TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-17507-1
TestAmerica Sample Delivery Group: SL2200
Client Project/Site: F16-020

For:
CH2M Hill Plateau Remediation Company
PO BOX 1600, MS H8-41
Richland, Washington 99352

Attn: Mr. Scot Fitzgerald

Elizabeth M. Hoerchler

*Authorized for release by:*
*6/21/2016 2:23:49 PM*
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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative



## Job ID: 160-17507-1

### Laboratory: TestAmerica St. Louis

**Narrative**

CASE NARRATIVE

CH2MHill Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352
June 21, 2016
Attention: Scot Fitzgerald

SDG : SL2200
Number of Samples : 1 samples
Sample Matrix : Soil
Data Deliverable : Summary
Date SDG Closed : May 24, 2016

II. Introduction

On May 24, 1 samples were received by TestAmerica - St. Louis for chemical analysis. The samples were received within temperature criteria. See the COC and receipt checklists for documentation of any variations on receipt conditions and temperature. Upon receipt, samples were given laboratory Ids to correspond with specific client Ids. Please refer to the Sample Summary sheets attached to this case narrative. This report is incomplete without the narrative.

The following SAFs are associated with this SDG: F16-020

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits. All results are based upon samples as they were received, i.e. wet weight, unless otherwise noted on the data sheets. See the attached Methods Summary Form for the methods used in this SDG.

MS/MSD/Dup analysis was done per the client requirements. Analytical batches that did not contain matrix QC were analyzed with an LCS/LCS duplicate.

Note: For Metals analyses, per standard practice, all 6020 water and soil samples are initially prepared at 2x dilution. This standard dilution does not affect reporting limits as MDL studies are also prepared in the same manner. These dilutions do not necessitate flagging unless otherwise noted in the case narrative.

For Anion analysis, samples have been started at a 2x dilution per CHPRC direction. The samples are flagged accordingly with a “D” flag if sample concentration is above the MDL/RL. Non-conformance will be included in the below section only if dilution is greater than 2x.

For WTPH methods, the lab utilizes method 8015B. Per CHPRC direction, the method name in the electronic data has been modified to read WTPH in the place of 8015B.

IV. Definitions

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike
DUP- Laboratory Duplicate
MS- Matrix Spike
MSD- Matrix Spike Duplicate

The term “Detection Limit” used in the analytical data report refers to either the lab’s standard reporting limits or contractually required reporting limits, whichever is applicable.

## Job ID: 160-17507-1 (Continued)

### Laboratory: TestAmerica St. Louis (Continued)

The following data qualifiers may be applicable to the results in this report, as appropriate.

- **B** - For inorganic analyses, the sample result is greater than the MDL but less than the RL.
- **B** - For organic analyses, Method Blank contamination. The Method Blank contains the target analyte at a concentration above the MDL.
- **J** - For organic analyses, the sample is estimated and less than the RL.
- **C** - For inorganic analyses, Method Blank contamination. The Method Blank contains the target analyte at a concentration above the MDL.
- **D** - For all analyses, the sample result was obtained from the analysis of a dilution. For Metals analyses, per standard practice, all solid samples are initially prepared at a 2x dilution. This standard dilution does not affect reporting limits as MDL studies are also prepared in the same manner. These dilutions do not necessitate qualification unless otherwise noted in the case narrative. Due to limitations of the LIMS system, "D" flags may appear on QC samples.
- **N** - For inorganics and GC analyses, the spike/spike duplicate recoveries are outside QC limits.
- **T** - For GCMS analyses, the spike/spike duplicate recoveries are outside QC limits.
- **O**- For all analyses, the LCS (LCSD) recoveries are outside QC limits.
- **M**- For inorganic analyses, the precision was outside control limits.
- **P -** For organic analyses (PCB/Pests only), the aroclor target analyte has greater than 25% difference for detected concentrations between the two GC columns.

**Volatiles**

**Batch: 253556**

The matrix spike duplicate (MSD) recoveries for preparation batch 160-253556 and analytical batch 160-253527 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected, because the associated laboratory control sample (LCS/LCSD) recoveries were within acceptance limits. (160-17445-C-1-B MSD) This analyte has been qualified accordingly with a "T" flag in the associated samples.

