



November 30, 2015

Mr. Scot Fitzgerald  
CH2MHill Plateau Remediation Company  
MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352

Re: CHPRC SAF F15-011  
Work Order: 386080  
SDG: GEL386080

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 20, 2015. 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,

Sarah Edwards for  
Heather Shaffer  
Project Manager

Purchase Order: 302632 8C  
Chain of Custody: F15-011-472, F15-011-473, F15-011-475, F15-011-476, F15-011-477 and F15-011-478  
Enclosures



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# Case Narrative

DECEMBER 04, 2015

General Narrative  
for  
CH2MHill Plateau Remediation Company  
CHPRC SAF F15-011  
SDG: GEL386080

November 30, 2015

**Laboratory Identification:**

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

**Summary**

**Sample receipt**

The sample(s) arrived at GEL Laboratories, LLC, Charleston, South Carolina on November 20, 2015, 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.

**Items of Note** All efforts were made by the lab to meet any short hold times. Samples that were analyzed outside of the initial hold time but still within 2X hold time will be noted in the lab case narrative and DER.

**Sample Identification**

The laboratory received the following samples:

<b><u>Laboratory Identification</u></b>	<b><u>Sample Description</u></b>
386080001	B33MH7
386080002	B33MJ0
386080003	B33MJ2
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1

**Case Narrative**

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) 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.

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Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: General Chemistry, Metals and Radiochemistry.

This package, to the best of my knowledge, is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or designee) and the laboratory's client services representative as verified by their signatures on this report.



Sarah Edwards for  
Heather Shaffer  
Project Manager

# **Chain of Custody and Supporting Documentation**



DECEMBER 04, 2015

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-011-476	PAGE 1 OF 1
COLLECTOR <i>D. Wight</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9511, I-002	PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites - Soil	SAF NO. F15-011		AIR QUALITY	
ICE CHEST NO. <i>GWS-493</i>	FIELD LOGBOOK NO. <i>HNE-NL-507-33/19</i>	ACTUAL SAMPLE DEPTH <i>7.6 ft / 10.0 ft</i>	COA 302632	METHOD OF SHIPMENT FEDERAL EXPRESS	<b>ORIGINAL</b>
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <i>6156</i>	BILL OF LADING/AIR BILL NO. <i>7750 2080 7680</i>			

MATRIX*	PRESERVATION	COOL <=6C
A=Air	HOLDING TIME	28 Days/48 Hours
DL=Drum	TYPE OF CONTAINER	G/P
Liquids	NO. OF CONTAINER(S)	1
DS=Drum	VOLUME	60ml
Solids	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
L=Liquid	SAMPLE DATE	NOV 19 2015
O=Oil	SAMPLE TIME	<i>1035</i>
S=Soil		
SE=Sediment		
T=Tissue		
V=Vegetation		
W=Water		
WI=Wipe		
X=Other		
SPECIAL HANDLING AND/OR STORAGE RADIOACTIVE-TIE TO-B33MH8-225 <i>11-18-15</i>		
SAMPLE NO. B33MJ0	MATRIX*	SOIL

SPECIAL INSTRUCTIONS

TRVL-16-019  
(1) 9056\_ANIONS\_IC: COMMON;  
{Phosphorus in phosphate};

SIGN/PRINT NAMES

RELINQUISHED BY/REMOVED FROM <i>D. Wight</i>	DATE/TIME NOV 19 2015	RECEIVED BY/STORED IN <i>E.L. Kauer</i>	DATE/TIME NOV 19 2015
RELINQUISHED BY/REMOVED FROM <i>E.L. Kauer</i>	DATE/TIME NOV 19 2015	RECEIVED BY/STORED IN <i>CHPRC</i>	DATE/TIME NOV 19 2015
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME NOV 19 2015	RECEIVED BY/STORED IN <i>FEDEX</i>	DATE/TIME NOV 19 2015
RELINQUISHED BY/REMOVED FROM <i>FEDEX</i>	DATE/TIME NOV 19 2015	RECEIVED BY/STORED IN <i>Raymond Gray page 11/20/15 0550</i>	DATE/TIME NOV 19 2015
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
PRINTED ON 11/6/2015	FSR ID = FSR9263	TRVL NUM = TRVL-16-019	6003-618 (REV 2)

DECEMBER 04, 2015

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-011-478	PAGE 1 OF 1
COLLECTOR D. Wight	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9511, I-002 FTB	PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites - Soil	FIELD LOGBOOK NO. HNF-NL 507-33/15	SAF NO. F15-011	AIR QUALITY	
ICE CHEST NO. GWS-493	ACTUAL SAMPLE DEPTH (N/A)	OFFSITE PROPERTY NO. 6154	COA 302632	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC	BILL OF LADING/AIR BILL NO. 7750 20807680				

MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1. NA	PRESERVATION Cool <=6C
	HOLDING TIME 28 Days/48 Hours	
	TYPE OF CONTAINER G/P	
	NO. OF CONTAINER(S) 1	
	VOLUME 60ml	
	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS	
SAMPLE NO. B33MJ2	MATRIX* SOIL	SAMPLE DATE NOV 19 2015
		SAMPLE TIME 0952

CHAIN OF POSSESSION SIGN/ PRINT NAMES SPECIAL INSTRUCTIONS

RELINQUISHED BY/REMOVED FROM D. Wight	DATE/TIME 11-19-15	RECEIVED BY/STORED IN CHPRC	DATE/TIME 11-19-15	TRVL-16-019 (1) 9056_ANIONS_IC: COMMON; {Phosphorus in phosphate};
RELINQUISHED BY/REMOVED FROM E.L. Kauer	DATE/TIME NOV 19 2015	RECEIVED BY/STORED IN FEDEX	DATE/TIME 11-20-15	
RELINQUISHED BY/REMOVED FROM [Signature]	DATE/TIME [Signature]	RECEIVED BY/STORED IN [Signature]	DATE/TIME [Signature]	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME
PRINTED ON 11/6/2015	FSR ID = FSR9264	TRVL NUM = TRVL-16-019	A-6003-618 (REV 2)



CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-011-472	PAGE 2 OF 2
COLLECTOR <i>D. Wight</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9511, I-001	PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites - Soil		SAF NO. F15-011	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>GWS-493</i>	FIELD LOGBOOK NO. <i>HNF-N-507-33/19</i>	ACTUAL SAMPLE DEPTH <i>4.5 to 6.9</i>	COA 302632	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <i>6156</i>				<i>7750 20807600</i>

**SPECIAL INSTRUCTIONS**

TRVL-16-019  
 (1) 6020\_METALS\_ICPMS: COMMON {Aluminum, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Selenium}; 6020\_METALS\_ICPMS: COMMON (Add-on) {Arsenic, Manganese, Nickel, Uranium}; 6010\_METALS\_ICP: COMMON {Antimony, Silver}; 7471\_MERCURY\_CV: COMMON (SOLIDS);  
 (2) GAMMA\_GS: COMMON; AMCMISO\_IE\_PRECIP\_AEA: COMMON; PUIISO\_PLATE\_AEA: COMMON; Plutonium-238, Plutonium-239/240; UISO\_PLATE\_AEA: COMMON {Uranium-233/234, Uranium-235, Uranium-238}; C14\_LSC: COMMON; ~~TRITIU~~ TRITIU\_DIST\_LSC: COMMON; NP237\_IE\_PRECIP\_AEA: COMMON; SRTOT\_SEP\_PRECIP\_GPC: COMMON {Total beta radiostrontium}; TC99\_EIE\_LSC: COMMON; TRITIUM\_DIST\_LSC: COMMON;



CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-011-475	PAGE 2 OF 2
COLLECTOR <i>D. WIGHT</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9511, I-002	PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites - Soil	SAF NO. F15-011	COA 302632	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. <i>GWS-493</i>	FIELD LOGBOOK NO. <i>HNF-N-507-33/19</i>	ACTUAL SAMPLE DEPTH <i>7.6 to 10.0 ft</i>	BILL OF LADING/AIR BILL NO. <i>775020807600</i>		<b>ORIGINAL</b>
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <i>6156</i>				

**SPECIAL INSTRUCTIONS**  
 TRVL-16-019  
 (1) 6020\_METALS\_ICPMS: COMMON {Aluminum, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Selenium}; 6020\_METALS\_ICPMS: COMMON (Add-on) {Arsenic, Manganese, Nickel, Uranium}; 6010\_METALS\_ICP: COMMON {Antimony, Silver}; 7471\_MERCURY\_CV: COMMON (SOLIDS);  
 (2) GAMMA\_GS: COMMON; AMCMISO\_IE\_PRECIP\_AEA: COMMON; PUIISO\_PLATE\_AEA: COMMON; Plutonium-238, Plutonium-239/240); UTSO\_PLATE\_AEA: COMMON {Uranium-233/234, Uranium-235, Uranium-238}; C14\_LSC: COMMON; ~~429\_SEP\_HEPS\_GS: COMMON~~; NI63\_LSC: COMMON; NP237\_IE\_PRECIP\_AEA: COMMON; SRTOT\_SEP\_PRECIP\_GPC: COMMON {Total beta radiostrontium}; TC99\_EIE\_LSC: COMMON; TRITIUM\_DIST\_LSC: COMMON;



CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-011-477	PAGE 2 OF 2
COLLECTOR <i>D. Wight</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION C9511, I-002 FTB	PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites - Soil		SAF NO. F15-011	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>653-493</i>	FIELD LOGBOOK NO. <i>LINE-N-507-33/15</i>	ACTUAL SAMPLE DEPTH <i>N/A</i>	COA 302632	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO GEL Laboratories, LLC	OFFSITE PROPERTY NO. <i>6156</i>	BILL OF LADING/AIR BILL NO. <i>7750 20807680</i>			
<b>SPECIAL INSTRUCTIONS</b> TRVL-16-019 (1) 6020_METALS_ICPMS: COMMON {Aluminum, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Selenium}; 6020_METALS_ICPMS: COMMON (Add-on) {Arsenic, Manganese, Nickel, Uranium}; 6010_METALS_ICP: COMMON {Antimony, Silver}; 7471_MERCURY_CV: COMMON (SOLIDS); (2) GAMMA_GS: COMMON; AMCMISO_IE_PRECIP_AEA: COMMON; UIISO_PLATE_AEA: COMMON {Plutonium-238, Plutonium-239/240}; UIISO_PLATE_AEA: COMMON {Uranium-233/234, Uranium-235, Uranium-238}; C14_LSC: COMMON; <del>H-29_SEP_LEPS-GS: COMMON; Ni63_LSC: COMMON; NP237_IE_PRECIP_AEA: COMMON;</del> SRTOT_SEP_PRECIP_GPC: COMMON {Total beta radiostrontium}; TC99_EIE_LSC: COMMON; TRITIUM_DIST_LSC: COMMON;					

DECEMBER 04, 2015

SAMPLE RECEIPT & REVIEW FORM

Client: <u>CPRC</u>		SDG/AR/COC/Work Order:	
Received By: <u>COY</u>		Date Received: <u>11/20/15</u>	
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): <u>0cpm</u>
Classified Radioactive II or III by RSO?			If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?			
Package, COC, and/or Samples marked as beryllium or asbestos containing?			If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?			Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?			

