

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium Monitoring) Q4 Watershed Sampling

SAMPLE ID: CAMO-12-21746 WORK ORDER: NA

| | <u>AS PLANNED</u> | <u>AS COLLECTED</u> | | <u>AS PLANNED</u> | <u>AS COLLECTED</u> |
|------------------------------|-------------------|---------------------|--------------------|-------------------|---------------------|
| DATE COLLECTED (MM/DD/YYYY): | | 8/16/2012 | FIELD MATRIX: | WG | OK |
| TIME COLLECTED (HH:MM): | | 1148 | MEDIA: | UA | ↓ |
| PRS ID: | | OK | SAMPLE TECH CODE: | UA | 6SP |
| LOCATION ID: R-50 S2 | | ↓ | FIELD PREP: | F | OK |
| LOCATION TYPE: MON | | ↓ | FIELD QC TYPE: REG | | ↓ |
| PORT: P2A | | ↓ | SAMPLE USAGE: INV | | ↓ |

| PRIORITY | ORDER | CONTAINER | # | PRESERVATIVE | COLLECTED Y/N | SPECIAL INSTRUCTIONS |
|----------|---------------------|--------------------|---|--------------|---------------|----------------------|
| Y | WSP-GENINORG | 1 LITER POLY | 1 | ICE | Y | NA |
| ↓ | WSP-Met+B+SN+SR+U | 1 LITER POLY | 1 | HNO3 | ↓ | ↓ |
| ↓ | WSP-NH3+NO3/NO2+PO4 | 500 ML AMBER GLASS | 1 | H2SO4 | ↓ | ↓ |

SAMPLE COMMENTS: Collected within 50 ft of diesel generator. Slightly effervescent.

LOCATION COMMENTS: None

FIELD PARAMETERS:

Dissolved Oxygen 6.43 mg/L Oxidation-Reduction Potential 201.7 MV pH 8.06 SU

Specific Conductance 127 uS/cm Temperature 21.64 deg C Turbidity 0.43 NTU

COLLECTED BY (PRINT) D. Woody

| | | | |
|--|--|---|--|
| RELINQUISHED BY (Printed Name) <u>Megan Green</u> (Signature) <u>[Signature]</u> | Date/Time <u>8/16/12</u> <u>1235</u> | RECEIVED BY (Printed Name) <u>Sherwood</u> (Signature) <u>[Signature]</u> | Date/Time <u>8/16/12</u> <u>1235</u> |
| RELINQUISHED BY (Printed Name) (Signature) | Date/Time | RECEIVED BY (Printed Name) (Signature) | Date/Time |

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955 EVENT NAME: Mortandad (Chromium Monitoring) Q4 Watershed Sampling
 SAMPLE ID: CAMO-12-21738 WORK ORDER: NA

| | <u>AS PLANNED</u> | <u>AS COLLECTED</u> | | <u>AS PLANNED</u> | <u>AS COLLECTED</u> |
|------------------------------|-------------------|---------------------|--------------------|-------------------|---------------------|
| DATE COLLECTED (MM/DD/YYYY): | | 8/16/2012 | FIELD MATRIX: | WG | OK |
| TIME COLLECTED (HH:MM): | | 1148 | MEDIA: | UA | ↓ |
| PRS ID: | | OK | SAMPLE TECH CODE: | UA | 6SP |
| LOCATION ID: R-50 S2 | | ↓ | FIELD PREP: | UF | OK |
| LOCATION TYPE: MON | | ↓ | FIELD QC TYPE: REG | | ↓ |
| PORT: P2A | | ↓ | SAMPLE USAGE: INV | | ↓ |

| PRIORITY | ORDER | CONTAINER | # | PRESERVATIVE | COLLECTED Y/N | SPECIAL INSTRUCTIONS |
|----------|--------------|--------------------|---|--------------|---------------|----------------------|
| NA | WSP-GrossA/B | 1 LITER POLY | 1 | NONE | Y | NA |
| ↓ | WSP-RAD | 1 GAL POLY | 1 | HNO3 | ↓ | ↓ |
| ↓ | WSP-TKN+TOC | 500 ML AMBER GLASS | 1 | H2SO4 | ↓ | ↓ |

SAMPLE COMMENTS: see CAMO-12-21746

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen _____ mg/L Oxidation-Reduction Potential _____ MV pH _____ SU
 Specific Conductance _____ uS/cm Temperature _____ deg C Turbidity _____ NTU

COLLECTED BY (PRINT) D. Woody

| | | | |
|---|------------------------------|---|------------------------------|
| RELINQUISHED BY (Printed Name) Meyer Green (Signature) <i>[Signature]</i> | Date/Time 8/16/12 1235 | RECEIVED BY (Printed Name) J. Sherwood (Signature) <i>[Signature]</i> | Date/Time 8/16/12 1235 |
| RELINQUISHED BY (Printed Name) (Signature) | Date/Time | RECEIVED BY (Printed Name) (Signature) | Date/Time |

Data Validation Report

Chain Of Custody No. 12-1506

1. Distribution Of Samples In EDD.

| SDG | Analytical Method | Regular Samples | Field Duplicates | Trip Blanks | Field Blanks | Equipment Blanks |
|--------|-------------------|-----------------|------------------|-------------|--------------|------------------|
| 309870 | EPA:120.1 | | 1 | | | |
| 309870 | EPA:150.1 | | 1 | | | |
| 309870 | EPA:160.1 | | 1 | | | |
| 309870 | EPA:245.2 | | 1 | | | |
| 309870 | EPA:300.0 | | 1 | | | |
| 309870 | EPA:310.1 | | 1 | | | |
| 309870 | EPA:350.1 | | 1 | | | |
| 309870 | EPA:351.2 | | 1 | | | |
| 309870 | EPA:353.2 | | 1 | | | |
| 309870 | EPA:365.4 | | 1 | | | |
| 309870 | EPA:900 | | 1 | | | |
| 309870 | EPA:901.1 | | 1 | | | |
| 309870 | EPA:905.0 | | 1 | | | |
| 309870 | HASL-300:AM-241 | | 1 | | | |
| 309870 | HASL-300:ISOPU | | 1 | | | |
| 309870 | HASL-300:ISOU | | 1 | | | |
| 309870 | SM:A2340B | | 1 | | | |
| 309870 | SW-846:6010B | | 1 | | | |
| 309870 | SW-846:6020 | | 1 | | | |
| 309870 | SW-846:6850 | | 1 | | | |
| 309870 | SW-846:9060 | | 1 | | | |

| SDG | Analytical Method | Analysis Lot ID | Prep Lot ID | Regular Samples | Field Duplicates | Trip Blanks | Field Blanks | Equipment Blanks | Method Blanks | Matrix Spikes | Matrix Spike Dups |
|--------|-------------------|-----------------|-------------|-----------------|------------------|-------------|--------------|------------------|---------------|---------------|-------------------|
| 309870 | EPA:120.1 | 1241565 | 1241565 | | 1 | | | | | | |
| 309870 | EPA:150.1 | 1240576 | 1240576 | | 1 | | | | | | |
| 309870 | EPA:160.1 | 1240118 | 1240118 | | 1 | | | | | 1 | |
| 309870 | EPA:245.2 | 1243838 | 1243838 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:300.0 | 1239339 | 1239339 | | 1 | | | | | 1 | |
| 309870 | EPA:310.1 | 1241530 | 1241530 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:350.1 | 1239586 | 1239585 | | | | | | | 1 | 1 |
| 309870 | EPA:350.1 | 1243075 | 1243073 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:351.2 | 1243530 | 1243528 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:353.2 | 1239601 | 1239601 | | 1 | | | | | 1 | |
| 309870 | EPA:365.4 | 1239580 | 1239579 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:900 | 1239941 | 1239941 | | 1 | | | | | 1 | 1 |
| 309870 | EPA:901.1 | 1240464 | 1240464 | | 1 | | | | | 1 | |
| 309870 | EPA:905.0 | 1239939 | 1239939 | | 1 | | | | | 1 | 1 |
| 309870 | HASL-300:AM-241 | 1239554 | 1239554 | | 1 | | | | | 1 | |
| 309870 | HASL-300:ISOPU | 1239555 | 1239555 | | 1 | | | | | 1 | |
| 309870 | HASL-300:ISOU | 1239557 | 1239557 | | 1 | | | | | 1 | |
| 309870 | SM:A2340B | 1243893 | 1243893 | | 1 | | | | | | |
| 309870 | SW-846:6010B | 1239660 | 1239658 | | 1 | | | | | 1 | 1 |
| 309870 | SW-846:6020 | 1239655 | 1239654 | | 1 | | | | | 1 | 1 |
| 309870 | SW-846:6850 | 1238723 | 1238722 | | 1 | | | | | 1 | 1 |
| 309870 | SW-846:9060 | 1238959 | 1238959 | | 1 | | | | | 1 | |

| Analytical Spikes | Post-Digestion Spikes | Lab Control Samples | Lab Control Sample Dups | Blank Spikes | Blank Spike Dups | Lab Duplicates | Storage Blanks | Preparation Blanks | Reagent Blanks |
|-------------------|-----------------------|---------------------|-------------------------|--------------|------------------|----------------|----------------|--------------------|----------------|
| | | 1 | | | | 2 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 2 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 1 | | | |
| | | 1 | | | | 2 | | | |

2. Distribution Of Analytes In EDD.

| Analytical Method | Method Category | Field Sample ID | Lab Sample ID | Sample Purpose | Target Analytes | Surrogates | Spikes | TICS |
|-------------------|-------------------|-----------------|---------------|----------------|-----------------|------------|--------|------|
| EPA:120.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:120.1 | GENERAL CHEMISTRY | CAMO-12-21796 | 1202727789 | DUP | 1 | 0 | 0 | 0 |
| EPA:120.1 | GENERAL CHEMISTRY | CASA-12-21649 | 1202727788 | DUP | 1 | 0 | 0 | 0 |
| EPA:120.1 | GENERAL CHEMISTRY | LCS | 1202727790 | LCS | 0 | 0 | 1 | 0 |
| EPA:150.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 1202725409 | DUP | 1 | 0 | 0 | 0 |
| EPA:150.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:150.1 | GENERAL CHEMISTRY | LCS | 1202725408 | LCS | 0 | 0 | 1 | 0 |
| EPA:160.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:160.1 | GENERAL CHEMISTRY | CAMO-12-21810 | 1202724244 | DUP | 1 | 0 | 0 | 0 |
| EPA:160.1 | GENERAL CHEMISTRY | LCS | 1202724246 | LCS | 0 | 0 | 1 | 0 |
| EPA:160.1 | GENERAL CHEMISTRY | MB | 1202724243 | MB | 1 | 0 | 0 | 0 |
| EPA:245.2 | INORGANIC | CAMO-12-21742 | 1202733108 | DUP | 1 | 0 | 0 | 0 |
| EPA:245.2 | INORGANIC | CAMO-12-21742 | 1202733109 | MS | 0 | 0 | 1 | 0 |
| EPA:245.2 | INORGANIC | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:245.2 | INORGANIC | LCS | 1202733107 | LCS | 0 | 0 | 1 | 0 |
| EPA:245.2 | INORGANIC | MB | 1202733106 | MB | 1 | 0 | 0 | 0 |
| EPA:300.0 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 4 | 0 | 0 | 0 |
| EPA:300.0 | GENERAL CHEMISTRY | CAMO-12-21810 | 1202722213 | DUP | 4 | 0 | 0 | 0 |
| EPA:300.0 | GENERAL CHEMISTRY | LCS | 1202722215 | LCS | 0 | 0 | 4 | 0 |
| EPA:300.0 | GENERAL CHEMISTRY | MB | 1202722212 | MB | 4 | 0 | 0 | 0 |
| EPA:310.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 2 | 0 | 0 | 0 |
| EPA:310.1 | GENERAL CHEMISTRY | CAMO-12-21810 | 1202728101 | DUP | 3 | 0 | 0 | 0 |
| EPA:310.1 | GENERAL CHEMISTRY | CAMO-12-21810 | 1202728103 | MS | 0 | 0 | 1 | 0 |
| EPA:310.1 | GENERAL CHEMISTRY | LCS | 1202728104 | LCS | 0 | 0 | 1 | 0 |
| EPA:310.1 | GENERAL CHEMISTRY | MB | 1202728099 | MB | 3 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | CAPU-12-22843 | 1202731536 | DUP | 1 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | CAPU-12-22843 | 1202731537 | MS | 0 | 0 | 1 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | CAPU-12-22843 | 1202731538 | MSD | 0 | 0 | 1 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | LCS | 1202722804 | LCS | 0 | 0 | 1 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | LCS | 1202731539 | LCS | 0 | 0 | 1 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | MB | 1202722794 | MB | 1 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | MB | 1202731535 | MB | 1 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | SWWS46-12-22928 | 1202722797 | DUP | 1 | 0 | 0 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | SWWS46-12-22928 | 1202722800 | MS | 0 | 0 | 1 | 0 |
| EPA:350.1 | GENERAL CHEMISTRY | SWWS46-12-22928 | 1202722803 | MSD | 0 | 0 | 1 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | CAMO-12-21738 | 1202732512 | DUP | 1 | 0 | 0 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | CAMO-12-21738 | 1202732513 | MS | 0 | 0 | 1 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | CAMO-12-21738 | 1202732514 | MSD | 0 | 0 | 1 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | CAMO-12-21738 | 309870001 | REG | 1 | 0 | 0 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | LCS | 1202732515 | LCS | 0 | 0 | 1 | 0 |
| EPA:351.2 | GENERAL CHEMISTRY | MB | 1202732511 | MB | 1 | 0 | 0 | 0 |
| EPA:353.2 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:353.2 | GENERAL CHEMISTRY | CAMO-12-21794 | 1202722833 | DUP | 1 | 0 | 0 | 0 |
| EPA:353.2 | GENERAL CHEMISTRY | LCS | 1202722837 | LCS | 0 | 0 | 1 | 0 |
| EPA:353.2 | GENERAL CHEMISTRY | MB | 1202722832 | MB | 1 | 0 | 0 | 0 |
| EPA:353.2 | GENERAL CHEMISTRY | SWWS46-12-22928 | 1202722834 | DUP | 1 | 0 | 0 | 0 |
| EPA:365.4 | GENERAL CHEMISTRY | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| EPA:365.4 | GENERAL CHEMISTRY | CAMO-12-21794 | 1202722777 | DUP | 1 | 0 | 0 | 0 |
| EPA:365.4 | GENERAL CHEMISTRY | CAMO-12-21794 | 1202722779 | MS | 0 | 0 | 1 | 0 |

Data Validation Report for:

Chain Of Custody No. 12-1506

| | | | | | | | | |
|-----------------|------------------------|----------------|------------|-----|----|---|----|---|
| EPA:365.4 | GENERAL CHEMISTRY | CAMO-12-21794 | 1202722781 | MSD | 0 | 0 | 1 | 0 |
| EPA:365.4 | GENERAL CHEMISTRY | LCS | 1202722783 | LCS | 0 | 0 | 1 | 0 |
| EPA:365.4 | GENERAL CHEMISTRY | MB | 1202722776 | MB | 1 | 0 | 0 | 0 |
| EPA:900 | RAD | CAMO-12-21736 | 1202723793 | DUP | 2 | 0 | 0 | 0 |
| EPA:900 | RAD | CAMO-12-21736 | 1202723796 | MS | 0 | 0 | 2 | 0 |
| EPA:900 | RAD | CAMO-12-21736 | 1202723797 | MSD | 0 | 0 | 2 | 0 |
| EPA:900 | RAD | CAMO-12-21738 | 309870001 | REG | 2 | 0 | 0 | 0 |
| EPA:900 | RAD | LCS | 1202723798 | LCS | 0 | 0 | 2 | 0 |
| EPA:900 | RAD | MB | 1202723792 | MB | 2 | 0 | 0 | 0 |
| EPA:901.1 | RAD | CAMO-12-21738 | 309870001 | REG | 5 | 0 | 0 | 0 |
| EPA:901.1 | RAD | LCS | 1202725098 | LCS | 0 | 0 | 3 | 0 |
| EPA:901.1 | RAD | MB | 1202725096 | MB | 17 | 0 | 0 | 0 |
| EPA:901.1 | RAD | WST03-12-23161 | 1202725097 | DUP | 17 | 0 | 0 | 0 |
| EPA:905.0 | RAD | CAMO-12-21738 | 309870001 | REG | 1 | 0 | 0 | 0 |
| EPA:905.0 | RAD | CASA-12-21643 | 1202723780 | DUP | 1 | 0 | 0 | 0 |
| EPA:905.0 | RAD | CASA-12-21643 | 1202723781 | MS | 0 | 0 | 1 | 0 |
| EPA:905.0 | RAD | LCS | 1202723782 | LCS | 0 | 0 | 1 | 0 |
| EPA:905.0 | RAD | MB | 1202723779 | MB | 1 | 0 | 0 | 0 |
| HASL-300:AM-241 | RAD | CAMO-12-21738 | 1202722700 | DUP | 1 | 0 | 0 | 0 |
| HASL-300:AM-241 | RAD | CAMO-12-21738 | 309870001 | REG | 1 | 0 | 0 | 0 |
| HASL-300:AM-241 | RAD | LCS | 1202722701 | LCS | 0 | 0 | 1 | 0 |
| HASL-300:AM-241 | RAD | MB | 1202722699 | MB | 1 | 0 | 0 | 0 |
| HASL-300:ISOPU | RAD | CAMO-12-21738 | 1202722703 | DUP | 2 | 0 | 0 | 0 |
| HASL-300:ISOPU | RAD | CAMO-12-21738 | 309870001 | REG | 2 | 0 | 0 | 0 |
| HASL-300:ISOPU | RAD | LCS | 1202722704 | LCS | 0 | 0 | 1 | 0 |
| HASL-300:ISOPU | RAD | MB | 1202722702 | MB | 2 | 0 | 0 | 0 |
| HASL-300:ISOU | RAD | CAMO-12-21738 | 1202722706 | DUP | 3 | 0 | 0 | 0 |
| HASL-300:ISOU | RAD | CAMO-12-21738 | 309870001 | REG | 3 | 0 | 0 | 0 |
| HASL-300:ISOU | RAD | LCS | 1202722707 | LCS | 0 | 0 | 1 | 0 |
| HASL-300:ISOU | RAD | MB | 1202722705 | MB | 3 | 0 | 0 | 0 |
| SM:A2340B | INORGANIC | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| SW-846:6010B | INORGANIC | CAMO-12-21746 | 1202722990 | DUP | 17 | 0 | 0 | 0 |
| SW-846:6010B | INORGANIC | CAMO-12-21746 | 1202722991 | MS | 0 | 0 | 17 | 0 |
| SW-846:6010B | INORGANIC | CAMO-12-21746 | 309870002 | REG | 17 | 0 | 0 | 0 |
| SW-846:6010B | INORGANIC | LCS | 1202722989 | LCS | 0 | 0 | 17 | 0 |
| SW-846:6010B | INORGANIC | MB | 1202722988 | MB | 17 | 0 | 0 | 0 |
| SW-846:6020 | INORGANIC | CAMO-12-21746 | 1202722977 | DUP | 11 | 0 | 0 | 0 |
| SW-846:6020 | INORGANIC | CAMO-12-21746 | 1202722978 | MS | 0 | 0 | 11 | 0 |
| SW-846:6020 | INORGANIC | CAMO-12-21746 | 309870002 | REG | 11 | 0 | 0 | 0 |
| SW-846:6020 | INORGANIC | LCS | 1202722976 | LCS | 0 | 0 | 11 | 0 |
| SW-846:6020 | INORGANIC | MB | 1202722975 | MB | 11 | 0 | 0 | 0 |
| SW-846:6850 | LCMS/MS PERCHLORATE | CAMO-12-21746 | 309870002 | REG | 1 | 0 | 0 | 0 |
| SW-846:6850 | LCMS/MS PERCHLORATE | CASA-12-21649 | 1202720854 | MS | 0 | 0 | 1 | 0 |
| SW-846:6850 | LCMS/MS PERCHLORATE | CASA-12-21649 | 1202720855 | MSD | 0 | 0 | 1 | 0 |
| SW-846:6850 | LCMS/MS PERCHLORATE | LCS | 1202720853 | LCS | 0 | 0 | 1 | 0 |
| SW-846:6850 | LCMS/MS PERCHLORATE | MB | 1202720852 | MB | 1 | 0 | 0 | 0 |
| SW-846:9060 | GENERAL CHEMISTRY | CAMO-12-21738 | 1202722598 | DUP | 1 | 0 | 0 | 0 |
| SW-846:9060 | GENERAL CHEMISTRY | CAMO-12-21738 | 309870001 | REG | 1 | 0 | 0 | 0 |
| SW-846:9060 | GENERAL CHEMISTRY | CAMO-12-21786 | 1202721307 | DUP | 1 | 0 | 0 | 0 |
| SW-846:9060 | GENERAL CHEMISTRY | LCS | 1202721309 | LCS | 0 | 0 | 1 | 0 |
| SW-846:9060 | GENERAL CHEMISTRY | MB | 1202721306 | MB | 1 | 0 | 0 | 0 |

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

| Field | Lab | Type Of | Analytical | Sample | Parameter | Lab | Lab | | Lab |
|-----------|------------|--------------|--------------|--------|---------------------|--------|-----------|-------|-----------------|
| Sample ID | Sample ID | Blank | Method | Matrix | Name | Result | Qualifier | Units | Detection Limit |
| MB | 1202722988 | METHOD BLANK | SW-846:6010B | W | Potassium | 58 | J | ug/L | 150 |
| MB | 1202731535 | METHOD BLANK | EPA:350.1 | W | Ammonia as Nitrogen | 0.0332 | J | mg/L | 0.05 |
| MB | 1202733106 | METHOD BLANK | EPA:245.2 | W | Mercury | -0.085 | J | ug/L | 0.2 |

Any samples affected by the presence of contaminants in blanks?

| Field | Blank Field | Blank Lab | Blank | Analytical | Parameter | | Blank | Sample | Lab | Detect | |
|---------------|-------------|------------|--------------|------------|-----------|-------|--------|--------|-----------|--------|----------|
| Sample ID | Sample ID | Sample ID | Type | Method | Name | Units | Result | Result | Qualifier | Limit | Detected |
| CAMO-12-21746 | MB | 1202733106 | METHOD BLANK | EPA:245.2 | Mercury | ug/L | -0.085 | 0.067 | U | 0.2 | N |

6. Any surrogate recoveries outside the control limits?

No.

