GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
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gel.com

August 17, 2016

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

Re: CHPRC SAF S16-007
Work Order: 401832
SDG: GEL401832

Dear Mr. Fitzgerald:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on July 19, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,

Heather Shaffer

Heather Shaffer
Project Manager

Purchase Order: 300072 - 7H
Chain of Custody: S16-007-132, S16-007-135, S16-007-139, S16-007-143, S16-007-144, S16-007-146, S16-007-157 and S16-007-159
Enclosures

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# Case Narrative

**General Narrative**
**for**
**CH2MHill Plateau Remediation Company**
**CHPRC SAF S16-007**
**SDG: GEL401832**

**August 17, 2016**

**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 July 19, 2016, 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:

| Laboratory Identification | Sample Description |
|---|---|
| 401832001 | B35TK1 |
| 401832002 | B35TM1 |
| 401832003 | B35TM3 |
| 401832004 | B35TN9 |
| 401832005 | B35TT4 |
| 401832006 | B35TT2 |
| 401832007 | B35TT3 |
| 401832008 | B35TT5 |
| 401832009 | B35TV8 |
| 401832010 | B35V28 |
| 401832011 | B35V39 |

**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.

**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.

We certify that this package 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.

Heather Shaffer

Heather Shaffer
Project Manager

**Technical Case Narrative**
**CH2MHill Plateau Remediation Company (CPRC)**
**SDG #: GEL401832**
**Work Order #: 401832**

# Metals

**Determination of Metals by ICP**

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

**Calibration Information**

**CRDL/PQL Requirements**
The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium and sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 401832002 (B35TM1) and 401832003 (B35TM3).

**Quality Control (QC) Information**

**Method Blank (MB) Statement**
The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203587805 (MB).

**Determination of Metals by ICP-MS**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**
The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of nickel, zinc, and molybdenum. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203587754 (MB).

**Matrix Spike (MS/MSD) Recovery Statement**
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 recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

| Sample | Analyte | Value |
|---|---|---|
| 1203587757 (B35TM1MSD) | Chromium | 133* (75%-125%) |

**Determination of Metals by ICP-MS**

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

## General Chemistry

**Cyanide, Total**

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

## Radiochemistry

**I129LL_SEP_LEPS_GS: COMMON (low level)**

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

**GAMMA_GS:COMMON**

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

**SRISO_SEP_PRECIP_GPC: COMMON**

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

**Technical Information**

**Recounts**
Sample 401832004 (B35TN9) was recounted due to high MDC. The recount is reported. Samples 1203596848

(MB) and 1203596849 (B35TN9DUP) were recounted due to results more negative than the three sigma TPU. The second counts are reported.

**9310_ALPHABETA_GPC: COMMON**

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

**Technical Information**

**Gross Alpha/Beta Preparation Information**
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**Miscellaneous Information**

**Additional Comments**
The matrix spike and matrix spike duplicate, 1203596853 (B35TL7MS) and 1203596854 (B35TL7MSD), aliquots were reduced to conserve sample volume.

**TC99_EIE_LSC: COMMON**

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

**Technical Information**

**Recounts**
Samples 401832001 (B35TK1), 401832004 (B35TN9) and 401832011 (B35V39) were recounted to verify sample results. Recounts are reported.

**TRITIUM_DIST_LSC: COMMON**

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

**Technical Information**

**Recounts**
Samples 401832002 (B35TM1) and 401832010 (B35V28) were recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

**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.

# Chain of Custody and Supporting Documentation

77 lbs Pg 1 of 2

**CH2MHill Plateau Remediation Company**

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # **S16-007-132**

Page 1 of ~~1~~ 2

| | | | | | |
|---|---|---|---|---|---|
| **Collector** | CHRIS FULTON CHPRC | **Contact/Requester** | Karen Waters-Husted | **Telephone No.** | 509-376-4650 |
| **SAF No.** | S16-007 | **Sampling Origin** | Hanford Site | **Purchase Order/Charge Code** | 300071 |
| **Project Title** | SURV, JULY 2016 | **Logbook No.** | HNF-N-506 85/95 | **Ice Chest No.** | GWS-~~550~~ 344 |
| **Shipped To (Lab)** | GEL Laboratories, LLC | **Method of Shipment** | Commercial Carrier | **Bill of Lading/Air Bill No.** | 7767 7792 9350 |
| **Protocol** | SURV | **Priority:** | 30 Days **PRIORITY** | **Offsite Property No.** | ~~6830~~ 6834 |

LW 7/18/16

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A

Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TK1 | N | W | JUL 15 2016 | 1130 | 2x1-L P | 9310_ALPHABETA_GPC: COMMON | 6 Months | HNO3 to pH <2 |
| B35TK1 | N | W | JUL 15 2016 | 1130 | 2x4-L G/P | I129LL_SEP_LEPS_GS_LL: COMMON | 6 Months | None |
| B35TK1 | N | W | JUL 15 2016 | 1130 | 1x500-mL G/P | TC99_EIE_LSC: COMMON | 6 Months | HNO3 to pH <2 |

8/17/2016

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| CHRIS FULTON CHPRC | | | JUL 15 2016 1230 | Lesly Wall ~~ICHPRC~~ | | Lesly Wall | JUL 15 2016 1230 |
| Lesly Wall ~~ICHPRC~~ | | Lesly Wall | JUL 15 2016 1400 | ~~FEDEX~~ | Janelle Zunker CHPRC | Janelle Zunker | JUL 15 2016 1400 |
| Janelle Zunker CHPRC | | Janelle Zunker | JUL 15 2016 1430 | SSW#1 | | | JUL 15 2016 1430 |
| SSW#1 | | | JUL 18 2016 0745 | Lesly Wall ~~ICHPRC~~ | | Lesly Wall | JUL 18 2016 0745 |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

**PRINTED ON** 5/26/2016 **FSR ID = FSR10437** A-6004-842 (REV 2)

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST (continued)

C.O.C. No. SIU-007-132

Page 2 of 2

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Lesly Wall /CHPRC | Lesly Wall | | JUL 18 2016 1400 | FEDEX | | | |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| | | FX | | | M Kaschke | | 7-19-16 0915 |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |

A-6003-962 (03/05)

8/17/2016

**CH2MHill Plateau Remediation Company**

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # **S16-007-135**

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| **Collector** | Scott King CHPRC | **Contact/Requester** | Karen Waters-Husted | **Telephone No.** | 509-376-4650 |
| **SAF No.** | S16-007 | **Sampling Origin** | Hanford Site | **Purchase Order/Charge Code** | 300071 |
| **Project Title** | SURV, JULY 2016 | **Logbook No.** | HNF-N-506 86155 | **Ice Chest No.** | GWS-S35 |
| **Shipped To (Lab)** | GEL Laboratories, LLC | **Method of Shipment** | Commercial Carrier | **Bill of Lading/Air Bill No.** | 7767 7792 9556 |
| **Protocol** | SURV | **Priority:** | **30 Days** **PRIORITY** | **Offsite Property No.** | 68341 |

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A

Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TM1 | N | W | JUL 17 2016 | 1215 | 1x500-mL G/P | 6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04 | 6 Months | HNO3 to pH <2 |
| B35TM1 | N | W | ↓ | ↓ | 2x1-L P | 9310_ALPHABETA_GPC: COMMON | 6 Months | HNO3 to pH <2 |
| B35TM1 | N | W | ↓ | ↓ | 2x4-L G/P | I129LL_SEP_LEPS_GS_LL: COMMON | 6 Months | None |
| B35TM1 | N | W | ↓ | ↓ | 1x500-mL P | TRITIUM_DIST_LSC: COMMON | 6 Months | None |
| B35TM3 | Y | W | JUL 17 2016 | 1215 | 1x500-mL G/P | 6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04 | 6 Months | HNO3 to pH <2 |

8/17/2016

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Scott King CHPRC | | | JUL 17 2016 1500 | SSU#1 | | | JUL 17 2016 1500 |
| SSU#1 | | | JUL 18 2016 0745 | Lesly Wall /CHPRC | | | JUL 18 2016 0745 |
| Lesly Wall /CHPRC | | | JUL 18 2016 1400 | FEDEX | | | |
| | | | | M. Ensbow | | | 7-19-16 0915 |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

**CH2MHill Plateau Remediation Company**

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # **S16-007-139**

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| **Collector** | CHRIS FULTON CHPRC | **Contact/Requester** | Karen Waters-Husted | **Telephone No.** | 509-376-4650 |
| **SAF No.** | S16-007 | **Sampling Origin** | Hanford Site | **Purchase Order/Charge Code** | 300071 |
| **Project Title** | SURV, JULY 2016 | **Logbook No.** | HNF-N-506 82 / 88 | **Ice Chest No.** | GW-419 |
| **Shipped To (Lab)** | GEL Laboratories, LLC | **Method of Shipment** | Commercial Carrier | **Bill of Lading/Air Bill No.** | 7767 7792 9270 |
| **Protocol** | SURV | **Priority:** | **30 Days** **PRIORITY** | **Offsite Property No.** | 6834 |

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A
Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TN9 | N | W | JUL 17 2016 | 1343 | 3x1-L G/P | SRISO_SEP_PRECIP_GPC: COMMON | 6 Months | HNO3 to pH <2 |
| B35TN9 | N | W | JUL 17 2016 | 1343 | 1x500-mL G/P | TC99_EIE_LSC: COMMON | 6 Months | HNO3 to pH <2 |

ALL Samples Filtered
High Turb 462

| Relinquished By | Print / Sign | Date/Time | Received By | Print / Sign | Date/Time |
|---|---|---|---|---|---|
| IRIS FULTON CHPRC | | JUL 17 2016 1525 | SSU #1 | | JUL 17 2016 1525 |
| SSU-1 | | JUL 18 2016 0745 | Lesly Wall /CHPRC | Lesly Wall | JUL 18 2016 0745 |
| Lesly Wall /CHPRC | Lesly Wall | JUL 18 2016 1400 | FEDEX | | |
| FX | | | M. Gustlow | | 7-19-16 0915 |

**Matrix ***

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

PRINTED ON 5/26/2016 FSR ID = FSR32582 A-6004-842 (REV 2)



8/17/2016

CH2MHill Plateau Remediation Company

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # S16-007-143

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Collector | Scott King CHPRC | Contact/Requester | Karen Waters-Husted | Telephone No. | 509-376-4650 |
| SAF No. | S16-007 | Sampling Origin | Hanford Site | Purchase Order/Charge Code | 300071 |
| Project Title | SURV, JULY 2016 | Logbook No. | HNF-N-506 86/54 | Ice Chest No. | GW-419 |
| Shipped To (Lab) | GEL Laboratories, LLC | Method of Shipment | Commercial Carrier | Bill of Lading/Air Bill No. | 7767 7792 9270 |
| Protocol | SURV | Priority: | 30 Days PRIORITY | Offsite Property No. | 6834 |

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A
Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TT4 | Y | W | JUL 17 2016 | 0810 | 1x500-mL G/P | 6020_METALS_ICPMS: Arsenic (1) | 6 Months | HNO3 to pH <2 |
| B35TT2 | N | W | ↓ | ↓ | 1x500-mL G/P | 6020_METALS_ICPMS: Arsenic (1) | 6 Months | HNO3 to pH <2 |
| B35TT2 | N | W | ↓ | ↓ | 1x250-mL G/P | 9012_CYANIDE: COMMON | 14 Days | NaOH to pH >=12/Cool <=6C |
| B35TT2 | N | W | JUL 17 2016 | 0810 | 1x4-L G/P | GAMMA_GS: COMMON | 6 Months | HNO3 to pH <2 |

8/17/2016

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Scott King CHPRC | | | JUL 17 2016 1500 | SSU#1 | | | JUL 17 2016 1500 |
| SSU#1 | | | JUL 18 2016 0745 | Lesly Wall /CHPRC | | | JUL 18 2016 0745 |
| Lesly Wall /CHPRC | | | JUL 18 2016 1400 | FEDEX | | | |
| | | | | | | | |

Matrix *

| | | | | | |
|---|---|---|---|---|---|
| S | = Soil | DS | = Drum Solids | | |
| SE | = Sediment | DL | = Drum Liquids | | |
| SO | = Solid | T | = Tissue | | |
| SL | = Sludge | WI | = Wipe | | |
| W | = Water | L | = Liquid | | |
| O | = Oil | V | = Vegetation | | |
| A | = Air | X | = Other | | |