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: <u>Ice bags</u> Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	/			Temperature Device Serial #: <u>201404337</u> 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#: Sample ID's and containers affected:
6 Do Low Level Perchlorate samples have headspace as required?	/			(If unknown, select No)
7 VOA vials contain acid preservation?	/			Sample ID's and containers affected:
8 VOA vials free of headspace (defined as < 6mm bubble)?	/			(If yes, immediately deliver to Volatiles laboratory)
9 Are Encore containers present?	/			ID's and tests affected:
10 Samples received within holding time?	/			Sample ID's and containers affected:
11 Sample ID's on COC match ID's on bottles?	/			Sample ID's affected:
12 Date & time on COC match date & time on bottles?	/			Sample ID's affected:
13 Number of containers received match number indicated on COC?	/			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	/			
15 COC form is properly signed in relinquished/received sections?	/			
16 Carrier and tracking number.	/			Circle Applicable: FedEx Air <u>7750</u> FedEx Ground <u>280</u> UPS <u>7793</u> Field Services <u>1450</u> Courier <u>6554</u> Other <u>280</u> <u>7080</u> - 3.0°C <u>1450</u> <u>6668</u> - 3.2°C <u>280</u> <u>7080</u> - 2.7°C <u>1450</u> <u>6668</u> - 2.6°C

Comments (Use Continuation Form if needed):

# **Data Review Qualifier Definitions**

## Project Specific Qualifier Definitions for GEL Client Code: **CPRC**

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
U	Programmed	Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.	Y			Includes MDA, TPU, count uncert.
J	Programmed	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated	Y	Organics		Organics only
P	Programmed	Aroclor target analyte with greater than 25% difference between column analyses.	Y	Organics		PCB only
C	Manual	Analyte has been confirmed by GC/MS analysis	Y	Organics	Pesticide	IF GC/MS confirmation was attempted but unsuccessful do not qualify with C
B	Programmed	The analyte was detected in both the associated QC blank and in the sample.	Y	Organics		
E	Manual	Concentration exceeds the calibration range of the instrument	Y	Organics		Qualifier Uploaded
A	Manual	The TIC is a suspected aldol-condensation product	Y	Organics	Semi-Volatile	Uploaded with TIC
X	Programmed	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			Replaces H Hold Date In RAD replaces UI. Same usage as standard X as well.
N	Programmed	Spike Sample recovery is outside control limits.	Y			
*	Programmed	Duplicate analysis not within control limits	Y	Inorganics		
>	Programmed	Result greater than quantifiable range or greater than upper limit of the analysis range	Y	General Chemistry		
Z	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
B	Programmed	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	Y	Inorganics	Metals	Replaces J Estimated Value
D	Programmed	Results are reported from a diluted aliquot of sample.	Y			Dilution
E	Programmed	Reported value is estimated due to interferences. See comment in narrative.	Y	Inorganics	Metals	GEL E
M	Manual	Duplicate precision not met.	Y	Inorganics	Metals	Replaces *
o	Programmed	Analyte failed to recover within LCS limits (Organics only)	Y	Organics		
S	Manual	Reported value determined by the Method of Standard Additions (MSA)	Y	Inorganics		Not coded B/C Rarely preformed
T	Programmed	Spike and/or spike duplicate sample recovery is outside control limits.	Y	Organics		GC/MS only
W	Manual	Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.	Y	Inorganics		No GFAA in house.
B	Programmed	The associated QC sample blank has a result $\geq 2X$ the MDA and, after corrections, result is $\geq$ MDA for this sample	Y	Radiological		
Y	Manual	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier	Y			
+	Manual	Correlation coefficient for Method of Standard Additions (MSA) is < 0.995	Y	Inorganics		
B	Programmed	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).	Y	General Chemistry		Replaces J Estimated Value
C	Programmed	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is > 5% of the measured concentration and/or decision level for associated samples.	Y	Inorganics	Metals	Replaces B Blank Detection
C	Programmed	Target analyte was detected in the sample and the associated blank. The associated blank concentration is $\geq$ EQL or is > 5% of the measured concentration and/or decision level for associated samples.	Y	General Chemistry		Replaces B Blank Detection
<	Programmed	Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide	Y	General Chemistry		for Reactive CN/S

## Project Specific Qualifier Definitions for GEL Client Code: **CPRC**

Code	Status	Qualifier Definition	CofA	Department	Fraction	Additional Comments
UX	Manual	Gamma Spectroscopy--Uncertain identification	Y	Radiological		

# Laboratory Certifications

**List of current GEL Certifications as of 30 November 2015**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
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 SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA150001
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	2054
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	T104704235-15-10
Utah NELAP	SC000122015-19
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

# Metals Analysis

# Case Narrative

DECEMBER 04, 2015

Metals

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL386080

Work Order #: 386080

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438319	Method Blank (MB)ICP
1203438320	Laboratory Control Sample (LCS)
1203438323	386080004(B33MH6L) Serial Dilution (SD)
1203438321	386080004(B33MH6D) Sample Duplicate (DUP)
1203438322	386080004(B33MH6S) Matrix Spike (MS)
1203438299	Method Blank (MB)ICP-MS
1203438300	Laboratory Control Sample (LCS)
1203438303	386080004(B33MH6L) Serial Dilution (SD)
1203438301	386080004(B33MH6D) Sample Duplicate (DUP)
1203438302	386080004(B33MH6S) Matrix Spike (MS)
1203443195	386080004(B33MH6PS) Post Spike (PS)
1203439381	Method Blank (MB)CVAA
1203439382	Laboratory Control Sample (LCS)
1203439385	386080004(B33MH6L) Serial Dilution (SD)
1203439383	386080004(B33MH6D) Sample Duplicate (DUP)
1203439384	386080004(B33MH6S) Matrix Spike (MS)

**Sample Analysis**

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" basis.

**Method/Analysis Information**

<b>Analytical Batch:</b>	1525211, 1525202 and 1525661
<b>Prep Batch :</b>	1525210, 1525201 and 1525660
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 24, GL-MA-E-009 REV# 26, GL-MA-E-014 REV# 26 and GL-MA-E-010 REV# 31
<b>Analytical Method:</b>	6010_METALS_ICP, 6020_METALS_ICPMS and 7471_HG_CVAA
<b>Prep Method :</b>	SW846 3050B and SW846 7471B Prep

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**System Configuration**

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 300X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

**Calibration Information**

**Instrument Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

**CRDL/PQL Requirements**

The CRDL/PQL standard recoveries met the referenced advisory control limits.

**ICSA/ICSAB Statement**

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

**Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

**Continuing Calibration Verification (CCV) Requirements**

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The method blanks (MB) analyzed with this SDG did not meet all of the acceptance criteria. Barium, beryllium, cadmium, cobalt, copper and nickel were greater than the MDL. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. ICP-MS.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**Quality Control (QC) Sample Statement**

The following samples were selected as the quality control (QC) samples for this SDG: 386080004 (B33MH6)-ICP, ICP-MS and CVAA.

**Matrix Spike (MS/MSD) Recovery Statement**

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity.

Sample	Analyte	Value
--------	---------	-------

1203438302 (B33MH6MS)	Selenium	73.7* (75%-125%)
-----------------------	----------	------------------

**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. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

**Serial Dilution % Difference Statement**

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203438303 (B33MH6SDILT)	Copper	11.9 *(0%-10%)
	Nickel	12.8 *(0%-10%)

**Post Spike (PS) Recovery Statement**

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences.

Sample	Analyte	Value
1203443195 (B33MH6PS)	Selenium	76.9* (80%-120%)

**Technical Information**

**Holding Time Specifications**

GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. 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 are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 386080004 (B33MH6) and 386080005 (B33MH9)-ICP-MS were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	386080		
	004	005	006
Several	20X 2X 1X	20X 2X 1X	2X 1X

**Preparation Information**

The samples in this SDG were not diluted and prepared according to the cited SOP.

**Miscellaneous Information**

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator’s signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Data Exception (DER) Documentation**

A Data exception report (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1472765 was generated for samples 1203438302 (B33MH6MS), 1203438303 (B33MH6SDILT) and 1203443195 (B33MH6PS) in this SDG/batch.

**Additional Comments**

Additional comments were not required for this SDG.

**Special Preparation Directions**

Non-applicable for this SDG.

**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.

DECEMBER 04, 2015

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL386080 GEL Work Order: 386080

**The Qualifiers in this report are defined as follows:**

- \* Duplicate analysis not within control limits
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is  $\geq$  EQL or is  $> 5\%$  of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

**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: 

Name: Nik-Cole Elmore

Date: 03 DEC 2015

Title: Data Validator

# Sample Data Summary

**METALS**  
-1-  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: GEL386080

METHOD TYPE: SW846

SAMPLE ID: 386080004

CLIENT ID: B33MH6

CONTRACT: CPRC0F15011

MATRIX:SOIL

DATE RECEIVED 20-NOV-15

LEVEL: Low %SOLIDS: 95.3

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7429-90-5	Aluminum	9780000	ug/kg	D		MS	3060	2	ICPMS11	151201-3
7440-36-0	Antimony	1460	ug/kg			P	343	1	OPTIMA3	112415A-1
7440-38-2	Arsenic	2890	ug/kg	D		MS	204	2	ICPMS11	151130-2
7440-39-3	Barium	101000	ug/kg	D		MS	102	2	ICPMS11	151130-2
7440-41-7	Beryllium	346	ug/kg	CD		MS	20.4	2	ICPMS11	151130-2
7440-43-9	Cadmium	76.3	ug/kg	CBD		MS	20.4	2	ICPMS11	151130-2
7440-47-3	Chromium	12500	ug/kg	D		MS	204	2	ICPMS11	151130-2
7440-48-4	Cobalt	8680	ug/kg	D		MS	61.2	2	ICPMS11	151130-2
7440-50-8	Copper	13500	ug/kg	D	M	MS	67.3	2	ICPMS11	151130-2
7439-92-1	Lead	4870	ug/kg	D		MS	102	2	ICPMS11	151202-4
7439-96-5	Manganese	358000	ug/kg	D		MS	2040	20	ICPMS11	151201-3
7439-97-6	Mercury	4.17	ug/kg	U		AV	4.17	1	HG3	112415S3-5
7439-98-7	Molybdenum	523	ug/kg	D		MS	61.2	2	ICPMS11	151202-4
7440-02-0	Nickel	11200	ug/kg	D	M	MS	102	2	ICPMS11	151130-2
7782-49-2	Selenium	716	ug/kg	BD	N	MS	337	2	ICPMS11	151201-3
7440-22-4	Silver	104	ug/kg	U		P	104	1	OPTIMA3	112415A-1
7440-61-1	Uranium	641	ug/kg	D		MS	13.5	2	ICPMS11	151202-4

## \*Analytical Methods:

AV SW846 7471B  
P SW846 3050B/6010C  
MS SW846 3050B/6020A

**METALS**  
-1-  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: GEL386080

METHOD TYPE: SW846

SAMPLE ID: 386080005

CLIENT ID: B33MH9

CONTRACT: CPRC0F15011

MATRIX:SOIL

DATE RECEIVED 20-NOV-15

LEVEL: Low %SOLIDS: 94.7

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7429-90-5	Aluminum	8910000	ug/kg	D		MS	2930	2	ICPMS11	151201-3
7440-36-0	Antimony	1130	ug/kg			P	334	1	OPTIMA3	112415A-1
7440-38-2	Arsenic	3610	ug/kg	D		MS	196	2	ICPMS11	151130-2
7440-39-3	Barium	99800	ug/kg	D		MS	97.8	2	ICPMS11	151130-2
7440-41-7	Beryllium	307	ug/kg	CD		MS	19.6	2	ICPMS11	151130-2
7440-43-9	Cadmium	72.6	ug/kg	CBD		MS	19.6	2	ICPMS11	151130-2
7440-47-3	Chromium	10200	ug/kg	D		MS	196	2	ICPMS11	151130-2
7440-48-4	Cobalt	8480	ug/kg	D		MS	58.7	2	ICPMS11	151130-2
7440-50-8	Copper	13900	ug/kg	D	M	MS	64.6	2	ICPMS11	151130-2
7439-92-1	Lead	5270	ug/kg	D		MS	97.8	2	ICPMS11	151202-4
7439-96-5	Manganese	369000	ug/kg	D		MS	1960	20	ICPMS11	151201-3
7439-97-6	Mercury	4.23	ug/kg	U		AV	4.23	1	HG3	112415S3-5
7439-98-7	Molybdenum	314	ug/kg	D		MS	58.7	2	ICPMS11	151202-4
7440-02-0	Nickel	11700	ug/kg	D	M	MS	97.8	2	ICPMS11	151130-2
7782-49-2	Selenium	982	ug/kg	D	N	MS	323	2	ICPMS11	151201-3
7440-22-4	Silver	101	ug/kg	U		P	101	1	OPTIMA3	112415A-1
7440-61-1	Uranium	783	ug/kg	D		MS	12.9	2	ICPMS11	151202-4

