# Quendall Terminals Superfund Site Results from the Self-Sustaining Treatment for Active Remediation Bench-Scale Treatability Study

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## Introduction

Creosote manufacturing was historically conducted at the Quendall Terminals Site (Site), located on the southeast shore of Lake Washington, in Renton, Washington (**Figure 1**[1]). From 1916 through 1969, coal and oil-gas tar residues (collectively referred to as coal tars) were distilled into three fractions that were shipped off the Site for a variety of uses. Releases of coal tar and distillate products occurred at Site locations where product transport, production, storage, and/or disposal were performed. Between 1969 and 1983, the Site was used to store crude oil, waste oil and diesel. From 1975 to 2009, it was used as a log sorting and storage yard. The Site is currently vacant and fenced to prevent public access.

Hydrocarbon contamination of soil and groundwater extends over a portion of the 22-acre uplands area of the Site. Dense Non-Aqueous Phase Liquid (DNAPL) or DNAPL-contaminated soil is present in approximately 8 acres of the Site, often as discontinuous layers (stringers), within alluvial material that forms the shallow-most water bearing zone. In general, DNAPL stringers are separated by low-permeability materials within a heterogeneous soil matrix. Most of the DNAPL is present in the top 20 feet, with the maximum observed DNAPL depth at 34 feet below ground surface (bgs).

The Quendall Terminals Feasibility Study (FS) identified remediation technologies capable of addressing subsurface contamination that were assembled to produce 10 alternatives for the Site. Comprehensive analysis subsequently identified preferred alternatives premised on: 1) *in situ* stabilization (ISS) and 2) excavation with onsite thermal treatment or offsite disposal as the optimal technologies for Site remediation (Aspect and Arcadis, 2016). Self-Sustaining Treatment for Active Remediation (STAR) is an emerging technology that is also being evaluated as a potential alternative for the *in situ* treatment of upland soil. This technology uses heat to ignite soil contaminants with simultaneous air injection to the treatment zone to promote subsurface oxidation by smoldering combustion processes. Following the onset of combustion processes, the ignition source is removed and continuous air injection is applied to control and moderate movement of the smoldering front. Intense heat, generated by DNAPL ("fuel") combustion is capable of promoting and sustaining subsurface smoldering of adjacent and nearby

[1] All figures are located at the end of this technical memorandum behind the Figures divider.



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DNAPL resulting in contaminant destruction. Movement of the smoldering front in the subsurface is collectively controlled by two factors: the supply of oxygen (by air injection) and the presence of DNAPL. In the absence of one factor, the subsurface combustion process is effectively controlled.

The Site characteristics, contaminant composition and total mass of DNAPL in upland soil at Quendall Terminals suggest that STAR may provide complementary benefits in reaching the remedial action objectives for the Site. Although ISS is assumed to be the primary technology that will be applied to the Site, U.S. Environmental Protection Agency (USEPA) is evaluating STAR because it could offer significant advantages over ISS and *ex situ* thermal treatment, such as:

- STAR can permanently destroy the site contaminants *in situ*; whereas, ISS as contemplated by the FS, is a containment strategy premised on limiting mobility of site contaminants.
- STAR has lower sensitivity to heterogeneities versus conventional *in situ* processes.
- STAR infrastructure requirements are significantly lower than conventional thermal processes.
- Extraction of groundwater and DNAPL during treatment are not required.
- STAR processes include concurrent vapor extraction and will afford for control of nuisance odors during site remediation.
- STAR can be readily scaled and implemented using simple, off the shelf, components (air injection, soil vapor extraction [SVE] equipment, and heaters [ignition source]).

A bench-scale treatability study (TS) was performed on Site soil excavated from two areas of known contamination to evaluate the viability of the STAR technology for *in situ* treatment of contaminated soil at the Quendall Terminals Site. The STAR bench-scale column tests were performed by subcontractor Savron, with laboratory experiments conducted at the University of Western Ontario (UWO). Savron is the exclusive provider of the STAR technology.

This document summarizes the objectives of bench-scale TS, field activities associated with sample collection, the TS approach, and results of the TS performed by Savron. Analytical support was provided by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA (MEL) and ALS Environmental Laboratory, Simi Valley, CA (ALSS).

## Purpose and Objectives

The bench-scale TS of STAR is the first of a two-step process to evaluate if STAR is a viable technology for treating Site contaminants. In general, feasibility demonstration by bench-scale TS results is a prerequisite step for the pre-design evaluation (PDE) which is conducted *in situ* under representative field conditions. Only results from the bench-scale TS are presented in this document. Study results will be applied to implementation of a future PDE developed for the Site.

Controlled laboratory column testing was used to assess the feasibility of attaining self-sustaining smoldering conditions with contaminants that are present in subsurface materials at the Site. Two laboratory assessments using homogenized soil from the Site were performed in support the TS evaluation of the STAR technology. The aim of the bench-scale TS was to provide evidence of a self-sustaining combustion reaction and inform future design efforts for a PDE pending successful laboratory demonstration of the technology. Specifically, laboratory testing was performed to assess the:

- ignition temperature and airflow rate to achieve self-sustaining smoldering combustion;
- peak combustion temperature (with thermocouple profiles);
- smoldering front propagation velocity;
- degree of combustion anticipated; and
- principle composition of gas emissions (for design of vapor treatment systems).



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A PDE is necessary to evaluate field scale characteristics of the STAR processes namely, the radius of ignition well influence and the smoldering front propagation rate. These parameters cannot be evaluated from bench-scale tests given scale limitations and heat losses which are much greater in the laboratory column tests. In general, STAR is typically more effective when applied at field scale given greater heat retention afforded by subsurface soil. Coal tar and creosote are complex hydrocarbon mixtures that vary widely in chemical composition. Similarly, DNAPL is often contained in small stringers in saturated deltaic soils with high heterogeneity. Collectively, these factors present specific concerns for the future viability of STAR at the Site, and for these reasons, completion of the PDE to evaluate performance *in situ* is considered a requisite component for technology evaluation.

## Summary of Field Work Activities

Soil samples for the TS were collected in accordance with the *Final Quality Assurance Project Plan (QAPP), STAR Bench-Scale Treatability Study, Quendall Terminals Superfund Site* (CH2M, 2018). Test pit locations (TP-01 and TP-02) were identified by CH2M personnel, targeting previous boring locations BH-30C in the former May Creek and QP-6/ QP-7 in the Quendall Ponds, respectively (**Figure 2**). Details of field activities, including logs of each test pit and selected photos of the excavation work and backfilled excavations, are provided in **Appendix A**.

During utility locate activities preceding excavation of the test pits, a sanitary sewer line was identified and suspected to be in the path of the proposed test pit TP-01 location near BH-30C. Accordingly, the test pit was relocated approximately 30 feet northwest of the originally planned location.

Excavation was completed by Anderson Environmental Contracting of Kelso, Washington on March 8, 2018. TP-01 was excavated to a total depth of 4 feet bgs. Sample 2018QT-SB-TP01-03081028 was collected from the excavator bucket and consisted of soil recovered from 3.5 feet bgs (**Figure 3**). A metal pipe was observed at 6.5 feet bgs in the initial excavation for TP-02; therefore, the TP-02 pit was moved 5 feet to the west. TP-02 was excavated to a total depth of 9 feet bgs, encountering saturated conditions at 7.5 feet bgs (**Figure 4**). Sample 2018QT-SB-TP02-03081028 was collected from the excavator bucket and consisted of soil recovered from 7.5 feet bgs. Obtaining the soil sample from TP-02 was extremely challenging in that the targeted DNAPL seam was below the groundwater table. Sloughing of the excavation sidewall and rapid groundwater infiltration confounded collection of soil from the targeted oil-wetted zone. Soil obtained possessed strong hydrocarbon odor and exhibited heavy sheen but visible DNAPL was absent from the soil samples collected for testing from TP-02.

Following collection, samples were maintained on ice until shipped to Savron's laboratory at UWO under chain of custody on March 12, 2018. Due to delays in Canadian customs, the samples were not received by the laboratory until March 16, 2018. Despite this delay, both samples were within temperature limits upon arrival.

## Summary of Treatability Activities

The bench-scale TS was conducted in accordance with the QAPP (CH2M, 2018) with a few exceptions as noted in the testing and results summaries provided below and detailed in Savron's TS report provided in **Appendix B**.

Two separate bench-scale column tests were performed using STAR processes using soil samples collected from TP-01 and TP-02 at the Site. Upon arrival, the Site soils were individually homogenized and subsampled for baseline (pre-treatment) characterization in triplicate as outlined in **Table 1**.[2] The combustion tests were conducted in 15-centimeter (cm) diameter steel columns that were insulated and instrumented with thermocouples for temperature monitoring along the length of the column. A

[2] All tables are located at the end of this technical memorandum behind the Tables divider.



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conductive heating coil (to ignite test soil) and an air diffuser (to promote combustion) were located at the bottom of the column. The air flow controller was set to a flow rate of 2.1 cm/s, which was lowered from the original rate of 4.5 cm/s due to the high moisture content of the soil.

For the bench-scale TS, a 12-cm layer of a Site soil was loaded into the column. The air supply was turned on and the ignition coil activated to initiate the combustion reaction. A temperature profile was developed by collecting data from each thermocouple every 30 seconds. Exhaust vapors were collected through a stainless steel tube at the top of the column. After the combustion test was complete, as evidenced by the vertical propagation of peak temperature measurements through the column, testing was terminated and the apparatus was allowed to cool. Where self-sustaining combustion was observed, as evidenced by combustion temperature measurements, soil was removed from the column, homogenized, and subsampled in triplicate for post-treatment characterization according to **Table 1**. Soil was not sampled if self-sustaining combustion was not observed. Photographs of the soil before and after treatment were taken for comparison of visual change in Site soil samples attributed to smoldering processes that occurred during column testing (Appendix B).

## Data Usability Summary

A complete list of baseline (pre-treatment) and post-treatment analytical results are presented in **Appendix B** (Savron's TS Report). A Data Quality and Data Usability Assessment is provided in **Appendix C**. This assessment indicates the following:

- All planned samples were collected in accordance with the QAPP, with the exception of TP-02. Post-treatment soil sampling and process analyses were not performed on a sample from TP-02 as self-sustaining combustion were not observed in soil obtained from this test pit location.
- Sample analysis was carried out in accordance with the QAPP and all data were subjected to the equivalent of a USEPA Stage 4 data validation.
- All analytical data are acceptable for use as qualified and 100% complete (i.e., no data were rejected during validation).

## Treatability Study Findings

The performance criteria identified in the QAPP (CH2M, 2018) for the bench-scale test included:

- Evidence of self-sustaining combustion; that is, the peak temperature front (measured using thermocouples) continued to progress through the test column following termination of the ignition source.
- Reduction in TPH and PAHs in soil to concentration values at or below the lowest project criteria (see **Table 2**) following STAR treatment.

The treatability study findings are discussed in detail in **Appendix B** (Savron's TS Report). The sections below provide a synopsis of the findings.

### Smoldering Combustion Results

For TP-01 soils, smoldering combustion was successfully initiated and demonstrated self-sustaining smoldering behavior. The smoldering front propagation velocity was estimated to be 0.17 centimeters per minute (cm/min) (or 8 feet per day [ft/d]) based on column test results. It is important to note that propagation velocities are correlated to aquifer properties and the mass of contaminants present in the pore space. Accordingly, the combustion front propagation velocity will vary during field implementation as a function of soil type, heterogeneity, and contaminant concentration values.

For TP-02 soils, combustion was not initiated in a self-sustaining manner. Savron reports that a total petroleum hydrocarbon concentration of at least 3,000 – 5,000 mg/kg is typically required to achieve



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self-sustaining smoldering and successful treatment via STAR. Baseline analytical results presented in **Table 2** indicate that the TP-02 soil sample contained petroleum hydrocarbon concentrations of approximately 1,240 mg/kg; thus, there was insufficient fuel present within the soil sample to support the smoldering combustion process.

### TP-01 Baseline and Post-Treatment Soil Results

A summary of baseline concentration measurements and observed contaminant reductions after treatment are presented in **Table 2**. Values represent an average of triplicate analyses. The concentration of TPH (composed of gasoline range organics [GRO], diesel range organics [DRO], and residual range organics [RRO]) and Polycyclic Aromatic Hydrocarbons (PAHs) are reported. Project criteria from the QAPP are also included in this table. In summary:

- The average baseline concentration of total petroleum hydrocarbons (TPH, based on the sum of average GRO and DRO for the three replicate samples) was approximately 95,000 mg/kg.[3] Baseline analysis for RRO was non-detect. The average post-treatment concentration of TPH was approximately 160 mg/kg.
- The average baseline concentrations of individual PAHs ranged from non-detect (one analyte, 2-chloronaphthalene) and a maximum of 6,200 mg/kg for naphthalene. Average individual PAH concentrations in post-treatment TP-01 soil ranged from non-detect (11 analytes) to maximum of 13 mg/kg for 2-methyl-naphthalene.[4]
- The soil concentration of TPH and PAH analytes following treatment was reduced greater than 99%, with most analytes exceeding 99.9% reduction.
- Measurements for recalcitrant (slowly biodegradable) carcinogenic PAHs were reduced to non-detect values in post-treatment TP-01 samples. Residual naphthalene was present in post-treatment soil at a concentration greater than the conservative QAPP project criteria. However, the post-treatment naphthalene concentrations are consistent with naphthalene concentrations observed in soil outside the DNAPL areas that are currently targeted for source treatment at the Quendall Terminals Site.

### TP-01 Gaseous Emission Results

Savron reported that combustion gas measurements collected during TP-01 column tests were within the range of typical values for the soil types and contaminants examined at the laboratory bench-scale. In addition, compounds identified in vapor samples and condensate are consistent with those typically identified in STAR laboratory bench-scale tests involving coal tar- and creosote-contaminated soil. These data provide representative information about the constituents that may be generated during STAR operation in the field. Vapor sampling results therefore are considered representative of field scale smoldering and can be used to design a suitable vapor capture and treatment system in support of a future PDE effort to further evaluate STAR under site-specific conditions.

### TP-02 Baseline Soil Results

Savron noted that the baseline soil concentrations of TPH in TP-02 were insufficient for self-sustaining smoldering. As discussed previously, targeting and collection of DNAPL-impacted soil from TP-02 was challenged by the presence of groundwater infiltration and soil sloughing.

Although smoldering combustion in TP-02 soil samples was not initiated, conclusions drawn from laboratory tests in TP-01 indicate STAR is feasible for treatment of both the contaminants and

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[3] RRO was not detected and not included in the sum.

4 The maximum concentration detected for 2-methyl-naphthalene in the three replicate samples was 14 mg/kg.



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subsurface materials present at the Site. Two comparisons were made between the TP-01 and TP-02 baseline samples that suggest that water entering the test pit created an emulsion that diluted the fuel content in the soil sample collected from the excavator bucket:

- Savron placed the samples of TP-01 and TP-02 soils in an oven at 100°C to evaporate the water. As shown in **Figure 5**, after removal of water the TP-01 baseline soils still appear visually contaminated, while TP-02 baseline soils display significantly less visual indication of contamination.
- TP-01 and TP-02 TPH and PAH concentration profiles were plotted by analyte. The TP-01 concentrations were reduced by a factor of 100 to make the scales comparable. As indicated in **Figure 6** and **Figure 7**, the relative concentration and chemical signatures of detected analytes in both samples is very similar. These results suggest DNAPL in both locations is similar in relative chemical composition. As discussed above, the concentration of TPH (fuel) in TP-02 was significantly lower; collectively, these observations suggest that the inability to support combustion in TP-02 samples was a factor of sample dilution by water pooling in the test pit rather than suitability of Site materials for treatment by STAR processes.

## Conclusions and Recommendations

Self-sustaining smoldering combustion was observed for TP-01 soils. The remediation efficiency as observed in **Figure 8**, along with the concentration reductions observed through chemical analysis (**Table 2**) suggests that STAR may an effective technology for the Site. Smoldering propagation velocity measurements approaching 8 feet per day were obtained in the laboratory testing. Supplemental evaluation of STAR feasibility and implementability through a PDE under Site-specific conditions is warranted based on TS findings. In summary:

- Concentration reductions of greater than 99% were achieved for all detected TPH and PAH analytes, with most achieving greater than 99.9% reduction.
- Post-treatment results for TP-01 indicated that naphthalene and 2-methylnaphthalene were present in the treated soil at residual concentrations above the conservative QAPP project criteria; however, post-treatment naphthalene concentrations are consistent with naphthalene concentrations found in Site soils outside areas currently targeted for treatment.
- TP-02 soils contained insufficient concentrations of petroleum hydrocarbons; therefore, no smoldering was observed for this sample. However, Savron reports that self-sustaining smoldering combustion is anticipated with this soil if sufficiently impacted with petroleum hydrocarbons.

Completion of a STAR PDE is recommended to assess field scale treatment efficacy and further evaluate implementability of the technology to Site specific conditions. The PDE would consist of a 10-day field test to evaluate radius of influence, smoldering propagation rate, post-treatment levels, and vapor emissions. A PDE would provide the basis for deciding whether to add the STAR technology to USEPA's remedial strategy for the Site.

## References

Aspect Consulting, LLC and Arcadis US (Aspect and Arcadis). 2016. *Feasibility Study, Quendall Terminals Site.* Prepared for: U.S. Environmental Protection Agency, Region 10 on behalf of Altino Properties and J.H. Baxter & Co.

CH2M. 2018. *Quality Assurance Project Plan, Self-Sustaining Technology for Active Remediation Bench-Scale Treatability Study, Quendall Terminals Superfund Site.* Remedial Action Contract No. EP-W-06-021. Prepared for U.S. Environmental Protection Agency. DCN: 000P-03601. March 2018.



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# Tables

**Table 1. Analytical Sample Summary**

*Quendall Terminals STAR Bench-Scale Treatability Study*

| | | | Analytical Method | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Total Petroleum Hydrocarbons (GRO/DRO/RRO) | | PAHs | VOCs | VOCs | $CS_2$, $H_2S$, and CS | CO and $CO_2$ |
| **Location ID** | **Sample Description** | **Sample Date** | **NWTPH-Gx** | **NWTPH-Dx/Rx** | **SW8270D** | **SW8260C** | **TO15** | **ASTM D5504M** | **E3C** |
| TP-01 | Baseline Soil (Triplicate) | 19-Mar-18 | X | X | X | | | | |
| TP-01 | Post-Treatment Soil (Triplicate) | 28-Mar-18 | X | X | X | | | | |
| TP-02 | Baseline Soil (Triplicate) | 19-Mar-18 | X | X | X | | | | |
| TP-01 | Post-Treatment Condensate (Water) | 28-Mar-18 | | | | X | | | |
| TP-01 | Post-Treatment Condensate (Product) | 28-Mar-18 | | | | X | | | |
| TP-01 | Test Vapors | 27-Mar-18 | | | | | X | X | X |

Notes:

There are no post-treatment results for TP-02 as the baseline concentrations were too low to successfully sustain smoldering.

TP-01 and TP-02 relate to TP-1 and TP-2 in the treatability study report provided by Savron.