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| | | McGuire | 71910 0915 |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

PRINTED ON 6/7/2016 FSR ID = FSR33106 A-6004-842 (REV 2)

CH2MHill Plateau Remediation Company

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # S16-007-144

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Collector | Scott King CHPRC | Contact/Requester | Karen Waters-Husted | Telephone No. | 509-376-4650 |
| SAF No. | S16-007 | Sampling Origin | Hanford Site | Purchase Order/Charge Code | 300071 |
| Project Title | SURV, JULY 2016 | Logbook No. | HNF-N-506 816/54 | Ice Chest No. | GWS-530 |
| Shipped To (Lab) | GEL Laboratories, LLC | Method of Shipment | Commercial Carrier | Bill of Lading/Air Bill No. | 7767 7792 9615 |
| Protocol | SURV | Priority: | 30 Days PRIORITY | Offsite Property No. | 68834 |

**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

**SPECIAL INSTRUCTIONS** - **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A

Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TT3 | N | W | JUL 17 2016 | 0810 | 1x250-mL G/P | 9012_CYANIDE: COMMON | 14 Days | NaOH to pH >=12/Cool <=6C |
| B35TT3 | N | W | ↓ | ↓ | 1x4-L G/P | GAMMA_GS: COMMON | 6 Months | HNO3 to pH <2 |
| B35TT3 | N | W | ↓ | ↓ | 1x500-mL G/P | 6020_METALS_ICPMS: Arsenic (1) | 6 Months | HNO3 to pH <2 |
| B35TT5 | Y | W | JUL 17 2016 | 0810 | 1x500-mL G/P | 6020_METALS_ICPMS: Arsenic (1) | 6 Months | HNO3 to pH <2 |

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Scott King CHPRC | | | JUL 17 2016 1500 | SSW#1 | | | JUL 17 2016 1500 |
| SSW#1 | | | JUL 18 2016 0745 | Lesly Wall /CHPRC | | | JUL 18 2016 0745 |
| Lesly Wall /CHPRC | | | JUL 18 2016 1400 | FEDEX | | | |
| FP | | | | M Grosslow | | | 7-19-16 0915 |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

PRINTED ON 6/7/2016 FSR ID = FSR33106 A-6004-842 (REV 2)

8/17/2016

89 165

| CH2MHill Plateau Remediation Company | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 401832 | C.O.C. # S16-007-146 Page 1 of 12 |
|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Collector | J.R. Aguilar/CHPRC | Contact/Requester | Karen Waters-Husted | Telephone No. | 509-376-4650 |
| SAF No. | S16-007 | Sampling Origin | Hanford Site | Purchase Order/Charge Code | 300071 |
| Project Title | SURV, JULY 2016 | Logbook No. | HNF-N-506 82/87 | Ice Chest No. | GWS-530 |
| Shipped To (Lab) | GEL Laboratories, LLC | Method of Shipment | Commercial Carrier | Bill of Lading/Air Bill No. | 7767 7792 9615 |
| Protocol | SURV | Priority: | 30 Days PRIORITY | Offsite Property No. | 6834 |

LW 7/18/16

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A
Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35TV8 | N | W | JUL 15 2016 | 1334 | 1x250-mL G/P | 9012_CYANIDE: COMMON | 14 Days | NaOH to pH >=12/Cool <=6C |
| B35TV8 | N | W | JUL 15 2016 | 1334 | 1x4-L G/P | GAMMA_GS: COMMON | 6 Months | HNO3 to pH <2 |

8/17/2016

| Relinquished By | Print / Sign | Date/Time | Received By | Print / Sign | Date/Time |
|---|---|---|---|---|---|
| J.R. Aguilar/CHPRC | | JUL 15 2016 1410 | Janelle Zunker CHPRC | Chris Fulton CHPRC | JUL 15 2016 1410 |
| Chris Fulton CHPRC | | JUL 15 2016 1415 | SSU-1 | | JUL 15 2016 1415 |
| SSU-1 | | JUL 18 2016 0745 | Lesly Wall /CHPRC | | JUL 18 2016 0745 |
| Lesly Wall /CHPRC | | JUL 18 2016 1400 | FEDEX | | |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time



PRINTED ON 5/26/2016 FSR ID = FSR32470 A-6004-842 (REV 2)

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST (continued)

C.O.C. No. Sil-007-146

Page 2 of 2

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| | | | | | | | |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| | | | | | | | |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| | | | | | | | |
| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
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| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
| | | | | | | | |

A-6003-962 (03/05)

8/17/2016

62165

| CH2MHill Plateau Remediation Company | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 401832 | C.O.C. # S16-007-157 Page 1 of 1 |
|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Collector | Frank Hall /CHPRC | Contact/Requester | Karen Waters-Husted | Telephone No. | 509-376-4650 |
| SAF No. | S16-007 | Sampling Origin | Hanford Site | Purchase Order/Charge Code | 300071 |
| Project Title | SURV, JULY 2016 | Logbook No. | HNF-N-506 87/1 | Ice Chest No. | GWS-535 |
| Shipped To (Lab) | GEL Laboratories, LLC | Method of Shipment | Commercial Carrier | Bill of Lading/Air Bill No. | 7767 7792 9556 |
| Protocol | SURV | Priority: | 30 Days PRIORITY | Offsite Property No. | 6834 |

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A
Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35V28 | N | W | 7/17/16 | 1420 | 1x500-mL G/P | TC99_EIE_LSC: COMMON | 6 Months | HNO3 to pH <2 |
| B35V28 | N | W | ↓ | ↓ | 1x500-mL P | TRITIUM_DIST_LSC: COMMON | 6 Months | None |

8/17/2016

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Frank Hall /CHPRC | | | JUL 1 7 2016 1555 | SSU #1 | | | JUL 1 7 2016 1555 |
| SSU #1 | | | JUL 1 8 2016 ~~1400~~ 0745 | Lesly Wall /CHPRC | | Lesly Wall | JUL 1 8 2016 0745 |
| Lesly Wall /CHPRC | | Lesly Wall | JUL 1 8 2016 1400 | FEDEX | | | |
| | | | | M Kinslow | | M Kinslow | 7-19-16 0915 |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

| FINAL SAMPLE DISPOSITION | Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time |
|---|---|---|---|
| | | | |

PRINTED ON 5/26/2016 FSR ID = FSR32615 A-6004-842 (REV 2)

CH2MHill Plateau Remediation Company

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

401832

C.O.C. # S16-007-159

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Collector | Frank Hall /CHPRC | Contact/Requester | Karen Waters-Husted | Telephone No. | 509-376-4650 |
| SAF No. | S16-007 | Sampling Origin | Hanford Site | Purchase Order/Charge Code | 300071 |
| Project Title | SURV, JULY 2016 | Logbook No. | HNF-N-506 871 | Ice Chest No. | GWS-530 |
| Shipped To (Lab) | GEL Laboratories, LLC | Method of Shipment | Commercial Carrier | Bill of Lading/Air Bill No. | 7767 7792 9615 |
| Protocol | SURV | Priority: | 30 Days PRIORITY | Offsite Property No. | 6834 |

**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

**SPECIAL INSTRUCTIONS** **Hold Time** Total Activity Exemption: Yes ☑ No ☐

N/A
Special Handling:N/A

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|---|---|---|---|---|---|---|---|---|
| B35V39 | N | W | 7/17/16 | 1136 | 1x500-mL G/P | 6020_METALS_ICPMS: Uranium (1) | 6 Months | HNO3 to pH <2 |
| B35V39 | N | W | ↓ | ↓ | 1x500-mL G/P | TC99_EIE_LSC: COMMON | 6 Months | HNO3 to pH <2 |

8/17/2016

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| Frank Hall /CHPRC | | | JUL 1 7 2016 1555 | SSU #1 | | | JUL 1 7 2016 1555 |
| SSU #1 | | | JUL 1 8 2016 0745 | Lesly Wall /CHPRC | | Lesly Wall | JUL 1 8 2016 0745 |
| Lesly Wall /CHPRC | | Lesly Wall | JUL 1 8 2016 1400 | FEDEX | | | |
| | | | | M. Kaslow | | | 7-19-16 0915 |

Matrix *

| | | | |
|---|---|---|---|
| S | = Soil | DS | = Drum Solids |
| SE | = Sediment | DL | = Drum Liquids |
| SO | = Solid | T | = Tissue |
| SL | = Sludge | WI | = Wipe |
| W | = Water | L | = Liquid |
| O | = Oil | V | = Vegetation |
| A | = Air | X | = Other |

**FINAL SAMPLE DISPOSITION** Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

PRINTED ON 5/26/2016 FSR ID = FSR32944 A-6004-842 (REV 2)

GEL Laboratories LLC

# SAMPLE RECEIPT & REVIEW FORM

| | |
|---|---|
| Client: CPRC | SDG/AR/COC/Work Order: 401832 |
| Received By: MK | Date Received: 7-19-16 |

| 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): CPM 0 |
| 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: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 1c 2c |
| 2a | Daily check performed and passed on IR temperature gun? | ✓ | | | Temperature Device Serial #: 13462962 Secondary Temperature Device Serial # (If Applicable): |
| 3 | Chain of custody documents included with shipment? | ✓ | | | |
| 4 | Sample containers intact and sealed? | ✓ | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 5 | Samples requiring chemical preservation at proper pH? | ✓ | | | Sample ID's, containers affected and observed pH: If Preservation added, Lot#: |
| 6 | Do Low Level Perchlorate samples have headspace as required? | | ✓ | | Sample ID's and containers affected: |
| 7 | VOA vials contain acid preservation? | | ✓ | | (If unknown, select No) |
| 8 | VOA vials free of headspace (defined as < 6mm bubble)? | | ✓ | | Sample ID's and containers affected: |
| 9 | Are Encore containers present? | | | ✓ | (If yes, immediately deliver to Volatiles laboratory) |
| 10 | Samples received within holding time? | ✓ | | | ID's and tests affected: |
| 11 | Sample ID's on COC match ID's on bottles? | ✓ | | | Sample ID's and containers 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 FedEx Ground UPS Field Services Courier Other<br>7767 7792 9383 2c<br>9350 19c No ice<br>9556 20c No ice<br>9615 2c<br>9063 1c<br>9270 2c |

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KS Date 7/20/16 Page 1 of 1

GL-CHL-SR-001 Rev 3

# Data Review Qualifier Definitions

**GEL LABORATORIES LLC**
2040 Savage Road Charleston, SC 29407 (843) 556−8171

Report Date: 17−AUG−16

# Project Specific Qualifier Definitions for GEL Client Code: CPRC

| Qualifier | Qualifier Definition | Department | Fraction |
|---|---|---|---|
| U | Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. | | |
| J | 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 | Organics | |
| P | Aroclor target analyte with greater than 25% difference between column analyses. | Organics | |
| C | Analyte has been confirmed by GC/MS analysis | Organics | Pesticide |
| B | The analyte was detected in both the associated QC blank and in the sample. | Organics | |
| E | Concentration exceeds the calibration range of the instrument | Organics | |
| A | The TIC is a suspected aldol−condensation product | Organics | Semi−Volatile |
| X | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier | | |
| N | Spike Sample recovery is outside control limits. | | |
| * | Duplicate analysis not within control limits | Inorganics | |
| > | Result greater than quantifiable range or greater than upper limit of the analysis range | General Chemistry | |
| Z | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier | | |
| 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). | Inorganics | Metals |
| D | Results are reported from a diluted aliquot of sample. | | |
| E | Reported value is estimated due to interferences. See comment in narrative. | Inorganics | Metals |
| M | Duplicate precision not met. | Inorganics | Metals |
| o | Analyte failed to recover within LCS limits (0rganics only) | Organics | |
| S | Reported value determined by the Method of Standard Additions (MSA) | Inorganics | |
| T | Spike and/or spike duplicate sample recovery is outside control limits. | Organics | |
| W | Post−digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency. | Inorganics | |
| B | The associated QC sample blank has a result >= 2X the MDA and, after corrections, result is >= MDA for this sample | Radiological | |
| Y | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier | | |
| + | Correlation coefficient for Method of Standard Additions (MSA) is < 0.995 | Inorganics | |
| 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). | General Chemistry | |
| 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. | Inorganics | Metals |
| 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. | General Chemistry | |
| < | Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide | General Chemistry | |
| UX | Gamma Spectroscopy−−Uncertain identification | Radiological | |