## \*Analytical Methods:

AV SW846 7471B  
P SW846 3050B/6010C  
MS SW846 3050B/6020A

**METALS**  
-1-  
**INORGANICS ANALYSIS DATA PACKAGE**

SDG No: GEL386080

METHOD TYPE: SW846

SAMPLE ID: 386080006

CLIENT ID: B33MJ1

CONTRACT: CPRC0F15011

MATRIX:SOIL

DATE RECEIVED 20-NOV-15

LEVEL: Low %SOLIDS: 99.957

<u>CAS No</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>C</u>	<u>Qual</u>	<u>M*</u>	<u>MDL</u>	<u>DF</u>	<u>Inst ID</u>	<u>Analytical Run</u>
7429-90-5	Aluminum	37900	ug/kg	D		MS	2580	2	ICPMS11	151201-3
7440-36-0	Antimony	283	ug/kg	U		P	283	1	OPTIMA3	112415A-1
7440-38-2	Arsenic	172	ug/kg	UD		MS	172	2	ICPMS11	151130-2
7440-39-3	Barium	203	ug/kg	CBD		MS	86.1	2	ICPMS11	151130-2
7440-41-7	Beryllium	17.2	ug/kg	UD		MS	17.2	2	ICPMS11	151130-2
7440-43-9	Cadmium	17.2	ug/kg	UD		MS	17.2	2	ICPMS11	151130-2
7440-47-3	Chromium	209	ug/kg	BD		MS	172	2	ICPMS11	151130-2
7440-48-4	Cobalt	51.7	ug/kg	UD		MS	51.7	2	ICPMS11	151130-2
7440-50-8	Copper	256	ug/kg	CD	M	MS	56.8	2	ICPMS11	151130-2
7439-92-1	Lead	100	ug/kg	BD		MS	86.1	2	ICPMS11	151202-4
7439-96-5	Manganese	293	ug/kg	BD		MS	172	2	ICPMS11	151201-3
7439-97-6	Mercury	3.7	ug/kg	U		AV	3.7	1	HG3	112415S3-5
7439-98-7	Molybdenum	51.7	ug/kg	UD		MS	51.7	2	ICPMS11	151202-4
7440-02-0	Nickel	86.1	ug/kg	UD	M	MS	86.1	2	ICPMS11	151130-2
7782-49-2	Selenium	284	ug/kg	UD	N	MS	284	2	ICPMS11	151201-3
7440-22-4	Silver	85.8	ug/kg	U		P	85.8	1	OPTIMA3	112415A-1
7440-61-1	Uranium	52.3	ug/kg	D		MS	11.4	2	ICPMS11	151202-4

**\*Analytical Methods:**

AV SW846 7471B  
P SW846 3050B/6010C  
MS SW846 3050B/6020A

# Quality Control Summary

**DECEMBER 04, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Report Date: December 3, 2015

Page 1 of 6

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 386080

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1525202										
QC1203438301 386080004 DUP											
Aluminum	D	9780000	D	8590000	ug/kg	12.9		(0%-20%)	PRB	12/01/15	21:14
Arsenic	D	2890	D	2790	ug/kg	3.46	^	(+/-1040)		11/30/15	16:03
Barium	D	101000	D	95500	ug/kg	5.72		(0%-20%)			
Beryllium	CD	346	D	325	ug/kg	6.26	^	(+/-104)			
Cadmium	BCD	76.3	BD	80.3	ug/kg	5.12	^	(+/-208)			
Chromium	D	12500	D	10600	ug/kg	16.4		(0%-20%)			
Cobalt	D	8680	D	8330	ug/kg	4.12		(0%-20%)			
Copper	DM	13500	D	13400	ug/kg	1.12		(0%-20%)			
Lead	D	4870	D	4850	ug/kg	0.44		(0%-20%)		12/02/15	18:21
Manganese	D	358000	D	361000	ug/kg	0.812		(0%-20%)		12/01/15	21:45
Molybdenum	D	523	D	349	ug/kg	39.9	^	(+/-208)		12/02/15	18:21
Nickel	DM	11200	D	11200	ug/kg	0.397		(0%-20%)		11/30/15	16:03
Selenium	BDN	716	BD	644	ug/kg	10.6	^	(+/-1040)		12/01/15	21:14
Uranium	D	641	D	568	ug/kg	12.1		(0%-20%)		12/02/15	18:21
QC1203438300 LCS											
Aluminum		193000	D	204000	ug/kg			105 (80%-120%)		12/01/15	21:08
Arsenic		4840	D	4270	ug/kg			88.3 (80%-120%)		11/30/15	15:56
Barium		4840	D	5060	ug/kg			105 (80%-120%)			
Beryllium		4840	D	5180	ug/kg			107 (80%-120%)			
Cadmium		4840	D	4620	ug/kg			95.5 (80%-120%)			

**DECEMBER 04, 2015**  
**GEL LABORATORIES LLC**

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**QC Summary**

Workorder: **386080**

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD/D%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
<b>Metals Analysis - ICPMS</b>											
Batch	1525202										
Chromium	4840		D	5350	ug/kg		111	(80%-120%)			
Cobalt	4840		D	5030	ug/kg		104	(80%-120%)	PRB	11/30/15	15:56
Copper	4840		D	5150	ug/kg		107	(80%-120%)			
Lead	4840		D	5550	ug/kg		115	(80%-120%)		12/02/15	18:15
Manganese	4840		D	5050	ug/kg		104	(80%-120%)		12/01/15	21:08
Molybdenum	4840		D	5350	ug/kg		111	(80%-120%)		12/02/15	18:15
Nickel	4840		D	5200	ug/kg		107	(80%-120%)		11/30/15	15:56
Selenium	4840		D	4090	ug/kg		84.6	(80%-120%)		12/01/15	21:08
Uranium	4840		D	5510	ug/kg		114	(34%-166%)		12/02/15	18:15
QC1203438299	MB										
Aluminum			DU	ND	ug/kg					12/01/15	21:05
Arsenic			DU	ND	ug/kg					11/30/15	15:53
Barium			BD	104	ug/kg						
Beryllium			BD	49.1	ug/kg						
Cadmium			BD	78.6	ug/kg						
Chromium			DU	ND	ug/kg						
Cobalt			BD	86.8	ug/kg						
Copper			BD	96.4	ug/kg						
Lead			DU	ND	ug/kg					12/02/15	18:12
Manganese			DU	ND	ug/kg					12/01/15	21:05
Molybdenum			DU	ND	ug/kg					12/02/15	18:12
Nickel			BD	107	ug/kg					11/30/15	15:53
Selenium			DU	ND	ug/kg					12/01/15	21:05

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**QC Summary**

Workorder: **386080**

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1525202										
Uranium			DU	ND	ug/kg				PRB	12/02/15	18:12
QC1203438302	386080004	MS									
Aluminum	203000	D	9780000	D	10100000	ug/kg	N/A	(75%-125%)		12/01/15	21:17
Arsenic	5070	D	2890	D	7490	ug/kg	90.8	(75%-125%)		11/30/15	16:06
Barium	5070	D	101000	D	111000	ug/kg	N/A	(75%-125%)			
Beryllium	5070	CD	346	D	5270	ug/kg	97	(75%-125%)			
Cadmium	5070	BCD	76.3	D	4990	ug/kg	96.8	(75%-125%)			
Chromium	5070	D	12500	D	16700	ug/kg	82.4	(75%-125%)			
Cobalt	5070	D	8680	D	14700	ug/kg	118	(75%-125%)			
Copper	5070	DM	13500	D	19500	ug/kg	118	(75%-125%)			
Lead	5070	D	4870	D	11000	ug/kg	121	(75%-125%)		12/02/15	18:24
Manganese	5070	D	358000	D	388000	ug/kg	N/A	(75%-125%)		12/01/15	21:48
Molybdenum	5070	D	523	D	5990	ug/kg	108	(75%-125%)		12/02/15	18:24
Nickel	5070	DM	11200	D	17200	ug/kg	118	(75%-125%)		11/30/15	16:06
Selenium	5070	BDN	716	DN	4450	ug/kg	73.7*	(75%-125%)		12/01/15	21:17
Uranium	5070	D	641	D	6560	ug/kg	117	(75%-125%)		12/02/15	18:24
QC1203443195	386080004	PS									
Selenium	25.0	BDN	3.51	D	22.7	ug/L	76.9*	(80%-120%)		12/01/15	21:20
QC1203438303	386080004	SDILT									
Aluminum		D	47900	D	10200	ug/L	6.53	(0%-10%)		12/01/15	21:23
Arsenic		D	14.1	D	3.03	ug/L	6.93	(0%-10%)		11/30/15	16:12
Barium		D	495	D	102	ug/L	2.98	(0%-10%)			
Beryllium		CD	1.70	D	0.412	ug/L	21.5	(0%-10%)			

**DECEMBER 04, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: **386080**

Page 4 of 6

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch	1525202										
Cadmium	BCD	0.374	DU	ND	ug/L	N/A		(0%-10%)			
Chromium	D	61.4	D	12.9	ug/L	5.33		(0%-10%)	PRB	11/30/15	16:12
Cobalt	D	42.5	D	9.04	ug/L	6.29		(0%-10%)			
Copper	DM	66.3	DM	14.8	ug/L	11.9*		(0%-10%)			
Lead	D	23.9	D	5.27	ug/L	10.5		(0%-10%)		12/02/15	18:31
Manganese	D	175	D	33.3	ug/L	5.19		(0%-10%)		12/01/15	21:51
Molybdenum	D	2.56	D	0.583	ug/L	13.7		(0%-10%)		12/02/15	18:31
Nickel	DM	54.9	DM	12.4	ug/L	12.8*		(0%-10%)		11/30/15	16:12
Selenium	BDN	3.51	DU	ND	ug/L	N/A		(0%-10%)		12/01/15	21:23
Uranium	D	3.14	D	0.673	ug/L	7.13		(0%-10%)		12/02/15	18:31
<b>Metals Analysis-ICP</b>											
Batch	1525211										
QC1203438321	386080004	DUP									
Antimony		1460		1430	ug/kg	2.18 ^		(+/-995)	HSC	11/24/15	18:45
Silver	U	ND	U	ND	ug/kg	N/A					
QC1203438320	LCS										
Antimony		48800		48300	ug/kg		98.9	(80%-120%)		11/24/15	18:32
Silver		48800		49100	ug/kg		101	(80%-120%)			
QC1203438319	MB										
Antimony			U	ND	ug/kg					11/24/15	18:29
Silver			U	ND	ug/kg						
QC1203438322	386080004	MS									
Antimony		48700		47100	ug/kg		93.7	(75%-125%)		11/24/15	18:48
Silver		48700	U	ND	48700	ug/kg		100	(75%-125%)		
QC1203438323	386080004	SDILT									
Antimony		14.1	DU	ND	ug/L	N/A		(0%-10%)		11/24/15	18:52

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**QC Summary**

Workorder: **386080**

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1525211										
Silver	U	ND DU		ND	ug/L	N/A		(0%-10%)			
<b>Metals Analysis-Mercury</b>											
Batch	1525661										
QC1203439383	386080004	DUP									
Mercury	U	ND B		3.95	ug/kg	38.5		(+/-11.8)	MTM1	11/24/15	11:46
QC1203439382	LCS										
Mercury	106			109	ug/kg		102	(80%-120%)		11/24/15	11:38
QC1203439381	MB										
Mercury		U		ND	ug/kg					11/24/15	11:36
QC1203439384	386080004	MS									
Mercury	125	U	ND	134	ug/kg		105	(80%-120%)		11/24/15	11:48
QC1203439385	386080004	SDILT									
Mercury	U	ND DU		ND	ug/L	N/A		(0%-10%)		11/24/15	11:49

**Notes:**

The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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**QC Summary**

Workorder: 386080

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<b>Parmname</b>	<b>NOM</b>	<b>Sample Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD/D%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
-----------------	------------	--------------------	-----------	--------------	---------------	-------------	--------------	--------------	-------------	-------------

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.

