration	$%$ RSD \leq 30%. Average RRFs >	Initial Calibration	None	
	0.050 or lab limits.	Instrument MSY 07/22/2013 23:34		
		All %RSD criteria met.		
		Average RRF meets requirements.		
GC/MS Continuing Calibration	CV performed for every 12 hours per	CCVIS 160-62847/3	None	
	instrument. % D \leq 20%. RRFs \geq 0.05	Chloroethane 22.2% - associated samples were not detected - no qualification required		
		compounds		
		compounds		
Internal Standards	IS areas of samples & blank within (-	Standard recovery area within the QC limits for all three standards; and retention times were within	None	
	50% to + 100%). RTs < 30 seconds.	30 seconds of the standard for all samples that were used in this SDG.		
Field Duplicate	Field duplicate: RPD < 35% or	No field duplicates were collected with this sample set.	None	
	Absolute Diff < 5 XRL when			

PROJECT NAME/NO.	West Lake Landfill (Operable Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3079			
FRACTION:	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER	TOTAL)		
SAMPLES:	PZ-100-KS			
SAMPLE DATE(S):	7/23/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 3° C. All holding time criteria met.	None	
Calibration	Calibration every 24 hours Hg $r^2 \ge 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80- 120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None	
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	 Method blanks: <u>MB 160-63421/1-A (total and dissolved)</u> - no analytes detected <u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected <u>MB 160-62433/1-A: Hg (dissolved)</u> - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-63920/28 (total and dissolved) Co 6.2 ug/L - associated sample were not detected - no qualifications required Hg CCBs - no detects 	None	

PROJECT NAME/NO.	West Lake Landfill	Operable Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3079			
FRACTION:	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER	(TOTAL)		
SAMPLES:	PZ-100-KS			
SAMPLE DATE(S):	7/23/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
CRDL Standard	CRDL results btw 70- 130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None	
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None	
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None	
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75- 125%	MS/MSDs performed on I-73 for total and dissolved Hg: Hg(tot)37%/33% Hg (diss) 34%/33% MS/MSDs performed on PZ-100-KS for dissolved metals - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc	All tot samples Hg J-/UJ- All dissolved samples Hg J-/UJ-	
ICP Interference Check Sample (ICS)	ICS results within 80- 120%.	All criteria met.	None	
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None	
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-100-KS for dissolved metals - results were in control Serial dilutions were performed on I-73 for total and dissolved Hg - results were in control		

PROJECT NAME/NO.	West Lake Landfill (Dperable Unit 1		
LAB:	TestAmerica - St. Lo	uis		
SDG:	160-3079			
FRACTION:	Metals (SW846 6010	OB and 7470A/7471A)		
MEDIA:	GROUNDWATER	(TOTAL)		
SAMPLES:	PZ-100-KS			
SAMPLE DATE(S):	7/23/2013			
CRITERIA	Acceptable limits /	Comments/Qualifying Actions		Qualifiers
	criteria			Added?
Field Duplicate	Field duplicate: RPD <	No field duplicates were collected with this sample set.		None
	35% or Absolute Diff <			
	5XRL when samp/dup			
	value < 5X RL			
RT = Retention Time; %D = Perc	cent Deviation; %RP	D = Relative Percent Difference; %RSD = Percent Relative Standard Deviation;	RRF = Relative Res	ponse Factor;
TCL = Target Compound List;	MS = Matrix Spike;	MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3068
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-305-AI, LR-104
SAMPLE DATE(S):	7/22/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PZ-305-AI - results were in control Lab duplicate for I was performed on PZ-102R-SS (SDG 160-3052) - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for NO3, Cl, Br, SO4 was performed on PZ-305-AI - results were in control MS analysis for I was performed on PZ-102R-SS (SDG 160-3052) - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3068
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-305-AI, LR-104
SAMPLE DATE(S):	7/22/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Low Level Control Sample	recovery within 80-	Performed on alkalinity only. Results were in control.	None
	120%		
Field Duplicate	Field duplicate: RPD <	No field duplicates were collected with this sample set.	None
	35% or Absolute Diff		
	< 5XRL when		
	samp/dup value < 5X		
	RL		

PROJECT NAME/NO.	West Lake Landfill Operable Un	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3068		
FRACTION:	VOA (SW846 8260C) for the Ta	arget Compound List only	
MEDIA:	GROUNDWATER		
SAMPLES:	PZ-305-AI, LR-104		
SAMPLE DATE(S):	7/22/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 3° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed I-73 (SDG 160-3052) Chloroethane 164%/142% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-62292/4-A - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-62292/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were associated to this SDG	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. $%D \le 20\%$. RRFs ≥ 0.05	<u>CCVIS 160-62292/2</u> Chloroethane 38.4% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target	None
Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

CCV = Continuing Calibration Verification

TIC = Tentatively Identified Compound

TCL = Target Compound List;

PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES:	West Lake Landfill Operable TestAmerica - St. Louis 160-3052 Metals (SW846 6010B and 74 GROUNDWATER (TOTAL) I-73, PZ-103-SS, PZ-102R-SS	Unit 1 970A/7471A) 5, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-	107-SS)
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. Analytical batch 63435 and 63744: The sample results for iron and magnesium were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. 62879 and 62880: the samples were prepped at a dilution due to their matrix. Samples were light brown in color and had a strong odor.	None
Calibration	$\begin{array}{l} \mbox{Calibration every 24 hours} \\ \mbox{Hg } r^2 \geq 0.995 \\ \mbox{CCV every 10 samples or 2 hours} \\ \mbox{ICP } CV/CCV \ \%R = \ 90\mbox{-}110\% \\ \mbox{Hg } CV/CCV \ \%R = \ 80\mbox{-}120\% \end{array}$	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3052		
FRACTION:	Metals (SW846 6010B and 74	470A/7471A)	
MEDIA:	GROUNDWATER (TOTAL)		
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS	S, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ	Z-107-SS)
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project	Method blanks: MB 160-62880/1-A (total) - no analytes detected	I-73 Mn (dis) J+
	samples. No TCL detected in MB, TB, or EB.	MB 160-62879/1-A (dissolved) Mn (11 4 us/L)	PZ-102R-SS Mn (dis) I+
		 - qualify associated detects < 5X blank conc as J+ - qualify associated detects <rl as="" li="" u<=""> </rl>	Zn (dis) U
		Zn (7.4 ug/L) - qualify associated detects <rl as="" th="" u<=""><th>PZ-107-SS Zn (dis) U</th></rl>	PZ-107-SS Zn (dis) U
		MB 160-62431/1-A: Hg (Total) - no analytes detected	P7-106-KS
		MB 160-62433/1-A: Hg (dissolved) - no analytes detected	Mn (dis) U
		Equipment blank: No equipment blanks associated to this SDG.	DUPLICATE 08 Zn (dis) U
		CCBs:	
		<u>CCB 160-63744/101 (dis)</u>	
		Be (1.6 ug/L) - associated results were not detected - no qualification required	
		CCB 160-63280/49 (tot)	
		Be (0.7 ug/L) - associated results were not detected - no qualification required	
		<u>CCB 160-63280/85 (tot)</u> Be (1.5 ug/L) - associated results were not detected - no qualification required	
		Hg CCBs - no detects	
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3052		
FRACTION:	Metals (SW846 6010B and 74	470A/7471A)	
MEDIA:	GROUNDWATER (TOTAL)		
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS	S, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ	Z-107-SS)
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 for total metals and Hg: Mn 66%/42% Ag 73%/71% Ba pass/53% Zn 63%/36% Hg 37%/33% qualify associated samples as J/UJ MS/MSDs performed on I-73 for dissolved metals and Hg: Hg 34%/33% qualify associated samples as J/UJ recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI (SDG 160-3013) for total Hg - all results in control	All tot samples Mn J-/UJ- Ag J-/UJ- Ba J-/UJ- Zn J-/UJ- Hg J-/UJ- All dissolved samples Hg J-/UJ-
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on I-73 total: 1X dilution Al, Ba, Fe, Mn, Zn - qualify associated detects as J/UJ dissolved 1X dilution Ba, Fe, Mn, Zn - qualify associated detects as J/UJ	all samples total (1X) Al J/UJ Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ all samples dissolved (1X) Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3052		
FRACTION:	Metals (SW846 6010B and 74	470A/7471A)	
MEDIA:	GROUNDWATER (TOTAL)	
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS	S, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup	of PZ-107-SS)
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or	The following field duplicates were collected with this sample set.	None
	Absolute Diff < 5XRL when samp/dup value < 5X RL	DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	
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RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RTCL = Target Compound List;MS = Matrix Spike;MSD = Matrix Spike Duplicate;%R

%RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification RRF = Relative Response Factor;

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3052
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S):	7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63730/1 alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: <u>CCB 160-62889/61</u> Cl (0.0212 mg/L) = all associated sample conc >5X blank conc X DF - no qualification required <u>CCB 160-62889/71</u> Cl (0.0728 mg/L) - qualify associated detects < 5X blank conc X DF as J+	PZ-102-SS Cl J+
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for I, NO3, Cl, Br, SO4 was performed on PZ-102R-SS - results were in control Lab duplicate for alkalinity was performed on I-73 - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3052
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S):	7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab	MS analysis for I, NO3, Cl, Br, SO4 was performed on PZ-102R-SS - results were in control	None
	established limits	MS analysis for alkalinity was performed on I-73 - results were in control	
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or	The following field duplicates were collected with this sample set.	None
	Absolute Diff < 5XRL when	DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	
	samp/dup value < 5X RL		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3052
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S):	7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. The following samples effervesced when HCl was added - they were not preserved and have a 7 day holding time: I-73, PZ-103-SS, PZ-107-SS, DUPLICATE 08	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed I-73 Chloroethane 164%/142% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-62292/4-A - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-62292/3-A - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	Field blank at 1-73 - no analytes were detected	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. $%D \le 20\%$. RRFs ≥ 0.05	<u>CCVIS 160-62292/2</u> Chloroethane 38.4% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3052
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S):	7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	None

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;RRF = Relative Response Factor;TCL = Target Compound List;TIC = Tentatively Identified CompoundCCV = Continuing Calibration VerificationRRF = Relative Response Factor;

PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES:	West Lake Landfill Operable TestAmerica - St. Louis 160-3052 Metals (SW846 6010B and 74 GROUNDWATER (TOTAL) I-73, PZ-103-SS, PZ-102R-SS	Unit 1 970A/7471A) 5, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-	107-SS)
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. Analytical batch 63435 and 63744: The sample results for iron and magnesium were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. 62879 and 62880: the samples were prepped at a dilution due to their matrix. Samples were light brown in color and had a strong odor.	None
Calibration	$\begin{array}{l} \mbox{Calibration every 24 hours} \\ \mbox{Hg } r^2 \geq 0.995 \\ \mbox{CCV every 10 samples or 2 hours} \\ \mbox{ICP } CV/CCV \ \%R = \ 90\mbox{-}110\% \\ \mbox{Hg } CV/CCV \ \%R = \ 80\mbox{-}120\% \end{array}$	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3052			
FRACTION:	Metals (SW846 6010B and 7470A/7471A) GROUNDWATER (TOTAL) I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)			
MEDIA:				
SAMPLES:				
SAMPLE DATE(S):	7/19/2013		r í	
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: MB 160-62880/1-A (total) - no analytes detected MB 160-62879/1-A (dissolved)	I-73 Mn (dis) J+ PZ-102R-SS	
		Mn (11.4 ug/L) - qualify associated detects < 5X blank conc as J+ - qualify associated detects <rl as="" u<br="">Zn (7.4 ug/L) - qualify associated detects <rl as="" th="" u<=""><th>Mn (dis) J+ Zn (dis) U PZ-107-SS</th></rl></rl>	Mn (dis) J+ Zn (dis) U PZ-107-SS	
		<u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected MB 160-62433/1-A: Hg (dissolved) - no analytes detected	Zn (dis) U PZ-106-KS Mn (dis) U	
		Equipment blank: No equipment blanks associated to this SDG.	DUPLICATE 08 Zn (dis) U	
		CCBs: <u>CCB 160-63744/101 (dis)</u> Be (1.6 ug/L) - associated results were not detected - no qualification required		
		CCB 160-63280/49 (tot) Be (0.7 ug/L) - associated results were not detected - no qualification required		
		CCB 160-63280/85 (tot) Be (1.5 ug/L) - associated results were not detected - no qualification required		
		Hg CCBs - no detects		
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None	
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None	
Lab Duplicates	RPD <20% or Absolute Diff <RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None	

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3052			
FRACTION:	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER (TOTAL)			
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)			
SAMPLE DATE(S):	7/19/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 for total metals and Hg: Mn 66%/42% Ag 73%/71% Ba pass/53% Zn 63%/36% Hg 37%/33% qualify associated samples as J/UJ MS/MSDs performed on I-73 for dissolved metals and Hg: Hg 34%/33% qualify associated samples as J/UJ recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI (SDG 160-3013) for total Hg - all results in control	All tot samples Mn J-/UJ- Ag J-/UJ- Ba J-/UJ- Zn J-/UJ- Hg J-/UJ- All dissolved samples Hg J-/UJ-	
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None	
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None	
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on I-73 total: 1X dilution Al, Ba, Fe, Mn, Zn - qualify associated detects as J/UJ dissolved 1X dilution Ba, Fe, Mn, Zn - qualify associated detects as J/UJ	all samples total (1X) Al J/UJ Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ all samples dissolved (1X) Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ	

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1			
LAB:	TestAmerica - St. Louis				
SDG:	160-3052				
FRACTION:	Metals (SW846 6010B and 74	470A/7471A)			
MEDIA:	GROUNDWATER (TOTAL	GROUNDWATER (TOTAL)			
SAMPLES:	I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)				
SAMPLE DATE(S):	7/19/2013				
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?		
Field Duplicate	Field duplicate: RPD < 35% or	The following field duplicates were collected with this sample set.	None		
	Absolute Diff < 5XRL when samp/dup value < 5X RL	DUP 08 was collected as a field dup of PZ-107-SS - all results were in control			
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RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RTCL = Target Compound List;MS = Matrix Spike;MSD = Matrix Spike Duplicate;%R

%RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification RRF = Relative Response Factor;

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3040
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S):	7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	 Method Blank: MB 160-63730/1 alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes detected 	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on S-53 - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3040
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S):	7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab	MS analysis for I was performed on S-53 - results were in control	None
	established limits		
		MS analysis for NO3, Br, Cl and SO4 was performed on PZ-102R-SS (SDG 160-3052) - results were in	
		control	
Low Level Control Sample	recovery within 80-	Performed on alkalinity only. Results were in control.	None
	120%		
Field Duplicate	Field duplicate: RPD <	The following field duplicates were collected with this sample set.	None
	35% or Absolute Diff	DUP 07 was collected as a field dup of I-65 - all results were in control	
	< 5XRL when		
	samp/dup value < 5X		
	RL		

PROJECT NAME/NO.	West Lake Landfill Operable Un	nit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3040			
FRACTION:	VOA (SW846 8260C) for the Target Compound List only			
MEDIA:	GROUNDWATER			
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)			
SAMPLE DATE(S):	7/18/2013			
	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
CRITERIA				
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days	Coolers received at 2° C.	None	
	(<14 days if HCL preserved).			
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample PZ-205-AS 4-Bromofluorobenzene 80% - qualify results as J/UJ	PZ-205-AS all compounds J/UJ	
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	MS/MSD performed LR-100 (SDG 160-3013)	All samples	
Duplicates	Recoveries and RPDs within lab limits	Chloroethane 190%/185% - associated samples were not detected - no qualification required Bromoform 83%/pass - qualify results as J/UJ Dichlorodifluoromethane 77%/82%	Bromoform J/UJ Dichlorodifluoromethane J/UJ	
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-61804/4-A Chloroethane (170%) - associated samples were not detected - no qualification required LCS 160-62292/4-A - results were in control	None	
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-61804/3-A - no analytes were detected MB 160-62292/3-A - no analytes were detected	None	
	Trip Blanks	no analytes were detected	None	
	Equipment Blanks	No field blanks were collected with this sample set.	None	
GC/MS Initial Calibration	%RSD \leq 30%. Average RRFs >	Initial Calibration	None	
	0.050 or lab limits.	Instrument MSX 07/15/2013 11:23 All %RSD criteria met.		
		Average RRF meets requirements.		
PROJECT NAME/NO.	West Lake Landfill Operable Un	nit 1		
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LAB:	TestAmerica - St. Louis			
SDG:	160-3040			
FRACTION:	VOA (SW846 8260C) for the T	arget Compound List only		
MEDIA:	GROUNDWATER			
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D	-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate	of I-65)	
SAMPLE DATE(S):	7/18/2013			
	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
CRITERIA				
GC/MS Continuing Calibration	CV performed for every 12 hours per	CCVIS 160-61804/2	None	
	instrument. %D \leq 20%. RRFs \geq 0.05	Chloroethane 86.3% - associated samples were not detected - no qualification required		
		CCVIS 160 62202/2		
		Chloroethane 38.4% - not a target for the sample analyzed		
		RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all		
		target compounds		
Internal Standards	IS areas of samples & blank within (Standard recovery area within the QC limits for all three standards; and retention times	None	
	50% to $+$ 100%). RTs $<$ 30 seconds.	were within 30 seconds of the standard for all samples that were used in this SDG.		
Field Duplicate	Field duplicate: $RPD < 35\%$ or	The following field duplicates were collected with this sample set.	None	
	Absolute Diff < 5 XRL when	DUP 07 was collected as a field dup of I-65 - all results were in control		
	samp/uup value < 3A KL			

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;RRF = Relative Response Factor;TCL = Target Compound List;TIC = Tentatively Identified CompoundCCV = Continuing Calibration VerificationRRF = Relative Response Factor;

PROJECT NAME/NO.	West Lake Landfill Operable Uni	t 1				
LAB:	TestAmerica - St. Louis	TestAmerica - St. Louis				
SDG:	160-3040					
FRACTION:	Metals (SW846 6010B and 74704	A/7471A)				
MEDIA:	GROUNDWATER (TOTAL)					
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D-	13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65	5)			
SAMPLE DATE(S):	7/18/2013					
CRITERIA	Acceptable limits / criteria	Acceptable limits / criteria Comments/Qualifying Actions Qualifiers Added				
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. The sample results for antimony, iron, magnesium, manganese, and sodium and were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that	None			
Calibration	Calibration every 24 hours Hg r^2 ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None			

PROJECT NAME/NO.	West Lake Landfill Operable Uni	t 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3040			
FRACTION:	Metals (SW846 6010B and 7470A/7471A) GROUNDWATER (TOTAL)			
MEDIA:				
SAMPLES:	S-53 D-14 P7-205-AS I-65 D-	13 PZ-104-KS PZ-206-SS PZ-207-AS DUPLICATE 07 (Field duplicate of L	65)	
SAMPLE DATE(S):	7/18/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Blanks (method blank, prep blank)	CC Blank Conc < CRQL.	Method blanks:	S-53	
	Method blanks: 1 per 20 project	MB 160-62880/1-A (total) - no analytes detected	Zn (dis) U	
	samples. No TCL detected in MB,		Be (tot) U	
	TB, or EB.	<u>MB 160-62879/1-A (dissolved)</u>		
		Mn (11.4 ug/L)	D-14	
		- qualify associated detects < 5X blank conc as J+	Zn (dis) U	
		- qualify associated detects <rl as="" td="" u<=""><td></td></rl>		
		Zn (7.4 ug/L) - qualify associated detects <rl as="" th="" u<=""><th>PZ-205-AS</th></rl>	PZ-205-AS	
		MP 160 62/21/1 A: Hg (Total) no analytes detected	Zn (dis) U	
		$\frac{100-02451/1-A. Hg}{100a1} - 100 analytes detected$	De (loi) U	
		MB 160-62433/1-A: Hg (dissolved) - no analytes detected	1-65	
			Mn (dis) J+	
		Equipment blank: No equipment blanks associated to this SDG.		
			PZ-104-KS	
		CCBs:	Mn (dis) U	
		<u>CCB 160-63744/101 (dis)</u>		
		Be (1.6 ug/L) - associated results were not detected - no qualification required	PZ-206-SS	
			Mn (dis) J+	
		<u>CCB 160-63280/49 (tot)</u>		
		Be (0.7 ug/L) - qualify associated detects <rl as="" th="" u<=""><th>DUPLICATE 07</th></rl>	DUPLICATE 07	
			Mn (dis) J+	
		Hg CCBs - no detects		
CRDL Standard	CRDL results btw 70-130%	The CRI was in control	None	
	50-150% for Sb, Pb, and Tl			
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples	LCS results within limits for total and dissolved metals	None	
r	or each preparation batch. LCS limits			
	within 80-120%.			
Lab Duplicates	RPD <20% or Absolute Diff < RL	No lab duplicates were analyzed within this SDG.	None	
	when samp/dup value $< 5x RL$			

PROJECT NAME/NO.	West Lake Landfill Operable Uni	t 1			
LAB:	TestAmerica - St. Louis				
SDG:	160-3040	160-3040			
FRACTION:	Metals (SW846 6010B and 7470)	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER (TOTAL)	GROUNDWATER (TOTAL)			
SAMPLES:	S-53, D-14, PZ-205-AS, I-65, D-	13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65	5)		
SAMPLE DATE(S):	7/18/2013		, 		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?		
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 (SDG 160-3052) for total and dissolved metals and Hg Mn (tot) 66%/42% Ag (tot) 73%/71% Ba (tot) pass/53% Zn (tot) 63%/36% Hg (tot) 37%/33% Hg (dis) 34%/33%	all samples Mn (tot) UJ-/J- Ag (tot) UJ-/J- Ba (tot) UJ-/J- Zn (tot) UJ-/J- Hg (tot) UJ-/J- Hg (dis) UJ-/J-		
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None		
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None		
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $\%D \le 10\%$ conc ≥ 50 xDL for 5-fold dilution.	Serial dilutions were performed on I-73 (SDG 160-3052) for total and dissolved metals and Hg - all results in control	None		
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 07 was collected as a field dup of I-65 - all results were in control	None		

RT = Retention Time; TCL = Target Compound List;

%D = Percent Deviation;

MS = Matrix Spike;

MSD = Matrix Spike Duplicate;

%RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3022
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S):	7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding	Cooler temp < 6 C.	Coolers received at 2° C.	None
Times & Preservation	Holding time $= 28$ days for		
	chloride, sulfate, bromide and	Holding time requirements were met for all samples.	
	iodide		
	14 days for alkalinity	There was a discrepancy between the containers received and the COC. The bottle ID was PZ-100-KS	
	48 hrs for nitrate.	and the COC read PZ-111-KS. PZ-111-KS was correct.	
Calibration and Continuing	R2>0.99	ICVs, CCVs, and Calibrations were in control.	None
Calibration Verification	CCVs 90-110%		
Standards			
Blanks	Method blanks: 1 per 20	Method Blank:	None
	project samples. No analytes	no analytes detected	
	detected in MBs, CCBs or		
	EBs.	Equipment blank: No equipment blanks were collected for these methods.	
		CCBs:	
		CCB 160-63933/46 Chloride 0.0215 mg/L - all samples concentrations > 5X the blank value X Dilution	
		Factor - no qualification required	
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on LR-100 - results were in control	None
	Absolute Diff < RL when		
	samp/dup value < 5x RL		
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PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3022
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S):	7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on LR-100	all samples
	established limits	Iodide (87%) - qualify associated samples as J-/UJ-	I J-/UJ-
		MS analysis for bromide and NO3 was performed on PZ-102R-SS (SDG 160-3052) - results were in control	
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35%	The following field duplicates were collected with this sample set.	None
	or Absolute Diff < 5XRL	DUP 06 was collected as a field dup of D-81 - all results were in control	
	when samp/dup value < 5X		
	RL		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3022
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S):	7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times,	Cooler temp < 6 °C. Samples	Coolers received at 2° C.	None
Preservation	holding time requirement < 7 days		
	(<14 days if HCL preserved).	All holding time criteria met.	
		There was a discrepancy between the containers received and the COC. The bottle ID was PZ-100-KS and the COC read PZ-111-KS. PZ-111-KS was correct.	
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample LR- 100	LR-100 all compounds J/UJ
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	MS/MSD performed LR-100	All samples
Duplicates	Recoveries and RPDs within lab	Chloroethane 190%/185% - associated samples were not detected - no	Bromoform J/UJ
	limits	qualification required	Dichlorodifluoromethane J/UJ
		Bromoform 83%/pass - qualify results as J/UJ	
		Dichlorodifluoromethane 77%/82% - qualify results as J/UJ	
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-61804/4-A Chloroethane (170%) - associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No	MB 160-61804/3-A - no analytes were detected	None
	analytes detected in MB, TB, or EB.	<u></u>	
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were collected with this sample set.	None
GC/MS Initial Calibration	$\%$ RSD \leq 30%. Average RRFs >	Initial Calibration	None
	0.050 or lab limits.	Instrument MSX 07/15/2013 11:23	
		All %RSD criteria met.	
		Average RRF meets requirements.	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3022
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S):	7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. $\text{\%D} \le 20\%$. RRFs ≥ 0.05	<u>CCVIS 160-61804/2</u> Chloroethane 86.3% - associated samples were not detected - no qualification required	None
		RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for	
Internal Standards	IS areas of samples & blank within (50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 06 was collected as a field dup of D-81 - all results were in control	None