# Laboratory Certifications

**List of current GEL Certifications as of 17 August 2016**

| State | Certification |
|---|---|
| Alaska | UST−0110 |
| Arkansas | 88−0651 |
| CLIA | 42D0904046 |
| California | 2940 |
| Colorado | SC00012 |
| Connecticut | PH−0169 |
| Delaware | SC00012 |
| DoD ELAP/ ISO17025 A2LA | 2567.01 |
| Florida NELAP | E87156 |
| Foreign Soils Permit | P330−15−00283, P330−15−00253 |
| Georgia | SC00012 |
| Georgia SDWA | 967 |
| Hawaii | SC00012 |
| Idaho Chemistry | SC00012 |
| Idaho Radiochemistry | SC00012 |
| Illinois NELAP | 200029 |
| Indiana | C−SC−01 |
| Kansas NELAP | E−10332 |
| Kentucky SDWA | 90129 |
| Kentucky Wastewater | 90129 |
| Louisiana NELAP | 03046 (AI33904) |
| Louisiana SDWA | LA160006 |
| Maryland | 270 |
| Massachusetts | M−SC012 |
| Michigan | 9976 |
| Mississippi | SC00012 |
| Nebraska | NE−OS−26−13 |
| Nevada | SC000122016−1 |
| New Hampshire NELAP | 205415 |
| New Jersey NELAP | SC002 |
| New Mexico | SC00012 |
| New York NELAP | 11501 |
| North Carolina | 233 |
| North Carolina SDWA | 45709 |
| North Dakota | R−158 |
| Oklahoma | 9904 |
| Pennsylvania NELAP | 68−00485 |
| S.Carolina Radchem | 10120002 |
| South Carolina Chemistry | 10120001 |
| Tennessee | TN 02934 |
| Texas NELAP | T104704235−16−11 |
| Utah NELAP | SC000122016−20 |
| Vermont | VT87156 |
| Virginia NELAP | 460202 |
| Washington | C780 |
| West Virginia | 997404 |

# Metals Analysis

# Case Narrative

**Metals**
**Technical Case Narrative**
**CH2MHill Plateau Remediation Company (CPRC)**
**SDG #: GEL401832**
**Work Order #: 401832**

**Product:** **Determination of Metals by ICP-MS**
**Analytical Method:** 6020_METALS_ICPMS
**Analytical Procedure:** GL-MA-E-014 REV# 28
**Analytical Batches:** 1582928 and 1590070

**Product:** **Determination of Metals by ICP**
**Analytical Method:** 6010_METALS_ICP
**Analytical Procedure:** GL-MA-E-013 REV# 26
**Analytical Batch:** 1582958

**Preparation Method:** SW846 3005A
**Preparation Procedure:** GL-MA-E-006 REV# 13
**Preparation Batches:** 1582927, 1582957 and 1590068

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832002 | B35TM1 |
| 401832003 | B35TM3 |
| 401832005 | B35TT4 |
| 401832006 | B35TT2 |
| 401832007 | B35TT3 |
| 401832008 | B35TT5 |
| 401832011 | B35V39 |
| 1203587805 | Method Blank (MB)**ICP** |
| 1203587806 | Laboratory Control Sample (LCS) |
| 1203587809 | 401832002(B35TM1L) Serial Dilution (SD) |
| 1203587807 | 401832002(B35TM1S) Matrix Spike (MS) |
| 1203587808 | 401832002(B35TM1SD) Matrix Spike Duplicate (MSD) |
| 1203587754 | Method Blank (MB)**ICP-MS** |
| 1203605784 | Method Blank (MB)**ICP-MS** |
| 1203587755 | Laboratory Control Sample (LCS) |
| 1203605785 | Laboratory Control Sample (LCS) |
| 1203587758 | 401832002(B35TM1L) Serial Dilution (SD) |
| 1203605788 | 401832003(B35TM3L) Serial Dilution (SD) |
| 1203587756 | 401832002(B35TM1S) Matrix Spike (MS) |
| 1203605786 | 401832003(B35TM3S) Matrix Spike (MS) |
| 1203587757 | 401832002(B35TM1SD) Matrix Spike Duplicate (MSD) |
| 1203605787 | 401832003(B35TM3SD) Matrix Spike Duplicate (MSD) |
| 1203604200 | 401832002(B35TM1PS) Post Spike (PS) |

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

**Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and

procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Calibration Information**

**CRDL/PQL Requirements**
The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium and sodium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 401832002 (B35TM1) and 401832003 (B35TM3)-ICP.

**Quality Control (QC) Information**

**Method Blank (MB) Statement**
The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of zinc. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203587805 (MB)-ICP. The method blanks (MB) analyzed with this SDG met the exception criteria with the exception of nickel, zinc, and molybdenum. In instances where there were positive hits in the method blank, the results were evaluated and appropriately flagged on the data. 1203587754 (MB)-ICP-MS.

**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 recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

| Sample | Analyte | Value |
|---|---|---|
| 1203587757 (B35TM1MSD) | Chromium | 133* (75%-125%) |

**Certification Statement**

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

# GEL LABORATORIES LLC

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

## Qualifier Definition Report
for

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL401832 GEL Work Order: 401832

**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 >= 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.

**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:** Nik-Cole A. Elmore **Name: Nik-Cole Elmore**

**Date: 15 AUG 2016** **Title: Data Validator**

# Sample Data Summary

*GEL Laboratories LLC*

# METALS
## −1−
## INORGANICS ANALYSIS DATA PACKAGE

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832002 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TM1 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7429−90−5 | Aluminum | 15 | ug/L | U | 15 | 50 | 50 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−36−0 | Antimony | 1 | ug/L | U | 1 | 3 | 3 | 1 | MS | SKJ | 08/11/16 03:38 | 160810−6 | 1582928 |
| 7440−38−2 | Arsenic | 7.02 | ug/L | | 1.7 | 5 | 5 | 1 | MS | BAJ | 08/12/16 14:13 | 160812−2 | 1582928 |
| 7440−39−3 | Barium | 34.6 | ug/L | | 0.6 | 2 | 2 | 1 | MS | SKJ | 08/11/16 12:18 | 160811−7 | 1582928 |
| 7440−41−7 | Beryllium | 0.204 | ug/L | B | 0.2 | 0.5 | 0.5 | 1 | MS | SKJ | 08/11/16 12:18 | 160811−7 | 1582928 |
| 7440−42−8 | Boron | 15 | ug/L | U | 15 | 50 | 50 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7440−43−9 | Cadmium | 0.119 | ug/L | B | 0.11 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−70−2 | Calcium | 48900 | ug/L | | 50 | 200 | 200 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7440−47−3 | Chromium | 19.9 | ug/L | N | 2 | 10 | 10 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−48−4 | Cobalt | 0.432 | ug/L | B | 0.1 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−50−8 | Copper | 4.76 | ug/L | | 0.35 | 1 | 1 | 1 | MS | BAJ | 08/15/16 10:28 | 160815−3 | 1590070 |
| 7439−89−6 | Iron | 103 | ug/L | | 30 | 100 | 100 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7439−92−1 | Lead | 0.50 | ug/L | U | 0.5 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7439−95−4 | Magnesium | 13000 | ug/L | | 110 | 300 | 300 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7439−96−5 | Manganese | 2.88 | ug/L | B | 1 | 5 | 5 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7439−98−7 | Molybdenum | 2.59 | ug/L | C | 0.165 | 0.5 | 0.5 | 1 | MS | SKJ | 08/11/16 12:18 | 160811−7 | 1582928 |
| 7440−02−0 | Nickel | 11.6 | ug/L | C | 0.5 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−09−7 | Potassium | 6110 | ug/L | | 50 | 150 | 150 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7782−49−2 | Selenium | 5.5 | ug/L | | 1.5 | 5 | 5 | 1 | MS | BAJ | 08/12/16 14:13 | 160812−2 | 1582928 |
| 7440−22−4 | Silver | 0.20 | ug/L | U | 0.2 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−23−5 | Sodium | 12600 | ug/L | | 100 | 300 | 300 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7440−24−6 | Strontium | 289 | ug/L | | 2 | 10 | 10 | 1 | MS | SKJ | 08/11/16 12:18 | 160811−7 | 1582928 |
| 7440−28−0 | Thallium | 0.450 | ug/L | U | 0.45 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−29−1 | Thorium | 0.383 | ug/L | U | 0.383 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−31−5 | Tin | 1.06 | ug/L | B | 1 | 5 | 5 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−61−1 | Uranium | 3.28 | ug/L | | 0.067 | 0.2 | 0.2 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |
| 7440−62−2 | Vanadium | 26.1 | ug/L | | 1 | 5 | 5 | 1 | P | HSC | 07/29/16 13:10 | 072916−1 | 1582958 |
| 7440−66−6 | Zinc | 5.46 | ug/L | CB | 3.5 | 10 | 10 | 1 | MS | SKJ | 08/10/16 23:11 | 160810−4 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |
| 1582958 | 1582957 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |
| 1590070 | 1590068 | SW846 3005A | 25 | mL | 25 | mL | 08/12/16 | JP1 |

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

***Analytical Methods:**

| | |
|---|---|
| **P** | **SW846 3005A/6010C** |
| **MS** | **SW846 3005A/6020A** |

*GEL Laboratories LLC*

# METALS
## −1−
## INORGANICS ANALYSIS DATA PACKAGE

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832003 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TM3 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7429−90−5 | Aluminum | 15 | ug/L | U | 15 | 50 | 50 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−36−0 | Antimony | 1 | ug/L | U | 1 | 3 | 3 | 1 | MS | SKJ | 08/11/16 03:44 | 160810−6 | 1582928 |
| 7440−38−2 | Arsenic | 7.09 | ug/L | | 1.7 | 5 | 5 | 1 | MS | BAJ | 08/12/16 14:35 | 160812−2 | 1582928 |
| 7440−39−3 | Barium | 33.2 | ug/L | | 0.6 | 2 | 2 | 1 | MS | SKJ | 08/11/16 12:30 | 160811−7 | 1582928 |
| 7440−41−7 | Beryllium | 0.20 | ug/L | U | 0.2 | 0.5 | 0.5 | 1 | MS | SKJ | 08/11/16 12:30 | 160811−7 | 1582928 |
| 7440−42−8 | Boron | 15 | ug/L | U | 15 | 50 | 50 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7440−43−9 | Cadmium | 0.110 | ug/L | U | 0.11 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−70−2 | Calcium | 49200 | ug/L | | 50 | 200 | 200 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7440−47−3 | Chromium | 2 | ug/L | UN | 2 | 10 | 10 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−48−4 | Cobalt | 0.347 | ug/L | B | 0.1 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−50−8 | Copper | 0.491 | ug/L | B | 0.35 | 1 | 1 | 1 | MS | BAJ | 08/15/16 10:29 | 160815−3 | 1590070 |
| 7439−89−6 | Iron | 30 | ug/L | U | 30 | 100 | 100 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7439−92−1 | Lead | 0.50 | ug/L | U | 0.5 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7439−95−4 | Magnesium | 13100 | ug/L | | 110 | 300 | 300 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7439−96−5 | Manganese | 1.4 | ug/L | B | 1 | 5 | 5 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7439−98−7 | Molybdenum | 2.41 | ug/L | C | 0.165 | 0.5 | 0.5 | 1 | MS | SKJ | 08/11/16 12:30 | 160811−7 | 1582928 |
| 7440−02−0 | Nickel | 3.04 | ug/L | C | 0.5 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−09−7 | Potassium | 6190 | ug/L | | 50 | 150 | 150 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7782−49−2 | Selenium | 5.98 | ug/L | | 1.5 | 5 | 5 | 1 | MS | BAJ | 08/12/16 14:35 | 160812−2 | 1582928 |
| 7440−22−4 | Silver | 0.20 | ug/L | U | 0.2 | 1 | 1 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−23−5 | Sodium | 13300 | ug/L | | 100 | 300 | 300 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7440−24−6 | Strontium | 283 | ug/L | | 2 | 10 | 10 | 1 | MS | SKJ | 08/11/16 12:30 | 160811−7 | 1582928 |
| 7440−28−0 | Thallium | 0.450 | ug/L | U | 0.45 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−29−1 | Thorium | 0.383 | ug/L | U | 0.383 | 2 | 2 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−31−5 | Tin | 1 | ug/L | U | 1 | 5 | 5 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−61−1 | Uranium | 3.14 | ug/L | | 0.067 | 0.2 | 0.2 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |
| 7440−62−2 | Vanadium | 26 | ug/L | | 1 | 5 | 5 | 1 | P | HSC | 07/29/16 13:22 | 072916−1 | 1582958 |
| 7440−66−6 | Zinc | 4.99 | ug/L | CB | 3.5 | 10 | 10 | 1 | MS | SKJ | 08/10/16 23:31 | 160810−4 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |
| 1582958 | 1582957 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |
| 1590070 | 1590068 | SW846 3005A | 25 | mL | 25 | mL | 08/12/16 | JP1 |