# Miscellaneous

DATA EXCEPTION REPORT			
<b>Mo.Day Yr.</b> 03-DEC-15	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ICP/MS	<b>Test / Method:</b> SW846 3050B/6020A	<b>Matrix Type:</b> Solid	<b>Client Code:</b> CPRC
<b>Batch ID:</b> 1525202	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 386080(GEL386080)</b>			
<b>Application Issues:</b> Failed Recovery for MS/MSD, or PS/PSD Failed Recovery for PS/PSD Failed difference for SDILT			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
1. Failed Recovery for MS/MSD, or PS/PSD: QC 1203438302MS  2. Failed Recovery for PS/PSD: QC 1203443195PS  3. Failed difference for SDILT: QC 1203438303SDILT		1. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike also did not meet the required control limits; thus, confirming matrix interferences and/or sample non-homogeneity. 1203438302 (B33MH6MS) Selenium [73.7* (75%-125%)].  2. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the presence of matrix interferences. 1203443195 (B33MH6PS) Selenium [76.9* (80%-120%)].  3. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified. 1203438303 (B33MH6SDILT) Copper [11.9 *(0%-10%)] and Nickel [12.8 *(0%-10%)].	

**Originator's Name:**  
Paul Boyd                      03-DEC-15

**Data Validator/Group Leader:**  
Bryan Davis                      03-DEC-15

# General Chem Analysis

# Case Narrative

General Chemistry  
Technical Case Narrative  
CH2MHill Plateau Remediation Company (CPRC)  
SDG #: GEL386080  
Work Order #: 386080

**Method/Analysis Information**

**Product:** Cyanide and Total  
**Analytical Batch:** 1525252      **Method:** 9010\_CYANIDE: COMMON  
**Prep Batch :** 1525251      **Method:** SW846 9010C Distillation

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 9012B:

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438383	Method Blank (MB)
1203438384	Laboratory Control Sample (LCS)
1203438386	386080004(B33MH6) Sample Duplicate (DUP)
1203438388	386080004(B33MH6) Matrix Spike (MS)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-GC-E-095 REV# 17.

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information**

The Flow Injection analysis was performed on a Lachat QuickChem FIA+ 8000 Series.

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Y Intercept Rule**

The absolute value of the intercept is less than 3 times the MDL.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 386080004 (B33MH6) was selected for QC analysis.

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits where applicable.

**Duplicate Relative Percent Difference (RPD) Statement**

The RPD between the sample and its duplicate met the acceptance limits.

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The following sample was diluted because target analyte concentrations exceeded the calibration range. 1203438384 (LCS).

**Sample Re-analysis**

Sample1203438384 (LCS) was re-analyzed to verify the result.

**Miscellaneous Information**

**Data Exception (DER) Documentation**

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

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Method/Analysis Information**

<b>Product:</b>	<b>Ion Chromatography</b>		
<b>Analytical Batch:</b>	1525280	<b>Method:</b>	9056_ANIONS_IC:COMMON + (Add-on)
<b>Prep Batch :</b>	1525279	<b>Method:</b>	SW846 9056A

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

<b>Sample ID</b>	<b>Client ID</b>
386080001	B33MH7
386080002	B33MJ0
386080003	B33MJ2
1203438465	Method Blank (MB)
1203438466	Laboratory Control Sample (LCS)
1203438467	385927001(B33MD8) Sample Duplicate (DUP)
1203438468	385927001(B33MD8) Matrix Spike (MS)

Samples 386080 001, 002 and 003 in this SDG were analyzed on a "dry weight corrected" 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-GC-E-086 REV# 24.

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information**

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

**Initial Calibration**

All initial calibration requirements have been met for this SDG.

**Continuing Calibration Blanks**

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

**Calibration Verification Information (CCV)**

All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

**Y Intercept Rule**

The absolute value of the intercept is less than 3 times the MDL.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

Sample 385927001 (B33MD8) was selected for QC analysis.

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits where applicable.

**Duplicate Relative Percent Difference (RPD) Statement**

The RPD between the sample and its duplicate met the acceptance limits.

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

The samples in this SDG did not require re-analysis.

**Miscellaneous Information**

**Data Exception (DER) Documentation**

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

**Manual Integrations**

Samples 1203438467 (B33MD8DUP), 1203438468 (B33MD8MS), 386080001 (B33MH7), 386080002 (B33MJ0) and 386080003 (B33MJ2) were manually integrated to correctly position the baseline as set in the calibration standards.

**Additional Comments**

Additional comments were not required for this SDG.

**Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an

effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**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.

DECEMBER 04, 2015

**GEL LABORATORIES LLC**

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**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL386080 GEL Work Order: 386080

**The Qualifiers in this report are defined as follows:**

B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

D Results are reported from a diluted aliquot of sample.

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

**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:** 

**Name:** Thomas Lewis

**Date:** 02 DEC 2015

**Title:** Data Validator

# Sample Data Summary

## Certificate of Analysis

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F15-011

Client Sample ID: B33MH7	Project: CPRC0F15011
Sample ID: 386080001	Client ID: CPRC001
Matrix: SOIL	
Collect Date: 19-NOV-15 10:15	
Receive Date: 20-NOV-15	
Collector: Client	
Moisture: 4.18%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Ion Chromatography</b>											
<b>9056_ANIONS_IC:COMMON + (Add-on) "Dry Weight Corrected"</b>											
Chloride		3150	691	2060	ug/Kg	1	MXL2	11/23/15	2046	1525280	1
Fluoride		1600	340	1030	ug/Kg	1					
Nitrate-N		2490	340	1030	ug/Kg	1					
Nitrite-N	U	340	340	1030	ug/Kg	1					
Phosphorus in phosphate	B	692	691	2060	ug/Kg	1					
Sulfate		16900	1370	4120	ug/Kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/23/15	0935	1525279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	

**Notes:**

## Certificate of Analysis

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F15-011

Client Sample ID: B33MJ0	Project: CPRC0F15011
Sample ID: 386080002	Client ID: CPRC001
Matrix: SOIL	
Collect Date: 19-NOV-15 10:35	
Receive Date: 20-NOV-15	
Collector: Client	
Moisture: 4.81%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Ion Chromatography</b>											
<b>9056_ANIONS_IC:COMMON + (Add-on) "Dry Weight Corrected"</b>											
Chloride	B	1300	699	2090	ug/Kg	1	MXL2	11/23/15	2119	1525280	1
Fluoride		1890	344	1040	ug/Kg	1					
Nitrate-N		3280	344	1040	ug/Kg	1					
Nitrite-N	U	344	344	1040	ug/Kg	1					
Phosphorus in phosphate	U	699	699	2090	ug/Kg	1					
Sulfate		4870	1390	4170	ug/Kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/23/15	0935	1525279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	

**Notes:**

## Certificate of Analysis

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
 Address : MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
 Contact: Mr. Scot Fitzgerald  
 Project: CHPRC SAF F15-011

Client Sample ID: B33MJ2	Project: CPRC0F15011
Sample ID: 386080003	Client ID: CPRC001
Matrix: SOIL	
Collect Date: 19-NOV-15 09:52	
Receive Date: 20-NOV-15	
Collector: Client	
Moisture: .792%	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Ion Chromatography</b>											
<b>9056_ANIONS_IC:COMMON + (Add-on) "Dry Weight Corrected"</b>											
Chloride	B	1640	669	2000	ug/Kg	1	MXL2	11/23/15	2152	1525280	1
Fluoride	U	329	329	998	ug/Kg	1					
Nitrate-N	U	329	329	998	ug/Kg	1					
Nitrite-N	U	329	329	998	ug/Kg	1					
Phosphorus in phosphate	U	669	669	2000	ug/Kg	1					
Sulfate	B	1960	1330	3990	ug/Kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/23/15	0935	1525279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	

**Notes:**

**Certificate of Analysis**

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
Address : MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Project: CHPRC SAF F15-011

Client Sample ID: B33MH6 Project: CPRC0F15011  
Sample ID: 386080004 Client ID: CPRC001  
Matrix: SOIL  
Collect Date: 19-NOV-15 10:15  
Receive Date: 20-NOV-15  
Collector: Client  
Moisture: 4.66%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis											
9010_CYANIDE: COMMON "Dry Weight Corrected"											
Cyanide, Total	U	65.4	65.4	196	ug/kg	1	AXH3	12/01/15	1055	1525252	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	12/01/15	0856	1525251

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9012B	

Notes:

**Certificate of Analysis**

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
Address : MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Project: CHPRC SAF F15-011

Client Sample ID: B33MH9 Project: CPRC0F15011  
Sample ID: 386080005 Client ID: CPRC001  
Matrix: SOIL  
Collect Date: 19-NOV-15 10:35  
Receive Date: 20-NOV-15  
Collector: Client  
Moisture: 5.33%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis											
9010_CYANIDE: COMMON "Dry Weight Corrected"											
Cyanide, Total	U	84.8	84.8	254	ug/kg	1	AXH3	12/01/15	1058	1525252	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	12/01/15	0856	1525251

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9012B	

Notes:

**Certificate of Analysis**

Report Date: December 2, 2015

Company : CH2MHill Plateau Remediation Company  
Address : MSIN R3-50 CHPRC  
PO Box 1600  
Richland, Washington 99352  
Contact: Mr. Scot Fitzgerald  
Project: CHPRC SAF F15-011

Client Sample ID: B33MJ1 Project: CPRC0F15011  
Sample ID: 386080006 Client ID: CPRC001  
Matrix: SOIL  
Collect Date: 19-NOV-15 09:52  
Receive Date: 20-NOV-15  
Collector: Client  
Moisture: <0.1%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis											
9010_CYANIDE: COMMON "Dry Weight Corrected"											
Cyanide, Total	U	75.9	75.9	227	ug/kg	1	AXH3	12/01/15	1100	1525252	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010C Distillation	SW846 9010C Prep	AXH3	12/01/15	0856	1525251

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9012B	

Notes:

# Quality Control Summary

**DECEMBER 04, 2015**  
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**QC Summary**

Report Date: December 2, 2015

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**CH2MHill Plateau Remediation Company**