The matrix spike / matrix spike duplicate (MS/MSD) precision for preparation batch 160-253556 and analytical batch 160-253527 was outside control limits. Sample matrix interference and/or non-homogeneity are suspected, because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits. (160-17445-C-1-B MSD)

Internal standard (ISTD) response for the following sample in batch 160-253527 was outside the lower control limit: B35454 (160-17507-1), indicating a possible high bias for analytes associated with the ISTD. There were no target analytes associated with the affected ISTD detected in the sample; therefore, the data have been reported.

The following compounds did not meet the minimum relative response factor limits in the continuing calibration verification (CCV) associated with batch 160-253527: Acetone and 2-Butanone (MEK). A low-level LOQV was analyzed at the reporting limit (5ug/L) and the affected analytes were detected. Target analytes recovering above the reporting limit will be qualified and reported. (CCVIS 160-253527/3)

Toluene was detected in method blank MB 160-253556/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged "B". If the associated sample reported a result above the MDL and/or RL and is not greater than 5x the method blank, the result has been flagged "C".

There were no observations or non-conformances associated with the following methods:
**%Moisture**

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

Reviewed and approved:

Elizabeth Hoerchler
St. Louis Project Manager Assistant

# Login Sample Receipt Checklist

Client: CH2M Hill Plateau Remediation Company

Job Number: 160-17507-1
SDG Number: SL2200

**Login Number: 17507**
**List Number: 1**
**Creator: Clarke, Jill C**

**List Source: TestAmerica St. Louis**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 0.8° |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

| CH2MHill Plateau Remediation Company | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | | F16-020-494 | PAGE 1 OF 1 |
|---|---|---|---|---|---|
| COLLECTOR SL2200 D.E. WIGHT/CHPRC | COMPANY CONTACT TODAK, D | TELEPHONE NO. 376-6427 | PROJECT COORDINATOR TODAK, D | PRICE CODE 8H | DATA TURNAROUND |
| SAMPLING LOCATION C9507, Core 20 | PROJECT DESIGNATION 200-DV-1 Operable Unit Characterization of Waste Sites Phase 3 Sampling | | SAF NO. F16-020 | AIR QUALITY ☐ | 30 Days / 30 Days |
| ICE CHEST NO. GWS-490 | FIELD LOGBOOK NO. HNF-N-507-33-78 | ACTUAL SAMPLE DEPTH 122.5-127.5 ft | COA 302632 | METHOD OF SHIPMENT FEDERAL EXPRESS | ORIGINAL |
| SHIPPED TO TestAmerica St. Louis | OFFSITE PROPERTY NO. N/A | | BILL OF LADING/AIR BILL NO. 7763 5140 3919 | | |

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegetation
W=Water
WI=Wipe
X=Other

**POSSIBLE SAMPLE HAZARDS/ REMARKS**
*Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1. NA

**SPECIAL HANDLING AND/OR STORAGE**
~~RADIOACTIVE TIE TO: B35453~~
N/A 5-18-16

| | |
|---|---|
| PRESERVATION | Frozen/Cool <-7C and >-20C |
| HOLDING TIME | 14 Days |
| TYPE OF CONTAINER | aGs |
| NO. OF CONTAINER(S) | 5 |
| VOLUME | 40mL |
| SAMPLE ANALYSIS | SEE ITEM (1) IN SPECIAL INSTRUCTIONS |