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

***Analytical Methods:**

| | |
|---|---|
| **P** | **SW846 3005A/6010C** |
| **MS** | **SW846 3005A/6020A** |

*GEL Laboratories LLC*

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832005 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TT4 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440−38−2 | Arsenic | 8.35 | ug/L | | 1.7 | 5 | 10 | 1 | MS | BAJ | 08/12/16 14:27 | 160812−2 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |

***Analytical Methods:**

**MS** **SW846 3005A/6020A**

*GEL Laboratories LLC*

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832006 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TT2 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440−38−2 | Arsenic | 8.82 | ug/L | | 1.7 | 5 | 10 | 1 | MS | BAJ | 08/12/16 14:29 | 160812−2 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |

***Analytical Methods:**

**MS** **SW846 3005A/6020A**

*GEL Laboratories LLC*

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832007 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TT3 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440−38−2 | Arsenic | 8.79 | ug/L | | 1.7 | 5 | 10 | 1 | MS | BAJ | 08/12/16 14:31 | 160812−2 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |

***Analytical Methods:**

**MS** **SW846 3005A/6020A**

*GEL Laboratories LLC*

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832008 **BASIS:** As Received **DATE COLLECTED** 15−JUL−16

**CLIENT ID:** B35TT5 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440−38−2 | Arsenic | 8.25 | ug/L | | 1.7 | 5 | 10 | 1 | MS | BAJ | 08/12/16 14:33 | 160812−2 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |

***Analytical Methods:**

**MS** **SW846 3005A/6020A**

*GEL Laboratories LLC*

**METALS**
**−1−**
**INORGANICS ANALYSIS DATA PACKAGE**

**SDG No:** GEL401832 **CONTRACT:** CPRC0S16007 **METHOD TYPE:** SW846

**SAMPLE ID:** 401832011 **BASIS:** As Received **DATE COLLECTED** 17−JUL−16

**CLIENT ID:** B35V39 **LEVEL:** Low **DATE RECEIVED** 19−JUL−16

**MATRIX:** WATER **%SOLIDS:** 0

| CAS No. | Analyte | Result | Units | Qual | MDL | PQL | CRDL | DF | M* | Analyst | Run Date | Analytical Run | Analytical Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440−61−1 | Uranium | 10.2 | ug/L | | 0.067 | 0.2 | 15 | 1 | MS | SKJ | 08/11/16 00:14 | 160810−4 | 1582928 |

**Prep Information:**

| Analytical Batch | Prep Batch | Prep Method | Initial wt./vol. | Units | Final wt./vol. | Units | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| 1582928 | 1582927 | SW846 3005A | 50 | mL | 50 | mL | 07/19/16 | JP1 |

***Analytical Methods:**

**MS** **SW846 3005A/6020A**

# Quality Control Summary

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: August 15, 2016



**CH2MHill Plateau Remediation Company**
**MSIN R3-50 CHPRC**
**PO Box 1600**
**Richland, Washington**

**Contact:** **Mr. Scot Fitzgerald**

**Workorder:** **401832**

| Parmname | NOM | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | |
| Batch 1582928 | | | | | | | | | | |
| QC1203587755 LCS | | | | | | | | | | |
| Aluminum | 2000 | | | 2000 | ug/L | | 100 | (80%-120%) | SKJ | 08/10/16 22:59 |
| Antimony | 50.0 | | | 53.6 | ug/L | | 107 | (80%-120%) | | 08/11/16 03:36 |
| Arsenic | 50.0 | | | 54.5 | ug/L | | 109 | (80%-120%) | BAJ | 08/12/16 14:12 |
| Barium | 50.0 | | | 48.5 | ug/L | | 97 | (80%-120%) | SKJ | 08/11/16 12:11 |
| Beryllium | 50.0 | | | 50.1 | ug/L | | 100 | (80%-120%) | | |
| Cadmium | 50.0 | | | 50.6 | ug/L | | 101 | (80%-120%) | | 08/10/16 22:59 |
| Chromium | 50.0 | | | 53.4 | ug/L | | 107 | (80%-120%) | | |
| Cobalt | 50.0 | | | 52.9 | ug/L | | 106 | (80%-120%) | | |
| Lead | 50.0 | | | 50.8 | ug/L | | 102 | (80%-120%) | | |
| Manganese | 50.0 | | | 51.7 | ug/L | | 103 | (80%-120%) | | |
| Molybdenum | 50.0 | | | 50.0 | ug/L | | 100 | (80%-120%) | | 08/11/16 12:11 |
| Nickel | 50.0 | | | 53.0 | ug/L | | 106 | (80%-120%) | | 08/10/16 22:59 |
| Selenium | 50.0 | | | 54.6 | ug/L | | 109 | (80%-120%) | BAJ | 08/12/16 14:12 |
| Silver | 50.0 | | | 51.2 | ug/L | | 102 | (80%-120%) | SKJ | 08/10/16 22:59 |
| Strontium | 50.0 | | | 51.7 | ug/L | | 103 | (80%-120%) | | 08/11/16 12:11 |
| Thallium | 50.0 | | | 47.4 | ug/L | | 94.8 | (80%-120%) | | 08/10/16 22:59 |
| Thorium | 50.0 | | | 53.5 | ug/L | | 107 | (80%-120%) | | |
| Tin | 50.0 | | | 49.0 | ug/L | | 97.9 | (80%-120%) | | |
| Uranium | 50.0 | | | 54.0 | ug/L | | 108 | (80%-120%) | | |
| Zinc | 50.0 | | | 55.7 | ug/L | | 111 | (80%-120%) | | |

