

VAMC Portland Low Level Rad & Mixed Waste Information

Container ID	VAMCP-01
Size/Type	55 Gallon Open Head Recon Steel
Gross Weight	95 lbs. (estimated)
Contents	Dry Waste consisting of plastic, used PPE, decon pads generated during decontamination of waste shed floor
Dose Rate	None (<0.1 mr/hr)
Isotopes	Minimal value of 1 uCi each assigned for U-nat, C-14 , and H-3
Waste Codes	None

Container ID	VAMCP-02
Size/Type	55 Gallon Open Head Recon Steel
Gross Weight	70 lbs. (estimated)
Contents	An empty 30 gallon steel drum that had previously contained U-nat solution. The lower portion of the drum rusted out. It is empty and overpacked
Dose Rate	None (<0.1 mr/hr)
Isotopes	0.03 uCi U-nat assigned based on lab analysis
Waste Codes	None
	Sample #5 – rusty looking fines Note drum is RCRA “empty”

Container ID	VAMCP-03
Size/Type	55 Gallon Open Head Recon Steel
Gross Weight	200 lbs. (estimated)
Contents	Mixed waste (ignitable) containers lab packed in vermiculite: <ul style="list-style-type: none"> - 10 gallon metal bung drum with hole in top and filled with vermiculite (may have some small pockets of free liquids remaining). Material in drum was sampled (Sample #4). - 1 quart glass bottle with 100 ml liquid (composited into Sample #3) - 1 gallon glass jug with 1 liter liquid labeled “MMPT”) (composited into Sample #3) - 1 pint plastic bottle labeled “dibutyl phthalate” (composited into Sample #3) - 1 pint glass bottle labeled “paraffin oil” (composited into Sample #3)
Dose Rate	None (<0.1 mr/hr)
Isotopes	0.12 uCi U-nat, 14.4 uCi H-3
Waste Codes	D001 (flash point < 140)
	Sample #3 and Sample #4 (see attached profile)

Container ID	VAMCP-04
Size/Type	55 Gallon Open Head Recon Steel
Gross Weight	250 lbs. (estimated)
Contents	Lab pack of aqueous Uranium salt solutions: - Two 5 gallon plastic safety cans full - One 2.5 gallon plastic carboy ½ full - Two ½ gallon plastic jugs ½ full
Dose Rate	None (<0.1 mr/hr)
Isotopes	70.5 uCi assigned for U-nat based on lab analysis
Waste Codes	None
	Sample #1

Container ID	VAMCP-05
Size/Type	55 Gallon Open Head Recon Steel
Gross Weight	130 lbs. (estimated)
Contents	Lab pack of aqueous corrosive liquid Uranium salt solutions: - One 5 gallon plastic carboy full - One 5 gallon plastic carboy ½ full - One 1 gallon plastic jug ¼ full - Two 1 pint plastic bottles full
Dose Rate	None (<0.1 mr/hr)
Isotopes	59.5 uCi assigned for U-nat based on lab analysis
Waste Codes	D002 (corrosive, acidic, inorganic – dilute nitric acid)
	Sample #2

Please contact ESI representative Paul Marshall at 443-871-2574 if you have any questions.

VAMC Portland Sample Information

The VAMC in Portland conducts some medical research and routine diagnostic lab applications using isotopes. Uranium is used to create a stain that is used in histology. These stains are typically less than 5% Uranium Acetate or Uranium Nitrate in water and sometimes the solution also contains methanol or ethanol. Lead citrate is also sometimes a component of this stain.

Tritium and Carbon-14 are also used in research but in small (microcurie) amounts.

ESI was called on site to organize waste containers and develop waste disposal information. We did some pH testing, examined container labels, and conversed with VA staff in deciding how to consolidate and sample the waste materials. We ended up with 5 samples with the following descriptions.

VA – 1

VA-1 is believed to be Uranium acetate solution used in staining. ESI composited everything with a pH above 2. The uranium (U-nat) specific activity in the sample is on the order of 50 picocuries per gram based on testing in ESI's Liquid Scintillation Counter.

Parameter	Result	Comments
Methanol (GC-FID)	30.1 ppm (0.003%)	Below UHC for NWW
Flash Point	> 140 deg. F	Non RCRA
Lead (ICP-metals)	24.8 ppm (0.002%)	Below TCLP by dilution
Uranium (ICP-metals)	2,830 ppm (0.283%)	
pH	3.3	Non RCRA
Ethanol	4,360 PPM (0.436%)	

VA – 2

VA-2 is believed to be Uranium nitrate solution as this liquid is acidic (pH below 2) which is typical. Specific activity of U-nat in this sample is roughly 25 picocuries per gram.

Parameter	Result	Comments
Methanol (GC-FID)	42.5 ppm (0.004%)	Below UHC for NWW
Flash Point	> 140 deg. F	Non RCRA
Lead (ICP-metals)	4.71 ppm (0.0004%)	Below TCLP by dilution
Uranium (ICP-metals)	3,190 ppm (0.319%)	
pH	0.5	D002 Corrosive (neutralize?)
Ethyl Acetate	7.03 PPM (0.0007%)	
Ethanol	9,440 (0.944%)	

VA – 3

This container was labeled solvents with Tritium. ESI LS counting determined a specific activity of 9000 picocuries per gram in the Tritium channel. There is a definite aromatic solvent odor to the sample. It is a grab from a single container.

Parameter	Result	Comments
Methanol (GC-FID)	23.8 ppm (0.002%)	Below UHC for NWW
Butyl Acetate	499 ppm (0.05%)	
Flash Point	139 deg. F	D001 Ignitable (DOT Combustible)
Uranium (ICP-metals)	1.5 ppm	
pH	7.4	Non RCRA
Ethanol	21.4 ppm	
Butanone	10.4 ppm	
Acetone	63.2 ppm	
H-3	9000 pCi/g	

VA – 4

This container was unlabeled and contained liquid mixed with vermiculite. The container was rusted. This is a grab sample of the liquid.

Parameter	Result	Comments
Methanol (GC-FID)	41 ppm	
Flash Point	> 140	
Lead (ICP-metals)	0.5 ppm	
Uranium (ICP-metals)	13.2 ppm	
pH	4.4	
Ethanol	90.1 ppm	
Benzene	30,300 ppm (3%)	
Toluene	5,790 ppm (0.6%)	
H-3		Need to check

VA – 5

This is a sample of rust from a drum that had rusted out and previously contained the Uranium solutions similar to VA-1 and VA-2. Testing in a windowless gas flow counter indicates specific activity of Uranium on the order of 50 picocuries per gram.