$CS_2$, $H_2S$, and CS = Carbon disulfide, hydrogen sulfide, and carbonyl sulfide

CO and $CO_2$ = carbon monoxide and carbon dioxide

PAHs = polycyclic aromatic hydrocarbons

VOCs = volatile organic compounds



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**Table 2. Average Baseline and Post-Treatment Concentrations and Percent Reduction Estimates**

*Quendall Terminals STAR Bench-Scale Treatability Study*

| Ref. # | Compound Name | CAS | QAPP Project Criterion | TP-01 Average Baseline | | TP-01 Average Post-Treatment | | TP-01 Percent Reduction | TP-02 Average Baseline | |
|---|---|---|---|---|---|---|---|---|---|---|
| (Fig. 5) | | | mg/kg | mg/kg | | mg/kg | | mg/kg | mg/kg | |
| - | GRO | TPH-GASOLINE | 1,000 | 25,000 | | 10 | | 99.96% | 310 | |
| - | DRO | TPH-Diesel | 2,000 | 70,000 | | 150 | | 99.79% | 930 | |
| - | RRO | TPH-Motor Oil | 2,000 | 6,200 | U | 98 | U | 98.42% | 110 | U |
| 1 | 2-Chloronaphthalene | 91-58-7 | 3.9 | 4.6 | U | 0.049 | U | 98.93% | 0.11 | U |
| 2 | 2-Methylnaphthalene | 91-57-6 | 0.185 | 2,400 | | **13** | | 99.46% | 45 | |
| 3 | Acenaphthene | 83-32-9 | 5.5 | 1,700 | | 5 | | 99.71% | 17 | |
| 4 | Acenaphthylene | 208-96-8 | -- | 80 | | 0.23 | | 99.71% | 0.79 | |
| 5 | Anthracene | 120-12-7 | 58 | 680 | | 0.049 | U | 99.99% | 9.1 | |
| 6 | Benzo(a)anthracene | 56-55-3 | 0.05 | 500 | | **0.13** | **U** | 99.97% | 3.5 | |
| 7 | Benzo(a)pyrene | 50-32-8 | 0.235 | 270 | | 0.049 | U | 99.98% | 2.2 | |
| 8 | Benzo(b)fluoranthene | 205-99-2 | 0.3 | 350 | | 0.049 | U | 99.99% | 2.9 | |
| 9 | Benzo(g,h,i)perylene | 191-24-2 | -- | 110 | | 0.049 | U | 99.96% | 1.1 | |
| 10 | Benzo(k)fluoranthene | 207-08-9 | 2.9 | 140 | | 0.049 | U | 99.97% | 1.2 | |
| 11 | Chrysene | 218-01-9 | 9.1 | 420 | | 0.13 | U | 99.97% | 3.9 | |
| 12 | Dibenzo(a,h)anthracene | 53-70-3 | 0.096 | 34 | | 0.049 | U | 99.86% | 0.37 | |
| 13 | Fluoranthene | 206-44-0 | 89 | 1,900 | | 0.078 | | 100.00% | 11 | |
| 14 | Fluorene | 86-73-7 | 5.5 | 1,200 | | 0.5 | | 99.96% | 15 | |
| 15 | Indeno(1,2,3-Cd)Pyrene | 193-39-5 | 0.98 | 94 | | 0.049 | U | 99.95% | 0.86 | |
| 16 | Naphthalene | 91-20-3 | 0.05 | 6,200 | | **0.94** | | 99.98% | 69 | |
| 17 | Phenanthrene | 85-01-8 | -- | 3,800 | | 0.25 | | 99.99% | 31 | |
| 18 | Pyrene | 129-00-0 | 13 | 1,700 | | 0.066 | U | 100.00% | 10 | |

Notes:

There are no post-treatment results for TP-02 as the baseline concentrations were too low to successfully sustain smoldering.

Bold concentrations indicate exceedance of QAPP Project Criterion for the compound.

CAS = Chemical Abstracts Service registry number, a unique numerical identifier assigned to a chemical substance.

DRO = Diesel-Range Organics

GRO = Gasoline-Range Organics

QAPP = Quality Assurance Project Plan

RRO = Residual-Range Organics

TPH = Total Petroleum Hydrocarbons

U = Compound was not detected above the reporting limit.

mg/kg = milligram per kilogram



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# Figures

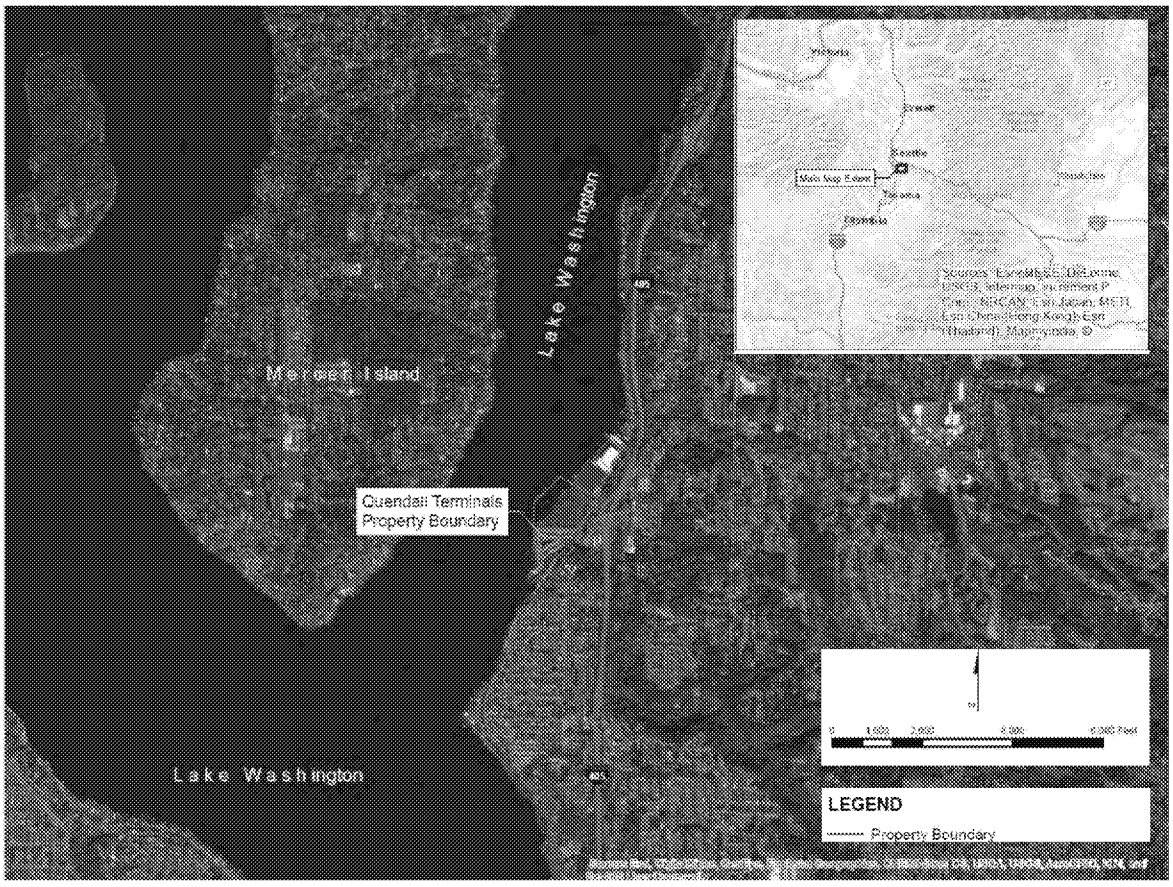


Figure 1. Quendall Terminals Site Vicinity Map

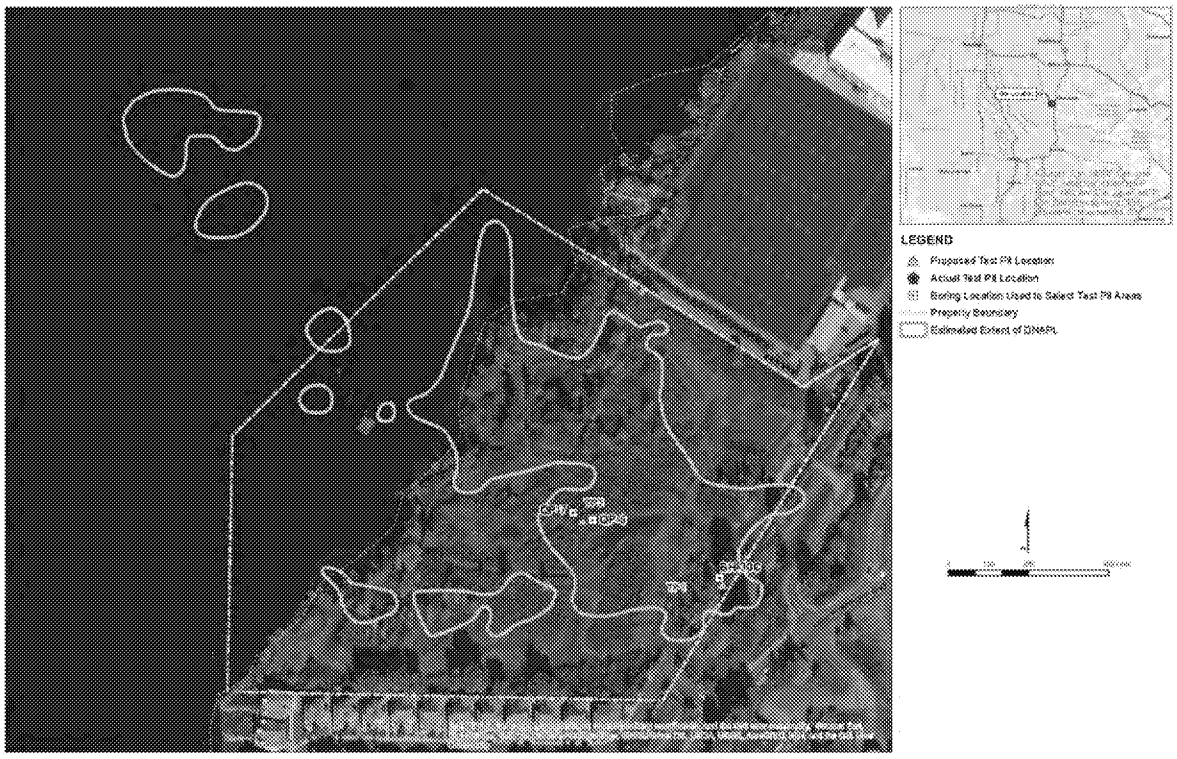


Figure 2. Treatability Study Test Pit Areas

**Figure 3. Collection of Soil from TP-01 at Site**

*A DNAPL seam was found at approximately 3.5 feet bgs on top of a low permeability layer. Product drained into the pit that was excavated to 4 feet bgs. The bulk soil sample was collected from the excavator bucket at 3.5 feet bgs.*

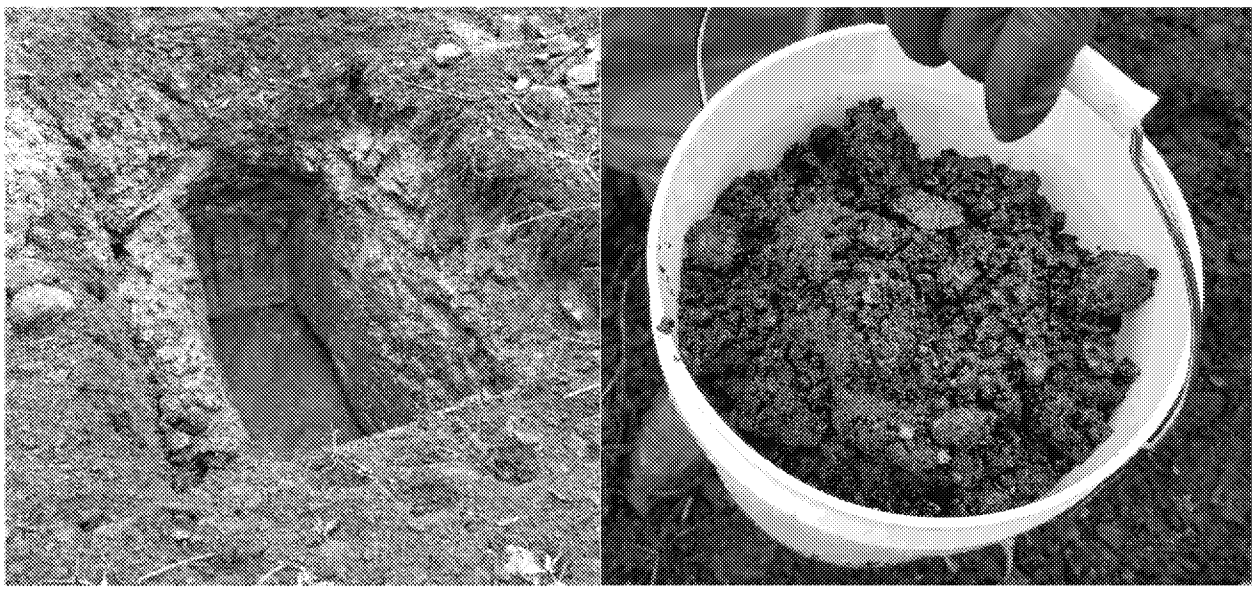

**Figure 4. Collection of Soil from TP-02 at Site**

*TP-02 was excavated to a total depth of 9 feet bgs, encountering saturated conditions at 7.5 feet bgs. The bulk soil sample was collected from the excavator bucket at approximately 7.5 feet bgs.*



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**Figure 5. Untreated Soils Oven-Dried at 100°C**

*TP-01 soil is displayed on the left, TP-02 soil is on the right.*

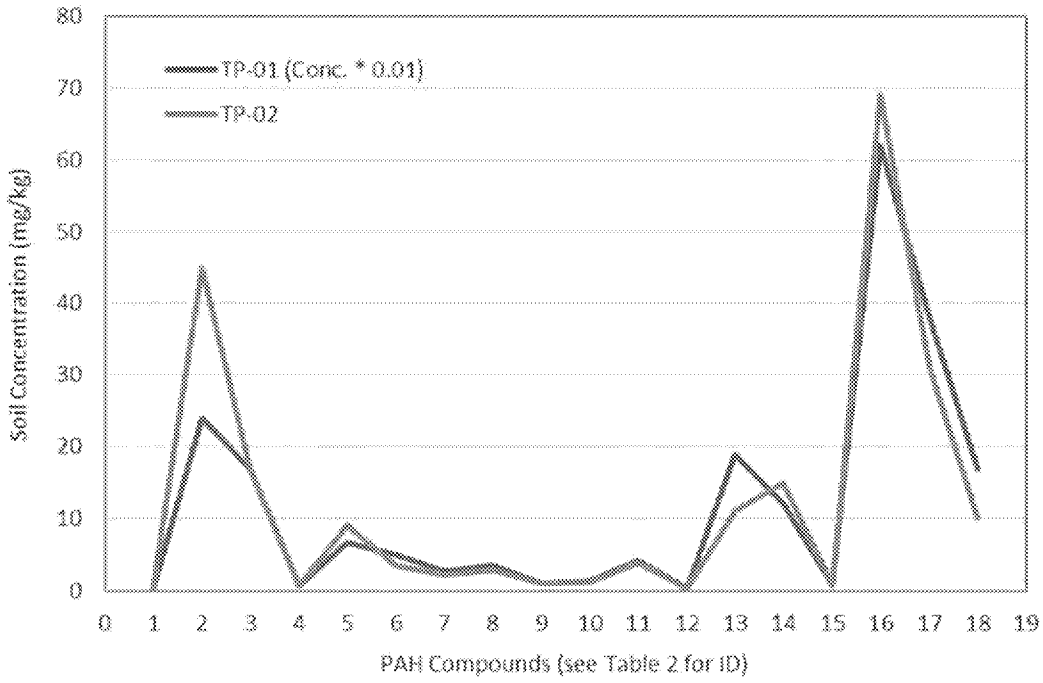


**Figure 6. Relative Distribution of PAHs in TP-01 and TP-02 Soils Before Treatment**

*TP-01 soil concentrations were reduced by 1/100 to scale with TP-02 concentrations.*



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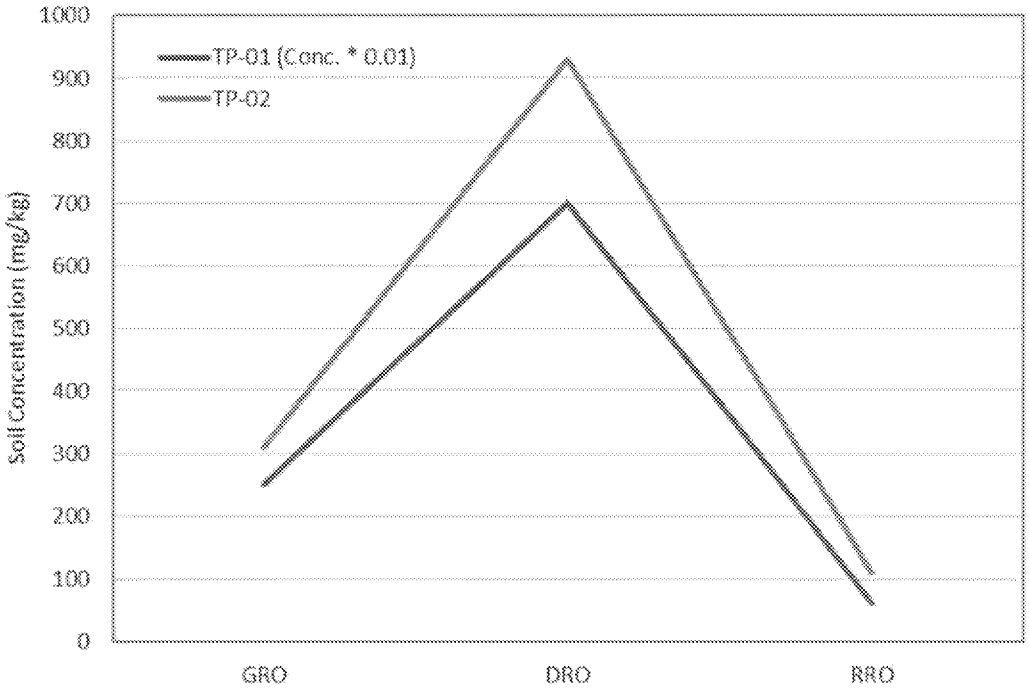


**Figure 7. Relative Distribution of GRO, DRO, and RRO in TP-01 and TP-02 Soils Before Treatment**
*TP-01 soil concentrations were reduced by 1/100 to scale with TP-02 concentrations.*

**Figure 8. Comparison of TP-01 Soil Before and After STAR**
*Untreated soil is displayed on the left. Treated soil is on the right.*

# Appendix A

# Field Activities Summary

APPENDIX A

# Field Activities Summary

On February 22, March 6, and March 8, 2018, field activities were conducted in support of a Bench-Scale Treatability Study examining the viability of Self-Sustaining Active Remediation (STAR) technology at the Quendall Terminals Superfund Site in Renton, Washington. Unless otherwise noted, all field activities were conducted in accordance with the *Final Quality Assurance Project Plan (QAPP), STAR Bench-Scale Treatability Study, Quendall Terminals Superfund Site*, dated March 2018. Field activities completed included test pit location, utility clearance, test pit excavation, sample collection, and sample shipment.

## Test Pit Location

On February 22, 2018, CH2M personnel visited the site with a Trimble global positioning system (GPS) unit to identify the potential test pit locations (TP-01 and TP-02) and record the related coordinates. CH2M personnel used the GPS device to identify previous boring locations BH-30C, QP-6, and QP-7, and placed survey stakes in the ground at the locations of TP-01 and TP-02 as described in the QAPP.

## Utility Location

On Tuesday, March 6, Applied Professional Services, Inc. (APS) of North Bend, Washington completed third-party utility clearance of the two planned test pit locations using ground penetrating radar (GPR) and radio frequency (RF) survey techniques. No subsurface utilities were identified by APS at either test pit location. A water main, outside of the test pit locations and running northeast to southwest along the eastern border of the property was identified by locating fire hydrants and completing RF survey work between the hydrants. APS also located a subsurface electrical wire near a power pole feeding the old terminal shack. The water and electrical lines were not in conflict with the proposed locations of TP-01 and TP-02.