**MSIN R3-50 CHPRC**

**PO Box 1600**

**Richland, Washington**

**Contact: Mr. Scot Fitzgerald**

**Workorder: 386080**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Flow Injection Analysis</b>											
Batch	1525252										
QC1203438386	386080004	DUP									
Cyanide, Total		U	65.4	U	85.9	ug/kg	N/A		AXH3	12/01/15	10:56
QC1203438384	LCS										
Cyanide, Total	90600			D	71900	ug/kg	79.4	(64%-149%)		12/01/15	10:59
QC1203438383	MB										
Cyanide, Total				U	83.5	ug/kg				12/01/15	10:53
QC1203438388	386080004	MS									
Cyanide, Total	4950	U	65.4		5100	ug/kg	103	(47%-133%)		12/01/15	10:57
<b>Ion Chromatography</b>											
Batch	1525280										
QC1203438467	385927001	DUP									
Chloride			6480		6550	ug/Kg	1.16 ^	(+/-2080)	MXL2	11/23/15	19:40
Fluoride			1310		1310	ug/Kg	0.705 ^	(+/-1040)			
Nitrate-N			2440		2450	ug/Kg	0.504 ^	(+/-1040)			
Nitrite-N		U	343	U	344	ug/Kg	N/A				
Phosphorus in phosphate		U	696	U	698	ug/Kg	N/A				
Sulfate			22000		21700	ug/Kg	1.26	(0%-30%)			
QC1203438466	LCS										
Chloride	50000				48100	ug/Kg	96.2	(70%-130%)		11/23/15	18:34
Fluoride	25000				24800	ug/Kg	99.3	(70%-130%)			
Nitrate-N	25000				24500	ug/Kg	98.2	(70%-130%)			
Nitrite-N	25000				24500	ug/Kg	98.1	(70%-130%)			
Phosphorus in phosphate	12500				13900	ug/Kg	111	(70%-130%)			
Sulfate	100000				99200	ug/Kg	99.2	(70%-130%)			
QC1203438465	MB										

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**QC Summary**

Workorder: **386080**

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Ion Chromatography</b>											
Batch	1525280										
Chloride			U	668	ug/Kg					11/23/15	18:01
Fluoride			U	329	ug/Kg				MXL2		
Nitrate-N			U	329	ug/Kg						
Nitrite-N			U	329	ug/Kg						
Phosphorus in phosphate			U	668	ug/Kg						
Sulfate			U	1330	ug/Kg						
QC1203438468 385927001 MS											
Chloride	52100	6480		55600	ug/Kg		94.4	(48%-145%)		11/23/15	20:13
Fluoride	26000	1310		25700	ug/Kg		93.6	(30%-135%)			
Nitrate-N	26000	2440		27300	ug/Kg		95.3	(70%-125%)			
Nitrite-N	26000	U 343		25500	ug/Kg		98	(70%-120%)			
Phosphorus in phosphate	13000	U 696		10600	ug/Kg		77.9	(35%-134%)			
Sulfate	104000	22000		124000	ug/Kg		97.8	(45%-162%)			

**Notes:**

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- N Spike Sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

**DECEMBER 04, 2015**  
**GEL LABORATORIES LLC**

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

**QC Summary**

Workorder: 386080

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<b>Parmname</b>	<b>NOM</b>	<b>Sample</b>	<b>Qual</b>	<b>QC</b>	<b>Units</b>	<b>RPD%</b>	<b>REC%</b>	<b>Range</b>	<b>Anlst</b>	<b>Date</b>	<b>Time</b>
-----------------	------------	---------------	-------------	-----------	--------------	-------------	-------------	--------------	--------------	-------------	-------------

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.

# Radiological Analysis

DECEMBER 04, 2015

Radiochemistry

Technical Case Narrative

CH2MHill Plateau Remediation Company (CPRC)

SDG #: GEL386080

Work Order #: 386080

**Method/Analysis Information**

**Product:** NP237\_IE\_PRECIP\_AEA: COMMON

Analytical Method: ASTM C 1476-00 Modified

Prep Method: Dry Soil Prep

Analytical Batch Number: 1525726

Prep Batch Number: 1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203439555	Method Blank (MB)
1203439557	Laboratory Control Sample (LCS)
1203439556	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-032 REV# 20.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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.

**Manual Integration**

No manual integrations were performed on data in this batch.

**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**

<b>Product:</b>	<b>PUISO_PRECIP_AEA:COMMON</b>
Analytical Method:	PUISO_PLATE_AEA
Prep Method:	Dry Soil Prep
Analytical Batch Number:	1525729
Prep Batch Number:	1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9

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386080006	B33MJ1
1203439558	Method Blank (MB)
1203439560	Laboratory Control Sample (LCS)
1203439559	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-011 REV# 25.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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.

**Manual Integration**

No manual integrations were performed on data in this batch.

**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:** UISO\_IE\_PRECIP\_AEA:COMMON  
Analytical Method: UISO\_IE\_PRECIP\_AEA  
Prep Method: Dry Soil Prep  
Analytical Batch Number: 1525730  
Prep Batch Number: 1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203439561	Method Blank (MB)
1203439563	Laboratory Control Sample (LCS)
1203439562	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-011 REV# 25.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

Sample 386080004 (B33MH6) was recounted due to a suspected false U-235/236 positive. The recount is 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.

**Manual Integration**

Manual integrations of alpha spectroscopy spectra 1203439562 (B33MH6DUP) and 386080005 (B33MH9) were performed to fully separate counts in Regions of Interest which would have been biased.

**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**

<b>Product:</b>	<b>AMCMISO_EIE_PRECIP_AEA: COMMON</b>
Analytical Method:	AMCMISO_EIE_PREC_AEA
Prep Method:	Dry Soil Prep
Analytical Batch Number:	1527133

Prep Batch Number: 1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203443231	Method Blank (MB)
1203443233	Laboratory Control Sample (LCS)
1203443232	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-011 REV# 25.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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 reprepared due to low carrier/tracer yield. The re-analysis is being reported.

**Recounts**

None of the samples in this sample set were recounted.

**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.

**Manual Integration**

No manual integrations were performed on data in this batch.

**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**

<b>Product:</b>	<b>Dry Weight-Percent Moisture</b>
Analytical Method:	Dry Soil Prep
Analytical Batch Number:	1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438361	386080005(B33MH9) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 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-OA-E-020 REV# 10 and GL-RAD-A-021 REV# 20.

**Calibration Information:**

**Quality Control (QC) Information:**

**Designated QC**

The following sample was used for QC: 386080005 (B33MH9).

**Technical Information:**

**Holding Time**

DECEMBER 04, 2015

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

**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.

**Additional Comments**

Sample 386080006 is a silica sand trip blank and was prepped without sieving. 386080006 (B33MJ1).

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

<b>Procedure:</b>	<b>Dry Weight-Percent Moisture</b>
Analytical Method:	ASTM D 2216 (Modified)
Analytical Batch Number:	1525262

<b>Sample ID</b>	<b>Client ID</b>
386080001	B33MH7
386080002	B33MJ0
386080003	B33MJ2
1203438425	386080001(B33MH7) Sample Duplicate (DUP)

Samples 386080 001, 002 and 003 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-OA-E-020 REV# 10.

**Calibration Information:**

**Quality Control (QC) Information:**

**Designated QC**

The following sample was used for QC: 386080001 (B33MH7).

**Technical Information:**

**Holding Time**

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

**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.

**Additional Comments**

Additional comments were not required for this sample set.

**Qualifier Information**

Manual qualifiers were not required.

**Method/Analysis Information**

**Product:** GAMMA\_GS:COMMON

Analytical Method: GAMMA\_GS

Prep Method: Dry Soil Prep

Analytical Batch Number: 1525537

Prep Batch Number: 1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203439034	Method Blank (MB)
1203439036	Laboratory Control Sample (LCS)
1203439035	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-013 REV# 25.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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**

Qualifier	Reason	Analyte	Sample	Client Sample
X	Data rejected due to high counting uncertainty.	Cesium-137	386080005	B33MH9

**Method/Analysis Information**

**Product:** SRTOT\_SEP\_PRECIP\_GPC: COMMON

Analytical Method: SRTOT\_SEP\_PRECIP\_GPC  
Prep Method: Dry Soil Prep  
Analytical Batch Number: 1525650  
Prep Batch Number: 1525235

Sample ID	Client ID
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203439345	Method Blank (MB)
1203439347	Laboratory Control Sample (LCS)
1203439346	386080006(B33MJ1) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-004 REV# 17.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080006 (B33MJ1).

**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.

**Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

**Recounts**

Sample 386080004 (B33MH6) was recounted due to results more negative than the three sigma TPU. The second count is 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.

**Manual Integration**

No manual integrations were performed on data in this batch.

**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**

<b>Product:</b>	<b>NI63_LSC: COMMON</b>
Analytical Method:	NI63_LSC
Prep Method:	Dry Soil Prep
Analytical Batch Number:	1525463
Prep Batch Number:	1525235

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438850	Method Blank (MB)
1203438852	Laboratory Control Sample (LCS)
1203438851	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 in this SDG were analyzed on a "dry weight corrected" 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-022 REV# 17.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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:** TC99\_EIE\_LSC: COMMON  
Analytical Method: TC99\_EIE\_LSC  
Analytical Batch Number: 1525464

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438853	Method Blank (MB)
1203438855	Laboratory Control Sample (LCS)
1203438854	386080004(B33MH6) Sample Duplicate (DUP)

Samples 386080 004, 005 and 006 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-059 REV# 3.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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 1203438853 (MB), 1203438855 (LCS), 386080004 (B33MH6), 386080005 (B33MH9) and 386080006 (B33MJ1) were recounted due to a suspected blank false positive. The recounts are reported. Sample 1203438854 (B33MH6DUP) was recounted due to a suspected blank false positive and then recounted due to results more negative than the three sigma TPU. The third count is 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:** TRITIUM\_DIST\_LSC: COMMON  
**Analytical Method:** TRITIUM\_DIST\_LSC  
**Analytical Batch Number:** 1525465

<b>Sample ID</b>	<b>Client ID</b>
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438856	Method Blank (MB)
1203438859	Laboratory Control Sample (LCS)
1203438857	386080004(B33MH6) Sample Duplicate (DUP)
1203438858	386080004(B33MH6) Matrix Spike (MS)

Samples 386080 004, 005 and 006 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-002 REV# 21.

**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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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**

DECEMBER 04, 2015

Product: C14\_LSC: COMMON

Analytical Method: C14\_LSC

Analytical Batch Number: 1525466

Sample ID	Client ID
386080004	B33MH6
386080005	B33MH9
386080006	B33MJ1
1203438860	Method Blank (MB)
1203438863	Laboratory Control Sample (LCS)
1203438861	386080004(B33MH6) Sample Duplicate (DUP)
1203438862	386080004(B33MH6) Matrix Spike (MS)

Samples 386080 004, 005 and 006 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.

**QC Information**

All of the QC samples met the required acceptance limits.

**Designated QC**

The following sample was used for QC: 386080004 (B33MH6).

**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**

None of the samples in this sample set were recounted.

