GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

June 10, 2014

Mr. Danny O'Connor
Tetra Tech Inc.
415 Oak Street
Kansas City, Missouri 64106

Re: C14 Analysis for BetaChem Site
Work Order: 349877

Dear Mr. O'Connor:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 03, 2014. 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. 4505.

Sincerely,

Heather Shaffer

Heather Shaffer
Project Manager

Enclosures

Receipt Narrative
for
Tetra Tech, Inc. (BetaChem 1105919)
SDG: 349877

June 10, 2014

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on June 03, 2014 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
349877001	Container #393
349877002	Container #385
349877003	Container #69
349877004	Container #62
349877005	Container #375
349877006	Container #90
349877007	Container #73
349877008	Container #29
349877009	Container #392

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Heather Shaffer

Heather Shaffer
Project Manager

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Chain of Custody and Supporting Documentation

CHAIN-OF-CUSTODY RECORD

349877

TETRA TECH EM INC.
8030 Flint Street
Lenexa, Kansas 66214
(913) 894-2600

Date: 5-12-14
Page: 1 of 1
Project No: X9025140060
Shipment Method: FedEx
Number of Coolers Shipped: 1

Project Name: Beta-Chem
Project Manager: Danny O'Connor
Sampler: (Signature)

Sample Number:	Date:	Time:	C-14 via Liquid Scintillation Counter	Matrix Type	No. of Containers	Laboratory Comments:
Container # 393	5-12-14	1530	1	W	1	
Container # 385	5-12-14	1535	1	W	1	
Container # 69	5-12-14	1540	1	W	1	
Container # 62	5-12-14	1545	1	W	1	
Container # 375	5-12-14	1550	1	W	1	
Container # 90	5-12-14	1555	1	W	1	
Container # 73	5-12-14	1600	1	W	1	
Container # 29	5-12-14	1605	1	W	1	
Container # 392	5-12-14	1610	1	W	1	
				W		

Turn-around Time Requested: 5-day

Danny O. 5-12-14

Matrix: S = Soil M = Sediment W = Water A = Air
Preservatives: 1 = Ice 2 = HCl 3 = H_2SO_4 4 = NaOH 5 = HNO_3

Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:
		051314	0910
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:

White = Tetra Tech Yellow = Laboratory Pink = Return to Tetra Tech

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: TETR	**SDG/AR/COC/Work Order:** 349877
Received By: H. Taylor	**Date Received:** 060314

Suspected Hazard Information	**Yes**	**No**	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#: 3271, 1145, 1265, 1307, 1170
Samples identified as Foreign Soil?		✓	1294, 1173, 1230, 2056

	Sample Receipt Criteria	**Yes**	**NA**	**No**	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Ice bags Blue ice Dry ice (None) Other (describe) *all temperatures are recorded in Celsius 20
2a	Daily check performed and passed on IR temperature gun?		✓		Temperature Device Serial #: 130462966 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		✓		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 8045 9347 8213

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials HA Date 060314 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 10 June 2014

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC000122013−10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−12−00283, P330−12−00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013−10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC000122013−10
Nebraska	NE−OS−26−13
Nevada	SC000122014−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68−00485
Plant Material Permit	PDEP−12−00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235−14−9
Utah NELAP	SC000122014−12
Vermont	VT87156
Virginia NELAP	460202
Washington	C780−12
Wisconsin	999887790

Radiological Analysis

Radiochemistry Case Narrative
Tetra Tech, Inc. (TETR)
SDG 349877

Method/Analysis Information

Product:	**Liquid Scint C14, Liquid**
Analytical Method:	EPA EERF C-01 Modified
Analytical Batch Number:	1393498

Sample ID	Client ID
349877001	Container #393
349877002	Container #385
349877004	Container #62
349877005	Container #375
1203102849	Method Blank (MB)
1203102850	349877001(Container #393) Sample Duplicate (DUP)
1203102851	349877001(Container #393) Matrix Spike (MS)
1203102852	Laboratory Control Sample (LCS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-003 REV# 15.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 349877001 (Container #393).

QC Information
All of the QC samples meet the required acceptance limits with the following exceptions: The Matrix Spike 1203102851 (Container #393) did not meet recovery requirements due to the sample activity being greater than five times the spiked nominal concentration. The blank, 1203102849 (MB), did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots. All other samples met the detection limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Recounts
Samples 349877002 (Container #385), 349877004 (Container #62) and 349877005 (Container #375) were recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Miscellaneous Information:

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Sample-Specific MDA/MDC
The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

Additional Comments
Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product:	**Liquid Scint C14, Liquid**
Analytical Method:	EPA EERF C-01 Modified
Analytical Batch Number:	1394307

Sample ID	Client ID
349877003	Container #69
349877006	Container #90
349877007	Container #73
349877008	Container #29
349877009	Container #392
1203104897	Method Blank (MB)

1203104898	349877003(Container #69) Sample Duplicate (DUP)
1203104899	349877003(Container #69) Matrix Spike (MS)
1203104900	Laboratory Control Sample (LCS)

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

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-003 REV# 15.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 349877003 (Container #69).

QC Information
All of the QC samples meet the required acceptance limits with the following exceptions: Refer to Data Exception Report (DER).

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Samples were reprepped due to high MDCs. Reanalysis is reported.

Recounts
Samples 1203104899 (Container #69) and 349877007 (Container #73) were recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Miscellaneous Information:

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: DER 1302466 was generated due to Failed Recovery for MS/PS. 1. The matrix spike 1203104899 does not meet the recovery requirement due to the non-homogeneous matrix of the sample. 1. Reporting results.