Washington Utility Notification Center ticket number 19079552 was activated on Thursday, March 8, 2018 at 0800, as requested by CH2M. Emil Gundersen III, Utility Locator from the City of Renton Public Works Maintenance Services, was the only utility owner who responded to the ticket. Mr. Gunderson visited the site on the morning of March 8 prior to test pit excavation activities to examine the water main as well as a potential sanitary sewer main. Mr. Gunderson used City of Renton plan drawings to locate a fire hydrant near the center of the property that was obscured by dense vegetation. The hydrant was several hundred feet west of the water line identified on March 6 by APS. Mr. Gunderson indicated that the water line identified on March 6 contains a “tee” connection and proceeds northwest into the center of the site, before making another “tee” connection. The additional water line identified with City aid is believed to be pressurized with water as part of the local water utility network and was thereby considered active. The supplemental water main identified on site posed no conflict with excavation actives in TP-02, but its location must be considered when making future decisions involving any intrusive actives at the site.

Mr. Gunderson indicated that the sanitary sewer line was likely in the path of the proposed test pit TP-01 near BH-30C. Rocky Sittner, Lead Maintenance Services Worker with the City of Renton Public Works Maintenance Services Worker, was called to the site by Mr. Gundersen to verify the location of the sanitary sewer line. Because sanitary sewer lines are generally made of clay or plastic, they are difficult to locate, even with GPR. Mr. Sittner informed the field team of the approximate location of the line and requested a minimum of ten feet clearance on either size of the line. The location of the sanitary sewer line was in close proximity to the proposed location of test pit TP-01, so the pit was relocated approximately 30 feet northwest of the originally planned location well outside of the clearance interval



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requested by Mr. Sittner, also avoiding the site road. Upon completion of the test pit relocation, Mr. Gunderson and Mr. Sittner departed the site.

## Test Pit Excavation

Test pit excavation was completed by Anderson Environmental Contracting of Kelso, Washington on March 8, 2018. Test pit TP-02 was excavated first, followed by test pit TP-01. TP-02 was excavated to a total depth of 9 feet below ground surface, encountering saturated conditions at 7.5 feet below ground surface. The pit was offset by 5 feet to the west after what appeared to be metal pipe was observed at 6.5 feet below ground surface in the initial excavation. As mentioned previously, the initial location of TP-01 was offset to the west, due to the location of previously unidentified sanitary sewer line. TP-01 was excavated to a total depth of 4 feet below ground surface. In accordance with the QAPP, surface soils and visibly contaminated deeper soils were placed in different stockpiles adjacent to each pit.

Upon completion of each test pit, excavations were initially backfilled with contaminated soil. The excavation bucket was then decontaminated by pressure washing over the partially-filled pit. Surface soils were replaced and compacted, and the ground surrounding the test pits was smoothed. Cedar bark was used at TP-01 to further stabilize the wet ground. Both locations were marked with survey stakes upon restoration and GPS data was collected from each dig location.

## Sample Collection

CH2M collected one sample from TP-01 and one sample from TP-02 in accordance with the QAPP. The sample from TP-02 (sample no. 2018QT-SB-TP02-03081028) was collected at 1130 from material excavated at a depth of 7.5 feet below ground surface. The sample from TP-01 (sample no. 2018QT-SB-TP01-03081028) was collected at 1330 from material excavated at a depth of 3.5 feet below ground surface. Both samples were collected directly from the excavator bucket using a clean shovel immediately after the excavator operator brought the material to ground level. Samples were containerized in 2-gallon plastic pails with snap seal lids and placed in coolers (two buckets per cooler) on ice prior to shipment. Three sample containers were filled at each test pit location.

Samples were packaged and shipped directly to Savron's laboratory located at the University of Western Ontario following the protocols established in Appendix B of the QAPP. Following collection, samples were maintained on ice until shipped under chain of custody control on March 12. Due to delays in Canadian customs, samples were not received by the laboratory until March 16; despite this delay, both samples were within temperature limits upon arrival. The completed chain of custody is included with the supporting documentation described in the following section.

## Supporting Documentation

Attachments 1 through 4 provide documentation related to the test pit excavation activities:

- Attachment 1 - Test pit logs.
- Attachment 2 - Selected photographs of the excavation and sampling work.
- Attachment 3 - Health and safety forms.
- Attachment 4 - Sample shipping documents including chain of custody documents.

## Reference

CH2M. 2018. *Quality Assurance Project Plan, Self-Sustaining Technology for Active Remediation Bench-Scale Treatability Study, Quendall Terminals Superfund Site.* Remedial Action Contract No. EP-W-06-021. Prepared for U.S. Environmental Protection Agency. DCN: 000P-03601. March 2018.

# Attachment 1
# Test Pit Logs

| CH2MHILL | PROJECT NUMBER 682283.00 | TEST PIT NUMBER TP-01 | SHEET 1 of 1 |
|---|---|---|---|

# TEST PIT LOG

PROJECT : STAR Treatability Testing | LOCATION : Quendall Terminals | DATE: 3/8/2018
WEATHER: Cool, breezy, with showers | EXCAVATION CONTRACTOR : Anderson Environmental Contracting
EXCAVATION METHOD AND EQUIPMENT USED : Kobelco SK140 SR 68-5
WATER LEVEL : **DATE/TIME** Start: 12:30 End: 1430 LOGGER : J. Hauser

## TEST PIT PROFILE

Compass Direction

| Pit Dimensions | |
|---|---|
| 8' | L |
| 3' | W |
| 4' | H |

| | | |
|---|---|---|
| Surface 0' BGS | | |
| | -Topsoil<br>-Gray Gravelly Material | PID: 0.0 |
| 1' BGS | | |
| | -Tar-like Substance Observed at 1.67' | PID: 105.1 |
| 2' BGS | -Black Gravel and Soil Mix | |
| | -Gray Soil | |
| 3' BGS | | |
| | -Dark Brown Tar/Soil Mixture | PID: 180.7 |
| | -Terminate Pit at 4' | |
| Bottom of Pit 4' BGS | | |

## DEBRIS IDENTIFIED

*Examples: Drums, steel or plastic and size; spray cans/bottles; newspapers; plastic; appliances; vehicles and/or parts; clothing; hazardous waste and type; chemical containers; batteries*

No debris observed in this test pit.

## SOIL SAMPLES

**Composite Soil Sample**

Sample ID: 2018QT-SB-TP01-03082018
Sampler Name: J. Hauser Sample Date/Time: 13:30
Parameters Sampled for: Savron Laboratories to Determine
Collected 3 5-gallon buckets, unpreserved.
Soil Description:
@ 3.5' BGS
GPS Coordinates: 1302711.13 E, 197068.05 N
Sampled using a shovel from the center of the excavator bucket.

## BREATHING SPACE MONITORING

| Time | MiniRae | MultiRae |
|---|---|---|
| | | |

Logger Signature: D. Joseph Hauser Date: 3/8/2018

| CH2MHILL | PROJECT NUMBER 682283.00 | TEST PIT NUMBER TP-02 | SHEET 1 of 1 |
|---|---|---|---|

# TEST PIT LOG

PROJECT : STAR Treatability Testing | LOCATION : Quendall Terminals | DATE: 3/8/2018
WEATHER: Cool, breezy, with showers | EXCAVATION CONTRACTOR : Anderson Environmental Contracting
EXCAVATION METHOD AND EQUIPMENT USED : Kobelco SK140 SR 68-5
WATER LEVEL : **DATE/TIME** Start: 10:30 End: 12:30 LOGGER : J. Hauser

## TEST PIT PROFILE

| | | | |
|---|---|---|---|
| Surface 0' BGS | -Topsoil | PID: 0.0 | |
| 1' BGS | -Gray, Gravelly Material | | |
| | -Initial Water Begins Filling Pit | PID: 0.0 | |
| 2' BGS | -Debris | | |
| 3' BGS | | | |
| 4' BGS | -Layer of Woody Material @ 4.5' | PID: 0.0 | |
| 5' BGS | | | |
| 6' BGS | -Metal Debris (possibly a p.pt) oriented parallel to test pit | PID: 5.7 | Offset 5' |
| 7' BGS | | | |
| | -Saturated Soil with petrol colors | | |
| 8' BGS | -Terminate pit at 9' | | |
| Bottom of Pit 9' BGS | | | |

Compass Direction

| Pit Dimensions | |
|---|---|
| 8' | L |
| 8' | W |
| 9' | H |

## DEBRIS IDENTIFIED

*Examples: Drums, steel or plastic and size; spray cans/bottles; newspapers; plastic; appliances; vehicles and/or parts; clothing; hazardous waste and type; chemical containers; batteries*

Some woody material and a possible metal pipe.

## SOIL SAMPLES

**Composite Soil Sample**

Sample ID: 2018QT-SB-TP02-03082018
Sampler Name: J. Hauser Sample Date/Time: 11:30
Parameters Sampled for: Savron Laboratories to Determine
Collected 3 5-gallon buckets, unpreserved.
Soil Description:
@ 7.5' BGS
GPS Coordinates: 1302434.49 E, 197234.56 N
Sampled using a shovel from the center of the excavator bucket.

## BREATHING SPACE MONITORING

| Time | MiniRae | MultiRae |
|---|---|---|
| | | |

Logger Signature: D. Joseph Hauser Date: 3/8/2018

# Attachment 2
# Selected Photographs

# Attachment 2 – Selected Photographs

**Photo 1**

*Test Pit 1 (TP-01). DNAPL entering the bottom of the pit*

**Photo 2**
*TP-01 – Gloved hand squeezing DNAPL from sample.*

**Photo 3**

*Test Pit 2 (TP-02) – Water and DNAPL pooling in test pit.*

**Photo 4**

*TP-02 – One of three 2-gallon buckets comprising the bulk TP-02 sample sent to Savron's UWO Laboratory for the bench-scale STAR TS.*

# Attachment 3
# Health and Safety Forms

# Activity Hazard Analysis (AHA)

| | | | |
|---|---|---|---|
| ACTIVITY/WORK TASK: | Excavation | Overall Risk Assessment Code (RAC) (Use highest code) | M |
| Quendall Terminals Test Pits | SIGNATURES | Activity # / AHA # | 1 |
| CLIENT: | USEPA | | |
| NAME & DATE ACCEPTED BY GDA: | | | |
| CONTRACT NUMBER: | EP-W-06-021 | | |
| TASK ORDER/DELIVERY #: | 0098 | | |
| PRIME CONTRACTOR: | CH2M | | |
| SUBCONTRACTOR: | Anderson Environmental Contracting, LLC | | |
| DATE OF PREPARATORY MEETING: | 3/6/18 | | |
| DATE OF INITIAL INSPECTION: | 3/7/18 | | |
| CONTRACTOR COMPETENT PERSON: | J. Decker | | |
| SITE SAFETY and HEALTH OFFICER | J. Hauser | | |

## Risk Assessment Code (RAC) Matrix

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | | | H | H | M |
| Critical | | H | H | M | |
| Marginal | H | M | M | | |
| Negligible | M | | | | |

ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)

H = HIGH RISK

M = MODERATE RISK

Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)

Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity

**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place

**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.

| Job Steps | Hazards | Controls | RAC |
|---|---|---|---|
| Excavation of Soils | Adverse weather | • Check internet, local TV weather or radio channels for daily forecasts and plan daily work activities accordingly.<br>• Frequently observe the skyline for rain squalls and thunder storms systems that may develop.<br>• Bring clothing suitable for anticipated daily weather conditions.<br>• Shut down operations during heavy rain/lightning events or high wind conditions. For storms producing lightning, seek safe haven in a grounded structure or rubber vehicle.<br>• Implement 30 – 30 rule. Do not seek refuge under trees during electrical or high wind storm events.<br>• Do not use telephones during electrical storms, except in the case of emergency.<br>• Follow all manufacturer recommendations for wind speeds. Review with DSC and Site Supervisor. | L |

| | | | |
|---|---|---|---|
| | | • Do not place feet in a pinch point. | |
| | Driving | • Always use a seat belt while driving on military/government facilities.<br>• Always observe posted speed limits, traffic signs and signals.<br>• Never using a cell phone or two way radio while driving on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges. | L |
| | Fire prevention | • Use only metal safety cans for storage and transfer of fuel.<br>• Use funnels and nozzles during fueling operations.<br>• Appropriately sized, easily accessible ABC fire extinguisher in work area.<br>• Fire extinguishers must be inspected monthly (inspection tag) and have an annual maintenance/inspection certification (tag) attached to the extinguisher.<br>• Only smoke in designated areas. Designated area must be free of combustible/flammable materials. | L |
| | Hand tools | • Technicians shall perform a pre-operational inspection of their equipment. Do not use any equipment that is unsafe.<br>• Never use a tool to do a job it was not designed to do.<br>• Use tools in the manner for which they are designed to avoid tool damage and personal injury.<br>• Keep all bystanders, children, and pets out of the work area.<br>• Allow ample space for each employee to work safely<br>• Prevent back injuries and take frequent breaks to avoid ergonomic stress.<br>• Allow the tool to do the work by using a grip light enough to maintain control.<br>• Be alert to protruding nails or spikes, concrete barriers, or other buried materials.<br>• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris<br>• Mark, identify, or barricade other obstructions<br>• The employee is responsible for complying with all applicable HS&E training requirements relating to hand and power tool safety and for providing any additional training necessary to complete their tasks safely.<br>• Operate all tools according to the manufacturer's instructions and within design limitations<br>• All hand and power tools shall be maintained in a safe condition<br>• Tools are to be inspected and tested before use—if a tool is found to be defective it is to be tagged "Do Not Use" and removed from service until repaired<br>• Personal protective equipment, such as gloves, safety glasses, earplugs, and face shields, are to be used when exposed to a hazard from the tool.<br>• Power tools are not to be carried or lowered by the cord or hose | L |

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|---|---|---|---|
| | | * Disconnect tools from energy sources when not in use, before servicing and cleaning, and when changing accessories such as blades, bits, and cutters<br>* Safety guards on tools are to remain installed while the tool is in use and promptly replaced after repair or maintenance has been performed<br>* Tools are to be stored properly, where they will not be damaged or come in contact with hazardous materials<br>* If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications<br>* Only use a knife or blade if it is the best tool for the job, a separate AHA has been developed, and hand protection (e.g. Kevlar gloves) is provided. Cut away from the body.<br>* As alternatives to manual and pistol-grip hand tools that involve work with highly repetitive movement, extended elevation, constrained postures, or positioning of body members (e.g., hand, wrist, arm, shoulder, neck, etc.):<br>– Consider alternative tool design<br>– Improve posture<br>– Select appropriate materials<br>– Organize work—sequencing to prevent muscular skeletal, repetitive motion, and cumulative trauma stressors<br>* Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool—training and certification must be provided to the Safety Coordinator before using the tool. | |
| | Heat/Cold Stress | **Heat Stress**<br>* Perform physiological monitoring according to the APP/SSHP and/or Employee Handbook.<br>* Become familiar with signs and symptoms of heat stress.<br>* Drink 16 oz. of water prior to beginning work.<br>* Acclimate by slowly increasing workloads (e.g., do not begin with extremely demanding activities).<br>* Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.<br>* Conduct strenuous field activities in the early morning or evening and rotate shifts of workers, if possible.<br>* Whenever possible, avoid direct sun, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.<br>* Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).<br>* Maintain good hygiene standards by frequently changing clothing and showering.<br>* Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SSHO to avoid progression of heat-related illness. | L |

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|---|---|---|---|
| | | • To counteract the onset of heat stress symptoms, a work-break regimen must be established during the executed work.<br><br>1) Heat Syncope = Sluggishness or fainting while standing erect or immobile in heat.<br>*Treatment = Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.*<br>2) Heat Rash = Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.<br>*Treatment = Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.*<br>3) Heat Cramps = Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.<br>*Treatment = Remove to cooler area. Rest lying down. Increase fluid intake.*<br>4) Heat exhaustion = Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid pulse and low blood pressure; oral temperature normal or low.<br>*Treatment = Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.*<br>5) Heat Stroke = Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.<br>*Treatment = Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!*<br><br>**Cold Stress**<br>• Be aware of the symptoms of cold-related disorders.<br>• Wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.<br>• Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SHSO to avoid progression of cold-related illness.<br>• Implement work/rest regimen as necessary.<br>• Observe one another for initial signs of cold-related disorders.<br>• Obtain and review weather forecast— be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation. | |
| | **Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - Equipment incidents and injury** | • Perform an equipment inspection before operations.<br>• Wear seat belt.<br>• Obey site rules.<br>• Keep alert for people on foot on site.<br>• Use lights in foggy and or wet conditions.<br>• Use spotters.<br>• Watch for low over-heads.<br>• Never talk / text on the phone while operating equipment.<br>• Never eat while operating equipment.<br>• Communicate any changes in site conditions to the DSC. | **M** |