Parameter	Result	Comments
Methanol (GC-FID)	3.5 ppm	
Flash Point		N.A. – sample is solid
Lead (ICP-metals)	25,200 ppm (2.5%)	
Uranium (ICP-metals)	2.51 ppm	
pH		N.A. – sample is solid
Ethanol	31 ppm	

Please contact ESI representative Paul Marshall at 443-871-2574 if you have any questions.



November 18, 2016

Paul Marshall
Ecology Services, Inc.
9135 Guilford Road, Suite 200
Columbia, Maryland 21046

Re: Waste Stream Analysis
Work Order: 409952

Dear Paul :

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 04, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4443.

Sincerely,

Lindsay Fabra
Project Manager

Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 – (843) 556–8171 – www.gel.com

Certificate of Analysis Report for

ECLY001 Ecology Services, Inc.

Client SDG: 409952 GEL Work Order: 409952

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- E %difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- E Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- h Preparation or preservation holding time was exceeded

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Lindsay Fabra.

Reviewed by

Lindsay Fabra

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-1	Project: ECLY00101
Sample ID: 409952001	Client ID: ECLY001
Matrix: Misc Liquid	
Collect Date: 13-JUL-16 10:30	
Receive Date: 04-NOV-16	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Alcohols												
SW846 8015C Methanol Only, Liquid "As Received"												
Methanol	H	30100	250	500	ug/L		1	LXA1	11/10/16	1250	1615142	1
GC-FID												
SW846 8015C Acetate , Liquid "As Received"												
Ethyl acetate	HU	ND	2000	10000	ug/L		1	LXA1	11/11/16	1654	1615116	2
Isopropyl acetate	HU	ND	3500	10000	ug/L		1					
n-Amyl acetate	HU	ND	4700	10000	ug/L		1					
n-Butyl acetate	HU	ND	4200	10000	ug/L		1					
Hazardous Waste												
SW1020A Setaflash Flash Point 140 "As Received"												
Setaflash-140		>140	75.0	75.0	Fahrenheit		1	SXW3	11/18/16	1005	1613835	3
Metals Analysis-ICP												
SW846 3010A/6010C Liquid "As Received"												
Lead		24800	825	2500	ug/L	10.0	25	TXT1	11/07/16	1407	1613803	4
Uranium		2830000	2500	12500	ug/L	10.0	25					
Solvent Scan												
SW846 8015C Solvent Screen Liquid "As Received"												
1,1,1-Trichloroethane	HU	ND	3000	10000	ug/L		1	LXA1	11/10/16	1649	1615126	5
2-Butanone	HU	ND	3000	10000	ug/L		1					
4-Methyl-2-pentanone	HU	ND	3000	10000	ug/L		1					
Acetone	H	48700	3000	10000	ug/L		1					
Benzene	HU	ND	3000	10000	ug/L		1					
Chloroform	HU	ND	3000	10000	ug/L		1					
Ethanol	EH	3470000	3000	10000	ug/L		1					
Ethyl acetate	HU	ND	2000	10000	ug/L		1					
Ethylbenzene	HU	ND	3000	10000	ug/L		1					
Hexane	HU	ND	3000	10000	ug/L		1					
Methylene chloride	HU	ND	3000	10000	ug/L		1					
Toluene	HU	ND	3000	10000	ug/L		1					
m,p-Xylenes	HU	ND	6000	20000	ug/L		1					
o-Xylene	HU	ND	3000	10000	ug/L		1					
Ethanol	H	4360000	150000	500000	ug/L		50	LXA1	11/16/16	1549	1615126	6
Titration and Ion Analysis												
SW846 9041A pH "As Received"												
pH at Temp 17.0C	H	3.30	0.010	0.100	SU		1	RXB5	11/16/16	1841	1615942	7

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-1

Project: ECLY00101

Sample ID: 409952001

Client ID: ECLY001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3010A	ICP-TRACE SW846 3010A	SXW1	11/05/16	1054	1613802

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8015C	
2	SW846 8015C	
3	SW846 1020A	
4	SW846 3010A/6010C	
5	SW846 8015C	
6	SW846 8015C	
7	SW846 9041A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,4-Dioxane-d8	SW846 8015C Methanol Only, Liquid "As Received"	46700 ug/L	50000	93	(61%-122%)

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-2 Project: ECLY00101
Sample ID: 409952002 Client ID: ECLY001
Matrix: Misc Liquid
Collect Date: 13-JUL-16 11:00
Receive Date: 04-NOV-16
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Alcohols												
SW846 8015C Methanol Only, Liquid "As Received"												
Methanol	H	42500	250	500	ug/L		1	LXA1	11/10/16	1304	1615142	1
GC-FID												
SW846 8015C Acetate , Liquid "As Received"												
Ethyl acetate	HJ	7570	2000	10000	ug/L		1	LXA1	11/11/16	1739	1615116	2
Isopropyl acetate	HU	ND	3500	10000	ug/L		1					
n-Amyl acetate	HU	ND	4700	10000	ug/L		1					
n-Butyl acetate	HU	ND	4200	10000	ug/L		1					
Hazardous Waste												
SW1020A Setaflash Flash Point 140 "As Received"												
Setaflash-140		>140	75.0	75.0	Fahrenheit		1	SXW3	11/18/16	1045	1613835	3
Metals Analysis-ICP												
SW846 3010A/6010C Liquid "As Received"												
Lead		4710	825	2500	ug/L	10.0	25	TXT1	11/07/16	1420	1613803	4
Uranium		3190000	2500	12500	ug/L	10.0	25					
Solvent Scan												
SW846 8015C Solvent Screen Liquid "As Received"												
1,1,1-Trichloroethane	HU	ND	3000	10000	ug/L		1	LXA1	11/10/16	1733	1615126	5
2-Butanone	HU	ND	3000	10000	ug/L		1					
4-Methyl-2-pentanone	HU	ND	3000	10000	ug/L		1					
Acetone	HU	ND	3000	10000	ug/L		1					
Benzene	HU	ND	3000	10000	ug/L		1					
Chloroform	HU	ND	3000	10000	ug/L		1					
Ethyl acetate	HJ	7030	2000	10000	ug/L		1					
Ethylbenzene	HU	ND	3000	10000	ug/L		1					
Hexane	HU	ND	3000	10000	ug/L		1					
Methylene chloride	HU	ND	3000	10000	ug/L		1					
Toluene	HU	ND	3000	10000	ug/L		1					
m,p-Xylenes	HU	ND	6000	20000	ug/L		1					
o-Xylene	HU	ND	3000	10000	ug/L		1					
Ethanol	H	9440000	300000	1000000	ug/L		100	LXA1	11/16/16	1611	1615126	6
Titration and Ion Analysis												
SW846 9041A pH "As Received"												
pH at Temp 17.0C	H	0.500	0.010	0.100	SU		1	RXB5	11/16/16	1846	1615942	7