**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.

**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.

DECEMBER 04, 2015

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL386080 GEL Work Order: 386080

**The Qualifiers in this report are defined as follows:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

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

**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: 

Name: Heather McCarty

Date: 03 DEC 2015

Title: Analyst II

# Sample Data Summary

DECEMBER 04, 2015

**Certificate of Analysis**

**Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080001

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.2

DECEMBER 04, 2015

**Certificate of Analysis**

**Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080002

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.8

DECEMBER 04, 2015

**Certificate of Analysis**

**Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080003

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: .8

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

Client ID: B33MH6  
Batch ID: 1525726  
Run Date: 11/25/2015 13:49  
Data File: S0386080004\_NP.1A.gcnf  
Prep Batch: 1525726  
Prep Date: 11/24/2015 00:00

Method: ASTM C 1476-00 Modified  
Analyst: MXS2  
Aliquot: 0.106 g  
Prep Method: ASTM C 1476-00 Modified

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-032  
Instrument: 1169  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	-0.0396	pCi/g	+/-0.175	0.175	0.457	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1530	1900	pCi/g	81	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

Client ID: B33MH6  
Batch ID: 1525729  
Run Date: 11/27/2015 09:42  
Data File: S0386080004\_PU.1A.gcnf  
Prep Batch: 1525729  
Prep Date: 11/24/2015 00:00

Method: PUIISO\_PLATE\_AEA  
Analyst: MXS2  
Aliquot: 0.104 g  
Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1100  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.120	pCi/g	+/-0.315	0.316	0.567	1.00
OER-100-70	Plutonium-239/240	U	0.0399	pCi/g	+/-0.221	0.222	0.425	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	14.4	18.9	pCi/g	76	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

Client ID: B33MH6  
Batch ID: 1525730  
Run Date: 11/30/2015 14:40  
Data File: S0386080004\_UU.2A.gcnf  
Prep Batch: 1525730  
Prep Date: 11/24/2015 00:00

Method: UIISO\_IE\_PRECIP\_AEA  
Analyst: MXS2  
Aliquot: 0.104 g  
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1154  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		0.998	pCi/g	+/-0.575	0.598	0.459	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.0706	pCi/g	+/-0.265	0.265	0.445	1.00
7440-61-1	Uranium-238	U	0.322	pCi/g	+/-0.368	0.371	0.459	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	18.6	20.3	pCi/g	91.3	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080004	<b>Date Collected:</b> 11/19/2015 10:15	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 4.7
<b>Client ID:</b> B33MH6	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1527133	<b>Analyst:</b> MXS2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 11/30/2015 22:21	<b>Aliquot:</b> 0.105 g	<b>Instrument:</b> 1223
<b>Data File:</b> S0386080004_AM.2A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1527133		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 11/30/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	-0.0194	pCi/g	+/-0.167	0.168	0.388	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	17.7	20.4	pCi/g	87	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

Client ID: B33MH6  
Batch ID: 1525650  
Run Date: 12/01/2015 12:18  
Data File: S1525650r1.xls  
Prep Batch: 1525650  
Prep Date: 11/30/2015 00:00

Method: SRTOT\_SEP\_PRECIP\_GPC  
Analyst: KSD1  
Aliquot: 0.332 g  
Prep Method: EPA 905.0 Modified/DOE RP5

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-004  
Instrument: PIC1A  
Count Time: 60 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	-0.06	pCi/g	+/-0.734	0.734	1.42	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.40	9.34	mg	79.2	(25%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
 Lab Sample ID: 386080004  
  
 Client ID: B33MH6  
 Batch ID: 1525537  
 Run Date: 11/25/2015 08:53  
 Data File: G386080004.CNF;1  
 Prep Batch: 1525537  
 Prep Date: 11/24/2015 00:00

Client: CPRC001  
 Date Collected: 11/19/2015 10:15  
 Date Received: 11/20/2015 08:50  
  
 Method: GAMMA\_GS  
 Analyst: RXF2  
 Aliquot: 145.579 g  
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F15011  
 Matrix: SOIL  
 %Moisture: 4.7  
  
 Prep Basis: "Dry Weight Corrected"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM30  
 Count Time: 120 min  
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137		0.118	pCi/g	+/-0.0429	0.0439	0.033	0.100
10198-40-0	Cobalt-60	U	0.00985	pCi/g	+/-0.0268	0.0272	0.0515	
14683-23-9	Europium-152	U	0.0684	pCi/g	+/-0.0633	0.0707	0.117	
15585-10-1	Europium-154	U	-0.00319	pCi/g	+/-0.0953	0.0953	0.156	
14391-16-3	Europium-155	U	0.000178	pCi/g	+/-0.0689	0.0689	0.127	

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

Client ID: B33MH6  
Batch ID: 1525463  
Run Date: 12/02/2015 16:49  
Data File: N1525463.xls  
Prep Batch: 1525463  
Prep Date: 12/01/2015 00:00

Method: NI63\_LSC  
Analyst: TYJ1  
Aliquot: 0.224 g  
Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-022  
Instrument: LSCGOLD  
Count Time: 15 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	5.59	pCi/g	+/-11.0	11.1	18.9	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	19.9	24.4	mg	81.5	(25%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080004	<b>Date Collected:</b> 11/19/2015 10:15	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 4.7
<b>Client ID:</b> B33MH6		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525464	<b>Method:</b> TC99_EIE_LSC	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 11/30/2015 07:53	<b>Analyst:</b> MYM1	<b>Instrument:</b> LSCRED
<b>Data File:</b> E1525464R2.xls	<b>Aliquot:</b> 0.361 g	<b>Count Time:</b> 25 min
<b>Prep Batch:</b> 1525464	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	
<b>Prep Date:</b> 11/24/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-2.95	pCi/g	+/-5.50	5.50	9.67	15.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	45500	47300	CPM	96.3	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080004	<b>Date Collected:</b> 11/19/2015 10:15	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 4.7
<b>Client ID:</b> B33MH6		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525465	<b>Method:</b> TRITIUM_DIST_LSC	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 11/27/2015 07:13	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> T1525465.xls	<b>Aliquot:</b> 1.25 g	<b>Count Time:</b> 15 min
<b>Prep Batch:</b> 1525465	<b>Prep Method:</b> EPA 906.0 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	6.78	pCi/g	+/-11.2	11.3	19.3	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080004	<b>Date Collected:</b> 11/19/2015 10:15	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 4.7
<b>Client ID:</b> B33MH6		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525466	<b>Method:</b> C14_LSC	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 11/27/2015 10:42	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> C1525466.xls	<b>Aliquot:</b> 0.52 g	<b>Count Time:</b> 45 min
<b>Prep Batch:</b> 1525466	<b>Prep Method:</b> EPA EERF C-01 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	0.797	pCi/g	+/-1.98	1.98	3.37	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis**

**Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080004

Client: CPRC001  
Date Collected: 11/19/2015 10:15  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 4.7

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

Client ID: B33MH9  
Batch ID: 1525726  
Run Date: 11/25/2015 13:49  
Data File: S0386080005\_NP.1A.gcnf  
Prep Batch: 1525726  
Prep Date: 11/24/2015 00:00

Method: ASTM C 1476-00 Modified  
Analyst: MXS2  
Aliquot: 0.117 g  
Prep Method: ASTM C 1476-00 Modified

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-032  
Instrument: 1170  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	0.0247	pCi/g	+/-0.292	0.292	0.615	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1530	1720	pCi/g	89.2	(15%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

Client ID: B33MH9  
Batch ID: 1525729  
Run Date: 11/28/2015 11:30  
Data File: S0386080005\_PU.1A.gcnf  
Prep Batch: 1525729  
Prep Date: 11/24/2015 00:00

Method: PUIISO\_PLATE\_AEA  
Analyst: MXS2  
Aliquot: 0.108 g  
Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1065  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	-0.0185	pCi/g	+/-0.159	0.160	0.369	1.00
OER-100-70	Plutonium-239/240	U	-0.0555	pCi/g	+/-0.167	0.168	0.470	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	14.8	18.2	pCi/g	81.3	(15%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

Client ID: B33MH9  
Batch ID: 1525730  
Run Date: 11/27/2015 09:42  
Data File: S0386080005\_UU.1A  
Prep Batch: 1525730  
Prep Date: 11/24/2015 00:00

Method: UIISO\_IE\_PRECIP\_AEA  
Analyst: MXS2  
Aliquot: 0.108 g  
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1005  
Count Time: 239.9998 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234		1.01	pCi/g	+/-0.495	0.519	0.319	1.00
15117-96-1/13982-7	Uranium-235/236	U	-0.0513	pCi/g	+/-0.155	0.155	0.436	1.00
7440-61-1	Uranium-238		0.837	pCi/g	+/-0.455	0.473	0.319	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	17.9	19.6	pCi/g	91.2	(15%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080005	<b>Date Collected:</b> 11/19/2015 10:35	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 5.3
<b>Client ID:</b> B33MH9	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1527133	<b>Analyst:</b> MXS2	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 11/30/2015 22:21	<b>Aliquot:</b> 0.113 g	<b>Instrument:</b> 1225
<b>Data File:</b> S0386080005_AM.2A.gcnf	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1527133		<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 11/30/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0245	pCi/g	+/-0.256	0.256	0.535	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	13.8	18.9	pCi/g	73.1	(15%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

Client ID: B33MH9  
Batch ID: 1525650  
Run Date: 11/30/2015 17:11  
Data File: S1525650r1.xls  
Prep Batch: 1525650  
Prep Date: 11/30/2015 00:00

Method: SRTOT\_SEP\_PRECIP\_GPC  
Analyst: KSD1  
Aliquot: 0.344 g  
Prep Method: EPA 905.0 Modified/DOE RP5

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-004  
Instrument: PIC8A  
Count Time: 60 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	-0.876	pCi/g	+/-0.915	0.915	1.93	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.60	9.34	mg	81.4	(25%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
 Lab Sample ID: 386080005  
  
 Client ID: B33MH9  
 Batch ID: 1525537  
 Run Date: 11/25/2015 11:36  
 Data File: G386080005.CNF;1  
 Prep Batch: 1525537  
 Prep Date: 11/24/2015 00:00

Client: CPRC001  
 Date Collected: 11/19/2015 10:35  
 Date Received: 11/20/2015 08:50  
  
 Method: GAMMA\_GS  
 Analyst: RXF2  
 Aliquot: 148.343 g  
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F15011  
 Matrix: SOIL  
 %Moisture: 5.3  
  
 Prep Basis: "Dry Weight Corrected"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM16  
 Count Time: 60 min  
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	UX	0.00	pCi/g	+/-0.0869	0.0871	0.0594	0.100
10198-40-0	Cobalt-60	U	0.014	pCi/g	+/-0.0362	0.0368	0.0762	
14683-23-9	Europium-152	U	0.00195	pCi/g	+/-0.0994	0.0994	0.182	
15585-10-1	Europium-154	U	0.00744	pCi/g	+/-0.108	0.108	0.214	
14391-16-3	Europium-155	U	0.0502	pCi/g	+/-0.109	0.111	0.193	

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

Client ID: B33MH9  
Batch ID: 1525463  
Run Date: 12/02/2015 17:06  
Data File: N1525463.xls  
Prep Batch: 1525463  
Prep Date: 12/01/2015 00:00

Method: NI63\_LSC  
Analyst: TYJ1  
Aliquot: 0.231 g  
Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-022  
Instrument: LSCGOLD  
Count Time: 15 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	7.43	pCi/g	+/-11.6	11.6	19.7	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	18.5	24.4	mg	75.8	(25%-125%)

**Comments:**

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  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080005	<b>Date Collected:</b> 11/19/2015 10:35	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 5.3
<b>Client ID:</b> B33MH9		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525464	<b>Method:</b> TC99_EIE_LSC	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 11/30/2015 08:20	<b>Analyst:</b> MYM1	<b>Instrument:</b> LSCRED
<b>Data File:</b> E1525464R2.xls	<b>Aliquot:</b> 0.338 g	<b>Count Time:</b> 25 min
<b>Prep Batch:</b> 1525464	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	
<b>Prep Date:</b> 11/24/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-3.41	pCi/g	+/-5.97	5.97	10.5	15.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	44700	47300	CPM	94.5	(15%-125%)

**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080005	<b>Date Collected:</b> 11/19/2015 10:35	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 5.3
<b>Client ID:</b> B33MH9		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525465	<b>Method:</b> TRITIUM_DIST_LSC	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 11/27/2015 07:29	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> T1525465.xls	<b>Aliquot:</b> 1.26 g	<b>Count Time:</b> 15 min
<b>Prep Batch:</b> 1525465	<b>Prep Method:</b> EPA 906.0 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	5.70	pCi/g	+/-11.1	11.2	19.4	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080005	<b>Date Collected:</b> 11/19/2015 10:35	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 5.3
<b>Client ID:</b> B33MH9		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525466	<b>Method:</b> C14_LSC	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 11/27/2015 11:28	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> C1525466.xls	<b>Aliquot:</b> 0.5 g	<b>Count Time:</b> 45 min
<b>Prep Batch:</b> 1525466	<b>Prep Method:</b> EPA EERF C-01 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	1.17	pCi/g	+/-2.06	2.06	3.48	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
  - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080005

Client: CPRC001  
Date Collected: 11/19/2015 10:35  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 5.3