| SAMPLE NO. | MATRIX* | SAMPLE DATE | SAMPLE TIME | |
|---|---|---|---|---|
| B35454 | SOIL | MAY 18 2016 | 0750 | ✓ |

| CHAIN OF POSSESSION | | SIGN/ PRINT NAMES | |
|---|---|---|---|
| RELINQUISHED BY/REMOVED FROM D.E. WIGHT/CHPRC | DATE/TIME MAY 18 2016 1515 | RECEIVED BY/STORED IN SSU-1 | DATE/TIME MAY 18 2016 1515 |
| RELINQUISHED BY/REMOVED FROM SSU #1 | DATE/TIME MAY 23 2016 1100 | RECEIVED BY/STORED IN L.D. Wall CHPRC | DATE/TIME MAY 23 2016 1100 |
| RELINQUISHED BY/REMOVED FROM L.D. Wall CHPRC | DATE/TIME MAY 23 2016 1400 | RECEIVED BY/STORED IN FEDEX | DATE/TIME |
| RELINQUISHED BY/REMOVED FROM FEDEX | DATE/TIME | RECEIVED BY/STORED IN JILL CLARKE | DATE/TIME 5-24-16 0840 |
| RELINQUISHED BY/REMOVED FROM | DATE/TIME | RECEIVED BY/STORED IN | DATE/TIME |
| RELINQUISHED BY/REMOVED FROM | DATE/TIME | RECEIVED BY/STORED IN | DATE/TIME |
| RELINQUISHED BY/REMOVED FROM | DATE/TIME | RECEIVED BY/STORED IN | DATE/TIME |

**SPECIAL INSTRUCTIONS**
PORTION 20A
(1) 5035/8260_VOA: LOW LEVEL: COMMON {1,1,1-Trichloroethane, 1,1-Dichloroethane, 1,2-Dichloroethane, 2-Butanone, 4-Methyl-2-pentanone, Acetone, Benzene, Carbon tetrachloride, Chlorobenzene, Chloroform, Ethylbenzene, Methylene chloride, Tetrachloroethene, Toluene, Trichloroethene, Xylenes (total)}; 5035/8260_VOA: LOW LEVEL: COMMON (Add-On) {cis-1,2-Dichloroethylene, n-Butylbenzene, trans-1,2-Dichloroethylene};

| | | | |
|---|---|---|---|
| LABORATORY SECTION | RECEIVED BY | TITLE | DATE/TIME |
| FINAL SAMPLE DISPOSITION | DISPOSAL METHOD | DISPOSED BY | DATE/TIME |

PRINTED ON 3/29/2016 FSR ID = FSR31151 TRVL NUM = TRVL-16-117 A-6003-618 (REV 2)

## SAMPLE RECORD SHEET FOR VOC SAMPLE COLLECTION

**Location:** 200 west C9507 Core 20 F16-020-494

**Sampler Initials and Date:** D.W 5-18-16

| Sample Number [1] | Sample Suffix | Initial Weight [2] (grams) | Total Weight [3] (grams) | Soil Weight [4] (grams) |
|---|---|---|---|---|
| B35454 | K | 29.5 | 36.4 | 6.9 |
| B35454 | L | 29.4 | 37.1 | 7.7 |
| B35454 | M | 29.5 | 37.4 | 7.9 |
| B35454 | N | 29.2 | 36.0 | 6.8 |
| B35454 | P | 29.1 | 37.1 | 8.0 |

[1] Enter sample number associated with the sampling event.

[2] Initial weight is to include all labels, stickers, bags, spin bars (for samples with suffix K, L, M, N and P) and anything else that will be associated with the bottle when it is weighed with the sample.

[3] Ensure that everything weighed for the empty bottle and no additional items (besides the sample) is weighed.

[4] Soil weight is the vial with sample minus Initial Weight.

A-6005-526 (REV 0)

# FedEx ® Tracking

## 776351403919

Ship date:
**Mon 5/23/2016**

RICHLAND, WA US

**Delivered**
*Signed for by: S.CASTILLO*

Actual delivery:
**Tue 5/24/2016 8:29 am**

EARTH CITY, MO US

## Travel History

| Date/Time | Activity | Location |
|---|---|---|
| - 5/24/2016 - Tuesday | | |
| 8:29 am | Delivered | EARTH CITY, MO |
| 7:14 am | On FedEx vehicle for delivery | EARTH CITY, MO |
| 7:07 am | At local FedEx facility | EARTH CITY, MO |
| 5:33 am | At destination sort facility | BERKELEY, MO |
| 4:42 am | Departed FedEx location | MEMPHIS, TN |
| 12:35 am | Arrived at FedEx location | MEMPHIS, TN |
| - 5/23/2016 - Monday | | |
| 5:00 pm | Left FedEx origin facility | PASCO, WA |
| 3:23 pm | Picked up | PASCO, WA |
| 2:41 pm | Shipment information sent to FedEx | |