7. Any MS/MSD recoveries or RPDs outside the control limits?

| Field | Matrix | Matrix | Analytical | Parameter | Analysis | Analysis | Sample | MS % | MSD % | Upper | Lower |
|-----------------|------------|--------------|------------|-------------------------|----------|-----------|--------|--------|--------|-------|-------|
| Sample ID | Spike ID | Spike Dup ID | Method | Name | Lot ID | Date | Matrix | Recvry | Recvry | Limit | Limit |
| SWWS46-12-22928 | 1202722800 | 1202722803 | EPA:350.1 | Ammonia as Nitrogen | 1239585 | 8/21/2012 | W | 109 | 113 | 110 | 90 |
| CAMO-12-21738 | 1202732513 | 1202732514 | EPA:351.2 | Total Kjeldahl Nitrogen | 1243528 | 9/7/2012 | W | 88.2 | 93.1 | 110 | 90 |
| CAMO-12-21738 | 1202732513 | 1202732514 | EPA:351.2 | Total Kjeldahl Nitrogen | 1243528 | 9/7/2012 | W | 88.2 | 93.1 | 110 | 90 |

8. Any LCS/LCSD or BS/BSD recoveries or RPDs outside the control limits?

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

| Field | Lab | Lab Duplicate | Analytical | Parameter | Sample | Sample | Dup Sample | | Detected | Detected | |
|---------------|-----------|---------------|---------------|-------------|--------|--------|------------|-------|-----------|----------|------|
| Sample ID | SampleID | Sample ID | Method | Name | Matrix | Result | Result | Units | In Sample | In Dup | RPD |
| CAMO-12-21738 | 309870001 | 1202722706 | HASL-300:ISOU | Uranium-234 | W | 0.446 | 0.379 | pCi/L | Y | Y | 16.1 |
| CAMO-12-21738 | 309870001 | 1202722706 | HASL-300:ISOU | Uranium-238 | W | 0.203 | 0.182 | pCi/L | Y | Y | 10.6 |

11. Any required reporting limits exceeded?

No.

| Correction Factor (ND) | Correction Factor (J) | Use Factors |
|------------------------|-----------------------|-------------|
| 5 | | Y |

| Rejection Limit | RPD | RPD Limit |
|-----------------|------|-----------|
| 10 | 3.2 | 15 |
| 10 | 5.41 | 20 |
| 10 | 5.41 | 20 |

RPD
Limit
0.0624
0.0317

12. Additional Validator's Comments.

None.

13. Display Flagged Data.

| Location ID | Chain Of Custody No | Field Sample ID | Sample Purpose | Analysis Type Code | Analytical Suite | Analytical Method | Parameter Name | Lab Qualifier | Validation Qualifier | Validation Reason Codes | Detected |
|-------------|---------------------|-----------------|----------------|--------------------|-------------------|-------------------|-------------------------|---------------|----------------------|-------------------------|----------|
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:AM-241 | Americium-241 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:901.1 | Cesium-137 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:901.1 | Cobalt-60 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:900 | Gross alpha | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:900 | Gross beta | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:901.1 | Neptunium-237 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:ISOPU | Plutonium-238 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:ISOPU | Plutonium-239/240 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:901.1 | Potassium-40 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:901.1 | Sodium-22 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | EPA:905.0 | Strontium-90 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | GENERAL CHEMISTRY | EPA:351.2 | Total Kjeldahl Nitrogen | U | UJ | I6a | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:ISOU | Uranium-234 | | J | R10 | Y |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:ISOU | Uranium-235/236 | U | U | R5 | N |
| R-50 S2 | 12-1506 | CAMO-12-21738 | REG | INIT | RAD | HASL-300:ISOU | Uranium-238 | | J | R10 | Y |

Reason Code

Description

I6a The associated matrix spike recovery was below the lower acceptance limit (LAL) but >10%. Follow the external laboratory limits located within the associated data package.

J_LAB The analytical laboratory qualified the detected result as estimated (J) because the result was less the PQL but greater than the MDL

NQ The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.

R10 Associated duplicate sample has DER or RER> the analytical laboratory's acceptance limits.

R5 Analyte is not detected because the amount reported is less than the MDC.

U_LAB The analytical laboratory qualified the analyte as not detected.

14. Useable Result Count.

| Field Sample ID | Location ID | Sample Purpose | Analytical Method | No. Unuseable Records | Total No. Of Records |
|-----------------|-------------|----------------|-------------------|-----------------------|----------------------|
| CAMO-12-21738 | R-50 S2 | REG | EPA:351.2 | 0 | 1 |
| CAMO-12-21738 | R-50 S2 | REG | EPA:900 | 0 | 2 |
| CAMO-12-21738 | R-50 S2 | REG | EPA:901.1 | 0 | 5 |
| CAMO-12-21738 | R-50 S2 | REG | EPA:905.0 | 0 | 1 |
| CAMO-12-21738 | R-50 S2 | REG | HASL-300:AM-241 | 0 | 1 |
| CAMO-12-21738 | R-50 S2 | REG | HASL-300:ISOPU | 0 | 2 |
| CAMO-12-21738 | R-50 S2 | REG | HASL-300:ISOU | 0 | 3 |
| CAMO-12-21738 | R-50 S2 | REG | SW-846:9060 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:120.1 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:150.1 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:160.1 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:245.2 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:300.0 | 0 | 4 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:310.1 | 0 | 2 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:350.1 | 0 | 1 |

| Lab Result | Lab Units | Report Result | Report Units | Report MDA | Report Uncertainty | Lab Matrix | Sample Date | Percent Moisture | Analysis Lot ID | Validation Status Code | Use Flag |
|------------|-----------|---------------|--------------|------------|-----------------------|------------|-------------|---------------------|-----------------|---------------------------|----------|
| 0 | pCi/L | 0 | pCi/L | 0.0305 | 0.00314 | W | 8/16/2012 | | 1239554 | VAL | Y |
| 1.84 | pCi/L | 1.84 | pCi/L | 6.08 | 1.54 | W | 8/16/2012 | | 1240464 | VAL | Y |
| -0.498 | pCi/L | -0.498 | pCi/L | 5.46 | 1.45 | W | 8/16/2012 | | 1240464 | VAL | Y |
| 0.009 | pCi/L | 0.009 | pCi/L | 2.4 | 0.506 | W | 8/16/2012 | | 1239941 | VAL | Y |
| 2.16 | pCi/L | 2.16 | pCi/L | 2.98 | 0.929 | W | 8/16/2012 | | 1239941 | VAL | Y |
| 5.02 | pCi/L | 5.02 | pCi/L | 11.4 | 3.01 | W | 8/16/2012 | | 1240464 | VAL | Y |
| 0.00506 | pCi/L | 0.00506 | pCi/L | 0.017 | 0.00506 | W | 8/16/2012 | | 1239555 | VAL | Y |
| 0.00253 | pCi/L | 0.00253 | pCi/L | 0.0305 | 0.00438 | W | 8/16/2012 | | 1239555 | VAL | Y |
| 0.964 | pCi/L | 0.964 | pCi/L | 75.6 | 19.9 | W | 8/16/2012 | | 1240464 | VAL | Y |
| 0.591 | pCi/L | 0.591 | pCi/L | 6.08 | 1.52 | W | 8/16/2012 | | 1240464 | VAL | Y |
| -0.319 | pCi/L | -0.319 | pCi/L | 0.484 | 0.122 | W | 8/16/2012 | | 1239939 | VAL | Y |
| 0.035 | mg/L | 0.035 | mg/L | | | W | 8/16/2012 | | 1243530 | VAL | Y |
| 0.446 | pCi/L | 0.446 | pCi/L | 0.0722 | 0.0373 | W | 8/16/2012 | | 1239557 | VAL | Y |
| 0.0267 | pCi/L | 0.0267 | pCi/L | 0.0466 | 0.0106 | W | 8/16/2012 | | 1239557 | VAL | Y |
| 0.203 | pCi/L | 0.203 | pCi/L | 0.0366 | 0.0237 | W | 8/16/2012 | | 1239557 | VAL | Y |

Data Validation Report for:

Chain Of Custody No. 12-1506

| | | | | | |
|---------------|---------|-----|--------------|---|----|
| CAMO-12-21746 | R-50 S2 | REG | EPA:353.2 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | EPA:365.4 | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | SM:A2340B | 0 | 1 |
| CAMO-12-21746 | R-50 S2 | REG | SW-846:6010B | 0 | 17 |
| CAMO-12-21746 | R-50 S2 | REG | SW-846:6020 | 0 | 11 |
| CAMO-12-21746 | R-50 S2 | REG | SW-846:6850 | 0 | 1 |



August 27, 2012

www.gel.com

Keith Greene
Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Re: LANL-WQH Water Samples
Work Order: 309870
SDG: 12-1506

Dear Keith Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 18, 2012, and analyzed for General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry. 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. 4485.

Sincerely,

Hope Taylor for
Valerie Davis
Project Manager

Purchase Order: 63641-10
Chain of Custody: 12-1506
Enclosures



ARS International (63641-10)
LANL-WQH Water Samples
Work Order #: 309870
SDG: 12-1506

Table of Contents

| | |
|--|-----|
| Case Narrative..... | 1 |
| Chain of Custody and Supporting Documentation..... | 4 |
| Data Review Qualifier Flag Definition Sheet..... | 9 |
| Perchlorates by LCMSMS Analysis..... | 11 |
| Case Narrative..... | 12 |
| Sample Data Summary..... | 18 |
| Quality Control Summary..... | 20 |
| Quality Control Data..... | 23 |
| Metals Analysis..... | 29 |
| Case Narrative..... | 30 |
| Sample Data Summary..... | 36 |
| Quality Control Summary..... | 40 |
| General Chem Analysis..... | 54 |
| Case Narrative..... | 55 |
| Sample Data Summary..... | 83 |
| Quality Control Summary..... | 88 |
| Miscellaneous..... | 93 |
| Radiological Analysis..... | 98 |
| Sample Data Summary..... | 110 |
| Quality Control Data..... | 113 |

Case Narrative

**Case Narrative for
ARS International (63641-10)
LANL-WQH Water Samples
Workorder #: 309870
SDG # : 12-1506**

August 27, 2012

Laboratory Identification:

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

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 18, 2012 for analysis. Please see email for discrepancies. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. The Gross A/B containers were preserved prior to analysis. Shipping container temperature was within specification (0 - 6C). Shipping container temperatures were checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

| <u>Laboratory ID</u> | <u>Client ID</u> |
|----------------------|------------------|
| 309870001 | CAMO-12-21738 |
| 309870002 | CAMO-12-21746 |

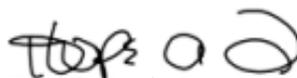
Case Narrative

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: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry, Metals, Perchlorates by LCMSMS and Radiochemistry.

I certify that this data report is in compliance with the terms and conditions of the subcontract and task order, both technically and for completeness, for other than the conditions detailed in the attached case narrative.



Hope Taylor for
Valerie Davis
Project Manager

List of current GEL Certifications as of 27 August 2012

| State | Certification |
|---------------------------|----------------------|
| Arizona | AZ0766 |
| Arkansas | 88-0651 |
| CLIA | 42D0904046 |
| California NELAP | 01151CA |
| Colorado | SC00012 |
| Connecticut | PH-0169 |
| Delaware | SC00012 |
| DoD ELAP A2LA ISO 17025 | 2567.01 |
| Florida NELAP | E87156 |
| Foreign Soils Permit | P330-09-00191 |
| Georgia | SC00012 |
| Georgia SDWA | 967 |
| Hawaii | SC00012 |
| Idaho | SC00012 |
| Illinois NELAP | 200029 |
| Indiana | C-SC-01 |
| Kansas NELAP | E-10332 |
| Kentucky | 90129 |
| Louisiana NELAP | 03046 (AI33904) |
| Louisiana SDWA | LA120008 |
| Maryland | 270 |
| Massachusetts | M-SC012 |
| Mississippi | SC00012 |
| Nevada | SC000122011-1 |
| New Hampshire NELAP | 2054 |
| New Jersey NELAP | SC002 |
| New Mexico | SC00012 |
| New York NELAP | 11501 |
| North Carolina | 233 |
| North Carolina SDWA | 45709 |
| Oklahoma | 9904 |
| Pennsylvania NELAP | 68-00485 |
| South Carolina Chemistry | 10120001 |
| South Carolina Radiochemi | 10120002 |
| Tennessee | TN 02934 |
| Texas NELAP | T104704235-12-7 |
| Utah NELAP | SC00012 |
| Vermont | VT87156 |
| Virginia NELAP | 460202 |
| Washington | C780 |
| Wisconsin | 999887790 |

Chain of Custody and Supporting Documentation



SAMPLE RECEIPT & REVIEW FORM

| | | | |
|--|-----|--------------------------------|--|
| Client: LANL | | SDG/AR/COC/Work Order:12-1506 | |
| Received By: Patricia Dent | | Date Received: AUGUST 18, 2012 | |
| 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? | | X | Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0CPM |
| Classified Radioactive II or III by RSO? | | X | If yes, Were swipes taken of sample containers < action levels? |
| COC/Samples marked containing PCBs? | | X | |
| Shipped as a DOT Hazardous? | | X | Hazard Class Shipped: UN#: |
| Samples identified as Foreign Soil? | | X | |

| Sample Receipt Criteria | Yes | NA | No | Comments/Qualifiers (Required for Non-Conforming Items) |
|---|-----|----|----|--|
| 1 Shipping containers received intact and sealed? | X | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?* | X | | | Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3,4C |
| 2a Daily check performed and passed on IR temperature gun? | X | | | Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):61524646 |
| 3 Chain of custody documents included with shipment? | X | | | |
| 4 Sample containers intact and sealed? | X | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 5 Samples requiring chemical preservation at proper pH? | | | X | Sample ID's, containers affected and observed pH: CAMO-12-21738 for Gross A/B If Preservation added, Lot# L03022 |
| 6 VOA vials free of headspace (defined as < 6mm bubble)? | | X | | Sample ID's and containers affected: |
| 7 Are Encore containers present? | | | X | (If yes, immediately deliver to Volatiles laboratory) |
| 8 Samples received within holding time? | X | | | ID's and tests affected: |
| 9 Sample ID's on COC match ID's on bottles? | X | | | Sample ID's and containers affected: |
| 10 Date & time on COC match date & time on bottles? | X | | | Sample ID's affected: |
| 11 Number of containers received match number indicated on COC? | X | | | Sample ID'S affected: |
| 12 Are sample containers identifiable as GEL provided? | | | X | CLIENT |
| 13 COC form is properly signed in relinquished/received sections? | X | | | |
| 14 Carrier and tracking number. | X | | | Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7209 7856 9113 4C 7209 7856 9135 3C |

Comments (Use Continuation Form if needed):

Subject: ISSUES FROM 08/18/2012
From: Pat Dent <Pat.Dent@gel.com>
Date: 8/18/2012 1:49 PM
To: "Keith R. Greene" <kgreene@lanl.gov>
CC: LANL@amrad.com, "team.davis" <team.davis@gel.com>

Good Afternoon all listed below are today's Issues

Container received for Gross A/B was preserved prior to analysis.

RN#2012-2205 the lab received (1) container each instead of (2) as indicated on COC.

Thanks!! Pat Dent

--

Patricia Dent
Project Manager Assistant
GEL Laboratories, LLC
2040 Savage Rd.
Charleston, S.C. 29407
Main: 843-556-8171 Ext 4264
Fax: 843-766-1178
Email: pad@gel.com
Web: www.gel.com

ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

SHIP DATE: 17AUG12
ACTWGT: 10.0 LB MAN
CAD: 0014176/09FE2511

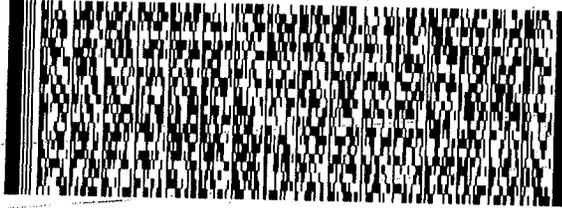
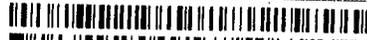
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 566-8171
REF: WE6L11550000

3c



FedEx
Express



TRK# 7209 7856 9135
0201

SATURDAY ### A1
PRIORITY OVERNIGHT

X0 CHSA

29407
SC-US CHS

47 72 10 11 8



ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB
TA00 BLDG 1237 DPU 03

SHIP DATE: 17AUG12
ACTWGT: 5.0 LB MAN
CAD: 0014176/CAFE2511

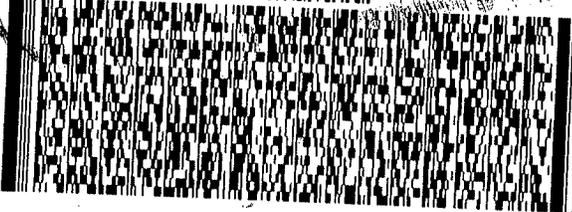
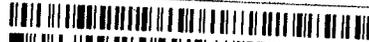
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 566-8171
REF: MR1A015AGWK0

4c



FedEx
Express



J11131186060125

TRK# 7209 7856 9113
0201

SATURDAY ### A1
PRIORITY OVERNIGHT

X0 CHSA

29407
SC-US CHS

71 80

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

| Qualifier | Explanation |
|-----------|---|
| * | A quality control analyte recovery is outside of specified acceptance criteria |
| ** | Analyte is a surrogate compound |
| < | Result is less than value reported |
| > | Result is greater than value reported |
| ^ | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL |
| A | The TIC is a suspected aldol-condensation product |
| B | Target analyte was detected in the associated blank |
| B | Metals-Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL |
| BD | Results are either below the MDC or tracer recovery is low |
| C | Analyte has been confirmed by GC/MS analysis |
| D | Results are reported from a diluted aliquot of the sample |
| d | 5-day BOD-The 2:1 depletion requirement was not met for this sample |
| E | Organics-Concentration of the target analyte exceeds the instrument calibration range |
| E | Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria |
| H | Analytical holding time was exceeded |
| h | Preparation or preservation holding time was exceeded |
| J | Value is estimated |
| N | Metals-The Matrix spike sample recovery is not within specified control limits |
| N | Organics-Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor |
| N/A | Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more |
| ND | Analyte concentration is not detected above the reporting limit |
| UI | Gamma Spectroscopy-Uncertain identification |
| X | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| Y | QC Samples were not spiked with this compound |
| Z | Paint Filter Test-Particulates passed through the filter, however no free liquids were observed. |

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorate by LC/MSMS
ARS International (ARSL)
SDG 12-1506**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1238723

Prep Batch Number: 1238722

Sample Analysis

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202720856 | Interference Check Sample (ICS) |
| 1202720852 | Method Blank (MB) |
| 1202720853 | Laboratory Control Sample (LCS) |
| 1202720854 | 309669002(CASA-12-21649) Matrix Spike (MS) |
| 1202720855 | 309669002(CASA-12-21649) Matrix Spike Duplicate (MSD) |

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

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 9.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

The initial calibration verification standard (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The interference check sample (ICS) met all recovery acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 309669002 (CASA-12-21649) from SDG 12-1495 was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD(s) between the MS and MSD met the acceptance limits.