# GEL LABORATORIES LLC

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## QC Summary

**Workorder:** **401832**



| Parmname | NOM | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | |
| Batch 1582928 | | | | | | | | | | |
| QC1203587754 MB | | | | | | | | | | |
| Aluminum | | | U | 15.0 | ug/L | | | | SKJ | 08/10/16 22:55 |
| Antimony | | | U | 1.00 | ug/L | | | | | 08/11/16 03:35 |
| Arsenic | | | U | 1.70 | ug/L | | | | BAJ | 08/12/16 14:10 |
| Barium | | | U | 0.600 | ug/L | | | | SKJ | 08/11/16 12:09 |
| Beryllium | | | U | 0.200 | ug/L | | | | | |
| Cadmium | | | U | 0.110 | ug/L | | | | | 08/10/16 22:55 |
| Chromium | | | U | 2.00 | ug/L | | | | | |
| Cobalt | | | U | 0.100 | ug/L | | | | | |
| Lead | | | U | 0.500 | ug/L | | | | | |
| Manganese | | | U | 1.00 | ug/L | | | | | |
| Molybdenum | | | B | 0.165 | ug/L | | | | | 08/11/16 12:09 |
| Nickel | | | B | 1.64 | ug/L | | | | | 08/10/16 22:55 |
| Selenium | | | U | 1.50 | ug/L | | | | BAJ | 08/12/16 14:10 |
| Silver | | | U | 0.200 | ug/L | | | | SKJ | 08/10/16 22:55 |
| Strontium | | | U | 2.00 | ug/L | | | | | 08/11/16 12:09 |
| Thallium | | | U | 0.450 | ug/L | | | | | 08/10/16 22:55 |
| Thorium | | | U | 0.383 | ug/L | | | | | |
| Tin | | | U | 1.00 | ug/L | | | | | |
| Uranium | | | U | 0.067 | ug/L | | | | | |
| Zinc | | | B | 4.70 | ug/L | | | | | |
| QC1203587756 401832002 MS | | | | | | | | | | |
| Aluminum | 2000 | U | 15.0 | 1970 | ug/L | | 97.9 | (75%-125%) | | 08/10/16 23:15 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | Qual | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | | |
| Batch 1582928 | | | | | | | | | | | |
| Antimony | 50.0 | U | 1.00 | | 55.3 | ug/L | | 110 | (75%-125%) | SKJ | 08/11/16 03:39 |
| Arsenic | 50.0 | | 7.02 | | 61.4 | ug/L | | 109 | (75%-125%) | BAJ | 08/12/16 14:15 |
| Barium | 50.0 | | 34.6 | | 79.6 | ug/L | | 90 | (75%-125%) | SKJ | 08/11/16 12:21 |
| Beryllium | 50.0 | B | 0.204 | | 51.8 | ug/L | | 103 | (75%-125%) | | |
| Cadmium | 50.0 | B | 0.119 | | 50.7 | ug/L | | 101 | (75%-125%) | | 08/10/16 23:15 |
| Chromium | 50.0 | N | 19.9 | | 73.8 | ug/L | | 108 | (75%-125%) | | |
| Cobalt | 50.0 | B | 0.432 | | 50.3 | ug/L | | 99.7 | (75%-125%) | | |
| Lead | 50.0 | U | 0.500 | | 51.2 | ug/L | | 102 | (75%-125%) | | |
| Manganese | 50.0 | B | 2.88 | | 52.4 | ug/L | | 98.9 | (75%-125%) | | |
| Molybdenum | 50.0 | C | 2.59 | | 53.0 | ug/L | | 101 | (75%-125%) | | 08/11/16 12:21 |
| Nickel | 50.0 | C | 11.6 | | 63.4 | ug/L | | 104 | (75%-125%) | | 08/10/16 23:15 |
| Selenium | 50.0 | | 5.50 | | 58.4 | ug/L | | 106 | (75%-125%) | BAJ | 08/12/16 14:15 |
| Silver | 50.0 | U | 0.200 | | 49.4 | ug/L | | 98.6 | (75%-125%) | SKJ | 08/10/16 23:15 |
| Strontium | 50.0 | | 289 | | 334 | ug/L | | N/A | (75%-125%) | | 08/11/16 12:21 |
| Thallium | 50.0 | U | 0.450 | | 47.7 | ug/L | | 95.2 | (75%-125%) | | 08/10/16 23:15 |
| Thorium | 50.0 | U | 0.383 | | 56.0 | ug/L | | 112 | (75%-125%) | | |
| Tin | 50.0 | B | 1.06 | | 50.7 | ug/L | | 99.2 | (75%-125%) | | |
| Uranium | 50.0 | | 3.28 | | 58.0 | ug/L | | 110 | (75%-125%) | | |
| Zinc | 50.0 | BC | 5.46 | | 55.3 | ug/L | | 99.7 | (75%-125%) | | |
| QC1203587757 401832002 MSD | | | | | | | | | | | |
| Aluminum | 2000 | U | 15.0 | | 1880 | ug/L | 4.61 | 93.5 | (0%-20%) | | 08/10/16 23:19 |
| Antimony | 50.0 | U | 1.00 | | 55.7 | ug/L | 0.707 | 111 | (0%-20%) | | 08/11/16 03:41 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | | |
| Batch 1582928 | | | | | | | | | | | |
| Arsenic | 50.0 | | 7.02 | | 60.5 | ug/L | 1.54 | 107 | (0%-20%) | BAJ | 08/12/16 14:17 |
| Barium | 50.0 | | 34.6 | | 78.1 | ug/L | 1.99 | 86.9 | (0%-20%) | SKJ | 08/11/16 12:23 |
| Beryllium | 50.0 | B | 0.204 | | 50.9 | ug/L | 1.78 | 101 | (0%-20%) | | |
| Cadmium | 50.0 | B | 0.119 | | 51.4 | ug/L | 1.41 | 103 | (0%-20%) | | 08/10/16 23:19 |
| Chromium | 50.0 | N | 19.9 | N | 86.2 | ug/L | 15.5 | 133* | (0%-20%) | | |
| Cobalt | 50.0 | B | 0.432 | | 49.4 | ug/L | 1.76 | 98 | (0%-20%) | | |
| Lead | 50.0 | U | 0.500 | | 49.3 | ug/L | 3.82 | 98.4 | (0%-20%) | | |
| Manganese | 50.0 | B | 2.88 | | 52.4 | ug/L | 0.115 | 99.1 | (0%-20%) | | |
| Molybdenum | 50.0 | C | 2.59 | | 52.6 | ug/L | 0.881 | 99.9 | (0%-20%) | | 08/11/16 12:23 |
| Nickel | 50.0 | C | 11.6 | | 68.6 | ug/L | 7.8 | 114 | (0%-20%) | | 08/10/16 23:19 |
| Selenium | 50.0 | | 5.50 | | 58.4 | ug/L | 0 | 106 | (0%-20%) | BAJ | 08/12/16 14:17 |
| Silver | 50.0 | U | 0.200 | | 49.9 | ug/L | 0.999 | 99.6 | (0%-20%) | SKJ | 08/10/16 23:19 |
| Strontium | 50.0 | | 289 | | 333 | ug/L | 0.465 | N/A | (0%-20%) | | 08/11/16 12:23 |
| Thallium | 50.0 | U | 0.450 | | 46.9 | ug/L | 1.8 | 93.5 | (0%-20%) | | 08/10/16 23:19 |
| Thorium | 50.0 | U | 0.383 | | 52.7 | ug/L | 6.15 | 105 | (0%-20%) | | |
| Tin | 50.0 | B | 1.06 | | 50.3 | ug/L | 0.753 | 98.5 | (0%-20%) | | |
| Uranium | 50.0 | | 3.28 | | 55.2 | ug/L | 5.09 | 104 | (0%-20%) | | |
| Zinc | 50.0 | BC | 5.46 | | 54.1 | ug/L | 2.2 | 97.3 | (0%-20%) | | |
| QC1203604200 401832002 PS | | | | | | | | | | | |
| Chromium | 50.0 | N | 19.9 | | 69.5 | ug/L | | 99.4 | (80%-120%) | | 08/10/16 23:23 |
| QC1203587758 401832002 SDILT | | | | | | | | | | | |
| Aluminum | | U | 13.7 | DU | 75.0 | ug/L | N/A | | (0%-10%) | | 08/10/16 23:27 |
| Antimony | | U | 0.349 | DU | 5.00 | ug/L | N/A | | (0%-10%) | | 08/11/16 03:43 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | |
| Batch 1582928 | | | | | | | | | | |
| Arsenic | | 7.02 | DU | 8.50 | ug/L | N/A | | (0%-10%) | BAJ | 08/12/16 14:19 |
| Barium | | 34.6 | D | 7.29 | ug/L | 5.26 | | (0%-10%) | SKJ | 08/11/16 12:28 |
| Beryllium | B | 0.204 | DU | 1.00 | ug/L | N/A | | (0%-10%) | | |
| Cadmium | B | 0.119 | DU | 0.550 | ug/L | N/A | | (0%-10%) | | 08/10/16 23:27 |
| Chromium | N | 19.9 | BD | 3.13 | ug/L | 21.2 | | (0%-10%) | | |
| Cobalt | B | 0.432 | DU | 0.500 | ug/L | N/A | | (0%-10%) | | |
| Lead | U | 0.079 | DU | 2.50 | ug/L | N/A | | (0%-10%) | | |
| Manganese | B | 2.88 | DU | 5.00 | ug/L | N/A | | (0%-10%) | | |
| Molybdenum | C | 2.59 | D | 0.604 | ug/L | 16.7 | | (0%-10%) | | 08/11/16 12:28 |
| Nickel | C | 11.6 | D | 2.34 | ug/L | 1.14 | | (0%-10%) | | 08/10/16 23:27 |
| Selenium | | 5.50 | DU | 7.50 | ug/L | N/A | | (0%-10%) | BAJ | 08/12/16 14:19 |
| Silver | U | 0.082 | DU | 1.00 | ug/L | N/A | | (0%-10%) | SKJ | 08/10/16 23:27 |
| Strontium | | 289 | D | 59.0 | ug/L | 2.19 | | (0%-10%) | | 08/11/16 12:28 |
| Thallium | U | 0.097 | DU | 2.25 | ug/L | N/A | | (0%-10%) | | 08/10/16 23:27 |
| Thorium | U | 0.140 | DU | 1.92 | ug/L | N/A | | (0%-10%) | | |
| Tin | B | 1.06 | DU | 5.00 | ug/L | N/A | | (0%-10%) | | |
| Uranium | | 3.28 | D | 0.649 | ug/L | .916 | | (0%-10%) | | |
| Zinc | BC | 5.46 | DU | 17.5 | ug/L | N/A | | (0%-10%) | | |
| Batch 1590070 | | | | | | | | | | |
| QC1203605785 LCS | | | | | | | | | | |
| Copper | 50.0 | | | 49.7 | ug/L | | 99.4 | (80%-120%) | BAJ | 08/15/16 10:27 |
| QC1203605784 MB | | | | | | | | | | |
| Copper | | | U | 0.350 | ug/L | | | | | 08/15/16 10:25 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis - ICPMS** | | | | | | | | | | | |
| Batch 1590070 | | | | | | | | | | | |
| QC1203605786 401832003 MS | | | | | | | | | | | |
| Copper | 50.0 | B | 0.491 | | 49.4 | ug/L | | 97.9 | (75%-125%) | BAJ | 08/15/16 10:30 |
| QC1203605787 401832003 MSD | | | | | | | | | | | |
| Copper | 50.0 | B | 0.491 | | 49.1 | ug/L | 0.7 | 97.2 | (0%-20%) | | 08/15/16 10:32 |
| QC1203605788 401832003 SDILT | | | | | | | | | | | |
| Copper | | B | 0.491 | DU | 1.75 | ug/L | N/A | | (0%-10%) | | 08/15/16 10:33 |
| **Metals Analysis-ICP** | | | | | | | | | | | |
| Batch 1582958 | | | | | | | | | | | |
| QC1203587806 LCS | | | | | | | | | | | |
| Boron | 500 | | | | 499 | ug/L | | 99.8 | (80%-120%) | HSC | 07/29/16 13:07 |
| Calcium | 5000 | | | | 4900 | ug/L | | 98 | (80%-120%) | | |
| Iron | 5000 | | | | 4860 | ug/L | | 97.1 | (80%-120%) | | |
| Magnesium | 5000 | | | | 4980 | ug/L | | 99.6 | (80%-120%) | | |
| Potassium | 5000 | | | | 4900 | ug/L | | 98.1 | (80%-120%) | | |
| Sodium | 5000 | | | | 5060 | ug/L | | 101 | (80%-120%) | | |
| Vanadium | 500 | | | | 495 | ug/L | | 98.9 | (80%-120%) | | |
| QC1203587805 MB | | | | | | | | | | | |
| Boron | | | | U | 15.0 | ug/L | | | | | 07/29/16 13:03 |
| Calcium | | | | U | 50.0 | ug/L | | | | | |
| Iron | | | | U | 30.0 | ug/L | | | | | |
| Magnesium | | | | U | 110 | ug/L | | | | | |
| Potassium | | | | U | 50.0 | ug/L | | | | | |
| Sodium | | | | U | 100 | ug/L | | | | | |
| Vanadium | | | | U | 1.00 | ug/L | | | | | |
| QC1203587807 401832002 MS | | | | | | | | | | | |
| Boron | 500 | U | 15.0 | | 521 | ug/L | | 102 | (75%-125%) | | 07/29/16 13:13 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | | Sample | Qual | QC | Units | RPD/D% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals Analysis-ICP** | | | | | | | | | | | |
| Batch 1582958 | | | | | | | | | | | |
| Calcium | 5000 | | 48900 | | 54800 | ug/L | | N/A | (75%-125%) | | |
| Iron | 5000 | | 103 | | 4900 | ug/L | | 95.9 | (75%-125%) | HSC | 07/29/16 13:13 |
| Magnesium | 5000 | | 13000 | | 18200 | ug/L | | 104 | (75%-125%) | | |
| Potassium | 5000 | | 6110 | | 11100 | ug/L | | 100 | (75%-125%) | | |
| Sodium | 5000 | | 12600 | | 18500 | ug/L | | 117 | (75%-125%) | | |
| Vanadium | 500 | | 26.1 | | 525 | ug/L | | 99.7 | (75%-125%) | | |
| QC1203587808 401832002 MSD | | | | | | | | | | | |
| Boron | 500 | U | 15.0 | | 535 | ug/L | 2.72 | 105 | (0%-20%) | | 07/29/16 13:16 |
| Calcium | 5000 | | 48900 | | 56600 | ug/L | 3.11 | N/A | (0%-20%) | | |
| Iron | 5000 | | 103 | | 4910 | ug/L | 0.23 | 96.1 | (0%-20%) | | |
| Magnesium | 5000 | | 13000 | | 18600 | ug/L | 2.4 | 113 | (0%-20%) | | |
| Potassium | 5000 | | 6110 | | 11500 | ug/L | 3.21 | 108 | (0%-20%) | | |
| Sodium | 5000 | | 12600 | | 18000 | ug/L | 2.22 | 109 | (0%-20%) | | |
| Vanadium | 500 | | 26.1 | | 533 | ug/L | 1.69 | 101 | (0%-20%) | | |
| QC1203587809 401832002 SDILT | | | | | | | | | | | |
| Boron | | U | 10.2 | DU | 75.0 | ug/L | N/A | | (0%-10%) | | 07/29/16 13:19 |
| Calcium | | | 48900 | D | 9860 | ug/L | .768 | | (0%-10%) | | |
| Iron | | | 103 | DU | 150 | ug/L | N/A | | (0%-10%) | | |
| Magnesium | | | 13000 | D | 2750 | ug/L | 5.92 | | (0%-10%) | | |
| Potassium | | | 6110 | D | 1210 | ug/L | 1.2 | | (0%-10%) | | |
| Sodium | | | 12600 | D | 2560 | ug/L | 1.59 | | (0%-10%) | | |
| Vanadium | | | 26.1 | D | 5.19 | ug/L | .675 | | (0%-10%) | | |

**Notes:**

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# QC Summary

**Workorder:** **401832**



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

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

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.

# General Chem Analysis

# Case Narrative

**General Chemistry**
**Technical Case Narrative**
**CH2MHill Plateau Remediation Company (CPRC)**
**SDG #: GEL401832**
**Work Order #: 401832**

**Product:** **Cyanide, Total**
**Analytical Method:** 9012_CYANIDE
**Analytical Procedure:** GL-GC-E-095 REV# 18
**Analytical Batches:** 1582169 and 1582168

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832006 | B35TT2 |
| 401832007 | B35TT3 |
| 401832009 | B35TV8 |
| 1203585920 | Method Blank (MB) |
| 1203585921 | Laboratory Control Sample (LCS) |
| 1203588009 | 401832006(B35TT2) Sample Duplicate (DUP) |
| 1203588010 | 401832006(B35TT2) Matrix Spike (MS) |

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

**Data Summary:**

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

**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.

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## Qualifier Definition Report
for

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL401832 GEL Work Order: 401832

**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.

**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: Aubrey Kingsbury**

**Date: 21 JUL 2016** **Title: Analyst I**

# Sample Data Summary

**GEL LABORATORIES LLC**
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# Certificate of Analysis

Report Date: July 21, 2016

| | |
|---|---|
| Company : | CH2MHill Plateau Remediation Company |
| Address : | MSIN R3-50 CHPRC<br>PO Box 1600<br>Richland, Washington 99352 |
| Contact: | Mr. Scot Fitzgerald |
| Project: | CHPRC SAF S16-007 |

| | | | |
|---|---|---|---|
| Client Sample ID: | B35TT2 | Project: | CPRC0S16007 |
| Sample ID: | 401832006 | Client ID: | CPRC001 |
| Matrix: | WATER | | |
| Collect Date: | 15-JUL-16 08:10 | | |
| Receive Date: | 19-JUL-16 | | |
| Collector: | Client | | |

| Parameter | Qualifier | Result | DL | RL | Units | PF | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Injection Analysis | | | | | | | | | | | | |
| 9012_CYANIDE: COMMON "As Received" | | | | | | | | | | | | |
| Cyanide, Total | | 29.0 | 1.67 | 5.00 | ug/L | 1.00 | 1 | AXH3 | 07/20/16 | 1055 | 1582169 | 1 |

The following Prep Methods were performed:

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 9010C Distillation | SW846 9010C Prep | AXH3 | 07/20/16 | 1010 | 1582168 |

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | 9012_CYANIDE | |

**Notes:**

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

# Certificate of Analysis

Report Date: July 21, 2016

| | |
|---|---|
| Company : | CH2MHill Plateau Remediation Company |
| Address : | MSIN R3-50 CHPRC<br>PO Box 1600<br>Richland, Washington 99352 |
| Contact: | Mr. Scot Fitzgerald |
| Project: | CHPRC SAF S16-007 |

| | | | |
|---|---|---|---|
| Client Sample ID: | B35TT3 | Project: | CPRC0S16007 |
| Sample ID: | 401832007 | Client ID: | CPRC001 |
| Matrix: | WATER | | |
| Collect Date: | 15-JUL-16 08:10 | | |
| Receive Date: | 19-JUL-16 | | |
| Collector: | Client | | |

| Parameter | Qualifier | Result | DL | RL | Units | PF | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Injection Analysis | | | | | | | | | | | | |
| 9012_CYANIDE: COMMON "As Received" | | | | | | | | | | | | |
| Cyanide, Total | | 28.7 | 1.67 | 5.00 | ug/L | 1.00 | 1 | AXH3 | 07/20/16 | 1058 | 1582169 | 1 |

The following Prep Methods were performed:

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 9010C Distillation | SW846 9010C Prep | AXH3 | 07/20/16 | 1010 | 1582168 |

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | 9012_CYANIDE | |

**Notes:**

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

# Certificate of Analysis

Report Date: July 21, 2016

| | |
|---|---|
| Company : | CH2MHill Plateau Remediation Company |
| Address : | MSIN R3-50 CHPRC<br>PO Box 1600<br>Richland, Washington 99352 |
| Contact: | Mr. Scot Fitzgerald |
| Project: | CHPRC SAF S16-007 |

| | | | |
|---|---|---|---|
| Client Sample ID: | B35TV8 | Project: | CPRC0S16007 |
| Sample ID: | 401832009 | Client ID: | CPRC001 |
| Matrix: | WATER | | |
| Collect Date: | 15-JUL-16 13:34 | | |
| Receive Date: | 19-JUL-16 | | |
| Collector: | Client | | |

| Parameter | Qualifier | Result | DL | RL | Units | PF | DF | Analyst | Date | Time | Batch | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Injection Analysis | | | | | | | | | | | | |
| 9012_CYANIDE: COMMON "As Received" | | | | | | | | | | | | |
| Cyanide, Total | | 42.0 | 1.67 | 5.00 | ug/L | 1.00 | 1 | AXH3 | 07/20/16 | 1059 | 1582169 | 1 |

The following Prep Methods were performed:

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| SW846 9010C Distillation | SW846 9010C Prep | AXH3 | 07/20/16 | 1010 | 1582168 |

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|---|---|---|
| 1 | 9012_CYANIDE | |

**Notes:**

# Quality Control Summary

# GEL LABORATORIES LLC

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

## QC Summary

**Report Date: July 21, 2016**



**CH2MHill Plateau Remediation Company**
**MSIN R3-50 CHPRC**
**PO Box 1600**
**Richland, Washington**

**Contact:** **Mr. Scot Fitzgerald**

**Workorder:** **401832**

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Flow Injection Analysis** | | | | | | | | | | |
| Batch 1582169 | | | | | | | | | | |
| QC1203588009 401832006 DUP | | | | | | | | | | |
| Cyanide, Total | | 29.0 | | 30.9 | ug/L | 6.34 | | (0%-20%) | AXH3 | 07/20/16 10:56 |
| QC1203585921 LCS | | | | | | | | | | |
| Cyanide, Total | 50.0 | | | 46.3 | ug/L | | 92.6 | (80%-120%) | | 07/20/16 10:22 |
| QC1203585920 MB | | | | | | | | | | |
| Cyanide, Total | | | U | 1.67 | ug/L | | | | | 07/20/16 10:21 |
| QC1203588010 401832006 MS | | | | | | | | | | |
| Cyanide, Total | 100 | 29.0 | | 134 | ug/L | | 105 | (75%-125%) | | 07/20/16 10:57 |

**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

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

# Case Narrative

**Radiochemistry**
**Technical Case Narrative**
**CH2MHill Plateau Remediation Company (CPRC)**
**SDG #: GEL401832**
**Work Order #: 401832**

**Product:** **I129LL_SEP_LEPS_GS: COMMON (low level)**
**Analytical Method:** DOE EML HASL-300,I-01 Modified
**Analytical Procedure:** GL-RAD-A-006 REV# 21
**Analytical Batch:** 1583841

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832001 | B35TK1 |
| 401832002 | B35TM1 |
| 1203590012 | Method Blank (MB) |
| 1203590013 | 401838001(NonSDG) Sample Duplicate (DUP) |
| 1203590014 | 401838001(NonSDG) Matrix Spike (MS) |
| 1203590015 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Product:** **GAMMA_GS:COMMON**
**Analytical Method:** 901.1_GAMMA_GS
**Analytical Procedure:** GL-RAD-A-013 REV# 25
**Analytical Batch:** 1584531

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832006 | B35TT2 |
| 401832007 | B35TT3 |
| 401832009 | B35TV8 |
| 1203591815 | Method Blank (MB) |
| 1203591816 | 402290002(NonSDG) Sample Duplicate (DUP) |
| 1203591817 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Product:** **SRISO_SEP_PRECIP_GPC: COMMON**
**Analytical Method:** SRISO_SEP_PRECIP_GPC
**Analytical Procedure:** GL-RAD-A-004 REV# 17
**Analytical Batch:** 1586574

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832004 | B35TN9 |
| 1203596848 | Method Blank (MB) |
| 1203596849 | 401832004(B35TN9) Sample Duplicate (DUP) |
| 1203596850 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Technical Information**

**Recounts**
Sample 401832004 (B35TN9) was recounted due to high MDC. The recount is reported. Samples 1203596848 (MB) and 1203596849 (B35TN9DUP) were recounted due to results more negative than the three sigma TPU. The second counts are reported.

**Product:** **9310_ALPHABETA_GPC: COMMON**
**Analytical Method:** 9310_ALPHABETA_GPC
**Analytical Procedure:** GL-RAD-A-001 REV# 18
**Analytical Batch:** 1586575

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832001 | B35TK1 |
| 401832002 | B35TM1 |
| 1203596851 | Method Blank (MB) |
| 1203596852 | 402539004(B35TL7) Sample Duplicate (DUP) |

| | |
|---|---|
| 1203596853 | 402539004(B35TL7) Matrix Spike (MS) |
| 1203596854 | 402539004(B35TL7) Matrix Spike Duplicate (MSD) |
| 1203596855 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Technical Information**

**Gross Alpha/Beta Preparation Information**
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

**Miscellaneous Information**

**Additional Comments**
The matrix spike and matrix spike duplicate, 1203596853 (B35TL7MS) and 1203596854 (B35TL7MSD), aliquots were reduced to conserve sample volume.

**Product:** **TC99_EIE_LSC: COMMON**
**Analytical Method:** TC99_EIE_LSC
**Analytical Procedure:** GL-RAD-A-059 REV# 4
**Analytical Batch:** 1585343

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832001 | B35TK1 |
| 401832004 | B35TN9 |
| 401832010 | B35V28 |
| 401832011 | B35V39 |
| 1203593731 | Method Blank (MB) |
| 1203593732 | 401768001(NonSDG) Sample Duplicate (DUP) |
| 1203593733 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Technical Information**

**Recounts**
Samples 401832001 (B35TK1), 401832004 (B35TN9) and 401832011 (B35V39) were recounted to verify sample results. Recounts are reported.

**Product:** **TRITIUM_DIST_LSC: COMMON**
**Analytical Method:** TRITIUM_DIST_LSC
**Analytical Procedure:** GL-RAD-A-002 REV# 21
**Analytical Batch:** 1585740

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

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 401832002 | B35TM1 |
| 401832010 | B35V28 |
| 1203594768 | Method Blank (MB) |
| 1203594769 | 401768001(NonSDG) Sample Duplicate (DUP) |
| 1203594770 | 401768001(NonSDG) Matrix Spike (MS) |
| 1203594771 | Laboratory Control Sample (LCS) |

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

**Data Summary:**

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

**Technical Information**

**Recounts**
Samples 401832002 (B35TM1) and 401832010 (B35V28) were recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

**Certification Statement**

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

# GEL LABORATORIES LLC

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

## Qualifier Definition Report
for

CPRC001 CH2MHill Plateau Remediation Company

Client SDG: GEL401832 GEL Work Order: 401832

**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.

**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:** Theresa L Austin **Name: Theresa Austin**

**Date: 17 AUG 2016** **Title: Group Leader**

# Sample Data Summary

# Rad
## Certificate of Analysis
## Sample Summary

| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832001** | **Date Collected:** | **07/15/2016 11:30** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TK1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1586575** | **Method:** | **9310_ALPHABETA_GPC** | **SOP Ref:** | **GL-RAD-A-001** |
| **Run Date:** | **08/11/2016 12:16** | **Analyst:** | **JXC9** | **Instrument:** | **PIC1A** |
| **Data File:** | **AB1586575.xls** | **Aliquot:** | **150 mL** | **Count Time:** | **160 min** |
| **Prep Batch:** | **1586575** | **Prep Method:** | **EPA 900.0/SW846 9310** | | |
| **Prep Date:** | **08/09/2016 10:27** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 12587-46-1 | Alpha<br>*ALPHA* | | 3.37 | pCi/L | +/-2.09 | 2.17 | 2.92 | 3.00 |
| 12587-47-2 | Beta<br>*BETA* | | 50.1 | pCi/L | +/-3.10 | 8.70 | 1.78 | 4.00 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832001** | **Date Collected:** | **07/15/2016 11:30** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TK1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1583841** | **Method:** | **DOE EML HASL-300,I-01 Mo** | **SOP Ref:** | **GL-RAD-A-006** |
| **Run Date:** | **08/12/2016 06:49** | **Analyst:** | **MJH1** | **Instrument:** | **XRAY2** |
| **Data File:** | **I401832001.CNF;2** | **Aliquot:** | **1.5 L** | **Count Time:** | **60 min** |
| **Prep Batch:** | **1583841** | **Prep Method:** | **DOE EML HASL-300,I-01 M** | | |
| **Prep Date:** | **08/10/2016 00:00** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 15046-84-1 | Iodine-129 | U | -0.0615 | pCi/L | +/-0.508 | 0.508 | 0.996 | 1.00 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832001** | **Date Collected:** | **07/15/2016 11:30** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TK1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585343** | **Method:** | **TC99_EIE_LSC** | **SOP Ref:** | **GL-RAD-A-059** |
| **Run Date:** | **08/10/2016 09:23** | **Analyst:** | **GXR1** | **Instrument:** | **LSCGREEN** |
| **Data File:** | **E1585343R.xls** | **Aliquot:** | **100 mL** | **Count Time:** | **20 min** |
| **Prep Batch:** | **1585343** | **Prep Method:** | **DOE EML HASL-300, Tc-02-** | | |
| **Prep Date:** | **08/05/2016 15:35** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 14133-76-7 | Technetium-99 | | 78.1 | pCi/L | +/-26.0 | 27.4 | 40.4 | 50.0 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| Technetium-99m Tracer | 27600 | 31300 | CPM | 88.3 | (30%-105%) |