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-2

Project: ECLY00101

Sample ID: 409952002

Client ID: ECLY001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3010A	ICP-TRACE SW846 3010A	SXW1	11/05/16	1054	1613802

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8015C	
2	SW846 8015C	
3	SW846 1020A	
4	SW846 3010A/6010C	
5	SW846 8015C	
6	SW846 8015C	
7	SW846 9041A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,4-Dioxane-d8	SW846 8015C Methanol Only, Liquid "As Received"	44900 ug/L	50000	90	(61%-122%)

Notes:

Column headers are defined as follows:

DF: Dilution Factor

Lc/LC: Critical Level

DL: Detection Limit

PF: Prep Factor

MDA: Minimum Detectable Activity

RL: Reporting Limit

MDC: Minimum Detectable Concentration

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID:	VA-3	Project:	ECLY00101
Sample ID:	409952003	Client ID:	ECLY001
Matrix:	Misc Liquid		
Collect Date:	13-JUL-16 11:15		
Receive Date:	04-NOV-16		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Alcohols												
SW846 8015C Methanol Only, Liquid "As Received"												
Methanol	H	23800	1250	2500	ug/L		5	LXA1	11/10/16	1746	1615142	1
GC-FID												
SW846 8015C Acetate , Liquid "As Received"												
Ethyl acetate	HU	ND	2000	10000	ug/L		1	LXA1	11/11/16	1801	1615116	2
Isopropyl acetate	HU	ND	3500	10000	ug/L		1					
n-Amyl acetate	HU	ND	4700	10000	ug/L		1					
n-Butyl acetate	H	499000	4200	10000	ug/L		1					
Hazardous Waste												
SW1020A Setaflash Flash Point 140 "As Received"												
Setaflash-140		139	75.0	75.0	Fahrenheit		1	SXW3	11/18/16	1105	1613835	3
Metals Analysis-ICP												
SW846 3010A/6010C Liquid "As Received"												
Lead	U	ND	33.0	100	ug/L	10.0	1	TXT1	11/07/16	1347	1613803	4
Uranium		1570	100	500	ug/L	10.0	1					
Solvent Scan												
SW846 8015C Solvent Screen Liquid "As Received"												
1,1,1-Trichloroethane	HU	ND	3000	10000	ug/L		1	LXA1	11/16/16	1633	1615126	5
2-Butanone	H	10400	3000	10000	ug/L		1					
4-Methyl-2-pentanone	HU	ND	3000	10000	ug/L		1					
Acetone	H	63200	3000	10000	ug/L		1					
Benzene	HU	ND	3000	10000	ug/L		1					
Chloroform	HU	ND	3000	10000	ug/L		1					
Ethanol	H	21400	3000	10000	ug/L		1					
Ethyl acetate	HU	ND	2000	10000	ug/L		1					
Ethylbenzene	HU	ND	3000	10000	ug/L		1					
Hexane	HU	ND	3000	10000	ug/L		1					
Methylene chloride	HU	ND	3000	10000	ug/L		1					
Toluene	HU	ND	3000	10000	ug/L		1					
m,p-Xylenes	HU	ND	6000	20000	ug/L		1					
o-Xylene	HU	ND	3000	10000	ug/L		1					
Titration and Ion Analysis												
SW846 9041A pH "As Received"												
pH at Temp 19.0C	H	7.40	0.010	0.100	SU		1	RXB5	11/16/16	1853	1615942	6

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-3

Project: ECLY00101

Sample ID: 409952003

Client ID: ECLY001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3010A	ICP-TRACE SW846 3010A	SXW1	11/05/16	1054	1613802

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8015C	
2	SW846 8015C	
3	SW846 1020A	
4	SW846 3010A/6010C	
5	SW846 8015C	
6	SW846 9041A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,4-Dioxane-d8	SW846 8015C Methanol Only, Liquid "As Received"	46900 ug/L	50000	94	(61%-122%)

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-4	Project: ECLY00101
Sample ID: 409952004	Client ID: ECLY001
Matrix: Misc Liquid	
Collect Date: 13-JUL-16 12:00	
Receive Date: 04-NOV-16	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Alcohols												
SW846 8015C Methanol Only, Liquid "As Received"												
Methanol	H	41000	5000	10000	ug/L		20	LXA1	11/10/16	1759	1615142	1
GC-FID												
SW846 8015C Acetate , Liquid "As Received"												
Ethyl acetate	HU	ND	2000	10000	ug/L		1	LXA1	11/11/16	1823	1615116	2
Isopropyl acetate	HU	ND	3500	10000	ug/L		1					
n-Amyl acetate	HU	ND	4700	10000	ug/L		1					
n-Butyl acetate	HU	ND	4200	10000	ug/L		1					
Hazardous Waste												
SW1020A Setaflash Flash Point 140 "As Received"												
Setaflash-140		>140	75.0	75.0	Fahrenheit		1	SXW3	11/18/16	1125	1613835	3
Metals Analysis-ICP												
SW846 3010A/6010C Liquid "As Received"												
Lead		497	33.0	100	ug/L	10.0	1	TXT1	11/07/16	1350	1613803	4
Uranium		13200	500	2500	ug/L	10.0	5	TXT1	11/07/16	1423	1613803	5
Solvent Scan												
SW846 8015C Solvent Screen Liquid "As Received"												
1,1,1-Trichloroethane	HU	ND	3000	10000	ug/L		1	LXA1	11/10/16	1817	1615126	6
2-Butanone	HU	ND	3000	10000	ug/L		1					
4-Methyl-2-pentanone	HU	ND	3000	10000	ug/L		1					
Acetone	HU	ND	3000	10000	ug/L		1					
Chloroform	HU	ND	3000	10000	ug/L		1					
Ethanol	H	90100	3000	10000	ug/L		1					
Ethyl acetate	HU	ND	2000	10000	ug/L		1					
Ethylbenzene	HU	ND	3000	10000	ug/L		1					
Hexane	HU	ND	3000	10000	ug/L		1					
Methylene chloride	HU	ND	3000	10000	ug/L		1					
m,p-Xylenes	HU	ND	6000	20000	ug/L		1					
o-Xylene	HU	ND	3000	10000	ug/L		1					
Benzene	H	30300000	600000	2000000	ug/L		200	LXA1	11/16/16	1656	1615126	7
Toluene	H	5790000	600000	2000000	ug/L		200					
Titration and Ion Analysis												
SW846 9041A pH "As Received"												
pH at Temp 20.0C	H	4.40	0.010	0.100	SU		1	RXB5	11/16/16	1856	1615942	8