Retention Time Standard Area Acceptance

The retention time standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard.

The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by Method 332.0, has been used.

In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

A data exception report (DER) was not generated for this SDG.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may require manual integrations due to software limitations.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

The Perchlorate Isotope Ratio on the Form I may differ slightly from the ratio on the corresponding raw data due to rounding rules and/or significant figures or due to software limitations when there are manual integrations, dilutions or other factors. The ratio value of the Form I is the correct value.

The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred.

Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are not internally corrected for using Perchlorate-O (18). They are external calibrations.

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples.

Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with either a Micromass Quattro Micro Mass Spectrometer/ Mass Spectrometer, or a Micromass Quattro Ultima Mass Spectrometer/ Mass Spectrometer. Each being designated as LCMSMS #1 and LCMSMS #2, respectively. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/ Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

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

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package.

Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

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

ARSL001 ARS International (63641-10)

Client SDG: 12-1506 GEL Work Order: 309870

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

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: Michael Penny

Date: 28 AUG 2012

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

CAMO-12-21746Lab Code: GELDate Received: 18-AUG-12Instrument: LCMSMSGEL Job No (SDG): 12-1506Method: SW846 6850 ModifiedGEL Sample ID: 309870002Matrix: WATERDate Filtered: 22-AUG-12Extraction Batch ID: 1238722Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.336 | ug/L | | 1 | 22-AUG-12 18:11 | per0822037a |
| | Perchlorate Isotope Ratio | | | 3.29 | | | 1 | 22-AUG-12 18:11 | per0822037a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.353 | ug/L | | 1 | 22-AUG-12 18:11 | per0822037a |
| | Perchlorate-O(18) | | | 0.541 | ug/L | | 1 | 22-AUG-12 18:11 | per0822037a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 12-1506

Extract Batch Code: 1238722

Date Filtered: 22-AUG-12

Matrix: WATER

Sample ID: 1202720853

| Analyte [^] | True | Found | Units | %Rec | Q | Control Limits |
|---------------------------|-------|-------|-------|------|---|----------------|
| Perchlorate | 0.200 | .196 | ug/L | 98.0 | | 85 - 115 |
| Perchlorate Isotope Ratio | | 3.15 | | | | - |
| Perchlorate-101 | 0.200 | .215 | ug/L | 108 | | 85 - 115 |
| Perchlorate-O(18) | | .51 | ug/L | | | - |

[^] When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No (SDG): 12-1506

Extract Batch Code: 1238722

Date Extracted: 22-AUG-12

GEL MS/PS ID: 1202720854

Client ID: CASA-12-21649

GEL MSD/PSD ID: 1202720855

QC Type: MS

| Compound^ | Spike Added | Sample Conc | Units | MS Conc | MS Rec # | MSD Conc | MSD Rec # | RPD # | RPD Limit | Recovery Limit |
|---------------------------|-------------|-------------|-------|---------|----------|----------|-----------|-------|-----------|----------------|
| Perchlorate | 0.200 | 0.497 | ug/L | 0.684 | 93.4 | .705 | 104 | 2.96 | 30 | 75 - 125 |
| Perchlorate Isotope Ratio | 0 | 3.25 | | 3.27 | | 3.3 | | .742 | | - |
| Perchlorate-101 | 0.200 | 0.529 | ug/L | 0.723 | 96.9 | .739 | 105 | 2.21 | 30 | 75 - 125 |
| Perchlorate-O(18) | 0 | 0.556 | ug/L | 0.550 | | .558 | | 1.52 | | - |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

MBLab Code: GELDate Received: 22-AUG-12Instrument: LCMSMSGEL Job No (SDG): 12-1506Method: EPA 6850 ModifiedGEL Sample ID: 1202720852Matrix: WATERDate Filtered: 22-AUG-12Extraction Batch ID: 1238722Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.050 | ug/L | U | 1 | 22-AUG-12 15:03 | per0822012a |
| | Perchlorate Isotope Ratio | | | | | | 1 | 22-AUG-12 15:03 | per0822012a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.050 | ug/L | U | 1 | 22-AUG-12 15:03 | per0822012a |
| | Perchlorate-O(18) | | | 0.503 | ug/L | | 1 | 22-AUG-12 15:03 | per0822012a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: EPA 6850 ModifiedMatrix: WATERExtraction Batch ID: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LCSDate Received: 22-AUG-12GEL Job No (SDG): 12-1506GEL Sample ID: 1202720853Date Filtered: 22-AUG-12Injection Volume (uL): 20

%Solids: .

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.196 | ug/L | J | 1 | 22-AUG-12 15:10 | per0822013a |
| | Perchlorate Isotope Ratio | | | 3.15 | | | 1 | 22-AUG-12 15:10 | per0822013a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.215 | ug/L | | 1 | 22-AUG-12 15:10 | per0822013a |
| | Perchlorate-O(18) | | | 0.510 | ug/L | | 1 | 22-AUG-12 15:10 | per0822013a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1238722Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 12-1506GEL Sample ID: 1202720856Date Filtered: 22-AUG-12Injection Volume (uL): 20

%Solids:

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.228 | ug/L | | 1 | 22-AUG-12 15:18 | per0822014a |
| | Perchlorate Isotope Ratio | | | 3.21 | | | 1 | 22-AUG-12 15:18 | per0822014a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.245 | ug/L | | 1 | 22-AUG-12 15:18 | per0822014a |
| | Perchlorate-O(18) | | | 0.555 | ug/L | | 1 | 22-AUG-12 15:18 | per0822014a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

CASA-12-21649MSLab Code: GELDate Received: 15-AUG-12Instrument: LCMSMSGEL Job No (SDG): 12-1506Method: SW846 6850 ModifiedGEL Sample ID: 1202720854Matrix: WATERDate Filtered: 22-AUG-12Extraction Batch ID: 1238722Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.684 | ug/L | | 1 | 22-AUG-12 16:41 | per0822025a |
| | Perchlorate Isotope Ratio | | | 3.27 | | | 1 | 22-AUG-12 16:41 | per0822025a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.723 | ug/L | | 1 | 22-AUG-12 16:41 | per0822025a |
| | Perchlorate-O(18) | | | 0.550 | ug/L | | 1 | 22-AUG-12 16:41 | per0822025a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

CASA-12-21649MSDLab Code: GELDate Received: 15-AUG-12Instrument: LCMSMSGEL Job No (SDG): 12-1506Method: SW846 6850 ModifiedGEL Sample ID: 1202720855Matrix: WATERDate Filtered: 22-AUG-12Extraction Batch ID: 1238722Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

| CAS No. | Analyte^ | MDL | RL | Conc* | Units | Q | Dilution Factor | Date Analyzed | GEL File ID |
|------------|---------------------------|-----|----|-------|-------|---|-----------------|-----------------|-------------|
| 14797-73-0 | Perchlorate | .05 | .2 | 0.705 | ug/L | | 1 | 22-AUG-12 16:48 | per0822026a |
| | Perchlorate Isotope Ratio | | | 3.3 | | | 1 | 22-AUG-12 16:48 | per0822026a |
| 14797-73-0 | Perchlorate-101 | .05 | .2 | 0.739 | ug/L | | 1 | 22-AUG-12 16:48 | per0822026a |
| | Perchlorate-O(18) | | | 0.558 | ug/L | | 1 | 22-AUG-12 16:48 | per0822026a |

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Metals Analysis

Case Narrative

**Metals Fractional Narrative
ARS International (ARSL)
SDG 12-1506**

Sample Analysis

| Sample ID | Client ID |
|------------------|--|
| 309870002 | CAMO-12-21746 |
| 1202722988 | Method Blank (MB) ICP |
| 1202722989 | Laboratory Control Sample (LCS) |
| 1202722992 | 309870002(CAMO-12-21746L) Serial Dilution (SD) |
| 1202722990 | 309870002(CAMO-12-21746D) Sample Duplicate (DUP) |
| 1202722991 | 309870002(CAMO-12-21746S) Matrix Spike (MS) |
| 1202722975 | Method Blank (MB) ICP-MS |
| 1202722976 | Laboratory Control Sample (LCS) |
| 1202722979 | 309870002(CAMO-12-21746L) Serial Dilution (SD) |
| 1202722977 | 309870002(CAMO-12-21746D) Sample Duplicate (DUP) |
| 1202722978 | 309870002(CAMO-12-21746S) Matrix Spike (MS) |
| 1202733106 | Method Blank (MB) CVAA |
| 1202733107 | Laboratory Control Sample (LCS) |
| 1202733112 | 309910002(CAMO-12-21742L) Serial Dilution (SD) |
| 1202733108 | 309910002(CAMO-12-21742D) Sample Duplicate (DUP) |
| 1202733109 | 309910002(CAMO-12-21742S) Matrix Spike (MS) |

Method/Analysis Information

| | |
|---------------------------------------|--|
| Analytical Batch: | 1239660, 1239655, 1243838 and 1243893 |
| Prep Batch : | 1239658, 1239654 and 1243833 |
| Standard Operating Procedures: | GL-MA-E-013 REV# 21, GL-MA-E-006 REV# 9, GL-MA-E-014 REV# 24, GL-MA-E-010 REV# 25 and GL-GC-E-107 REV# 7 |
| Analytical Method: | SW846 3005/6010B, SW846 3005/6020 DOE-AL, EPA 245.1/245.2 and SM 2340 B |
| Prep Method : | SW846 3005A and EPA 245.1/245.2 Prep |

Preparation/Analytical Method Verification

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

System Configuration

The Hardness as CaCO₃ is calculated from Calcium and Magnesium results.

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/- 7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

Calibration Information

Instrument Calibration

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

CRDL Requirements

All CRDL standard(s) met the referenced advisory control limits with the exception of potassium that recovered outside of the advisory control limits.

ICSA/ICSAB Statement

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

Continuing Calibration Blank (CCB) Requirements

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

criteria.

Continuing Calibration Verification (CCV) Requirements

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 309870002 (CAMO-12-21746)-ICP and ICP-MS and 309910002 (CAMO-12-21742)-CVAA.

Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

Duplicate Relative Percent Difference (RPD) Statement

The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. All applicable analytes met these requirements.

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. Dilutions were required for this SDG in order to minimize tin suppression due to matrix interferences.

Preparation Information

The samples in this SDG were prepared exactly according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment

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

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

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Total Hardness by Calculation is determined using the results of Total Calcium (Ca) and Total Magnesium (Mg) determined by ICP or ICP-MS.

$$\text{Hardness} = 2.497 (\text{Ca}) + 4.118 (\text{Mg})$$

Please refer to the Total Ca and Total Mg data to validate results appearing on the Hardness Summary sheet. Both results are in the Inorganic/metals section of the package. There is no Batch QC for calculated results, and thus no QC Summary for the Hardness by Calculation Batch. The MDLs and PQLs are calculated using the higher of the two calculated values of Ca or Mg.

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.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: Nick Cole A. Elmore Date: 09.13.12

Sample Data Summary

GEL LABORATORIES LLC

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

Qualifier Definition Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1506 GEL Work Order: 309870

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

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

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

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

Reviewed by

Nick Cole A. Elmore 09.13.12

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 12-1506

METHOD TYPE: EPA

SAMPLE ID: 309870002

CLIENT ID: CAMO-12-21746

CONTRACT: ESHL00210

MATRIX: Water

DATE RECEIVED 18-AUG-12

LEVEL: Low %SOLIDS:

| <u>CAS No</u> | <u>Analyte</u> | <u>Result</u> | <u>Units</u> | <u>C</u> | <u>Qual</u> | <u>M*</u> | <u>MDL</u> | <u>DF</u> | <u>Inst ID</u> | <u>Analytical Run</u> |
|---------------|----------------|---------------|--------------|----------|-------------|-----------|------------|-----------|----------------|-----------------------|
| 7439-97-6 | Mercury | 0.067 | ug/L | U | | AV | 0.067 | 1 | MER536 | 090712W1-4 |
| 7429-90-5 | Aluminum | 68 | ug/L | U | | P | 68 | 1 | OPTIMA3 | 082412A-1 |
| 7440-36-0 | Antimony | 1 | ug/L | U | | MS | 1 | 1 | ICPMS5 | 120905-2 |
| 7440-38-2 | Arsenic | 1.7 | ug/L | U | | MS | 1.7 | 1 | ICPMS5 | 120906-3 |
| 7440-39-3 | Barium | 23.6 | ug/L | | | P | 1 | 1 | OPTIMA3 | 082412A-1 |
| 7440-41-7 | Beryllium | 1 | ug/L | U | | P | 1 | 1 | OPTIMA3 | 082412A-1 |
| 7440-42-8 | Boron | 15 | ug/L | U | | P | 15 | 1 | OPTIMA3 | 082412A-1 |
| 7440-43-9 | Cadmium | 0.11 | ug/L | U | | MS | 0.11 | 1 | ICPMS5 | 120906-3 |
| 7440-70-2 | Calcium | 11100 | ug/L | | | P | 50 | 1 | OPTIMA3 | 082412A-1 |
| 7440-47-3 | Chromium | 3.17 | ug/L | J | | MS | 2 | 1 | ICPMS5 | 120905-2 |
| 7440-48-4 | Cobalt | 1 | ug/L | U | | P | 1 | 1 | OPTIMA3 | 082412A-1 |
| 7440-50-8 | Copper | 3 | ug/L | U | | P | 3 | 1 | OPTIMA3 | 082412A-1 |
| 7439-89-6 | Iron | 30 | ug/L | U | | P | 30 | 1 | OPTIMA3 | 082412A-1 |
| 7439-92-1 | Lead | 0.5 | ug/L | U | | MS | 0.5 | 1 | ICPMS5 | 120906-3 |
| 7439-95-4 | Magnesium | 3930 | ug/L | | | P | 110 | 1 | OPTIMA3 | 082412A-1 |
| 7439-96-5 | Manganese | 2 | ug/L | U | | P | 2 | 1 | OPTIMA3 | 082412A-1 |
| 7439-98-7 | Molybdenum | 1.3 | ug/L | | | MS | 0.165 | 1 | ICPMS5 | 120906-3 |
| 7440-02-0 | Nickel | 1.38 | ug/L | J | | MS | 0.5 | 1 | ICPMS5 | 120905-2 |
| 7440-09-7 | Potassium | 1450 | ug/L | | | P | 50 | 1 | OPTIMA3 | 082412A-1 |
| 7782-49-2 | Selenium | 1.5 | ug/L | U | | MS | 1.5 | 1 | ICPMS5 | 120906-3 |
| 7631-86-9 | Silica | 76900 | ug/L | | | P | 53 | 1 | OPTIMA3 | 082412A-1 |
| 7440-22-4 | Silver | 0.2 | ug/L | U | | MS | 0.2 | 1 | ICPMS5 | 120905-2 |
| 7440-23-5 | Sodium | 10900 | ug/L | | | P | 100 | 1 | OPTIMA3 | 082412A-1 |
| 7440-24-6 | Strontium | 50.7 | ug/L | | | P | 1 | 1 | OPTIMA3 | 082412A-1 |
| 7440-28-0 | Thallium | 0.45 | ug/L | U | | MS | 0.45 | 1 | ICPMS5 | 120905-2 |
| 7440-31-5 | Tin | 12.5 | ug/L | U | | P | 12.5 | 5 | OPTIMA3 | 082412A-1 |

METALS
-1-
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 12-1506

METHOD TYPE: EPA

SAMPLE ID: 309870002

CLIENT ID: CAMO-12-21746

CONTRACT: ESHL00210

MATRIX:Water

DATE RECEIVED 18-AUG-12

LEVEL: Low **%SOLIDS:**

| <u>CAS No</u> | <u>Analyte</u> | <u>Result</u> | <u>Units</u> | <u>C</u> | <u>Qual</u> | <u>M*</u> | <u>MDL</u> | <u>DF</u> | <u>Inst ID</u> | <u>Analytical Run</u> |
|---------------|-------------------|---------------|--------------|----------|-------------|-----------|------------|-----------|----------------|-----------------------|
| 7440-61-1 | Uranium | 0.62 | ug/L | | | MS | 0.067 | 1 | ICPMS5 | 120906-3 |
| 7440-62-2 | Vanadium | 7.23 | ug/L | | | P | 1 | 1 | OPTIMA3 | 082412A-1 |
| 7440-66-6 | Zinc | 3.61 | ug/L | J | | P | 3.3 | 1 | OPTIMA3 | 082412A-1 |
| | Hardness as CaCO3 | 43.9 | mg/L | | | | 0.453 | 1 | CALC001 | |

***Analytical Methods:**

- MS SW846 3005/6020 DOE-AL**
- P SW846 3005/6010B**
- AV EPA 245.1/245.2**
- SM 2340 B**

Quality Control Summary

METALS
-3b-
PREPARATION BLANK SUMMARY

SDG NO. 12-1506
Contract: ESHL00210
Matrix: Water

| <u>Sample ID</u> | <u>Analyte</u> | <u>Result</u> | <u>Units</u> | <u>Acceptance Window</u> | <u>Conc Qual</u> | <u>M*</u> | <u>MDL</u> | <u>RDL</u> |
|------------------|----------------|---------------|--------------|--------------------------|------------------|-----------|------------|------------|
| 1202722975 | Antimony | 1 | ug/L | +/-3 | U | MS | 1 | 3 |
| | Arsenic | 1.7 | ug/L | +/-5 | U | MS | 1.7 | 5 |
| | Cadmium | 0.11 | ug/L | +/-1 | U | MS | 0.11 | 1 |
| | Chromium | 2 | ug/L | +/-10 | U | MS | 2 | 10 |
| | Lead | 0.5 | ug/L | +/-2 | U | MS | 0.5 | 2 |
| | Molybdenum | 0.165 | ug/L | +/-0.5 | U | MS | 0.165 | 0.5 |
| | Nickel | 0.5 | ug/L | +/-2 | U | MS | 0.5 | 2 |
| | Selenium | 1.5 | ug/L | +/-5 | U | MS | 1.5 | 5 |
| | Silver | 0.2 | ug/L | +/-1 | U | MS | 0.2 | 1 |
| | Thallium | 0.45 | ug/L | +/-2 | U | MS | 0.45 | 2 |
| | Uranium | 0.067 | ug/L | +/-0.2 | U | MS | 0.067 | 0.2 |
| 1202722988 | Aluminum | 68 | ug/L | +/-200 | U | P | 68 | 200 |
| | Barium | 1 | ug/L | +/-5 | U | P | 1 | 5 |
| | Beryllium | 1 | ug/L | +/-5 | U | P | 1 | 5 |
| | Boron | 15 | ug/L | +/-50 | U | P | 15 | 50 |
| | Calcium | 50 | ug/L | +/-200 | U | P | 50 | 200 |
| | Cobalt | 1 | ug/L | +/-5 | U | P | 1 | 5 |
| | Copper | 3 | ug/L | +/-10 | U | P | 3 | 10 |
| | Iron | 30 | ug/L | +/-100 | U | P | 30 | 100 |
| | Magnesium | 110 | ug/L | +/-300 | U | P | 110 | 300 |
| | Manganese | 2 | ug/L | +/-10 | U | P | 2 | 10 |
| | Potassium | 58 | ug/L | +/-150 | J | P | 50 | 150 |
| | Silica | 53 | ug/L | +/-213 | U | P | 53 | 213 |
| | Sodium | 100 | ug/L | +/-300 | U | P | 100 | 300 |
| | Strontium | 1 | ug/L | +/-5 | U | P | 1 | 5 |
| | Tin | 2.5 | ug/L | +/-10 | U | P | 2.5 | 10 |
| | Vanadium | 1 | ug/L | +/-5 | U | P | 1 | 5 |
| | Zinc | 3.3 | ug/L | +/-10 | U | P | 3.3 | 10 |
| 1202733106 | Mercury | -0.085 | ug/L | +/-0.2 | J | AV | 0.067 | 0.2 |