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;TCL = Target Compound List;TIC = Tentatively Identified CompoundCCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3022		
FRACTION:	Metals (SW846 6010B and 7470	DA/7471A)	
MEDIA:	GROUNDWATER (TOTAL)		
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-1	103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)	
SAMPLE DATE(S):	7/17/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. There was a discrepancy between the containers received and the COC. The bottle ID was PZ- 100-KS and the COC read PZ-111-KS. PZ-111-KS was correct. The sample results for aluminum and iron were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference.	None
Calibration	Calibration every 24 hours Hg r^2 ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3022		
FRACTION:	Metals (SW846 6010B and 7470)A/7471A)	
MEDIA:	GROUNDWATER (TOTAL)		
SAMPLES:	LR-100, D-81, PZ-204-SS, LR-1	103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)	
SAMPLE DATE(S):	7/17/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: MB 160-61454/1-A (total) Co (5.9 ug/L) - qualify associated detects <rl as="" td="" u<=""> MB 160-61452/1-A (dissolved) - no analytes detected MB 160-61467/1-A: Hg (Total) - no analytes detected MB 160-61468/1-A: Hg (dissolved) - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-61766/98 (dis) Se (2.9 ug/L) - qualify associated detects <rl as="" td="" u<=""> CCB 160-61766/110 (dis) Se (3.2 ug/L) - qualify associated detects <rl as="" td="" u<=""> CCB 160-62409/26 and 37 (tot) - no detects</rl></rl></rl>	D-81 Co (tot) U PZ-203-SS Co (tot) U LR-103 Se (dis) U D-87 Se (dis) U DUPLICATE 06 Co (tot) U
CRDL Standard	CRDL results btw 70-130%	Hg CCBs - no detects The CRI was in control	None
	50-150% for Sb, Pb, and T1		
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nit 1			
LAB: SDC:	1 estAmerica - St. Louis				
FRACTION:	Metals (SW846 6010B and 747)	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER (TOTAL)				
SAMPLES:	LR-100 D-81 PZ-204-SS LR-	103 PZ-111-KS PZ-203-SS D-87 DUPLICATE 06 (Field dup of D-81)			
SAMPLE DATE(S):	7/17/2013				
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?		
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75- 125%	MS/MSDs performed on D-12 (SDG 160-3000) for dissolved metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-208-SS (SDG 160-3013) for total metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-304-AI (SDG 160-3013) for total Hg - all results in control	None		
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None		
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None		
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $%D \le 10\%$ conc $\ge 50xDL$ for 5-fold dilution.	Serial dilutions were performed on PZ-208-SS (SDG 160-3013) for total metals and dissolved Hg. Serial dilutions were performed on a West Lake sample from another SDG for dissolved metals Serial dilutions were performed on PZ-303-AI (SDG 160-3013) for total Hg. All results were in control	None		
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 06 was collected as a field dup of D-81 - all results were in control	None		

RT = Retention Time; %D TCL = Target Compound List;

%D = Percent Deviation; % ist; MS = Matrix Spike;

%RPD = Relative Percent Difference; e; MSD = Matrix Spike Duplicate; %RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3013
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S):	7/16/2013

	Acceptable limits /	Comments/Qualifying Actions	Qualifiers Added?
CRITERIA	criteria		
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide	Coolers received at 2° C. Holding time requirements were met for all samples.	None
	14 days for alkalinity 48 hrs for nitrate.	PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	 Method Blank: no analytes detected Equipment blank: No equipment blanks were collected for these methods. CCBs: CCB 12:27 Chloride 0.0214 mg/L - all samples concentrations > 5X the blank value X Dilution Factor - no qualification required 	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on PZ-208-SS - results were in control Lab duplicate for alkalinity was performed on PZ-303-AI - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3013
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S):	7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-208-SS Chloride (112%) - qualify associated samples as J+ MS analysis for alkalinity was performed on PZ-303-AI - results were in control	all samples Cl J+
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3013
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S):	7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met.	None
		PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample MW-104 4-Bromofluorobenzene 80% - qualify results as J/UJ	MW-104 all compounds J/UJ
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed PZ-208-SS Chloroethane 172%/146% - associated samples were not detected - no qualification required Bromoform pass/82% - qualify results as J/UJ	All samples Bromoform J/UJ
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-61806/4-A Chloroethane (150%) - associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-61806/3-A - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were collected with this sample set.	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3013
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S):	7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per	<u>CCVIS 160-61806/2</u>	None
	instrument. %D \leq 20%. RRFs \geq 0.05	Chloroethane 36.2% - associated samples were not detected - no qualification required	
		RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	
Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;TCL = Target Compound List;TIC = Tentatively Identified CompoundCCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3013			
FRACTION:	Metals (SW846 6010B and 7	/470A/7471A)		
MEDIA:	GROUNDWATER (TOTAL	.)		
SAMPLES:	PZ-208-SS, PZ-303-AI, PZ-3	304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS		
SAMPLE DATE(S):	7/16/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. PZ-208-SS (160-3013-1): The sample results for aluminum and were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	None	
Calibration	Calibration every 24 hours Hg r^2 ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None	

PROJECT NAME/NO.	West Lake Landfill Operabl	e Unit 1			
LAB:	TestAmerica - St. Louis				
SDG:	160-3013 Metals (SW846 6010B and 7470A/7471A)				
FRACTION:					
MEDIA:	GROUNDWATER (TOTAL) PZ-208-SS PZ-303-AL PZ-304-AS MW-104 PZ-204A-SS PZ-302-AL PZ-302-AS				
SAMPLES:					
SAMPLE DATE(S):	7/16/2013				
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?		
Blanks (method blank, prep blank)	CC Blank Conc < CRQL.	Method blanks:	PZ-208-SS		
	Method blanks: 1 per 20 project	<u>MB 160-61454/1-A (total)</u>	Se (dis) U		
	samples. No TCL detected in	Co (5.9 ug/L) - qualify associated detects <rl as="" td="" u<=""><td></td></rl>			
	MB, TB, or EB.		PZ-303-AI		
		MB 160-61452/1-A (dissolved) - no analytes detected	(PZ-304-AI)		
			Co (tot) U		
		MB 160-61467/1-A: Hg (Total) - no analytes detected	Se (dis) U		
		MB 160-61468/1-A: Hg (dissolved) - no analytes detected	PZ-304-AS		
			Co (tot) U		
		Equipment blank: No equipment blanks associated to this SDG.			
			MW-104		
		CCBs:	Co (tot) U		
		<u>CCB 160-61766/86 (dis)</u>	Se (dis) U		
		Se (2.9 ug/L) - qualify associated detects <rl as="" td="" u<=""><td></td></rl>			
			PZ-204A-AS		
		<u>CCB 160-61766/98 (dis)</u>	Co (tot) U		
		Se (2.9 ug/L) - qualify associated detects <rl as="" td="" u<=""><td></td></rl>			
			PZ-302-AI		
		<u>CCB 160-61766/110 (dis</u>)	Co (tot) U		
		Se (3.2 ug/L) - qualify associated detects <rl as="" td="" u<=""><td></td></rl>			
			PZ-302-AS		
			Co (tot) U		
		<u>CCB 160-62409/13 and 26 and 37 (tot) - no detects</u>	Se (dis) U		
CRDL Standard	CRDL results btw 70-130%	The CRI was in control	None		
	50-150% for Sb, Pb, and Tl				
Laboratory Control Sample	LCS/LCSD: 1 per 20 project	LCS results within limits for total and dissolved metals	None		
	samples or each preparation batch. LCS limits within 80- 120%.				

PROJECT NAME/NO.	West Lake Landfill Operable	e Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-3013			
FRACTION:	Metals (SW846 6010B and 7470A/7471A)			
MEDIA:	GROUNDWATER (TOTA)	L)		
SAMPLES:	PZ-208-SS, PZ-303-AI, PZ-	304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS		
SAMPLE DATE(S):	7/16/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None	
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on PZ-208-SS for total and dissolved metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI for total Hg - all results in control	None	
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None	
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None	
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $\%D \le 10\%$ conc ≥ 50 xDL for 5-fold dilution.	Serial dilutions were performed on PZ-208-SS for total metals and dissolved Hg. Serial dilutions were performed on a West Lake sample from another SDG for dissolved metals Serial dilutions were performed on PZ-303-AI for total Hg. All results were in control	None	
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None	
RT = Retention Time; % $D = PeTCL = Target Compound List;$	ercent Deviation; %RPD = Rela MS = Matrix Spike; MSD	tive Percent Difference; $\%$ RSD = Percent Relative Standard Deviation; RRF = Relative = Matrix Spike Duplicate; CCV = Continuing Calibration Verification	e Response Factor;	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3000
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S):	7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63159/1 - Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for alkalinity, bromide, I, Cl, SO4, and NO3 was performed on S-8 - results were in control NO3 - 28% RPD - difference < RL - no qualification required	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3000
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S):	7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab	MS analysis for alkalinity, bromide, I, Cl, SO4, and NO3 was performed on D-12 - results were in	None
	established limits	control	
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35%	The following field duplicates were collected with this sample set.	all samples
	or Absolute Diff < 5XRL	DUP 05 was collected as a field dup of D-12	Alk J
	when samp/dup value < 5X	Alkalinity was out of control at 46% - qualify associated samples as J	
	RL		

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3000		
FRACTION:	VOA (SW846 8260C) for the Ta	arget Compound List only	
MEDIA:	GROUNDWATER		
SAMPLES:	I-66, MW-102, MW-103, PZ-30	3-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
SAMPLE DATE(S):	7/15/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times,	Cooler temp < 6 °C. Samples	Coolers received at 3° C.	None
Preservation	holding time requirement < 7 days		
	(<14 days if HCL preserved).	All holding time criteria met.	
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	MS/MSD performed D-12	PZ-303-AS
Duplicates	Recoveries and RPDs within lab	Chloroethane 129%/129% - qualify associated detects as J+	Chloroethane J+
	limits	2-Hexanone pass/126% - associated samples were not detected - no qualification	
		required	I-11
			Chloroethane J+

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-3000
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S):	7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-61405/4 and LCSD 160-61405/5 1,2-Dichloroethane (125%/pass) - qualify associated detects as J+ Chloroethane (pass/132%) - qualify associated detects as J+ 2-Hexanone (132%/135%) - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (pass/130%) - associated samples were not detected - no qualification required Methylene Chloride (pass/83%) - qualify associated samples as J-/UJ- trans-1,2-Dichloroethene (82%/81%) - qualify associated samples as J-/UJ-	I-66 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ- MW-102 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ- MW-103 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-J
		LCS 160-62292/4-A - results were in control	PZ-303-AS Chloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene J-
			Chloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			S-10 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			D-12 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			DUPLICATE 05 1,2-Dichloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-

PROJECT NAME/NO.	west Lake Landfill Operable U		
LAB:	TestAmerica - St. Louis		
SDG:	160-3000		
FRACTION:	VOA (SW846 8260C) for the T	arget Compound List only	
MEDIA:	GROUNDWATER		
SAMPLES:	I-66, MW-102, MW-103, PZ-30	3-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
SAMPLE DATE(S):	7/15/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-61405/2 4-Methyl-2-pentanone (2.49 ug/L) - associated samples were not detected - no qualification required	None
		MB 160-62292/3-A - no analytes were detected	
	Trip Blanks	no analytes were detected	
	Equipment Blanks	Field Blank at D-12 - no analytes were detected	
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration Instrument MSY 06/29/2013 10:56: All %RSD criteria met.	None
		Instrument MSX 07/15/2013 11:23 All %RSD criteria met.	
		Average RRF meets requirements.	
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-61405/3</u> Chloroethane 77.1% - associated samples were not detected - no qualification required Trichlorofluoromethane 24.8% - associated samples were not detected - no qualification required Acetone 30.4% - associated samples were not detected - no qualification required 1,2-Dichloroethane 33.8% - qualify associated detects as J+ 4-Methyl-2-pentanone 36.5% - qualify associated detects as J+ 2-Hexanone 34.3% - associated samples were not detected - no qualification required	PZ-303-AS Chloroethane J+ I-11 Chloroethane J+ DUPLICATE 05 1,2-Dichloroethane J+
		CCVIS 160-62292/2 for 4-Methyl-2-pentanone and m&p-Xylenes - results were in control	

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PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES:	West Lake Landfill Operable Un TestAmerica - St. Louis 160-3000 VOA (SW846 8260C) for the T GROUNDWATER I-66, MW-102, MW-103, PZ-30	nit 1 arget Compound List only)3-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
SAMPLE DATE(S):	7/15/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Internal Standards	IS areas of samples & blank within (50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 05 was collected as a field dup of D-12 - all results were in control	None

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;TCL = Target Compound List;TIC = Tentatively Identified CompoundCCV = Continuing Calibration Verification

PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES: SAMPLE DATE(S):	West Lake Landfill Operable TestAmerica - St. Louis 160-3000 Metals (SW846 6010B and 7- GROUNDWATER (TOTAL I-66, MW-102, MW-103, PZ- 7/15/2013	Unit 1 470A/7471A)) -303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 3° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg r^2 ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable	e Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3000		
FRACTION:	Metals (SW846 6010B and 7	7470A/7471A)	
MEDIA:	GROUNDWATER (TOTAL		
SAMPLES:	I-66, MW-102, MW-103, PZ	2-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
SAMPLE DATE(S):	7/15/2013		
CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL.	Method blanks:	I-66
	Method blanks: 1 per 20 project	MB 160-60996/1-A (total and dissolved)	Se (tot) U
	samples. No TCL detected in MB, TB, or EB.	Be (0.8 ug/L) - all associated samples were not detected - no qualification required	Se (dis) U
	,,	MB 160-61452/1-A (dissolved) - no analytes detected	MW-102
		MP 160 60780/1 A: Hz (Total) no analytes detected	Se (dis) U
		<u>MB 100-00789/1-A. Hg (10tal)</u> - no analytes detected	MW-103
		MB 160-60793/1-A: Hg (dissolved) - no analytes detected	Se (tot) U
		Equipment blank: No equipment blanks associated to this SDG.	PZ-303-AS
			Se (tot) U
			Se (dis) U
		$\frac{CCB 100-01/00/50 (tot & dis)}{Se (3.3 ug/L)} = \text{qualify associated detects } < RL as LL$	T 11
		Se (5.5 ug/L) - quanty associated delects <kl 0<="" as="" td=""><td>Se (dis) U</td></kl>	Se (dis) U
		<u>CCB 160-61766/74</u>	Se (dis) e
		Se (3.0 ug/L) - qualify associated detects <rl as="" td="" u<=""><td>S-10</td></rl>	S-10
			Se (tot) U
		<u>CCB 160-61766/86 and 98</u>	Se (dis) U
		Se (2.9 ug/L) - qualify associated detects <rl as="" td="" u<=""><td>D 12</td></rl>	D 12
			D-12 Se (tot) U
		Hg CCBs - no detects	Se (dis) U
			DUPLICATE 05
			Se (tot) U
			Se (dis) U
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-3000		
FRACTION:	Metals (SW846 6010B and 74	470A/7471A)	
MEDIA:	GROUNDWATER (TOTAL	.)	
SAMPLES:	I-66, MW-102, MW-103, PZ	-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)	
SAMPLE DATE(S):	7/15/2013		
CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80- 120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on D-12 for total and dissolved metals - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on I-66 for Hg - all results in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $\%D \le 10\%$ conc \ge 50xDL for 5-fold dilution.	Serial dilutions were performed on D-12 for metals and Hg. Co (dis) 99% - not applicable - sample conc <50XDL	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 05 was collected as a field dup of D-12 - all results were in control	None

RT = Retention Time; TCL = Target Compound List;

MS = Matrix Spike;

%RPD = Relative Percent Difference; MSD = Matrix Spike Duplicate; %RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2984
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S):	7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding	Cooler temp < 6 C.	Coolers received at 2° C.	None
Times & Preservation	Holding time = 28 days for chloride, sulfate, bromide and	Holding time requirements were met for all samples.	
	iodide 14 days for alkalinity 48 hrs for nitrate.		
Calibration and Continuing	R2>0.99	ICVs, CCVs, and Calibrations were in control.	None
Calibration Verification Standards	CCVs 90-110%		
Blanks	Method blanks: 1 per 20 project	Method Blank:	None
	samples. No analytes detected in MBs, CCBs or EBs.	MB 160-63159/1 - Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required	
		Equipment blank: No equipment blanks were collected for these methods.	
		CCBs:	
		no analytes were detected in the CCBs	
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide , I , Cl , SO4 , and NO3 was performed on S-8 - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on S-8 - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-2984	160-2984		
FRACTION:	Chloride, Sulfate, Nitrate, Bro	omide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)		
MEDIA:	GROUNDWATER			
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)			
SAMPLE DATE(S):	7/12/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions		

Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 04 was collected as a field dup of I-62 - all results were in control	None

Qualifiers Added?

PROJECT NAME/NO.	West Lake Landfill Operable Ur	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-2984		
FRACTION:	VOA (SW846 8260C) for the Ta	arget Compound List only	
MEDIA:	GROUNDWATER		
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-A	S. D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)	
SAMPLE DATE(S):	7/12/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on DUPLICATE 04 Chloroethane 129%/129% - all associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS 160-61405/4 and LCSD 160-61405/5 1,2-Dichloroethane (125%/pass) - qualify associated detects as J+ Chloroethane (pass/132%) - all associated samples were not detected - no qualification required 2-Hexanone (132%/135%) - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (pass/130%) - qualify associated detects as J+ Methylene Chloride (pass/83%) - qualify associated samples as J-/UJ- trans-1,2-Dichloroethene (82%/81%) - qualify associated samples as J-/UJ-	D-6 1,2-Dichloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ- S-8 4-Methyl-2-pentanone J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ PZ-105-SS Methylene Chloride UJ- trans-1,2-Dichloroethene UJ I-62 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ

PROJECT NAME/NO.	West Lake Landfill Operable U	nit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-2984		
FRACTION:	VOA (SW846 8260C) for the T	arget Compound List only	
MEDIA:	GROUNDWATER		
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-A	AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)	
SAMPLE DATE(S):	7/12/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
2			PZ-114-AS Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
S			S-61 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			I-67 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			I-68 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
			DUPLICATE 04 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-61405/2 4-Methyl-2-pentanone (2.49 ug/L) - qualify associated detects <rl as="" td="" u<=""><td>S-8 4-Methyl-2-pentanone U</td></rl>	S-8 4-Methyl-2-pentanone U
	Trip Blanks	no trip blank received with this sample set although it was listed on COC	
	Equipment Blanks	No equipment blank was associated to this sample set	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSY 06/29/2013 10:56</u> : All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per	CCVIS 160-61405/3	S-8

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PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2984
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S):	7/12/2013

	LAB:	TestAmerica - St. Louis		
	SDG:	160-2984		
	FRACTION:	VOA (SW846 8260C) for the Ta	arget Compound List only	
	MEDIA:	GROUNDWATER		
~	SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-A	S, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)	
П	SAMPLE DATE(S):	7/12/2013		
⋝	CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
		instrument. % D \leq 20%. RRFs \geq 0.05	Chloroethane 77.1% - associated samples were not detected - no qualification required	4-Methyl-2-pentanone J+
-			Trichlorofluoromethane 24.8% - associated samples were not detected - no qualification	D (
U			required	D-6 1.2 Dichloroethane L
			1.2-Dichloroethane 33.8% - qualify associated detects as J+	1,2-Diemoioeutane J+
\mathbf{r}			4-Methyl-2-pentanone 36.5% - qualify associated detects as J+	
			2-Hexanone 34.3% - associated samples were not detected - no qualification required	
п			RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target	
>	Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
	Field Duplicate	Field duplicate: RPD < 35% or	The following field duplicates were collected with this sample set.	None
		Absolute Diff $< 5XRL$ when	DUP 04 was collected as a field dup of 1-62 - all results were in control	
C		samp/oup value < 3A KL		
Ň	PT - Patantian Time: %D - Par	cant Daviation: % PDD - Palativa	Parcent Difference: % DSD - Parcent Palative Standard Deviation: DDE - Palati	va Pasponsa Factor:
	D = Per	TIC – Tentatively Identified Compose	CCV = Continuing Calibration Verification	ve Response Factor,
-1	i CL – Target Compound List,	ric – remainery identified Compot	and CCv – Continuing Canoration verification	

PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES: SAMPLE DATE(S):	West Lake Landfill Operable TestAmerica - St. Louis 160-2984 Metals (SW846 6010B and 74 GROUNDWATER (TOTAL) S-8, PZ-105-SS, I-62, PZ-114 7/12/2013	Unit 1 470A/7471A) -AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)	
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg $r^2 \ge 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control except one ICV was out of control for Tl at 111% but there was a passing CCV analyzed before samples were run	None

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1				
LAB:	TestAmerica - St. Louis					
SDG:	160-2984					
FRACTION:	Metals (SW846 6010B and 74	etals (SW846 6010B and 7470A/7471A)				
MEDIA:	GROUNDWATER (TOTAL)	OUNDWATER (TOTAL)				
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114	-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)				
SAMPLE DATE(S):	7/12/2013					
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?			
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: MB 160-60807/1-A (dissolved) Zn (7.1 ug/L) - qualify associated detects <rl as="" td="" u<=""> MB 160-60809/1-A (total) - no analytes detected MB 160-60789/1-A: Hg (Total) - no analytes detected MB 160-60793/1-A: Hg (dissolved) (0.117 ug/L) - qualify associated detects <rl as="" td="" u<=""> Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-61576/85 (tot) As (2.5 ug/L) - qualify associated detects <rl as="" td="" u<=""> Pb (1.8 ug/L) qualify associated detects <rl as="" td="" u<=""> Pb (1.9 ug/L) - qualify associated detects <rl as="" td="" u<=""> Hg CCBs - no detects</rl></rl></rl></rl></rl>	S-8 Zn (dis) U Hg (dis) U PZ-105-SS Zn (dis) U Hg (dis) U I-62 Zn (dis) U Hg (dis) U PZ-114-AS Zn (dis) U Hg (dis) U Hg (dis) U As (tot) U Pb (tot) U S-61 Hg (dis) U As (tot) U			

PROJECT NAME/NO.	West Lake Landfill Operable	Unit 1			
SDC.	168 America - St. Louis 160 2084				
	Metals (SW846 6010B and 7470A/7471A)				
MEDIA.					
MEDIA:	UKUUNDWATEK (TUTAL)				
SAMPLES:	S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)				
SAMPLE DATE(S):	7/12/2013				
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?		
			I-67 Hg (dis) U As (tot) U Pb (tot) U		
			I-68 Zn (dis) U Hg (dis) U As (tot) J+ Cd (tot) U		
			DUPLICATE 04 Hg (dis) U Pb (tot) U		
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None		
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None		
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None		
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when	MS/MSDs performed on DUPLICATE 04 for total and dissolved metals and Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on S-8 for Hg - all results in control	None		
	MS spike rec out of control) limits 75-125%	MS/MSD for remaining metals performed on DUPLICATE 04 - results were in control			
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None		

PROJECT NAME/NO. LAB: SDG: FRACTION: MEDIA: SAMPLES: SAMPLE DATE(S):	West Lake Landfill Operable Unit 1 TestAmerica - St. Louis 160-2984 Metals (SW846 6010B and 7470A/7471A) GROUNDWATER (TOTAL) S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62) 7/12/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None	
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on DUPLICATE 04 for metals and Hg results were in control	None	
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 04 was collected as a field dup of I-62 - all results were in control	None	