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832002** | **Date Collected:** | **07/15/2016 12:15** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TM1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1586575** | **Method:** | **9310_ALPHABETA_GPC** | **SOP Ref:** | **GL-RAD-A-001** |
| **Run Date:** | **08/11/2016 12:33** | **Analyst:** | **JXC9** | **Instrument:** | **LB4100F1** |
| **Data File:** | **AB1586575.xls** | **Aliquot:** | **150 mL** | **Count Time:** | **100 min** |
| **Prep Batch:** | **1586575** | **Prep Method:** | **EPA 900.0/SW846 9310** | | |
| **Prep Date:** | **08/09/2016 10:27** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 12587-46-1 | Alpha<br>*ALPHA* | U | 0.506 | pCi/L | +/-1.54 | 1.54 | 3.00 | 3.00 |
| 12587-47-2 | Beta<br>*BETA* | | 8.04 | pCi/L | +/-2.04 | 2.42 | 2.60 | 4.00 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832002** | **Date Collected:** | **07/15/2016 12:15** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TM1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1583841** | **Method:** | **DOE EML HASL-300,I-01 Mo** | **SOP Ref:** | **GL-RAD-A-006** |
| **Run Date:** | **08/12/2016 06:57** | **Analyst:** | **MJH1** | **Instrument:** | **XRAY4** |
| **Data File:** | **I401832002.CNF;2** | **Aliquot:** | **1.5 L** | **Count Time:** | **60 min** |
| **Prep Batch:** | **1583841** | **Prep Method:** | **DOE EML HASL-300,I-01 M** | | |
| **Prep Date:** | **08/10/2016 00:00** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 15046-84-1 | Iodine-129 | | 2.30 | pCi/L | +/-0.946 | 0.972 | 0.912 | 1.00 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832002** | **Date Collected:** | **07/15/2016 12:15** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TM1** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585740** | **Method:** | **TRITIUM_DIST_LSC** | **SOP Ref:** | **GL-RAD-A-002** |
| **Run Date:** | **08/06/2016 03:14** | **Analyst:** | **KXA1** | **Instrument:** | **LSCBROWN** |
| **Data File:** | **T1585740.xls** | **Aliquot:** | **50 mL** | **Count Time:** | **45 min** |
| **Prep Batch:** | **1585740** | **Prep Method:** | **EPA 906.0 Modified** | | |
| **Prep Date:** | **08/05/2016 11:31** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10028-17-8 | Tritium | | 2120 | pCi/L | +/-295 | 505 | 363 | 400 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832004** | **Date Collected:** | **07/15/2016 13:43** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TN9** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1586574** | **Method:** | **SRISO_SEP_PRECIP_GPC** | **SOP Ref:** | **GL-RAD-A-004** |
| **Run Date:** | **08/16/2016 17:35** | **Analyst:** | **KSD1** | **Instrument:** | **PIC4B** |
| **Data File:** | **S1586574r2.xls** | **Aliquot:** | **300 mL** | **Count Time:** | **80 min** |
| **Prep Batch:** | **1586574** | **Prep Method:** | **EPA 905.0 Modified/DOE RP5** | | |
| **Prep Date:** | **08/15/2016 17:10** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10098-97-2 | Strontium-90 | U | 0.527 | pCi/L | +/-1.09 | 1.09 | 1.88 | 2.00 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| Strontium Carrier | 6.70 | 7.37 | mg | 91 | (40%-110%) |

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832004** | **Date Collected:** | **07/15/2016 13:43** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TN9** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585343** | **Method:** | **TC99_EIE_LSC** | **SOP Ref:** | **GL-RAD-A-059** |
| **Run Date:** | **08/10/2016 09:44** | **Analyst:** | **GXR1** | **Instrument:** | **LSCGREEN** |
| **Data File:** | **E1585343R.xls** | **Aliquot:** | **100 mL** | **Count Time:** | **20 min** |
| **Prep Batch:** | **1585343** | **Prep Method:** | **DOE EML HASL-300, Tc-02-** | | |
| **Prep Date:** | **08/05/2016 15:35** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 14133-76-7 | Technetium-99 | | 3440 | pCi/L | +/-81.6 | 391 | 40.8 | 50.0 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| Technetium-99m Tracer | 27300 | 31300 | CPM | 87.1 | (30%-105%) |

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary

| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832006** | **Date Collected:** | **07/15/2016 08:10** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TT2** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1584531** | **Method:** | **901.1_GAMMA_GS** | **SOP Ref:** | **GL-RAD-A-013** |
| **Run Date:** | **08/11/2016 11:27** | **Analyst:** | **MXR1** | **Instrument:** | **GAM44** |
| **Data File:** | **G401832006.CNF;1** | **Aliquot:** | **2 L** | **Count Time:** | **120 min** |
| **Prep Batch:** | **1584531** | **Prep Method:** | **EPA 901.1** | | |
| **Prep Date:** | **08/10/2016 00:00** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10045-97-3 | Cesium-137 | U | 0.231 | pCi/L | +/-2.86 | 2.86 | 5.50 | 15.0 |
| 10198-40-0 | Cobalt-60 | U | 3.02 | pCi/L | +/-4.30 | 4.52 | 7.94 | |
| 14683-23-9 | Europium-152 | U | -7.98 | pCi/L | +/-8.64 | 9.40 | 14.2 | |
| 15585-10-1 | Europium-154 | U | 2.04 | pCi/L | +/-7.99 | 8.04 | 16.7 | |
| 14391-16-3 | Europium-155 | U | -5.98 | pCi/L | +/-10.9 | 11.3 | 18.5 | |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary

| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832007** | **Date Collected:** | **07/15/2016 08:10** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TT3** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1584531** | **Method:** | **901.1_GAMMA_GS** | **SOP Ref:** | **GL-RAD-A-013** |
| **Run Date:** | **08/11/2016 12:17** | **Analyst:** | **MXR1** | **Instrument:** | **GAM16** |
| **Data File:** | **G401832007.CNF;1** | **Aliquot:** | **2 L** | **Count Time:** | **120 min** |
| **Prep Batch:** | **1584531** | **Prep Method:** | **EPA 901.1** | | |
| **Prep Date:** | **08/10/2016 00:00** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10045-97-3 | Cesium-137 | U | 1.21 | pCi/L | +/-2.31 | 2.37 | 4.75 | 15.0 |
| 10198-40-0 | Cobalt-60 | U | 2.23 | pCi/L | +/-2.64 | 2.83 | 5.93 | |
| 14683-23-9 | Europium-152 | U | -0.767 | pCi/L | +/-7.33 | 7.34 | 13.3 | |
| 15585-10-1 | Europium-154 | U | 0.321 | pCi/L | +/-5.84 | 5.84 | 12.1 | |
| 14391-16-3 | Europium-155 | U | -3.25 | pCi/L | +/-9.75 | 9.86 | 16.9 | |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary

| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832009** | **Date Collected:** | **07/15/2016 13:34** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35TV8** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1584531** | **Method:** | **901.1_GAMMA_GS** | **SOP Ref:** | **GL-RAD-A-013** |
| **Run Date:** | **08/11/2016 12:18** | **Analyst:** | **MXR1** | **Instrument:** | **GAM06** |
| **Data File:** | **G401832009.CNF;1** | **Aliquot:** | **2 L** | **Count Time:** | **120 min** |
| **Prep Batch:** | **1584531** | **Prep Method:** | **EPA 901.1** | | |
| **Prep Date:** | **08/10/2016 00:00** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10045-97-3 | Cesium-137 | U | 1.96 | pCi/L | +/-2.69 | 2.83 | 5.72 | 15.0 |
| 10198-40-0 | Cobalt-60 | U | 1.41 | pCi/L | +/-3.24 | 3.31 | 6.90 | |
| 14683-23-9 | Europium-152 | U | -0.597 | pCi/L | +/-8.36 | 8.37 | 15.3 | |
| 15585-10-1 | Europium-154 | U | 1.38 | pCi/L | +/-6.35 | 6.38 | 14.0 | |
| 14391-16-3 | Europium-155 | U | -1.84 | pCi/L | +/-9.87 | 9.90 | 17.5 | |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832010** | **Date Collected:** | **07/17/2016 14:20** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35V28** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585343** | **Method:** | **TC99_EIE_LSC** | **SOP Ref:** | **GL-RAD-A-059** |
| **Run Date:** | **08/09/2016 11:37** | **Analyst:** | **GXR1** | **Instrument:** | **LSCGOLD** |
| **Data File:** | **E1585343.xls** | **Aliquot:** | **100 mL** | **Count Time:** | **20 min** |
| **Prep Batch:** | **1585343** | **Prep Method:** | **DOE EML HASL-300, Tc-02-** | | |
| **Prep Date:** | **08/05/2016 15:35** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 14133-76-7 | Technetium-99 | U | -14.2 | pCi/L | +/-22.3 | 22.3 | 39.7 | 50.0 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| Technetium-99m Tracer | 28500 | 31300 | CPM | 91.1 | (30%-105%) |

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832010** | **Date Collected:** | **07/17/2016 14:20** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35V28** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585740** | **Method:** | **TRITIUM_DIST_LSC** | **SOP Ref:** | **GL-RAD-A-002** |
| **Run Date:** | **08/06/2016 04:01** | **Analyst:** | **KXA1** | **Instrument:** | **LSCBROWN** |
| **Data File:** | **T1585740.xls** | **Aliquot:** | **50 mL** | **Count Time:** | **45 min** |
| **Prep Batch:** | **1585740** | **Prep Method:** | **EPA 906.0 Modified** | | |
| **Prep Date:** | **08/05/2016 11:31** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 10028-17-8 | Tritium | | 5650 | pCi/L | +/-396 | 1160 | 353 | 400 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|

**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).**
**The MDC is a sample specific MDC.**

# Rad
## Certificate of Analysis
## Sample Summary



| | | | | | |
|---|---|---|---|---|---|
| **SDG Number:** | **GEL401832** | **Client:** | **CPRC001** | **Project:** | **CPRC0S16007** |
| **Lab Sample ID:** | **401832011** | **Date Collected:** | **07/17/2016 11:36** | **Matrix:** | **WATER** |
| | | **Date Received:** | **07/19/2016 09:15** | | |
| **Client ID:** | **B35V39** | | | **Prep Basis:** | **"As Received"** |
| **Batch ID:** | **1585343** | **Method:** | **TC99_EIE_LSC** | **SOP Ref:** | **GL-RAD-A-059** |
| **Run Date:** | **08/10/2016 10:06** | **Analyst:** | **GXR1** | **Instrument:** | **LSCGREEN** |
| **Data File:** | **E1585343R.xls** | **Aliquot:** | **100 mL** | **Count Time:** | **20 min** |
| **Prep Batch:** | **1585343** | **Prep Method:** | **DOE EML HASL-300, Tc-02-** | | |
| **Prep Date:** | **08/05/2016 15:35** | | | | |

| CAS No. | Parmname | Qual | Result | Units | Uncert | TPU | MDC | RDL |
|---|---|---|---|---|---|---|---|---|
| 14133-76-7 | Technetium-99 | | 475 | pCi/L | +/-37.3 | 64.6 | 40.8 | 50.0 |

| Surrogate/Tracer recovery | Result | Nominal | Units | Recovery% | Acceptable Limits |
|---|---|---|---|---|---|
| Technetium-99m Tracer | 27400 | 31300 | CPM | 87.4 | (30%-105%) |

**Comments:**

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

**The MDC is a sample specific MDC.**

# Quality Control Summary

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## QC Summary

**Report Date: August 17, 2016**
**Page 1 of 5**

**Client :** **CH2MHill Plateau Remediation Company**
**MSIN R3-50 CHPRC**
**PO Box 1600**
**Richland, Washington 99352**