*Analytical Methods:

MS SW846 3005/6020 DOE-AL
P SW846 3005/6010B
AV EPA 245.1/245.2

METALS

-5a-

Matrix Spike Summary

SDG NO. 12-1506 Client ID: CAMO-12-21746S

Contract: ESHL00210 Level: Low

Matrix: WATER % Solids:

Sample ID: 309870002 Spike ID: 1202722978

| <u>Analyte</u> | <u>Units</u> | <u>Acceptance Limit</u> | <u>Spiked Result</u> | <u>C</u> | <u>Sample Result</u> | <u>C</u> | <u>Spike Added</u> | <u>% Recovery</u> | <u>Qual</u> | <u>M*</u> |
|----------------|--------------|-------------------------|----------------------|----------|----------------------|----------|--------------------|-------------------|-------------|-----------|
| Antimony | ug/L | 75-125 | 217 | | 1 | U | 200 | 109 | | MS |
| Arsenic | ug/L | 75-125 | 85.2 | | 1.7 | U | 80 | 105 | | MS |
| Cadmium | ug/L | 75-125 | 11 | | 0.11 | U | 10 | 110 | | MS |
| Chromium | ug/L | 75-125 | 52.6 | | 3.17 | J | 50 | 99 | | MS |
| Lead | ug/L | 75-125 | 43.3 | | 0.5 | U | 40 | 108 | | MS |
| Molybdenum | ug/L | 75-125 | 54.7 | | 1.3 | | 50 | 107 | | MS |
| Nickel | ug/L | 75-125 | 48.8 | | 1.38 | J | 50 | 94.9 | | MS |
| Selenium | ug/L | 75-125 | 20.9 | | 1.5 | U | 20 | 102 | | MS |
| Silver | ug/L | 75-125 | 54.7 | | 0.2 | U | 50 | 109 | | MS |
| Thallium | ug/L | 75-125 | 102 | | 0.45 | U | 100 | 102 | | MS |
| Uranium | ug/L | 75-125 | 57.3 | | 0.62 | | 50 | 113 | | MS |

*Analytical Methods:

MS SW846 3005/6020 DOE-AL

METALS

-5a-

Matrix Spike Summary

SDG NO. 12-1506 Client ID: CAMO-12-21746S

Contract: ESHL00210 Level: Low

Matrix: WATER % Solids:

Sample ID: 309870002 Spike ID: 1202722991

| <u>Analyte</u> | <u>Units</u> | <u>Acceptance Limit</u> | <u>Spiked Result</u> | <u>C</u> | <u>Sample Result</u> | <u>C</u> | <u>Spike Added</u> | <u>% Recovery</u> | <u>Qual</u> | <u>M*</u> |
|----------------|--------------|-------------------------|----------------------|----------|----------------------|----------|--------------------|-------------------|-------------|-----------|
| Aluminum | ug/L | 75-125 | 5040 | | 68 | U | 5000 | 100 | | P |
| Barium | ug/L | 75-125 | 512 | | 23.6 | | 500 | 97.6 | | P |
| Beryllium | ug/L | 75-125 | 499 | | 1 | U | 500 | 99.7 | | P |
| Boron | ug/L | 75-125 | 501 | | 15 | U | 500 | 97.4 | | P |
| Calcium | ug/L | 75-125 | 15900 | | 11100 | | 5000 | 95.7 | | P |
| Cobalt | ug/L | 75-125 | 493 | | 1 | U | 500 | 98.6 | | P |
| Copper | ug/L | 75-125 | 513 | | 3 | U | 500 | 103 | | P |
| Iron | ug/L | 75-125 | 5060 | | 30 | U | 5000 | 101 | | P |
| Magnesium | ug/L | 75-125 | 8890 | | 3930 | | 5000 | 99.3 | | P |
| Manganese | ug/L | 75-125 | 481 | | 2 | U | 500 | 96 | | P |
| Potassium | ug/L | 75-125 | 6360 | | 1450 | | 5000 | 98.1 | | P |
| Silica | ug/L | | 86400 | | 76900 | | 10700 | 89.2 | N/A | P |
| Sodium | ug/L | 75-125 | 15900 | | 10900 | | 5000 | 100 | | P |
| Strontium | ug/L | 75-125 | 538 | | 50.7 | | 500 | 97.5 | | P |
| Tin | ug/L | 75-125 | 500 | | 12.5 | U | 500 | 100 | | P |
| Vanadium | ug/L | 75-125 | 506 | | 7.23 | | 500 | 99.7 | | P |
| Zinc | ug/L | 75-125 | 480 | | 3.61 | J | 500 | 95.2 | | P |

*Analytical Methods:

P SW846 3005/6010B

METALS

-5a-

Matrix Spike Summary

SDG NO. 12-1506 Client ID: CAMO-12-21742S

Contract: ESHL00210 Level: Low

Matrix: WATER % Solids:

Sample ID: 309910002 Spike ID: 1202733109

| <u>Analyte</u> | <u>Units</u> | <u>Acceptance Limit</u> | <u>Spiked Result</u> | <u>C</u> | <u>Sample Result</u> | <u>C</u> | <u>Spike Added</u> | <u>% Recovery</u> | <u>Qual</u> | <u>M*</u> |
|----------------|--------------|-------------------------|----------------------|----------|----------------------|----------|--------------------|-------------------|-------------|-----------|
| Mercury | ug/L | 75-125 | 2.01 | | 0.067 | U | 2 | 100 | | AV |

*Analytical Methods:

AV EPA 245.1/245.2

Metals
-6-
Duplicate Sample Summary

SDG No.: 12-1506

Lab Code: GEL

Contract: ESHL00210

Client ID: CAMO-12-21746D

Matrix: LIQUID

Level: Low

Sample ID: 309870002

Duplicate ID: 1202722977

Percent Solids for Dup: N/A

| Analyte | Units | Acceptance Limit | Sample Result | C | Duplicate Result | C | RPD | Qual | M* |
|------------|-------|------------------|---------------|---|------------------|---|------|------|----|
| Antimony | ug/L | | 1 U | | 1 U | | | | MS |
| Arsenic | ug/L | | 1.7 U | | 1.7 U | | | | MS |
| Cadmium | ug/L | | 0.11 U | | 0.11 U | | | | MS |
| Chromium | ug/L | +/-10 | 3.17 J | | 2.97 J | | 6.45 | | MS |
| Lead | ug/L | | 0.5 U | | 0.5 U | | | | MS |
| Molybdenum | ug/L | +/- .5 | 1.3 | | 1.18 | | 9.45 | | MS |
| Nickel | ug/L | +/-2 | 1.38 J | | 1.41 J | | 2.29 | | MS |
| Selenium | ug/L | | 1.5 U | | 1.5 U | | | | MS |
| Silver | ug/L | | 0.2 U | | 0.2 U | | | | MS |
| Thallium | ug/L | | 0.45 U | | 0.45 U | | | | MS |
| Uranium | ug/L | +/- .2 | 0.62 | | 0.59 | | 4.96 | | MS |

*Analytical Methods:

MS SW846 3005/6020 DOE-AL

Metals
-6-
Duplicate Sample Summary

SDG No.: 12-1506

Lab Code: GEL

Contract: ESHL00210

Client ID: CAMO-12-21746D

Matrix: LIQUID

Level: Low

Sample ID: 309870002

Duplicate ID: 1202722990

Percent Solids for Dup: N/A

| Analyte | Units | Acceptance Limit | Sample Result | C | Duplicate Result | C | RPD | Qual | M* |
|-----------|-------|------------------|---------------|---|------------------|---|------|------|----|
| Aluminum | ug/L | | 68 | U | 68 | U | | | P |
| Barium | ug/L | +/-5 | 23.6 | | 24 | | 1.5 | | P |
| Beryllium | ug/L | | 1 | U | 1 | U | | | P |
| Boron | ug/L | | 15 | U | 15 | J | 200 | | P |
| Calcium | ug/L | +/-20% | 11100 | | 11300 | | 1.39 | | P |
| Cobalt | ug/L | | 1 | U | 1 | U | | | P |
| Copper | ug/L | | 3 | U | 3 | U | | | P |
| Iron | ug/L | | 30 | U | 30 | U | | | P |
| Magnesium | ug/L | +/-20% | 3930 | | 3970 | | 1.1 | | P |
| Manganese | ug/L | | 2 | U | 2 | U | | | P |
| Potassium | ug/L | +/-20% | 1450 | | 1470 | | 1.48 | | P |
| Silica | ug/L | +/-20% | 76900 | | 77900 | | 1.35 | | P |
| Sodium | ug/L | +/-20% | 10900 | | 11100 | | 1.25 | | P |
| Strontium | ug/L | +/-20% | 50.7 | | 51.3 | | 1.16 | | P |
| Tin | ug/L | | 12.5 | U | 12.5 | U | | | P |
| Vanadium | ug/L | +/-5 | 7.23 | | 7.18 | | .644 | | P |
| Zinc | ug/L | | 3.61 | J | 3.3 | U | 200 | | P |

*Analytical Methods:

P SW846 3005/6010B

Metals
-6-
Duplicate Sample Summary

SDG No.: 12-1506

Lab Code: GEL

Contract: ESHL00210

Client ID: CAMO-12-21742D

Matrix: LIQUID

Level: Low

Sample ID: 309910002

Duplicate ID: 1202733108

Percent Solids for Dup: N/A

| Analyte | Units | Acceptance Limit | Sample Result | C | Duplicate Result | C | RPD | Qual | M* |
|---------|-------|------------------|---------------|---|------------------|---|-----|------|----|
| Mercury | ug/L | | 0.067 | U | 0.067 | U | | | AV |

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 12-1506

Contract: ESHL00210

Aqueous LCS Source:O2si

Solid LCS Source:

| <u>Sample ID</u> | <u>Analyte</u> | <u>Units</u> | <u>True Value</u> | <u>Result</u> | <u>C</u> | <u>% Recovery</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|------------------|----------------|--------------|-------------------|---------------|----------|-------------------|-------------------------|-----------|
| 1202722976 | | | | | | | | |
| | Antimony | ug/L | 50 | 51.2 | | 102 | 80-120 | MS |
| | Arsenic | ug/L | 50 | 51.1 | | 102 | 80-120 | MS |
| | Cadmium | ug/L | 50 | 52.1 | | 104 | 80-120 | MS |
| | Chromium | ug/L | 50 | 49 | | 98.1 | 80-120 | MS |
| | Lead | ug/L | 50 | 52.2 | | 104 | 80-120 | MS |
| | Molybdenum | ug/L | 50 | 51.2 | | 102 | 80-120 | MS |
| | Nickel | ug/L | 50 | 49.5 | | 99.1 | 80-120 | MS |
| | Selenium | ug/L | 50 | 51.9 | | 104 | 80-120 | MS |
| | Silver | ug/L | 50 | 52.6 | | 105 | 80-120 | MS |
| | Thallium | ug/L | 50 | 51.2 | | 102 | 80-120 | MS |
| | Uranium | ug/L | 50 | 53.4 | | 107 | 80-120 | MS |

*Analytical Methods:

MS SW846 3005/6020 DOE-AL

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 12-1506

Contract: ESHL00210

Aqueous LCS Source:OS2I

Solid LCS Source:

| <u>Sample ID</u> | <u>Analyte</u> | <u>Units</u> | <u>True Value</u> | <u>Result</u> | <u>C</u> | <u>% Recovery</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|------------------|----------------|--------------|-------------------|---------------|----------|-------------------|-------------------------|-----------|
| 1202722989 | | | | | | | | |
| | Aluminum | ug/L | 5000 | 4910 | | 98.2 | 80-120 | P |
| | Barium | ug/L | 500 | 492 | | 98.4 | 80-120 | P |
| | Beryllium | ug/L | 500 | 496 | | 99.1 | 80-120 | P |
| | Boron | ug/L | 500 | 481 | | 96.2 | 80-120 | P |
| | Calcium | ug/L | 5000 | 4940 | | 98.8 | 80-120 | P |
| | Cobalt | ug/L | 500 | 498 | | 99.6 | 80-120 | P |
| | Copper | ug/L | 500 | 502 | | 100 | 80-120 | P |
| | Iron | ug/L | 5000 | 4970 | | 99.4 | 80-120 | P |
| | Magnesium | ug/L | 5000 | 5000 | | 100 | 80-120 | P |
| | Manganese | ug/L | 500 | 482 | | 96.5 | 80-120 | P |
| | Potassium | ug/L | 5000 | 5030 | | 101 | 80-120 | P |
| | Silica | ug/L | 10700 | 10500 | | 98 | 80-120 | P |
| | Sodium | ug/L | 5000 | 5000 | | 99.9 | 80-120 | P |
| | Strontium | ug/L | 500 | 492 | | 98.3 | 80-120 | P |
| | Tin | ug/L | 500 | 498 | | 99.5 | 80-120 | P |
| | Vanadium | ug/L | 500 | 499 | | 99.9 | 80-120 | P |
| | Zinc | ug/L | 500 | 475 | | 94.9 | 80-120 | P |

*Analytical Methods:

P SW846 3005/6010B

METALS

-7-

Laboratory Control Sample Summary

SDG NO. 12-1506

Contract: ESHL00210

Aqueous LCS Source:GEL

Solid LCS Source:

| <u>Sample ID</u> | <u>Analyte</u> | <u>Units</u> | <u>True Value</u> | <u>Result</u> | <u>C</u> | <u>% Recovery</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|------------------|----------------|--------------|-------------------|---------------|----------|-------------------|-------------------------|-----------|
| 1202733107 | Mercury | ug/L | 2 | 2.07 | | 103 | 85-115 | AV |

*Analytical Methods:

AV EPA 245.1/245.2

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 12-1506 Client ID: CAMO-12-21746L

Contract: ESHL00210

Matrix: LIQUID Level: Low

Sample ID: 309870002 Serial Dilution ID: 1202722979

| <u>Analyte</u> | <u>Initial Value</u> ug/L | <u>C</u> | <u>Serial Value</u> ug/L | <u>C</u> | <u>% Difference</u> | <u>Qual</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|----------------|------------------------------|----------|-----------------------------|----------|---------------------|-------------|-------------------------|-----------|
| Antimony | 1 | U | 5 | U | | | | MS |
| Arsenic | 1.7 | U | 8.5 | U | | | | MS |
| Cadmium | .11 | U | .55 | U | | | | MS |
| Chromium | 3.17 | J | 10 | U | 100 | | | MS |
| Lead | .5 | U | 2.5 | U | | | | MS |
| Molybdenum | 1.3 | | 1.4 | J | 7.94 | | | MS |
| Nickel | 1.38 | J | 2.5 | U | 100 | | | MS |
| Selenium | 1.5 | U | 7.5 | U | | | | MS |
| Silver | .2 | U | 1 | U | | | | MS |
| Thallium | .45 | U | 2.25 | U | | | | MS |
| Uranium | .62 | | .6 | J | 3.23 | | | MS |

*Analytical Methods:

MS SW846 3005/6020 DOE-AL

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 12-1506 Client ID: CAMO-12-21746L

Contract: ESHL00210

Matrix: LIQUID Level: Low

Sample ID: 309870002 Serial Dilution ID: 1202722992

| <u>Analyte</u> | <u>Initial Value</u> ug/L | <u>C</u> | <u>Serial Value</u> ug/L | <u>C</u> | <u>% Difference</u> | <u>Qual</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|----------------|------------------------------|----------|-----------------------------|----------|---------------------|-------------|-------------------------|-----------|
| Aluminum | 68 | U | 340 | U | | | | P |
| Barium | 23.6 | | 24 | J | 1.8 | | | P |
| Beryllium | 1 | U | 5 | U | | | | P |
| Boron | 15 | U | 75 | U | | | | P |
| Calcium | 11100 | | 10900 | | 2.22 | | 10 | P |
| Cobalt | 1 | U | 5 | U | | | | P |
| Copper | 3 | U | 15 | U | | | | P |
| Iron | 30 | U | 150 | U | | | | P |
| Magnesium | 3930 | | 3830 | | 2.56 | | | P |
| Manganese | 2 | U | 10 | U | | | | P |
| Potassium | 1450 | | 1510 | | 3.98 | | | P |
| Silica | 76900 | | 76200 | | .948 | | 10 | P |
| Sodium | 10900 | | 10600 | | 3.36 | | 10 | P |
| Strontium | 50.7 | | 50.5 | | .264 | | 10 | P |
| Tin | 2.5 | U | 12.5 | U | | | | P |
| Vanadium | 7.23 | | 8.92 | J | 23.4 | | | P |
| Zinc | 3.61 | J | 16.5 | U | 100 | | | P |

*Analytical Methods:

P SW846 3005/6010B

METALS

-9-

Serial Dilution Sample Summary

SDG NO. 12-1506 Client ID: CAMO-12-21742L

Contract: ESHL00210

Matrix: LIQUID Level: Low

Sample ID: 309910002 Serial Dilution ID: 1202733112

| <u>Analyte</u> | <u>Initial Value</u> ug/L | <u>C</u> | <u>Serial Value</u> ug/L | <u>C</u> | <u>% Difference</u> | <u>Qual</u> | <u>Acceptance Limit</u> | <u>M*</u> |
|----------------|------------------------------|----------|-----------------------------|----------|---------------------|-------------|-------------------------|-----------|
| Mercury | .067 | U | .335 | U | | | | AV |

*Analytical Methods:

AV EPA 245.1/245.2

General Chem Analysis

Case Narrative

**General Chemistry Narrative
ARS International (ARSL)
SDG 12-1506**

Method/Analysis Information

Product: Carbon, Total Organic

Analytical Batch: 1238959

Method: SW 9060 Total Organic Carbon

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9060:

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202721306 | Method Blank (MB) |
| 1202721307 | 309548006(CAMO-12-21786) Sample Duplicate (DUP) |
| 1202721308 | 309548006(CAMO-12-21786) Post Spike (PS) |
| 1202721309 | Laboratory Control Sample (LCS) |
| 1202722598 | 309870001(CAMO-12-21738) Sample Duplicate (DUP) |
| 1202722599 | 309870001(CAMO-12-21738) Post Spike (PS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-093 REV# 10.

Preparation/Analytical Method Verification

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

Calibration Information

The Carbon analysis was performed on a O-I Analytical Model 1010 Total Organic Carbon Analyzer.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following samples were selected for QC analysis: 309548006 (CAMO-12-21786) and 309870001 (CAMO-12-21738).

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

The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The following samples were re-analyzed to verify the results: 1202722598 (CAMO-12-21738), 1202722599 (CAMO-12-21738) and 309870001 (CAMO-12-21738).

Miscellaneous Information**Data Exception (DER) Documentation**

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

Additional Comments

A 15 mg/L Total Inorganic Carbon check standard is analyzed with each analytical run to prove that the instrument is effectively sparging away the inorganic carbon.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Specific Conductivity
Analytical Batch: 1241565 **Method:** EPA120.1 Specific Conductivity

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 120.1:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202727788 | 309669002(CASA-12-21649) Sample Duplicate (DUP) |
| 1202727789 | 309548008(CAMO-12-21796) Sample Duplicate (DUP) |
| 1202727790 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-009 REV# 11.