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| | | • Never operate equipment tired.<br>• Get out and look where you are moving to or use a spotter when backing or high risk maneuvers. | |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) – Slips, Trips, and Fall | • Authorized & trained competent person inspects mobilization work area for hazards – pot holes, fall hazards, water hazards, and ground surface support<br>• Step and walk with purpose, watch where you are placing your feet (pick them up and set them down).<br>• Use machine grips, rails and footsteps when accessing and leaving equipment<br>• (3 points of contact).<br>• Know and understand impacts from changing weather conditions.<br>• Watch weather reports (DSC)<br>• No jumping off equipment<br>• Get out and look where you are moving to or use a spotter when backing or high risk maneuvers. | M |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - Injuries caused by shifted loads, crush potential and unloading –Struck by. | • Only operators trained and experienced with the specific equipment will operate that equipment.<br>• Inspection Forms that may be used are provided in the Field Forms.<br>• Do not operate equipment on grades which exceed manufacturer's recommendations.<br>• Equipment is to have and maintain manufacturer's guards.<br>• Plan travel route when moving equipment from one site to the next location to avoid hazards.<br>• Equipment will not be approached on blind sides and eye contact with operators will be made before approaching equipment. .<br>• Define equipment swing areas with high visibility markings, barriers or spotters.<br>• Establish and know hand signals between ground spotters and operators.<br>• All equipment will be equipped with backup alarms.<br>• The use of headphones, cell phones and texting devices is prohibited.<br>• Equipment parked on an incline shall have the wheels chocked or track mechanisms blocked and / or the parking brake set.<br>• A spotter will be used for backing up equipment in congested areas.<br>• Do not approach any equipment without first making eye contact with the operator; ensure you communicate what your intentions are.<br>• Set exclusion zone for offloading. | M |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - Injuries resulting from Pinch points (Hands and feet) | • Identify all pinch points.<br>• Wear appropriate gloves for the task.<br>• Always leave your hands a way out of pinch points.<br>• Use brightly colored gloves where possible.<br>• Identify sharp edges, points and burs. | M |

| | | | |
|---|---|---|---|
| | | • Never place hands between rigging apparatus.<br>• Use sleever bars and/or crow bars to aid with separating bunched up materials, as needed.<br>• Do not place feet in a pinch point. | |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - **Injuries resulting from improper rigging of materials and equipment. Struck by, crush or rolled.** | • All rigging to be performed by the competent riggers. All rigging used shall be inspected by a competent person for damage prior to each individual pick.<br>• If rigging has signs significant damage it is to be removed from the project site.<br>• Rigging used shall be appropriate for the load that is being picked. Know the weight of loads and rigging capacity.<br>• Rigging shall have the legible tags in place showing capable capacities.<br>• Any shackles used in the rigging process shall have the proper pin and be stamped with the capable working capacities. | M |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - **Strains and sprains from unloading.** | • Avoid moving heavy awkward objects by yourself. Get help or equipment to assist in handling materials if needed.<br>• Limit of 40# to be moved by any one person.<br>• Use proper lifting techniques and appropriate PPE.<br>• Use well defined routes for travel on jobsite.<br>• Keep work area clear of tools and debris.<br>• Never block your line of vision with the load. | M |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - **Injuries caused by rollover of trucks and equipment.** | • Define travel routes and walk the routes with the site Designated Safety Coordinator (DSC).<br>• Mark areas of concern such as ponds, low shoulders, low lying areas with cones, flags poles, etc.<br>• Unfamiliar drivers are to be escorted to lay-down locations.<br>• Wear seatbelts at all times. | M |
| | Heavy Equipment Operations (Skid Steer, Excavator, Bulldozer, Mini Excavator.) - **Damage to existing site infrastructure and Existing well locations** | • Review locations with staff and mark as appropriate.<br>• Review site diagrams.<br>• Use third party locating firms where required. | M |
| | Excavation/Trenching - **Controlling work areas** | • Fencing, caution tape, cones or other DSC - approved barricades will be erected to warn and protect approaching personnel of the hazardous area. Use a spotter when bringing in disposal trucks to reduce the risk of equipment/property damage or injury to personnel. | L |
| | Excavation/Trenching - **Benching/Shoring** | • No workers will enter excavations that are in excess of 4 feet deep without authorization from the Competent Person and properly benched, sloped or shored based on the soil type and conditions | L |
| | Excavation/Trenching - **Daily excavation inspection** | • The Competent Person will conduct daily excavation/trench inspections on all excavations in excess of 4 feet in depth.<br>• All trenches and excavations will need to be re-inspected if the site conditions change, i.e. rain or water accumulation. | L |

| | | | |
|---|---|---|---|
| | Excavation/Trenching - **Underground Utilities and Unknown Items** | • Prior to digging contact JULIE (811) and private utility locator to mark utility location. Submit utility locate information to client prior to excavation for review.<br>• At Pre-Phase and Initial-Phase site quality control meetings utility locate documentation will be reviewed. A site walk will be performed upon completing paperwork review to visually inspect utility locate markings and discuss means and methods of excavation. At this time photo documentation of utility markings will be collected.<br>• Obtain utility diagrams for the facility.<br>• Underground utilities will be "day-lighted" if expect to dig with heavy equipment within 5' of marked utility. After "day-lighted' proceed up to 2' from the utility; after that only hand digging is authorized around the underground utility.<br>• Where unknown or unanticipated buried objects (i.e. drums, tanks, cylinders, MEC/MPPEH, soil with unusual staining or odor) are encountered during site operations, ongoing activities at that sampling location shall be immediately suspended<br>• Hand dig around identified utilities (within 5') or as otherwise required by the APG issued excavation permit.<br>• Protect and preserve the markings of approximate locations of facilities until the markings are no longer required. If the markings of utility locations are destroyed or removed before excavation commences or is completed, utilities must be relocated/marked. | L |
| | Excavation/Trenching - **Stockpiling of soils** | • All stockpiled spoils will be stockpiled at a minimum of 2' from the leading edge of the excavation or trench.<br>• Operator will strike the bucket prior to swinging to the stockpile. This will reduce the risk of soil or debris falling from the bucket while in motion. | L |
| | Excavation/Trenching - **Contaminants** | • Primary site contaminants include coal tar creosotes. Personnel will perform air monitoring and wear proper PPE in accordance with the APP/SSHP at all times to reduce risk of coming in direct contact with contaminants.<br>• No eating, drinking, or smoking is permitted in contaminated areas or in exclusion or decontamination zones. | L |
| | Decontamination of Equipment - **Decontamination of Equipment and Tools** | • The Safety Coordinator and Site Supervisor will coordinate an area onsite in which decontamination procedures will occur if needed.<br>• A decontamination pad will be constructed as needed for equipment and hand tool decontamination if materials come in contact with subsurface soils.<br>• A dry decontamination will be used to remove gross contamination | L |
| | Refueling equipment from fuel cell in pick-up truck. Diesel - **Injuries from fire and explosions.** | • Proper labeling on all fueling equipment is required. Designation for diesel (1993), no smoking etc.<br>• Fuel only in well ventilated areas.<br>• No smoking while fueling.<br>• Do not mix or combine different fuel types.<br>• Do not fuel during lightning storms. | L |

| | | | |
|---|---|---|---|
| | | • Fire extinguisher required.<br>• Refueling personnel will wear at a minimum safety glasses when refueling, ground to prevent static electricity. | |
| | Refueling equipment from fuel cell in pick-up truck. Diesel - **Environmental damage caused by spills.** | • Fueling requires mandatory attendance with no other responsibility.<br>• Have spill kit available.<br>• Never use auto lock function.<br>• Shut down equipment while refueling<br>• Only fill to 80 percent capacity. Warming days may expand fuel and cause a spill.<br>• Do not drip fuel. Completely clear the lines or use a 5 gallon recovery bucket. Use rags at end of nozzle where applicable.<br>• Fuel equipment at least 75' from drains and waterways (unless spill control is used).<br>• Fuel over solid / impermeable surfaces where possible.<br>• Follow fuel handling and use instructions per MFG's SDS (See SDS).<br>• If a spill occurs, Notify DSC regardless of size or material spilled. | L |
| | Manual lifting | • Personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities, especially lifting operation involving repetitive motions.<br>• When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. Use heavy equipment to transfer heavy or awkward loads wherever possible. Have someone assist with the lift—especially for heavy (> 40lbs.) or awkward loads. Do not attempt to manually lift objects that should otherwise be lifted with heavy equipment.<br>• Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear before the lift. Avoid carrying heavy objects above shoulder level. | L |
| | Noise | • Personnel adjacent to operating heavy equipment shall wear hearing protection<br>• Wear hearing protection around equipment that generates 85db or greater noise level.<br>• Minimize noise exposure whenever possible<br>Know and understand noise reduction rates for hearing protection | L |
| | Spill prevention | • Ensure that spill control and spill clean-up and materials are on hand before initiating any heavy equipment or fueling operations to prevent entry into sensitive receptors. | L |
| | Slips/trips/falls/housekeeping | • Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet surfaces, polyethylene sheeting, and where unprotected holes, drainage areas, rip rap, utilities, and ground protrusions. Observe, mark and avoid any of these identified conditions.<br>• Use sturdy hard-toe work boots with sufficient ankle support.<br>• Institute and maintain good housekeeping practices. Clean Work Areas as activities proceed. Remove and store materials from pathways and commonly traveled areas as soon as possible.<br>• Three points of contact when enter/exiting equipment. | L |

| | | | |
|---|---|---|---|
| | Traffic control, impact with vehicle | • Shut off and secure Site vehicles prior to exiting them. Park on level ground where possible. If parking on an incline, engage parking brake. If the vehicle has a manual transmission, ensure the transmission is in gear (not neutral) and the parking brake is engaged before exiting the vehicle.<br>• Exercise caution when exiting traveled way or parking along street— avoid sudden stops, use flashers, etc.<br>• Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.<br>• Wear safety vests when working near roadways or heavy equipment.<br>• Make eye contact with equipment operator before approaching equipment. | L |
| | Visible lighting | • Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lightly must be provided to sufficient illuminate work area(s). | L |

| Equipment to be Used | Training Requirements/Competent or Qualified Personnel name(s) | Inspection Requirements |
|---|---|---|
| • Fire extinguisher (when using fuel and electrical sources)<br>• Eye wash (small portable type)<br>• Miscellaneous power and manual hand tools.<br>• First Aid/BBP/CPR shield<br>• Spill Kit<br>• Communication devices.<br>• Skid Steer, Excavator, Bulldozer, Mini Excavator. Standard site requires modified level D PPE (ANSI approved hard hat, eye protection, safety boots, high visibility traffic vest or equivalent shirt/jacket, hearing protection (8hr TWA 85db or greater), N-95 dust mask w/ visible dust, and gloves. | • Fire extinguisher training<br>• Review HASP for new site personnel.<br>• 1st Aid/CPR 1st Aid/CPR (2 per site).<br>• Training and medical surveillance per 29CFR1910.120. | • Monthly fire extinguisher inspection by competent employee, yearly inspection by licensed company. Monthly inspection tag should be attached.<br>• Visual inspections of designated work areas identify and address hazardous/MR conditions.<br>• Emergency Response equipment inspections (Fire Extinguishers, Eye wash First Aid/CPR etc.)<br>• Heavy equipment shall be inspected per the MFG specifications by a competent person.<br>• Inspections shall be performed daily prior to use. Defective equipment shall be tagged out from use (tag attached to operating controls, for equipment deficiency). Inspection of all tools and rigging prior to use by a competent person. .<br>• Inspect PPE equipment prior to use and replace and/or repair defective PPE. |

3-8-18

Tom 3-8-18

3-8-18

SECTION 21

# Employee Signoff Form

**EMPLOYEE SIGNOFF FORM**

**Health and Safety Plan**

The Jacobs project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

**Project Name:** **Project Number:**

| EMPLOYEE NAME (Please print) | EMPLOYEE SIGNATURE | COMPANY | DATE |
|---|---|---|---|
| Joe Hawk | Joe H | CH2M | 3-6-18 |
| Ben Foster | Ben F | APS | 3-6-18 |
| Steven Bittenbender | Steve Bittenbender | APS | 3-6-18 |
| Jim Declair | Jim D | AEC | 3-8-18 |
| Tom Hallgren | Tom H | AEC | 3-8-18 |
| Jacob Briere | [illegible] | AEC | 3-8-18 |
| Jessa Cole | Jessa Cole | CH2M | 3/8/18 |
| Susan Moore | Susan Moore | CH2M | 3/8/18 |
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# Daily Pre-Task Safety Plan (PTSP)



Project: Quadal Terminals Date: 3-8-18

Location: Renton, WA

Site Supervisor: J. Hauser Site Safety & Health Officer: J. Hauser

Job Description:

Excavate Test pits

Specific Tasks:

Dig two test pits, collect two soil samples

Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

Excavator, shovels

| | | |
|---|---|---|
| __ Chemical burns/contact | X Trench, excavations, cave-ins | X Ergonomics |
| __ Pressurized lines/equipment | X Overexertion | __ Chemical splash |
| __ Thermal burns | X Pinch points | __ Poisonous plants/insects |
| __ Electrical | X Cuts/abrasions | X Eye hazards/flying projectile |
| X Weather conditions - rain | __ Spills | X Inhalation hazard |
| __ Heights/fall > 6 feet | __ Overhead Electrical hazards | X Heat/cold stress |
| X Noise | __ Elevated loads | X Water/drowning hazard |
| X Explosion/fire | X Slips, trip and falls | X Heavy equipment |
| __ Radiation | X Manual lifting | __ Aerial lifts/platforms |
| __ Confined space entry | __ Welding/cutting | __ Demolition |

Other Potential Hazards (Describe):

# Daily Pre-Task Safety Plan (PTSP)

## Hazard Control Measures (Check All That Apply):

| PPE | Protective Systems | Fire Protection | Electrical |
|---|---|---|---|
| ☒ Thermal/lined<br>☒ Eye<br>☒ Dermal/hand<br>☒ Hearing<br>☒ Respiratory<br>☐ Flotation device<br>☒ Reflective vests<br>☒ Hard hat | ☐ Sloping<br>☐ Shoring<br>☐ Trench box<br>☐ Barricades<br>☒ Competent person<br>☒ Locate buried utilities<br>☐ Daily inspections | ☒ Fire extinguishers<br>☐ Fire watch<br>☐ Non-spark tools<br>☐ Grounding/bonding<br>☐ Intrinsically safe equipment | ☐ Lockout/tagout<br>☐ Grounded N/A<br>☐ Panels covered<br>☐ GFCI/extension cords<br>☐ Power tools/cord inspected |
| **Fall Protection** | **Air Monitoring** | **Proper Equipment** | **Welding & Cutting** |
| ☐ Harness/lanyards<br>☐ Adequate anchorage<br>☐ Guardrail system<br>☐ Covered opening<br>☐ Fixed barricades<br>☐ Warning system<br>N/A | ☒ PID/FID<br>☒ Detector tubes<br>☐ Radiation<br>☐ Personnel sampling<br>☒ LEL/O2<br>☐ Other | ☐ Aerial lift/ ladders/ scaffolds<br>☐ Forklift/heavy equipment<br>☒ Backup alarms<br>☐ Hand/power tools<br>☐ Crane with current inspection<br>☐ Proper rigging<br>☐ Operator qualified | ☐ Cylinders secured/capped N/A<br>☐ Cylinders separated/upright<br>☐ Flash-back arrestors<br>☐ No cylinders in CSE<br>☐ Flame retardant clothing<br>☐ Appropriate goggles |
| **Confined Space Entry** | **Medical/ER** | **Heat/Cold Stress** | **Vehicle/Traffic** |
| ☐ Isolation N/A<br>☐ Air monitoring<br>☐ Trained personnel<br>☐ Permit completed<br>☐ Rescue | ☒ First-aid kit<br>☒ Eye wash<br>☒ FA-CPR trained personnel<br>☒ Route to hospital | ☒ Work/rest regime<br>☒ Rest area<br>☒ Liquids available<br>☒ Monitoring<br>☒ Training | ☐ Traffic control N/A<br>☐ Barricades<br>☐ Flags<br>☐ Signs |
| **Permits** | **Demolition** N/A | **Inspections:** | **Training:** |
| ☐ Hot work N/A<br>☐ Confined space<br>☐ Lockout/tagout<br>☐ Excavation<br>☐ Demolition<br>☐ Energized work | ☐ Pre-demolition survey<br>☐ Structure condition<br>☐ Isolate area/utilities<br>☐ Competent person<br>☐ Hazmat present | ☐ Ladders/aerial lifts<br>☐ Lanyards/harness<br>☐ Scaffolds<br>☒ Heavy equipment<br>☐ Cranes and rigging | ☒ Hazardous Waste<br>☐ Construction<br>☒ Competent person<br>☒ Task-specific (THA)<br>☒ HAZCOM<br>☒ HAZWOPER |

**Field Notes** Slip trip and fall in rainy conditions is a concern

List employees who reviewed hazards identified in today's PTSP checklist.

| Print Name | Signature | Employer | Date |
|---|---|---|---|
| Jacob Briere | | AEC | 3/8/18 |
| Tom Hazlegrove | | AEC | 3/8/18 |
| Jim Decker | | AEC | 3/8/18 |
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Meeting Conducted By:

(Print): Joe Hosie Signature: [signature] Date: 3-8-18

# Attachment 4
# Sample Shipping Documentation

**FedEx Express** International Air Waybill

For FedEx services worldwide. Packages up to 150 lbs. (68 kg), excluding dangerous goods. Not all services and options are available to all destinations.

Sender's Copy

**1 From** *Please print and press hard.*

Date 3/2/18 Sender's FedEx Account Number 098113142

Sender's Name Joe Hauser Phone

Company CH2M/Jacobs

Address 1100 112th Ave NE Ste 500

Address

City Bellevue, State Province WA

Country USA ZIP Postal Code 98004

Email Address

Internal Billing Reference 682283.TT.01

**2 To** Joshua Brown ☐ Residential Delivery

Recipient's Name Sample Custodian Phone 519-661-2111 ex. 88288

Company The University of Western Ontario

Address 1151 Richmond St N

Address Dock 59 - Faculty of Engineering Dept./Room

City London State Province Ontario

Country Canada ZIP Postal Code N6A3K7

Email Address

Recipient's Tax ID Number for Customs Purposes

**3 Shipment Information**

Total Packages Shipper's Load and Count/SLAC 3 Total Weight lbs. kg. DIM / / in. cm.

| Commodity Description DETAIL REQUIRED. PRINT IN ENGLISH. | Harmonized Code | Country of Manufacture | Value for Customs |
|---|---|---|---|
| (3) Soil Samples (for Research - not for human consumption) | 2530.90 00.00 | | 1.00 |

Has EEI been filed in AES? ☒ No EEI required, value $2,500 or less per Sch. B Number, no license required (NLR) not subject to EAR. ☐ No EEI required, enter exemption number. ☐ Yes - Enter AES proof of filing citation.

Total Declared Value for Carriage

Total Value for Customs (Specify Currency) 1.00

**The service order has changed in Section 4. Signature options have been added to Section 6.**

For Completion Instructions, and details on services and options, see back of fifth page.

FedEx Tracking Number 8103 5139 1060 Form ID No. 0402

**4 Express Package Service**

NOTE: Service order has changed. Please select carefully.

☐ FedEx Intl. First ☒ FedEx Intl. Priority ☐ FedEx Intl. Economy

**5 Packaging**

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

**6 Special Handling and Delivery Signature Options** Fees may apply. See the FedEx Service Guide.

☐ HOLD at FedEx Location ☐ SATURDAY Delivery

☐ Direct Signature Someone at recipient's address may sign for delivery ☐ Indirect Signature If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only.

**7 Payment** Complete payment options for both transportation charges and duties and taxes.

*Bill transportation charges to:* Enter FedEx Acct. No. or Credit Card No. below.

☒ Sender Acct. No. in Section 1 will be billed ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash Check/Cheque FedEx Use Only

FedEx Acct. No.

Credit Card No.

Credit Card Exp. Date

*Bill duties and taxes to:* Enter FedEx Acct. No. below.

☒ Sender Acct. No. in Section 1 will be billed ☐ Recipient ☐ Third Party

FedEx Acct. No.

**8 Required Signature**

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain dangerous goods. Certain international treaties, including the Warsaw or Montreal Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: X Joe Hauser

662

**For questions or to ship and track packages, go to fedex.com.**

Or in the U.S. call 1.800.GoFedEx 1.800.463.3339.

Terms and conditions of service may vary from country to country.

For a full version of the Conditions of Contract, go to fedex.com.

RETAIN THIS COPY FOR YOUR RECORDS.

05/16 RRDA

PART 158416 • Rev. Date 9/13 • ©1994-2013 FedEx • PRINTED IN U.S.A. • Non-Negotiable International Air Waybill

Address: 651 SOUTH ALASKA
STREET
SEATTLE
WA 98108
Location: BFIA
Device ID: -BTC01
Transaction: 910192388323

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FedEx International Priority
810351391060 (S) 506.22
780007146270 (S)
780007146281 (S)
Non-standard packaging
Total Declared Value: $0
Total Weight: 315.3 lbs.

Shipment subtotal: $506.22

Total Due: $506.22

FedEx SENDER Account
*****3142

M = Weight entered manually
S = Weight read from scale
T = Taxable item

Terms and Conditions apply. See
fedex.com/us/service-guide for details.