RT = Retention Time; %I TCL = Target Compound List;

%D = Percent Deviation; % ist; MS = Matrix Spike;

%RPD = Relative Percent Difference; e; MSD = Matrix Spike Duplicate; %RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification
PROJECT NAME/NO.West Lake Landfill Operable Unit 1LAB:TestAmerica - St. LouisSDG:160-2968FRACTION:Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)MEDIA:GROUNDWATERSAMPLES:PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
DUPLICATE 03 (FIELD DUP OF D-83)

SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-62899/1 - Alkalinity 0.350 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for ALK, bromide, I, Cl, SO4, and NO3 was performed on PZ-202-SS - results were in control	None

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LAB:TestAmerica - St. LouisSDG:160-2968FRACTION:Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)MEDIA:GROUNDWATERSAMPLES:PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
DUPLICATE 03 (FIELD DUP OF D-83)

SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for Alkalinity, bromide, I, Cl, SO4, and NO3 was performed on PZ-202-SS - results were in control	None
		MS analysis for bromide, Cl, SO4, and NO3 was performed on PZ-116-SS - results were in control	
Low Level Control Sample	recovery within 80- 120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

PROJECT NAME/NO.	west Lake Landfill Operable Un	nit 1		
LAB:	TestAmerica - St. Louis			
SDG:	160-2968			
FRACTION:	VOA (SW846 8260C) for the Target Compound List only			
MEDIA:	GROUNDWATER			
	PZ-113-SS, PZ-104-SS, PZ-101	-SS. PZ-104-SD. PZ-202-SS. D-83. MW-1204. S-82. PZ-116-SS. D-93. I-9. PZ-1	15-88	
SAMPLES	DUPLICATE 03 (FIELD DUP	OF D-83)		
SAMPLE DATE(S):	7/11/2013			
	//11/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
Data Completeness, Holding Times,	Cooler temp < 6 °C. Samples	Coolers received at 2° C.	None	
Preservation	notating time requirement < 7 days	All holding time criteria met		
		An nothing time erroria met.		
		Samples PZ* were logged in as P2		
System Monitoring Compounds	recoveries within limits (70 - 130%)	System monitoring compound recoveries were in control.	None	
Matrix Spiles/Matrix Spiles	MS/MSD: 1 per 20 project samples	MS/MSD performed on DZ 202 SS	None	
Dunlicates	Recoveries and RPDs within lab	Chloroethane 127%/131% - associated samples were not detected - no qualification required	None	
Dupileures	limits	2-Hexanone 125% - associated samples were not detected - no qualification required		
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-	LCS results for target compounds were within control limits	None	
	130%).	LCS 160-60813/4-A		
		2-Hexanone 124% - associated samples were not detected - no qualification required		
		I CS 160.61806/4-A		
		all results were in control		
Planks	Mothod blanks: 1 par 12 hours No.	MP 160 60912/2 A	D7 112 SS	
DIAIINS	analytes detected in MB TR or FR	all compounds were not detected	Acetone II	
	anarytes detected in WD, TD, Of ED.		Accione	
		<u>MB 160-61806/3-A</u>	PZ-104-SS	
		all compounds were not detected	Acetone U	
	k	4	1	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2968
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER

PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83) 7/11/2013

SAMPLES: SAMPLE DATE(S):

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
	Trip Blanks	Acetone (8.0 ug/L) - qualify associated samples <rl as="" u<br="">- qualify associates sample concs <5X blank conc X dil factor as J+</rl>	PZ-101-SS Acetone J+
			PZ-202-SS Acetone J+
			S-82 Acetone J+
			I-9 Acetone U
			PZ-115-SS Acetone U
	Equipment Blanks	FB at PZ-202-SS Acetone (12 ug/L) - qualify associated samples as J+	DUPLICATE 03 Acetone U
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met.	None
		Instrument MSY 06/29/2013 10:56: All %RSD criteria met.	
COMO Continuitor Calibration	CV as a family of family and fami	Average RRF meets requirements.	DZ 104 CC
GC/MS Continuing Calibration	instrument. %D \leq 20%. RRFs \geq 0.05	CLVIS 100-01800/2 Chloroethane 36.2% -qualify associated detects as $J+$	Chloroethane J+

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2968
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER

PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS **SAMPLES:** DUPLICATE 03 (FIELD DUP OF D-83) 7/11/2013

SAMPLE DATE(S):

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>CCVIS 160-60813/2</u> Chloroethane 27% - associated samples were not detected - no qualification required Methyl acetate 21.6% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	PZ-104-SD Chloroethane J+
Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor; TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2968
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)

SAMPLE DATE(S):

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times	Cooler temp < 4 C	Coolers received at 2° C.	None
& Preservation	Holding Time: $Hg < 28$ days all	All holding time criteria met.	
	other metals < 180 days from		
	collection		
	concetion.		
Calibration	Calibration every 24 hours	Hg calibrations, ICVs, and CCVs were in control	None
	Hg r^2 ≥ 0.995		
	CCV every 10 samples or 2	Metals ICVs and CCVs were in control except one ICV was out of control for Tl at 111% but there was	
	hours	a passing CCV analyzed before samples were run	
	ICP CV/CCV $\%$ R = 90-110%		
	Hg CV/CCV %R = 80-120%		

7/11/2013

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2968
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S):	7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: MB 160-60808/1-A (dissolved) - no analytes detected MB 160-60810/1-A (total) - no analytes detected MB 160-60787/1-A: Hg (Total) - no analytes detected MB 160-60792/1-A: Hg (dissolved) - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-61388/61 (dis) Be (1.2 ug/L) - associated samples were not detected CCB 160-61388/73 (dis) Be (0.7 ug/L) - associated samples were not detected or >5X the blank conc CCB 160-61576/13 (tot) As (4.0 ug/L) - qualify associated detects <rl <5x="" as="" blank="" conc="" detects="" j+<="" qualify="" td="" the="" u,=""> Cd (2.5 ug/L) - associated samples were not detected Pb (2.4 ug/L) - qualify associated detects <rl as="" td="" u<=""></rl></rl>	PZ-113-SS As (tot) U Pb (tot) U PZ-104-SS As (tot) U Pb (tot) U PZ-101-SS As (tot) U Pb (tot) U PZ-104-SD As (tot) J+ Pb (tot) U PZ-202-SS As (tot) U Pb (tot) U
CRDL Standard	CRDL results btw 70-130%	Se (4.2 ug/L) - associated samples were not detected Hg CCBs - no detects The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80- 120%.	LCS results within limits for total and dissolved metals	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2968
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)

SAMPLE DATE(S):

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on PZ-202-SS for total and dissolved metals and Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > $4X$ the spike conc	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $\text{MD} \le 10\%$ conc ≥ 50 xDL for 5-fold dilution.	Serial dilutions were performed on PZ-202-SS for metals and Hg. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

RT = Retention Time; %D TCL = Target Compound List;

%D = Percent Deviation; % ist; MS = Matrix Spike;

7/11/2013

%RPD = Relative Percent Difference;e; MSD = Matrix Spike Duplicate;

%RSD = Percent Relative Standard Deviation; CCV = Continuing Calibration Verification RRF = Relative Response Factor;

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

LAB:	TestAmerica - St. Louis	
SDG:	160-2953	
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)	
MEDIA:	GROUNDWATER	
SAMPLES:	02	

SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	
Data Completeness, Holding	Cooler temp < 6 C.	Coolers received at 2° C.	None
Times & Preservation	Holding time = 28 days		
	for chloride, sulfate,	Holding time requirements were met for all samples.	
	bromide and iodide		
	14 days for alkalinity		
	48 hrs for nitrate.		
Calibration and Continuing	R2>0.99	ICVs, CCVs, and Calibrations were in control.	None
Calibration Verification Standards	CCVs 90-110%		
Blanks	Method blanks: 1 per	Method Blank:	None
	20 project samples. No analytes detected in	Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required	
	MBs, CCBs or EBs.	Equipment blank: No equipment blanks were collected for these methods.	
		CCBs:	
		no analytes were detected in the CCBs	
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD	Lab duplicate for ALK, bromide, I, Cl, SO4, and NO3 was performed on PZ-201A-SS - results	None
	<20% or Absolute Diff	were in control	
	< RL when samp/dup		
	value < 5x RL		

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

LAB:	TestAmerica - St. Louis	
SDG:	160-2953	
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)	
MEDIA:	GROUNDWATER	
SAMPLES:	02	

SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-201A-SS - results were in	None
	established limits	control	
Low Level Control Sample	recovery within 80-	Performed on alkalinity only. Results were in control.	None
	120%		
Field Duplicate	Field duplicate: RPD <	The following field duplicates were collected with this sample set.	None
	35% or Absolute Diff $<$	DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	
	5XRL when samp/dup		
	value < 5X RL		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2953
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02 (Field dup of
SAMPLE DATE(S):	7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times,	Cooler temp < 6 °C. Samples	Coolers received at 2° C.	None
Preservation	holding time requirement < 7 days (<14 days if HCL preserved).	All holding time criteria met.	
System Monitoring Compounds	recoveries within limits (70 120%)	Samples 1 Z ⁺ were logged in as 1 Z	None
System Monitoring Compounds	or laboratory established limits	system monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike	MS/MSD: 1 per 20 project samples.	MS/MSD performed on PZ-201A-SS	None
Duplicates	Recoveries and RPDs within lab limits	Chloroethane 130%/126% - associated samples were not detected - no qualification required Trichlorofluoromethane 121%/117% - associated samples were not detected - no qualification required 2-Hexanone 125% - associated samples were not detected - no qualification required	
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS results for target compounds were within control limits LCS 160-60980/4 2-Hexanone 130% - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (MIBK) 128%- associated samples were not detected - no qualification required Chloroethane 131%- associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-60980/2 all compounds were not detected	None
	Trip Blanks	all compounds were not detected	None
	Equipment Blanks	None	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits	Initial Calibration <u>Instrument MSY 06/29/2013 10:56</u> : All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2953
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02 (Field dup of
SAMPLE DATE(S):	7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per	<u>CCVIS 160-60980/3</u>	None
	instrument. % D \leq 20%. RRFs \geq 0.05	Chloroethane 41.6% - associated samples were not detected - no qualification required	
		2-Hexanone 29.7% - associated samples were not detected - no qualification required	
Internal Standards	IS areas of samples & blank within (- 50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	None
RT = Retention Time: %D = Perc	ent Deviation: $\[\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Percent Difference: %RSD = Percent Relative Standard Deviation: RRF = Relative Resp	onse Factor:
CCV = Continuing Calibration Verific	ation; TCL = Target Compound List	; TIC = Tentatively Identified Compound	onse i detor,

PROJECT NAME/NO.	West Lake Landfill	Operable Unit 1	
LAB:	TestAmerica - St. Louis		
SDG:	160-2953		
FRACTION:	Metals (SW846 601	0B and 7470A/7471A)	
MEDIA:	GROUNDWATER	(TOTAL)	
SAMPLES:	PZ-201A-SS, D-85,	PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-2	05-SS, DUPLICATE 02
SAMPLE DATE(S):	7/10/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualitying Actions	Qualifiers Added?
Data Completeness, Holding Times	Cooler temp < 4 C.	Coolers received at 2° C.	None
& Preservation	Holding Time: Hg <	All holding time criteria met.	
	28 days, all other		
	metals < 180 days from		
	collection.		
Calibration	Calibration every 24	Hg calibrations, ICVs, and CCVs were in control	None
	hours		
	Hg r^2 \ge 0.995	Metals ICVs and CCVs were in control	
	CCV every 10 samples		
	or 2 hours		
	ICP CV/CCV $\%$ R =		
	90-110%		
	Hg CV/CCV %R = 80 -		
	120%		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LAB:	TestAmerica - St. Louis			
SDG:	160-2953			
FRACTION:	Metals (SW846 6010	OB and 7470A/7471A)		
MEDIA:	GROUNDWATER ((TOTAL)		
SAMPLES:	PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02			
SAMPLE DATE(S):	7/10/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualitying Actions	Qualifiers Added?	

CRITERIA	criteria	Comments/ Quantynig Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: MB 160-60807/1-A (dissolved) Zn 7.1 ug/L - qualify associated sample detects < RL as U - qualify associated sample detects> RL but <5X blank conc X DF as J+ MB 160-60809/1-A (total) - not detected MB 160-60784/1-A: Hg (total) - not detected	PZ-201A-SS Zn (dis) 21 J+ PZ-113-AS Zn (dis) 20U PZ-109-SS Zn (dis) 23 J+ PZ-205-SS
		MB 160-60791/1-A: Hg (dissolved) - not detected Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-61388/13 (dis) Be (2.8 ug/L) - associated samples were not detected Fe (34.6 ug/L) - associated samples were not detected or > 5X blank conc V (5.3 ug/L) - associated samples were not detected Hg CCBs - no detects	Zn (dis) 20U
CRDL Standard	CRDL results btw 70- 130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None

PROJECT NAME/NO.	West Lake Landfill	Operable Unit 1	
LAB:	TestAmerica - St. Lo	Duis	
SDG:	160-2953		
FRACTION:	Metals (SW846 6010B and 7470A/7471A)		
MEDIA:	GROUNDWATER	(TOTAL)	
SAMPLES:	PZ-201A-SS, D-85,	PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-20	05-SS, DUPLICATE 02
SAMPLE DATE(S):	7/10/2013		
CRITERIA	Acceptable limits / criteria	Comments/Qualitying Actions	Qualifiers Added?
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75- 125%	MS/MSD performed on a West Lake sample from another SDG - results were in control.	None
ICP Interference Check Sample (ICS)	ICS results within 80- 120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. $\%D \le$ 10% conc \ge 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-110-SS for metals and H). Results were in control.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LAB:	TestAmerica - St. Louis			
SDG:	160-2953			
FRACTION:	Metals (SW846 601	0B and 7470A/7471A)		
MEDIA:	GROUNDWATER	(TOTAL)		
SAMPLES:	PZ-201A-SS, D-85,	PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-24	05-SS, DUPLICATE 02	
SAMPLE DATE(S):	7/10/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualitying Actions	Qualifiers Added?	
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions
Data Completeness, Holding	Cooler temp < 6 C.	Coolers received at 2° C.
Fimes & Preservation	Holding time = 28 days	
	for chloride, sulfate,	Holding time requirements were met for all samples.
	bromide and iodide	
	14 days for alkalinity	
	48 hrs for nitrate.	
Calibration and Continuing	R2>0.99	ICVs, CCVs, and Calibrations were in control.
Calibration Verification	CCVs 90-110%	
Standards		
Blanks	Method blanks: 1 per	Method Blank:
	20 project samples.	Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required
	No analytes detected in	
	MBs, CCBs or EBs.	Equipment blank: No equipment blanks were collected for these methods.
		no analytes were detected in the CCBs
Laboratory Control Sample	Recoveries within lab	LCS recoveries were in control.
	limits.	
Lab Duplicates	Lab Duplicate: RPD	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on PZ-111-SD - results were in control
	<20% or Absolute	
	Diff $< RL$ when	Lab duplicate for Alkalinity was performed on I-4 - results were in control
	samp/dup value < 5x	
	RL	
Spike Sample Analysis	MS recovery within lab	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-111-SD - results were in control

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA:	GROUNDWATER
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions
	established limits	
		MS analysis for Alkalinity was performed on I-4 - results were in control
Low Level Control Sample	recovery within 80- 120%	Performed on alkalinity only. Results were in control.
Field Duplicate	Field duplicate: RPD <	The following field duplicates were collected with this sample set.
	35% or Absolute Diff	DUP 01 was collected as a field dup of I-4 - all results were in control
	< 5XRL when	
	samp/dup value $< 5X$	
	KL	

Qualifiers Added?	
None	

Qualifiers Added?
None
None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. Sample S-5 was unpreserved because it effervesced when HCl was added in the field. Holding time is 7 days.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on DUPLICATE 01 Dichlorodifluoromethane 132%/122% - associated samples were not detected - no qualification required 2-Hexanone RPD = 21% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS results for target compounds were within control limits LCS 160-60374/4 LCS 160-60980/4 Chlorobenzene only LCS 160-60998/3 Chlorobenzene only All results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	MB 160-60374/2 all compounds were not detected MB 160-60980/2 all compounds were not detected MB 160-60998/2 all compounds were not detected	None
	Trip Blanks	all compounds were not detected	None
	Equipment Blanks	FB at PZ-110-SS - all compounds were not detected	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	VOA (SW846 8260C) for the Target Compound List only
MEDIA:	GROUNDWATER
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Initial Calibration	%RSD \leq 30%. Average RRFs >	Initial Calibration	None
	0.050 or lab limits		
		Instrument MSX 07/15/2013 11:23:	
		All %RSD criteria met.	
		Average RRF meets requirements.	
		Instrument MSV 06/20/2012 10:56:	
		All & PSD criteria met	
		All %KSD chiena lilet.	
GC/MS Continuing Calibration	CV performed for every 12 hours per	<u>CCVIS 160-60374/3</u> -	None
	instrument. %D \leq 20%. RRFs \geq 0.05	Chloroethane 22.1% - all associated samples were not detected - no qualification required	
		<u>CCVIS 160-60980/3</u>	
		Chloroethane 41.6% - not a target for the analysis run	
		2-Hexanone 29.7% - not a target for the analysis run	
		ICV 160-60754/10 - results were in control	
		RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target	
Internal Standards	IS areas of samples & blank within (-	Standard recovery area within the QC limits for all three standards; and retention times were	None
	50% to $+$ 100%). RTs $<$ 30 seconds.	within 30 seconds of the standard for all samples that were used in this SDG.	
Field Duplicate	Field duplicate: RPD < 35% or	The following field duplicates were collected with this sample set.	None
	Absolute Diff < 5XRL when	DUP 01 was collected as a field dup of I-4 - all results were in control	
	samp/dup value < 5X RL		

RT = Retention Time;%D = Percent Deviation;%RPD = Relative Percent Difference;%RSD = Percent Relative Standard Deviation;CCV = Continuing Calibration Verification;TCL = Target Compound List;TIC = Tentatively Identified Compound

RRF = Relative Response Factor;

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	
Data Completeness, Holding Times	Cooler temp < 4 C.	Coolers received at 2° C.	None
& Preservation	Holding Time: Hg < 28	All holding time criteria met.	
	days, all other metals $<$		
	180 days from	One sample was received unpreserved but was not identified. HNO3 was added in the laboratory; sample	
	collection.	quality should not be affected.	
Calibration	Calibration every 24	Hg calibrations, ICVs, and CCVs were in control	None
	hours		
	Hg r^2 ≥ 0.995	Metals ICVs and CCVs were in control	
	CCV every 10 samples		
	or 2 hours		
	ICP CV/CCV $\%$ R =		
	90-110%		
	Hg CV/CCV $\%$ R = 80-		
	120%		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc <	Method blanks:	PZ-111-SD
	CRQL.	MB 160-60204/1-A (dissolved & total)	Zn (tot) 20U
	Method blanks: 1 per	Zn 6.6 ug/L	Zn (dis) 20U
	20 project samples. No	- qualify associated sample detects < RL as U	
	TCL detected in MB,	- qualify associated sample detects> RL but <5X blank conc X DF as J+	S-5
	TB, or EB.		Zn (dis) 20U
		<u>MB 160-47518/1-A: Hg (Total)</u> - not detected	As (dis) 10 J+
		MB 160-47520/1-A: Hg (dissolved) - not detected Equipment blank: No equipment blanks associated to this SDG.	PZ-110-SS Zn (tot) 20U Zn (dis) 20U
		CCBs: CCB 160-60554/94 (tot)	I-4 Zn (tot) 20U
		As (2.5 ug/L)	Zn (dis) 20U
		- qualify associated sample detects < RL as U	
		- qualify associated sample detects> RL but <5X blank conc X DF as J+	PZ-100-SS
		Cd (1.3 ug/L) - associated samples were not detected	Zn (tot) 20U Zn (dis) 20U
		CCB 160-60554/118 (dis & tot)	D-3
		Cd 1.6 ug/L) - qualify associated sample detects < RL as U	Zn (tot) 20U
			Zn (dis) 20U
		Pb (1.8 ug/L) - qualify associated sample detects < RL as U	As (tot) 10U As (dis) 10U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LAB:	TestAmerica - St. Louis
SDG:	160-2937
FRACTION:	Metals (SW846 6010B and 7470A/7471A)
MEDIA:	GROUNDWATER (TOTAL)
SAMPLES:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S):	7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
		Hg CCBs - no detects	PZ-100-SD Zn (tot) 20U Zn (dis) 21 J+ As (dis) 10U PZ-112-AS Zn (tot) 20U
			Zn (dis) 20U Pb (tot) 10 U Pb (dis) 10 U DUPLICATE 01 Zn (tot) 20U
CRDL Standard	CRDL results htw 70-	The CRI was in control	Zn (dis) 20U Pb (tot) 10 U Pb (dis) 10 U
	130% 50-150% for Sb, Pb, and Tl		None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each	MS/MSD analysis for total 6010 metals performed on PZ-110-SS - Some analytes not calculated because the sample conc was > 4X the spike conc	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LAB:	TestAmerica - St. Louis			
SDG:	160-2937			
FRACTION:	Metals (SW846 6010	OB and 7470A/7471A)		
MEDIA:	GROUNDWATER	(TOTAL)		
SAMPLES:	PZ-111-SD, S-5, PZ-	-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)		
SAMPLE DATE(S):	7/9/2013			
CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?	
	preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75- 125%	- remaining results were in control MS/MSD analysis for total mercury performed on PZ-110-SS results were in control		
ICP Interference Check Sample (ICS)	ICS results within 80- 120%.	All criteria met.	None	
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None	
Serial Dilution	$\begin{array}{l} \mbox{Performed on samples} \\ \mbox{of a similar matrix or 1} \\ \mbox{per 20 samples. } \%D \leq \\ \mbox{10\% conc} \geq 50 \mbox{xDL for} \\ \mbox{5-fold dilution.} \end{array}$	Serial dilutions were performed on PZ-110-SS for metals and H). Results were in control.	None	
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 01 was collected as a field dup of I-4 - all results were in control	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE 7	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?	I I I I I I I I I I I I I I I I I I I	
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis'?		
	3. Were spike recovery and RPD results reported $C(T, t)$		
	In pU/L?		
	4. were wis/MSD results within iab established		
	5 Were $\text{RPD} < 20\%$?		
	5. Weie Re D <u>-</u> 2070 :		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE 7	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure	2 No	
	each batch of 20 samples, whichever is more	5. NO Mathad blank	
	frequent?		
	2. Was at least one field blank/matrix per	- Uranium-234 (0.10 pCi/L) - Positive Blank Conc	
	sampling episode collected?	is <1.65 X blank uncertainty no qualifications	
	3. Were the associated blanks free of target	required	
	analytes?		
		- Uranium-235 (0.04) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
		- Uranium-238 (0.05) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	2 Were I CS % R within 80-120%?		
	2. THERE LED /01C WITHIN 00-120/0:		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE 7	TANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	U-234	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PZ-100-KS TOT 0.05 pCi/L</th><th></th></mdc,>	PZ-100-KS TOT 0.05 pCi/L	
	comparison was made.	PZ-100-KS TOT DUP 0.02 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< th=""><th></th></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	U-235	
	their MDC, the absolute value of their difference	PZ-100-KS TOT 0.05 pCi/L	
	was $< 2 \text{ X MDC}$.	PZ-100-KS TOT DUP 0.04 pCi/L	
		Both results <lld< th=""><th></th></lld<>	
		U-238	
		PZ-100-KS TOT -0.02 pCi/L	
		PZ-100-KS TOT DUP 0.05 pCi/L	
		Both results <lld< th=""><th></th></lld<>	

LABORATORY:	Eberline Services			
PROJECT ID:	13-07170			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Uranium (EML U-02)			
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE	TANK (TOT only)		
SAMPLE DATE:	7/22,23/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 PZ-305-AI TOT U PZ-100-KS TOT U U-235 PZ-305-AI TOT & DIS U LR-104 DIS U PZ-100-KS TOT U PURGE TANK TOT U U-238 PZ-305-AI TOT & DIS U PZ-100-KS TOT & DIS U	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 PZ-305-AI DIS Q PZ-100-KS DIS Q U-235 LR-104 TOT Q PZ-100-KS DIS Q U-238 LR-104 DIS Q PURGE TANK TOT Q	

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	LR-104 DIS 14.7% - spectral degradation - qualify as R PZ-100-KS TOT 124% PZ-100-KS DIS 117.4% PURGE TANK TOT 23.1%	U-234, U-235, U238 LR-104 DIS R PZ-100-KS TOT J PZ-100-KS DIS J PURGE TANK TOT J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	No field duplicates were collected with this sample set	None

PROJECT NAME/NO.	. West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Thorium (EML-Th-01)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)		
SAMPLE DATE:	7/22.23/2013		

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Iolding Times	Samples met holding time requirement (180	Yes	None
Aatrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Thorium (EML-Th-01)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)		
SAMPLE DATE:	7/22.23/2013		

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. Yes	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.01 pCi/L)-Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.04 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-232 (0.00 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were LCS % R within 80-120% 2		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Thorium (EML-Th-01)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)		
SAMPLE DATE:	7/22,23/2013		

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>LR-104 TOT 0.06 pCi/L</th><th></th></mdc,>	LR-104 TOT 0.06 pCi/L	
	comparison was made.	LR-104 TOT DUP 0.05 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< th=""><th></th></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	LR-104 TOT 0.10 pCi/L	
	was < 2 X MDC.	LR-104 TOT DUP 0.12 pCi/L	
		Range = 0.02 - results are in control	
		Th-232	
		LR-104 TOT = 0.01 pCi/L	
		LR-104 TOT DUP 0.02 pCi/L	
		Both results <lld< th=""><th></th></lld<>	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1	
LABORATORY:	Eberline Services	
PROJECT ID:	13-07170	
MEDIA:	Groundwater (Dissolved and Total)	
FRACTION:	Radionuclides - Thorium (EML-Th-01)	
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)	

SAMPLE DATE: 7/22,23/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228 PZ-305-AI TOT & DIS U LR-104 TOT & DIS U PZ-100-KS TOT & DIS U PURGE TANK TOT U Th-230 PZ-305-AI TOT & DIS U PZ-100-KS TOT U Th-232 PZ-305-AI TOT & DIS U LR-104 TOT & DIS U LR-104 TOT & DIS U PZ-100-KS TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	Th-230 LR-104 TOT & DIS Q PZ-100-KS DIS Q PURGE TANK TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Thorium (EML-Th-01)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)		
SAMPLE DATE:	7/22,23/2013		

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-305-AI TOT 57.5%	Th-228, Th-230, Th-232
	(75-110%).	LR-104 TOT 115.5%	PZ-305-AI TOT J
		PZ-100-KS DIS 126.9%	LR-104 TOT J
	If chemical recoveries were <20% check for		PZ-100-KS DIS J
	spectral degradation.		
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	No field duplicates were collected with this	None
	samples?	sample set	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		
PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
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LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE 7	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Freservations	2. pri of aqueous samples <2?		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
_	similar matrix or for each 20 samples, whichever is		
	more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported in $rC(d, 2)$		
	III pCI/L?		
	control limits?		
	5. Were RPD $\leq 20\%$?		
		4. 37	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	sample preparation and analysis procedure	2. NO 3. Ves	
	prepared and analyzed with every SDG, or for	Method blank	
	each batch of 20 samples, whichever is more	- Radium-228 (0.57 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty -	
	frequent?	no qualifications required	
	2. Was at least one field blank/matrix per sampling		
	episode collected?		
	3. Were the associated blanks free of target		
	analytes?		