## Shipment Facts

| | | | |
|---|---|---|---|
| **Tracking number** | 776351403919 | **Service** | FedEx Standard Overnight |
| **Weight** | 78 lbs / 35.38 kgs | **Delivered To** | Shipping/Receiving |
| **Total pieces** | 1 | **Total shipment weight** | 78 lbs / 35.38 kgs |
| **Terms** | Recipient | **Shipper reference** | GWS-490 |
| **Packaging** | Your Packaging | **Special handling section** | Deliver Weekday, Additional Handling Surcharge |



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# Definitions/Glossary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200



## Qualifiers

### GC/MS VOA

| Qualifier | Qualifier Description |
|---|---|
| T | MS, MSD: Recovery exceeds upper or lower control limits. |
| U | Analyzed for but not detected. |
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

# Method Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8260C | Volatile Organic Compounds by GC/MS | SW846 | TAL SL |
| Moisture | Percent Moisture | EPA | TAL SL |

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 160-17507-1 | B35454 | Soil | 05/18/16 07:50 | 05/24/16 08:40 |

# Client Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS

**Client Sample ID: B35454**
**Date Collected: 05/18/16 07:50**
**Date Received: 05/24/16 08:40**

**Lab Sample ID: 160-17507-1**
**Matrix: Soil**
**Percent Solids: 94.9**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.33 | U | 3.8 | 0.33 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| 1,1-Dichloroethane | 0.30 | U | 3.8 | 0.30 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| 1,2-Dichloroethane | 0.66 | U | 3.8 | 0.66 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| 2-Butanone (MEK) | 1.5 | U | 15 | 1.5 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| 4-Methyl-2-pentanone (MIBK) | 0.56 | U | 15 | 0.56 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Acetone | 4.9 | U | 15 | 4.9 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Benzene | 0.19 | U | 3.8 | 0.19 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Carbon tetrachloride | 0.39 | U | 3.8 | 0.39 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Chlorobenzene | 0.29 | U | 3.8 | 0.29 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Chloroform | 0.29 | U | 3.8 | 0.29 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| cis-1,2-Dichloroethylene | 0.46 | U | 3.8 | 0.46 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Ethylbenzene | 0.23 | U | 3.8 | 0.23 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Methylene Chloride | 1.2 | U | 3.8 | 1.2 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| n-Butylbenzene | 0.46 | U T | 3.8 | 0.46 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Tetrachloroethene | 0.24 | U | 3.8 | 0.24 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Toluene | 0.53 | U | 3.8 | 0.53 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| trans-1,2-Dichloroethylene | 0.72 | U | 3.8 | 0.72 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Trichloroethene | 0.30 | U | 3.8 | 0.30 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |
| Xylenes, Total | 0.65 | U | 7.6 | 0.65 | ug/Kg | ☼ | 05/26/16 19:31 | 05/27/16 00:13 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *116* | | *67 - 132* | *05/26/16 19:31* | *05/27/16 00:13* | *1* |
| *4-Bromofluorobenzene (Surr)* | *115* | | *59 - 150* | *05/26/16 19:31* | *05/27/16 00:13* | *1* |
| *Dibromofluoromethane (Surr)* | *106* | | *53 - 143* | *05/26/16 19:31* | *05/27/16 00:13* | *1* |
| *Toluene-d8 (Surr)* | *107* | | *74 - 135* | *05/26/16 19:31* | *05/27/16 00:13* | *1* |

# QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS

**Lab Sample ID: MB 160-253556/1-A**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.43 | U | 5.0 | 0.43 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| 1,1-Dichloroethane | 0.39 | U | 5.0 | 0.39 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| 1,2-Dichloroethane | 0.87 | U | 5.0 | 0.87 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| 2-Butanone (MEK) | 1.9 | U | 20 | 1.9 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| 4-Methyl-2-pentanone (MIBK) | 0.73 | U | 20 | 0.73 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Acetone | 6.5 | U | 20 | 6.5 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Benzene | 0.25 | U | 5.0 | 0.25 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Carbon tetrachloride | 0.51 | U | 5.0 | 0.51 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Chlorobenzene | 0.38 | U | 5.0 | 0.38 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Chloroform | 0.38 | U | 5.0 | 0.38 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| cis-1,2-Dichloroethylene | 0.60 | U | 5.0 | 0.60 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Ethylbenzene | 0.30 | U | 5.0 | 0.30 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Methylene Chloride | 1.6 | U | 5.0 | 1.6 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| n-Butylbenzene | 0.60 | U | 5.0 | 0.60 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Tetrachloroethene | 0.32 | U | 5.0 | 0.32 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Toluene | 1.01 | J | 5.0 | 0.70 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| trans-1,2-Dichloroethylene | 0.94 | U | 5.0 | 0.94 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Trichloroethene | 0.39 | U | 5.0 | 0.39 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |
| Xylenes, Total | 0.85 | U | 10 | 0.85 | ug/Kg | | 05/26/16 16:58 | 05/26/16 18:32 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *98* | | *67 - 132* | *05/26/16 16:58* | *05/26/16 18:32* | *1* |
| *4-Bromofluorobenzene (Surr)* | *105* | | *59 - 150* | *05/26/16 16:58* | *05/26/16 18:32* | *1* |
| *Dibromofluoromethane (Surr)* | *99* | | *53 - 143* | *05/26/16 16:58* | *05/26/16 18:32* | *1* |
| *Toluene-d8 (Surr)* | *104* | | *74 - 135* | *05/26/16 16:58* | *05/26/16 18:32* | *1* |

**Lab Sample ID: LCS 160-253556/2-A**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 50.0 | 49.6 | | ug/Kg | | 99 | 71 - 127 |
| 1,1-Dichloroethane | 50.0 | 47.6 | | ug/Kg | | 95 | 80 - 120 |
| 1,2-Dichloroethane | 50.0 | 45.6 | | ug/Kg | | 91 | 68 - 128 |
| 2-Butanone (MEK) | 50.0 | 49.9 | | ug/Kg | | 100 | 41 - 140 |
| 4-Methyl-2-pentanone (MIBK) | 50.0 | 43.9 | | ug/Kg | | 88 | 67 - 130 |
| Acetone | 50.0 | 44.4 | | ug/Kg | | 89 | 39 - 140 |
| Benzene | 50.0 | 48.8 | | ug/Kg | | 98 | 80 - 120 |
| Carbon tetrachloride | 50.0 | 48.8 | | ug/Kg | | 98 | 68 - 130 |
| Chlorobenzene | 50.0 | 48.6 | | ug/Kg | | 97 | 80 - 120 |
| Chloroform | 50.0 | 48.3 | | ug/Kg | | 97 | 78 - 120 |
| cis-1,2-Dichloroethylene | 50.0 | 49.0 | | ug/Kg | | 98 | 80 - 121 |
| Ethylbenzene | 50.0 | 49.8 | | ug/Kg | | 100 | 79 - 126 |
| Methylene Chloride | 50.0 | 48.5 | | ug/Kg | | 97 | 76 - 120 |
| n-Butylbenzene | 50.0 | 47.3 | | ug/Kg | | 95 | 77 - 132 |
| Tetrachloroethene | 50.0 | 49.3 | | ug/Kg | | 99 | 76 - 126 |
| Toluene | 50.0 | 48.6 | | ug/Kg | | 97 | 76 - 136 |
| trans-1,2-Dichloroethylene | 50.0 | 49.2 | | ug/Kg | | 98 | 76 - 122 |

# QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: LCS 160-253556/2-A**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Trichloroethene | 50.0 | 48.7 | | ug/Kg | | 97 | 66 - 130 |
| Xylenes, Total | 100 | 98.3 | | ug/Kg | | 98 | 79 - 132 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *94* | | *67 - 132* |
| *4-Bromofluorobenzene (Surr)* | *93* | | *59 - 150* |
| *Dibromofluoromethane (Surr)* | *100* | | *53 - 143* |
| *Toluene-d8 (Surr)* | *101* | | *74 - 135* |