Preparation/Analytical Method Verification

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

Calibration Information

The Conductivity analysis was performed on a Orion 160 Conductivity Meter.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following samples were selected for QC analysis: 309548008 (CAMO-12-21796) and 309669002 (CASA-12-21649).

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: pH
Analytical Batch: 1240576 **Method:** EPA 150.1 pH

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 150.1:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202725408 | Laboratory Control Sample (LCS) |
| 1202725409 | 309870002(CAMO-12-21746) Sample Duplicate (DUP) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 21.

Preparation/Analytical Method Verification

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

Calibration Information

The Electrode analysis was performed on a PerpHect pH Meter Orion 370.

Initial Calibration

All initial calibration requirements have been met for this SDG.

Calibration Verification Information (CCV)

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

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309870002 (CAMO-12-21746).

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

The following sample from this sample group was received by the lab outside of the method specified holding time: 309870002 (CAMO-12-21746).

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1113961 309870002 (CAMO-12-21746).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Ion Chromatography
Analytical Batch: 1239339 **Method:** EPA 300.0 Anions Liquid 28 day

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 300.0:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202722212 | Method Blank (MB) |
| 1202722213 | 309783001(CAMO-12-21810) Sample Duplicate (DUP) |
| 1202722214 | 309783001(CAMO-12-21810) Post Spike (PS) |
| 1202722215 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 21.

Preparation/Analytical Method Verification

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

Calibration Information

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

Initial Calibration

All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309783001 (CAMO-12-21810).

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

The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1202722214 (CAMO-12-21810).

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Dilutions

The following samples in this sample group were diluted due to high concentration: 1202722213 (CAMO-12-21810) and 1202722214 (CAMO-12-21810).

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1114122 1202722214 (CAMO-12-21810).

Manual Integrations

The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1202722213 (CAMO-12-21810), 1202722214 (CAMO-12-21810) and 309870002 (CAMO-12-21746).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Ammonia Nitrogen
Analytical Batch: 1243075 **Method:** EPA 350.1 Nitrogen and Ammonia L
Prep Batch : 1239585, 1243073 **Method:** EEPA 350.2 Prep

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 350.1:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202731535 | Method Blank (MB) |
| 1202731536 | 310512002(CAPU-12-22843) Sample Duplicate (DUP) |
| 1202731537 | 310512002(CAPU-12-22843) Matrix Spike (MS) |
| 1202731538 | 310512002(CAPU-12-22843) Matrix Spike Duplicate (MSD) |
| 1202731539 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-106 REV# 8.

Preparation/Analytical Method Verification

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

Calibration Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 310512002 (CAPU-12-22843).

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

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

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery for this sample set was within the required acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

One or more of the values for the sample and/or duplicate are less than 5 times the Practical Quantitation Limit (PQL), and the difference is within one PQL value; therefore, the RPD is not applicable. 1202731536 (CAPU-12-22843).

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The following sample was re-analyzed due to instrument failure: 1202731535 (MB). The following sample was re-analyzed due to its proximity to an overrange sample: 1202731535 (MB). The following samples were originally analyzed in batch 1239586. The matrix specific QC sample selected to associate with these samples was reanalyzed and reported in another batch; therefore, these samples were reanalyzed in order to include reportable matrix specific QC. 309870002 (CAMO-12-21746).

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced

SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Total Kjeldahl Nitrogen
Analytical Batch: 1243530 **Method:** Nitrogen and Total Kjeldahl (TKN)
Prep Batch : 1243528 **Method:** EEPA 351.2 Prep

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 351.2:

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202732511 | Method Blank (MB) |
| 1202732512 | 309870001(CAMO-12-21738) Sample Duplicate (DUP) |
| 1202732513 | 309870001(CAMO-12-21738) Matrix Spike (MS) |
| 1202732514 | 309870001(CAMO-12-21738) Matrix Spike Duplicate (MSD) |
| 1202732515 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-104 REV# 12.

Preparation/Analytical Method Verification

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

Calibration Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309870001 (CAMO-12-21738).

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

The spike recovery falls outside of the established acceptance limits. Since both the spike duplicate recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported. 1202732513 (CAMO-12-21738).

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery for this sample set was within the required acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1118208 1202732513 (CAMO-12-21738).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Nitrate Nitrite by Cadmium Reduction
Analytical Batch: 1239601 **Method:** EPA 353.2 Nitrogen and Nitrate/Nitrite

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 353.2:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202722832 | Method Blank (MB) |
| 1202722833 | 309548002(CAMO-12-21794) Sample Duplicate (DUP) |
| 1202722834 | 309785001(SWWS46-12-22928) Sample Duplicate (DUP) |
| 1202722835 | 309548002(CAMO-12-21794) Post Spike (PS) |
| 1202722836 | 309785001(SWWS46-12-22928) Post Spike (PS) |
| 1202722837 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 7.

Preparation/Analytical Method Verification

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

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following samples were selected for QC analysis: 309548002 (CAMO-12-21794) and 309785001 (SWWS46-12-22928).

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

The spike recovery falls outside of the GEL acceptance limits but within the client specified limits. 1202722835 (CAMO-12-21794).

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The following samples in this sample group were diluted due to matrix interference: 1202722833 (CAMO-12-21794), 1202722835 (CAMO-12-21794) and 309870002 (CAMO-12-21746).

Sample Re-analysis

The following samples were reanalyzed due to PS failure: 1202722833 (CAMO-12-21794) and 1202722835 (CAMO-12-21794). The following samples were re-analyzed to verify the results: 1202722832 (MB) and 1202722837 (LCS).

Miscellaneous Information**Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1112776 1202722835 (CAMO-12-21794).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

| | | | |
|--------------------------|-------------------------|----------------|-----------------------------------|
| Product: | Total Phosphorus | | |
| Analytical Batch: | 1239580 | Method: | EPA 365.4 Phosphorus and Total in |
| Prep Batch : | 1239579 | Method: | EEPA 365.4 Prep |

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 365.4:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202722776 | Method Blank (MB) |
| 1202722777 | 309548002(CAMO-12-21794) Sample Duplicate (DUP) |
| 1202722779 | 309548002(CAMO-12-21794) Matrix Spike (MS) |
| 1202722781 | 309548002(CAMO-12-21794) Matrix Spike Duplicate (MSD) |
| 1202722783 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-103 REV# 8.

Preparation/Analytical Method Verification

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

Calibration Information

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

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309548002 (CAMO-12-21794).

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

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

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery for this sample set was within the required acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

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

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Solids, Total Dissolved
Analytical Batch: 1240118 **Method:** EPA 160.1 Solids and Dissolved-F

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 160.1:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202724243 | Method Blank (MB) |
| 1202724244 | 309783001(CAMO-12-21810) Sample Duplicate (DUP) |
| 1202724246 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-001 REV# 12.

Preparation/Analytical Method Verification

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

Calibration Information

The Solids analysis was performed on a Sartorius Balance BAL216. Solids lab

Initial Calibration

All initial calibration requirements have been met for this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309783001 (CAMO-12-21810).

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Re-analysis

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

Sample Aliquot

A sufficient amount of sample was provided by the client for analysis.

Miscellaneous Information

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Method/Analysis Information

Product: Alkalinity
Analytical Batch: 1241530 **Method:** EPA 310.1 Total Alkalinity

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 310.1:

| Sample ID | Client ID |
|------------------|---|
| 309870002 | CAMO-12-21746 |
| 1202728099 | Method Blank (MB) |
| 1202728101 | 309783001(CAMO-12-21810) Sample Duplicate (DUP) |
| 1202728103 | 309783001(CAMO-12-21810) Matrix Spike (MS) |
| 1202728104 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-033 REV# 10.

Preparation/Analytical Method Verification

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

Calibration Information

The Titration analysis was performed on a Manually operated buret.

Initial Standardization

The titrant was properly standardized

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 309783001 (CAMO-12-21810).

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

All samples in this SDG met the specified holding time.

Sample Re-analysis

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

Miscellaneous Information**Data Exception (DER) Documentation**

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

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

Certification Statement

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

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer:  Date: 14Sep12

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1506 GEL Work Order: 309870

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- H Analytical holding time was exceeded
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
- UI Gamma Spectroscopy--Uncertain identification

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

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

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

Reviewed by



GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 14, 2012

Company : Los Alamos National Laboratory
Address : PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Contact: Keith Greene
Project: LANL-WQH Water Samples

Client SDG: 12-1506

Client Sample ID: CAMO-12-21738
Sample ID: 309870001
Matrix: Water
Collect Date: 16-AUG-12 11:48
Receive Date: 18-AUG-12
Collector: Client

Project: ESHL00210
Client ID: ARSL001

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|--|-----------|--------|-------|-------|-------|----|---------|----------|------|---------|--------|
| Carbon Analysis | | | | | | | | | | | |
| SW 9060 Total Organic Carbon "As Received" | | | | | | | | | | | |
| Total Organic Carbon Average | J | 0.534 | 0.330 | 1.00 | mg/L | 1 | TSM | 08/22/12 | 0907 | 1238959 | 1 |
| Nutrient Analysis | | | | | | | | | | | |
| Nitrogen, Total Kjeldahl (TKN) "As Received" | | | | | | | | | | | |
| Nitrogen, Total Kjeldahl | U | ND | 0.035 | 0.100 | mg/L | 1 | AXH3 | 09/07/12 | 1053 | 1243530 | 2 |

The following Prep Methods were performed:

| Method | Description | Analyst | Date | Time | Prep Batch |
|----------------|--|---------|----------|------|------------|
| EPA 351.2 Prep | EPA 351.2 Total Kjeldahl Nitrogen Prep | AXH3 | 09/06/12 | 1700 | 1243528 |

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|--------|-------------|------------------|
| 1 | SW846 9060 | |
| 2 | EPA 351.2 | |

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 14, 2012

Company : Los Alamos National Laboratory
 Address : PO Box 1663
 TA-03, SM271, Drop Pt. 02U, Rm111
 Los Alamos, New Mexico 87545

Contact: Keith Greene
 Project: LANL-WQH Water Samples

Client SDG: 12-1506

Client Sample ID: CAMO-12-21746
 Sample ID: 309870002
 Matrix: Water
 Collect Date: 16-AUG-12 11:48
 Receive Date: 18-AUG-12
 Collector: Client

Project: ESHL00210
 Client ID: ARSL001

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|-----------|--------|-------|-------|----------|----|---------|----------|------|---------|--------|
| Conductivity Analysis | | | | | | | | | | | |
| EPA120.1 Specific Conductivity "As Received" | | | | | | | | | | | |
| Conductivity | | 135 | 1.00 | 1.00 | umhos/cm | 1 | TXT1 | 08/28/12 | 1130 | 1241565 | 1 |
| Electrode Analysis | | | | | | | | | | | |
| EPA 150.1 pH "As Received" | | | | | | | | | | | |
| pH at Temp 19.0C | H | 7.86 | 0.010 | 0.100 | SU | 1 | LXA1 | 08/23/12 | 1333 | 1240576 | 2 |
| Ion Chromatography | | | | | | | | | | | |
| EPA 300.0 Anions Liquid 28 day "As Received" | | | | | | | | | | | |
| Bromide | U | ND | 0.067 | 0.200 | mg/L | 1 | VH1 | 08/22/12 | 0052 | 1239339 | 3 |
| Chloride | | 2.11 | 0.067 | 0.200 | mg/L | 1 | | | | | |
| Fluoride | | 0.339 | 0.033 | 0.100 | mg/L | 1 | | | | | |
| Sulfate | | 2.48 | 0.133 | 0.400 | mg/L | 1 | | | | | |
| Nutrient Analysis | | | | | | | | | | | |
| EPA 350.1 Nitrogen, Ammonia L "As Received" | | | | | | | | | | | |
| Nitrogen, Ammonia | | 0.399 | 0.017 | 0.050 | mg/L | 1 | KLP1 | 09/05/12 | 1633 | 1243075 | 4 |
| EPA 353.2 Nitrogen, Nitrate/Nitrite "As Received" | | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | | 0.975 | 0.085 | 0.250 | mg/L | 5 | AXH3 | 08/21/12 | 1413 | 1239601 | 5 |
| EPA 365.4 Phosphorus, Total in "As Received" | | | | | | | | | | | |
| Phosphorus, Total as P | U | ND | 0.017 | 0.050 | mg/L | 1 | KLP1 | 08/30/12 | 1327 | 1239580 | 6 |
| Solids Analysis | | | | | | | | | | | |
| EPA 160.1 Solids, Dissolved-F "As Received" | | | | | | | | | | | |
| Total Dissolved Solids | | 130 | 3.40 | 14.3 | mg/L | | LYG1 | 08/22/12 | 0819 | 1240118 | 7 |
| Titration Analysis | | | | | | | | | | | |
| EPA 310.1 Total Alkalinity "As Received" | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | | 61.9 | 0.725 | 1.00 | mg/L | | LXA1 | 08/28/12 | 1704 | 1241530 | 8 |
| Carbonate alkalinity (CaCO3) | U | ND | 0.725 | 1.00 | mg/L | | | | | | |

The following Prep Methods were performed:

| Method | Description | Analyst | Date | Time | Prep Batch |
|----------------|--|---------|----------|------|------------|
| EPA 350.2 Prep | EPA 350.1 Ammonia Nitrogen Prep | KLP1 | 08/21/12 | 1245 | 1239585 |
| EPA 350.2 Prep | EPA 350.1 Ammonia Nitrogen Prep | KLP1 | 09/05/12 | 1315 | 1243073 |
| EPA 365.4 Prep | EPA 365.4 Phosphorus, Total in liquid PR | KLP1 | 08/29/12 | 1630 | 1239579 |

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 14, 2012

Company : Los Alamos National Laboratory
Address : PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Contact: Keith Greene
Project: LANL-WQH Water Samples

Client SDG: 12-1506

Client Sample ID: CAMO-12-21746

Project: ESHL00210

Sample ID: 309870002

Client ID: ARSL001

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|-----------|-----------|--------|----|----|-------|----|---------|------|------|-------|--------|
|-----------|-----------|--------|----|----|-------|----|---------|------|------|-------|--------|

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|--------|-------------|------------------|
| 1 | EPA 120.1 | |
| 2 | EPA 150.1 | |
| 3 | EPA 300.0 | |
| 4 | EPA 350.1 | |
| 5 | EPA 353.2 | |
| 6 | EPA 365.4 | |
| 7 | EPA 160.1 | |
| 8 | EPA 310.1 | |

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 14, 2012
Page 1 of 4

Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico
Contact: Keith Greene

Workorder: 309870

| Paramname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|------------------------------|-----------|--------|-------|-------|----------|--------|------|-----------------|-------|----------|-------|
| Carbon Analysis | | | | | | | | | | | |
| Batch | 1238959 | | | | | | | | | | |
| QC1202721307 | 309548006 | DUP | | | | | | | | | |
| Total Organic Carbon Average | | 1.05 | | 1.09 | mg/L | 3.46 | ^ | (+/-1.00) | TSM | 08/21/12 | 15:56 |
| QC1202722598 | 309870001 | DUP | | | | | | | | | |
| Total Organic Carbon Average | J | 0.534 | J | 0.562 | mg/L | 5.11 | ^ | (+/-1.00) | | 08/22/12 | 09:40 |
| QC1202721309 | LCS | | | | | | | | | | |
| Total Organic Carbon Average | 10.0 | | | 10.1 | mg/L | | | 101 (85%-115%) | | 08/21/12 | 14:40 |
| QC1202721306 | MB | | | | | | | | | | |
| Total Organic Carbon Average | | | U | ND | mg/L | | | | | 08/21/12 | 14:31 |
| QC1202721308 | 309548006 | PS | | | | | | | | | |
| Total Organic Carbon Average | 10.0 | 1.05 | | 10.4 | mg/L | | | 93.9 (65%-120%) | | 08/21/12 | 16:16 |
| QC1202722599 | 309870001 | PS | | | | | | | | | |
| Total Organic Carbon Average | 10.0 | J | 0.534 | 10.1 | mg/L | | | 95.5 (65%-120%) | | 08/22/12 | 10:00 |
| Conductivity Analysis | | | | | | | | | | | |
| Batch | 1241565 | | | | | | | | | | |
| QC1202727788 | 309669002 | DUP | | | | | | | | | |
| Conductivity | | 186 | | 186 | umhos/cm | 0.00 | | (0%-10%) | TXT1 | 08/28/12 | 11:28 |
| QC1202727789 | 309548008 | DUP | | | | | | | | | |
| Conductivity | | 180 | | 180 | umhos/cm | 0.333 | | (0%-10%) | | 08/28/12 | 11:27 |
| QC1202727790 | LCS | | | | | | | | | | |
| Conductivity | 1410 | | | 1410 | umhos/cm | | | 100 (95%-105%) | | 08/28/12 | 11:26 |
| Electrode Analysis | | | | | | | | | | | |
| Batch | 1240576 | | | | | | | | | | |
| QC1202725409 | 309870002 | DUP | | | | | | | | | |
| pH | H | 7.86 | H | 7.97 | SU | 1.39 | | (0%-10%) | LXA1 | 08/23/12 | 13:34 |
| QC1202725408 | LCS | | | | | | | | | | |
| pH | 7.00 | | | 7.02 | SU | | | 100 (99%-101%) | | 08/23/12 | 12:09 |
| Ion Chromatography | | | | | | | | | | | |
| Batch | 1239339 | | | | | | | | | | |
| QC1202722213 | 309783001 | DUP | | | | | | | | | |
| Bromide | U | ND | U | ND | mg/L | N/A | | | VH1 | 08/21/12 | 22:59 |
| Chloride | | 62.9 | | 62.7 | mg/L | 0.322 | | (0%-20%) | | 08/22/12 | 15:50 |
| Fluoride | | 0.875 | | 0.856 | mg/L | 2.29 | | (0%-20%) | | 08/21/12 | 22:59 |
| Sulfate | | 12.2 | | 12.2 | mg/L | 0.0646 | | (0%-20%) | | | |
| QC1202722215 | LCS | | | | | | | | | | |
| Bromide | 2.50 | | | 2.50 | mg/L | | | 100 (90%-110%) | | 08/21/12 | 21:35 |
| Chloride | 10.0 | | | 9.68 | mg/L | | | 96.8 (90%-110%) | | | |
| Fluoride | 5.00 | | | 5.02 | mg/L | | | 100 (90%-110%) | | | |
| Sulfate | 20.0 | | | 19.5 | mg/L | | | 97.4 (90%-110%) | | | |
| QC1202722212 | MB | | | | | | | | | | |
| Bromide | | | U | ND | mg/L | | | | | 08/21/12 | 21:07 |
| Chloride | | | U | ND | mg/L | | | | | | |