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-4

Project: ECLY00101

Sample ID: 409952004

Client ID: ECLY001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3010A	ICP-TRACE SW846 3010A	SXW1	11/05/16	1054	1613802

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8015C	
2	SW846 8015C	
3	SW846 1020A	
4	SW846 3010A/6010C	
5	SW846 3010A/6010C	
6	SW846 8015C	
7	SW846 8015C	
8	SW846 9041A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,4-Dioxane-d8	SW846 8015C Methanol Only, Liquid "As Received"	0.00 ug/L	50000	0*	(61%-122%)

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-5	Project: ECLY00101
Sample ID: 409952005	Client ID: ECLY001
Matrix: Solid	
Collect Date: 13-JUL-16 12:30	
Receive Date: 04-NOV-16	
Collector: Client	
Moisture: 7.3%	

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Alcohols												
SW846 8015C Methanol, Solid "Dry Weight Corrected"												
Methanol	HJh	3510	1350	5390	ug/kg	5.00	1	LXA1	11/15/16	1508	1615123	1
GC-FID												
SW846 8015B Acetates Solid "Dry Weight Corrected"												
Ethyl acetate	HUh	ND	16200	53900	ug/kg	5.00	1	LXA1	11/14/16	1718	1615644	2
Isopropyl acetate	HUh	ND	17800	53900	ug/kg	5.00	1					
n-Amyl acetate	HUh	ND	21600	53900	ug/kg	5.00	1					
n-Butyl acetate	HUh	ND	21600	53900	ug/kg	5.00	1					
Metals Analysis-ICP												
SW846 3050B/6010C Lead, Uranium Solid "Dry Weight Corrected"												
Lead		25200000	17400	52900	ug/kg	98.0	50	LS	11/09/16	1011	1613805	3
Uranium		2510000	52900	264000	ug/kg	98.0	50					
Solvent Scan												
SW846 8015C Solvent Scan, Solid "Dry Weight Corrected"												
1,1,1-Trichloroethane	HUh	ND	15900	52900	ug/kg	4.90	1	LXA1	11/15/16	1848	1615119	4
2-Butanone	HUh	ND	15900	52900	ug/kg	4.90	1					
4-Methyl-2-pentanone	HUh	ND	15900	52900	ug/kg	4.90	1					
Acetone	HUh	ND	15900	52900	ug/kg	4.90	1					
Benzene	HUh	ND	15900	52900	ug/kg	4.90	1					
Chloroform	HUh	ND	15900	52900	ug/kg	4.90	1					
Ethanol	HJh	31800	15900	52900	ug/kg	4.90	1					
Ethyl acetate	HUh	ND	15900	52900	ug/kg	4.90	1					
Ethylbenzene	HUh	ND	15900	52900	ug/kg	4.90	1					
Hexane	HUh	ND	15900	52900	ug/kg	4.90	1					
Methylene chloride	HUh	ND	15900	52900	ug/kg	4.90	1					
Toluene	HUh	ND	15900	52900	ug/kg	4.90	1					
m,p-Xylenes	HUh	ND	31700	106000	ug/kg	4.90	1					
o-Xylene	HUh	ND	15900	52900	ug/kg	4.90	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	SXW1	11/05/16	1143	1613804
SW846 8015A/B SVOC	SW846 8015B Acetate Solid Prep	LXA1	11/11/16	0829	1615643
SW846 8015C	SW846 8015C Alcohol Solid Prep	LXA1	11/15/16	0815	1615121
SW846 8015C	SW846 8015C Solvent Scan Solid Prep	LXA1	11/15/16	0814	1615118

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Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID: VA-5

Project: ECLY00101

Sample ID: 409952005

Client ID: ECLY001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
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The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	SW846 8015C		
2	SW846 8015A/B SVOC		
3	SW846 3050B/6010C		
4	SW846 8015C		

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
1,4-Dioxane-d8	SW846 8015C Methanol, Solid "Dry Weight Corrected"	260000 ug/kg	270000	96	(33%-122%)

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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QC Summary

Report Date: November 18, 2016

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Ecology Services, Inc.
9135 Guilford Road, Suite 200
Columbia, Maryland

Contact: Paul Marshall

Workorder: 409952

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Alcohols											
Batch	1615123										
QC1203667523	410183014	DUP									
Methanol		U	ND	U	ND	ug/kg	N/A		LXA1	11/15/16	16:32
**1,4-Dioxane-d8	250000	243000		243000	ug/kg		97	(33%-122%)			
QC1203667522	LCS										
Methanol	50000			50800	ug/kg		102	(65%-112%)		11/15/16	14:54
**1,4-Dioxane-d8	50000			49500	ug/kg		99	(33%-122%)			
QC1203667521	MB										
Methanol			U	ND	ug/kg					11/15/16	14:40
**1,4-Dioxane-d8	50000			50200	ug/kg		100	(33%-122%)			
Batch	1615142										
QC1203667581	LCS										
Methanol	50000			50500	ug/L		101	(69%-125%)	LXA1	11/10/16	12:23
**1,4-Dioxane-d8	50000			48900	ug/L		98	(61%-122%)			
QC1203667580	MB										
Methanol			U	ND	ug/L					11/10/16	12:09
**1,4-Dioxane-d8	50000			49900	ug/L		100	(61%-122%)			
QC1203667582	410173003	MS									
Methanol	50000	U	ND	46400	ug/L		93	(60%-111%)		11/10/16	16:36
**1,4-Dioxane-d8	50000	46300		51200	ug/L		102	(61%-122%)			
QC1203667583	410173003	MSD									
Methanol	50000	U	ND	48800	ug/L	5	98	(0%-30%)		11/10/16	16:50
**1,4-Dioxane-d8	50000	46300		70700	ug/L		141 *	(61%-122%)			
GC-FID											
Batch	1615116										
QC1203667507	409952001	DUP									
Ethyl acetate		HU	ND	HU	ND	ug/L	N/A		LXA1	11/11/16	17:16
Isopropyl acetate		HU	ND	HU	ND	ug/L	N/A				