**Contact:** **Mr. Scot Fitzgerald**

**Workorder:** **401832**

| Parmname | NOM | Sample | Qual | QC | Units | QC Criteria | Range | Analyst | Date Time |
|---|---|---|---|---|---|---|---|---|---|
| **Rad Gamma Spec** | | | | | | | | | |
| Batch 1583841 | | | | | | | | | |
| QC1203590012 MB | | | | | | | | | |
| Iodine-129 | | | U | 0.0633 | pCi/L | | | MJH1 | 08/12/16 09:55 |
| Uncert: | | | | +/-0.467 | | | | | |
| TPU: | | | | +/-0.468 | | | | | |
| QC1203590013 401838001 DUP | | | | | | | | | |
| Iodine-129 | U | 0.408 | | 1.43 | pCi/L | | | | 08/12/16 12:34 |
| Uncert: | | +/-0.588 | | +/-1.21 | | RPD: 77 | (0% - 100%) | | |
| TPU: | | +/-0.589 | | +/-1.22 | | RER: 1.48 | (0-2) | | |
| QC1203590014 401838001 MS | | | | | | | | | |
| Iodine-129 | 27.7 U | 0.408 | | 29.1 | pCi/L | REC: 103 | (75%-125%) | | 08/12/16 14:09 |
| Uncert: | | +/-0.588 | | +/-2.87 | | | | | |
| TPU: | | +/-0.589 | | +/-4.05 | | | | | |
| QC1203590015 LCS | | | | | | | | | |
| Iodine-129 | 27.7 | | | 31.3 | pCi/L | REC: 113 | (80%-120%) | | 08/12/16 14:10 |
| Uncert: | | | | +/-2.86 | | | | | |
| TPU: | | | | +/-4.19 | | | | | |
| Batch 1584531 | | | | | | | | | |
| QC1203591815 MB | | | | | | | | | |
| Cesium-137 | | | U | 1.75 | pCi/L | | | MXR1 | 08/11/16 12:37 |
| Uncert: | | | | +/-3.49 | | | | | |
| TPU: | | | | +/-3.58 | | | | | |
| Cobalt-60 | | | U | 2.25 | pCi/L | | | | |
| Uncert: | | | | +/-3.83 | | | | | |
| TPU: | | | | +/-3.97 | | | | | |
| Europium-152 | | | U | -4.96 | pCi/L | | | | |
| Uncert: | | | | +/-9.27 | | | | | |
| TPU: | | | | +/-9.54 | | | | | |
| Europium-154 | | | U | -3.78 | pCi/L | | | | |
| Uncert: | | | | +/-8.71 | | | | | |
| TPU: | | | | +/-8.88 | | | | | |
| Europium-155 | | | U | 4.89 | pCi/L | | | | |
| Uncert: | | | | +/-10.3 | | | | | |
| TPU: | | | | +/-10.3 | | | | | |
| QC1203591816 402290002 DUP | | | | | | | | | |
| Cesium-137 | U | -1.13 | U | -2.09 | pCi/L | | | | 08/11/16 13:54 |
| Uncert: | | +/-3.52 | | +/-2.36 | | RPD: 0 | N/A | | |
| TPU: | | +/-3.56 | | +/-2.55 | | RER: 0.429 | (0-2) | | |
| Cobalt-60 | U | -0.198 | U | 0.402 | pCi/L | | | | |
| Uncert: | | +/-2.85 | | +/-2.14 | | RPD: 0 | N/A | | |
| TPU: | | +/-2.85 | | +/-2.15 | | RER: 0.329 | (0-2) | | |
| Europium-152 | U | -5.37 | U | -1.81 | pCi/L | | | | |
| Uncert: | | +/-8.53 | | +/-8.56 | | RPD: 0 | N/A | | |
| TPU: | | +/-8.88 | | +/-8.60 | | RER: 0.564 | (0-2) | | |
| Europium-154 | U | -0.948 | U | -5.86 | pCi/L | | | | |
| Uncert: | | +/-8.99 | | +/-6.87 | | RPD: 0 | N/A | | |

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# QC Summary

**Workorder: 401832**



| Parmname | NOM | Sample | Qual | QC | Units | QC Criteria | Range | Analyst | Date Time |
|---|---|---|---|---|---|---|---|---|---|
| **Rad Gamma Spec** | | | | | | | | | |
| Batch 1584531 | | | | | | | | | |
| | TPU: | +/-9.00 | | +/-7.37 | | | | | |
| | | | | | | RER: | 0.828 | (0-2) | |
| Europium-155 | U | -14.2 | U | 1.50 | pCi/L | | | | |
| | Uncert: | +/-12.2 | | +/-11.2 | | RPD: | 0 | N/A | |
| | TPU: | +/-13.9 | | +/-11.2 | | RER: | 1.73 | (0-2) | |
| QC1203591817 LCS | | | | | | | | | |
| Americium-241 | 34400 | | | 36800 | pCi/L | REC: | 107 | (80%-120%) | 08/11/1614:18 |
| | Uncert: | | | +/-1240 | | | | | |
| | TPU: | | | +/-3000 | | | | | |
| Cesium-137 | 13400 | | | 14200 | pCi/L | REC: | 106 | (80%-120%) | |
| | Uncert: | | | +/-360 | | | | | |
| | TPU: | | | +/-708 | | | | | |
| Cobalt-60 | 13300 | | | 13400 | pCi/L | REC: | 101 | (80%-120%) | |
| | Uncert: | | | +/-393 | | | | | |
| | TPU: | | | +/-631 | | | | | |
| Europium-152 | | | U | -22 | pCi/L | | | | |
| | Uncert: | | | +/-240 | | | | | |
| | TPU: | | | +/-240 | | | | | |
| Europium-154 | | | U | -39.8 | pCi/L | | | | |
| | Uncert: | | | +/-121 | | | | | |
| | TPU: | | | +/-123 | | | | | |
| Europium-155 | | | U | 151 | pCi/L | | | | |
| | Uncert: | | | +/-289 | | | | | |
| | TPU: | | | +/-297 | | | | | |
| **Rad Gas Flow** | | | | | | | | | |
| Batch 1586574 | | | | | | | | | |
| QC1203596848 MB | | | | | | | | | |
| Strontium-90 | | | U | -0.162 | pCi/L | | | KSD1 | 08/16/1615:04 |
| | Uncert: | | | +/-0.576 | | | | | |
| | TPU: | | | +/-0.576 | | | | | |
| **Strontium Carrier | 7.37 | | | 7.10 | mg | REC: | 96 | (40%-110%) | |
| QC1203596849 401832004 DUP | | | | | | | | | |
| Strontium-90 | U | 0.527 | U | 0.967 | pCi/L | | | | 08/16/1615:04 |
| | Uncert: | +/-1.09 | | +/-1.13 | | RPD: | 0 | N/A | |
| | TPU: | +/-1.09 | | +/-1.14 | | RER: | 0.547 | (0-2) | |
| **Strontium Carrier | 7.37 | 6.70 | | 7.20 | mg | REC: | 98 | (40%-110%) | |
| QC1203596850 LCS | | | | | | | | | |
| Strontium-90 | 72.7 | | | 75.2 | pCi/L | REC: | 103 | (80%-120%) | 08/16/1612:31 |
| | Uncert: | | | +/-4.29 | | | | | |
| | TPU: | | | +/-12.5 | | | | | |
| **Strontium Carrier | 7.37 | | | 6.70 | mg | REC: | 91 | (40%-110%) | |
| Batch 1586575 | | | | | | | | | |
| QC1203596851 MB | | | | | | | | | |
| Alpha | | | U | -1.21 | pCi/L | | | JXC9 | 08/11/1613:00 |
| | Uncert: | | | +/-0.584 | | | | | |
| | TPU: | | | +/-0.584 | | | | | |
| Beta | | | U | 0.0261 | pCi/L | | | | |
| | Uncert: | | | +/-1.56 | | | | | |

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# QC Summary

**Workorder: 401832**



| Parmname | NOM | Sample | Qual | QC | Units | QC Criteria | Range | Analyst | Date Time |
|---|---|---|---|---|---|---|---|---|---|
| **Rad Gas Flow** | | | | | | | | | |
| Batch 1586575 | | | | | | | | | |
| | TPU: | | | +/-1.57 | | | | | |
| QC1203596852 402539004 DUP | | | | | | | | | |
| Alpha | | 2.99 | U | 2.19 | pCi/L | | | | 08/11/1613:01 |
| | Uncert: | +/-2.05 | | +/-1.91 | | RPD: 31 | (0% - 100%) | | |
| | TPU: | +/-2.11 | | +/-1.94 | | RER: 0.549 | (0-2) | | |
| Beta | | 6.71 | | 3.71 | pCi/L | | | | |
| | Uncert: | +/-2.02 | | +/-1.75 | | RPD: 58 | (0% - 100%) | | |
| | TPU: | +/-2.30 | | +/-1.85 | | RER: 1.99 | (0-2) | | |
| QC1203596853 402539004 MS | | | | | | | | | |
| Alpha | 240 | 2.99 | | 264 | pCi/L | REC: 109 | (75%-125%) | | 08/11/1613:01 |
| | Uncert: | +/-2.05 | | +/-26.1 | | | | | |
| | TPU: | +/-2.11 | | +/-50.5 | | | | | |
| Beta | 873 | 6.71 | | 1010 | pCi/L | REC: 115 | (75%-125%) | | |
| | Uncert: | +/-2.02 | | +/-37.3 | | | | | |
| | TPU: | +/-2.30 | | +/-170 | | | | | |
| QC1203596854 402539004 MSD | | | | | | | | | |
| Alpha | 240 | 2.99 | | 235 | pCi/L | REC: 97 | (75%-125%) | | 08/11/1613:01 |
| | Uncert: | +/-2.05 | | +/-24.2 | | RPD: 12 | (0%-20%) | | |
| | TPU: | +/-2.11 | | +/-45.5 | | RER: 0.831 | (0-2) | | |
| Beta | 873 | 6.71 | | 975 | pCi/L | REC: 111 | (75%-125%) | | |
| | Uncert: | +/-2.02 | | +/-36.5 | | RPD: 3 | (0%-20%) | | |
| | TPU: | +/-2.30 | | +/-164 | | RER: 0.268 | (0-2) | | |
| QC1203596855 LCS | | | | | | | | | |
| Alpha | 79.9 | | | 71.8 | pCi/L | REC: 90 | (80%-120%) | | 08/11/1613:01 |
| | Uncert: | | | +/-7.14 | | | | | |
| | TPU: | | | +/-14.0 | | | | | |
| Beta | 291 | | | 343 | pCi/L | REC: 118 | (80%-120%) | | |
| | Uncert: | | | +/-12.3 | | | | | |
| | TPU: | | | +/-57.9 | | | | | |
| **Rad Liquid Scintillation** | | | | | | | | | |
| Batch 1585343 | | | | | | | | | |
| QC1203593731 MB | | | | | | | | | |
| Technetium-99 | | | U | -20.8 | pCi/L | | | GXR1 | 08/09/1613:47 |
| | Uncert: | | | +/-24.5 | | | | | |
| | TPU: | | | +/-24.5 | | | | | |
| **Technetium-99m Tracer | 31300 | | | 25700 | CPM | REC: 82 | (30%-105%) | | |
| QC1203593732 401768001 DUP | | | | | | | | | |
| Technetium-99 | U | 18.2 | U | 10.1 | pCi/L | | | | 08/09/1614:08 |
| | Uncert: | +/-25.0 | | +/-25.2 | | RPD: 0 | N/A | | |
| | TPU: | +/-25.0 | | +/-25.2 | | RER: 0.449 | (0-2) | | |
| **Technetium-99m Tracer | 31300 | 26800 | | 26200 | CPM | REC: 84 | (30%-105%) | | |
| QC1203593733 LCS | | | | | | | | | |
| Technetium-99 | 861 | | | 799 | pCi/L | REC: 93 | (80%-120%) | | 08/09/1614:30 |
| | Uncert: | | | +/-43.5 | | | | | |
| | TPU: | | | +/-98.8 | | | | | |
| **Technetium-99m Tracer | 31300 | | | 28400 | CPM | REC: 91 | (30%-105%) | | |
| Batch 1585740 | | | | | | | | | |
| QC1203594768 MB | | | | | | | | | |
| Tritium | | | U | 23.5 | pCi/L | | | KXA1 | 08/06/1609:31 |
| | Uncert: | | | +/-204 | | | | | |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | Sample | Qual | QC | Units | QC Criteria | | Range | Analyst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rad Liquid Scintillation** | | | | | | | | | | |
| Batch 1585740 | | | | | | | | | | |
| | TPU: | | | +/-204 | | | | | | |
| QC1203594769 401768001 DUP | | | | | | | | | | |
| Tritium | | U 349 | U | 281 | pCi/L | | | | | 08/06/1610:18 |
| | Uncert: | +/-216 | | +/-208 | | RPD: | 0 | N/A | | |
| | TPU: | +/-226 | | +/-215 | | RER: | 0.425 | (0-2) | | |
| QC1203594770 401768001 MS | | | | | | | | | | |
| Tritium | 2320 | U 349 | | 2270 | pCi/L | REC: | 98 | (75%-125%) | | 08/06/1611:05 |
| | Uncert: | +/-216 | | +/-301 | | | | | | |
| | TPU: | +/-226 | | +/-533 | | | | | | |
| QC1203594771 LCS | | | | | | | | | | |
| Tritium | 2310 | | | 1980 | pCi/L | REC: | 86 | (80%-120%) | | 08/06/1611:53 |
| | Uncert: | | | +/-289 | | | | | | |
| | TPU: | | | +/-479 | | | | | | |

**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 >= 2X the MDA and, after corrections, result is >= MDA for this sample |
| 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. |
| 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 |

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# QC Summary

**Workorder:** **401832**



| Parmname | NOM | Sample | Qual | QC | Units | QC Criteria | Range | Analyst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|

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 acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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