Visit us at: fedex.com
Or call 1.800.GoFedEx
1.800.463.3339

Mar 12, 2018 1:38:23 PM

# Commercial Invoice

| | |
|---|---|
| SELLER/SHIPPER (Name, Full Address, Country)<br>Joe Hauser<br>Phone: 984-663-4393<br>Email: joe.hauser@ch2m.com<br>CH2M Inc.<br>1100 112th Ave. NE, Suite 500<br>Bellevue, WA 98004<br>United States of America<br>Tax Identification Number (EIN) 930549963 | Invoice Date and Number<br>March 12, 2018<br>Invoice # DJH-001<br>Customer Order Number<br>CH2M-001<br>Tracking ID/Air Waybill No. 810351391060 |
| CONSIGNEE (Name, Full Address, Country)<br>Joshua Brown<br>Phone: 519-661-2111 ex. 88288<br>University of Western Ontario<br>Email: jbrow227@uwo.ca<br>1151 Richmond Street North<br>Faculty of Engineering<br>Dept 59<br>N6A-3K7 | Buyer (if Other than Consignee) |
| Port of Lading Bellevue, WA, USA | Terms and Conditions of Delivery and Payment (Incoterms) |
| Final Destination<br>London, Ontario, Canada<br>Exporting Carrier<br>FedEx Express | |
| Other Transportation Information | Currency of Sale USD |
| Marks and Numbers<br>Total Number of Packages 3 | Total Gross Weight (kg)<br>Cubic Meters |

| Complete And Accurate Commodity Description And Country of Manufacture | Quantity/ Unit of Measure | Unit Price | Amount |
|---|---|---|---|
| Soil Samples for research purposes, to be destroyed after analysis. Not for human consumption.<br><br>Harmonized Tariff Schedule # 2530.90.00.00 | 3 samples | $0.333 | $1.00 |

These commodities, technology, or software were exported from the United States in accordance with the Export Administration Regulations. Diversion contrary to United States law is prohibited.

I declare all the information contained in this invoice to be true and correct.

Joe Hauser — 3-12-2018 — Bellevue, WA USA

Signature and Status of Authorized Person — Date — Place

| | |
|---|---|
| Packing Costs | |
| Freight Costs | |
| Other Transportation Costs | |
| Handling | |
| Insurance Costs | |
| Assists | |
| Additional Fees | |
| Duties and Taxes | |
| Total Invoice Value | |

Page 1 of 1

Letter of General Consideration

*March 12, 2018*

To Whom It May Concern:

Shipper Name: *Joe Hauser*
*CH2M*
*1100 112th Ave NE Ste 500*
*Bellevue, WA 98004*
*425-453-5000*

Recipient Name: *Joshua Brown*
*The University of Western Ontario*
*1151 Richmond Street North*
*Faculty of Engineering*
*Dock 59*
*London, Ontario N6A 3K7*
*519-661-2111 ex 88288*
*jbrow27@uwo.ca*

Waybill Number: *810351391060,* ~~*807300349644, 807300349633*~~ 780007148270, 780007148281
Tracking Number: 810351391060, ~~807300349644; 807300349633~~ 780007148270, 780007148281

Description:
Soil samples for research purposes, to be destroyed after analysis. Not for human consumption.
Refer to CFIA Soil Import Permit *P-2018-00327.*

Manufacturer: CH2M
Declared value: *$1.00*

Country of origin: *United States of America*

I certify that this declaration is true and correct.

*Joe Hauser*

Canada Border Services Agency | Agence des services frontaliers du Canada

# CANADA CUSTOMS INVOICE
# FACTURE DES DOUANES CANADIENNES

PROTECTED B when completed



1. Vendor (name and address) - Vendeur (nom et adresse)

Joe Hauser
CH2M, Inc.
1100 112th Ave. NE, Suite 500
Bellevue, WA 98004
United States of America

2. Date of direct shipment to Canada - Date d'expédition directe vers le Canada

2018/03/12

3. Other references (include purchaser's order No.)
Autres références (inclure le n° de commande de l'acheteur)

4. Consignee (name and address) - Destinataire (nom et adresse)

Joshua Brown
University of Western Ontario
1151 Richmond Street North
Faculty of Engineering
Dock 59
N6A 3K7
London, Ontario
Canada

5. Purchaser's name and address (if other than consignee)
Nom et adresse de l'acheteur (s'il diffère du destinataire)

6. Country of transshipment - Pays de transbordement

7. Country of origin of goods
Pays d'origine des marchandises

United States

If shipment includes goods of different origins enter origins against items 9 to 12.
Si l'expédition comprend des marchandises d'origines différentes, préciser leur provenance en 9 à 12.

8. Transportation: Give mode and place of direct shipment to Canada
Transport : Précisez mode et point d'expédition directe vers le Canada

FedEx Express

9. Conditions of sale and terms of payment
(i.e. sale, consignment shipment, leased goods, etc.)
Conditions de vente et modalités de paiement
(p. ex. vente, expédition en consignation, location de marchandises, etc.)

Samples for research purposes

10. Currency of settlement - Devises du paiement

USD

| 11. Number of packages Nombre de colis | 12. Specification of commodities (kind of packages, marks and numbers, general description and characteristics, i.e., grade, quality) Désignation des articles (nature des colis, marques et numéros, description générale et caractéristiques, p. ex. classe, qualité) | 13. Quantity (state unit) Quantité (précisez l'unité) | Selling price - Prix de vente 14. Unit price Prix unitaire | 15. Total |
|---|---|---|---|---|
| 3 | Coolers containing soil samples for research purposes to be destroyed after analysis. Not for human consumption. | 3 | 0.33 | 1.00 |

18. If any of fields 1 to 17 are included on an attached commercial invoice, check this box
Si tout renseignement relativement aux zones 1 à 17 figure sur une ou des factures commerciales ci-attachées, cochez cette case ☑
Commercial Invoice No. - N° de la facture commerciale ▶ DJH-001

19. Total weight - Poids total
Net
Gross - Brut

17. Invoice total
Total de la facture

19. Exporter's name and address (if other than vendor)
Nom et adresse de l'exportateur (s'il diffère du vendeur)

20. Originator (name and address) - Expéditeur d'origine (nom et adresse)

Joe Hauser
CH2M, Inc.
1100 112th Ave. NE, Suite 500
Bellevue, WA 98004, USA

21. Agency ruling (if applicable) - Décision de l'Agence (s'il y a lieu)

22. If fields 23 to 25 are not applicable, check this box
Si les zones 23 à 25 sont sans objet, cochez cette case ☑

23. If included in field 17 indicate amount:
Si compris dans le total à la zone 17, précisez :

(i) Transportation charges, expenses and insurance from the place of direct shipment to Canada
Les frais de transport, dépenses et assurances à partir du point d'expédition directe vers le Canada

(ii) Costs for construction, erection and assembly incurred after importation into Canada
Les coûts de construction, d'érection et d'assemblage après importation au Canada

(iii) Export packing
Le coût de l'emballage d'exportation

24. If not included in field 17 indicate amount:
Si non compris dans le total à la zone 17, précisez :

(i) Transportation charges, expenses and insurance to the place of direct shipment to Canada
Les frais de transport, dépenses et assurances jusqu'au point d'expédition directe vers le Canada

(ii) Amounts for commissions other than buying commissions
Les commissions autres que celles versées pour l'achat

(iii) Export packing
Le coût de l'emballage d'exportation

25. Check (if applicable):
Cochez (s'il y a lieu) :

(i) Royalty payments or subsequent proceeds are paid or payable by the purchaser
Des redevances ou produits ont été ou seront versés par l'acheteur ☐

(ii) The purchaser has supplied goods or services for use in the production of these goods
L'acheteur a fourni des marchandises ou des services pour la production de ces marchandises ☐

Dans ce formulaire, toutes les expressions désignant des personnes visent à la fois les hommes et les femmes.

Savron

DateShipped: 3/12/2018

CarrierName:

AirbillNo:

CHAIN OF CUSTODY RECORD

Site #: LA00

Project Code:

Cooler #: 1

No: 10-030718-140532-0001

Account Number FILL IN

Contact Name: Joe Hauser

Contact Phone: 404-661-4395

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 6 samples | [signature] CH2M | 3/12/18 1100 | [signature] UWO | 18/03/18 10:20 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# Appendix B

# TS Report from Savron

APPENDIX B

# Treatability Study Report from Savron

This appendix includes the Self-Sustaining Treatment for Active Remediation (STAR) Treatability Study (TS) report issued by Savron and the shipping documents accompanying the transfer of TS sample from Savron's laboratory at the University of Western Ontario (UWO) to the analytical laboratories (U.S. Environmental Protection Agency [USEPA] Region 10 Manchester Environmental Laboratory in Port Orchard, WA and ALS Environmental in Simi Valley, CA). Two sets of shipping documents are provided to account for the shipment of baseline (pre-treatment) and post-treatment samples.



ED_004220_00020298-00059

# Attachment 1
# Savron's STAR TS Report

savronsolutions.com

25 April 2018

Susan Moore, P.G.
Project Manager
CH2M/Jacobs
1100 112th Ave NE, Suite 500
Bellevue, WA 98004
via email: Susan.Moore@jacobs.com

**Subject:** **Self-sustaining Treatment for Active Remediation (STAR) Treatability Study Report to Treat Coal Tar and Creosote-Impacted Soils from the Port Quendall Terminals Superfund Site in Renton, WA.**

Susan,

A treatability study for the application of Self-sustaining Treatment for Active Remediation (STAR) to treat coal tar and creosote-impacted soils from the Port Quendall Terminals Superfund Site in Renton, WA (the "Site") was conducted. This report presents a brief description of the scope of work, the results of treatability testing, and recommendations for future phases of work.

## SCOPE OF WORK

The proposed treatability study scope of work was conducted as presented in our proposal dated 12 January 2018 with the following exceptions:

- The TP-2 soil sample targeted for STAR treatment contained insufficient petroleum hydrocarbon concentrations to achieve self-sustaining smoldering (i.e., <3,000 – 5,000 milligrams per kilogram [mg/kg]); therefore, post-treatment analytical data was not collected for this sample;
- A lower air flux (2.1 centimeters per second [cm/s]) was used for testing of both TP-1 and TP-2 soils due to the high moisture content in the received soil samples; and
- A conductive ignition method was used to permit testing using a lower air flux (i.e., 2.1 cm/s) in the lab.

Two samples were considered in this study and are referred to herein as:

- "TP-1 soils" – located in the Former May Creek area (near BH-30C), which represents an area with primarily creosote contamination; and
- "TP-2 soils" – located in the vicinity of the Quendall Pond/Still House (near QP-6 and QP-7), which represents an area with primarily coal tar contamination.



ED_004220_00020298-00063

## RESULTS

### Ignition Protocol and Smoldering Characteristics

A conductive ignition source with air injected at a fixed flux of 2.1 cm/s was used to initiate the smoldering combustion process for the two samples tested.

For TP-1 soils, smoldering combustion was initiated successfully using a target ignition temperature of 400°C (Figure 1). The combustion test demonstrated self-sustaining smoldering behavior; that is, temperatures at each location within the experimental apparatus continued to increase and "cross-over" temperatures at the preceding monitoring interval following the termination of the heating element (Figure 1). The peak temperature recorded for the sample was approximately 699°C and the smoldering front propagation velocity was estimated to be 0.17 centimeters per minute (cm/min) (or 8 feet per day [ft/d]). Propagation velocities are correlated to aquifer properties and the mass of contaminants present in the pore space and will vary during field implementation as a function of soil concentrations and heterogeneity.

For TP-2 soils, combustion was not initiated in a self-sustaining manner. Figure 2 shows a brief inflection of temperatures and detection of low concentrations of combustion gases (i.e., carbon monoxide [CO] and carbon dioxide [$CO_2$]) at a time of 130 minutes. These temperatures and combustion gas concentrations, however, were not sustained. After the heater was turned off (at a time of 220 minutes), Figure 2 shows a heat wave propagating through the soil but no sustained temperature peaks and negligible combustion gas generation, indicating that combustion was not maintained. Baseline analytical results presented below indicate that the TP-2 soil sample contained initial petroleum hydrocarbon concentrations of approximately 1,240 mg/kg; thus, there was insufficient fuel present within the soil sample to support the smoldering combustion process. Concentrations of between 3,000 – 5,000 mg/kg are typically required to achieve self-sustaining smoldering and successful treatment via STAR.

A summary of all soil, gas and condensate samples collected and submitted for analysis is presented in Table 1.

### Soil Analytical Results

Analytical results both 'Before' (baseline) and 'After' (post) treatment for TP-1 soils and 'Before' treatment for TP-2 soils are presented in Table 2. A summary of average baseline concentrations and percent reductions after treatment are presented in Table 3. Data presented in these tables includes concentrations of petroleum hydrocarbons (gasoline range organics [GRO], diesel range organics [DRO], and residual range organics [RRO]), and Polycyclic Aromatic Hydrocarbons (PAHs).

For the TP-1 soil, 'Before' concentrations of total petroleum hydrocarbons (average sum of GRO and DRO for the three replicate samples) were approximately 95,300 mg/kg with elevated concentrations of PAHs present. 'After' STAR treatment concentrations of petroleum hydrocarbons were approximately 160 mg/kg, representing a greater than 99.8% soil concentration decrease. PAH concentrations in 'After' STAR TP-1 soil ranged from non-detect to

a maximum of 14 mg/kg (maximum concentration detected for 2-methyl-naphthalene in the three replicate samples). This represents a greater than 99% reduction in soil concentrations for all PAHs. Photographs, presented as Plates 1a and 1b, showing the 'Before' and 'After' samples provide visual evidence of contaminant destruction.

For the TP-2 soil, 'Before' concentrations of total petroleum hydrocarbons (average sum of GRO and DRO for the three replicate samples) were approximately 1,240 mg/kg, indicating insufficient hydrocarbon impacts in the soil for STAR treatment. Thus, combustion testing showed no self-sustaining smoldering and 'After' analytical samples were not submitted for laboratory analysis. Plate 2 presents a photograph of the 'Before' sample. While TP-2 soils appear dark in color, samples of both TP-1 and TP-2 soils were placed in an oven at 100°C to evaporate the water. As shown in Plate 3, after removal of water the TP-1 baseline soils still appear visually contaminated, while TP-2 baseline soils display significantly less visual contamination.

**Principle Components of Gaseous Emissions**

Concentrations of CO and $CO_2$ (i.e., combustion gases) measured during the TP-1 soil test ranged between background levels and 3.8% and 9.6%, respectively. Concentrations of CO and $CO_2$ during the TP-2 soil tests briefly reached a maximum of 0.2% and 1.7%, respectively, before decreasing to background levels as combustion was not sustained.

The combustion gas concentrations for TP-1 soils are within the range of typical values for the types of contaminants and soils examined at the laboratory bench scale. Combustion gas presence is primarily viewed as an indicator of the occurrence of combustion, and combustion gases measured during a field trial or full-scale field application will allow for an estimation of contaminant mass destroyed via STAR in the subsurface.

Volatile compounds measured in the vapor phase during the TP-1 soil test are presented in Table 4. Sulfur compounds, volatile organic compounds (VOCs), and fixed gases detected in the emissions include:

| **Sulfur Compounds** | |
|---|---|
| **Compound** | **Concentration (µg/m$^3$)** |
| Thiophene | 1,300 |
| Carbonyl Sulfide | 15,000 |
| 3-Methylthiopene | 4,200 |
| Ethyl Methyl Sulfide | 30 |
| Dimethyldisulfide | 320 |
| 2,5-Dimethylthiophene | 3,100 |
| Carbon Disulfide | 1,100 |
| Dimethyl Sulfide | 440 |
| Hydrogen Sulfide | 16 |
| 2-Ethylthiophene | 6,100 |

| VOCs | |
|---|---|
| **Compound** | **Concentration (µg/m$^3$)** |
| Ethylbenzene | 160,000 |
| n-Propylbenzene | 4,800 |
| Acrolein | 6,500 |
| Acrylonitrile | 2,400 |
| m+p-Xylenes | 240,000 |
| 1,3,5-Trimethylbenzene | 17,000 |
| Toluene | 200,000 |
| Nonane | 1,500 |
| Propene | 8,500 |
| 4-Ethyltoluene | 23,000 |
| Acetone | 15,000 |
| Benzene | 37,000 |
| Chloromethane | 3,800 |
| Acetonitrile | 15,000 |
| o-Xylene | 100,000 |
| 1,2,4-Trimethylbenzene | 36,000 |
| Isopropylbenzene | 12,000 |
| **Fixed Gases** | |
| **Compound** | **%v/v** |
| Carbon Dioxide | 5.47 |
| Hydrogen | 0.152 |
| Carbon Monoxide | 1.38 |
| Nitrogen | 78.3 |
| Oxygen | 14.7 |

A vapor emissions sample for the TP-2 soil was not analyzed.

Analysis of the condensate is summarized in Table 5. The only compound detected above the reported detection limit, in both the water and product phases, was naphthalene. Low concentrations of 1,2,4-Trimethylbenzene were also detected in the water phase.

Vapor concentrations during a laboratory bench test are anticipated to over-estimate the fraction of volatile emissions (relative to mass destroyed via smoldering) due to the large air flow rates used and the scale of the apparatus. However, these vapor data provide important information about the constituents that can be anticipated to be generated during STAR operation in the field and will be used to design a suitable vapor capture and treatment system for any subsequent field pilot testing.

The compounds identified in vapors and condensate are consistent with the types of compounds typically identified in STAR laboratory bench scale tests involving coal tar and creosote-contaminated soils.

## RECOMMENDATIONS

Self-sustaining smoldering combustion was observed for TP-1 soils. The remediation efficiency as observed in Plate 1 along with the concentration reductions observed through laboratory analysis (Table 3) and the calculated smoldering propagation velocity suggests that STAR could be successfully applied at the Site. TP-2 soils contained insufficient concentrations of petroleum hydrocarbons (Plates 2 and 3, and Table 2); therefore, no smoldering was observed for this sample. However, based on our evaluation of the soil, it is anticipated that self-sustaining smoldering combustion would be achieved with this soil if sufficiently impacted with petroleum hydrocarbons.

It is recommended that a Pre-Design Evaluation (PDE) or field pilot test be performed at the Site in the Former May Creek area (near the location of TP-1 soil samples), and/or in the vicinity of the Quendall Pond/Still House (near the location of TP-2 soil samples) at a depth interval with higher contaminant concentrations (i.e., >5,000 mg/kg). The PDE would consist of a 10-day field test (with an optional second 10-day field test at the second treatability study sample location) to evaluate radius of influence, propagation rate, treatment levels as well as vapor emissions. A refined conceptual approach and cost estimate for full-scale STAR implementation could be completed at that time. Further details on the scope of work, schedule and cost estimates are presented in Savron's proposal ST-0072-20171222-B dated 12 January 2018.

If you have any questions or require additional information regarding this report, please contact me at 1-519-515-0848.