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080006	<b>Date Collected:</b> 11/19/2015 09:52	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 0
<b>Client ID:</b> B33MJ1		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1525726	<b>Method:</b> ASTM C 1476-00 Modified	<b>SOP Ref:</b> GL-RAD-A-032
<b>Run Date:</b> 11/25/2015 13:49	<b>Analyst:</b> MXS2	<b>Instrument:</b> 1171
<b>Data File:</b> S0386080006_NP.1A.gcnf	<b>Aliquot:</b> 0.125 g	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1525726	<b>Prep Method:</b> ASTM C 1476-00 Modified	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 11/24/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
13994-20-2	Neptunium-237	U	-0.0167	pCi/g	+/-0.250	0.250	0.584	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	1130	1610	pCi/g	70.6	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080006

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 0

Client ID: B33MJ1  
Batch ID: 1525729  
Run Date: 11/27/2015 09:42  
Data File: S0386080006\_PU.1A.gcnf  
Prep Batch: 1525729  
Prep Date: 11/24/2015 00:00

Method: PUIISO\_PLATE\_AEA  
Analyst: MXS2  
Aliquot: 0.105 g  
Prep Method: DOE EML HASL-300, Pu-11-

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1103  
Count Time: 240 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
I3981-16-3	Plutonium-238	U	0.132	pCi/g	+/-0.227	0.228	0.199	1.00
OER-100-70	Plutonium-239/240	U	-0.0132	pCi/g	+/-0.199	0.199	0.465	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Plutonium-242 Tracer	15.1	18.8	pCi/g	80.7	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080006

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 0

Client ID: B33MJ1  
Batch ID: 1525730  
Run Date: 11/27/2015 09:42  
Data File: S0386080006\_UU.1A.gcnf  
Prep Batch: 1525730  
Prep Date: 11/24/2015 00:00

Method: UIISO\_IE\_PRECIP\_AEA  
Analyst: MXS2  
Aliquot: 0.105 g  
Prep Method: DOE EML HASL-300, U-02-R

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-011  
Instrument: 1008  
Count Time: 239.9998 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
U-233/234 <small>13968-55-3/13966-29-5</small>	Uranium-233/234	U	0.233	pCi/g	+/-0.289	0.291	0.419	1.00
15117-96-1/13982-7	Uranium-235/236	U	0.0508	pCi/g	+/-0.190	0.191	0.320	1.00
7440-61-1	Uranium-238	U	0.244	pCi/g	+/-0.263	0.266	0.299	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Uranium-232 Tracer	20.5	20.1	pCi/g	102	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080006	<b>Date Collected:</b> 11/19/2015 09:52	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 0
<b>Client ID:</b> B33MJ1		<b>Prep Basis:</b> "Dry Weight Corrected"
<b>Batch ID:</b> 1527133	<b>Method:</b> AMCMISO_EIE_PREC_AEA	<b>SOP Ref:</b> GL-RAD-A-011
<b>Run Date:</b> 11/30/2015 22:22	<b>Analyst:</b> MXS2	<b>Instrument:</b> 1227
<b>Data File:</b> S0386080006_AM.3A.gcnf	<b>Aliquot:</b> 0.106 g	<b>Count Time:</b> 240 min
<b>Prep Batch:</b> 1527133	<b>Prep Method:</b> DOE EML HASL-300, Am-05	<b>Prep SOP Ref:</b> GL-RAD-A-021
<b>Prep Date:</b> 11/30/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14596-10-2	Americium-241	U	0.0435	pCi/g	+/-0.242	0.242	0.463	1.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Americium-243 Tracer	16.7	20.2	pCi/g	82.9	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080006

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 0

Client ID: B33MJ1  
Batch ID: 1525650  
Run Date: 11/30/2015 17:11  
Data File: S1525650r1.xls  
Prep Batch: 1525650  
Prep Date: 11/30/2015 00:00

Method: SRTOT\_SEP\_PRECIP\_GPC  
Analyst: KSD1  
Aliquot: 0.342 g  
Prep Method: EPA 905.0 Modified/DOE RP5

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-004  
Instrument: PIC9A  
Count Time: 60 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
SR-RAD	Total Strontium	U	0.318	pCi/g	+/-0.916	0.920	1.66	2.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Strontium Carrier	7.70	9.34	mg	82.4	(25%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
 Lab Sample ID: 386080006  
  
 Client ID: B33MJ1  
 Batch ID: 1525537  
 Run Date: 11/25/2015 11:36  
 Data File: G386080006.CNF;1  
 Prep Batch: 1525537  
 Prep Date: 11/24/2015 00:00

Client: CPRC001  
 Date Collected: 11/19/2015 09:52  
 Date Received: 11/20/2015 08:50  
  
 Method: GAMMA\_GS  
 Analyst: RXF2  
 Aliquot: 170.8 g  
 Prep Method: DOE HASL 300, 4.5.2.3/Ga-01

Project: CPRC0F15011  
 Matrix: SOIL  
 %Moisture: 0  
  
 Prep Basis: "Dry Weight Corrected"  
 SOP Ref: GL-RAD-A-013  
 Instrument: GAM36  
 Count Time: 60 min  
 Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10045-97-3	Cesium-137	U	-0.0222	pCi/g	+/-0.0332	0.0348	0.0568	0.100
10198-40-0	Cobalt-60	U	0.00304	pCi/g	+/-0.0472	0.0472	0.100	
14683-23-9	Europium-152	U	-0.0768	pCi/g	+/-0.0829	0.0901	0.148	
15585-10-1	Europium-154	U	0.0452	pCi/g	+/-0.0941	0.0963	0.234	
14391-16-3	Europium-155	U	0.0415	pCi/g	+/-0.0793	0.0816	0.155	

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080006

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 0

Client ID: B33MJ1  
Batch ID: 1525463  
Run Date: 12/02/2015 17:22  
Data File: N1525463.xls  
Prep Batch: 1525463  
Prep Date: 12/01/2015 00:00

Method: NI63\_LSC  
Analyst: TYJ1  
Aliquot: 0.281 g  
Prep Method: DOE RESL Ni-1, Modified

Prep Basis: "Dry Weight Corrected"  
SOP Ref: GL-RAD-A-022  
Instrument: LSCGOLD  
Count Time: 15 min  
Prep SOP Ref: GL-RAD-A-021

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
NI-63	Nickel-63	U	0.961	pCi/g	+/-9.20	9.20	16.2	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Nickel Carrier	18.6	24.4	mg	76.2	(25%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080006	<b>Date Collected:</b> 11/19/2015 09:52	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 0
<b>Client ID:</b> B33MJ1		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525464	<b>Method:</b> TC99_EIE_LSC	<b>SOP Ref:</b> GL-RAD-A-059
<b>Run Date:</b> 11/30/2015 08:47	<b>Analyst:</b> MYM1	<b>Instrument:</b> LSCRED
<b>Data File:</b> E1525464R2.xls	<b>Aliquot:</b> 0.432 g	<b>Count Time:</b> 25 min
<b>Prep Batch:</b> 1525464	<b>Prep Method:</b> DOE EML HASL-300, Tc-02-	
<b>Prep Date:</b> 11/24/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14133-76-7	Technetium-99	U	-3.48	pCi/g	+/-4.54	4.54	8.05	15.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
Technetium-99m Tracer	45700	47300	CPM	96.7	(15%-125%)

**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080006	<b>Date Collected:</b> 11/19/2015 09:52	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 0
<b>Client ID:</b> B33MJ1		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525465	<b>Method:</b> TRITIUM_DIST_LSC	<b>SOP Ref:</b> GL-RAD-A-002
<b>Run Date:</b> 11/27/2015 07:46	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> T1525465.xls	<b>Aliquot:</b> 1.3 g	<b>Count Time:</b> 15 min
<b>Prep Batch:</b> 1525465	<b>Prep Method:</b> EPA 906.0 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
10028-17-8	Tritium	U	11.1	pCi/g	+/-11.3	11.6	18.8	30.0

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

**DECEMBER 04, 2015**

**Certificate of Analysis  
Sample Summary**

<b>SDG Number:</b> GEL386080	<b>Client:</b> CPRC001	<b>Project:</b> CPRC0F15011
<b>Lab Sample ID:</b> 386080006	<b>Date Collected:</b> 11/19/2015 09:52	<b>Matrix:</b> SOIL
	<b>Date Received:</b> 11/20/2015 08:50	<b>%Moisture:</b> 0
<b>Client ID:</b> B33MJ1		<b>Prep Basis:</b> "As Received"
<b>Batch ID:</b> 1525466	<b>Method:</b> C14_LSC	<b>SOP Ref:</b> GL-RAD-A-003
<b>Run Date:</b> 11/27/2015 12:15	<b>Analyst:</b> TXJ1	<b>Instrument:</b> LSCBROWN
<b>Data File:</b> C1525466.xls	<b>Aliquot:</b> 0.5 g	<b>Count Time:</b> 45 min
<b>Prep Batch:</b> 1525466	<b>Prep Method:</b> EPA EERF C-01 Modified	
<b>Prep Date:</b> 11/25/2015 00:00		

CAS No.	Parmname	Qual	Result	Units	Uncert	TPU	MDC	RDL
14762-75-5	Carbon-14	U	-0.347	pCi/g	+/-2.02	2.02	3.48	5.00

Surrogate/Tracer recovery	Result	Nominal	Units	Recovery%	Acceptable Limits
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**Comments:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.  
 TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

DECEMBER 04, 2015

**Certificate of Analysis  
Sample Summary**

SDG Number: GEL386080  
Lab Sample ID: 386080006

Client: CPRC001  
Date Collected: 11/19/2015 09:52  
Date Received: 11/20/2015 08:50

Project: CPRC0F15011  
Matrix: SOIL  
%Moisture: 0

# Quality Control Data

**QC Summary**

Report Date: December 3, 2015  
 Page 1 of 6

**Client :** CH2MHill Plateau Remediation Company  
 MSIN R3-50 CHPRC  
 PO Box 1600  
 Richland, Washington 99352  
**Contact:** Mr. Scot Fitzgerald  
**Workorder:** 386080

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1525726								
QC1203439555	MB								
Neptunium-237			U	-0.0268	pCi/g			MXS2	11/25/1513:49
				Uncert: +/-0.185					
				TPU: +/-0.185					
**Americium-243 Tracer	1610			1580	pCi/g	REC: 99	(15%-125%)		
QC1203439556	386080004	DUP							
Neptunium-237		U	-0.0396	U	-0.0488				11/25/1513:49
				Uncert: +/-0.175		RPD: 0	N/A		
				TPU: +/-0.175		RER: 0.0645	(0-2)		
**Americium-243 Tracer	1730	1530		1030	pCi/g	REC: 60	(15%-125%)		
QC1203439557	LCS								
Neptunium-237	35.7			36.4	pCi/g	REC: 102	(80%-120%)		11/25/1513:49
				Uncert: +/-2.82					
				TPU: +/-4.86					
**Americium-243 Tracer	1610			1620	pCi/g	REC: 101	(15%-125%)		
Batch	1525729								
QC1203439558	MB								
Plutonium-238			U	0.029	pCi/g			MXS2	11/27/1509:42
				Uncert: +/-0.161					
				TPU: +/-0.161					
Plutonium-239/240			U	0.058	pCi/g				
				Uncert: +/-0.198					
				TPU: +/-0.198					
**Plutonium-242 Tracer	17.1			14.1	pCi/g	REC: 82	(15%-125%)		
				Uncert: +/-1.92					
				TPU: +/-2.88					
QC1203439559	386080004	DUP							
Plutonium-238		U	0.120	U	0.0345				11/27/1509:42
				Uncert: +/-0.315		RPD: 0	N/A		
				TPU: +/-0.316		RER: 0.451	(0-2)		
Plutonium-239/240		U	0.0399	U	0.00265				
				Uncert: +/-0.221		RPD: 0	N/A		
				TPU: +/-0.222		RER: 0.246	(0-2)		
**Plutonium-242 Tracer	17.1	14.4		12.9	pCi/g	REC: 75	(15%-125%)		
				Uncert: +/-2.38					
				TPU: +/-3.53					
QC1203439560	LCS								
Plutonium-238			U	0.324	pCi/g				
				Uncert: +/-0.357					
				TPU: +/-0.360					
Plutonium-239/240	17.2			17.3	pCi/g	REC: 101	(80%-120%)		
				Uncert: +/-2.34					
				TPU: +/-3.46					
**Plutonium-242 Tracer	17.1			10.2	pCi/g	REC: 60	(15%-125%)		