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 2 of 4

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---------------------------|-----------|--------|--------|-------|--------|------|-------|------------|------------|----------|----------------|
| Ion Chromatography | | | | | | | | | | | |
| Batch | 1239339 | | | | | | | | | | |
| Fluoride | | | U | ND | mg/L | | | | | | |
| Sulfate | | | U | ND | mg/L | | | | VH1 | 08/21/12 | 21:07 |
| QC1202722214 | 309783001 | PS | | | | | | | | | |
| Bromide | 2.50 | U | ND | 2.58 | mg/L | | 103 | (90%-110%) | | 08/21/12 | 23:28 |
| Chloride | 10.0 | | 6.29 | 17.7 | mg/L | | 114* | (90%-110%) | | 08/22/12 | 16:46 |
| Fluoride | 5.00 | | 0.875 | 5.90 | mg/L | | 101 | (90%-110%) | | 08/21/12 | 23:28 |
| Sulfate | 20.0 | | 12.2 | 33.1 | mg/L | | 104 | (90%-110%) | | | |
| Nutrient Analysis | | | | | | | | | | | |
| Batch | 1239580 | | | | | | | | | | |
| QC1202722777 | 309548002 | DUP | | | | | | | | | |
| Phosphorus, Total as P | | J | 0.0173 | J | 0.0199 | mg/L | 14.0 | ^ | (+/-0.050) | KLP1 | 08/30/12 13:10 |
| QC1202722783 | LCS | | | | | | | | | | |
| Phosphorus, Total as P | 1.00 | | | 1.06 | mg/L | | 106 | (84%-122%) | | 08/30/12 | 13:08 |
| QC1202722776 | MB | | | | | | | | | | |
| Phosphorus, Total as P | | | | U | ND | mg/L | | | | 08/30/12 | 13:08 |
| QC1202722779 | 309548002 | MS | | | | | | | | | |
| Phosphorus, Total as P | 1.00 | J | 0.0173 | 1.07 | mg/L | | 105 | (46%-146%) | | 08/30/12 | 13:11 |
| QC1202722781 | 309548002 | MSD | | | | | | | | | |
| Phosphorus, Total as P | 1.00 | J | 0.0173 | 1.09 | mg/L | 1.85 | 107 | (0%-21%) | | 08/30/12 | 13:12 |
| Batch | 1239601 | | | | | | | | | | |
| QC1202722833 | 309548002 | DUP | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | | | 0.875 | 0.850 | mg/L | 2.90 | ^ | (+/-0.250) | AXH3 | 08/21/12 | 14:16 |
| QC1202722834 | 309785001 | DUP | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | | | 0.535 | 0.526 | mg/L | 1.70 | | (0%-20%) | | 08/21/12 | 13:57 |
| QC1202722837 | LCS | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | 1.00 | | | 1.08 | mg/L | | 108 | (90%-110%) | | 08/21/12 | 13:38 |
| QC1202722832 | MB | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | | | | U | ND | mg/L | | | | 08/21/12 | 13:37 |
| QC1202722835 | 309548002 | PS | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | 1.00 | | 0.175 | 0.933 | mg/L | | 75.8* | (90%-110%) | | 08/21/12 | 14:17 |
| QC1202722836 | 309785001 | PS | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | 1.00 | | 0.535 | 1.50 | mg/L | | 96.5 | (90%-110%) | | 08/21/12 | 13:58 |
| Batch | 1243075 | | | | | | | | | | |
| QC1202731536 | 310512002 | DUP | | | | | | | | | |
| Nitrogen, Ammonia | | | 0.0764 | J | 0.0465 | mg/L | 48.7 | ^ | (+/-0.050) | KLP1 | 09/05/12 16:35 |
| QC1202731539 | LCS | | | | | | | | | | |
| Nitrogen, Ammonia | 1.00 | | | 1.07 | mg/L | | 107 | (90%-110%) | | 09/05/12 | 16:30 |
| QC1202731535 | MB | | | | | | | | | | |
| Nitrogen, Ammonia | | | | J | 0.0332 | mg/L | | | | 09/05/12 | 16:34 |
| QC1202731537 | 310512002 | MS | | | | | | | | | |
| Nitrogen, Ammonia | 1.00 | | 0.0764 | 1.03 | mg/L | | 95.4 | (90%-110%) | | 09/05/12 | 16:36 |
| QC1202731538 | 310512002 | MSD | | | | | | | | | |
| Nitrogen, Ammonia | 1.00 | | 0.0764 | 0.986 | mg/L | 4.37 | 91 | (0%-15%) | | 09/05/12 | 16:41 |
| Batch | 1243530 | | | | | | | | | | |
| QC1202732512 | 309870001 | DUP | | | | | | | | | |
| Nitrogen, Total Kjeldahl | | U | ND | U | ND | mg/L | N/A | | | AXH3 | 09/07/12 10:54 |
| QC1202732515 | LCS | | | | | | | | | | |

GEL LABORATORIES LLC

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

QC Summary

Workorder: **309870**

Page 3 of 4

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|------------------------------|---------|--------|------|-------|-------|-------|-------|------------|-------|----------|-------|
| Nutrient Analysis | | | | | | | | | | | |
| Batch | 1243530 | | | | | | | | | | |
| Nitrogen, Total Kjeldahl | 1.00 | | | 1.00 | mg/L | | 100 | (90%-110%) | | 09/07/12 | 10:52 |
| QC1202732511 MB | | | | | | | | | | | |
| Nitrogen, Total Kjeldahl | | | U | ND | mg/L | | | | AXH3 | 09/07/12 | 10:51 |
| QC1202732513 309870001 MS | | | | | | | | | | | |
| Nitrogen, Total Kjeldahl | 1.00 | U | ND | 0.882 | mg/L | | 88.2* | (90%-110%) | | 09/07/12 | 10:55 |
| QC1202732514 309870001 MSD | | | | | | | | | | | |
| Nitrogen, Total Kjeldahl | 1.00 | U | ND | 0.931 | mg/L | 5.41 | 93.1 | (0%-20%) | | 09/07/12 | 10:55 |
| Solids Analysis | | | | | | | | | | | |
| Batch | 1240118 | | | | | | | | | | |
| QC1202724244 309783001 DUP | | | | | | | | | | | |
| Total Dissolved Solids | | | 271 | 267 | mg/L | 1.59 | | (0%-10%) | LYG1 | 08/22/12 | 08:19 |
| QC1202724246 LCS | | | | | | | | | | | |
| Total Dissolved Solids | 300 | | | 286 | mg/L | | 95.2 | (95%-105%) | | 08/22/12 | 08:19 |
| QC1202724243 MB | | | | | | | | | | | |
| Total Dissolved Solids | | | U | ND | mg/L | | | | | 08/22/12 | 08:19 |
| Titration Analysis | | | | | | | | | | | |
| Batch | 1241530 | | | | | | | | | | |
| QC1202728101 309783001 DUP | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | | | 109 | 110 | mg/L | 0.962 | | (0%-20%) | LXA1 | 08/28/12 | 16:31 |
| Carbonate alkalinity (CaCO3) | | U | ND | U | ND | mg/L | N/A | | | | |
| QC1202728104 LCS | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | 50.0 | | | 51.9 | mg/L | | 104 | (90%-110%) | | 08/28/12 | 11:00 |
| QC1202728099 MB | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | | | U | ND | mg/L | | | | | 08/28/12 | 10:58 |
| Carbonate alkalinity (CaCO3) | | | U | ND | mg/L | | | | | | |
| QC1202728103 309783001 MS | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | 50.0 | | 109 | 159 | mg/L | | 102 | (80%-120%) | | 08/28/12 | 16:40 |

Notes:

RER is calculated at the 95% confidence level (2-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- E Metals--%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- E Organics--Concentration of the target analyte exceeds the instrument calibration range
- F Estimated Value

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 4 of 4

| Parname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time | |
|---------|-----|--------|------|----|-------|------|------|-------|-------|------|------|--|
| FB | | | | | | | | | | | | Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies |
| H | | | | | | | | | | | | Analytical holding time was exceeded |
| J | | | | | | | | | | | | Value is estimated |
| K | | | | | | | | | | | | Analyte present. Reported value may be biased high. Actual value is expected to be lower. |
| L | | | | | | | | | | | | Analyte present. Reported value may be biased low. Actual value is expected to be higher. |
| M | | | | | | | | | | | | M if above MDC and less than LLD |
| M | | | | | | | | | | | | Matrix Related Failure |
| N | | | | | | | | | | | | Metals--The Matrix spike sample recovery is not within specified control limits |
| N | | | | | | | | | | | | Organics--Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor |
| N/A | | | | | | | | | | | | RPD or %Recovery limits do not apply. |
| NI | | | | | | | | | | | | See case narrative |
| ND | | | | | | | | | | | | Analyte concentration is not detected above the detection limit |
| NJ | | | | | | | | | | | | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| P | | | | | | | | | | | | Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, difference is also <70% |
| Q | | | | | | | | | | | | One or more quality control criteria have not been met. Refer to the applicable narrative or DER. |
| R | | | | | | | | | | | | Sample results are rejected |
| U | | | | | | | | | | | | Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. |
| UI | | | | | | | | | | | | Gamma Spectroscopy--Uncertain identification |
| UJ | | | | | | | | | | | | Gamma Spectroscopy--Uncertain identification |
| UL | | | | | | | | | | | | Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. |
| X | | | | | | | | | | | | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| Y | | | | | | | | | | | | QC Samples were not spiked with this compound |
| Z | | | | | | | | | | | | Paint Filter Test--Particulates passed through the filter, however no free liquids were observed. |
| ^ | | | | | | | | | | | | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry. |
| d | | | | | | | | | | | | 5-day BOD--The 2:1 depletion requirement was not met for this sample |
| h | | | | | | | | | | | | Preparation or preservation holding time was exceeded |

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

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

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

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

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

Miscellaneous

DATA EXCEPTION REPORT

| | | | |
|---|--------------------------------------|---|-----------------------------|
| Mo.Day Yr. 21-AUG-12 | Division: Industrial | Quality Criteria: Specifications | Type: Process |
| Instrument Type: LACHAT Flow Injection Analyzer | Test / Method: EPA 353.2 | Matrix Type: Liquid | Client Code: ESHL |
| Batch ID: 1239601 | Sample Numbers: See below. | | |
| <p>Potentially affected work order(s)(SDG): 309548(12-1492),309669(12-1495),309704(12-1496),309709(12-1498),309783(12-1501),309784(12-1503),309785(12-1505),309791(12-1502),309870(12-1506)</p> <p>Application Issues:</p> <p>Failed Recovery for MS/PS</p> | | | |
| Specification and Requirements | | DER Disposition: | |
| Exception Description: | | | |
| <p>1. Failed Recovery for PS:</p> <p>QC 1202722835PS</p> | | <p>1. The spike recovery falls outside of the GEL acceptance limits but within the client specified limits.</p> | |

Originator's Name:

Aubrey Kingsbury 22-AUG-12

Data Validator/Group Leader:

Julia Hamilton 22-AUG-12

DATA EXCEPTION REPORT

| | | | |
|---|--------------------------------------|---|--|
| Mo.Day Yr. 24-AUG-12 | Division: | Quality Criteria: | Type: Process |
| Instrument Type: PH METER | Test / Method: EPA 150.1 | Matrix Type: Liquid | Client Code: ESHL, WSRB, LBNL, BETT, |
| Batch ID: 1240576 | Sample Numbers: See below. | | |
| <p>Potentially affected work order(s)(SDG): 309548(12-1492),309612,309629(W4910),309667,309781(2012-2202),309783(12-1501),309784(12-1503),309795(W4912),309857(112-000251),309858(113-000251),309859(115-000251),309860(114-000251),309870(12-1506),310048</p> <p>Application Issues:</p> <p>Sample received out of holding</p> | | | |
| Specification and Requirements Exception Description: | | DER Disposition: | |
| <p>1. Sample received out of holding:</p> <p>309548008, 309612001, 309629005, 309629007, 309667002, 309667006, 309667010, 309781006, 309783001, 309784002, 309795002, 309795003, 309857001, 309858001, 309859001, 309860001, 309870002, 310048001, 310048002</p> | | <p>1. Samples were received out of holding.</p> | |

Originator's Name:

Lindsey Jensen 24-AUG-12

Data Validator/Group Leader:

Julia Hamilton 05-SEP-12

DATA EXCEPTION REPORT

| | | | |
|---|-------------------------------------|---|-----------------------------|
| Mo.Day Yr. 24-AUG-12 | Division: Industrial | Quality Criteria: Specifications | Type: Process |
| Instrument Type: IC | Test / Method: EPA 300.0 | Matrix Type: Liquid | Client Code: ESHL |
| Batch ID: 1239339 | Sample Numbers: See Below | | |
| Potentially affected work order(s)(SDG): 309548(12-1492),309783(12-1501),309784(12-1503),309791(12-1502),309870(12-1506) | | | |
| Application Issues: Failed Recovery for MS/PS | | | |
| Specification and Requirements Exception Description: | | DER Disposition: | |
| 1. Failed Recovery for MS/PS: QC 1202722214PS | | 1. The Chloride results failed GEL acceptance limits, but passed the client specific acceptance limits. | |

Originator's Name:

Virginia Winger 24-AUG-12

Data Validator/Group Leader:

Mary Sherwood 25-AUG-12

DATA EXCEPTION REPORT

| | | | |
|---|--------------------------------------|---|-----------------------------|
| Mo.Day Yr. 07-SEP-12 | Division: Industrial | Quality Criteria: Specifications | Type: Process |
| Instrument Type: LACHAT Flow Injection Analyzer | Test / Method: EPA 351.2 | Matrix Type: Liquid | Client Code: ESHL |
| Batch ID: 1243530 | Sample Numbers: See below. | | |
| Potentially affected work order(s)(SDG): 309870(12-1506),310694(12-1534),310696(12-1533) | | | |
| Application Issues: Failed Recovery for MS/PS | | | |
| Specification and Requirements Exception Description: | | DER Disposition: | |
| <p>1. Failed Recovery for MS: QC 1202732513MS</p> | | <p>1. The spike recovery falls outside of the established acceptance limits. Since both the spike duplicate recovery and the RPD between the spike and spike duplicate fall within acceptance limits, the data is reported.</p> | |

Originator's Name:
Aubrey Kingsbury 07-SEP-12

Data Validator/Group Leader:
Julia Hamilton 13-SEP-12

Radiological Analysis

**Radiochemistry Case Narrative
ARS International (ARSL)
SDG 12-1506
Work Order 309870**

Method/Analysis Information

Product: Alphaspec Am241 Liquid
Analytical Method: DOE EML HASL-300, Am-05-RC Modified
Analytical Batch Number: 1239554

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202722699 | Method Blank (MB) |
| 1202722700 | 309870001(CAMO-12-21738) Sample Duplicate (DUP) |
| 1202722701 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 22.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1202722699 (MB) and 1202722701 (LCS) were changed to 1.0 per client request.

Designated QC

The following sample was used for QC: 309870001 (CAMO-12-21738). The QC was from ARSL work order 309870.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

None of the samples in this sample set required prep or reanalysis.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Manual Integration

No manual integrations were performed on data in this batch.

Additional Comments

The MDCs are calculated using a blank population.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: Alphaspec Pu, Liquid
Analytical Method: DOE EML HASL-300, Pu-11-RC Modified
Analytical Batch Number: 1239555

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202722702 | Method Blank (MB) |
| 1202722703 | 309870001(CAMO-12-21738) Sample Duplicate (DUP) |
| 1202722704 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as

Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 22.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1202722702 (MB) and 1202722704 (LCS) were changed to 1.0 per client request.

Designated QC

The following sample was used for QC: 309870001 (CAMO-12-21738). The QC was from ARSL work order 309870.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Manual Integration

No manual integrations were performed on data in this batch.

Additional Comments

The MDCs are calculated using a blank population.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: Alphaspec U, Liquid
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Batch Number: 1239557

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202722705 | Method Blank (MB) |
| 1202722706 | 309870001(CAMO-12-21738) Sample Duplicate (DUP) |
| 1202722707 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 22.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. Calibrations are performed monthly using mixed alpha standards comprised of the following: Gd-148, Np-237, and Cm-244.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1202722705 (MB) and 1202722707 (LCS) were changed to 1.0 per client request.

Designated QC

The following sample was used for QC: 309870001 (CAMO-12-21738). The QC was from ARSL work order 309870.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Manual Integration

No manual integrations were performed on data in this batch.

Additional Comments

The MDCs are calculated using a blank population.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

| | |
|--------------------------|------------------|
| Product: | GammaSpec |
| Analytical Method: | EPA 901.1 |
| Analytical Batch Number: | 1240464 |

| Sample ID | Client ID |
|------------------|--|
| 309870001 | CAMO-12-21738 |
| 1202725096 | Method Blank (MB) |
| 1202725097 | 309992001(WST03-12-23161) Sample Duplicate (DUP) |
| 1202725098 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 24.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. The initial Calibrations were performed in May 2012, June 2012 and July 2012.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

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

Designated QC

The following sample was used for QC: 309992001 (WST03-12-23161). The QC was from ARSL work order 309992.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Additional Comments

Additional comments were not required for this sample set.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

Product: GFPC, Sr90, liquid
Analytical Method: EPA 905.0 Modified
Analytical Batch Number: 1239939

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202723779 | Method Blank (MB) |
| 1202723780 | 309911001(CASA-12-21643) Sample Duplicate (DUP) |
| 1202723781 | 309911001(CASA-12-21643) Matrix Spike (MS) |
| 1202723782 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 16.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met. The initial Calibration was performed in April 2012.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1202723779 (MB) and 1202723782 (LCS) were changed to 1.0 per client request.

Designated QC

The following sample was used for QC: 309911001 (CASA-12-21643). The QC was from ARSL work order 309911.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

Sample 1202723780 (CASA-12-21643) was recounted due to high MDC. The recount is reported.

Chemical Recoveries

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

Miscellaneous Information:**Data Exception (DER) Documentation**

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

Additional Comments

The matrix spike, 1202723781 (CASA-12-21643), aliquot was reduced to conserve sample volume.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Method/Analysis Information

| | |
|--------------------------|----------------------|
| Product: | WSP-GrossA/B |
| Analytical Method: | EPA 900.0/SW846 9310 |
| Analytical Batch Number: | 1239941 |

| Sample ID | Client ID |
|------------------|---|
| 309870001 | CAMO-12-21738 |
| 1202723792 | Method Blank (MB) |
| 1202723793 | 309454003(CAMO-12-21736) Sample Duplicate (DUP) |
| 1202723796 | 309454003(CAMO-12-21736) Matrix Spike (MS) |
| 1202723797 | 309454003(CAMO-12-21736) Matrix Spike Duplicate (MSD) |
| 1202723798 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 15.

Calibration Information:**Calibration Information**

All initial and continuing calibration requirements have been met. The initial Calibration was performed in September 2011. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha

crosstalk.

Standards Information

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

Sample Geometry

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

Quality Control (QC) Information:

Blank Information

Aliquots for samples 1202723792 (MB) and 1202723798 (LCS) were changed to 1.0 per client request.

Designated QC

The following sample was used for QC: 309454003 (CAMO-12-21736). The QC was from ARSL work order 309454.

QC Information

All of the QC samples met the required acceptance limits.

CSU

The blank result is less than 1.65 times the CSU.

Technical Information:

Holding Time

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

Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

Chemical Recoveries

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

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, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity.

Miscellaneous Information:

Data Exception (DER) Documentation

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

Additional Comments

The matrix spike and matrix spike duplicate, 1202723796 (CAMO-12-21736) and 1202723797 (CAMO-12-21736), aliquots were reduced to conserve sample volume.

Blank Decision Level

The blank result is less than the decision level.

Qualifier Information

Manual qualifiers were not required.