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
GC-FID											
Batch	1615116										
n-Amyl acetate	HU	ND	HU	ND	ug/L	N/A			LXA1	11/11/16	17:16
n-Butyl acetate	HU	ND	HU	ND	ug/L	N/A					
QC1203667506	LCS										
Ethyl acetate	100000			101000	ug/L		101	(59%-141%)		11/11/16	15:47
Isopropyl acetate	100000			101000	ug/L		101	(70%-130%)			
n-Amyl acetate	100000			104000	ug/L		104	(70%-130%)			
n-Butyl acetate	100000			104000	ug/L		104	(70%-130%)			
QC1203667505	MB										
Ethyl acetate			U	ND	ug/L					11/11/16	15:25
Isopropyl acetate			U	ND	ug/L						
n-Amyl acetate			U	ND	ug/L						
n-Butyl acetate			U	ND	ug/L						
Batch	1615644										
QC1203668743	409952005	DUP									
Ethyl acetate	HUh	ND	HUh	ND	ug/kg	N/A			LXA1	11/14/16	17:40
Isopropyl acetate	HUh	ND	HUh	ND	ug/kg	N/A					
n-Amyl acetate	HUh	ND	HUh	ND	ug/kg	N/A					
n-Butyl acetate	HUh	ND	HUh	ND	ug/kg	N/A					
QC1203668742	LCS										
Ethyl acetate	100000			85500	ug/kg		85	(63%-131%)		11/14/16	16:12
Isopropyl acetate	100000			87000	ug/kg		87	(70%-130%)			
n-Amyl acetate	100000			89800	ug/kg		90	(70%-130%)			
n-Butyl acetate	100000			89600	ug/kg		90	(70%-130%)			
QC1203668741	MB										
Ethyl acetate			U	ND	ug/kg					11/14/16	15:50

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QC Summary

Workorder: 409952

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
GC-FID											
Batch	1615644										
Isopropyl acetate			U	ND	ug/kg				LXA1	11/14/16	15:50
n-Amyl acetate			U	ND	ug/kg						
n-Butyl acetate			U	ND	ug/kg						
Hazardous Waste											
Batch	1613835										
QC1203672574	409952001	DUP									
Setaflash-140			>140	>140	Fahrenheit	0		(0%-9%)	SXW3	11/18/16	10:25
QC1203664297	LCS										
Setaflash-140	81.0			81.0	Fahrenheit		100	(97%-103%)		11/18/16	08:35
Metals Analysis-ICP											
Batch	1613803										
QC1203664216	409952001	DUP									
Lead			24800	26300	ug/L	5.8		(0%-20%)	TXT1	11/07/16	14:10
Uranium			2830000	3050000	ug/L	7.38		(0%-20%)			
QC1203664215	LCS										
Lead	5000			4840	ug/L		96.7	(80%-120%)		11/07/16	13:32
Uranium	5000			4500	ug/L		89.9	(80%-120%)			
QC1203664214	MB										
Lead			U	ND	ug/L					11/07/16	13:29
Uranium			U	ND	ug/L						
QC1203664217	409952001	MS									
Lead	5000		24800	32000	ug/L		N/A	(75%-125%)		11/07/16	14:12
Uranium	5000		2830000	3060000	ug/L		N/A	(75%-125%)			
QC1203664218	409952001	SDILT									
Lead			99.2	21.2	ug/L	6.89		(0%-10%)		11/07/16	14:17
Uranium			11300	E	2540	ug/L	12*	(0%-10%)			
Batch	1613805										
QC1203664221	409952005	DUP									
Lead			25200000	16600000	ug/kg	41.3*		(0%-20%)	LS	11/09/16	10:15

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QC Summary

Workorder: 409952

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1613805										
Uranium		2510000		5120000	ug/kg	68.5*		(0%-20%)	LS	11/09/16	10:15
QC1203664220	LCS										
Lead	47900			46600	ug/kg		97.2	(80%-120%)		11/09/16	09:52
Uranium	47900			44800	ug/kg		93.6	(80%-120%)			
QC1203664219	MB										
Lead			U	ND	ug/kg					11/09/16	09:49
Uranium			U	ND	ug/kg						
QC1203664222	409952005 MS										
Lead	53700	25200000		34100000	ug/kg		N/A	(75%-125%)		11/09/16	10:18
Uranium	53700	2510000		5100000	ug/kg		N/A	(75%-125%)			
QC1203664223	409952005 SDILT										
Lead		4760		906	ug/L	4.8		(0%-10%)		11/09/16	10:21
Uranium		475		79.0	ug/L	16.7		(0%-10%)			
Solvent Scan											
Batch	1615119										
QC1203667510	410183014 DUP										
1,1,1-Trichloroethane			U	ND	ug/kg	N/A		(+/-50000)	LXA1	11/15/16	21:43
2-Butanone			U	ND	ug/kg	N/A		(+/-50000)			
4-Methyl-2-pentanone			U	ND	ug/kg	N/A		(+/-50000)			
Acetone			U	ND	ug/kg	N/A		(+/-50000)			
Benzene			U	ND	ug/kg	N/A		(+/-50000)			
Chloroform			U	ND	ug/kg	N/A		(+/-50000)			
Ethanol	U	ND	U	ND	ug/kg	N/A					
Ethyl acetate			U	ND	ug/kg	N/A		(+/-50000)			
Ethylbenzene			U	ND	ug/kg	N/A		(+/-50000)			