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more frequent?	2. Yes	
	2. Were LCS %R within 80-120%?		
Laboratory Duplicate	1. Was one dunlicate sample analyzed for each	1 Ves	None
Laboratory Duplicate	batch and each method?	2. Yes	None
	2. Were duplicate results reported in pCi/L?	3.	
	3.		
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PURGE TANK TOT 3.03 pCi/L</th><th></th></mdc,>	PURGE TANK TOT 3.03 pCi/L	
	comparison was made.	PURGE TANK TOT DUP 1.56 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Bothe results <lld -="" no="" qualifications="" required<="" th=""><th></th></lld>	
	relative percent difference (RPD) was $\leq 20\%$.		
	their MDC, the absolute value of their difference		
	was $< 2 \text{ X}$ MDC.		
Non-Detects	Is the LLD > the sample concentration.	See qualifications	LR-104 DIS U
			PURGE TANK TOT U
			PZ-100-KS IOI & DIS U
Uncertainty	For the sample results $>$ LLD, the combined	Yes	None
Cheertanity	standard uncertainty is less than 50% of the		Tone
	sample activity.		
Standards and Defenses	1. The standards used for calibration are not cood	1 Vag	None
Standards and Kelerence Materials	1. The standards used for cambration are not aged more than four times the half-life from the	1. 165 2 Ves	None
111atti 1a15	certification date and have been recalibrated	12. 100	
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		
	1		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	CANK (TOT only)	
SAMPLE DATE:	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	No field duplicates were collected with this sample set	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	ANK (TOT only)	
SAMPLE DATE(S):	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		N
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
rreservations	2. pri of aqueous samples <2?		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported in $rCi(L_2)$		
	III pCI/L?		
	control limits?		
	5. Were RPD < 20%?		
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each		
	sample preparation and analysis procedure	2. No	
	each batch of 20 samples, whichever is more	3 Vas	
	frequent?	Method blank	
	2. Was at least one field blank/matrix per	Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank	
	sampling episode collected?	uncertainty - results were in control	
	3. Were the associated blanks free of target		
	analytes?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	CANK (TOT only)	
SAMPLE DATE(S):	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	5.	PURGE TANK TOT DUD 0.54 pC/L	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PURGE TANK TOT DUP 0.07 pCI/L Pange = 0.13 = \sim2YLLD</th><th></th></mdc,>	PURGE TANK TOT DUP 0.07 pCI/L Pange = 0.13 = \sim 2YLLD	
	b) If both results are ≥ 5 times their MDC, the	Kallge = 0.13 = ZZKLLD	
	relative percent difference (RPD) was $< 20\%$		
	c) If either result is \geq their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 2 \text{ X MDC}$.		
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-100-KS DIS U
Uncertainty	For the sample results >LLD the combined	See qualifications	PZ-305-AI TOT Q
	standard uncertainty is less than 50% of the	•	LR-104 TOT & DIS Q
	sample activity.		PZ-100-KS TOT Q
			PURGE TANK TOT Q
		1	

LABORATORY:	Eberline Services		
PROJECT ID:	13-07170		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-305-AI, LR-104, PZ-100-KS, PURGE T	ANK (TOT only)	
SAMPLE DATE(S):	7/22,23/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	All standards used in instrument calibrations		
	were NIST traceable with certification date		
	certified, expiration dates, and DPM activities.		
Chamical Vield (Trager)	Chamical recoveries were within control limits	Vac	None
Chemical Tielu (Tracer)	(75-110%).	105	None
		1 1	N
Background Counts	1. Background was measured	1. Yes	None
	long as the sample count duration	2. 105	
Field Duplicate	1. Were field duplicates collected for every 10	No field duplicates were collected with this sample set	None
	samples? 2 a) If both results are $\angle MDC$ then no duplicate		
	comparison was made		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	U-234 B+
	sample preparation and analysis procedure	2 N-	
	prepared and analyzed with every SDG, or for	5. NO	
	frequent?		
	2. Was at least one field blank/matrix per	- Uranium-234 (0.31 pCi/L) - Positive Blank Conc	
	sampling episode collected?	is >1.65 X blank uncertainty - qualify associated	
	3. Were the associated blanks free of target	samples as B+	
	analytes?		
		- Uranium-235 (0.06) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
		- Uranium-238 (0.06) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2. Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 PZ-107-SS TOT 1.65 pCi/L PZ-107-SS TOT DUP 1.31 pCi/L RPD = 22% = qualify associated result P U-235 PZ-107-SS TOT 0.18 pCi/L PZ-107-SS TOT 0.18 pCi/L Range = 0.08 < 2XLLD - in control U-238 PZ-107-SS TOT 1.42 pCi/L PZ-107-SS TOT 1.42 pCi/L PZ-107-SS TOT DUP 1.44 pCi/L RPD = 1% - results are in control	all samples U-234 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 PZ-200-SS DIS U PZ-107-SS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-235 PZ-107-SS FD TOT & DIS Q PZ-200-SS TOT Q PZ-107-SS TOT Q PZ-106-KS TOT & DIS Q

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1 Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated	1. Yes 2. Yes	None
	within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	PZ-200-SS DIS 121% PZ-107-SS DIS 49.9% PZ-107-SS FD TOT 38.6% PZ-107-SS FD DIS 59.1%	U-234, U-235, U238 PZ-200-SS DIS J PZ-107-SS DIS J PZ-107-SS FD TOT J PZ-107-SS FD DIS J
Background Counts	 Background was measured Background counts duration was at least as 	1. Yes 2. Yes	None
	long as the sample count duration		

ROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
ABORATORY:	Eberline Services		
ROJECT ID:	13-07154		
IEDIA:	Groundwater (Dissolved and Total)		
RACTION:	Radionuclides - Uranium (EML U-02)		
AMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
AMPLE DATE:	7/19/2013		
RITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ-	Qualifiers Added
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10 samples?	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10 samples? 2. a) If both results are <mdc, duplicate<="" no="" td="" then=""></mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added None
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10 samples? 2. a) If both results are <mdc, duplicate<="" no="" td="" then=""> comparison was made.</mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10 samples? 2. a) If both results are <mdc, comparison="" duplicate="" made.<="" no="" td="" then="" was=""> b) If both results are >5 times their MDC, the</mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added
RITERIA eld Duplicate	Project Criteria 1. Were field duplicates collected for every 10 samples? 2. a) If both results are <mdc, comparison="" duplicate="" made.<="" no="" td="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%.</mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added None
RITERIA eld Duplicate	Project Criteria1. Were field duplicates collected for every 10samples?2. a) If both results are <mdc, duplicate<="" no="" td="" then="">comparison was made.b) If both results are >5 times their MDC, therelative percent difference (RPD) was ≤ 35%.c) If either result is > their MDC, but < 5 times</mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added None
RITERIA eld Duplicate	 Project Criteria Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference </mdc,>	Comments/Qualifying Actions 1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	Qualifiers Added None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07154
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE:	7/19/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07154
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE:	7/19/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. Yes	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (-0.02 pCi/L) -Negative Blank	
	2. Was at least one field blank/matrix per	Conc is <3 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.08 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-232 (0.04 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	all samples
(LCS)	each batch of samples whichever is more	2. No	Th-230 S-
	frequent?	Th-230 78.9%	
	2 Were LCS % P within 80-120% ?		

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LABORATORY:	Eberline Services
PROJECT ID:	13-07154
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE:	7/19/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	all samples
	batch and each method?	2. Yes	Th-228 P
	2. Were duplicate results reported in pCi/L?	3.	Th-230 P
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" td="" then=""><td>PZ-107-SS TOT 1.13 pCi/L</td><td></td></mdc,>	PZ-107-SS TOT 1.13 pCi/L	
	comparison was made.	PZ-107-SS TOT DUP 0.87 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	RPD = 26 % - qualify associated results as P	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	PZ-107-SS TOT 1.66 pCi/L	
	was $< 2 \text{ X MDC}$.	PZ-107-SS TOT DUP 1.32 pCi/L	
		RPD = 23 % - qualify associated results as P	
		Th-232	
		PZ-107-SS TOT 1.38 pCi/L	
		PZ-107-SS TOT DUP 1.28 pCi/L	
		RPD = 8% - results on control	

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LABORATORY:	Eberline Services
PROJECT ID:	13-07154
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)

SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			PZ-200-SS DIS U
			PZ-102-SS DIS U
			PZ-107-SS DIS U
			PZ-106-KS TOT & DIS U
			Th-230
			PZ-106-KS DIS U
			Th-232
			PZ-200-SS DIS U
			PZ-102-SS DIS U
			PZ-107-SS FD DIS U
			PZ-107-SS DIS U
			PZ-106-KS TOT & DIS U
-			
Uncertainty	For the sample results >LLD the combined	No - see qualifications.	Th-228
	standard uncertainty is less than 50% of the		PZ-10/-SS DIS Q
	sample activity.		PZ-200-SS TOT Q
			Th-230
			PZ-107-SS FD DIS Q
			PZ-200-SS DIS Q
			PZ-102-SS DIS Q
			PZ-107-SS DIS Q
			PZ-106-KS TOT Q

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07154
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE:	7/19/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated	1. Yes 2. Yes	None
	within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-200-SS TOT 111% PZ-107-SS DIS 35.4% PZ-106-KS DIS 43.4% PZ-107-SS FD DIS 63.4%	Th-228, Th-230, Th-232 PZ-200-SS TOT J PZ-107-SS DIS J PZ-106-KS DIS J PZ-107-SS FD DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 08) was collected for PZ- 107-SS - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? 	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.59 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-10	6-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE:	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. PZ-107-SS TOT 3.03 pCi/L PZ-107-SS TOT DUP 2.54 pCi/L Range = 0.49 <2XLLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-106-KS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75 110%).	s Chemical recoveries: PZ-102-SS TOT 31.6% 5 PZ-107-SS TOT 73.9% Gravimetric recoveries were in control	PZ-102-SS TOT J PZ-107-SS TOT J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None

PROJECT NAME/NO. LABORATORY:	West Lake Landfill Operable Unit 1 Eberline Services			
PROJECT ID:	13-07152			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-228 (904.0)			
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)		
SAMPLE DATE:	7/19/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in	None	
	 samples? 2. a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	control		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-226 (0.14 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more frequent?	2. Yes	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. PZ-107-SS TOT 6.39 pCi/L PZ-107-SS TOT DUP 5.07 pCi/L RPD = 23% = qualify associated samples as P	all samples Ra-226 P
Non-Detects	Is the LLD > the sample concentration.	No	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-KS TOT & DIS Q

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PROJECT ID:	13-07154		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106	5-KS, DUP 08 (Field dup of PZ-107-SS)	
SAMPLE DATE(S):	7/19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	PZ-102-SS TOT 31.6% PZ-107-SS TOT 73.9%	PZ-102-SS TOT J PZ-107-SS TOT J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, P	PZ-102R-SS
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met notating time requirement (180	ies	INORE
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	o of I-65 [SDG 13-07152), I-73, PZ-103-SS, F	Z-102R-SS
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	U-234 B+
	sample preparation and analysis procedure	2 N-	
	prepared and analyzed with every SDG, or for	5. NO Mathad blank	
	frequent?		
	2. Was at least one field blank/matrix per	- Uranium-234 (0.27 pCi/L) - Positive Blank Conc	
	sampling episode collected?	is >1.65 X blank uncertainty - qualify associated	
	3. Were the associated blanks free of target	samples as B+	
	analytes?		
		- Uranium-235 (0.13) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
		- Uranium-238 (0.12) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	trequent?		
	2. were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dur	o of I-65 [SDG 13-07152), I-73, PZ-103-SS, F	PZ-102R-SS
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. U-234 PZ-206-SS TOT 0.53 pCi/L PZ-206-SS TOT DUP 0.44 pCi/L Range = 0.09 < 2XLLD - in control U-235 PZ-206-SS TOT 0.23 pCi/L PZ-206-SS TOT DUP 0.16 pCi/L Range = 0.07 < 2XLLD - in control U-238 PZ-206-SS TOT 0.49 pCi/L PZ-206-SS TOT 0.49 pCi/L PZ-206-SS TOT DUP 0.21 pCi/L Range = 0.28 - qualify associated samples as P	all samples U-238 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 PZ-207-AS TOT U U-235 PZ-207-AS TOT U I-73 DIS U PZ-103-AS TOT U U-238 PZ-207-AS TOT & DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07153
MEDIA:	Groundwater (Dissolved and Total)

FRACTION: Radionuclides - Uranium (EML U-02)

SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 PZ-207-AS DIS Q PZ-103-SS TOT Q U-235 PZ-104-KS TOT Q PZ-206-SS TOT & DIS O
			PZ-207-AS DIS Q PZ-207-AS DIS Q I-73 TOT Q PZ-103-SS DIS Q U-238 PZ-104-KS TOT Q PZ-206-SS DIS Q PZ-103-SS TOT & DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, F	Z-102R-SS
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	PZ-104-KS DIS 114.7% PZ-207-AS TOT 22.2% PZ-207-AS DIS 38.4% I-73 TOT 35.1% I-73 DIS 34.4% PZ-103-SS TOT 115.4% PZ-103-SS DIS 113.2%	U-234, U-235, U238 PZ-104-KS DIS J PZ-207-AS TOT J PZ-207-AS DIS J I-73 TOT J I-73 DIS J PZ-103-SS TOT J PZ-103-SS DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 07) was collected for I- 65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07153
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07153
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE:	7/18,19/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. Yes	
	sample preparation and analysis procedure	- Thorium-228 (0.00 pCi/L) -Positive Blank Conc	
	prepared and analyzed with every SDG, or for	is <1.65 X blank uncertainty- no qualification	
	each batch of 20 samples, whichever is more	required	
	frequent?		
	2. Was at least one field blank/matrix per	- Thorium-230 (0.23 pCi/L) -Positive Blank Conc	
	sampling episode collected?	is <1.65 X blank uncertainty- no qualification	
	3. Were the associated blanks free of target	required	
	analytes?		
		- Thorium-232 (0.0 pCi/L) -Positive Blank Conc is	
		<1.65 X blank uncertainty- no qualification	
		required	
		3 Vac	
		J. 105 Method blank	
		- Thorium-228 (0.01 pCi/L) - Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		required	
		- Thorium-230 (0.20 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		-	
		- Thorium-232 (0.00 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1 Was LCS analyzed for every 20 samples or for	1 Ves	None
(LCS)	each batch of samples whichever is more	2 Yes	TUNC
	frequent?		
	2 Were LCS % R within 80.120% ?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07153MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SSSAMPLE DATE:7/18,19/2013

		Qualifiers Added?
Project Criteria	Comments/Qualifying Actions	
1. Was one duplicate sample analyzed for each	1. Yes	all samples
batch and each method?	2. Yes	Th-230 P
2. Were duplicate results reported in pCi/L?	3.	
3.	Th-228	
a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PZ-206-SS TOT 0.15 pCi/L</th><th></th></mdc,>	PZ-206-SS TOT 0.15 pCi/L	
comparison was made.	PZ-206-SS TOT DUP 0.27 pCi/L	
b) If both results are ≥ 5 times their MDC, the	Range = $0.12 < 2XLLD$ - results on control	
relative percent difference (RPD) was $\leq 20\%$.		
c) If either result is \geq their MDC, but < 5 times	Th-230	
their MDC, the absolute value of their difference	PZ-206-SS TOT 0.17 pCi/L	
was $< 2 X MDC$.	PZ-206-SS TOT DUP 0.43 pCi/L	
	Range = 0.26 >2XLLD - qualify associated results	
	as P	
	Th-232	
	PZ-206-SS TOT 0.10 pCi/L	
	PZ-206-SS TOT DUP 0.16 pCi/L	
	Range = $0.06 < 2XLLD$ - results on control	
	 Project Criteria Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? Were duplicate are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> If both results are ≥5 times their MDC, the elative percent difference (RPD) was ≤ 20%. If either result is ≥ their MDC, but < 5 times heir MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	Project CriteriaComments/Qualifying Actions Was one duplicate sample analyzed for each batch and each method?1. Yes 2. Yes 3 Were duplicate results reported in pCi/L? S.3 Were duplicate results reported in pCi/L? S.3 Were duplicate results are <mdc, duplicate<br="" no="" then=""></mdc,> comparison was made.PZ-206-SS TOT 0.15 pCi/L PZ-206-SS TOT DUP 0.27 pCi/L Range = 0.12 <2XLLD - results on control MDC, the absolute value of their difference was < 2 X MDC.Th-230PZ-206-SS TOT DUP 0.43 pCi/L Range = 0.26 >2XLLD - qualify associated results as PTh-232 PZ-206-SS TOT DUP 0.16 pCi/L Range = 0.06 <2XLLD - results on control

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07153MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)

SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			PZ-104-KS TOT & DIS U
			PZ-207-AS TOT & DIS U
			PZ-103-SS TOT & DIS U
			PZ-102R-SS DIS U
			I-65 FD DIS U
			Th-230
			PZ-103-SS DIS U
			Th-232
			PZ-104-KS TOT & DIS U
			PZ-207-AS TOT & DIS U
			PZ-103-SS TOT & DIS U
			PZ-102R-SS DIS U
			I-65 FD DIS U
			PZ-206-SS DIS U

PROJECT NAME/NOWest Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07153MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of 1-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

SAMPLE DATE: 7/18,19/2013 **Qualifiers Added? CRITERIA Project Criteria Comments/Qualifying Actions** For the sample results >LLD the combined Th-228 Uncertainty No - see qualifications. standard uncertainty is less than 50% of the I-65 FD TOT O sample activity. PZ-206-SS TOT & DIS Q I-73 DIS Q Th-230 I-65 FD TOT & DIS Q PZ-104-KS TOT & DIS Q PZ-206-SS TOT & DIS O PZ-207-AS TOT & DIS Q PZ-103-SS TOT Q PZ-102R-SS DIS Q Th-232 I-65 TOT Q PZ-206-SS TOT Q I-73 TOT Q Standards and Reference 1. The standards used for calibration are not aged 1. Yes None Materials more than four times the half-life from the 2. Yes certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07153MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMPERS:PZ 104 KS_PZ 206 SS_DUP 07 (Field dup of L65 (SDC 13 07152), L73 PZ 103 SS_PZ

SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-104-KS DIS 63.6%	Th-228, Th-230, Th-232
	(75-110%).	PZ-206-SS TOT 124%	PZ-104-KS DIS J
		I-65 FD TOT 56.4%	PZ-206-SS TOT J
	If chemical recoveries were <20% check for	I-65 FD DIS 72.3%	I-65 FD TOT J
	spectral degradation.	I-73 DIS 73.4%	I-65 FD DIS J
		PZ-103-SS DIS 49.8%	I-73 DIS J
		PZ-102R-SS TOT 72.8%	PZ-103-SS DIS J
		PZ-102R-SS DIS 70.9%	PZ-102R-SS TOT J
			PZ-102R-SS DIS J
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 07) was collected for I-	None
	samples?	65 (SDG 13-07152) - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?	Samples I-73 TOT and DIS contained high solids. They were prepared with	
		EDTA, phenolphthalein, and hydroxide precipitation.	
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever is		
	more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		
L			

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07152			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-228 (904.0)			
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS		
SAMPLE DATE:	7/18,19/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes Yes FB to I-73 TOT Radium-228 (0.56 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required Yes Method blank Run 1: Radium-228 (0.56 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required Run 2: Radium-228 (0.36 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required 	None	
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. Run 2: I-73 TOT 1.07 pCi/L I-73 TOT DUP 2.88 pCi/L Range = 1.81 <2XLLD - no qualifications required	None	

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	o of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-104-KS TOT & DIS U PZ-206-SS DIS U PZ-207-AS DIS U I-73 TOT & DIS U PZ-103-SS DIS U PZ-102R-SS TOT U I-65 TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75 110%).	Chemical recoveries were in control Gravimetric recoveries PZ-206-SS DIS 72%	PZ-206-SS DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION:	West Lake Landfill Operable Unit 1 Eberline Services 13-07152 Groundwater (Dissolved and Total) Radionuclides - Radium-228 (904.0)		
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SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE:	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE(S):	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes Samples I-73 TOT and DIS contained high solids and were reanalyzed due to low chemical recoveries related to the presence of a sulfate forming compound which interferes with the initial precipitation of radium as sulfate. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20% ? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE(S):	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes Yes FB at I-73 TOT Radium-226 (0.05 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control Yes Method blank Run 1- Radium-226 (-0.01 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - results were in control Run 2- Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control 	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. Run 1: PZ-206-SS TOT 2.30 pCi/L PZ-206-SS TOT DUP 2.27 pCi/L RPD = 1% = results in control Run 2: I-73 TOT 1.90 pCi/L I-73 TOT DUP 2.20 pCi/L Range = 0.30 = results in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07153		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-104-KS, PZ-206-SS, DUP 07 (Field dup	of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS	
SAMPLE DATE(S):	7/18,19/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-104-KS DIS U
T Tay a said a b ardara	Easthe course acculary UD the cousting of		
Uncertainty	standard uncertainty is less than 50% of the	see quanneations	1-05 FD DIS Q P7-104-KS TOT O
	sample activity.		PZ-207-AS Q
			I-73 TOT & DIS Q
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits	Yes	None
	(75-110%).		
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07153MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Radium-226 (903.0)

SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS

SAMPLE DATE(S): 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-	None
	samples?	07152) - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is $>$ their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS	S, I-65, D-13
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS	, I-65, D-13
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	U-234 B+
	sample preparation and analysis procedure	2 No	
	prepared and analyzed with every SDG, of for	5. NO Mathad blank	
	frequent?		
	2. Was at least one field blank/matrix per	- Uranium-234 (0.24 pCi/L) - Positive Blank Conc	
	sampling episode collected?	is >1.65 X blank uncertainty - qualify associated	
	3. Were the associated blanks free of target	samples as B+	
	analytes?		
		- Uranium-235 (0.09) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
		- Uranium-238 (0.10) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualifications	
		required	
Laboratory Control Sample	1 Was LCS analyzed for every 20 samples or for	1 Ves	None
(LCS)	each batch of samples whichever is more	2 Yes	Ivone
	frequent?	2. 105	
	2. Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS	s, I-65, D-13
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 PZ-203-SS TOT 2.86 pCi/L PZ-203-SS TOT DUP 2.76 pCi/L RPD = 3.6% - in control U-235 PZ-203-SS TOT 0.22 pCi/L PZ-203-SS TOT DUP 0.26 pCi/L Range = 0.04 < 2XLLD - in control U-238 PZ-203-SS TOT 0.40 pCi/L PZ-203-SS TOT 0.40 pCi/L PZ-203-SS TOT DUP 0.80 pCi/L RPD = 67% - qualify associated samples as P	all samples U-238 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 PZ-205-AS TOT U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07152
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE:	7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 D-87 DIS Q D-14 TOTQ U-235 D-13 TOT & DIS Q D-14 TOT & DIS Q D-14 TOT & DIS Q D-81 FD TOT Q D-87 TOT & DIS Q I-65 DIS Q PZ-203-SS TOT Q PZ-205-AS TOT & DIS Q U-238 D-87 DIS Q D-14 DIS Q D-13 TOT & DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS	S, I-65, D-13
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	D-87 DIS 49% S-53 TOT 71.1% D-14 TOT 41.7% D-14 DIS 31.4% PZ-205-AS TOT 43.6% PZ-205-AS DIS 29.1% I-65 TOT 65.8%	U-234, U-235, U238 D-87 DIS J S-53 TOT J D-14 TOT J D-14 DIS J PZ-205-AS TOT J PZ-205-AS DIS J I-65 TOT J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	 A field duplicate (DUP 06) was collected for D- 81 (SDG 13-07149) - results were in control A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07152
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE:	7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07152
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE:	7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	Th-230 B+
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. No	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.08 pCi/L) -Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.45 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- qualify associated	
		samples as B+	
		- Thorium-232 (0.17 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were ICS % R within 80-120% ?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07152MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13SAMPLE DATE:7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PZ-203-SS TOT -0.01 pCi/L</th><th></th></mdc,>	PZ-203-SS TOT -0.01 pCi/L	
	comparison was made.	PZ-203-SS TOT DUP 0.01 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< th=""><th></th></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	PZ-203-SS TOT 0.58 pCi/L	
	was $< 2 \text{ X MDC}$.	PZ-203-SS TOT DUP 0.56 pCi/L	
		RPD = 3.5% - results are in control	
		Th-232	
		PZ-203-SS TOT 0.10 pCi/L	
		PZ-203-SS TOT DUP 0.07 pCi/L	
		Range = $0.03 < 2XLLD$ - results on control	

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07152MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13

SAMPLE DATE: 7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			D-14 DIS U
			D-81 FD TOT & DIS U
			D-87 DIS U
			I-65 DIS U
			PZ-203-SS TOT & DIS U
			PZ-205-AS U
			S-53 DIS U
			Th-232
			PZ-203-SS DIS U
			D-87 DIS U
			D-13 TOT U
			I-65 DIS U
Uncertainty	For the sample results >LLD the combined	No - see qualifications.	Th-228
	standard uncertainty is less than 50% of the		I-65 TOT Q
	sample activity.		D-13 TOT & DIS Q
			Th-230
			D-81 FD TOT Q
			Th-232
			D-13 DIS O
			D-14 DIS O
			D-81 FD TOT & DIS O
			I-65 TOT O
			PZ-203-SS TOT O
			PZ-205-AS DIS O
			S-53 DIS O

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07152
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE:	7/16.17/2013

7/16,17/2013 **Oualifiers Added? CRITERIA Project Criteria Comments/Oualifying Actions Standards and Reference** 1. The standards used for calibration are not aged 1. Yes None Materials more than four times the half-life from the 2. Yes certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. **Chemical Yield (Tracer)** Chemical recoveries were within control limits D-87 DIS 71.8% Th-228, Th-230, Th-232 (75-110%). D-81 FD DIS 64.5% D-87 DIS J S-53 TOT 73.3% D-81 FD DIS J If chemical recoveries were <20% check for S-53 DIS 59% S-53 TOT J spectral degradation. I-65 TOT 70.6% S-53 DIS J I-65 DIS 74.2% I-65 TOT J D-13 TOT 62.7% I-65 DIS J D-13 DIS 64.8% D-13 TOT J D-13 DIS J **Background Counts** 1. Background was measured 1. Yes None 2. Background counts duration was at least as 2. Yes long as the sample count duration **Field Duplicate** 1. Were field duplicates collected for every 10 1. A field duplicate (DUP 06) was collected for D-None samples? 81 (SDG 13-07149) - results were in control 2. a) If both results are *<*MDC, then no duplicate comparison was made. 2. A field duplicate (DUP 07 - SDG 13-07153) b) If both results are >5 times their MDC, the was collected for I-65 - results were in control relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes Samples S-53 TOT and PZ-205-AS TOT contained high solids. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.41 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT LABORAT PROJECT MEDIA: FRACTIO SAMPLE SAMPLE	T NAME/NO. FORY: TD: NN: NUMBERS: DATE:	West Lake Landfill Operable Unit 1 Eberline Services 13-07152 Groundwater (Dissolved and Total) Radionuclides - Radium-228 (904.0) PZ-203-SS, D-87, DUP 06 (Field dup of D- 7/16,17/2013 Project Criteria	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13 Comments/Qualifying Actions	Qualifiers Added?
Laboratory ((LCS)	Control Sample	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None
	Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-203-SS TOT 1.19 pCi/L PZ-203-SS TOT DUP 0.76 pCi/L Range = 0.43 <2XLLD - no qualifications required	None
Non-Detects		Is the LLD > the sample concentration.	See qualifications	D-81 FD TOT U I-65 TOT & DIS U PZ-203-SS DIS U PZ-205-AS TOT & DIS U S-53 DIS U
Uncertainty		For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 FD DIS Q PZ-203-SS TOT Q
Standards an Materials	nd Reference	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical and Gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	 A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-2	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13	
SAMPLE DATE(S):	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?	Samples S-53 TOT and PZ-205-AS TOT contained high solids.	
		They were prepared with EDTA, phenolphthalein, and hydroxide	
		precipitation.	
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07152		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13	
SAMPLE DATE(S):	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No No Method blank Radium-226 (0.48 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ 	all samples Ra-226 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-203-SS TOT 2.31 pCi/L PZ-203-SS TOT DUP 1.09 pCi/L RPD = 74% = qualify associated samples as P	all samples Ra-226 P
Non-Detects	Is the LLD > the sample concentration.	See qualifications	S-53 DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07152			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-226 (903.0)			
SAMPLE NUMBERS:	PZ-203-SS, D-87, DUP 06 (Field dup of D-	81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13		
SAMPLE DATE(S):	7/16,17/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 TOT & DIS Q I-65 DIS Q	
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None	
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None	
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None	
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	 A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control 	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
		PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results.	
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07149	13-07149		
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Uranium (EML U-02)			
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS		
SAMPLE DATE:	7/16,17/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples	
	deionized distilled water, processed through each	2. No	U-234 B+	
	sample preparation and analysis procedure			
	prepared and analyzed with every SDG, or for	3. No		
	each batch of 20 samples, whichever is more	Method blank		
	2 Was at least one field blank/matrix per	Uranium 234 (0.23 pCi/L) Positive Blank Conc		
	sampling episode collected?	$1 \le 1 \le$		
	3. Were the associated blanks free of target	samples as B+		
	analytes?			
		- Uranium-235 (0.14) - Positive Blank Conc is		
		<1.65 X blank uncertainty no qualifications		
		required		
		- Uranium-238 (0.13) - Positive Blank Conc is		
		<1.65 X blank uncertainty no qualifications		
		required		
		•		
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None	
(LCS)	each batch of samples whichever is more	2. Yes		
	trequent?			
	2. were LCS %R within 80-120%?			

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 D-81 TOT 1.66 pCi/L D-81 TOT DUP 1.88 pCi/L RPD = 12% - in control U-235 D-81 TOT 0.73 pCi/L D-81 TOT DUP 0.29 pCi/L Range = 0.44 > 2XLLD - qualify associated samples as P U-238 D-81 TOT 1.39 pCi/L D-81 TOT DUP 1.30 pCi/L Range = 0.07 < 2XLLD - in control	all samples U-235 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 LR-100 TOT U LR-103 DIS U U-238 LR-100 TOT & DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07149	13-07149		
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Uranium (EML U-02)			
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS		
SAMPLE DATE:	7/16,17/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 LR-100 TOT & DIS Q LR-103 DIS Q U-235 LR-100 DIS Q PZ-204-SS DIS Q LR-103 TOT Q U-238 LR-103 DIS Q	
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services			
PROJECT ID:	13-07149			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Uranium (EML U-02)			
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS		
SAMPLE DATE:	7/16,17/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-302-AS TOT 62.2% LR-100 TOT 21.5% LR-100 DIS 25.9% D-81 TOT 56.2% D-81 DIS 61.7% LR-103 TOT 38.2% LR-103 DIS 57.6% PZ-111-KS DIS 56.3%	U-234, U-235, U238 PZ-302-AS TOT J LR-100 TOT J LR-100 DIS J D-81 TOT J D-81 DIS J LR-103 TOT J LR-103 DIS J PZ-111-KS DIS J	
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None	
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 06) was collected for D- 81 - U-235 DIS was out of control - qualify associated samples collected on 7/17 as P	U-235 LR-100 DIS P D-81 DIS P PZ-204-SS DIS P LR-103 DIS P PZ-111-KS DIS P	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07149
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE:	7/16.17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07149MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KSSAMPLE DATE:7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. Yes	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.06 pCi/L) -Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.40 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-232 (0.10 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were ICS % R within 80-120%?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07149MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KSSAMPLE DATE:7/16,17/2013

			Qualifiers Added?
RITERIA	Project Criteria	Comments/Qualifying Actions	
aboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>D-81 TOT 0.06 pCi/L</th><th></th></mdc,>	D-81 TOT 0.06 pCi/L	
	comparison was made.	D-81 TOT DUP 0.04 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< th=""><th></th></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	D-81 TOT 0.37 pCi/L	
	was $< 2 X MDC$.	D-81 TOT DUP 0.26 pCi/L	
		Range = $0.12 < 2XLLD$ - results are in control	
		Th-232	
		D-81 TOT 0.04 pCi/L	
		D-81 TOT DUP 0.04 pCi/L	
		Both results <lld< th=""><th></th></lld<>	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07149
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS

SAMPLE DATE: 7/16,17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			D-81 TOT & DIS U
			LR-100 TOT & DIS U
			LR-103 TOT & DIS U
			PZ-111-KS TOT & DIS U
			PZ-204-SS DIS U
			PZ-302-AS DIS U
			Th-232
			D-81 TOT & DIS U
			LR-100 TOT & DIS U
			LR-103 TOT & DIS U
			PZ-111-KS TOT & DIS U
			PZ-204-SS TOT & DIS U
			PZ-302-AS DIS U
Uncertainty	For the sample results >LLD the combined	No - see qualifications.	Th-228
	standard uncertainty is less than 50% of the		PZ-302-AS TOT Q
	sample activity.		PZ-204-SS Q
			Th-232
			PZ-302-AS TOT Q

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07149
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE:	7/16.17/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-302-AS TOT 74.2%	Th-228, Th-230, Th-232
	(75-110%).	D-81 DIS 114.3%	PZ-302-AS TOT J
		PZ-204-SS TOT 117.1%	D-81 DIS J
	If chemical recoveries were <20% check for	PZ-111-KS DIS 113.8%	PZ-204-SS TOT J
	spectral degradation.		PZ-111-KS DIS J
De alegnour d'Coursée	1. De demonderers messenned	1 V	Nora
Background Counts	2. Background was measured	1. Tes	None
	2. Background counts duration was at least as	2. 168	
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 06) was collected for D-	None
	samples?	81 - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" td="" then=""><td></td><td></td></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 X$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-	-103, PZ-111-KS	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-228 (0.95 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-81 TOT 1.33 pCi/L D-81 TOT DUP 0.97 pCi/L Range = 0.36 <2XLLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	LR-100 TOT & DIS U LR-103 TOT U PZ-111-KS TOT & DIS U PZ-204-SS TOT & DIS U PZ-302-AS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 TOT & DIS Q PZ-302-AS TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-	-103, PZ-111-KS	
SAMPLE DATE:	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits	Chemical recoveries	PZ-302-AS DIS J
	(75-110%).	PZ-302-AS DIS 73.1%	PZ-204-SS DIS J
	Chemical recoveries were within control limits (75-		
	110%).	Gravimetric recoveries	
		PZ-204-SS DIS 70.9%	
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as long	2. Yes	
	as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 06) was collected for D-81 - results were in control	None
	samples?		
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		
L	1	1	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR	-103, PZ-111-KS	
SAMPLE DATE(S):	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-226 00.02 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required 	None

LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS		
SAMPLE DATE(S):	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-81 TOT 0.30 pCi/L D-81 TOT DUP 0.84 pCi/L Range = 0.54 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	D-81 TOT U PZ-111-KS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	LR-100 TOT & DIS Q LR-103 TOT Q PZ-111-KS DIS Q PZ-204-SS DIS Q PZ-302-AS TOT & DIS Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services		
PROJECT ID:	13-07149		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-	-103, PZ-111-KS	
SAMPLE DATE(S):	7/16,17/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-302-AS DIS 73.1%	PZ-302-AS DIS J
	(75-110%).		
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 06) was collected for D-81 - results were	None
	samples?	in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their who, the absolute value of their difference $\sqrt{5}$ X the MDC		
	was $\leq J \wedge$ the MDC.		

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	-208-SS, PZ-304-AI, PZ-304-AS, MW-104, 7	PZ-204A-SS, PZ-302-AI
SAMPLE DATE:	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes Yes PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, I	PZ-204A-SS, PZ-302-AI
SAMPLE DATE:	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples except PZ-304_AS TOT & DIS
	deionized distilled water, processed through each	2. No	U-234 B+
	sample preparation and analysis procedure	2. N.	U-235 B+
	prepared and analyzed with every SDG, or for	5. NO Mathad blank	U-238 B+
	frequent?	Run 1.	P7-304 AS TOT & DIS
	2. Was at least one field blank/matrix per	- Uranium-234 (0.20 pCi/L) - Positive Blank Conc	II-234 B+
	sampling episode collected?	is >1.65 X blank uncertainty - gualify associated	0 23 1 2 1
	3. Were the associated blanks free of target analytes?	samples as B+	
		- Uranium-235 (0.19) - Positive Blank Conc is	
		>1.65 X blank uncertainty - qualify associated	
		samples as B+	
		- Uranium-238 (0.19) - Positive Blank Conc is	
		>1.65 X blank uncertainty - qualify associated	
		Run 2.	
		- Uranium-234 (0.19 pCi/L) - Positive Blank Conc	
		is >1.65 X blank uncertainty - qualify associated	
		samples as B+	
		- Uranium-235 (0.06) - Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
		Uranium 228 (0.00) Positius Plank Correit	
		- Oranium-256 (0.09) - POSITIVE Blank Conc 1s <1.65 X blank uncertainty - no qualification	
		required	
1	1	1 I	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	2-208-SS, PZ-304-AI, PZ-304-AS, MW-104,	PZ-204A-SS, PZ-302-AI
SAMPLE DATE:	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2. Were LCS %R within 80-120%?		
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	<u>Run 1:</u>	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>U-234</th><th></th></mdc,>	U-234	
	comparison was made.	D-12 TOT 0.58 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	D-12 TOT DUP 0.67 pCi/L	
	relative percent difference (RPD) was $\leq 20\%$.	RPD = 14% - in control	
	c) If either result is \geq their MDC, but < 5 times		
	their MDC, the absolute value of their difference	U-235	
	was $< 2 \text{ X MDC}$.	D-12 TOT 0.38 pCi/L	
		D-12 TOT DUP 0.22 pCi/L	
		Range = $0.16 = 2XLLD$ - in control	
		11 229	
		0.238	
		D = 12 TOT = 0.40 pCl/L	
		$D = \frac{12}{101} \frac{101}{101} \frac$	
		Kange = 0.17 < 2ALLD - 1III CONTOL	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07147
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Uranium (EML U-02)

SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>Run 2:</u>	
		U-234	
		PZ-304-AS TOT 0.46 pCi/L	
		PZ-304-AS TOT DUP 0.59 pCi/L	
		both results < LLD	
		U-235	
		PZ-304-AS TOT 0.72 pCi/L	
		PZ-304-AS TOT DUP 0.49 pCi/L	
		both results < LLD	
		U-238	
		PZ-304-AS TOT 0.45 pCi/L	
		PZ-304-AS TOT DUP -0.17 pCi/L	
		both results < LLD	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234
			PZ-304-AS TOT U
			U-235
			PPZ-304-AS TOT & DIS U
			PZ-304-AI DIS U
			U-238
			PZ-304-AS TOT & DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07147
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Uranium (EML U-02)
CAMDLE NUMBEDG.	D 12 DUD05 (E:11 the of D7 105 66) D7 200 66 D7 204 AL D7 204 AC MW 1

SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 D-12 DIS Q PZ-304-AI TOT & DIS Q PZ-304-AS DIS Q U-235 D-12 DIS Q MW-104 DIS Q PZ-105-SS FD TOT & DIS Q PZ-204A-SS TOT & DIS Q PZ-208-SS TOT Q PZ-302-AI DIS Q PZ-304-AI TOT Q U-238 D-12 DIS Q PZ-304-AI DIS Q PZ-304-AI DIS Q PZ-105-SS FD Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	-208-SS, PZ-304-AI, PZ-304-AS, MW-104, 1	PZ-204A-SS, PZ-302-AI
SAMPLE DATE:	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: D-12 DIS 54.6% PZ-105-SS TOT 67.7% PZ-304-AI TOT 35.2% PZ-304-AI DIS 34% MW-104 TOT 70.9% MW-104-DIS 71.9% PZ-204A-SS TOT 35.5% PZ-204A-SS DIS 54.8% PZ-302-AI DIS 41.8% PZ-304-AS TOT 31.6% PZ-304-AS DIS 43.2%	U-234, U-235, U238 D-12 DIS J PZ-105-SS TOT J PZ-304-AI TOT J PZ-304-AI DIS J MW-104 TOT J MW-104-DIS J PZ-204A-SS TOT J PZ-204A-SS DIS J PZ-302-AI DIS J PZ-304-AS TOT J PZ-304-AS DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 05) was collected for D- 12 - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07147
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE:	7/15,16/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		
		1	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07147
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	Th-230 B+
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. No	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.00 pCi/L) -Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.45 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- qualify associated	
		sample as B+	
		- Thorium-232 (0.08 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
I abaratany Control Samula	1 Was LCS analyzed for every 20 semples or for	1 Vac	None
Laboratory Control Sample	1. was LCS analyzed for every 20 samples of for		None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were LCS % P within 80-120% ?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07147MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AISAMPLE DATE:7/15,16/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" td="" then=""><td>D-12 TOT 0.11 pCi/L</td><td></td></mdc,>	D-12 TOT 0.11 pCi/L	
	comparison was made.	D-12 TOT DUP 0.08 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< td=""><td></td></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	D-12 TOT 0.54 pCi/L	
	was $< 2 \text{ X MDC}$.	D-12 TOT DUP 0.83 pCi/L	
		Range = $0.29 < 2XLLD$ - results are in control	
		Th-232	
		D-12 TOT 0.12 pCi/L	
		D-12 TOT DUP 0.06 pCi/L	
		Range = $0.06 < 2XLLD$ - results are in control	

PROJECT NAME/NO. West Lake Landfill Operable Unit 1 LABORATORY: **Eberline Services PROJECT ID:** 13-07147 **MEDIA:** Groundwater (Dissolved and Total) **FRACTION:** Radionuclides - Thorium (EML-Th-01)

SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			D-12 TOT & DIS U
			MW-104 DIS U
			PZ-105-SS FD TOT & DIS U
			PZ-304-AS TOT & DIS U
			PZ-204A-SS DIS U
			PZ-302-AI DIS U
			PZ-304 AI DIS U
			Th-232
			D-12 DIS U
			PZ-304-AI TOT & DIS U
			MW-104 DIS U
			PZ-105-SS FD DIS U

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07147MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

SAMPLE DATE: 7/15,16/2013 **Oualifiers Added? CRITERIA Project Criteria Comments/Qualifying Actions** Uncertainty For the sample results >LLD the combined Th-228 No - see qualifications. standard uncertainty is less than 50% of the PZ-208-SS TOT & DIS Q sample activity. PZ-304-AI TOT Q PZ-204A-SS TOT Q PZ-302-AI TOT Q Th-230 D-12 DIS Q PZ-304-AI DIS Q PZ-204A-SS TOT Q Th-232 D-12 TOT Q PZ-105-SS FD TOT O PZ-204A-SS TOT & DIS Q PZ-208-SS TOT & DIS Q PZ-302-AI TOT & DIS Q PZ-304-AS TOT & DIS Q **Standards and Reference** 1. The standards used for calibration are not aged 1. Yes None 2. Yes Materials more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07147MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	D-12 TOT 64.9%	Th-228, Th-230, Th-232
	(75-110%).	D-12 DIS 44%	D-12 TOT J
		PZ-105-SS FD TOT 73.3%	D-12 DIS J
	If chemical recoveries were <20% check for	PZ-304-AS TOT 66.8%	PZ-105-SS FD TOT J
	spectral degradation.	PZ-304-AS DIS 71.2%	PZ-304-AS TOT J
		MW-104 DIS 73.8%	PZ-304-AS DIS J
		PZ-204A-SS TOT 58.2%	MW-104 DIS J
			PZ-204A-SS TOT J
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
ield Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 05) was collected for D-	None
	samples?	12 - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is $>$ their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

	PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
	LABORATORY:	Eberline Services		
	PROJECT ID:	13-07147		
	MEDIA:	Groundwater (Dissolved and Total)		
	FRACTION:	Radionuclides - Radium-228 (904.0)		
\sim	SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI	
	SAMPLE DATE:	7/15,16/2013		
	CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
	Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
2	Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
П	Holding Times	Samples met holding time requirement (180 days)?	Yes	None
	Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
US EFA	Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. No 3. No Method blank - Radium-228 (1.01 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify all samples as B+	all samples Ra-228 B+

UMENT	PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION: SAMPLE NUMBERS: SAMPLE DATE: CRITERIA Laboratory Control Sample (LCS)	West Lake Landfill Operable Unit 1 Eberline Services 13-07147 Groundwater (Dissolved and Total) Radionuclides - Radium-228 (904.0) D-12, DUP05 (Field dup of PZ-105-SS), PZ 7/15,16/2013 Project Criteria 1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI Comments/Qualifying Actions 1. Yes 2. Yes	Qualifiers Added? None
HIVE DOC	Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-12 TOT 1.13 pCi/L D-12 TOT DUP 0.38 pCi/L both samples <lld< th=""><th>None</th></lld<>	None
ARC	Non-Detects	Is the LLD > the sample concentration. For the sample results > L D, the combined	See qualifications	MW-104 DIS U D-12 TOT U PZ-105-SS FD TOT U PZ-204A-SS TOT U PZ-208-SS DIS U PZ-302-AI TOT & DIS U
EPA	Uncertainty	standard uncertainty is less than 50% of the sample activity.	isee quanneations	PZ-204A-SS DIS Q PZ-105-SS FD DIS Q
N	Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI	
SAMPLE DATE:	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. A field duplicate (DUP 05) was collected for D-12 - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ	Z-302-AI
SAMPLE DATE(S):	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. No 3. Yes Method blank - Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	Z-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ	Z-302-AI
SAMPLE DATE(S):	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. D-12 TOT 0.29 pCi/L D-12 TOT DUP 0.12 pCi/L Range = 0.17 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	MW-104 DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-12 TOT & DIS Q PZ-208-SS DIS Q PZ-302-AI DIS Q PZ-105-SS FD TOT & DIS Q