Certification Statement

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

GEL LABORATORIES LLC

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

Qualifier Definition Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1506 GEL Work Order: 309870

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
- UI Gamma Spectroscopy--Uncertain identification

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: Kate Gellatly

Date: 12 SEP 2012

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Los Alamos National Laboratory
 Address : PO Box 1663
 TA-03, SM271, Drop Pt. 02U, Rm111
 Los Alamos, New Mexico 87545
 Contact: Keith Greene
 Project: LANL-WQH Water Samples

Report Date: September 11, 2012

| | |
|---------------------------------|--------------------|
| Client Sample ID: CAMO-12-21738 | Project: ESHL00210 |
| Sample ID: 309870001 | Client ID: ARSL001 |
| Matrix: Water | |
| Collect Date: 16-AUG-12 | |
| Receive Date: 18-AUG-12 | |
| Collector: Client | |

| Parameter | Qualifier | Result | Uncertainty | DL | TPU | RL | Units | DF | Analyst | Date | Time | Batch | Mtd. |
|---|-----------|---------|-------------|--------|------------|-------|-------|----|---------|----------|------|---------|------|
| Rad Alpha Spec Analysis | | | | | | | | | | | | | |
| <i>Alphaspec Am241 Liquid "As Received"</i> | | | | | | | | | | | | | |
| Americium-241 | U | 0.00 | +/-0.00314 | 0.0305 | +/-0.00314 | 0.050 | pCi/L | | JXH2 | 09/05/12 | 1400 | 1239554 | 1 |
| <i>Alphaspec Pu, Liquid "As Received"</i> | | | | | | | | | | | | | |
| Plutonium-238 | U | 0.00506 | +/-0.00506 | 0.017 | +/-0.00507 | 0.050 | pCi/L | | JXH2 | 09/05/12 | 1401 | 1239555 | 2 |
| Plutonium-239/240 | U | 0.00253 | +/-0.00438 | 0.0305 | +/-0.00438 | 0.050 | pCi/L | | | | | | |
| <i>Alphaspec U, Liquid "As Received"</i> | | | | | | | | | | | | | |
| Uranium-234 | | 0.446 | +/-0.0373 | 0.0722 | +/-0.0474 | 1.00 | pCi/L | | JXH2 | 09/01/12 | 1814 | 1239557 | 3 |
| Uranium-235/236 | U | 0.0267 | +/-0.0106 | 0.0466 | +/-0.0107 | 1.00 | pCi/L | | | | | | |
| Uranium-238 | | 0.203 | +/-0.0237 | 0.0366 | +/-0.0271 | 0.500 | pCi/L | | | | | | |
| Rad Gamma Spec Analysis | | | | | | | | | | | | | |
| <i>Gammascpec "As Received"</i> | | | | | | | | | | | | | |
| Cesium-137 | U | 1.84 | +/-1.54 | 6.08 | +/-1.54 | 8.00 | pCi/L | | KXG3 | 08/29/12 | 1223 | 1240464 | 4 |
| Cobalt-60 | U | -0.498 | +/-1.45 | 5.46 | +/-1.45 | 8.00 | pCi/L | | | | | | |
| Neptunium-237 | U | 5.02 | +/-3.01 | 11.4 | +/-3.01 | 10.0 | pCi/L | | | | | | |
| Potassium-40 | U | 0.964 | +/-19.9 | 75.6 | +/-19.9 | 10.0 | pCi/L | | | | | | |
| Sodium-22 | U | 0.591 | +/-1.52 | 6.08 | +/-1.52 | 10.0 | pCi/L | | | | | | |
| Rad Gas Flow Proportional Counting | | | | | | | | | | | | | |
| <i>GFPC, Sr90, liquid "As Received"</i> | | | | | | | | | | | | | |
| Strontium-90 | U | -0.319 | +/-0.122 | 0.484 | +/-0.122 | 0.500 | pCi/L | | VXC2 | 08/30/12 | 1706 | 1239939 | 5 |
| <i>WSP-GrossA/B "As Received"</i> | | | | | | | | | | | | | |
| Beta | U | 2.16 | +/-0.929 | 2.98 | +/-0.946 | 3.00 | pCi/L | | DYT1 | 08/31/12 | 0946 | 1239941 | 6 |
| Alpha | U | 0.009 | +/-0.506 | 2.40 | +/-0.507 | 3.00 | pCi/L | | DYT1 | 09/01/12 | 1915 | 1239941 | 7 |

The following Analytical Methods were performed

| Method | Description |
|--------|-------------------------------------|
| 1 | DOE EML HASL-300, Am-05-RC Modified |
| 2 | DOE EML HASL-300, Pu-11-RC Modified |
| 3 | DOE EML HASL-300, U-02-RC Modified |
| 4 | EPA 901.1 |
| 5 | EPA 905.0 Modified |
| 6 | EPA 900.0/SW846 9310 |
| 7 | EPA 900.0/SW846 9310 |

| Surrogate/Tracer Recovery | Test | Batch ID | Recovery% | Acceptable Limits |
|---------------------------|--------------------------------------|----------|-----------|-------------------|
| Americium-243 Tracer | Alphaspec Am241 Liquid "As Received" | 1239554 | 97.7 | (50%-105%) |
| Plutonium-242 Tracer | Alphaspec Pu, Liquid "As Received" | 1239555 | 86.3 | (50%-105%) |
| Uranium-232 Tracer | Alphaspec U, Liquid "As Received" | 1239557 | 85.3 | (50%-105%) |
| Strontium Carrier | GFPC, Sr90, liquid "As Received" | 1239939 | 77.4 | (50%-105%) |

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : Los Alamos National Laboratory
Address : PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Report Date: September 11, 2012

Contact: Keith Greene
Project: LANL-WQH Water Samples

Client Sample ID: CAMO-12-21738
Sample ID: 309870001

Project: ESHL00210
Client ID: ARSL001

| Parameter | Qualifier | Result | Uncertainty | DL | TPU | RL | Units | DF | Analyst | Date | Time | Batch | Mtd. |
|------------------|-----------|--------|-------------|----|-----|----|-------|----|---------|----------|-----------|-------------------|------|
| Surrogate/Tracer | Recovery | Test | | | | | | | | Batch ID | Recovery% | Acceptable Limits | |

Notes:

TPU and Uncertainty are calculated at the 67% confidence level (1-sigma).

Quality Control Data

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 11, 2012
Page 1 of 6

Client : Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm
Los Alamos, New Mexico
Contact: Keith Greene
Workorder: 309870

| Parname | NOM | Sample | Qual | QC | Units | RER | REC% | Range | Anlst | Date Time |
|------------------------|---------------|------------|------|------------|-------|-------|------|------------|-------|---------------|
| Rad Alpha Spec | | | | | | | | | | |
| Batch | 1239554 | | | | | | | | | |
| QC1202722700 | 309870001 DUP | | | | | | | | | |
| Americium-241 | U | 0.00 | U | -0.00237 | pCi/L | 0.164 | | (0-1) | JXH2 | 09/05/1214:01 |
| | Uncert: | +/-0.00314 | | +/-0.00411 | | | | | | |
| | TPU: | +/-0.00314 | | +/-0.00411 | | | | | | |
| **Americium-243 Tracer | 2.67 | 2.61 | | 2.45 | pCi/L | | 91.6 | (50%-105%) | | |
| | Uncert: | +/-0.0772 | | +/-0.0797 | | | | | | |
| | TPU: | +/-0.135 | | +/-0.137 | | | | | | |
| QC1202722701 | LCS | | | | | | | | | |
| Americium-241 | 1.42 | | | 1.42 | pCi/L | | 100 | (80%-120%) | | 09/05/1214:01 |
| | Uncert: | | | +/-0.0541 | | | | | | |
| | TPU: | | | +/-0.0812 | | | | | | |
| **Americium-243 Tracer | 2.14 | | | 1.78 | pCi/L | | 83.4 | (50%-105%) | | |
| | Uncert: | | | +/-0.0663 | | | | | | |
| | TPU: | | | +/-0.113 | | | | | | |
| QC1202722699 | MB | | | | | | | | | |
| Americium-241 | | | U | -0.00193 | pCi/L | | | | | 09/05/1214:01 |
| | Uncert: | | | +/-0.00335 | | | | | | |
| | TPU: | | | +/-0.00335 | | | | | | |
| **Americium-243 Tracer | 2.14 | | | 1.92 | pCi/L | | 90 | (50%-105%) | | |
| | Uncert: | | | +/-0.0644 | | | | | | |
| | TPU: | | | +/-0.111 | | | | | | |
| Batch | 1239555 | | | | | | | | | |
| QC1202722703 | 309870001 DUP | | | | | | | | | |
| Plutonium-238 | U | 0.00506 | U | -0.00241 | pCi/L | 0.404 | | (0-1) | JXH2 | 09/05/1214:01 |
| | Uncert: | +/-0.00506 | | +/-0.00418 | | | | | | |
| | TPU: | +/-0.00507 | | +/-0.00418 | | | | | | |
| Plutonium-239/240 | U | 0.00253 | U | 0.00965 | pCi/L | 0.345 | | (0-1) | | |
| | Uncert: | +/-0.00438 | | +/-0.00591 | | | | | | |
| | TPU: | +/-0.00438 | | +/-0.00592 | | | | | | |
| **Plutonium-242 Tracer | 2.41 | 2.08 | | 2.16 | pCi/L | | 89.4 | (50%-105%) | | |
| | Uncert: | +/-0.0783 | | +/-0.0764 | | | | | | |
| | TPU: | +/-0.131 | | +/-0.128 | | | | | | |
| QC1202722704 | LCS | | | | | | | | | |
| Plutonium-238 | | | U | 0.00663 | pCi/L | | | (80%-120%) | | 09/05/1214:16 |
| | Uncert: | | | +/-0.00494 | | | | | | |
| | TPU: | | | +/-0.00495 | | | | | | |
| Plutonium-239/240 | 2.03 | | | 2.12 | pCi/L | | 104 | (80%-120%) | | |
| | Uncert: | | | +/-0.0685 | | | | | | |
| | TPU: | | | +/-0.117 | | | | | | |
| **Plutonium-242 Tracer | 1.93 | | | 1.60 | pCi/L | | 82.8 | (50%-105%) | | |
| | Uncert: | | | +/-0.0658 | | | | | | |
| | TPU: | | | +/-0.108 | | | | | | |
| QC1202722702 | MB | | | | | | | | | |

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 2 of 6

| Parmname | NOM | Sample Qual | QC | Units | RER | REC% | Range | Anlst | Date Time |
|-------------------------------|---------------|-------------|------------|-------|-------|-------|------------|-------|---------------|
| Rad Alpha Spec | | | | | | | | | |
| Batch | 1239555 | | | | | | | | |
| Plutonium-238 | | U | 0.00404 | pCi/L | | | | | |
| | Uncert: | | +/-0.00404 | | | | | | |
| | TPU: | | +/-0.00405 | | | | | | |
| Plutonium-239/240 | | U | -0.00202 | pCi/L | | | | | |
| | Uncert: | | +/-0.00452 | | | | | | |
| | TPU: | | +/-0.00452 | | | | | | |
| **Plutonium-242 Tracer | 1.93 | | 1.63 | pCi/L | | 84.4 | (50%-105%) | | |
| | Uncert: | | +/-0.0626 | | | | | | |
| | TPU: | | +/-0.104 | | | | | | |
| Batch | 1239557 | | | | | | | | |
| QC1202722706 | 309870001 DUP | | | | | | | | |
| Uranium-234 | | 0.446 | 0.379 | pCi/L | 0.372 | | (0-1) | JXH2 | 09/01/1218:14 |
| | Uncert: | +/-0.0373 | +/-0.0335 | | | | | | |
| | TPU: | +/-0.0474 | +/-0.0416 | | | | | | |
| Uranium-235/236 | | U | 0.0267 | U | 0.00 | 0.621 | (0-1) | | |
| | Uncert: | +/-0.0106 | +/-0.0108 | | | | | | |
| | TPU: | +/-0.0107 | +/-0.0108 | | | | | | |
| Uranium-238 | | 0.203 | 0.182 | pCi/L | 0.199 | | (0-1) | | |
| | Uncert: | +/-0.0237 | +/-0.0214 | | | | | | |
| | TPU: | +/-0.0271 | +/-0.0243 | | | | | | |
| **Uranium-232 Tracer | 2.74 | 2.34 | 2.44 | pCi/L | | 89 | (50%-105%) | | |
| | Uncert: | +/-0.0865 | +/-0.0804 | | | | | | |
| | TPU: | +/-0.197 | +/-0.192 | | | | | | |
| QC1202722707 | LCS | | | | | | | | |
| Uranium-234 | | | 2.40 | pCi/L | | | | | 09/01/1218:14 |
| | Uncert: | | +/-0.0807 | | | | | | |
| | TPU: | | +/-0.179 | | | | | | |
| Uranium-235/236 | | | 0.0924 | pCi/L | | | | | |
| | Uncert: | | +/-0.0193 | | | | | | |
| | TPU: | | +/-0.0202 | | | | | | |
| Uranium-238 | 2.67 | | 2.67 | pCi/L | | 100 | (80%-120%) | | |
| | Uncert: | | +/-0.0848 | | | | | | |
| | TPU: | | +/-0.197 | | | | | | |
| **Uranium-232 Tracer | 2.19 | | 1.39 | pCi/L | | 63.3 | (50%-105%) | | |
| | Uncert: | | +/-0.0772 | | | | | | |
| | TPU: | | +/-0.165 | | | | | | |
| QC1202722705 | MB | | | | | | | | |
| Uranium-234 | | U | -0.0191 | pCi/L | | | | | 09/01/1218:14 |
| | Uncert: | | +/-0.00978 | | | | | | |
| | TPU: | | +/-0.00978 | | | | | | |
| Uranium-235/236 | | U | 0.00 | pCi/L | | | | | |
| | Uncert: | | +/-0.00541 | | | | | | |
| | TPU: | | +/-0.00541 | | | | | | |
| Uranium-238 | | U | 0.00309 | pCi/L | | | | | |
| | Uncert: | | +/-0.00818 | | | | | | |
| | TPU: | | +/-0.00819 | | | | | | |
| **Uranium-232 Tracer | 2.19 | | 1.24 | pCi/L | | 56.8 | (50%-105%) | | |
| | Uncert: | | +/-0.0829 | | | | | | |

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 3 of 6

| Parmname | NOM | Sample Qual | QC | Units | RER | REC% | Range | Anlst | Date Time |
|-----------------------|---------------|-------------|----|---------|-------|--------|----------------|-------|---------------|
| Rad Alpha Spec | | | | | | | | | |
| Batch | 1239557 | | | | | | | | |
| | TPU: | | | | | | | | +/-0.170 |
| Rad Gamma Spec | | | | | | | | | |
| Batch | 1240464 | | | | | | | | |
| QC1202725097 | 309992001 DUP | | | | | | | | |
| Cesium-137 | | 6.43 | U | 5.89 | pCi/L | 0.0688 | (0-1) | KXG3 | 08/30/1213:06 |
| | Uncert: | +/-2.12 | | +/-1.80 | | | | | |
| | TPU: | +/-2.12 | | +/-1.80 | | | | | |
| Cobalt-60 | U | 0.229 | U | -1.18 | pCi/L | 0.251 | (0-1) | | |
| | Uncert: | +/-1.12 | | +/-1.70 | | | | | |
| | TPU: | +/-1.12 | | +/-1.70 | | | | | |
| Neptunium-237 | U | 0.125 | U | 2.65 | pCi/L | 0.220 | (0-1) | | |
| | Uncert: | +/-2.56 | | +/-3.18 | | | | | |
| | TPU: | +/-2.56 | | +/-3.18 | | | | | |
| Potassium-40 | | 72.2 | U | 24.3 | pCi/L | 0.480 | (0-1) | | |
| | Uncert: | +/-23.7 | | +/-26.2 | | | | | |
| | TPU: | +/-23.7 | | +/-26.2 | | | | | |
| Sodium-22 | U | -0.0135 | U | -0.66 | pCi/L | 0.121 | (0-1) | | |
| | Uncert: | +/-1.15 | | +/-1.53 | | | | | |
| | TPU: | +/-1.15 | | +/-1.53 | | | | | |
| QC1202725098 | LCS | | | | | | | | |
| Americium-241 | 2780 | | | 2880 | pCi/L | | 103 (80%-120%) | | 08/30/1211:45 |
| | Uncert: | | | +/-224 | | | | | |
| | TPU: | | | +/-224 | | | | | |
| Cesium-137 | 6120 | | | 6180 | pCi/L | | 101 (80%-120%) | | |
| | Uncert: | | | +/-283 | | | | | |
| | TPU: | | | +/-283 | | | | | |
| Cobalt-60 | 5820 | | | 5820 | pCi/L | | 100 (80%-120%) | | |
| | Uncert: | | | +/-247 | | | | | |
| | TPU: | | | +/-247 | | | | | |
| Neptunium-237 | | | U | 1.53 | pCi/L | | | | |
| | Uncert: | | | +/-25.8 | | | | | |
| | TPU: | | | +/-25.8 | | | | | |
| Potassium-40 | | | U | 31.8 | pCi/L | | | | |
| | Uncert: | | | +/-52.9 | | | | | |
| | TPU: | | | +/-52.9 | | | | | |
| Sodium-22 | | | U | -10.9 | pCi/L | | | | |
| | Uncert: | | | +/-8.78 | | | | | |
| | TPU: | | | +/-8.78 | | | | | |
| QC1202725096 | MB | | | | | | | | |
| Cesium-137 | | | U | 0.137 | pCi/L | | | | 08/30/1211:39 |
| | Uncert: | | | +/-1.27 | | | | | |
| | TPU: | | | +/-1.27 | | | | | |
| Cobalt-60 | | | U | 1.65 | pCi/L | | | | |
| | Uncert: | | | +/-1.50 | | | | | |
| | TPU: | | | +/-1.50 | | | | | |
| Neptunium-237 | | | U | 1.72 | pCi/L | | | | |
| | Uncert: | | | +/-2.77 | | | | | |
| | TPU: | | | +/-2.77 | | | | | |

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 4 of 6

| Parmname | NOM | Sample | Qual | QC | Units | RER | REC% | Range | Anlst | Date | Time |
|-----------------------|-----------|---------|-------|-----------|-------|-------|------|------------|-------|----------|-------|
| Rad Gamma Spec | | | | | | | | | | | |
| Batch | 1240464 | | | | | | | | | | |
| Potassium-40 | | | U | -20.3 | pCi/L | | | | | | |
| | | Uncert: | | +/-18.1 | | | | | | | |
| | | TPU: | | +/-18.1 | | | | | | | |
| Sodium-22 | | | U | 2.05 | pCi/L | | | | | | |
| | | Uncert: | | +/-1.65 | | | | | | | |
| | | TPU: | | +/-1.65 | | | | | | | |
| Rad Gas Flow | | | | | | | | | | | |
| Batch | 1239939 | | | | | | | | | | |
| QC1202723780 | 309911001 | DUP | | | | | | | | | |
| Strontium-90 | U | 0.149 | U | 0.293 | pCi/L | 0.251 | | (0-1) | VXC2 | 09/05/12 | 13:07 |
| | | Uncert: | | +/-0.135 | | | | | | | |
| | | TPU: | | +/-0.135 | | | | | | | |
| **Strontium Carrier | 8.14 | 6.30 | | 6.80 | mg | | 83.5 | (50%-105%) | | | |
| QC1202723782 | LCS | | | | | | | | | | |
| Strontium-90 | 25.0 | | | 27.5 | pCi/L | | 110 | (80%-120%) | | 08/30/12 | 17:07 |
| | | Uncert: | | +/-0.613 | | | | | | | |
| | | TPU: | | +/-2.37 | | | | | | | |
| **Strontium Carrier | 8.14 | | | 6.70 | mg | | 82.3 | (50%-105%) | | | |
| QC1202723779 | MB | | | | | | | | | | |
| Strontium-90 | | | U | -0.0406 | pCi/L | | | | | 08/30/12 | 17:06 |
| | | Uncert: | | +/-0.0673 | | | | | | | |
| | | TPU: | | +/-0.0673 | | | | | | | |
| **Strontium Carrier | 8.14 | | | 6.70 | mg | | 82.3 | (50%-105%) | | | |
| QC1202723781 | 309911001 | MS | | | | | | | | | |
| Strontium-90 | 125 | U | 0.149 | 130 | pCi/L | | 104 | (75%-125%) | | 08/30/12 | 17:07 |
| | | Uncert: | | +/-0.135 | | | | | | | |
| | | TPU: | | +/-0.135 | | | | | | | |
| **Strontium Carrier | 8.14 | 6.30 | | 6.90 | mg | | 84.8 | (50%-105%) | | | |
| Batch | 1239941 | | | | | | | | | | |
| QC1202723793 | 309454003 | DUP | | | | | | | | | |
| Alpha | U | -0.106 | U | 0.181 | pCi/L | 0.177 | | (0-1) | DYT1 | 09/01/12 | 19:27 |
| | | Uncert: | | +/-0.385 | | | | | | | |
| | | TPU: | | +/-0.386 | | | | | | | |
| Beta | U | 1.37 | U | 1.70 | pCi/L | 0.129 | | (0-1) | | 08/31/12 | 09:35 |
| | | Uncert: | | +/-0.619 | | | | | | | |
| | | TPU: | | +/-0.630 | | | | | | | |
| QC1202723798 | LCS | | | | | | | | | | |
| Alpha | 12.0 | | | 11.2 | pCi/L | | 92.9 | (80%-120%) | | 09/01/12 | 19:17 |
| | | Uncert: | | +/-0.627 | | | | | | | |
| | | TPU: | | +/-1.23 | | | | | | | |
| Beta | 49.9 | | | 47.7 | pCi/L | | 95.5 | (80%-120%) | | 08/31/12 | 09:48 |
| | | Uncert: | | +/-0.865 | | | | | | | |
| | | TPU: | | +/-4.03 | | | | | | | |
| QC1202723792 | MB | | | | | | | | | | |
| Alpha | | | U | 0.0052 | pCi/L | | | | | 09/01/12 | 19:17 |
| | | Uncert: | | +/-0.0545 | | | | | | | |
| | | TPU: | | +/-0.0546 | | | | | | | |
| Beta | | | U | 0.189 | pCi/L | | | | | 08/31/12 | 09:33 |