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solvent Scan											
Batch	1615119										
Hexane			U	ND	ug/kg	N/A		(+/-50000)			
Methylene chloride			U	ND	ug/kg	N/A		(+/-50000)	LXA1	11/15/16	21:43
Toluene			U	ND	ug/kg	N/A		(+/-50000)			
m,p-Xylenes			U	ND	ug/kg	N/A		(+/-100000)			
o-Xylene			U	ND	ug/kg	N/A		(+/-50000)			
QC1203667509 LCS											
1,1,1-Trichloroethane	100000			99700	ug/kg		100	(70%-130%)		11/15/16	18:26
2-Butanone	100000			100000	ug/kg		100	(70%-130%)			
4-Methyl-2-pentanone	100000			103000	ug/kg		103	(70%-130%)			
Acetone	100000			94000	ug/kg		94	(70%-130%)			
Benzene	100000			102000	ug/kg		102	(70%-130%)			
Chloroform	100000			102000	ug/kg		102	(70%-130%)			
Ethanol	100000			86100	ug/kg		86	(70%-130%)			
Ethyl acetate	100000			98900	ug/kg		99	(63%-131%)			
Ethylbenzene	100000			102000	ug/kg		102	(70%-130%)			
Hexane	100000			101000	ug/kg		101	(56%-165%)			
Methylene chloride	100000			105000	ug/kg		105	(70%-130%)			
Toluene	100000			103000	ug/kg		103	(70%-130%)			
m,p-Xylenes	200000			204000	ug/kg		102	(70%-130%)			
o-Xylene	100000			103000	ug/kg		103	(70%-130%)			
QC1203667508 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					11/15/16	18:03
2-Butanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solvent Scan											
Batch	1615119										
Acetone			U	ND	ug/kg				LXA1	11/15/16	18:03
Benzene			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Ethanol			U	ND	ug/kg						
Ethyl acetate			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Hexane			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
m,p-Xylenes			U	ND	ug/kg						
o-Xylene			U	ND	ug/kg						
Batch	1615126										
QC1203667532 409952001 DUP											
1,1,1-Trichloroethane	HU	ND	HU	ND	ug/L	N/A			LXA1	11/10/16	17:11
2-Butanone	HU	ND	HU	ND	ug/L	N/A					
4-Methyl-2-pentanone	HU	ND	HU	ND	ug/L	N/A					
Acetone	H	48700	H	63800	ug/L	27*^		(+/-10000)			
Benzene	HU	ND	HU	ND	ug/L	N/A					
Chloroform	HU	ND	HU	ND	ug/L	N/A					
Ethanol	H	4360000	H	4290000	ug/L	2		(0%-30%)		11/17/16	21:41
Ethyl acetate	HU	ND	HU	ND	ug/L	N/A				11/10/16	17:11
Ethylbenzene	HU	ND	HU	ND	ug/L	N/A					

GEL LABORATORIES LLC

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solvent Scan											
Batch	1615126										
Hexane	HU	ND	HU	ND	ug/L	N/A					
Methylene chloride	HU	ND	HU	ND	ug/L	N/A			LXA1	11/10/16	17:11
Toluene	HU	ND	HU	ND	ug/L	N/A					
m,p-Xylenes	HU	ND	HU	ND	ug/L	N/A					
o-Xylene	HU	ND	HU	ND	ug/L	N/A					
QC1203667531 LCS											
1,1,1-Trichloroethane	100000			98900	ug/L		99	(63%-140%)		11/10/16	15:42
2-Butanone	100000			101000	ug/L		101	(70%-130%)			
4-Methyl-2-pentanone	100000			103000	ug/L		103	(64%-142%)			
Acetone	100000			98500	ug/L		98	(72%-127%)			
Benzene	100000			101000	ug/L		101	(70%-130%)			
Chloroform	100000			101000	ug/L		101	(63%-139%)			
Ethanol	100000			98700	ug/L		99	(59%-136%)			
Ethyl acetate	100000			99300	ug/L		99	(59%-141%)			
Ethylbenzene	100000			101000	ug/L		101	(70%-130%)			
Hexane	100000			101000	ug/L		101	(62%-141%)			
Methylene chloride	100000			106000	ug/L		106	(58%-144%)			
Toluene	100000			102000	ug/L		102	(70%-130%)			
m,p-Xylenes	200000			209000	ug/L		104	(70%-130%)			
o-Xylene	100000			101000	ug/L		101	(70%-130%)			
QC1203667530 MB											
1,1,1-Trichloroethane			U	ND	ug/L					11/10/16	15:20
2-Butanone			U	ND	ug/L						
4-Methyl-2-pentanone			U	ND	ug/L						

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Solvent Scan											
Batch	1615126										
Acetone			U	ND	ug/L				LXA1	11/10/16	15:20
Benzene			U	ND	ug/L						
Chloroform			U	ND	ug/L						
Ethanol			U	ND	ug/L						
Ethyl acetate			U	ND	ug/L						
Ethylbenzene			U	ND	ug/L						
Hexane			U	ND	ug/L						
Methylene chloride			U	ND	ug/L						
Toluene			U	ND	ug/L						
m,p-Xylenes			U	ND	ug/L						
o-Xylene			U	ND	ug/L						

Titration and Ion Analysis

Batch	1615942										
QC1203669504	409952001	DUP									
pH		H	3.30	H	3.30	SU	0	(0%-5%)	RXB5	11/16/16	18:45
QC1203669503	LCS										
pH		7.00			7.00	SU	100	(99%-101%)		11/16/16	18:41

Notes:

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B The target analyte was detected in the associated blank.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample

GEL LABORATORIES LLC

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QC Summary

Workorder: 409952

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
E											
E											
E											
FB											
H											
J											
JNX											
N											
N											
N											
N/A											
N1											
ND											
NJ											
P											
Q											
R											
R											
U											
UJ											
X											
Y											
Y											
Z											
^											
d											
e											
h											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID:	VA-3	Project:	ECLY00101
Sample ID:	409952003	Client ID:	ECLY001
Matrix:	Misc Liquid		
Collect Date:	13-JUL-16 11:15		
Receive Date:	04-NOV-16		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium		9.79E+06	6170	1000	pCi/L			TXP3	11/17/16	0736	1615058	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA 906.0 Modified		