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07147		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	D-12, DUP05 (Field dup of PZ-105-SS), PZ	-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ	Z-302-AI
SAMPLE DATE(S):	7/15,16/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	certified expiration dates and DPM activities		
	contined, expiration dates, and D1 to derivites.		
Chemical Yield (Tracer)	Chemical recoveries were within control limits	All chemical recoveries were in control	None
	(75-110%).		
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 05) was collected for D-12 - results were	None
	samples?	in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	(c) If either result is $>$ their MDC, but < 5 times		
	was $< 5 \text{ X}$ the MDC		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MV	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. were KPD $\leq 20\%$?		
	1	1	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, M	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	D-12 TOT
	deionized distilled water, processed through each	2. Yes	U-234 P
	sample preparation and analysis procedure	FB AT D-12 TOT	
	prepared and analyzed with every SDG, or for	- Uranium-234 (0.32 pCi/L) - Positive Blank Conc	
	frequent?	is >1.65 X blank uncertainty - quality sample as P	
	2. Was at least one field blank/matrix per	- Uranium-235 (0.04) - Positive Blank Conc is	
	sampling episode collected?	<1.65 X blank uncertainty - no qualification	
	3. Were the associated blanks free of target	required	
	analytes?		
		- Uranium-238 (0.04) -Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
		3. Yes	
		Method blank	
		- Uranium-234 (0.08 pCi/L) - Positive Blank Conc	
		is <1.65 X blank uncertainty - no qualification	
		required	
		- Uranium-235 (0.08) - Positive Blank Conc is	
		required	
		- Uranium-238 (0.03) -Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2. Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, M	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 PZ-105-SS TOT 2.81 pCi/L PZ-105-SS TOT DUP 3.12 pCi/L RPD = 10% - in control U-235 PZ-105-SS TOT 0.25 pCi/L PZ-105-SS TOT DUP 0.51 pCi/L Range = 0.26 > 2XLLD - qualify associated samples as P U-238 PZ-105-SS TOT 1.54 pCi/L PZ-105-SS TOT DUP 1.63 pCi/L RPD = 2% - in control	all samples U-235 B+
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 PZ-114-AS TOT U U-238 PZ-114-AS TOT U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, M	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 PZ-114-AS TOT & DIS Q S-10 DIS Q
			U-235 PZ-303-AS TOT & DIS Q I-11 TOT & DIS Q S-10 TOT & DIS Q PZ-114-AS DIS Q I-66 TOT & DIS Q PZ-105-SS TOT Q U-238 PX-303-AS TOT Q S-10 DIS Q PZ-114-AS DIS Q I-66 DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MV	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits	Qualify the following results as J:	U-234, U-235, U238
	(75-110%).	PZ-114-AS TOT 44%	PZ-114-AS TOT J
		PZ-114-AS DIS 66.2%	PZ-114-AS DIS J
	If chemical recoveries were <20% then check for	I-66 DIS 42.4%	I-66 DIS J
	spectral degradation.	PZ-303-AS TOT 52.6%	PZ-303-AS TOT J
		PZ-303-AS DIS 60.1%	PZ-303-AS DIS J
		S-10 TOT 61.9%	S-10 TOT J
		S-10 DIS 52.4%	S-10 DIS J
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	No field duplicates were collected with this	None
	samples?	sample set.	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE:	7/12,15/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE:	7/12,15/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	D-12 TOT
	deionized distilled water, processed through each	2. Yes	Th-230 B+
	sample preparation and analysis procedure	FB AT D-12 TOT	
	prepared and analyzed with every SDG, or for	- Thorium-228 (-0.08 pCi/L) -Negative Blank	all samples
	each batch of 20 samples, whichever is more	Conc is <3X blank uncertainty- no qualification	Th-230 B+
	frequent?	required	
	2. Was at least one field blank/matrix per		
	sampling episode collected?	- Thorium-230 (0.46 pCi/L) -Positive Blank Conc	
	3. Were the associated blanks free of target	is >1.65 X blank uncertainty- qualify associated	
	analytes?	sample as B+	
		- Thorium-232 (0.12 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty, no qualification	
		required	
		required	
		3. No	
		Method blank	
		- Thorium-228 (-0.02 pCi/L) -Negative Blank	
		Conc is <3X blank uncertainty- no qualification	
		required	
		- Thorium-230 (0.58 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- qualify associated	
		sample as B+	
		- Thorium-232 (0.03 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE:	7/12,15/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" td="" then=""><td>PZ-105-SS TOT -0.03 pCi/L</td><td></td></mdc,>	PZ-105-SS TOT -0.03 pCi/L	
	comparison was made.	PZ-105-SS TOT DUP 0.06 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< td=""><td></td></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	PZ-105-SS TOT 0.45 pCi/L	
	was $< 2 X$ MDC.	PZ-105-SS TOT DUP 0.56 pCi/L	
		Range = $0.11 < 2XLLD$ - results are in control	
		Th-232	
		PZ-105-SS TOT 0.06 pCi/L	
		PZ-105-SS TOT DUP 0.11 pCi/L	
		Both results <lld< td=""><td></td></lld<>	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMDI E NIIMPEDS.	D7 105 SS D7 114 AS 1 66 MW 102 MW 102 D7 202 AS 1 11 S

SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			MW102 DIS U
			MW-103 DIS U
			PZ-105-SS TOT & DIS U
			PZ-114-AS TOT & DIS U
			PZ-303-AS TOT & DIS U
			S-10 TOT & DIS U
			Th-232
			I-66 DIS U
			MW-102 TOT U
			MW-103 DIS U
			PZ-105-SS TOT U
			PZ-114-AS TOT & DIS U
			PZ-303-AS DIS U
			S-10 DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Uncertainty	For the sample results >LLD the combined	No - see qualifications.	Th-228
	standard uncertainty is less than 50% of the		I-11 TOT Q
	sample activity.		I-66 TOT Q
			Th-230
			S-10 TOT Q
			PZ-114-AS TOT & DIS Q
			I-66 DIS Q
			MW-102 TOT & DIS Q
			MW-103 DIS Q
			Th-232
			MW-102 DIS Q
			PZ-105-SS DIS Q
			PZ-303-AS TOT Q
			S-10 TOT Q
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07146
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE:	7/12,15/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-114-AS TOT 37.5%	Th-228, Th-230, Th-232
	(75-110%).	I-66 TOT 50.3%	PZ-114-AS TOT J
		I-66 DIS 65.2%	I-66 TOT J
	If chemical recoveries were <20% check for	MW-102 TOT 54.4%	I-66 DIS J
	spectral degradation.	MW-102 DIS 43.3%	MW-102 TOT J
		MW-103 TOT 70.3%	MW-102 DIS J
		MW-103 DIS 67.8%	MW-103 TOT J
		I-11 TOT 71.1%	MW-103 DIS J
		I-11 DIS 50.4%	I-11 TOT J
			I-11 DIS J
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	No field duplicates were collected with this	None
	samples?	sample set.	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is $>$ their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MV	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with chemist's review of data package?	3. Yes	
	chemist's review of data package.		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits? 5 Were RPD $< 20\%$?		
	5. Weie Ri D _ 20%.		
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	$\frac{2.168}{FR \ AT \ D_{-}12 \ TOT}$	
	prepared and analyzed with every SDG, or for	- Radium-228 (1.20 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty -	
	each batch of 20 samples, whichever is more	no qualifications required	
	frequent?		
	2. Was at least one field blank/matrix per sampling	3. Yes	
	episode collected?	Method blank	
	analytes?	- Kadium-228 (0.75 pCl/L) - Positive Blank Conc is <1.05 A blank uncertainty -	
		no quantonio requirea	
			·

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MW	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-105-SS TOT 0.92 pCi/L PZ-105-SS TOT DUP 1.61 pCi/L Range = 0.69 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	I-66 DIS U MW-103 DIS U PZ-105 SS TOT U PZ-114-AS TOT & DIS U PZ-303-AS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-303-AS TOT Q S-10 DIS Q MW-102 TOT & DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MV	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE:	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75 110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	No field duplicates were collected with this sample set.	None

alifiers Added? None
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None
None
New
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None
None
None
None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, M	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE(S):	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-105-SS TOT 1.54 pCi/L PZ-105-SS DUP 1.77 pCi/L RPD = 14% - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	MW-103 DIS U PZ-114-AS DIS U S-10 DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-66 TOT & DIS Q MW-102 DIS Q MW-103 TOT Q PZ-114-AS TOT Q PZ-303-AS DIS Q S-10 TOT Q

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07146		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-105-SS, PZ-114-AS, I-66, MW-102, MV	W-103, PZ-303-AS, I-11, S-10	
SAMPLE DATE(S):	7/12,15/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	All chemical recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	No field duplicates were collected with this sample set.	None
PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
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LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6,	S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Vas at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure	3. Yes	
	prepared and analyzed with every SDG, or for	Method blank	
	each batch of 20 samples, whichever is more	- Uranium-234 (0.39 pCi/L) - Positive Blank Conc	
	frequent?	is <1.65 X blank uncertainty - no qualification	
	2. Was at least one field blank/matrix per	required	
	3 Were the associated blanks free of target	- Uranium-235 (0.08) - Positive Blank Conc is	
	analytes?	<1.65 X blank uncertainty - no qualification	
		required	
		- Uranium-238 (0.09) -Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
		1	Num
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	frequent?	2. 105	
	2 Were I CS % R within 80-120%?		
	2. WOIC LCD 70K WITHIN 00-12070 :		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 I-67 TOT 0.89 pCi/L I-67 TOT DUP 0.84 pCi/L RPD = 5.8% - in control U-235 I-67 TOT 0.22 pCi/L I-67 TOT DUP 0.14 pCi/L Range = 0.08 < 2XLLD - in control U-238 I-67 TOT 0.56 pCi/L I-67 TOT DUP 0.54 pCi/L Range = 0.02 < 2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 D-6 TOT & DIS U I-62 FD TOT U D-83 FD TOT & DIS U U-238 D-6 TOT U D-83 FD DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 D-6 TOT & DIS U I-62 FD TOT Q D-83 FD TOT & DIS Q U-235 D-83 DIS Q I-62 TOT & DIS Q I-67 TOT & DIS Q I-68 DIS Q S-61 TOT & DIS Q S-8 TOT & DIS Q I-62 FD TOT Q D-83 FD TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6,	S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-113-AS FD TOT 57.1% PZ-113-AS FD DIS 26.2% S-8 TOT 61.1% I-62 DIS 72.4% D-6 TOT 63.4% D-6 DIS 64.9% S-61 DIS 47.3% I-67 DIS 70.3% I-68 TOT 61.8% D-83 FD TOT 58.6% D-83 FD DIS 71.9%	U-234, U-235, U238 D-83 FD TOT J D-83S FD DIS J S-8 TOT J I-62 DIS J D-6 TOT J D-6 DIS J S-61 DIS J I-67 TOT J I-67 DIS J I-68 TOT J I-62 FD TOT J I-62 FD DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	 A field duplicate (DUP 04) was collected for I- 62 - results were in control DUP 03 was collected as a field duplicate for D- 83 (SDG 13-07110) - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07111
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE:	7/11, 12/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07111
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE:	7/11, 12/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. No	Th-230 B+
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. No	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (-0.04 pCi/L) -Negative Blank	
	2. Was at least one field blank/matrix per	Conc is <3X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target	-	
	analytes?	- Thorium-230 (0.43 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- qualify associated	
		sample as B+	
		- Thorium-232 (0.01 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were ICS % P within 80-120% 2		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07111
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE:	7/11, 12/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	all samples
	batch and each method?	2. Yes	Th-230 P
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" td="" then=""><td>I-67 TOT 0.03 pCi/L</td><td></td></mdc,>	I-67 TOT 0.03 pCi/L	
	comparison was made.	I-67 TOT DUP 0.0 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Both results <lld< td=""><td></td></lld<>	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	I-67 TOT 0.87 pCi/L	
	was $< 2 \text{ X MDC}$.	I-67 TOT DUP 0.46 pCi/L	
		Range = $0.41 > 2XLLD$ - qualify associated results	
		as P	
		Th-232	
		I-67 TOT 0.06 pCi/L	
		I-67 TOT DUP 0.05 pCi/L	
		Both results <lld< td=""><td></td></lld<>	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07111
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)

SAMPLE DATE: 7/11, 12/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
		-	I-62 FD TOT & DIS U
			I-62 TOT & DIS U
			I-67 TOT & DIS U
			S-8 TOT & DIS U
			S-61 DIS U
			I-68 DIS U
			Th-232
			D-6 DIS U
			I-62 FD TOT U
			D-83 FD TOT & DIS U
			I-62 DIS U
			I-67 TOT U
			I-68 DIS U
			S-61 DIS U
			S-8 TOT & DIS U
Uncertainty	For the sample results >LLD the combined	No - see qualifications.	Th-228
-	standard uncertainty is less than 50% of the		D-6 TOT & DIS Q
	sample activity.		D-83 FD TOT & DIS Q
			Th-230
			S-8 DIS Q
			I-68 DIS Q
			Th-232
			I-62 TOT O
			D-6 TOT O
			I-62 FD DIS O
			I-67 DIS 0

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07111
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE:	7/11, 12/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	D-6 DIS 44.3% S-61 DIS 62.1% I-67 TOT 60.5% D-83 FD DIS 119%	Th-228, Th-230, Th-232 D-6 DIS J S-61 DIS J I-67 TOT J I-62 FD DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	 A field duplicate (DUP 04) was collected for I- 62 - results were in control DUP 03 was collected as a field duplicate for D- 83 (SDG 13-07110) - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6.	S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11 12/2013	<i>b</i> 01,1 0,1 00,2 01 0. (1100 dep 011 02)	
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-228 (0.28 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6,	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more frequent?	2. Yes	
	2. Were LCS %R within 80-120%?		
Laboratory Durkasta	1. Was one duplicate sample analyzed for each	1 Vac	Nona
Laboratory Duplicate	hatch and each method?	1. 165 2 Yes	None
	2. Were duplicate results reported in pCi/L?	3.	
	3.	I-67 TOT 1.19 pCi/L	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>I-67 DUP 1.22 pCi/L</th><th></th></mdc,>	I-67 DUP 1.22 pCi/L	
	comparison was made.	Both results <lld< th=""><th></th></lld<>	
	b) If both results are ≥ 5 times their MDC, the		
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 2 \times MDC$.		
Non-Detects	Is the LLD > the sample concentration.	See qualifications	S-8 TOT & DIS U
			I-62 DIS U
			I-62 FD DIS U
			I-67 TOT U
I to a sector to to	Earth and a subtained		
Uncertainty	standard uncertainty is less than 50% of the	see quannearons	1-62 TOT Q S-61 TOT Q
	sample activity.		I-67 DIS O
Standards and Pafarance	1. The standards used for calibration are not aged	1 Ves	None
Materials	more than four times the half-life from the	1. 105 2 Yes	None
114001 141.5	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6,	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE:	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75 110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	 A field duplicate (DUP 04) was collected for I-62 - results were in control DUP 03 was collected as a field duplicate for D-83 (SDG 13-07110) - results were in control 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07111		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	DUP 03 (Field dup of D-83), S-8, I-62, D-6	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
SAMPLE DATE(S):	7/11, 12/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-226 (-0.07 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required 	None

PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION:	West Lake Landfill Operable Unit 1 Eberline Services 13-07111 Groundwater (Dissolved and Total) Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS: SAMPLE DATE(S):	DUP 03 (Field dup of D-83), S-8, I-62, D-6 7/11, 12/2013	, S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. I-67 TOT 0.49 pCi/L I-67 DUP 0.46 pCi/L Range = 0.03 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	I-62 FD DIS U S-8 TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-62 FD TOT Q I-62 TOT & DIS Q I-67 TOT & DIS Q I-68 DIS Q S-61 DIS Q S-8 DIS Q

West Lake Landfill Operable Unit 1		
Eberline Services		
13-07111		
Groundwater (Dissolved and Total)		
Radionuclides - Radium-226 (903.0)		
DUP 03 (Field dup of D-83), S-8, I-62, D-6,	S-61, I-67, I-68, DUP 04 (Field dup of I-62)	
7/11, 12/2013		
Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.	1. Yes 2. Yes	None
2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.		
Chemical recoveries were within control limits (75-110%).	All chemical recoveries were in control	None
 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	 A field duplicate (DUP 04) was collected for I-62 - results were in control DUP 03 was collected as a field duplicate for D-83 (SDG 13-07110) - results were in control 	None
	West Lake Landfill Operable Unit 1 Eberline Services 13-07111 Groundwater (Dissolved and Total) Radionuclides - Radium-226 (903.0) DUP 03 (Field dup of D-83), S-8, I-62, D-6, 7/11, 12/2013 Project Criteria 1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. Chemical recoveries were within control limits (75-110%). 1. Background was measured 2. Background counts duration was at least as long as the sample count duration 1. Were field duplicates collected for every 10 samples? 2. a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was \leq 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.</mdc,>	West Lake Landfill Operable Unit 1 Eberline Services 13-07111 Groundwater (Dissolved and Total) Radionuclides - Radium-226 (903.0) DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62) 7/11, 12/2013 Comments/Qualifying Actions 1. The standards used for calibration are not aged nore than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. Chemical recoveries were within control limits All chemical recoveries were in control (75-110%). 1. Background was measured 2. Background counts duration was at least as long as the sample count duration 1. Were field duplicates collected for every 10 samples? 2. If both results are <5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If both results are >5 times their MDC, but < 5 times their MDC, but < 5 times their difference was < 5 X the MDC.

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	-SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes MW-1204 DIS was reanalyzed due to low chemical recovery. For PZ-202-SS TOT, PZ-116-SS TOT, PZ-116- SS DIS, PZ-115-SS TOT & PZ115-SS DIS, the U- 235 results appear to be biased positive due to created trailing of U 234 into the U 235 region of 	PZ-202-SS TOT U-235 J+ PZ-116-SS TOT U-235 J+ PZ-116-SS DIS U-235 J+ PZ 115 SS TOT
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	U-235 J+ PZ115-SS DIS U-235 J+ None
Preservations	 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions. 		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Yas at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	PZ-202-SS TOT
	deionized distilled water, processed through each	2. Yes	U-234 B+
	sample preparation and analysis procedure	FB at PZ-202-SS TOT	
	prepared and analyzed with every SDG, or for	- Uranium-234 (0.19 pCi/L) - Positive Blank Conc	MW-1204 DIS
	each batch of 20 samples, whichever is more	is >1.65 X blank uncertainty - qualify associated	U-234 B+
	frequent?	sample as B+	
	2. Was at least one field blank/matrix per	Uranium 225 (0.06) Positiva Plank Congia	
	3 Were the associated blanks free of target	$\sim 1.65 \text{ X}$ blank uncertainty - no qualification	
	analytes?	required	
		- Uranium-238 (0.05) -Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
		2 N-	
		5. NO Mathad blank	
		Run 1.	
		- Uranium-234 (0.08 pCi/L) - Positive Blank Conc.	
		is <1.65 X blank uncertainty - no qualification	
		required	
		- Uranium-235 (0.08) - Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
1	1	1	1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116	-SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		- Uranium-238 (0.07) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	
		Run 2 (MW-1204 DIS): - Uranium-234 (0.32 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+	
		- Uranium-235 (0.11) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	
		'- Uranium-238 (-0.01) -Negative Blank Conc is <3 X blank uncertainty - no qualification required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	MW-1204 DIS
(LCS)	each batch of samples whichever is more	2. No	U-234 S+
	frequent? 2. Were LCS %R within 80-120%?	Run 2: U-234 LCS = 78.1%	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	-SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	<u>Run 1:</u>	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>U-234</th><th></th></mdc,>	U-234	
	comparison was made.	D-83 TOT 0.12 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	D-83 TOT DUP 0.27 pCi/L	
	relative percent difference (RPD) was $\leq 20\%$.	Range = $0.15 < 2XLLD$ - in control	
	c) If either result is \geq their MDC, but < 5 times		
	their MDC, the absolute value of their difference	U-235	
	was $< 2 \text{ X MDC}$.	D-83 TOT 0.03 pCi/L	
		D-83 TOT DUP 0.05 pCi/L	
		Both results < LLD	
		U-238	
		D-83 TOT 0.12 pCi/L	
		D-83 TOT DUP 0.03 pCi/L	
		Both results < LLD	
1			

LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116	-SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		Run 2: U-234 MW-1204 DIS 0.12 pCi/L MW-1204 DIS DUP 0.18 pCi/L Both results < LLD U-235 MW-1204 DIS 0.03 pCi/L MW-1204 DIS DUP 0.21 pCi/L Both results < LLD U-238 MW-1204 DIS 0.12 pCi/L MW-1204 DIS 0.12 pCi/L Both results < LLD U-238 MW-1204 DIS 0.12 pCi/L MW-1204 DIS 0.12 pCi/L MW-1204 DIS 0.12 pCi/L	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 D-83 TOT U MW-1204 DIS U U-235 D-83 TOT & DISU D-93 TOT & DIS U I-9TOT & DIS U MW-1204 DIS U S-82 DIS U U-238 MW-1204 TOT & DIS U D-83 TOT & DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116	-SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 D-83 DIS Q D-93 TOT & DIS Q I-9 DIS Q MW-1204 TOT Q S-82 DIS Q U-235 PZ-115-SS TOT & DIS Q PZ-202-SS TOT & DIS Q S-82 TOT Q U-238 D-93 TOT & DIS Q I-9 TOT & DIS Q S-82 TOT & DIS Q
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the certification date and have been recalibrated	2. Yes	
	within the past three years.		
	were NIST traceable with certification. date		
	certified, expiration dates, and DPM activities.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07110			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Uranium (EML U-02)			
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS		
SAMPLE DATE:	7/11/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-202-SS DIS 58.8% D-83 TOT 44.9% D-83 DIS 63.8% MW-1204 TOT 35.4% MW-1204 DIS (Run 2) 62 6% S-82 TOT 66.5% S-82 DIS 52.2% PZ-116-SS DIS 126.6% I-9 TOT 66.9% I-9 DIS 57.2% PZ-115-SS TOT 73.8%	U-234, U-235, U238 PZ-202-SS DIS J D-83 TOT J D-83 DIS J MW-1204 TOT J MW-1204 DIS (Run 2) J S-82 TOT J S-82 DIS J PZ-116-SS DIS J I-9 TOT J I-9 DIS J PZ-115-SS TOT J	
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None	
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. A field duplicate (DUP 03) was collected for I- 62 in SDG 13-07111 - results were in control	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE:	7/11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
ample Conditions and reservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Iolding Times	Samples met holding time requirement (180	Yes	None
Aatrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE:	7/11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	PZ-202-SS TOT
	deionized distilled water, processed through each	2. Yes	Th-230 B+
	sample preparation and analysis procedure	FB at PZ-202-SS TOT	
	prepared and analyzed with every SDG, or for	- Thorium-228 (-0.01 pCi/L) - Negative Blank	all samples
	each batch of 20 samples, whichever is more	Conc is <3 X blank uncertainty- no qualification	Th-230 B+
	frequent?	required	
	2. Was at least one field blank/matrix per		
	sampling episode collected?	- Thorium-230 (0.22 pCi/L) -Positive Blank Conc	
	3. Were the associated blanks free of target	is >1.65 X blank uncertainty- qualify associated	
	analytes?	sample as B+	
		- Thorium-232 (0.04 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		3 No.	
		5. No Mathad blank	
		Therium 228 (0.00 pCi/L) Positive Blank Conc	
		is <1.65 X blank uncertainty, no qualification	
		required	
		required	
		- Thorium-230 (0.23 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- qualify associated	
		sample as B+	
		- Thorium-232 (0.05 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		•	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2 Were LCS % R within 80-120% 2		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE:	7/11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>D-83 TOT 0.14 pCi/L</th><th></th></mdc,>	D-83 TOT 0.14 pCi/L	
	comparison was made.	D-83 TOT DUP 0.16 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Range = 0.02 <2XLLD - results are in control	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	D-83 TOT 0.14 pCi/L	
	was $< 2 \text{ X MDC}$.	D-83 TOT DUP 0.19 pCi/L	
		Range = $0.05 < 2XLLD$ - results are in control	
		Th-232	
		D-83 TOT 0.06 pCi/L	
		D-83 TOT DUP 0.06 pCi/L	
		Range = $0.00 < 2XLLD$ - results are in control	
		č	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS

SAMPLE DATE: 7/11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			I-9 TOT & DIS U
			D-93 DIS U
			MW-1204 TOT & DIS U
			PZ-115-SS TOT & DIS U
			PZ-116-SS TOT & DIS U
			PZ-202-SS TOT & DIS U
			S-82 TOT U
			Th-232
			D-83 TOT & DIS U
			I-9 TOT & DIS U
			D-93 TOT & DIS U
			MW-1204 TOT & DIS U
			PZ-115-SS TOT & DIS U
			PZ-116-SS TOT & DIS U
			PZ-202-SS TOT & DIS U
			S-82 TOT & DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS

SAMPLE DATE: 7/11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	Th-228 D-83 TOT & DIS Q S-82 DIS Q D-93 TOT Q Th-230 D-83 TOT & DIS Q I-9 TOT & DIS Q D-93 TOT & DIS Q MW-1204 TOT Q PZ-115-SS TOT & DIS Q PZ-116-SS TOT & DIS Q PZ-202-SS TOT & DIS Q S-82 TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-202-SS TOT 71.0% PZ-202-SS DIS 68.2% D-83 DIS 127.8% S-82 TOT 115.5% S-82 DIS 114.8%	Th-228, Th-230, Th-232 PZ-202-SS TOT J PZ-202-SS DIS J D-83 DIS J S-82 TOT J S-82 DIS J

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07110
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE:	7/11/2013

13-07110		
Groundwater (Dissolved and Total)		
Radionuclides - Thorium (EML-Th-01)		
PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
7/11/2013		
		Qualifiers Added?
Project Criteria	Comments/Qualifying Actions	
1. Background was measured	1. Yes	None
long as the sample count duration	2. 165	
 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. A field duplicate (DUP 03) was collected for I- 62 in SDG 13-07111 - results were in control	None
	 13-07110 Groundwater (Dissolved and Total) Radionuclides - Thorium (EML-Th-01) PZ-202-SS, D-83, MW1204, S-82, PZ-116-7/11/2013 Project Criteria Background was measured Background counts duration was at least as long as the sample count duration Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	13-07110Groundwater (Dissolved and Total)Radionuclides - Thorium (EML-Th-01)PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS7/11/2013Project CriteriaComments/Qualifying Actions1. Background was measured1. Yes2. Background counts duration was at least as long as the sample count duration1. Yes1. Were field duplicates collected for every 10 samples?1. A field duplicate (DUP 03) was collected for I- 62 in SDG 13-07111 - results were in control2. a) If both results are <mdc, duplicate<br="" no="" then=""></mdc,> comparison was made.1. A field duplicate (DUP 03) was collected for I- 62 in SDG 13-07111 - results were in controlb) If both results are >5 times their MDC, the relative percent difference (RPD) was \leq 35%.1. Getter result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever is		
	more frequent?		
	2. Were field blanks used for MIS/MISD sample		
	3 Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	PZ-202-SS TOT
	deionized distilled water, processed through each	2. Yes	Ra-228 B+
	sample preparation and analysis procedure	FB at PZ-202-SS TOT	
	prepared and analyzed with every SDG, or for	- Radium-228 (1.16 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty -	
	frequent?	quanty associated sample as B+	
	2. Was at least one field blank/matrix per sampling	3 Yes	
	episode collected?	Method blank	
	3. Were the associated blanks free of target	- Radium-228 (0.59 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty -	
	analytes?	no qualifications required	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	All samples
(LCS)	each batch of samples whichever is more frequent?	2. No	Ra-228 S+
	2. Were LCS %R within 80-120%?	LCS = 134.9% - qualify associated samples as S+	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-83 TOT 4.30 pCi/L D-83 DUP 7.42 pCi/L Range = 3.12 <2XLLD results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	D-93 TOT U PZ-115-SS DIS U PZ-116-SS TOT U PZ-202-SS TOT U S-82 TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-5	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE:	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries: PZ-115-SS TOT 111% Gravimetric recoveries were in control	PZ-115-SS TOT Ra-228 J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-07111 - results were in control	None

PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION: SAMPLE NUMBERS: SAMPLE DATE(S):	West Lake Landfill Operable Unit 1 Eberline Services 13-07110 Groundwater (Dissolved and Total) Radionuclides - Radium-226 (903.0) PZ-202-SS, D-83, MW1204, S-82, PZ-116- 7/11/2013	-SS, D-93, I-9, PZ-115-SS	
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included?2. All samples in COC present?3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes Yes FB at PZ-202-SS TOT Radium-226 (0.00 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required Yes Method blank Radium-226 (0.05 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 	None

LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE(S):	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-83 TOT 3.04 pCi/L D-83 DUP 2.48 pCi/L RPD = 20%	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-116-SS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-116-SS TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	PZ-115-SS TOT 111%	PZ-115-SS TOT J

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07110		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-202-SS, D-83, MW1204, S-82, PZ-116-	SS, D-93, I-9, PZ-115-SS	
SAMPLE DATE(S):	7/11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-	None
	samples?	07111 - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 0	2 (Field duplicate of D-85), PZ-113-SS, PZ-	104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE:	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
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LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (02 (Field duplicate of D-85), PZ-113-SS, PZ-	104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE:	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Uranium-234 (0.16 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required Uranium-235 (0.03) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required Uranium-238 (0.09) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	No

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (02 (Field duplicate of D-85), PZ-113-SS, PZ-	104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE:	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. U-234 PZ-113-AS TOT 0.69 pCi/L PZ-113-AS TOT DUP 0.63 pCi/L Range = 0.06 <2XLLD - in control U-235 PZ-113-AS TOT 0.14 pCi/L PZ-113-AS TOT DUP 0.07 pCi/L Range = 0.07 <2XLLD - in control U-238 PZ-113-AS TOT 0.62 pCi/L PZ-113-AS TOT DUP 0.38 pCi/L Range = 0.24 <2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 DUP 02 TOT U PZ-104-SD TOT & DIS U U-235 DUP 02 TOT & DIS U PZ-104-SD TOT & DIS U PZ-101-SS TOT & DIS U PZ-104 SS DIS U U-238 DUP 02 TOT U PZ-104-SD TOT & DIS U PZ-101-SS TOT U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

LABORATORY: Eberline Services

PROJECT ID:13-07100**MEDIA:**Groundwater (Dissolved and Total)

FRACTION: Radionuclides - Uranium (EML U-02)

SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SD

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined	No - see qualifications	U-234
	standard uncertainty is less than 50% of the		DUP 02 DIS Q
	sample activity.		PZ-101-SS TOT Q
			U-235
			PZ-104-SS TOT Q
			PZ-109-SS TOT & DIS Q
			PZ-113-AS TOT & DIS Q
			PZ-113-SS TOT & DIS Q
			PZ-205-SS TOT & DIS Q
			U-238
			DUP 02 DIS Q
			PZ-104-SS DIS Q
			PZ-113-AS DIS Q
Standards and Reference	1. The standards used for calibration are not aged	1. Yes	None
Materials	more than four times the half-life from the	2. Yes	
	certification date and have been recalibrated		
	within the past three years.		
	2. All standards used in instrument calibrations		
	were NIST traceable with certification, date		
	certified, expiration dates, and DPM activities.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 0	2 (Field duplicate of D-85), PZ-113-SS, PZ-	104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE:	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-113-AS TOT 64% PZ-109-SS DIS 112.4% PZ-205-SS TOT 115% DUP 02 TOT 23.2% DUP 02 DIS 22.9% PZ-113-SS DIS 111.7% PZ-101-SS TOT 20.2% PZ-101 SS DIS 55.8% PZ-104-SD TOT 22.6% PZ-104-SD DIS 26.3%	U-234, U-235, U238 PZ-113-AS TOT J PZ-109-SS DIS J PZ-205-SS TOT J DUP 02 TOT J DUP 02 DIS J PZ-113-SS DIS J PZ-101-SS TOT J PZ-101 SS DIS J PZ-104-SD TOT J PZ-104-SD DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. DUP 02 was collected as a field duplicate of PZ- 113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SS

SAMPLE DATE:	7/10,11/2013		
			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Samula Canditions and	1. Cooler temperature (2002		News
Sample Conditions and	1. Cooler temperature $< 0^{\circ}$ C?	Samples were preserved and filtered in the field	INORE
r reservations	2. pH of aqueous samples <2?		
	5. Record of sample preservation and problems		
II.139	See to sample conditions.	X7	NT
Holding Times	Samples met holding time requirement (180	Yes	INOne
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NOWest Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. Yes	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.01 pCi/L) -Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.11 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-232 (0.02 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	Th-232
(LCS)	each batch of samples whichever is more	2. Th-232 - 124.45% - qualify associated samples	all samples S+
	frequent?	as S+	
	2 Were LCS % R within 80-120%?		

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SSSAMPLE DATE:7/10,11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>PZ-113-AS TOT 0.06 pCi/L</th><th></th></mdc,>	PZ-113-AS TOT 0.06 pCi/L	
	comparison was made.	PZ-113-AS TOT DUP 0.07 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Range = $0.01 < 2XLLD$ - results are in control	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	PZ-113-AS TOT 0.21 pCi/L	
	was $< 2 \text{ X MDC}$.	PZ-113-AS TOT DUP 0.23 pCi/L	
		Range = $0.02 < 2XLLD$ - results are in control	
		Th-232	
		PZ-113-AS TOT 0.12 pCi/L	
		PZ-113-AS TOT DUP 0.02 pCi/L	
		Range = $0.10 < 2XLLD$ - results are in control	

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)

 SAMPLE NUMBERS:
 PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SD

 SAMPLE DATE:
 7/10,11/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			DUP 02 DIS U
			PZ-101-SS TOT & DIS U
			PZ-104-SD TOT & DIS U
			PZ-109-SS TOT & DIS U
			PZ-113-AS TOT U
			PZ-113-SS DIS U
			PZ-205-SS TOT & DIS U
			Th-230
			PZ-205-SS TOT U
			PZ-109-SS TOT U
			PZ-104-SS DIS U
			PZ-104-SD TOT U
			Th 232
			PZ 104 SD TOT U
			12-104-50 101 0 P7 104 SS TOT & DIS U
			PZ-104-55 TOT & DIS U
			PZ-109-55 TOT & DIS U
			PZ-113-AS TOT & DIS U
			PZ-113-SS DIS U
			PZ-205-SS TOT U

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	Th-228 DUP 02 TOT Q PZ-113-AS TOT & DIS Q PZ-113-SS TOT Q Th-230 PZ-101-SS TOT & DIS Q PZ-104-SD DIS Q PZ-104-SS TOT Q PZ-109-SS DIS Q PZ-113-AS TOT & DIS Q
			PZ-205-SS DIS Q Th-232 PZ-104-SD DIS Q PZ-113-AS TOT Q PZ-113-SS TOT Q PZ-205-SS DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.West Lake Landfill Operable Unit 1LABORATORY:Eberline ServicesPROJECT ID:13-07100MEDIA:Groundwater (Dissolved and Total)FRACTION:Radionuclides - Thorium (EML-Th-01)SAMPLE NUMBERS:PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-104-SS

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	PZ-113-AS DIS 131.3%	Th-228, Th-230, Th-232
	(75-110%).	DUP 02 DIS 117.4%	PZ-113-AS DIS J
		PZ-113-SS TOT 125%	DUP 02 DIS J
	If chemical recoveries were <20% check for	PZ-104-SS TOT 114.4%	PZ-113-SS TOT J
	spectral degradation.	PZ-104-SD TOT 67.7%	PZ-104-SS TOT J
			PZ-104-SD TOT J
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. DUP 02 was collected as a field duplicate of PZ-	None
	samples?	113-AD (SDG 13-7099) - results were in control	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.		
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is $>$ their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

	PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
	LABORATORY:	Eberline Services		
	PROJECT ID:	13-07100		
	MEDIA:	Groundwater (Dissolved and Total)		
	FRACTION:	Radionuclides - Radium-228 (904.0)		
\leq	SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (2 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-	104-SD
	SAMPLE DATE:	7/10,11/2013		
	CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
CU V	Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
00	Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
	Holding Times	Samples met holding time requirement (180 days)?	Yes	None
AKCHIVE	Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
US EPA	Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.20 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION: SAMPLE NUMBERS: SAMPLE DATE: CRITERIA	West Lake Landfill Operable Unit 1 Eberline Services 13-07100 Groundwater (Dissolved and Total) Radionuclides - Radium-228 (904.0) PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (7/10,11/2013 Project Criteria	02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ- Comments/Qualifying Actions	104-SD Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	2. Yes	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-113-AS TOT 0.53 pCi/L PZ-113-AS DUP 0.68 pCi/L Both results <lld< th=""><th>None</th></lld<>	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-113-AS TOT & DIS U PZ-104-SS TOT & DIS U PZ-205-SS DIS U PZ-113-SS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-205-SS TOT Q PZ-109-SS TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO. LABORATORY: PROJECT ID: MEDIA: FRACTION: SAMPLE NUMBERS:	West Lake Landfill Operable Unit 1 Eberline Services 13-07100 Groundwater (Dissolved and Total) Radionuclides - Radium-228 (904.0) PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (7/10.11/2012)2 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-	104-SD
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical and gravimetric recoveries were in control	None
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101	-SS, PZ-104-SD
SAMPLE DATE(S):	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Vas at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-226 (-0.03 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP (02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101	-SS, PZ-104-SD
SAMPLE DATE(S):	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more frequent?	2. Yes	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. PZ-113=AS TOT 0.65 pCi/L PZ-113=AS DUP 0.66 pCi/L Range = 0.01 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-113-AS TOT & DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07100		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 0	02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101	-SS, PZ-104-SD
SAMPLE DATE(S):	7/10,11/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-1	13-AD
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes All samples were reanalyzed due to low chemical recovery. The second analysis also produced low chemical recoveries due to apparent chemical interferences. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-5	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-1	13-AD
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	U-234
	deionized distilled water, processed through each	2. No	all samples B+
	sample preparation and analysis procedure	2. 14	
	prepared and analyzed with every SDG, or for	3. No	
	each batch of 20 samples, whichever is more	Method blank	
	Prequent?	- Uranium-234 (0.33 pCl/L) - Positive Blank Conc	
	2. Was at least one field blank/matrix per	is >1.05 A blank uncertainty - quanty an samples	
	3 Were the associated blanks free of target	as D+	
	analytes?	- Uranium-235 (0.08) - Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		required	
		- Uranium-238 (0.08) -Positive Blank Conc is	
		<1.65 X blank uncertainty - no qualification	
		lequiled	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	No
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	12 W $1000 P$ $34 k$ $201200/9$		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-2	13-AD
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. U-234 D-85 TOT 2.95 pCi/L D-85 TOT DUP 2.57 pCi/L Range = 0.38 <2XLLD - in control U-235 D-85 TOT 1.31 pCi/L D-85 TOT DUP 0.64 pCi/L Range = 0.67 <2XLLD - in control U-238 D-85 TOT 2.39 pCi/L D-85 TOT DUP 2.37 pCi/L Range = 0.02 <2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 DUP 01 TOT & DIS U U-235 DUP 01 TOT & DIS U U-238 DUP 01 TOT & DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-1	13-AD
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 PZ-113-AD TOT & DIS Q S-84 TOT & DIS Q U-235 D-85 TOT Q PZ-106-SD TOT & DIS Q PZ-106-SS DIS Q PZ-201A-SS TOT Q S-84 DIS Q U-238 PZ-106-SD TOT Q PZ-106-SS TOT Q S-84 TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-	113-AD
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits	DUP 01 TOT 15.7%	U-234, U-235, U238
	(75-110%).	DUP 01 DIS 10.8%	DUP 01 TOT R
		PZ-113-AD TOT 10.9%	DUP 01 DIS R
	If chemical recoveries were <20% then check for	- spectral degradation - qualify associated results	PZ-113-AD TOT R
	spectral degradation.	as R	
			PZ-201A-SS TOT J
		Qualify the following results as J:	PZ-201A-SS DIS J
		PZ-201A-SS TOT 53.5%	D-85 TOT J
		PZ-201A-SS DIS 61.2%	D-85 DIS J
		D-85 TOT 26.2%	PZ-106-SD TOT J
		D-85 DIS 58.9%	PZ-106-SD DIS J
		PZ-106-SD TOT 52.4%	S-84 TOT J
		PZ-106-SD DIS 61.2%	S-84 DIS J
		S-84 TOT 33.2%	PZ-106-SS TOT J
		S-84 DIS 22.9%	PZ-106-SS DIS J
		PZ-106-SS 101 54%	PZ-113-AD DIS J
		PZ-106-SS DIS 60.9%	
		PZ-113-AD DIS 52.7%	
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10	1. DUP 01 was collected as a field duplicate of I-4	None
	samples?	- results were in control.	
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>		
	comparison was made.	2. A field dup of PZ-113-AD was collected in	
	b) If both results are >5 times their MDC, the	SDG 13-07100 - results were in control.	
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is > their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \times \text{the MDC}$.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE:	7/9,10/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE:	7/9,10/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	None
	deionized distilled water, processed through each	2. No	
	sample preparation and analysis procedure		
	prepared and analyzed with every SDG, or for	3. Yes	
	each batch of 20 samples, whichever is more	Method blank	
	frequent?	- Thorium-228 (0.03 pCi/L) -Positive Blank Conc	
	2. Was at least one field blank/matrix per	is <1.65 X blank uncertainty- no qualification	
	sampling episode collected?	required	
	3. Were the associated blanks free of target		
	analytes?	- Thorium-230 (0.13 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-232 (0.07 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2. Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD

SAMPLE DATE: 7/9,10/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
	3.	Th-228	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>D-85 TOT 2.68 pCi/L</th><th></th></mdc,>	D-85 TOT 2.68 pCi/L	
	comparison was made.	D-85 TOT DUP 2.48 pCi/L	
	b) If both results are ≥ 5 times their MDC, the	Range = $0.2 < 2XLLD$ - results are in control	
	relative percent difference (RPD) was $\leq 20\%$.		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	D-85 TOT 4.26 pCi/L	
	was $< 2 \text{ X MDC}$.	D-85 TOT DUP 4.31 pCi/L	
		Range = $0.05 < 2XLLD$ - results are in control	
		Th-232	
		D-85 TOT 2.50 pCi/L	
		D-85 TOT DUP 2.29 pCi/L	
		Range = $0.21 < 2XLLD$ - results are in control	
		-	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD

SAMPLE DATE: 7/9,10/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			D-85 DIS U
			DUP 01 TOT & DIS U
			PZ-106-SD TOT & DIS U
			PZ-106-SS TOT & DIS U
			PZ-113-AD DIS U
			PZ-201A-SS TOT & DIS U
			Th-230
			D-85 DIS U
			PZ-106-SD DIS U
			PZ-106-SS TOT U
			Th-232
			D-85 DIS U
			DUP 01 TOT & DIS U
			PZ-106-SD DIS U
			PZ-106-SS TOT & DIS U
			PZ-113-AD TOT & DIS U
			PZ-201A-SS TOT & DIS U
			S-84 DIS U

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMDIE NUMBERS.	DUP 01 (Field duplicate of L4) P7 201A SS D 85 P7 106 SD S 84 P7 106 SS P7 11

SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD

SAMPLE DATE: 7/9,10/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	Th-228 PZ-113-AD TOT Q S-84 DIS Q
			Th-230 DUP 01 TOT & DIS Q PZ-106-SD TOT Q PZ-106-SS DIS Q PZ-113-AD TOT & DIS Q PZ-201A-SS TOT & DIS Q S-84 DIS Q
			Th-232 PZ-106-SD TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	DUP 01 DIS 71.4% D-85 TOT 56.6% S-84 TOT 59.3% S-84 DIS 122.7% PZ-106-SS TOT 71.3%	Th-228, Th-230, Th-232 DUP 01 DIS J D-85 TOT J S-84 TOT J S-84 DIS J PZ-106-SS TOT J

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07099
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE:	7/9,10/2013

			Qualifiers Added?
RITERIA	Project Criteria	Comments/Qualifying Actions	
ckground Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as	2. Yes	
	long as the sample count duration		
eld Duplicate	1. Were field duplicates collected for every 10	1. DUP 01 was collected as a field duplicate of I-4	None
	samples?	- results were in control.	
	2. a) If both results are <mdc, duplicate<="" no="" td="" then=""><td></td><td></td></mdc,>		
	comparison was made.	2. A field dup of PZ-113-AD was collected in	
	b) If both results are >5 times their MDC, the	SDG 13-07100 - results were in control.	
	relative percent difference (RPD) was $\leq 35\%$.		
	c) If either result is $>$ their MDC, but < 5 times		
	their MDC, the absolute value of their difference		
	was $< 5 \text{ X}$ the MDC.		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD	
SAMPLE DATE(S):	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Vas at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes No Yes Method blank Radium-226 (0.10 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD	
SAMPLE DATE(S):	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. D-85 TOT 4.64 pCi/L D-85 TOT DUP 6.23 pCi/L RPD = 29% -qualify associated samples as P	all samples P
Non-Detects	Is the LLD > the sample concentration.	Yes	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-SD DIS Q PZ-201A-SS TOT & DIS Q S-84 DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07099			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-226 (903.0)			
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD		
SAMPLE DATE(S):	7/9,10/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Chemical recovery: D-85 TOT 34.6%	D-85 TOT J	
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None	
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	 DUP 01 was collected as a field duplicate of I-4 - results were in control. A field dup of PZ-113-AD was collected in SDG 13-07100 - results were in control. 	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-5	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD	
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. No 3. No Method blank - Radium-228 (0.90 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify samples as B+	All samples Ra-228 B+

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-S	SS. D-85. PZ-106-SD. S-84. PZ-106-SS. PZ-113-AD	
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. D-85 TOT 4.91 pCi/L D-85TOT DUP 6.34 pCi/L Range = 1.43 >2XLLD - qualify all samples as P	All samples Ra-228 P
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-201A-SS TOT & DIS U PZ-106-SS TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-SD TOT Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recovery: D-85 TOT 34.6%	D-85 TOT J

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07099		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	DUP 01 (Field duplicate of I-4), PZ-201A-4	SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD	
SAMPLE DATE:	7/9,10/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured	1. Yes	None
	2. Background counts duration was at least as long	2. Yes	
	as the sample count duration		
Field Duplicate	1. Were field duplicates collected for every 10 samples?	1. DUP 01 was collected as a field duplicate of I-4 - results were in control.	None
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>2. A field dup of PZ-113-AD was collected in SDG 13-07100</th><th></th></mdc,>	2. A field dup of PZ-113-AD was collected in SDG 13-07100	
	comparison was made.	- results were in control.	
	b) If both results are >5 times their MDC, the		
	relative percent difference (RPD) was $\leq 35\%$.		

c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference

was < 5 X the MDC.