Sincerely,

Laura Kinsman, M.E.Sc.
Senior Staff Engineer

Gavin Grant, Ph.D., P.Eng.
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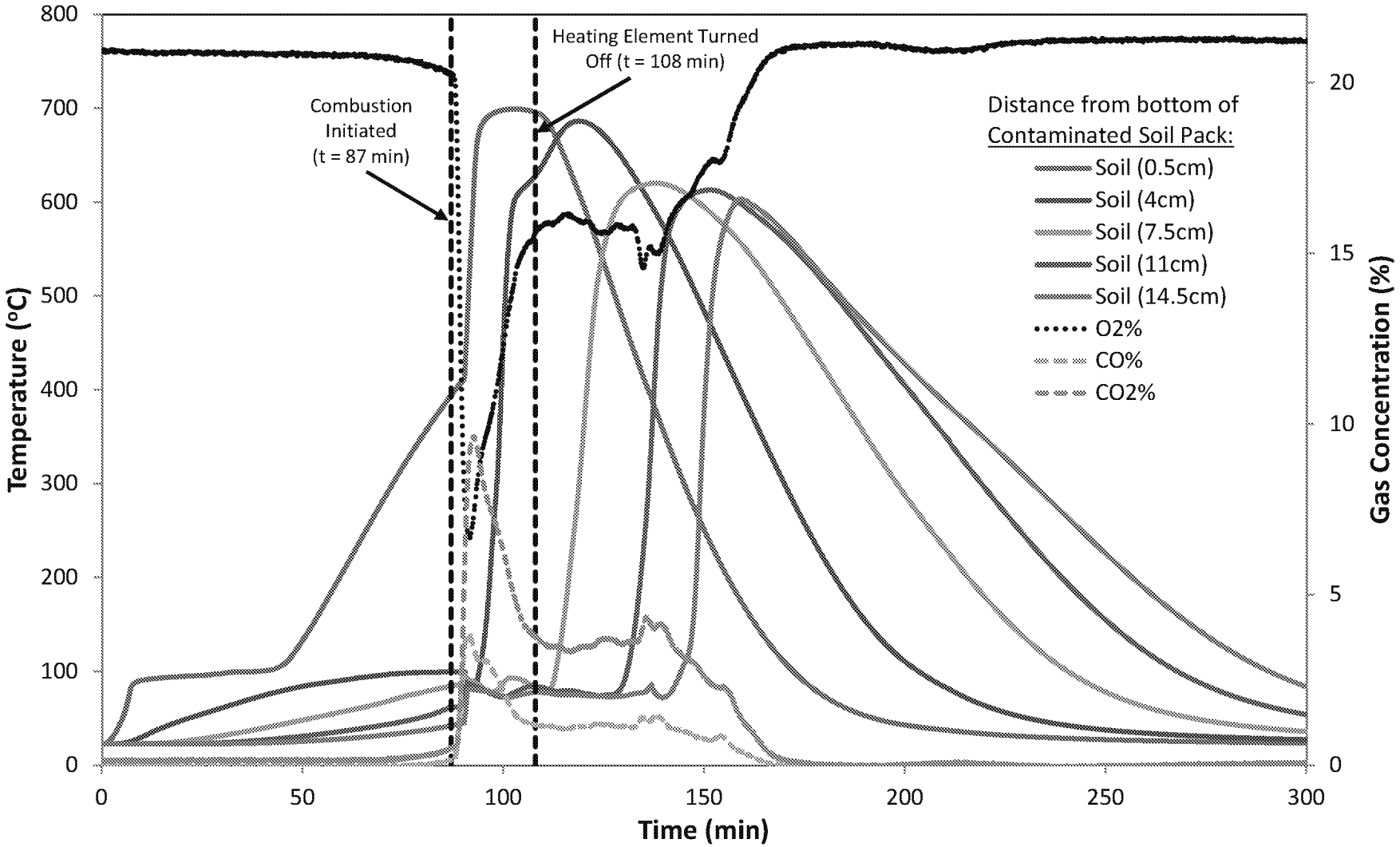
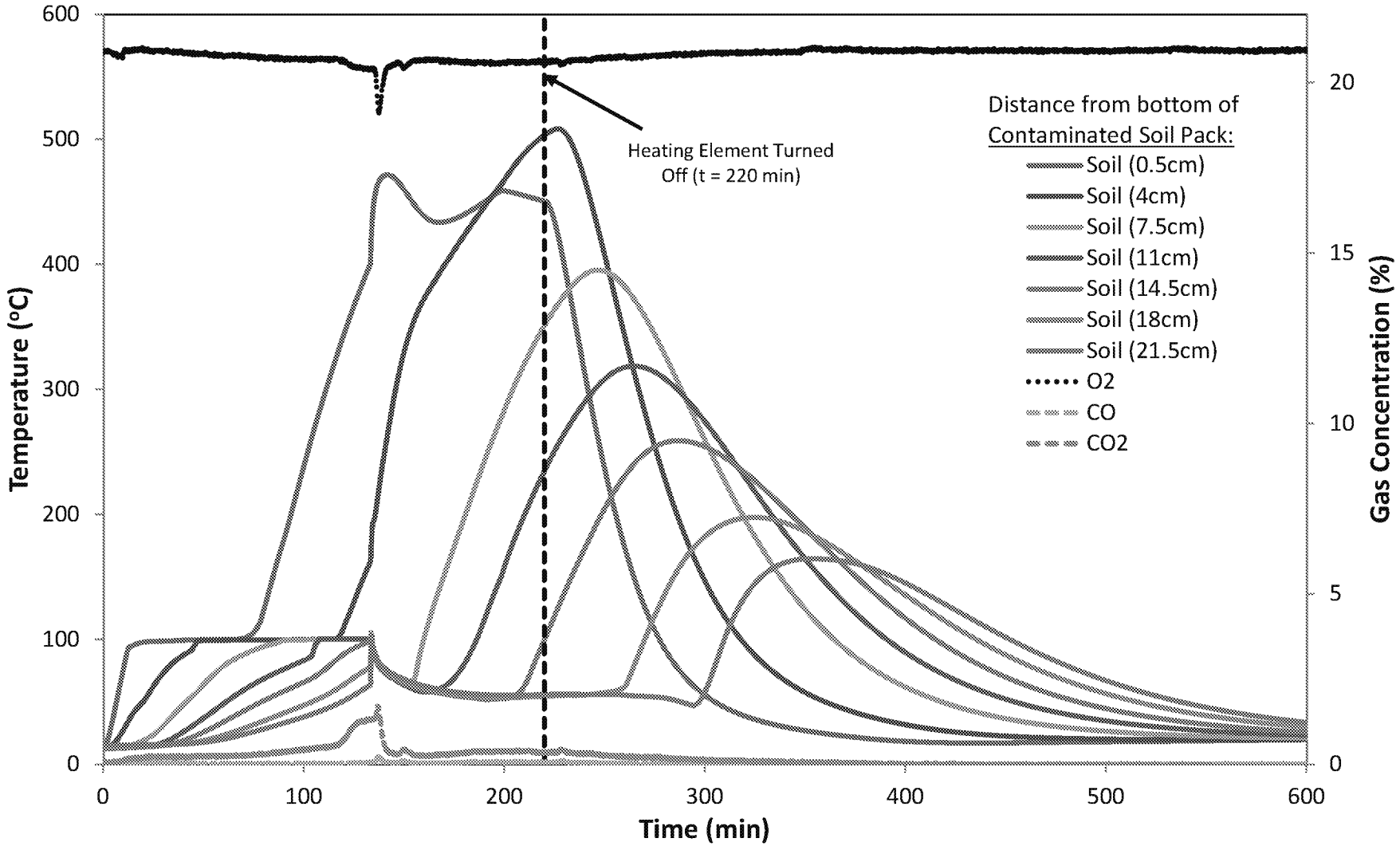



**Notes:**
1) Colored lines represent temperatures at various heights within the contaminated soil pack
2) Dashed lines represent combustion gas concentrations in the emissions ($O_2$, CO and $CO_2$)

| STAR Temperature Profiles (TP-1)<br>Port Quendall Terminals, Renton, WA<br>TS0034 | |
|---|---|
| savron | April 2018 |
| | Figure 1 |




**Notes:**
1) Colored lines represent temperatures at various heights within the contaminated soil pack
2) Dashed lines represent combustion gas concentrations in the emissions ($O_2$, CO and $CO_2$)

**STAR Temperature Profiles (TP-2)**
**Port Quendall Terminals, Renton, WA**
TS0034

savron

**April 2018**

Figure 2

**Table 1**
**Sample Summary**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Location ID | Sample ID | Sample Date | Analytical Method | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | NWTPH-Dx | NWTPH-Gx | SW8270D | SW8260C | TO15 | ASTM D5504 MODIFIED | E3C |
| TP-01 | 2018QT-SB-TP01_BASELINE_A | 19-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_BASELINE_B | 19-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_BASELINE_C | 19-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_POSTTREATMENT_A | 28-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_POSTTREATMENT_B | 28-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_POSTTREATMENT_C | 28-Mar-18 | X | X | X | | | | |
| TP-02 | 2018QT-SB-TP02_BASELINE_A | 19-Mar-18 | X | X | X | | | | |
| TP-02 | 2018QT-SB-TP02_BASELINE_B | 19-Mar-18 | X | X | X | | | | |
| TP-02 | 2018QT-SB-TP02_BASELINE_C | 19-Mar-18 | X | X | X | | | | |
| TP-01 | 2018QT-SB-TP01_CONDENSATE | 28-Mar-18 | | | | X | | | |
| TP-01 | 2018QT-SB-TP01_CONDENSATE_P | 28-Mar-18 | | | | X | | | |
| TP-01 | TP-1 EMISSIONS | 27-Mar-18 | | | | | X | X | X |

Note:
There are no post-treatment results for TP-02, as the baseline concentrations were too low to successfully smolder.



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**Table 2**
**Concentrations of Target Compounds in Soil**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Compound | Units | TP-1 'Before' STARx Treatment (Replicate 1) | | TP-1 'Before' STARx Treatment (Replicate 2) | | TP-1 'Before' STARx Treatment (Replicate 3) | |
|---|---|---|---|---|---|---|---|
| | | 2018QT-SB-TP01_BASELINE_A | | 2018QT-SB-TP01_BASELINE_B | | 2018QT-SB-TP01_BASELINE_C | |
| | | RDL | Concentration in Soil | RDL | Concentration in Soil | RDL | Concentration in Soil |
| **Petroleum Hydrocarbons (Method NWTPH-Dx/Gx)** | | | | | | | |
| TPH-Diesel | mg/kg | -- | 71,000 | -- | 68,000 | -- | 71,000 |
| Motor Oil | mg/kg | 6,400 | ND | 6,000 | ND | 6,200 | ND |
| TPH-Gasoline | mg/kg | -- | 24,000 | -- | 26,000 | -- | 26,000 |
| **Polycyclic Aromatic Hydrocarbons (Method SW8270D)** | | | | | | | |
| Anthracene | ug/kg | -- | 690,000 | -- | 650,000 | -- | 690,000 |
| Pyrene | ug/kg | -- | 1,700,000 | -- | 1,600,000 | -- | 1,700,000 |
| Benzo(g,h,i)perylene | ug/kg | -- | 110,000 | -- | 110,000 | -- | 120,000 |
| Indeno(1,2,3-Cd)Pyrene | ug/kg | -- | 96,000 | -- | 89,000 | -- | 98,000 |
| Benzo(b)fluoranthene | ug/kg | -- | 370,000 | -- | 330,000 | -- | 360,000 |
| Fluoranthene | ug/kg | -- | 2,000,000 | -- | 1,800,000 | -- | 2,000,000 |
| Benzo(k)fluoranthene | ug/kg | -- | 140,000 | -- | 130,000 | -- | 150,000 |
| Acenaphthylene | ug/kg | -- | 81,000 | -- | 76,000 | -- | 84,000 |
| Chrysene | ug/kg | -- | 430,000 | -- | 420,000 | -- | 420,000 |
| Benzo(a)pyrene | ug/kg | -- | 270,000 | -- | 250,000 | -- | 280,000 |
| Dibenzo(a,h)anthracene | ug/kg | -- | 35,000 | -- | 32,000 | -- | 35,000 |
| Benzo(a)anthracene | ug/kg | -- | 500,000 | -- | 480,000 | -- | 530,000 |
| Acenaphthene | ug/kg | -- | 1,700,000 | -- | 1,600,000 | -- | 1,700,000 |
| Phenanthrene | ug/kg | -- | 3,800,000 | -- | 3,600,000 | -- | 3,900,000 |
| Fluorene | ug/kg | -- | 1,200,000 | -- | 1,100,000 | -- | 1,200,000 |
| Naphthalene | ug/kg | -- | 6,200,000 | -- | 6,000,000 | -- | 6,500,000 |
| 2-Methylnaphthalene | ug/kg | -- | 2,300,000 | -- | 2,300,000 | -- | 2,500,000 |
| 2-Chloronaphthalene | ug/kg | 5,000 | ND | 4,600 | ND | 4,200 | ND |



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**Table 2**
**Concentrations of Target Compounds in Soil**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Compound | Units | TP-1 'After' STARx Treatment (Replicate 1) | | TP-1 'After' STARx Treatment (Replicate 2) | | TP-1 'After' STARx Treatment (Replicate 3) | |
|---|---|---|---|---|---|---|---|
| | | 2018QT-SB-TP01_POSTTREATMENT_A | | 2018QT-SB-TP01_POSTTREATMENT_B | | 2018QT-SB-TP01_POSTTREATMENT_C | |
| | | RDL | Concentration in Soil | RDL | Concentration in Soil | RDL | Concentration in Soil |
| **Petroleum Hydrocarbons (Method NWTPH-Dx/Gx)** | | | | | | | |
| TPH-Diesel | mg/kg | -- | **180** | -- | **140** | -- | **130** |
| Motor Oil | mg/kg | 98 | ND | 97 | ND | 98 | ND |
| TPH-Gasoline | mg/kg | -- | **9.9** | -- | **10** | -- | **11** |
| **Polycyclic Aromatic Hydrocarbons (Method SW8270D)** | | | | | | | |
| Anthracene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Pyrene | ug/kg | 49 | ND | 49 | ND | -- | **100** |
| Benzo(g,h,i)perylene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Indeno(1,2,3-Cd)Pyrene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Benzo(b)fluoranthene | ug/kg | 49 | ND | 49 | ND | -- | **48** |
| Fluoranthene | ug/kg | -- | **56** | -- | **78** | -- | **100** |
| Benzo(k)fluoranthene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Acenaphthylene | ug/kg | -- | **240** | -- | **220** | -- | **230** |
| Chrysene | ug/kg | 49 | ND | 49 | ND | -- | **280** |
| Benzo(a)pyrene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Dibenzo(a,h)anthracene | ug/kg | 49 | ND | 49 | ND | 48 | ND |
| Benzo(a)anthracene | ug/kg | 49 | ND | 49 | ND | -- | **290** |
| Acenaphthene | ug/kg | -- | **5,800** | -- | **4,600** | -- | **4,700** |
| Phenanthrene | ug/kg | -- | **150** | -- | **400** | -- | **200** |
| Fluorene | ug/kg | -- | **450** | -- | **520** | -- | **530** |
| Naphthalene | ug/kg | -- | **940** | -- | **890** | -- | **1,000** |
| 2-Methylnaphthalene | ug/kg | -- | **14,000** | -- | **13,000** | -- | **11,000** |
| 2-Chloronaphthalene | ug/kg | 49 | ND | 49 | ND | 48 | ND |



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**Table 2**
**Concentrations of Target Compounds in Soil**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Compound | Units | TP-2 'Before' STARx Treatment (Replicate 1) | | TP-2 'Before' STARx Treatment (Replicate 2) | | TP-2 'Before' STARx Treatment (Replicate 3) | |
|---|---|---|---|---|---|---|---|
| | | 2018QT-SB-TP02_BASELINE_A | | 2018QT-SB-TP02_BASELINE_B | | 2018QT-SB-TP02_BASELINE_C | |
| | | RDL | Concentration in Soil | RDL | Concentration in Soil | RDL | Concentration in Soil |
| **Petroleum Hydrocarbons (Method NWTPH-Dx/Gx)** | | | | | | | |
| TPH-Diesel | mg/kg | -- | 790 | -- | 890 | -- | 1,100 |
| Motor Oil | mg/kg | 110 | ND | 100 | ND | 110 | ND |
| TPH-Gasoline | mg/kg | -- | 270 | -- | 370 | -- | 280 |
| **Polycyclic Aromatic Hydrocarbons (Method SW8270D)** | | | | | | | |
| Anthracene | ug/kg | -- | 8,200 | -- | 10,000 | -- | 9,100 |
| Pyrene | ug/kg | -- | 9,400 | -- | 12,000 | -- | 10,000 |
| Benzo(g,h,i)perylene | ug/kg | -- | 910 | -- | 1,200 | -- | 1,100 |
| Indeno(1,2,3-Cd)Pyrene | ug/kg | -- | 740 | -- | 960 | -- | 890 |
| Benzo(b)fluoranthene | ug/kg | -- | 2,500 | -- | 3,100 | -- | 3,100 |
| Fluoranthene | ug/kg | -- | 10,000 | -- | 13,000 | -- | 11,000 |
| Benzo(k)fluoranthene | ug/kg | -- | 1,100 | -- | 1,300 | -- | 1,200 |
| Acenaphthylene | ug/kg | -- | 700 | -- | 890 | -- | 790 |
| Chrysene | ug/kg | -- | 3,500 | -- | 4,200 | -- | 3,900 |
| Benzo(a)pyrene | ug/kg | -- | 1,900 | -- | 2,400 | -- | 2,200 |
| Dibenzo(a,h)anthracene | ug/kg | -- | 320 | -- | 410 | -- | 390 |
| Benzo(a)anthracene | ug/kg | -- | 3,100 | -- | 3,900 | -- | 3,600 |
| Acenaphthene | ug/kg | -- | 15,000 | -- | 19,000 | -- | 16,000 |
| Phenanthrene | ug/kg | -- | 28,000 | -- | 35,000 | -- | 30,000 |
| Fluorene | ug/kg | -- | 14,000 | -- | 17,000 | -- | 15,000 |
| Naphthalene | ug/kg | -- | 55,000 | -- | 86,000 | -- | 66,000 |
| 2-Methylnaphthalene | ug/kg | -- | 38,000 | -- | 53,000 | -- | 44,000 |
| 2-Chloronaphthalene | ug/kg | 110 | ND | 100 | ND | 110 | ND |

Notes:
ND - non detect; the analyte was analyzed for, but was not detected above the reported detection limit.
mg/kg - milligrams per kilogram
ug/kg - micrograms per kilogram
RDL - Reported Detection Limit
-- - RDL only shown for non detect compounds

There are no post-treatment results for TP-02, as the baseline concentrations were too low to successfully smolder.



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**Table 3**
**Average Baseline and Post-Treatment Concentrations and Percent Reduction Estimates**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Compound | Units | TP-1 Average Baseline | TP-1 Average Post-Treatment | TP-1 Percent Reduction | TP-2 Average Baseline |
|---|---|---|---|---|---|
| | | Concentration in Soil | Concentration in Soil | | Concentration in Soil |
| **Petroleum Hydrocarbons (Method NWTPH-Dx/Gx)** | | | | | |
| TPH-Diesel | mg/kg | 70,000 | 150 | 99.79% | 930 |
| Motor Oil | mg/kg | < 6,200 | < 98 | 98.42% | < 110 |
| TPH-Gasoline | mg/kg | 25,000 | 10 | 99.96% | 310 |
| **Polycyclic Aromatic Hydrocarbons (Method SW8270D)** | | | | | |
| Anthracene | ug/kg | 680,000 | < 49 | 99.99% | 9,100 |
| Pyrene | ug/kg | 1,700,000 | < 66 | 100.00% | 10,000 |
| Benzo(g,h,i)perylene | ug/kg | 110,000 | < 49 | 99.96% | 1,100 |
| Indeno(1,2,3-Cd)Pyrene | ug/kg | 94,000 | < 49 | 99.95% | 860 |
| Benzo(b)fluoranthene | ug/kg | 350,000 | < 49 | 99.99% | 2,900 |
| Fluoranthene | ug/kg | 1,900,000 | 78 | 100.00% | 11,000 |
| Benzo(k)fluoranthene | ug/kg | 140,000 | < 49 | 99.97% | 1,200 |
| Acenaphthylene | ug/kg | 80,000 | 230 | 99.71% | 790 |
| Chrysene | ug/kg | 420,000 | < 130 | 99.97% | 3,900 |
| Benzo(a)pyrene | ug/kg | 270,000 | < 49 | 99.98% | 2,200 |
| Dibenzo(a,h)anthracene | ug/kg | 34,000 | < 49 | 99.86% | 370 |
| Benzo(a)anthracene | ug/kg | 500,000 | < 130 | 99.97% | 3,500 |
| Acenaphthene | ug/kg | 1,700,000 | 5,000 | 99.71% | 17,000 |
| Phenanthrene | ug/kg | 3,800,000 | 250 | 99.99% | 31,000 |
| Fluorene | ug/kg | 1,200,000 | 500 | 99.96% | 15,000 |
| Naphthalene | ug/kg | 6,200,000 | 940 | 99.98% | 69,000 |
| 2-Methylnaphthalene | ug/kg | 2,400,000 | 13,000 | 99.46% | 45,000 |
| 2-Chloronaphthalene | ug/kg | < 4,600 | < 49 | 98.93% | < 110 |

Notes:
mg/kg - milligrams per kilogram
ug/kg - micrograms per kilogram
< - reported detection limit was used for calculation of percent reduction of U-flagged (non detect) compounds
There are no post-treatment results for TP-02, as the baseline concentrations were too low to successfully smolder.