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 5 of 6

| Parmname | NOM | Sample Qual | QC | Units | RER | REC% | Range | Anlst | Date Time |
|---------------------|-----------|-------------|----------|-------|-------|--------|------------|-------|---------------|
| Rad Gas Flow | | | | | | | | | |
| Batch | 1239941 | | | | | | | | |
| | | Uncert: | | | | | +/-0.180 | | |
| | | TPU: | | | | | +/-0.180 | | |
| QC1202723796 | 309454003 | MS | | | | | | | |
| Alpha | 481 | U | -0.106 | 448 | pCi/L | 93 | (75%-125%) | | 09/01/1219:17 |
| | | Uncert: | +/-0.385 | | | | +/-25.5 | | |
| | | TPU: | +/-0.386 | | | | +/-45.6 | | |
| Beta | 2000 | U | 1.37 | 2020 | pCi/L | 101 | (75%-125%) | | 08/31/1209:48 |
| | | Uncert: | +/-0.619 | | | | +/-37.0 | | |
| | | TPU: | +/-0.630 | | | | +/-171 | | |
| QC1202723797 | 309454003 | MSD | | | | | | | |
| Alpha | 481 | U | -0.106 | 456 | pCi/L | 0.0453 | 94.7 | (0-1) | 09/01/1219:17 |
| | | Uncert: | +/-0.385 | | | | +/-26.1 | | |
| | | TPU: | +/-0.386 | | | | +/-46.6 | | |
| Beta | 2000 | U | 1.37 | 2140 | pCi/L | 0.174 | 107 | (0-1) | 08/31/1209:48 |
| | | Uncert: | +/-0.619 | | | | +/-37.6 | | |
| | | TPU: | +/-0.630 | | | | +/-181 | | |

Notes:

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- E Metals--%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- E Organics--Concentration of the target analyte exceeds the instrument calibration range
- F Estimated Value
- FB Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M Matrix Related Failure
- N Metals--The Matrix spike sample recovery is not within specified control limits
- N Organics--Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative

GEL LABORATORIES LLC

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

QC Summary

Workorder: 309870

Page 6 of 6

| Parname | NOM | Sample Qual | QC | Units | RER | REC% | Range | Anlst | Date | Time |
|---------|--|-------------|----|-------|-----|------|-------|-------|------|------|
| ND | Analyte concentration is not detected above the detection limit | | | | | | | | | |
| NJ | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier | | | | | | | | | |
| P | Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, difference is also <70% | | | | | | | | | |
| Q | One or more quality control criteria have not been met. Refer to the applicable narrative or DER. | | | | | | | | | |
| R | Sample results are rejected | | | | | | | | | |
| U | Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. | | | | | | | | | |
| UI | Gamma Spectroscopy--Uncertain identification | | | | | | | | | |
| UJ | Gamma Spectroscopy--Uncertain identification | | | | | | | | | |
| UL | Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. | | | | | | | | | |
| X | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier | | | | | | | | | |
| Y | QC Samples were not spiked with this compound | | | | | | | | | |
| Z | Paint Filter Test--Particulates passed through the filter, however no free liquids were observed. | | | | | | | | | |
| ^ | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry. | | | | | | | | | |
| d | 5-day BOD--The 2:1 depletion requirement was not met for this sample | | | | | | | | | |
| h | Preparation or preservation holding time was exceeded | | | | | | | | | |

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

** Indicates analyte is a surrogate/tracer compound.

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

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

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



September 21, 2012

www.gel.com

Keith Greene
Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Re: LANL-WQH Water Samples
Work Order: 311517
SDG: 12-1506-1

Dear Keith Greene:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on August 18, 2012, and analyzed for General Chemistry. 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. 4485.

Sincerely,

Hope Taylor for
Valerie Davis
Project Manager

Purchase Order: 63641-10
Chain of Custody: 12-1506
Enclosures



ARS International (63641-10)
LANL-WQH Water Samples
Work Order #: 311517
SDG: 12-1506-1

Table of Contents

| | |
|--|----|
| Case Narrative..... | 1 |
| Chain of Custody and Supporting Documentation..... | 4 |
| Data Review Qualifier Flag Definition Sheet..... | 10 |
| General Chem Analysis..... | 12 |
| Case Narrative..... | 13 |
| Sample Data Summary..... | 18 |
| Quality Control Summary..... | 21 |
| Miscellaneous..... | 24 |

Case Narrative

**Case Narrative for
ARS International (63641-10)
LANL-WQH Water Samples
Workorder #: 311517
SDG # : 12-1506-1**

September 21, 2012

Laboratory Identification:

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

Summary

Sample receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on August 18, 2012 for analysis. The sample was delivered with proper chain of custody documentation and signatures. The samples were screened according to GEL Standard Operating Procedure. All sample containers arrived without any visible signs of tampering or breakage. Containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Shipping container temperature was within specification (0 - 6C). Shipping container temperature was checked, documented, and within specifications. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following sample:

| <u>Laboratory ID</u> | <u>Client ID</u> |
|----------------------|------------------|
| 311517001 | CAMO-12-21746 |

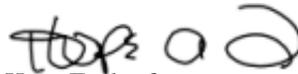
Case Narrative

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: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry.

I certify that this data report is in compliance with the terms and conditions of the subcontract and task order, both technically and for completeness, for other than the conditions detailed in the attached case narrative.



Hope Taylor for
Valerie Davis
Project Manager

List of current GEL Certifications as of 21 September 2012

| State | Certification |
|---------------------------|----------------------|
| Arizona | AZ0766 |
| Arkansas | 88-0651 |
| CLIA | 42D0904046 |
| California NELAP | 01151CA |
| Colorado | SC00012 |
| Connecticut | PH-0169 |
| Delaware | SC00012 |
| DoD ELAP A2LA ISO 17025 | 2567.01 |
| Florida NELAP | E87156 |
| Foreign Soils Permit | P330-09-00191 |
| Georgia | SC00012 |
| Georgia SDWA | 967 |
| Hawaii | SC00012 |
| Idaho | SC00012 |
| Illinois NELAP | 200029 |
| Indiana | C-SC-01 |
| Kansas NELAP | E-10332 |
| Kentucky | 90129 |
| Louisiana NELAP | 03046 (AI33904) |
| Louisiana SDWA | LA120008 |
| Maryland | 270 |
| Massachusetts | M-SC012 |
| Mississippi | SC00012 |
| Nevada | SC000122011-1 |
| New Hampshire NELAP | 2054 |
| New Jersey NELAP | SC002 |
| New Mexico | SC00012 |
| New York NELAP | 11501 |
| North Carolina | 233 |
| North Carolina SDWA | 45709 |
| Oklahoma | 9904 |
| Pennsylvania NELAP | 68-00485 |
| South Carolina Chemistry | 10120001 |
| South Carolina Radiochemi | 10120002 |
| Tennessee | TN 02934 |
| Texas NELAP | T104704235-12-7 |
| Utah NELAP | SC00012 |
| Vermont | VT87156 |
| Virginia NELAP | 460202 |
| Washington | C780 |
| Wisconsin | 999887790 |

Chain of Custody and Supporting Documentation



SAMPLE RECEIPT & REVIEW FORM

| | | |
|--|--|--|
| Client: LANL | | SDG/AR/COC/Work Order:12-1506 |
| Received By: Patricia Dent | | Date Received: AUGUST 18, 2012 |
| Suspected Hazard Information | Yes <input type="checkbox"/> No <input type="checkbox"/> | *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation. |
| COC/Samples marked as radioactive? | <input checked="" type="checkbox"/> | Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0CPM |
| Classified Radioactive II or III by RSO? | <input checked="" type="checkbox"/> | If yes, Were swipes taken of sample containers < action levels? |
| COC/Samples marked containing PCBs? | <input checked="" type="checkbox"/> | |
| Shipped as a DOT Hazardous? | <input checked="" type="checkbox"/> | Hazard Class Shipped: UN#: |
| Samples identified as Foreign Soil? | <input checked="" type="checkbox"/> | |

| Sample Receipt Criteria | | Yes | NA | No | Comments/Qualifiers (Required for Non-Conforming Items) |
|-------------------------|--|-------------------------------------|-------------------------------------|-------------------------------------|--|
| 1 | Shipping containers received intact and sealed? | <input checked="" type="checkbox"/> | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 2 | Samples requiring cold preservation within (0 ≤ 6 deg. C)?* | <input checked="" type="checkbox"/> | | | Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3,4C |
| 2a | Daily check performed and passed on IR temperature gun? | <input checked="" type="checkbox"/> | | | Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):61524646 |
| 3 | Chain of custody documents included with shipment? | <input checked="" type="checkbox"/> | | | |
| 4 | Sample containers intact and sealed? | <input checked="" type="checkbox"/> | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 5 | Samples requiring chemical preservation at proper pH? | | | <input checked="" type="checkbox"/> | Sample ID's, containers affected and observed pH: CAMO-12-21738 for Gross A/B If Preservation added, Lot# L03022 |
| 6 | VOA vials free of headspace (defined as < 6mm bubble)? | | <input checked="" type="checkbox"/> | | Sample ID's and containers affected: |
| 7 | Are Encore containers present? | | | <input checked="" type="checkbox"/> | (If yes, immediately deliver to Volatiles laboratory) |
| 8 | Samples received within holding time? | <input checked="" type="checkbox"/> | | | ID's and tests affected: |
| 9 | Sample ID's on COC match ID's on bottles? | <input checked="" type="checkbox"/> | | | Sample ID's and containers affected: |
| 10 | Date & time on COC match date & time on bottles? | <input checked="" type="checkbox"/> | | | Sample ID's affected: |
| 11 | Number of containers received match number indicated on COC? | <input checked="" type="checkbox"/> | | | Sample ID'S affected: |
| 12 | Are sample containers identifiable as GEL provided? | | | <input checked="" type="checkbox"/> | CLIENT |
| 13 | COC form is properly signed in relinquished/received sections? | <input checked="" type="checkbox"/> | | | |
| 14 | Carrier and tracking number. | <input checked="" type="checkbox"/> | | | Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 7209 7856 9113 4C 7209 7856 9135 3C |

Comments (Use Continuation Form if needed):

Subject: ISSUES FROM 08/18/2012
From: Pat Dent <Pat.Dent@gel.com>
Date: 8/18/2012 1:49 PM
To: "Keith R. Greene" <kgreene@lanl.gov>
CC: LANL@amrad.com, "team.davis" <team.davis@gel.com>

Good Afternoon all listed below are today's Issues

Container received for Gross A/B was preserved prior to analysis.

RN#2012-2205 the lab received (1) container each instead of (2) as indicated on COC.

Thanks!! Pat Dent

--
Patricia Dent
Project Manager Assistant
GEL Laboratories, LLC
2040 Savage Rd.
Charleston, S.C. 29407
Main: 843-556-8171 Ext 4264
Fax: 843-766-1178
Email: pad@gel.com
Web: www.gel.com

ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

SHIP DATE: 17AUG12
ACTWGT: 10.30 LB MAN
CAD: 0014176/CAFE2511

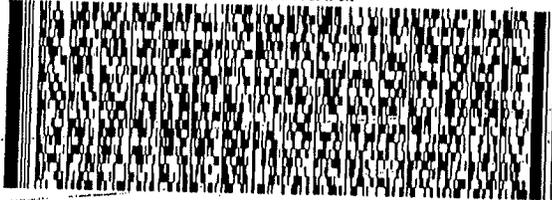
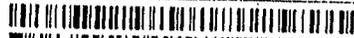
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: WE6L11550000

3c



FedEx
Express



TRKH
0201 7209 7856 9135

SATURDAY ### A1
PRIORITY OVERNIGHT

X0 CHSA

29407
SC-US CHS

98 190127 12



ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

SHIP DATE: 17AUG12
ACTWGT: 6.0 LB MAN
CAD: 0014176/CAFE2511

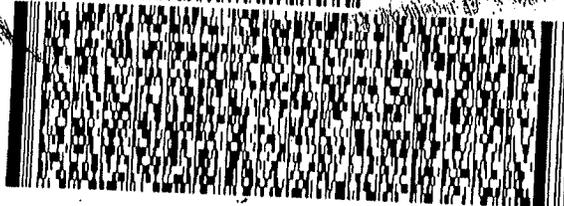
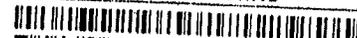
LOS ALAMOS, NM 87545
UNITED STATES US

BILL SENDER

TO VALERIE DAVIS
GENERAL ENGINEERING LAB
2040 SAVAGE RD

CHARLESTON SC 29407
(843) 556-8171
REF: MR1A015AGWK0

4c



FedEx
Express



TRKH
0201 7209 7856 9113

SATURDAY ### A1
PRIORITY OVERNIGHT

X0 CHSA

29407
SC-US CHS

71 30

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

| Qualifier | Explanation |
|-----------|---|
| * | A quality control analyte recovery is outside of specified acceptance criteria |
| ** | Analyte is a surrogate compound |
| < | Result is less than value reported |
| > | Result is greater than value reported |
| ^ | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL |
| A | The TIC is a suspected aldol-condensation product |
| B | Target analyte was detected in the associated blank |
| B | Metals-Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL |
| BD | Results are either below the MDC or tracer recovery is low |
| C | Analyte has been confirmed by GC/MS analysis |
| D | Results are reported from a diluted aliquot of the sample |
| d | 5-day BOD-The 2:1 depletion requirement was not met for this sample |
| E | Organics-Concentration of the target analyte exceeds the instrument calibration range |
| E | Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria |
| H | Analytical holding time was exceeded |
| h | Preparation or preservation holding time was exceeded |
| J | Value is estimated |
| N | Metals-The Matrix spike sample recovery is not within specified control limits |
| N | Organics-Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor |
| N/A | Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more |
| ND | Analyte concentration is not detected above the reporting limit |
| UI | Gamma Spectroscopy-Uncertain identification |
| X | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| Y | QC Samples were not spiked with this compound |
| Z | Paint Filter Test-Particulates passed through the filter, however no free liquids were observed. |

General Chem Analysis

Case Narrative

**General Chemistry Narrative
ARS International (ARSL)
SDG 12-1506-1**

Method/Analysis Information

| | | | |
|--------------------------|---|----------------|--|
| Product: | Nitrate Nitrite by Cadmium Reduction | | |
| Analytical Batch: | 1247937 | Method: | EPA 353.2 Nitrogen and Nitrate/Nitrite |

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 353.2:

| Sample ID | Client ID |
|------------------|---|
| 311517001 | CAMO-12-21746 |
| 1202743070 | Method Blank (MB) |
| 1202743071 | 311517001(CAMO-12-21746) Sample Duplicate (DUP) |
| 1202743073 | 311517001(CAMO-12-21746) Post Spike (PS) |
| 1202743075 | Laboratory Control Sample (LCS) |

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

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 7.

Preparation/Analytical Method Verification

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

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Continuing Calibration Blanks

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

Calibration Verification Information (CCV)

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

acceptance limits.

Y Intercept Rule

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

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation

The following sample was selected for QC analysis: 311517001 (CAMO-12-21746).

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

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

Duplicate Relative Percent Difference (RPD) Statement

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

Technical Information

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

Holding Times

The following sample from this sample group was logged in for this analysis outside of the method specified holding time: 311517001 (CAMO-12-21746).

Sample Preservation/Integrity

All the samples from this sample group met the preservation and integrity requirements of the method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-analysis

The following sample was re-analyzed due to sampling an empty cup: 1202743075 (LCS).

Miscellaneous Information

Data Exception (DER) Documentation

The following DER was generated for this SDG: 1122076 311517001 (CAMO-12-21746).

Additional Comments

Additional comments were not required for this SDG.

Electronic Packaging Comment

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

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

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

Certification Statement

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

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer:  Date: 21Sep12

Sample Data Summary

GEL LABORATORIES LLC

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

Certificate of Analysis Report for

ARSL001 ARS International (63641-10)

Client SDG: 12-1506-1 GEL Work Order: 311517

The Qualifiers in this report are defined as follows:

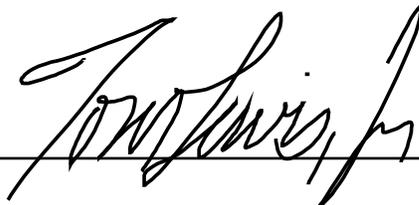
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- H Analytical holding time was exceeded
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

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

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

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

Reviewed by



GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: September 21, 2012

Company : Los Alamos National Laboratory
Address : PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Contact: Keith Greene
Project: LANL-WQH Water Samples

Client SDG: 12-1506-1

Client Sample ID: CAMO-12-21746
Sample ID: 311517001
Matrix: W
Collect Date: 16-AUG-12 11:48
Receive Date: 18-AUG-12
Collector: Client

Project: ESHL00210
Client ID: ARSL001

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | Method |
|---|-----------|--------|-------|-------|-------|----|---------|----------|------|---------|--------|
| Nutrient Analysis | | | | | | | | | | | |
| EPA 353.2 Nitrogen, Nitrate/Nitrite "As Received" | | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | H | 0.495 | 0.017 | 0.050 | mg/L | 1 | AXH3 | 09/20/12 | 1417 | 1247937 | 1 |

The following Analytical Methods were performed:

| Method | Description | Analyst Comments |
|--------|-------------|------------------|
| 1 | EPA 353.2 | |

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: September 21, 2012
Page 1 of 2

Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico

Contact: Keith Greene

Workorder: 311517

| Paramname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---------------------------|-----------|--------|-------|-------|-------|-------|------|----------------|-------|----------|-------|
| Nutrient Analysis | | | | | | | | | | | |
| Batch | 1247937 | | | | | | | | | | |
| QC1202743071 | 311517001 | DUP | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | H | 0.495 | H | 0.492 | mg/L | 0.608 | | (0%-20%) | AXH3 | 09/20/12 | 14:19 |
| QC1202743075 | LCS | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | 1.00 | | | 1.06 | mg/L | | 106 | (90%-110%) | | 09/20/12 | 14:25 |
| QC1202743070 | MB | | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | | | U | ND | mg/L | | | | | 09/20/12 | 14:15 |
| QC1202743073 | 311517001 | PS | | | | | | | | | |
| Nitrogen, Nitrate/Nitrite | 1.00 | H | 0.495 | H | 1.54 | mg/L | | 105 (90%-110%) | | 09/20/12 | 14:20 |

Notes:

RER is calculated at the 95% confidence level (2-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- F Estimated Value
- H Analytical holding time was exceeded
- J Value is estimated
- M Matrix Related Failure
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Sample results are rejected
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y QC Samples were not spiked with this compound
- Z Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.

GEL LABORATORIES LLC

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

QC Summary

Workorder: 311517

Page 2 of 2

| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|----------|-----|--|------|----|-------|------|------|-------|-------|------|------|
| ^ | | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry. | | | | | | | | | |
| d | | 5-day BOD--The 2:1 depletion requirement was not met for this sample | | | | | | | | | |
| h | | Preparation or preservation holding time was exceeded | | | | | | | | | |

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

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

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

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

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

Miscellaneous

DATA EXCEPTION REPORT

| | | | |
|--|--------------------------------------|--|-----------------------------|
| Mo.Day Yr. 20-SEP-12 | Division: Industrial | Quality Criteria: Specifications | Type: Process |
| Instrument Type: LACHAT Flow Injection Analyzer | Test / Method: EPA 353.2 | Matrix Type: Liquid | Client Code: ESHL |
| Batch ID: 1247937 | Sample Numbers: See below. | | |
| Potentially affected work order(s)(SDG): 311517(12-1506-1),311526 | | | |
| Application Issues: Sample Logged out of Holding | | | |
| Specification and Requirements Exception Description: | | DER Disposition: | |
| 1. Sample Logged out of Holding: 311517 001 | | 1. Sample was logged out of holding. | |

Originator's Name:
Aubrey Kingsbury 20-SEP-12

Data Validator/Group Leader:
Julia Hamilton 21-SEP-12