Notes:

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Lc/LC: Critical Level

PF: Prep Factor

RL: Reporting Limit

SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 18, 2016

Company : Ecology Services, Inc.
Address : 9135 Guilford Road, Suite 200

Columbia, Maryland 21046

Contact: Paul Marshall
Project: Waste Stream Analysis

Client Sample ID:	VA-5	Project:	ECLY00101
Sample ID:	409952005	Client ID:	ECLY001
Matrix:	Solid		
Collect Date:	13-JUL-16 12:30		
Receive Date:	04-NOV-16		
Collector:	Client		
Moisture:	7.3%		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
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Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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QC Summary

Report Date: November 18, 2016

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Ecology Services, Inc.
9135 Guilford Road, Suite 200
Columbia, Maryland

Contact: Paul Marshall

Workorder: 409952

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Liquid Scintillation											
Batch	1615058										
QC1203667230	409952003	DUP									
Tritium			9.79E+06	7.35E+06	pCi/L	28.4*		(0%-20%)	TXP3	11/16/16	08:18
			Uncertainty +/-1.80E+05	+/-1.37E+05							
QC1203667232	LCS										
Tritium			2280	2960	pCi/L		130*	(75%-125%)		11/17/16	07:37
			Uncertainty	+/-599							
QC1203667229	MB										
Tritium				2000	pCi/L					11/16/16	08:02
			Uncertainty	+/-439							
QC1203667231	409952003	MS									
Tritium			2320	9.79E+06	8.76E+06	pCi/L	N/A	(75%-125%)		11/16/16	08:19
			Uncertainty +/-1.80E+05	+/-1.66E+05							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMP Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Sample results are rejected
- U Analyte was analyzed for but not detected above the Lc
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification

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QC Summary

Workorder: 409952

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UJ											
UL											
X											
Y											
^											
h											

UJ Gamma Spectroscopy--Uncertain identification

UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



SAMPLE RECEIPT & REVIEW FORM

Client: ECLY	SDG/AR/COC/Work Order: 409952
Received By: zhu	Date Received: 11/4/16
Suspected Hazard Information	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <small>*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.</small>
COC/Samples marked as radioactive?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0cpm
Classified Radioactive II or III by RSO?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Package, COC, and/or Samples marked as beryllium or asbestos containing?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*			<input checked="" type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice <u>None</u> Other (describe) 23°C <small>*all temperatures are recorded in Celsius</small>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): E5032015830
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?			<input checked="" type="checkbox"/>	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
7 VOA vials contain acid preservation?			<input checked="" type="checkbox"/>	(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?			<input checked="" type="checkbox"/>	Sample ID's and containers affected:
9 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time? zhu			<input checked="" type="checkbox"/>	ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected:
13 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>			
15 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
16 Carrier and tracking number.				Circle Applicable: <u>FedEx Air</u> FedEx Ground UPS Field Services Courier Other 7845 3008 6298

Comments (Use Continuation Form if needed):

List of current GEL Certifications as of 18 November 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

**Technical Case Narrative
Ecology Services, Inc. (ECLY)
SDG #: 409952**

FID Flame Ionization Detector

Product: Common Industrial Solvents, Glycols, and Various Organic Compounds by Flame Ionization Detector

Analytical Method: SW846 8015C

Analytical Procedure: GL-OA-E-046 REV# 10

Analytical Batch: 1615116

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203667505	Method Blank (MB)
1203667506	Laboratory Control Sample (LCS)
1203667507	409952001(VA-1) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Holding Time Specifications

The following samples were received from the client out of holding: 409952001 (VA-1), 409952002 (VA-2), 409952003 (VA-3), 409952004 (VA-4) and 1203667507 (VA-1DUP).

Product: Non-Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector

Analytical Method: SW846 8015A/B SVOC

Analytical Procedure: GL-OA-E-003 REV# 28

Analytical Batches: 1615644 and 1615643

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952005	VA-5
1203668741	Method Blank (MB)
1203668742	Laboratory Control Sample (LCS)
1203668743	409952005(VA-5) Sample Duplicate (DUP)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Holding Time Specifications

The following sample was received from the client out of holding:409952005 (VA-5).

Solvent Scan

Product: Analysis of Solvent Scan by Flame Ionization Detector

Analytical Method: SW846 8015C

Analytical Procedure: GL-OA-E-046 REV# 10

Analytical Batches: 1615119 and 1615118

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952005	VA-5
1203667508	Method Blank (MB)
1203667509	Laboratory Control Sample (LCS)
1203667510	410183014(NonSDG) Sample Duplicate (DUP)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Analysis of Solvent Scan by Flame Ionization Detector

Analytical Method: SW846 8015C

Analytical Procedure: GL-OA-E-046 REV# 10

Analytical Batch: 1615126

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203667530	Method Blank (MB)
1203667531	Laboratory Control Sample (LCS)
1203667532	409952001(VA-1) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Holding Time Specifications

The following samples were received from the client out of holding: 409952001 (VA-1), 409952001 (VA-1), 409952002 (VA-2), 409952002 (VA-2), 409952003 (VA-3), 409952004 (VA-4) and 1203667532 (VA-1DUP).

Sample Dilutions

Samples 1203667532 (VA-1DUP), 409952001 (VA-1), 409952002 (VA-2) and 409952004 (VA-4) were diluted due to the presence of overrange target analytes.

Miscellaneous Information

Manual Integrations

Samples 1203667532 (VA-1DUP), 409952001 (VA-1), 409952002 (VA-2), 409952003 (VA-3) and 409952004 (VA-4) required manual integrations in order to properly identify one or more peaks. The shift of the retention time in samples 409952001(VA-1) (VA-1), 409952002(VA-2) (VA-2), 409952003(VA-3) (VA-3) and 409952004(VA-4) (VA-4) was possibly due to the nature of the sample matrix. All ECLY samples in this batch contained high level of analytes; however, please be aware that the results may not be accurate qualitatively and quantitatively due to the limitation of analytical methodology by GC/FID detection. Please use the data with caution.