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**Table 4**
**Concentrations of Target Compounds in Vapor Emissions**
**Port Quendall Terminals STAR Bench Treatability Study**
TS0034

| Compound | Units | During STARx Treatment | |
|---|---|---|---|
| | | TP-1 Emissions | |
| | | RDL | Gas Sample |
| **Sulfur Compounds (Method ASTM D5504 - Modified)** | | | |
| n-Propyl Mercaptan | ug/m$^3$ | 20 | ND |
| n-Butyl Mercaptan | ug/m$^3$ | 24 | ND |
| Tetrahydrothiophene | ug/m$^3$ | 24 | ND |
| Thiophene | ug/m$^3$ | -- | **1,300** |
| Diethyl Disulfide | ug/m$^3$ | 16 | ND |
| Diethyl Sulfide | ug/m$^3$ | 24 | ND |
| Carbonyl Sulfide | ug/m$^3$ | -- | **15,000** |
| Isobutyl Mercaptan | ug/m$^3$ | 24 | ND |
| 3-Methylthiophene | ug/m$^3$ | -- | **4,200** |
| Ethyl Methyl Sulfide | ug/m$^3$ | -- | **30** |
| DIMETHYLDISULFIDE | ug/m$^3$ | -- | **320** |
| 2,5-Dimethylthiophene | ug/m$^3$ | -- | **3,100** |
| Methyl Mercaptan | ug/m$^3$ | 13 | ND |
| Ethyl Mercaptan | ug/m$^3$ | 17 | ND |
| Carbon Disulfide | ug/m$^3$ | -- | **1,110** |
| Dimethyl Sulfide | ug/m$^3$ | -- | **440** |
| Isopropyl Mercaptan | ug/m$^3$ | 20 | ND |
| tert-Butyl Mercaptan | ug/m$^3$ | 24 | ND |
| Hydrogen Sulfide | ug/m$^3$ | -- | **16** |
| 2-Ethylthiophene | ug/m$^3$ | -- | **6,100** |
| **Fixed Gases (Method E3C)** | | | |
| Carbon Dioxide | %v/v | -- | **5.47** |
| Hydrogen | %v/v | -- | **0.152** |
| Carbon Monoxide | %v/v | -- | **1.38** |
| Methane | %v/v | 0.13 | ND |
| Nitrogen, Organic (as N) | %v/v | -- | **78.3** |
| Oxygen | %v/v | -- | **14.7** |
| **Volatile Organic Compounds (Method TO15)** | | | |
| Ethylbenzene | ug/m$^3$ | -- | **160,000** |
| Styrene | ug/m$^3$ | 1,100 | ND |
| Benzyl chloride | ug/m$^3$ | 2,200 | ND |
| cis-1,3-Dichloropropene | ug/m$^3$ | 1,100 | ND |
| trans-1,3-Dichloropropene | ug/m$^3$ | 1,100 | ND |
| n-Propylbenzene | ug/m$^3$ | -- | **4,800** |
| 1,4-Dichlorobenzene | ug/m$^3$ | 1,100 | ND |
| 1,2-Dibromoethane | ug/m$^3$ | 1,100 | ND |
| 1,3-Butadiene | ug/m$^3$ | 1,100 | ND |
| Acrolein | ug/m$^3$ | -- | **6,500** |
| Allyl chloride | ug/m$^3$ | 1,100 | ND |
| 1,2-Dichloroethane | ug/m$^3$ | 1,100 | ND |
| Acrylonitrile | ug/m$^3$ | -- | **2,400** |
| Vinyl Acetate | ug/m$^3$ | 11,000 | ND |
| 4-Methyl-2-Pentanone | ug/m$^3$ | 1,100 | ND |
| m+p-Xylenes | ug/m$^3$ | -- | **240,000** |
| 1,3,5-Trimethylbenzene | ug/m$^3$ | -- | **17,000** |
| Toluene | ug/m$^3$ | -- | **200,000** |
| Chlorobenzene | ug/m$^3$ | 1,100 | ND |
| Tetrahydrofuran | ug/m$^3$ | 1,100 | ND |
| n-Hexane | ug/m$^3$ | 1,100 | ND |
| Cyclohexane | ug/m$^3$ | 2,200 | ND |
| OCTANE | ug/m$^3$ | 1,100 | ND |
| Nonane | ug/m$^3$ | -- | **1,500** |
| Propene | ug/m$^3$ | -- | **8,500** |
| 1,2,4-Trichlorobenzene | ug/m$^3$ | 1,100 | ND |
| N-BUTYL ACETATE | ug/m$^3$ | 1,100 | ND |



ED_004220_00020298-00077

| Table 4<br>Concentrations of Target Compounds in Vapor Emissions<br>Port Quendall Terminals STAR Bench Treatability Study<br>TS0034 | | | |
|---|---|---|---|
| Compound | Units | During STARx Treatment | |
| | | TP-1 Emissions | |
| | | RDL | Gas Sample |
| 1,4-Dioxane | ug/m$^3$ | 1,100 | ND |
| Chlorodibromomethane | ug/m$^3$ | 1,100 | ND |
| Tetrachloroethene | ug/m$^3$ | 1,100 | ND |
| Ethyl acetate | ug/m$^3$ | 2,200 | ND |
| N-HEPTANE | ug/m$^3$ | 1,100 | ND |
| cis-1,2-Dichloroethene | ug/m$^3$ | 1,100 | ND |
| trans-1,2-Dichloroethene | ug/m$^3$ | 1,100 | ND |
| Methyl tert-butyl ether (MTBE) | ug/m$^3$ | 1,100 | ND |
| 1,3-Dichlorobenzene | ug/m$^3$ | 1,100 | ND |
| Carbon tetrachloride | ug/m$^3$ | 1,100 | ND |
| 2-Hexanone | ug/m$^3$ | 1,100 | ND |
| D-Limonene | ug/m$^3$ | 1,100 | ND |
| 4-Ethyltoluene | ug/m$^3$ | -- | **23,000** |
| ETHANOL | ug/m$^3$ | 11,000 | ND |
| ISOPROPYL ALCOHOL (ISOPROPANOL) | ug/m$^3$ | 11,000 | ND |
| Acetone | ug/m$^3$ | -- | **15,000** |
| Chloroform | ug/m$^3$ | 1,100 | ND |
| Benzene | ug/m$^3$ | -- | **37,000** |
| 1,1,1-Trichloroethane | ug/m$^3$ | 1,100 | ND |
| Bromomethane | ug/m$^3$ | 1,100 | ND |
| Chloromethane | ug/m$^3$ | -- | **3,800** |
| Chloroethane | ug/m$^3$ | 1,100 | ND |
| Vinyl Chloride | ug/m$^3$ | 1,100 | ND |
| Acetonitrile | ug/m$^3$ | -- | **15,000** |
| Dichloromethane | ug/m$^3$ | 1,100 | ND |
| Carbon Disulfide | ug/m$^3$ | 11,000 | ND |
| Bromoform | ug/m$^3$ | 1,100 | ND |
| Bromodichloromethane | ug/m$^3$ | 1,100 | ND |
| 1,1-Dichloroethane | ug/m$^3$ | 1,100 | ND |
| 1,1-Dichloroethene | ug/m$^3$ | 1,100 | ND |
| Trichlorofluoromethane | ug/m$^3$ | 1,100 | ND |
| Dichlorodifluoromethane | ug/m$^3$ | 1,100 | ND |
| Freon 113 | ug/m$^3$ | 1,100 | ND |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ug/m$^3$ | 1,100 | ND |
| 1,2-Dichloropropane | ug/m$^3$ | 1,100 | ND |
| 2-Butanone | ug/m$^3$ | 11,000 | ND |
| 1,1,2-Trichloroethane | ug/m$^3$ | 1,100 | ND |
| Trichloroethylene | ug/m$^3$ | 1,100 | ND |
| 1,1,2,2-Tetrachloroethane | ug/m$^3$ | 1,100 | ND |
| alpha-Pinene | ug/m$^3$ | 1,100 | ND |
| Methyl methacrylate | ug/m$^3$ | 2,200 | ND |
| Hexachlorobutadiene | ug/m$^3$ | 1,100 | ND |
| Naphthalene | ug/m$^3$ | 1,100 | ND |
| Xylene, o | ug/m$^3$ | -- | **100,000** |
| 1,2-Dichlorobenzene | ug/m$^3$ | 1,100 | ND |
| 1,2,4-Trimethylbenzene | ug/m$^3$ | -- | **36,000** |
| 1,2-Dibromo-3-chloropropane | ug/m$^3$ | 1,100 | ND |
| Isopropylbenzene | ug/m$^3$ | -- | **12,000** |

Notes:
ND - non detect; the analyte was analyzed for, but was not detected above the reported detection limit.
ug/m$^3$ - micrograms per cubic meter
%v/v - percent volume concentration
RDL - Reported Detection Limit
-- - RDL only shown for non detect compounds

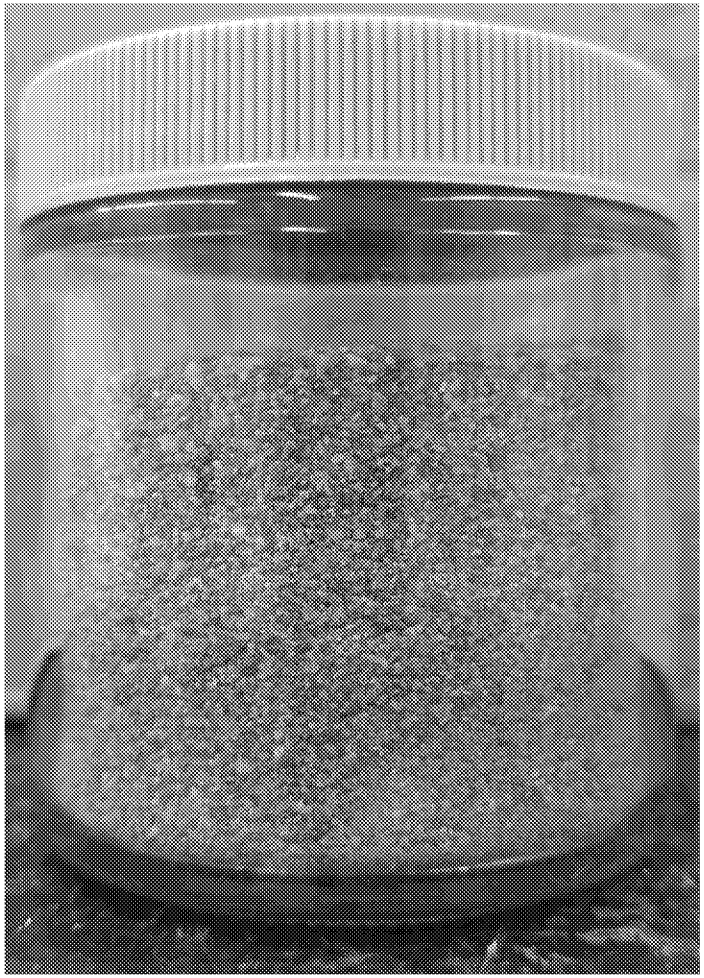
Table 5
Concentrations of Volatile Organic Compounds in Emitted Condensate
Port Quendall Terminals STAR Bench Treatability Study
TS0034

| Compound | Units | Condensate | | | |
|---|---|---|---|---|---|
| | | 2018QT-SB-TP01_CONDENSATE | | 2018QT-SB-TP01_CONDENSATE_P | |
| | | RDL | Water Phase | RDL | Product Phase |
| **Volatile Organic Compounds (Method SW8260C)** | | | | | |
| Ethylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Styrene | ug/L | 2,000 | ND | 3,200,000 | ND |
| cis-1,3-Dichloropropene | ug/L | 2,000 | ND | 3,200,000 | ND |
| trans-1,3-Dichloropropene | ug/L | 2,000 | ND | 3,200,000 | ND |
| n-Propylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| n-Butylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,4-Dichlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2-Dibromoethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2-Dichloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Acrylonitrile | ug/L | 2,000 | ND | 3,200,000 | ND |
| 4-Methyl-2-Pentanone | ug/L | 2,000 | ND | 3,200,000 | ND |
| m+p-Xylenes | ug/L | 4,000 | ND | 6,400,000 | ND |
| 1,3,5-Trimethylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| METHYLCYCLOHEXANE | ug/L | 2,000 | ND | 3,200,000 | ND |
| Toluene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Chlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Cyclohexane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2,4-Trichlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Chlorodibromomethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Tetrachloroethene | ug/L | 2,000 | ND | 3,200,000 | ND |
| sec-Butylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| cis-1,2-Dichloroethene | ug/L | 2,000 | ND | 3,200,000 | ND |
| trans-1,2-Dichloroethene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Methyl tert-butyl ether (MTBE) | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,3-Dichlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Carbon tetrachloride | ug/L | 2,000 | ND | 3,200,000 | ND |
| 2-Hexanone | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1,1,2-Tetrachloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Acetone | ug/L | 2,000 | ND, J | 3,200,000 | ND, J |
| Chloroform | ug/L | 2,000 | ND | 3,200,000 | ND |
| Benzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1,1-Trichloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Bromomethane | ug/L | 2,000 | ND, J | 3,200,000 | ND, J |
| Chloromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Dibromomethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Bromochloromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Chloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Vinyl Chloride | ug/L | 2,000 | ND | 3,200,000 | ND |
| Dichloromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Carbon Disulfide | ug/L | 2,000 | ND | 3,200,000 | ND |
| Bromoform | ug/L | 2,000 | ND | 3,200,000 | ND |
| Bromodichloromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1-Dichloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1-Dichloroethene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Trichlorofluoromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Dichlorodifluoromethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Freon 113 | ug/L | 2,000 | ND, J | 3,200,000 | ND, J |
| 1,2-Dichloropropane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 2-Butanone | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1,2-Trichloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| Trichloroethylene | ug/L | 2,000 | ND | 3,200,000 | ND |
| METHYL ACETATE | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2,3-Trichlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Hexachlorobutadiene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Naphthalene | ug/L | -- | **120,000** | 3,200,000 | **71,000,000** |
| Xylene, o | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2-Dichlorobenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2,4-Trimethylbenzene | ug/L | 1,300 | **1,300 J** | 3,200,000 | ND |
| 1,2-Dibromo-3-chloropropane | ug/L | 2,000 | ND | 3,200,000 | ND |
| 1,2,3-Trichloropropane | ug/L | 2,000 | ND | 3,200,000 | ND |
| tert-Butylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| Isopropylbenzene | ug/L | 2,000 | ND | 3,200,000 | ND |
| p-Isopropyltoluene | ug/L | 2,000 | ND | 3,200,000 | ND |

Notes:
ND - non detect; the analyte was analyzed for, but was not detected above the reported detection limit.
ug/L - micrograms per liter
RDL - Reported Detection Limit
J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
-- - RDL only shown for non detect compounds

a)

b)



**Notes:**

a) Soil before STAR treatment
b) Soil after STAR treatment

| | |
|---|---|
| **Untreated and Post-STAR Treated Soils (TP-1)**<br>**Port Quendall Terminals, Renton, WA**<br>TS0034 | |
| savron | **April 2018** |
| | Plate 1 |

a)

**Notes:**

a) Soil before STAR treatment

No treatment of TP-2 soils.

| | |
|---|---|
| **Untreated Soils (TP-2)**<br>**Port Quendall Terminals, Renton, WA**<br>TS0034 | |
| savron | **April 2018** |
| | Plate 2 |

a)

b)

**Notes:**

a) Oven dried (100°C) TP-1 soil sample
b) Oven dried (100°C) TP-2 soil sample

| | |
|---|---|
| **Oven-Dried Untreated Soils (TP-1 and TP-2)**<br>**Port Quendall Terminals, Renton, WA**<br>TS0034 | |
| savron | **April 2018** |
| | Plate 3 |

# Attachment 2
# Baseline Sample Shipping Documents

FedEx Express — International Air Waybill
For FedEx services worldwide.

Sender's Copy

**1 From** *Please print and press hard.*

Date 03/20/18 Sender's FedEx Account Number [redacted]

Sender's Name Joshua Brown Phone (519)661-2111x88258

Company The University of Western Ontario

Address 1151 Richmond St. N.

Address Dock 59 - Thompson Engineering Building

City London State/Province Ontario

Country Canada ZIP/Postal Code N6A 3K7

**2 To**

Recipient's Name Sample Receiving/Karen Norton Phone (360)871-8760

Company EPA Region 10 Lab (MEL)

Address 7411 Beach Drive East (Dept./Floor)

Address

City Port Orchard State/Province WA

Country United States of America ZIP/Postal Code 98366

Recipient's Tax ID Number for Customs Purposes (e.g., EIN/SSN/VAT/GST/RFC/IVA/IDN, or as locally required)

**3 Shipment Information** ☐ For EU Duty: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count): 1 Total Weight: 22.5 lbs ☒ kg Date / / in. cm

| Commodity Description | Harmonized Code | Country of Manufacture | Value for Customs |
|---|---|---|---|
| Soil Samples for laboratory analysis | | | 100 |

Has EEI been filed to AES? (For U.S. Export Only: Check one) ☒ No EEI required, enter $2,500 or less per Sch. B Number, no license required (NLR), or valuation (VAL) — Total Declared Value for Carriage

☐ No EEI required, enter exemption number: — If value less than $2,500, enter license/exemption:

☐ Yes – Enter AES proof of filing citation:

Total Value for Customs (Specify Currency): 100

**4 Express Package Service** *Packages up to 150 lbs. / 68 kg*

☒ FedEx Intl. Priority ☐ FedEx Intl. First (Available to select locations.)

☐ ☐ FedEx Intl. Economy (FedEx Envelope and FedEx Pak rate not available.)

Not all services and options are available to all destinations. Dangerous goods cannot be shipped using this Air Waybill.

**5 Packaging** *Those charges known boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube

☒ Other Cooler ☐ FedEx 10kg Box* ☐ FedEx 25kg Box*

**6 Special Handling**

☐ HOLD at FedEx Location ☐ SATURDAY Delivery (Available in select locations for FedEx Intl. Priority only.)

**7 Payment** Complete payment options for both transportation charges and duties and taxes.

*Bill transportation charges to:* (Enter FedEx Acct. No. or Credit Card No. below.)

☐ Sender (Acct. No. in Section 1 will be billed) ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash/Check/Cheque (FedEx Use Only)

FedEx Acct. No. 099113142 (Ref # 652253.TT.01)

Credit Card No.

Credit Card Exp. Date

*Bill duties and taxes to:* (Enter FedEx Acct. No. below.) All shipments may be subject to Customs charges, which FedEx does not estimate prior to shipment.