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package? 	 Yes Yes Yes S-5 TOT, I-4 TOT AND I-4 DIS were reanalyzed due to low chemical recovery. The second analysis also produced low chemical recoveries due to apparent chemical interferences. 	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes Yes Yes FB at PZ-110-SS TOT U-234 (0.05 pCi/L) - Positive Blank Conc is (1.65 X blank uncertainty no qualification required U-235 (0.04 pCi/L) - Positive Blank Conc is (1.65 X blank uncertainty no qualification required U-238 (0.13 pCi/L) - Positive Blank Conc is (1.65 X blank uncertainty no qualification required U-238 (0.13 pCi/L) - Positive Blank Conc is (1.65 X blank uncertainty no qualification required Yes Method blank Uranium-234 (0.13 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required Uranium-235 (0.04 and 0.06 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 	None
		- Uranium-238 (0.06 and 0.08 pCi/L) -Positive	
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	No
(LCS)	each batch of samples whichever is more frequent?	2. Yes	
	2. Were LCS %R within 80-120%?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3.	
		U-234	
	a) If both results are <mdc, duplicate<="" no="" th="" then=""><th>1-4 TOT 0.60 pCi/L</th><th></th></mdc,>	1-4 TOT 0.60 pCi/L	
	comparison was made.	1-4 TOT DUP 0.20 pC1/L	
	b) If both results are ≥ 5 times their MDC, the relative percent difference (PPD) was $\leq 20\%$	Range = $0.40 < 2XLLD - in control$	
	c) If either result is \geq their MDC but < 5 times	U_235	
	their MDC the absolute value of their difference	$I_{-4} TOT = 0.32 \text{ pCi/I}$	
	was $< 2 \times MDC$.	I-4 TOT DUP 0.27 pCi/L	
		both results <lld< th=""><th></th></lld<>	
		U-238	
		I-4 TOT 0.17 pCi/L	
		I-4 TOT DUP -0.09 pCi/L	
		both results <lld< th=""><th></th></lld<>	
PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
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LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		

SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS

SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234
			PZ-110-SS TOT & DIS U
			S-5 DIS U
			D-3 TOT U
			U-235
			D-3 TOT & DIS U
			I-4 TOT & DIS U
			PZ-100-SD TOT & DIS U
			PZ-110-SS DIS U
			PZ-111-SD TOT & DIS U
			PZ-112-AS TOT & DIS U
			S-5 TOT & DIS U
			11-238
			D-3 TOT & DIS U
			I-4 TOT & DIS U
			PZ-110-SS TOT & DIS U
			PZ-112-AS TOT & DIS U
			S-5 TOT U

LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	U-234 D-3 DIS Q PZ-112-AS TOT & DIS Q I-4 TOT & DIS Q S-5 TOT Q U-235 PZ-110-SS TOT Q PZ-100-SS DIS Q U-238 PZ-111-SD DIS Q S-5 DIS Q PZ-100-SD DIS Q
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Uranium (EML U-02)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for	S-5 TOT 15.7% - spectral degradation - qualify associated results as R Qualify the following results as J:	U-234, U-235, U238 S-5 TOT R PZ-111-SD TOT I
	spectral degradation.	PZ-111-SD TOT 118.2% S-5 DIS 32.4% PZ-110-SS DIS 70.2% I-4 TOT 26.0% I-4 DIS 27.7% D-3 TOT 35.2% D-3 DIS 39.9% PZ-100-SD TOT 116.5% PZ-112-AS TOT 67.5% PZ-112-AS DIS 47.9%	S-5 DIS J PZ-110-SS DIS J I-4 TOT J I-4 DIS J D-3 TOT J D-3 DIS J PZ-100-SD TOT J PZ-112-AS TOT J PZ-112-AS DIS J
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE:	7/9/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Data Package Completeness	1. All results forms and Case Narrative included?	1. Yes	None
	2. All samples in COC present?	2. Yes	
	3. All notes in Case Narrative consistent with	3. Yes	
	chemist's review of data package?		
Sample Conditions and	1. Cooler temperature <6°C?	Samples were preserved and filtered in the field	None
Preservations	2. pH of aqueous samples <2?		
	3. Record of sample preservation and problems		
	noted for sample conditions.		
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike	1. Was at least one MS/MSD analysis performed		None
Duplicates	for each method on each batch of samples of	No Matrix spikes performed.	
	similar matrix or for each 20 samples, whichever		
	is more frequent?		
	2. Were field blanks used for MS/MSD sample		
	analysis?		
	3. Were spike recovery and RPD results reported		
	in pCi/L?		
	4. Were MS/MSD results within lab established		
	control limits?		
	5. Were RPD $\leq 20\%$?		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE:	7/9/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Method and Field Blanks	1. Was at least one method blank, consisting of	1. Yes	all samples
	deionized distilled water, processed through each	2. Yes	Th-230 B+
	sample preparation and analysis procedure	FB at PZ-110-SS TOT	
	prepared and analyzed with every SDG, or for	- Th-228 (0.00 pCi/L) - Positive Blank Conc is	
	each batch of 20 samples, whichever is more	<1.65 X blank uncertainty no qualification	
	frequent?	required	
	2. Was at least one field blank/matrix per		
	sampling episode collected?	- Th-230 (0.09 pCi/L) - Positive Blank Conc is	
	3. Were the associated blanks free of target	<1.65 X blank uncertainty no qualification	
	analytes?	required	
		- Th-232 (0.03 pCi/L) - Positive Blank Conc is	
		<1.65 X blank uncertainty no qualification	
		required	
		3. No	
		Method blank	
		- Thorium-228 (0.08 pCi/L) -Positive Blank Conc	
		is <1.65 X blank uncertainty- no qualification	
		required	
		- Thorium-230 (0.16 pCi/L) -Positive Blank Conc	
		is >1.65 X blank uncertainty- quality samples as	
		R+	
		Thereiner 222 (0.01 rCi/L) Desition Divit Con	
		- Inorium-232 (0.01 pC1/L) -Positive Blank Conc	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE:	7/9/2013

PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Thorium (EML-Th-01)		
SAMPLE NUMBERS	PZ-111-SD S-5 PZ-110-SS I-4 PZ-100-S	S D-3 PZ-100-SD PZ-112-AS	
SAMPLE DATE:	7/0/2013	5, D-5, 12-100-5D, 12-112-115	
SAMIFLE DATE:	//9/2013	1	Qualifians Addad?
CRITERIA	Project Criteria	Comments/Qualifying Actions	Quanners Added:
Laboratory Control Sample	1. Was LCS analyzed for every 20 samples or for	1. Yes	None
(LCS)	each batch of samples whichever is more	2. Yes	
	frequent?		
	2. Were LCS %R within 80-120%?		
Laboratory Duplicate	1. Was one duplicate sample analyzed for each	1. Yes	None
	batch and each method?	2. Yes	
	2. Were duplicate results reported in pCi/L?	3. TH: 229	
	\mathcal{D} .	I II-220	
	a) if both results are <i>while</i> , then no duplicate	L_{4} TOT 0.01 pC/L	
	b) If both results are ≥ 5 times their MDC the	hoth results <i d<="" i="" td=""><td></td></i>	
	relative percent difference (RPD) was $< 20\%$		
	c) If either result is \geq their MDC, but < 5 times	Th-230	
	their MDC, the absolute value of their difference	I-4 TOT 0.06 pCi/L	
	was < 2 X MDC.	I-4 TOT DUP 0.08 pCi/L	
		both results <lld< td=""><td></td></lld<>	
		Th-232	
		I-4 TOT 0.01 pCi/L	
		I-4 TOT DUP 0.03 pCi/L	
		both results <lld< td=""><td></td></lld<>	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
CAMDLE NUMBERS.	D7 111 CD C 5 D7 110 CC 1 4 D7 100 CC D 2 D7 100 CD D7 112

SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS

SAMPLE DATE: 7/9/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	Th-228
			I-4 TOT & DIS U
			PZ-100-SD TOT & DIS U
			PZ-100-SS TOT & DIS U
			PZ-110-SS TOT & DIS U
			PZ-111-SD TOT & DIS U
			PZ-112-AS TOT & DIS
			S-5 TOT & DIS U
			Th 230
			P7 100 SS DIS
			P7-111-SD TOT U
			S-5 TOT & DIS U
			5-5101 @ Di5 0
			Th-232
			D-3 TOT & DIS U
			I-4 TOT & DIS U
			PZ-100-SD TOT & DIS U
			PZ-100-SS TOT & DIS U
			PZ-110-SS TOT & DIS U
			PZ-111-SD TOT & DIS U
			PZ-112-AS TOT & DIS
			S-5 DIS U
	1		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS

SAMPLE DATE: 7/9/2013

			Qualifiers Added?
CRITERIA	Project Criteria	Comments/Qualifying Actions	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	Th-228 D-3 TOT & DIS Q Th-230 D-3 TOT & DIS Q PZ-100-SD TOT &DIS Q PZ-110-SS TOT & DIS Q
			PZ-111-SD DIS Q I-4 DIS Q PZ-112-AS TOT & DIS Q Th-232 S-5 TOT Q
			551010
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	S-5 TOT 63.6% PZ-110-SS TOT 72.2% PZ-110-SS DIS 122% I-4 DIS 131.8% D-3 TOT 67.3% PZ-100-SD TOT 128.2%	Th-228, Th-230, Th-232 S-5 TOT J PZ-110-SS TOT J PZ-110-SS DIS J I-4 DIS J D-3 TOT J PZ-100-SD TOT J

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1
LABORATORY:	Eberline Services
PROJECT ID:	13-07098
MEDIA:	Groundwater (Dissolved and Total)
FRACTION:	Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE:	7/9/2013

PROJECT ID:	13-07098					
MEDIA:	Groundwater (Dissolved and Total)					
FRACTION:	Radionuclides - Thorium (EML-Th-01)	Radionuclides - Thorium (EML-Th-01)				
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS				
SAMPLE DATE:	7/9/2013					
			Qualifiers Added?			
CRITERIA	Project Criteria	Comments/Qualifying Actions				
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None			
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. </mdc,>	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None			

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-228 (904.0)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE:	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	 Yes Yes FB at PZ-110-SS TOT Radium-228 (2.86 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify PZ-110-SS TOT as B+ No Method blank Radium-228 (2.43 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify samples as B+ 	PZ-110-SS TOT Ra-228 B+ All samples Ra-228 B+

US EPA ARCHIVE DOCUMENT

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07098			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-228 (904.0)			
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS		
SAMPLE DATE:	7/9/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None	
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. 	1. Yes 2. Yes 3. I-4 TOT 5.20 pCi/L I-4 TOT DUP 3.00 pCi/L Range = 2.20 >2XLLD - qualify all samples as P	All samples Ra-228 P	
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-100-SD DIS U PZ-100-SS DIS U	
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-100-SD TOT Q	
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07098			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-228 (904.0)			
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS	S, D-3, PZ-100-SD, PZ-112-AS		
SAMPLE DATE:	7/9/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%).	Gravimetric Recovery: in control	S-5 TOT Ra-228 J	
	Chemical recoveries were within control limits (75- 110%).	Chem Recovery: S-5 TOT 56% S-5 DIS 68.8%	S-5 DIS Ra-228 J	
Background Counts	 Background was measured Background counts duration was at least as long as the sample count duration 	1. Yes 2. Yes	None	
Field Duplicate	 Were field duplicates collected for every 10 samples? a) If both results are <mdc, duplicate<br="" no="" then="">comparison was made.</mdc,> b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC. 	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None	

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1		
LABORATORY:	Eberline Services		
PROJECT ID:	13-07098		
MEDIA:	Groundwater (Dissolved and Total)		
FRACTION:	Radionuclides - Radium-226 (903.0)		
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS	
SAMPLE DATE(S):	7/9/2013		
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	 All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	 Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	 Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	 Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	1. Yes 2. Yes FB at PZ-110-SS TOT - Radium-226 (0.03 pCi/L) - Positive Blank Conc is <1.65 X blank	None

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1				
LABORATORY:	Eberline Services	Eberline Services			
PROJECT ID:	13-07098				
MEDIA:	Groundwater (Dissolved and Total)				
FRACTION:	Radionuclides - Radium-226 (903.0)				
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS			
SAMPLE DATE(S):	7/9/2013				
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?		
Laboratory Control Sample (LCS)	 Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? Were LCS %R within 80-120%? 	1. Yes 2. Yes	None		
Laboratory Duplicate	 Was one duplicate sample analyzed for each batch and each method? Were duplicate results reported in pCi/L? a) If both results are <mdc, comparison="" duplicate="" li="" made.<="" no="" then="" was=""> b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC. </mdc,>	1. Yes 2. Yes 3. I-4 TOT 1.37 pCi/L I-4 TOT DUP 1.08 pCi/L Range = 0.29 <2XLLD - no qualification required	None		
Non-Detects	Is the LLD > the sample concentration.	Yes	None		
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-4 DIS Q S-5 TOT Q S-5 DIS Q		
Standards and Reference Materials	 The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities. 	1. Yes 2. Yes	None		

PROJECT NAME/NO.	West Lake Landfill Operable Unit 1			
LABORATORY:	Eberline Services			
PROJECT ID:	13-07098			
MEDIA:	Groundwater (Dissolved and Total)			
FRACTION:	Radionuclides - Radium-226 (903.0)			
SAMPLE NUMBERS:	PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-S	S, D-3, PZ-100-SD, PZ-112-AS		
SAMPLE DATE(S):	7/9/2013			
CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?	
Chemical Yield (Tracer)	Chemical recoveries were within control limits	Chemical recovery:	S-5 TOT J	
	(75-110%).	S-5 TOT 56%	S-5 DIS J	
		S-5 DIS 68.8%		
Background Counts	1. Background was measured	1. Yes	None	
	2. Background counts duration was at least as	2. Yes		
	long as the sample count duration			
Field Duplicate	1. Were field duplicates collected for every 10	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results	None	
-	samples?	were in control.		
	2. a) If both results are <mdc, duplicate<="" no="" th="" then=""><th></th><th></th></mdc,>			
	comparison was made.			
	b) If both results are >5 times their MDC, the			
	relative percent difference (RPD) was $\leq 35\%$.			
	c) If either result is > their MDC, but < 5 times their MDC the absolute value of their $\frac{1}{2}$			
	was < 5 X the MDC			



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Detector N Chamber Se Detector S Env. Backg Reagent Bl	Jame: erial Seria groun .ank:	Number: l Number: d:	Alpha_0: 13 System D <not pe<="" td=""><td>13 Bkgd 63309 erformed></td><td></td><td></td><td></td></not>	13 Bkgd 63309 erformed>			
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Peak Match	ı Tol	erance:	0.150	MeV			
			PEA	K AREA RE	PORT		
Nuclide		Energy (MeV) F	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232 U-234 U-235 U-238	T T =	5.279 4.713 4.407 4.117	101.64 14.32 5.32 1.81 eak used	19.59 53.21 91.11 193.79 for Effecti	1.36 0.68 0.68 1.19	0.00E+000 0.00E+000 0.00E+000 0.00E+000 ency	4.4 4.9 2.8 2.8
				E ANALVSTS	RESILTS		
Nuclide	Id Conf	Ener . (kev	 gy /)	Activ (pCi/li	vity (ter)		MDA /liter)
U-232 U-234 U-235 U-238	0.99 80.0 90.0 90.0	96 5302. 33 4761. 97 4385. 59 4184.	50* 1. 50* 1. 50* 6. 40* 1.	04E+001 +/- 47E+000 +/- 73E-001 +/- 85E-001 +/-	- 2.10E+00 - 8.35E-00 - 6.28E-00 - 3.60E-00	0 7.03E-001 1 5.78E-001 1 7.13E-003 1 6.73E-003	+/- 1.41E-001 +/- 1.16E-001 +/- 1.43E-001 +/- 1.35E-001



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Page	1

	Sample '	Title: 1	2						
	Elapsed Elapsed	Live time Real Time	: 1 : 1	L0201 L0201					
Channel 1: 9: 17: 25: 33: 41: 49: 57: 65: 73: 81: 89: 97: 105: 113: 129: 137: 145: 161: 169: 177: 185: 193: 201: 209: 217: 233: 241: 249: 257: 265: 273: 241: 249: 257: 265: 273: 289: 297: 305: 313: 289: 297: 305: 313: 289: 297: 305: 313: 321: 329: 345: 345: 289: 273: 281: 289: 297: 305: 313: 321: 329: 317: 325: 317: 325: 317: 325: 317: 327: 345: 327:									
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Channel	Data	Report			8/1/2013	12:25:48	PM		Page	2
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405.		0	0	0	2	2	ñ	<u>_</u>	0 0	
420.		0	0	0	0	0	õ	0	0	
433:		0	0	0	0	0	0	0	1	
441;		0	0	0	0	0	0	0	<u>^</u>	
449:		0	0	0	0	0	0	0	0	
457;		1	0	1	1	0	ő	2	0	
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481:		0	0	0	0	0	<u>т</u>	0	1	
489:		Ţ	0	0	0	0	1	0		
497:		0	0	U 7	0	0		0	т Т	
505:		0	0	1	0	0	-	0	1	
513:		0	0	Ť	0	0	1	0	T	
521:		0	0	0	Ţ	0	U 1	0	0	
529:		1	0	0	0	0	1	U	0	
537:		0	0	1	0	0	1	U	0	
545:		1	0	0	0	0	2	0	0	
553:		0	0	0	2	0	0	0	0	
561:		0	0	0	0	0	0	3	0	
569:		0	0	1	0	0	0	1	0	
577:		0	1	1	0	1	0	0	1	
585:		0	0	0	0	1	1	1	3	
593:		0	1	0	0	1	0	2	3	
601:		2	2	2	2	2	1	3	3	
609:		1	2	1	3	0	1	1	4	
617:		1	1	4	4	9	2	5	4	
625:		0	3	2	7	1	3	2	3	
633:		1	1	0	0	0	0	0	0	
641:		0	0	0	0	1	0	0	0	
649:		0	0	1	0	0	0	0	0	
657:		0	0	0	0	0	0	0	0	
665:		0	0	1	0	0	1	0	0	
673:		0	0	0	0	0	0	0	0	
681:		0	0	0	0	0	0	0	0	
689:		0	0	0	0	0	0	0	0	
697:		0	0	0	0	0	0	0	0	
705:		0	0	0	0	0	0	0	0	
713:		0	0	0	0	0	0	0	0	
721:		0	0	0	0	0	0	0	0	
729:		0	0	0	0	0	0	0	0	
737:		0	0	0	0	0	0	0	1	
745:		0	0	0	0	0	0	0	0	
753:		0	0	0	0	0	0	0	0	
761:		1	0	1	0	0	0	0	0	
769:		0	0	0	0	0	0	0	0	
777:		0	0	0	0	0	0	0	0	
785:		0	0	0	0	0	0	0	0	
793:		0	0	0	0	0	0	0	0	

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4 1962,

Channel	Data Repor	rt		8/1/2013	12:25:	48 PM		Page
801:	0	0	0	0	0	0	0	0
	Sample Ti	tle:	12					
Channel								
809:	oʻ	oʻ	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937 :	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	0	1	0
977:	0	0	0	0	0	0	0	1
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

4 W.5



<u>QA SUMMARY REPORT</u> Review Of QA Results - Pulser Check

Date : 8/1/2013

Time : 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 004	21f .	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/1/2013 5:25:36 AM
Alpha 011	21f	ALL	Passed	8/1/2013 5:25:37 AM
Alpha 012	21f	ALL	Passed	8/1/2013 5:25:38 AM
Alpha 013	21f	ALL	Passed	8/1/2013 5:25:39 AM
Alpha 014	21f	ALL	Passed	8/1/2013 5:25:40 AM
Alpha 015	21f	Peak Energy	Action	8/1/2013 5:25:41 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/1/2013 5:25:41 AM
Alpha 019	AIM730	ALL	Passed	8/1/2013 5:25:42 AM
Alpha 020	AIM730	ALL	Passed	8/1/2013 5:25:43 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/1/2013 5:25:44 AM
Alpha 023	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 024	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 025	AIM730	ALL	Passed	8/1/2013 5:25:46 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/1/2013 5:25:47 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/1/2013 5:25:48 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/1/2013 5:25:49 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:53 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:55 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/1/2013 5:25:57 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:59 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:01 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:02 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:04 AM

Page 2 of 2

Review of QA Results - Pulser Check

8/1/2013 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:07 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:12 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:14 AM

C APPROVED BY: 8(11)

APPROVAL DATE:

Nuclide Library Title: Uranium

Nuclide Library Description: U-232,-234,-235,-238

Nuclide	Half-Life	Energy	Energy	Yield	Yield
Name	(Seconds)	(keV)	Uncert. (keV)	(%)	Uncert.(Abs.+-)
U-232	2.174E+009	5302.500*	0.000	99.8000	0.0000
U-234	7.731E+012	4761.500*	0.000	99.8000	0.0000
U-235	2.221E+016	4385.500*	0.000	80.9000	0.0000
U-238	1.410E+017	4184.400*	0.000	100.2300	0.0000

* = key line

TOTALS:

4 Nuclides

4 Energy Lines

4/2/13



Sample Description:DUP 01 TOTSpectrum File:\\OR-ALPHA1Batch Identification:1307099B-UCSample Identification:04Sample Geometry:Shelf 2Procedure Description:U isoDetector Name:Alpha_039Chamber Serial Number:06027396ADetector Serial Number:83109Env. Background:System BkgdReagent Blank: <not perfor<="" td="">Sample Size:5.000E-00Sample Size:5.000E-00Sample Date/Time:170.0Acquisition Date/Time:170.0Acquisition Real Time:170.0Tracer Certificate:U232_UU-JTracer Quantity:0.605 mLEffective Efficiency:0.0244 +/Counting Efficiency:0.1240 +/Dete Witch E-10.1240 +/</not>	\Canberra\ApexA 63327 rmed> 1 +/- 0.000E+0 7:28:24 AM 9:43:51 AM minutes minutes 0A - 0.0036 - 0.0034 on 4/ - 0.0185	lpha\Root\Data 00 liter 20/2013 2:01	a\00000649 1:25 PM
Peak Match Tolerance: 0.150 MeV			
PEAK F	REA REPORT		
Energy Net Pk Nuclide (MeV) Pk Area Er	Area Ambient ror % Backgnd	Reagent Backgnd	FWHM (keV)
U-232 T 5 232 47 49 5	8 62 0 51	0 005+000	4 5
U-234 4.756 4.66 9	4.59 0.34	0.00E+000	3.0
U-235 4.458 1.49 19	0.02 0.51	0.00E+000	6.0
U-238 4.128 2.66 12	8.85 0.34	0.00E+000	3.0
T = Tracer Peak used for	Effective Effic	iency	
NUCLIDE AN	ALYSIS RESULTS		
Id Energy	Activity		MDA
Nuclide Conf. (keV)	(pCi/liter)	(pCi	i/liter)
U-232 0.966 5302.50* 1.04E4	001 +/- 3 00E+0	00 1,14E+000	+/-3.31E-001
U-234 1.000 4761.50* 1.02E4	000 +/- 1.00E+0	00 1.04E+000	+/- 3.02E-001
U-235 0.963 4385.50* 4.00E-	001 +/- 7.70E-0	01 1.41E+000) +/- 4.09E-001
U-238 0.978 4184.40* 5.77E-	001 +/- 7.62E-0	01 1.04E+000) +/- 3.00E-001

-AG 8/2/13







Sample Description: Spectrum File: Batch Identification: Sample Identification: Sample Geometry: Procedure Description:	S-5 DIS \\OR-ALPHA1\Ca 1307098A-UU 07 Shelf 2 U iso	nberra\ApexAlp	ha\Root\Data\	00000639
Detector Name: Chamber Serial Number: Detector Serial Number: Env. Background: Reagent Blank:	Alpha_003 3 System Bkgd 62 <not performe<="" td=""><td>2747 3d></td><td></td><td></td></not>	2747 3d>		
Sample Size: Sample Date/Time: Acquisition Date/Time: Acquisition Live Time: Acquisition Real Time:	1.000E+000 + 7/9/2013 7/25/2013 170.0 mi 170.0 mi	/- 0.000E+000 9:15:58 AM 1:24:25 PM nutes nutes) liter	
Tracer Certificate: Tracer Quantity: Effective Efficiency: Counting Efficiency: Chem. Recovery Factor:	U232_UU-10A 0.603 mL 0.0566 +/- 0.1746 +/- 0.3243 +/-	0.0056 0.0033 on 12/1 0.0325	15/2012 11:26:	47 AM
Peak Match Tolerance:	0.150 MeV			
	PEAK AREA	A REPORT		
Energy Nuclide (MeV) P	Net Pk A: k Area Erro:	cea Ambient c % Backgnd	Reagent Backgnd	FWHM (keV)
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	109.98 18. 3.66 107. 2.83 120. 6.15 85. ak used for Ef	79 1.02 38 0.34 54 0.17 19 0.85 fective Efficia	0.00E+000 0.00E+000 0.00E+000 0.00E+000 ency	4.4 3.0 3.0 3.0
-	NUCLIDE ANAL	YSIS RESULTS		
Id Ener Nuclide Conf. (keV) (b dÀ	Activity Ci/liter)	I (pCi,	MDA /liter)
U-232 0.993 5302. U-234 0.999 4761. U-235 0.999 4385. U-238 0.995 4184.	50* 5.16E+00 50* 1.72E-00 50* 1.64E-00 40* 2.87E-00	0 +/- 9.97E-00 1 +/- 1.88E-00 1 +/- 2.00E-00 1 +/- 2.51E-00	1 2.95E-001 1 2.24E-001 1 2.41E-001 1 2.79E-001	+/- 5.71E-002 +/- 4.33E-002 +/- 4.66E-002 +/- 5.40E-002



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