Alcohols

Product: Analysis of Alcohol by Flame Ionization Detector

Analytical Method: SW846 8015C

Analytical Procedure: GL-OA-E-046 REV# 10

Analytical Batches: 1615123 and 1615121

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952005	VA-5
1203667521	Method Blank (MB)
1203667522	Laboratory Control Sample (LCS)
1203667523	410183014(NonSDG) Sample Duplicate (DUP)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Manual Integrations

Samples 1203667522 (LCS) and 409952005 (VA-5) required manual integration to correctly position the baseline as set in the calibration standard injections.

Product: Analysis of Alcohol by Flame Ionization Detector

Analytical Method: SW846 8015C

Analytical Procedure: GL-OA-E-046 REV# 10

Analytical Batch: 1615142

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203667580	Method Blank (MB)
1203667581	Laboratory Control Sample (LCS)
1203667582	410173003(NonSDG) Matrix Spike (MS)
1203667583	410173003(NonSDG) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Surrogate Recoveries

Samples (See Below) did not meet acceptance criteria for surrogate recovery due to sample matrix interference or dilution.

Sample	Analyte	Value
1203667583 (Non SDG 410173003MSD)	1,4-Dioxane-d8	141* (61%-122%)
409952004 (VA-4)	1,4-Dioxane-d8	0* (61%-122%)

Technical Information

Holding Time Specifications

Samples 409952001 (VA-1), 409952002 (VA-2), 409952003 (VA-3) and 409952004 (VA-4) were received out of holding.

Sample Dilutions

Samples were diluted due to the presence of matrix interference. 409952003 (VA-3) and 409952004 (VA-4).

Miscellaneous Information

Manual Integrations

Sample 409952001 (VA-1) required manual integration to correctly position the baseline as set in the calibration standard injections.

Metals

Product: Determination of Metals by ICP

Analytical Method: SW846 3010A/6010C

Analytical Procedure: GL-MA-E-013 REV# 26

Analytical Batch: 1613803

Preparation Method: SW846 3010A

Preparation Procedure: GL-MA-E-008 REV# 18

Preparation Batch: 1613802

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203664214	Method Blank (MB)ICP
1203664215	Laboratory Control Sample (LCS)
1203664218	409952001(VA-1L) Serial Dilution (SD)
1203664216	409952001(VA-1D) Sample Duplicate (DUP)
1203664217	409952001(VA-1S) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Sample Dilutions

Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range. Samples were diluted in order to bring raw values within the linear range of the instrument for uranium, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for lead. 409952001 (VA-1) and 409952002 (VA-2). Sample was diluted in order to bring raw values within the linear range of the instrument for iron, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for uranium. 409952004 (VA-4).

Analyte	409952		
	001	002	004
Lead	25X	25X	1X
Uranium	25X	25X	5X

Preparation Information

Samples in this SDG were prepared at a ten times dilution factor due to the miscellaneous liquid classification.

Product: Determination of Metals by ICP

Analytical Method: SW846 3050B/6010C

Analytical Procedure: GL-MA-E-013 REV# 26

Analytical Batch: 1613805

Preparation Method: SW846 3050B

Preparation Procedure: GL-MA-E-009 REV# 26

Preparation Batch: 1613804

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952005	VA-5
1203664219	Method Blank (MB)ICP
1203664220	Laboratory Control Sample (LCS)
1203664223	409952005(VA-5L) Serial Dilution (SD)
1203664221	409952005(VA-5D) Sample Duplicate (DUP)
1203664222	409952005(VA-5S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1203664221 (VA-5DUP)	Lead	41.3* (0%-20%)
	Uranium	68.5* (0%-20%)

Technical Information

Preparation/Analytical Method Verification

Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range. Samples was diluted to ensure that the lead and uranium concentrations were within the linear calibration range of the instrument. 409952005 (VA-5).

Analyte	409952
	005
Lead	50X
Uranium	50X

General Chemistry

Product: Flashpoint by Setaflash

Analytical Method: SW846 1020A

Analytical Procedure: GL-GC-E-066 REV# 12

Analytical Batch: 1613835

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203664297	Laboratory Control Sample (LCS)
1203672574	409952001(VA-1) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: pH_by_strip

Analytical Method: SW846 9041A

Analytical Procedure: GL-GC-E-008 REV# 22

Analytical Batch: 1615942

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952001	VA-1
409952002	VA-2
409952003	VA-3
409952004	VA-4
1203669503	Laboratory Control Sample (LCS)
1203669504	409952001(VA-1) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Holding Times

Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203669504 (VA-1DUP)	pH	Received 04-NOV-16, out of holding 13-JUL-16
409952001 (VA-1)	pH	Received 04-NOV-16, out of holding 13-JUL-16
409952002 (VA-2)	pH	Received 04-NOV-16, out of holding 13-JUL-16
409952003 (VA-3)	pH	Received 04-NOV-16, out of holding 13-JUL-16
409952004 (VA-4)	pH	Received 04-NOV-16, out of holding 13-JUL-16

Radiochemistry

Product: Dry Weight

Analytical Method: ASTM D 2216 (Modified)

Analytical Procedure: GL-OA-E-020 REV# 10

Analytical Batch: 1613987

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952005	VA-5
1203664634	409952005(VA-5) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: LSC, Tritium Dist, Liquid

Analytical Method: EPA 906.0 Modified

Analytical Procedure: GL-RAD-A-002 REV# 21

Analytical Batch: 1615058

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
409952003	VA-3
1203667229	Method Blank (MB)
1203667230	409952003(VA-3) Sample Duplicate (DUP)
1203667231	409952003(VA-3) Matrix Spike (MS)
1203667232	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

QC Information

All of the QC samples meet the required acceptance limits with the following exceptions: The Matrix Spike 1203667231 (VA-3MS) did not meet recovery requirements due to the sample activity being greater than five times the spiked nominal concentration. The blank 1203667229 (MB) activity is greater than the MDC but is less than five percent of the lowest activity in the batch. The sample and the duplicate, 1203667230 (VA-3DUP) and 409952003 (VA-3), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with a value of 2.0085.

Technical Information

Recounts

Samples 1203667232 (LCS) and 409952003 (VA-3) were recounted due to the quench number being outside the calibration range. The recounts are reported.

Miscellaneous Information

1. The laboratory control sample 1203667232 does not meet the recovery requirement due to high activity in the samples. The sample 409952003 and duplicate 1203667230 activities minus their respective uncertainties are still greater than their MDAs; therefore, the sample and duplicate results are not adversely affected by the high LCS recovery. 1. Reporting results.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.