**Lab Sample ID: LCSD 160-253556/3-A**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 50.0 | 48.6 | | ug/Kg | | 97 | 71 - 127 | 2 | 20 |
| 1,1-Dichloroethane | 50.0 | 48.6 | | ug/Kg | | 97 | 80 - 120 | 2 | 20 |
| 1,2-Dichloroethane | 50.0 | 47.2 | | ug/Kg | | 94 | 68 - 128 | 3 | 20 |
| 2-Butanone (MEK) | 50.0 | 56.0 | | ug/Kg | | 112 | 41 - 140 | 12 | 20 |
| 4-Methyl-2-pentanone (MIBK) | 50.0 | 43.4 | | ug/Kg | | 87 | 67 - 130 | 1 | 20 |
| Acetone | 50.0 | 44.5 | | ug/Kg | | 89 | 39 - 140 | 0 | 20 |
| Benzene | 50.0 | 49.1 | | ug/Kg | | 98 | 80 - 120 | 0 | 20 |
| Carbon tetrachloride | 50.0 | 47.5 | | ug/Kg | | 95 | 68 - 130 | 3 | 20 |
| Chlorobenzene | 50.0 | 48.9 | | ug/Kg | | 98 | 80 - 120 | 1 | 20 |
| Chloroform | 50.0 | 48.6 | | ug/Kg | | 97 | 78 - 120 | 1 | 20 |
| cis-1,2-Dichloroethylene | 50.0 | 49.7 | | ug/Kg | | 99 | 80 - 121 | 1 | 20 |
| Ethylbenzene | 50.0 | 49.8 | | ug/Kg | | 100 | 79 - 126 | 0 | 20 |
| Methylene Chloride | 50.0 | 48.3 | | ug/Kg | | 97 | 76 - 120 | 0 | 20 |
| n-Butylbenzene | 50.0 | 47.6 | | ug/Kg | | 95 | 77 - 132 | 1 | 20 |
| Tetrachloroethene | 50.0 | 49.1 | | ug/Kg | | 98 | 76 - 126 | 1 | 20 |
| Toluene | 50.0 | 48.7 | | ug/Kg | | 97 | 76 - 136 | 0 | 20 |
| trans-1,2-Dichloroethylene | 50.0 | 48.7 | | ug/Kg | | 97 | 76 - 122 | 1 | 20 |
| Trichloroethene | 50.0 | 48.7 | | ug/Kg | | 97 | 66 - 130 | 0 | 20 |
| Xylenes, Total | 100 | 96.2 | | ug/Kg | | 96 | 79 - 132 | 2 | 20 |

| *Surrogate* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *93* | | *67 - 132* |
| *4-Bromofluorobenzene (Surr)* | *95* | | *59 - 150* |
| *Dibromofluoromethane (Surr)* | *99* | | *53 - 143* |
| *Toluene-d8 (Surr)* | *99* | | *74 - 135* |

**Lab Sample ID: 160-17445-B-1-B MS**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.31 | U | 33.5 | 32.9 | | ug/Kg | ☼ | 98 | 80 - 120 |
| 1,1-Dichloroethane | 0.28 | U | 33.5 | 32.2 | | ug/Kg | ☼ | 96 | 80 - 120 |
| 1,2-Dichloroethane | 0.62 | U | 33.5 | 34.4 | | ug/Kg | ☼ | 103 | 78 - 117 |

# QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: 160-17445-B-1-B MS**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 2-Butanone (MEK) | 1.4 | U | 33.5 | 38.7 | | ug/Kg | ☼ | 116 | 69 - 124 |
| 4-Methyl-2-pentanone (MIBK) | 0.52 | U | 33.5 | 34.1 | | ug/Kg | ☼ | 102 | 73 - 125 |
| Acetone | 4.6 | U | 33.5 | 36.2 | | ug/Kg | ☼ | 108 | 54 - 139 |
| Benzene | 0.18 | U | 33.5 | 32.9 | | ug/Kg | ☼ | 98 | 80 - 120 |
| Carbon tetrachloride | 0.37 | U | 33.5 | 32.2 | | ug/Kg | ☼ | 96 | 80 - 120 |
| Chlorobenzene | 0.27 | U | 33.5 | 32.4 | | ug/Kg | ☼ | 97 | 80 - 120 |
| Chloroform | 0.27 | U | 33.5 | 32.5 | | ug/Kg | ☼ | 97 | 80 - 120 |
| cis-1,2-Dichloroethylene | 0.43 | U | 33.5 | 31.6 | | ug/Kg | ☼ | 94 | 80 - 120 |
| Ethylbenzene | 0.21 | U | 33.5 | 32.8 | | ug/Kg | ☼ | 98 | 80 - 120 |
| Methylene Chloride | 1.1 | U | 33.5 | 31.9 | | ug/Kg | ☼ | 95 | 77 - 123 |
| n-Butylbenzene | 0.43 | U T | 33.5 | 29.7 | | ug/Kg | ☼ | 89 | 80 - 120 |
| Tetrachloroethene | 0.23 | U | 33.5 | 31.3 | | ug/Kg | ☼ | 94 | 80 - 120 |
| Toluene | 0.50 | U | 33.5 | 32.4 | | ug/Kg | ☼ | 97 | 80 - 124 |
| trans-1,2-Dichloroethylene | 0.67 | U | 33.5 | 31.6 | | ug/Kg | ☼ | 94 | 80 - 120 |
| Trichloroethene | 0.28 | U | 33.5 | 34.4 | | ug/Kg | ☼ | 103 | 79 - 120 |
| Xylenes, Total | 0.61 | U | 66.9 | 64.1 | | ug/Kg | ☼ | 96 | 80 - 120 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *105* | | *67 - 132* |
| *4-Bromofluorobenzene (Surr)* | *94* | | *59 - 150* |
| *Dibromofluoromethane (Surr)* | *100* | | *53 - 143* |
| *Toluene-d8 (Surr)* | *99* | | *74 - 135* |

**Lab Sample ID: 160-17445-C-1-B MSD**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.31 | U | 33.9 | 32.3 | | ug/Kg | ☼ | 95 | 80 - 120 | 2 | 20 |
| 1,1-Dichloroethane | 0.28 | U | 33.9 | 32.2 | | ug/Kg | ☼ | 95 | 80 - 120 | 0 | 20 |
| 1,2-Dichloroethane | 0.62 | U | 33.9 | 34.0 | | ug/Kg | ☼ | 100 | 78 - 117 | 1 | 20 |
| 2-Butanone (MEK) | 1.4 | U | 33.9 | 41.0 | | ug/Kg | ☼ | 121 | 69 - 124 | 6 | 20 |
| 4-Methyl-2-pentanone (MIBK) | 0.52 | U | 33.9 | 35.1 | | ug/Kg | ☼ | 103 | 73 - 125 | 3 | 20 |
| Acetone | 4.6 | U | 33.9 | 39.0 | | ug/Kg | ☼ | 115 | 54 - 139 | 7 | 20 |
| Benzene | 0.18 | U | 33.9 | 32.8 | | ug/Kg | ☼ | 97 | 80 - 120 | 0 | 20 |
| Carbon tetrachloride | 0.37 | U | 33.9 | 31.7 | | ug/Kg | ☼ | 94 | 80 - 120 | 2 | 20 |
| Chlorobenzene | 0.27 | U | 33.9 | 32.3 | | ug/Kg | ☼ | 95 | 80 - 120 | 1 | 20 |
| Chloroform | 0.27 | U | 33.9 | 32.1 | | ug/Kg | ☼ | 95 | 80 - 120 | 1 | 20 |
| cis-1,2-Dichloroethylene | 0.43 | U | 33.9 | 31.8 | | ug/Kg | ☼ | 94 | 80 - 120 | 1 | 20 |
| Ethylbenzene | 0.21 | U | 33.9 | 32.0 | | ug/Kg | ☼ | 94 | 80 - 120 | 2 | 20 |
| Methylene Chloride | 1.1 | U | 33.9 | 33.0 | | ug/Kg | ☼ | 97 | 77 - 123 | 4 | 20 |
| n-Butylbenzene | 0.43 | U T | 33.9 | 23.2 | T | ug/Kg | ☼ | 69 | 80 - 120 | 25 | 20 |
| Tetrachloroethene | 0.23 | U | 33.9 | 30.3 | | ug/Kg | ☼ | 89 | 80 - 120 | 3 | 20 |
| Toluene | 0.50 | U | 33.9 | 31.5 | | ug/Kg | ☼ | 93 | 80 - 124 | 3 | 20 |
| trans-1,2-Dichloroethylene | 0.67 | U | 33.9 | 31.4 | | ug/Kg | ☼ | 93 | 80 - 120 | 1 | 20 |
| Trichloroethene | 0.28 | U | 33.9 | 33.8 | | ug/Kg | ☼ | 100 | 79 - 120 | 2 | 20 |
| Xylenes, Total | 0.61 | U | 67.8 | 61.3 | | ug/Kg | ☼ | 90 | 80 - 120 | 4 | 20 |

# QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: 160-17445-C-1-B MSD**
**Matrix: Solid**
**Analysis Batch: 253527**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: Total/NA**
**Prep Batch: 253556**

| Surrogate | MSD %Recovery | MSD Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 95 | | 67 - 132 |
| 4-Bromofluorobenzene (Surr) | 91 | | 59 - 150 |
| Dibromofluoromethane (Surr) | 91 | | 53 - 143 |
| Toluene-d8 (Surr) | 88 | | 74 - 135 |

# QC Association Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200



## GC/MS VOA

### Analysis Batch: 253527

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 160-17445-B-1-B MS | Matrix Spike | Total/NA | Solid | 8260C | 253556 |
| 160-17445-C-1-B MSD | Matrix Spike Duplicate | Total/NA | Solid | 8260C | 253556 |
| 160-17507-1 | B35454 | Total/NA | Soil | 8260C | 253556 |
| LCS 160-253556/2-A | Lab Control Sample | Total/NA | Solid | 8260C | 253556 |
| LCSD 160-253556/3-A | Lab Control Sample Dup | Total/NA | Solid | 8260C | 253556 |
| MB 160-253556/1-A | Method Blank | Total/NA | Solid | 8260C | 253556 |

### Prep Batch: 253556

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 160-17445-B-1-B MS | Matrix Spike | Total/NA | Solid | 5035 | |
| 160-17445-C-1-B MSD | Matrix Spike Duplicate | Total/NA | Solid | 5035 | |
| 160-17507-1 | B35454 | Total/NA | Soil | 5035 | |
| LCS 160-253556/2-A | Lab Control Sample | Total/NA | Solid | 5035 | |
| LCSD 160-253556/3-A | Lab Control Sample Dup | Total/NA | Solid | 5035 | |
| MB 160-253556/1-A | Method Blank | Total/NA | Solid | 5035 | |

## General Chemistry

### Analysis Batch: 253564

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 160-17507-1 | B35454 | Total/NA | Soil | Moisture | |
| 160-17542-A-14 DU | Duplicate | Total/NA | Solid | Moisture | |

# Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F16-020

TestAmerica Job ID: 160-17507-1
SDG: SL2200

## Method: 8260C - Volatile Organic Compounds by GC/MS

**Matrix: Soil** **Prep Type: Total/NA**

| | | Percent Surrogate Recovery (Acceptance Limits) | | | |
|---|---|---|---|---|---|
| | | 12DCE | BFB | DBFM | TOL |
| Lab Sample ID | Client Sample ID | (67-132) | (59-150) | (53-143) | (74-135) |
| 160-17507-1 | B35454 | 116 | 115 | 106 | 107 |

**Surrogate Legend**

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

## Method: 8260C - Volatile Organic Compounds by GC/MS

**Matrix: Solid** **Prep Type: Total/NA**

| | | Percent Surrogate Recovery (Acceptance Limits) | | | |
|---|---|---|---|---|---|
| | | 12DCE | BFB | DBFM | TOL |
| Lab Sample ID | Client Sample ID | (67-132) | (59-150) | (53-143) | (74-135) |
| 160-17445-B-1-B MS | Matrix Spike | 105 | 94 | 100 | 99 |
| 160-17445-C-1-B MSD | Matrix Spike Duplicate | 95 | 91 | 91 | 88 |
| LCS 160-253556/2-A | Lab Control Sample | 94 | 93 | 100 | 101 |
| LCSD 160-253556/3-A | Lab Control Sample Dup | 93 | 95 | 99 | 99 |
| MB 160-253556/1-A | Method Blank | 98 | 105 | 99 | 104 |

**Surrogate Legend**

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)