Sample-Specific MDA/MDC
The MDA/MDC reported on the certificate of analysis is a sample-specific MDA/MDC.

Additional Comments
Additional comments were not required for this sample set.

Qualifier Information

Manual qualifiers were not required.

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.

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

TETR056 Tetra Tech, Inc. (BetaChem 1105919)

Client SDG: 349877 GEL Work Order: 349877

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

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Heather M. McCarty **Name:** **Heather McCarty**

Date: **10 JUN 2014** **Title:** **Analyst II**

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
10-JUN-14	Radiochemistry	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
LSC	EPA EERF C-01 Modified	Liquid	TETR
Batch ID:	**Sample Numbers:**		
1394307	See below		

Potentially affected work order(s)(SDG): 349877

Application Issues:

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	DER Disposition:
1. The matrix spike 1203104899 does not meet the recovery requirement due to the non-homogeneous matrix of the sample.	1. Reporting results.

Originator's Name:

Lyndsey Pace 10-JUN-14

Data Validator/Group Leader:

Lesley Anderson 10-JUN-14

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106 — Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #393
Sample ID: 349877001
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14		1.21E+05	+/-2320	141	+/-22600	3.00	pCi/mL		BYS1	06/08/14	0919	1393498	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #385
Sample ID: 349877002
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14		4980	+/-100	32.0	+/-930	3.00	pCi/mL		BYS1	06/08/14	0921	1393498	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #69
Sample ID: 349877003
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14	U	-1.0	+/-1.17	2.08	+/-1.17	3.00	pCi/mL		BYS1	06/09/14	1725	1394307	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor

Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #62
Sample ID: 349877004
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14		50.9	+/-19.6	30.2	+/-21.8	3.00	pCi/mL		BYS1	06/08/14	0952	1393498	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #375
Sample ID: 349877005
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14		626	+/-37.5	30.4	+/-122	3.00	pCi/mL		BYS1	06/08/14	1008	1393498	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #90
Sample ID: 349877006
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14	U	0.685	+/-1.23	2.08	+/-1.23	3.00	pCi/mL		BYS1	06/09/14	1756	1394307	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #73
Sample ID: 349877007
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14		6.20	+/-1.41	2.09	+/-1.82	3.00	pCi/mL		BYS1	06/09/14	1828	1394307	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #29
Sample ID: 349877008
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14	U	-0.157	+/-1.20	2.08	+/-1.20	3.00	pCi/mL		BYS1	06/09/14	1859	1394307	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Tetra Tech Inc.
Address : 415 Oak Street

Kansas City, Missouri 64106

Report Date: June 10, 2014

Contact: Mr. Danny O'Connor
Project: C14 Analysis for BetaChem Site

Client Sample ID: Container #392
Sample ID: 349877009
Matrix: Misc Liquid
Collect Date: 12-MAY-14
Receive Date: 03-JUN-14
Collector: Client

Project: TETR00056
Client ID: TETR056

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Liquid Scintillation Analysis													
Liquid Scint C14, Liquid "As Received"													
Carbon-14	U	-0.162	+/-1.20	2.09	+/-1.20	3.00	pCi/mL		BYS1	06/09/14	1930	1394307	1

The following Analytical Methods were performed

Method	Description
1	EPA EERF C-01 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Quality Control Data

GEL LABORATORIES LLC

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

QC Summary

Report Date: June 10, 2014

Client : **Tetra Tech Inc.**
415 Oak Street

Kansas City, Missouri
Contact: **Mr. Danny O'Connor**
Workorder: **349877**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Liquid Scintillation										
Batch 1393498										
QC1203102850 349877001 DUP										
Carbon-14		1.21E+05		1.28E+05	pCi/mL	5.46		(0%-20%)	BYS1	06/08/1411:45
	Uncert:	+/-2320		+/-2490						
	TPU:	+/-22600		+/-23900						
QC1203102852 LCS										
Carbon-14	758			772	pCi/mL		102	(75%-125%)	BYS1	06/08/1411:48
	Uncert:			+/-41.1						
	TPU:			+/-149						
QC1203102849 MB										
Carbon-14			U	-1.96	pCi/mL				BYS1	06/08/1411:29
	Uncert:			+/-17.5						
	TPU:			+/-17.5						
QC1203102851 349877001 MS										
Carbon-14	758	1.21E+05		1.28E+05	pCi/mL		N/A	(75%-125%)	BYS1	06/08/1411:46
	Uncert:	+/-2320		+/-2490						
	TPU:	+/-22600		+/-24000						
Batch 1394307										
QC1203104898 349877003 DUP										
Carbon-14	U	-1.0	U	-0.194	pCi/mL	0		N/A	BYS1	06/09/1420:33
	Uncert:	+/-1.17		+/-1.19						
	TPU:	+/-1.17		+/-1.19						
QC1203104900 LCS										
Carbon-14	75.8			71.5	pCi/mL		94.4	(75%-125%)	BYS1	06/09/1421:36
	Uncert:			+/-2.74						
	TPU:			+/-13.6						
QC1203104897 MB										
Carbon-14			U	0.0977	pCi/mL				BYS1	06/09/1420:02
	Uncert:			+/-1.21						
	TPU:			+/-1.21						
QC1203104899 349877003 MS										
Carbon-14	75.8 U	-1.0		26.5	pCi/mL		35 *	(75%-125%)	BYS1	06/09/1421:04
	Uncert:	+/-1.17		+/-1.93						
	TPU:	+/-1.17		+/-5.29						

Notes:

TPU and Counting Uncertainty are 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

QC Summary

Workorder: **349877**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time

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 MDL, MDA, or LOD.
UI	Gamma Spectroscopy--Uncertain identification
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.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence 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.
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.