**QC Summary**

Workorder: 386080

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1525729								
				Uncert:					
				TPU:					
Batch	1525730								
QC1203439561	MB								
Uranium-233/234			U	0.428	pCi/g			MXS2	11/27/1509:42
				Uncert:					
				TPU:					
Uranium-235/236			U	0.0376	pCi/g				
				Uncert:					
				TPU:					
Uranium-238			U	0.147	pCi/g				
				Uncert:					
				TPU:					
**Uranium-232 Tracer		18.4		16.7	pCi/g	REC:	91 (15%-125%)		
				Uncert:					
				TPU:					
QC1203439562	386080004	DUP							
Uranium-233/234				0.998	0.669	pCi/g			11/27/1509:42
				Uncert:					
				TPU:					
Uranium-235/236		U	0.0706	U	0.0612	pCi/g			
				Uncert:					
				TPU:					
Uranium-238		U	0.322	0.442	pCi/g				
				Uncert:					
				TPU:					
**Uranium-232 Tracer		18.4	18.6	17.8	pCi/g	REC:	97 (15%-125%)		
				Uncert:					
				TPU:					
QC1203439563	LCS								
Uranium-233/234				20.6	pCi/g				
				Uncert:					
				TPU:					
Uranium-235/236				0.978	pCi/g				
				Uncert:					
				TPU:					
Uranium-238		23.4		23.7	pCi/g	REC:	101 (80%-120%)		
				Uncert:					
				TPU:					
**Uranium-232 Tracer		18.4		17.3	pCi/g	REC:	94 (15%-125%)		
				Uncert:					
				TPU:					
Batch	1527133								
QC1203443231	MB								
Americium-241			U	0.0671	pCi/g			MXS2	11/30/1522:22
				Uncert:					
				TPU:					
**Americium-243 Tracer		18.9		14.1	pCi/g	REC:	74 (15%-125%)		
				Uncert:					
				TPU:					

~~DECEMBER 01, 2015~~  
**GEL LABORATORIES LLC**

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

**QC Summary**

**Workorder: 386080**

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Alpha Spec</b>									
Batch	1527133								
QC1203443232	386080004	DUP							
Americium-241		U	-0.0194	U	-0.0703	pCi/g			11/30/1522:22
		Uncert:	+/-0.167		+/-0.212		RPD: 0	N/A	
		TPU:	+/-0.168		+/-0.213		RER: 0.368	(0-2)	
**Americium-243 Tracer	19.5	17.7	13.2		pCi/g	REC: 68	(15%-125%)		
		Uncert:	+/-2.51		+/-2.69				
		TPU:	+/-3.74		+/-3.97				
QC1203443233	LCS								
Americium-241	17.5				16.3	pCi/g	REC: 93	(80%-120%)	11/30/1522:22
		Uncert:			+/-2.38				
		TPU:			+/-3.38				
**Americium-243 Tracer	18.9				14.0	pCi/g	REC: 74	(15%-125%)	
		Uncert:			+/-2.57				
		TPU:			+/-3.79				
<b>Rad Gamma Spec</b>									
Batch	1525537								
QC1203439034	MB								
Cesium-137				U	0.00566	pCi/g		RXF2	11/25/1511:37
		Uncert:			+/-0.0167				
		TPU:			+/-0.0169				
Cobalt-60				U	0.00751	pCi/g			
		Uncert:			+/-0.0172				
		TPU:			+/-0.0176				
Europium-152				U	-0.0474	pCi/g			
		Uncert:			+/-0.0631				
		TPU:			+/-0.0667				
Europium-154				U	-0.0116	pCi/g			
		Uncert:			+/-0.0617				
		TPU:			+/-0.0619				
Europium-155				U	0.0138	pCi/g			
		Uncert:			+/-0.0579				
		TPU:			+/-0.0583				
QC1203439035	386080004	DUP							
Cesium-137		0.118			0.081	pCi/g			11/25/1511:37
		Uncert:	+/-0.0429		+/-0.0748		RPD: 37	(0% - 100%)	
		TPU:	+/-0.0439		+/-0.0751		RER: 0.827	(0-2)	
Cobalt-60		U	0.00985	U	-0.015	pCi/g			
		Uncert:	+/-0.0268		+/-0.0352		RPD: 0	N/A	
		TPU:	+/-0.0272		+/-0.0358		RER: 1.08	(0-2)	
Europium-152		U	0.0684	U	-0.0566	pCi/g			
		Uncert:	+/-0.0633		+/-0.110		RPD: 0	N/A	
		TPU:	+/-0.0707		+/-0.113		RER: 1.84	(0-2)	
Europium-154		U	-0.00319	U	0.0124	pCi/g			
		Uncert:	+/-0.0953		+/-0.111		RPD: 0	N/A	
		TPU:	+/-0.0953		+/-0.111		RER: 0.209	(0-2)	
Europium-155		U	0.000178	U	-0.0219	pCi/g			
		Uncert:	+/-0.0689		+/-0.0989		RPD: 0	N/A	
		TPU:	+/-0.0689		+/-0.0994		RER: 0.359	(0-2)	
QC1203439036	LCS								
Americium-241	490				550	pCi/g	REC: 112	(80%-120%)	11/25/1512:07

**QC Summary**

**Workorder: 386080**

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Gamma Spec</b>									
Batch	1525537								
				Uncert:					
				TPU:					
Cesium-137	183			179	pCi/g	REC: 98	(80%-120%)		
				Uncert:					
				TPU:					
Cobalt-60	180			170	pCi/g	REC: 95	(80%-120%)		
				Uncert:					
				TPU:					
Europium-152			U	0.407	pCi/g				
				Uncert:					
				TPU:					
Europium-154			U	0.637	pCi/g				
				Uncert:					
				TPU:					
Europium-155			U	-1.71	pCi/g				
				Uncert:					
				TPU:					
<b>Rad Gas Flow</b>									
Batch	1525650								
QC1203439345	MB								
Total Strontium			U	-1.71	pCi/g			KSD1	11/30/1517:11
				Uncert:					
				TPU:					
**Strontium Carrier	9.34			7.90	mg	REC: 85	(25%-125%)		
QC1203439346	386080006	DUP							
Total Strontium		U	0.318	U	-0.865	pCi/g			11/30/1517:11
			Uncert:	+/-0.916	+/-0.846		RPD: 0	N/A	
			TPU:	+/-0.920	+/-0.846		RER: 1.85	(0-2)	
**Strontium Carrier	9.34		7.70		8.20	mg	REC: 88	(25%-125%)	
QC1203439347	LCS								
Total Strontium	62.9				66.4	pCi/g	REC: 106	(80%-120%)	11/30/1517:11
				Uncert:	+/-4.16				
				TPU:	+/-17.3				
**Strontium Carrier	9.34				7.70	mg	REC: 82	(25%-125%)	
<b>Rad Liquid Scintillation</b>									
Batch	1525463								
QC1203438850	MB								
Nickel-63			U	3.22	pCi/g			TYJ1	12/02/1517:38
				Uncert:	+/-9.17				
				TPU:	+/-9.19				
**Nickel Carrier	24.4				19.0	mg	REC: 78	(25%-125%)	
QC1203438851	386080004	DUP							
Nickel-63		U	5.59	U	-3.27	pCi/g			12/02/1517:54
			Uncert:	+/-11.0	+/-12.0		RPD: 0	N/A	
			TPU:	+/-11.1	+/-12.0		RER: 1.07	(0-2)	
**Nickel Carrier	24.4		19.9		19.2	mg	REC: 79	(25%-125%)	
QC1203438852	LCS								
Nickel-63	483				497	pCi/g	REC: 103	(80%-120%)	12/02/1518:10
				Uncert:	+/-24.6				

**QC Summary**

**Workorder: 386080**

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
<b>Rad Liquid Scintillation</b>									
Batch	1525463								
		TPU:		+/-95.2					
**Nickel Carrier	24.4			19.2	mg	REC: 79	(25%-125%)		
Batch	1525464								
QC1203438853	MB								
Technetium-99			U	-3.04	pCi/g			MYM1	11/30/1509:14
		Uncert:		+/-4.64					
		TPU:		+/-4.64					
**Technetium-99m Tracer	47300			45000	CPM	REC: 95	(15%-125%)		
QC1203438854	386080004	DUP							
Technetium-99		U	-2.95	U	0.367				11/30/1512:12
		Uncert:	+/-5.50	+/-6.13		RPD: 0	N/A		
		TPU:	+/-5.50	+/-6.13		RER: 0.789	(0-2)		
**Technetium-99m Tracer	47300			45500	CPM	REC: 96	(15%-125%)		
QC1203438855	LCS								
Technetium-99				187	pCi/g	REC: 94	(80%-120%)		11/30/1510:08
		Uncert:		+/-9.04					
		TPU:		+/-23.5					
**Technetium-99m Tracer	47300			44700	CPM	REC: 94	(15%-125%)		
Batch	1525465								
QC1203438856	MB								
Tritium			U	1.14	pCi/g			TXJ1	11/27/1508:02
		Uncert:		+/-10.4					
		TPU:		+/-10.4					
QC1203438857	386080004	DUP							
Tritium		U	6.78	U	7.74				11/27/1508:19
		Uncert:	+/-11.2	+/-10.9		RPD: 0	N/A		
		TPU:	+/-11.3	+/-11.1		RER: 0.119	(0-2)		
QC1203438858	386080004	MS							
Tritium		94.1	U	6.78	pCi/g	REC: 96	(75%-125%)		11/27/1508:35
		Uncert:	+/-11.2	+/-17.4					
		TPU:	+/-11.3	+/-26.9					
QC1203438859	LCS								
Tritium		92.5		87.6	pCi/g	REC: 95	(80%-120%)		11/27/1508:51
		Uncert:		+/-17.0					
		TPU:		+/-26.2					
Batch	1525466								
QC1203438860	MB								
Carbon-14			U	0.499	pCi/g			TXJ1	11/27/1513:02
		Uncert:		+/-1.93					
		TPU:		+/-1.93					
QC1203438861	386080004	DUP							
Carbon-14		U	0.797	U	0.182				11/27/1513:48
		Uncert:	+/-1.98	+/-1.99		RPD: 0	N/A		
		TPU:	+/-1.98	+/-1.99		RER: 0.429	(0-2)		
QC1203438862	386080004	MS							
Carbon-14		143	U	0.797	pCi/g	REC: 101	(75%-125%)		11/27/1514:35
		Uncert:	+/-1.98	+/-4.23					
		TPU:	+/-1.98	+/-11.4					
QC1203438863	LCS								
Carbon-14		143		142	pCi/g	REC: 100	(80%-120%)		11/27/1515:22

## QC Summary

Workorder: **386080**

Page 6 of 6

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
<b>Rad Liquid Scintillation</b>										
Batch		1525466								
				Uncert:		+/-4.23				
				TPU:		+/-11.3				

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- B The associated QC sample blank has a result  $\geq 2X$  the MDA and, after corrections, result is  $\geq$  MDA for this sample
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is  $\geq$  EQL or is  $> 5\%$  of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- UX Gamma Spectroscopy--Uncertain identification
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency  $< 50\%$  of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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 compound.

^ 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.

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.