☐ Sender (Acct. No. in Section 1 will be billed) ☐ Recipient ☒ Third Party

FedEx Acct. No. 099113142 (Ref # 652253.TT.01)

**8 Your Internal Billing Reference** First 24 characters will appear on invoice.

OPTIONAL

**9 Required Signature**

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain dangerous goods. Certain international treaties, including the Warsaw Convention, may apply to the shipment and limit our liability for damage, loss, or delay as described in the Conditions of Contract. **WARNING:** These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature:

This is not a notification to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

568

FedEx Tracking Number 8083 3446 4295 Form ID No. 0402

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Out 10

USDA United States Department of Agriculture

APHIS Animal and Plant Health Inspection Service

Plant Protection & Quarantine

4700 River Road
Riverdale, Maryland
20737-1236

March 16, 2018

Re: P525-180312-001

Gerald Dodo

7411 Beach Drive East

Port Orchard, Washington 98366

Dear Gerald Dodo:

Your application to move soil or soil-like materials from a non-regulated area in Canada (and/or soils originating domestically from the continental United States outside of a quarantined area) for non-biological analysis does not require a permit. The Code of Federal Regulations (CFR), Title 7 Section 330.300a, exempts the requirements of a permit if the soil comes from such areas of Canada. However, all soil from Canada is subject to inspection at the port of U.S entry. In accordance with the Plant Protection Act, the inspector may refused entry if the inspection finds plant pests that are actionable to the United States.

Please keep in mind that you are also responsible for ensuring compliance with any applicable regulations of other State and Federal agencies (e.g., State Departments of Agriculture, U.S. Fish and Wildlife Service, etc.).

Thank you for your cooperation. If you have any questions regarding APHIS-PPQ permits, please contact the PPQ Permit Unit at 1-866-524-5421.

Sincerely,

Gibbs Smith

[State Plant Health Director]

APHIS Plant Health Programs

Plant Protection and Quarantine

**Certifying Origin of Environmental Samples for Destructive Analysis**

DESCRIPTION OF CONTENTS:

Environmental samples were collected from the Quendall Terminals Superfund Site (QTSS) in Renton, Washington USA and were shipped to the University of Western Ontario (UWO), London, Ontario, Canada for a laboratory treatability study. The enclosed environmental samples are being transferred from the UWO laboratory to the Manchester Environmental Laboratory in Port Orchard, Washington, for destructive analysis in accordance with a treatability study plan developed by the United States Environmental Protection Agency. Attached is a copy of the Airway bill and sample chain-of-custody form from the original shipment from QTSS to UWO.

CERTIFICATION:

I certify that the information on this document is true and accurate and I assume the responsibility for proving such representations. I understand that I am liable for any false statements or material omissions made on or in connection with this document.

I agree to maintain, and present upon request, documentation necessary to support this certification, and to inform, in writing, all persons to whom the certificate was given of any changes that could affect the accuracy or validity of this certificate.

I further certify that these samples for destructive analysis originated in the United States.

Signature: _____ Organization: The University of Western Ontario

(printed): Joshua Brown Title: Research Engineer

Date: Mar. 20, 2018 Telephone Number: (519) 661-2111 x 88258

EPA R10 Lab (MEL) (REGION COPY)
DateShipped: Mar 20, 2018
CarrierName: FedEx
AirbillNo: 9083 3146 4295

# CHAIN OF CUSTODY RECORD

Quendall Terminals SF Site STAR Bench Scale TS/WA
Project Code: SFP-127A
Cooler #: 2

No: 10-031218-084139-0002
Account Number 2018T10P000DD21044LA00
Contact Name: Susan Moore
Contact Phone: 206-779-4176

| Sample Identifier | CLP Sample No. | Matrix/Sampler | Coll. Method | Analysis/Turnaround (Days) | Tag/Preservative/Bottles | Location | Collection Date/Time | Sample Type |
|---|---|---|---|---|---|---|---|---|
| 18114200 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | Mar 19 | PreTreatment Sample |
| 18114201 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | Mar 19 | PreTreatment Duplicate |
| 18114202 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | Mar 19 | PreTreatment Triplicate |
| 18114204 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | Mar 19 | PreTreatment Duplicate |
| 18114205 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | Mar 19 | PreTreatment Triplicate |
| 18114203 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | Mar 19 | PreTreatment Sample |
| 18114200-18114205 QC | | Subsurface Soil/ Savron | Grab | " | " | " | Mar 19 | QC Sample |

Special Instructions: Pre-Treatment Samples

Shipment for Case Complete? N
Samples Transferred From Chain of Custody #

Analysis Key: TPH-Gx=TPH-Gx, PAHs=PAHs

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 1 | [signature] UWO | Mar 20/11:00 | | | |
| | | | | | |
| | | | | | |
| | | | | | |

COPY OF INCOMING WAYBILL

FedEx Express — International Air Waybill

For FedEx services worldwide. Packages up to 150 lbs., 330 kg, are subject to dangerous goods. Not all services and options are available to all destinations.

1 From Please print and press hard.
Date 3/2/18 Sender's FedEx Account Number 0981123142
Sender's Name Joe Hauser Phone
Company CH2M/Jacobs
Address 11000 112th Ave NE Ste 500
Address
City Bellevue, State/Province WA
Country USA ZIP/Postal Code 98004
Email Address
Internal Billing Reference 682283.TT.01

2 To Joshua Brown
Recipient's Name Sample Custodian Phone 519-661-2111 ex. 88138
Company The University of Western Ontario
Address 1151 Richmond St N
Address Dock 51 - Faculty of Engineering
City London State/Province Ontario
Country Canada ZIP/Postal Code N6A3K7
Email Address
Recipient's Tax ID Number for Customs Purposes

Residential Delivery

3 Shipment Information
Total Packages 3 Total Weight lbs. kg DIM / / in. cm
Description of Goods (optional) Soil Samples (for Research - not for human consumption)
Declared Value for Customs 100
Total Value for Customs (Check Currency) 100

The service order has changed in Section 4. Signature options have been added in Section 6.

For Completion Instructions, and details on services and options, see back of fifth page.

FedEx Tracking Number 8103 5139 1060 Form ID No. 0402

4 Express Package Service
NOTE: Service order has changed. Please select carefully.
☐ FedEx Intl. First ☒ FedEx Intl. Priority ☐ FedEx Intl. Economy

5 Packaging
☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube
☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling and Delivery Signature Options
☐ HOLD at FedEx Location ☐ SATURDAY Delivery
☐ Direct Signature ☐ Indirect Signature

7 Payment
Bill transportation charges to: ☒ Sender ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check/Charge
FedEx Acct No.
Bill duties and taxes to: ☒ Sender ☐ Recipient ☐ Third Party

8 Required Signature
Sender's Signature: Joe Hauser

662

For questions or to ship and track packages, go to fedex.com.
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For a full version of the Conditions of Contract, go to fedex.com.

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06/15 RRD4

ED_004220_00020298-00092

COPY OF INCOMING COC



Savron
DateShipped: 3/12/2018
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD
Site #: LA00
Project Code:
Cooler #: 1

No: 10-030718-140532-0001
Account Number FILL IN
Contact Name: Joe Hauser
Contact Phone: 404-681-4395

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| | Joe Hauser CH2M | 11:30 3-12-17 | | | |
| | | | | | |
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| | | | | | |
| | | | | | |

Savron

DateShipped: 3/12/2018

CarrierName:

AirbillNo:

CHAIN OF CUSTODY RECORD

Site #: LA00

Project Code:

Cooler #: 1

No: 10-030718-140532-0001

Account Number FILL IN

Contact Name: Joe Hauser

Contact Phone: 404-661-4395

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 6 samples | [signature] CH2M | 3/12/18 1100 | [signature] UWO | 18/03/18 10:20 | |
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| | | | | | |
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| | | | | | |

**Savron**
DateShipped: 3/12/2018
CarrierName:
AirbillNo:

**CHAIN OF CUSTODY RECORD**
Site #: LA00
Project Code:
Cooler #: 1

**No: 10-030718-140532-0001**
Account Number FILL IN
Contact Name: Joe Hauser
Contact Phone: 404-661-4395

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

**SAMPLES TRANSFERRED FROM**
**CHAIN OF CUSTODY #**

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 6 samples | [signature] CH2M | 3/12/18 1100 | [signature] UWO | 10:30 16/03/18 | |

Savron
DateShipped: 3/12/2018
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD
Site #: LA00
Project Code:
Cooler #: 1

No: 10-030718-140532-0001
Account Number FILL IN
Contact Name: Joe Hauser
Contact Phone: 404-661-4395

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 6 samples | [signature] CH2M | 3/12/18 1100 | [signature] UWO | 10:30 16/03/18 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# Attachment 3
# Post-Treatment Shipping Documents

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection & Quarantine
4700 River Road
Riverdale, Maryland
20737-1236

March 16, 2018

Re: P525-180312-001

Gerald Dodo

7411 Beach Drive East

Port Orchard, Washington 98366

Dear Gerald Dodo:

Your application to move soil or soil-like materials from a non-regulated area in Canada (and/or soils originating domestically from the continental United States outside of a quarantined area) for non-biological analysis does not require a permit. The Code of Federal Regulations (CFR), Title 7 Section 330.300a, exempts the requirements of a permit if the soil comes from such areas of Canada. However, all soil from Canada is subject to inspection at the port of U.S entry. In accordance with the Plant Protection Act, the inspector may refused entry if the inspection finds plant pests that are actionable to the United States.

Please keep in mind that you are also responsible for ensuring compliance with any applicable regulations of other State and Federal agencies (e.g., State Departments of Agriculture, U.S. Fish and Wildlife Service, etc.).

Thank you for your cooperation. If you have any questions regarding APHIS-PPQ permits, please contact the PPQ Permit Unit at 1-866-524-5421.

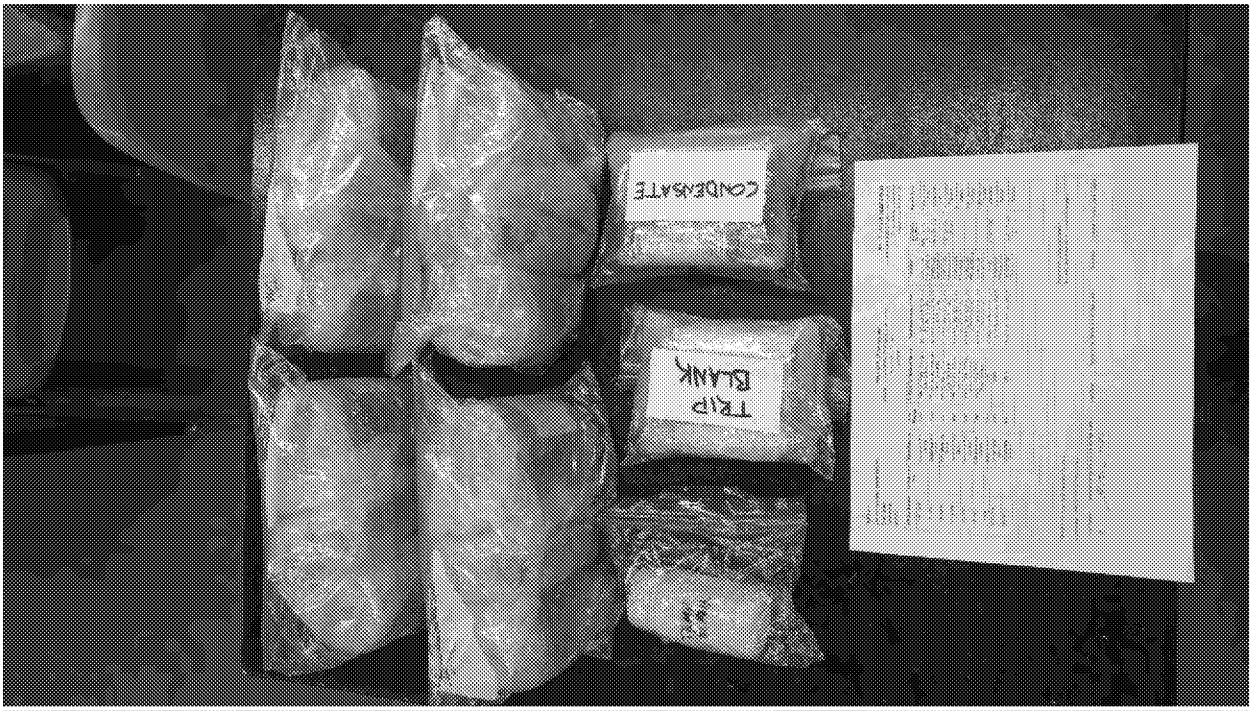
Sincerely,

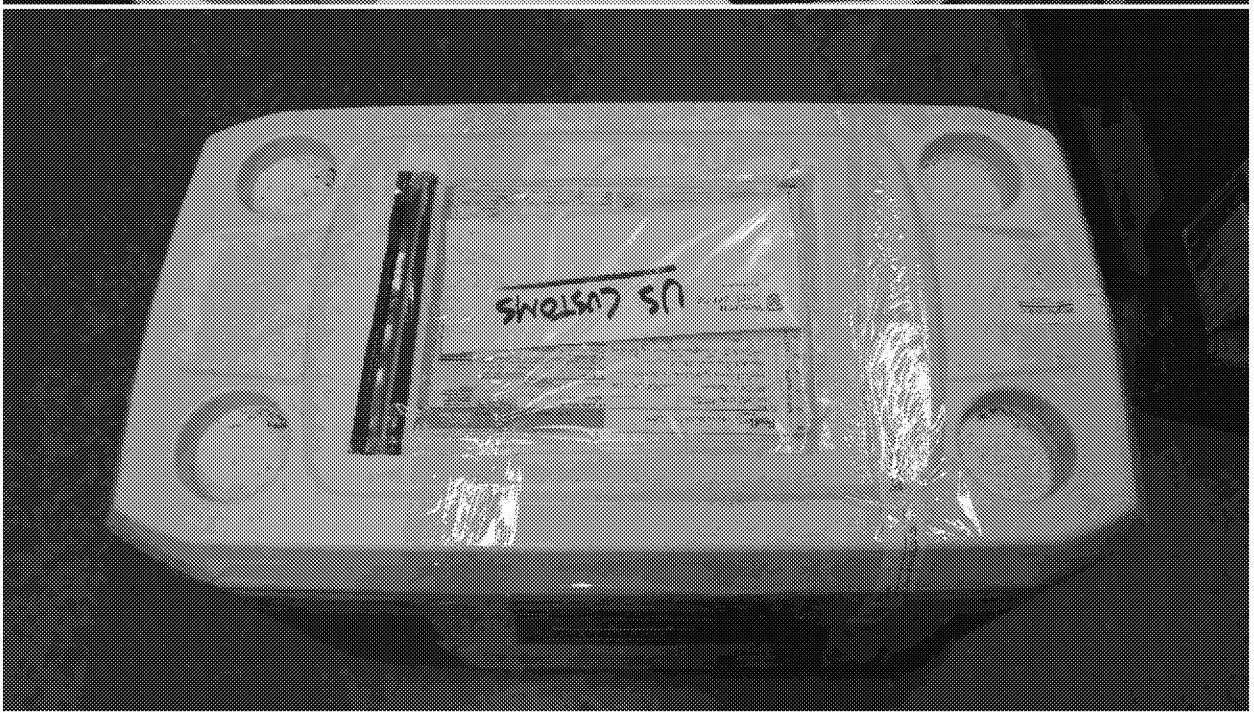
Gibbs Smith

[State Plant Health Director]

APHIS Plant Health Programs

Plant Protection and Quarantine


CONDEMNATE
TRIP
BLANK


US CUSTOMS

# CUSTOMS INVOICE DECLARATION

**EXPORTER**

108162587RM0001
University of Western Ontario
Department of Engineering
SEB Rm 19A
1151 Richmond Street N.
London Ontario N6A 3K7 Canada
Contact: Joshua Brown
Email: jbrow227@uwo.ca
Tel: 519-661-2111x88288
Fax:

Western

**Western University - Canada**
**Procurement Services**
**Customs and Logistics**

**CONSIGNEE**

EIN/VAT:
EPA Region 10 Lab (MEL)
7411 Beach Drive East
Port Orchard WA 98366
Attn: Sample Receiving/Karen Norton
Email:
Tel: 360-871-8760

| | |
|---|---|
| DUTY AND TAX FOR ACCOUNT OF: | Shipper |
| SHIPPER'S REFERENCE NO. | NFGM621930 |
| PARTIES TO THIS TRANSACTION ARE: | Not Related |
| POINT OF LADING: | London Ontario Canada |
| CONSIGNEE REF. NO. | |
| Reason for Shipment - Specify | |
| EXPORTING CARRIER: | FedEx |
| TRACKING NO. | 808334464295 |

| MARKS AND NUMBERS | NUMBER AND KIND OF PACKAGES | | SHIPPING WEIGHT | CURRENCY |
|---|---|---|---|---|
| Addressed | 1 | Specify | 19.7 kg | CAD |

| DESCRIPTION OF GOODS | COO | QTY | UM | UNIT VALUE | TOTAL VALUE |
|---|---|---|---|---|---|
| Soil Samples for Lab Analysis<br><br>Samples for further analysis.<br>Not Sold.<br>USDA Ref # P525-180312-001 | USA | 1 | Cooler | $1.00 | $1.00 |

| | |
|---|---|
| PACKING | |
| FREIGHT | |
| INSURANCE | |
| INVOICE TOTAL | $1.00 |

Ray Williamson, Manager, Customs and Logistics
University of Western Ontario, Financial Services
6100 - 1393 Western Road, London Ontario N6G 1G9
Phone: 519-661-2111 ext 88120 Fax: 519-661-3071

Date: 2018/04/02

FedEx Express **International Air Waybill**
For FedEx services worldwide.

**Sender's Copy**

**1 From** *Please print and press hard.*

Date 04/02/18 Sender's FedEx Account Number SENDER'S FEDEX ACCOUNT NUMBER ONLY

Sender's Name Joshua Brown Phone (519) 661-2111 x 88288

Company The University of Western Ontario

Address 1151 Richmond St. N.

Address Dock 59 - Thompson Engineering Building

City London State Province Ontario

Country Canada ZIP Postal Code N6A 3K7

**2 To**

Recipient's Name Sample Reception/Karen Norton Phone (360) 871-8760

Company EPA Region 10 Lab (MEL)

Address 7411 Beach Drive East Dept./Floor

Address

City Port Orchard State Province WA

Country United States of America ZIP Postal Code 98366

Recipient's Tax ID Number for Customs Purposes: e.g., GST/RFC/VAT/IVA/EIN/ABN, or as locally required.

**3 Shipment Information** ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipped Load and Count/SLAC) 1 Total Weight 19.7 lbs. ☐ kg. ☒ DIM / / / in. ☐ cm ☐

| Commodity Description | Harmonized Code | Country of Manufacture | Value for Customs |
|---|---|---|---|
| Soil Samples for laboratory analysis | | | 1.00 |

Has EEI been filed in AES? For U.S. Export Only. Check One: ☒ No EEI required, value $2,500 or less per Sch. B Number, no license required (NEC), not subject to ISAR. Total Declared Value for Carriage

☐ No EEI required, enter exemption number: If other than NLR, enter License Exception:

☐ Yes – Enter AES proof of filing citation:

Total Value for Customs (Specify Currency) 1.00

**4 Express Package Service** *Packages up to 150 lbs. / 68 kg* For packages over 150 lbs. (68 kg), see the FedEx Expanded Service Int. Air Waybill.

☒ FedEx Intl. Priority ☐ FedEx Intl. First Available to select locations.

☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available.

**Not all services and options are available to all destinations. Dangerous goods cannot be shipped using this Air Waybill.**

**5 Packaging** *These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube

☒ Other Cooler ☐ FedEx 10kg Box* ☐ FedEx 25kg Box*

**6 Special Handling**

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations for FedEx Intl. Priority only.

**7 Payment** Complete payment options for both transportation charges and duties and taxes.

*Bill transportation charges to:* Enter FedEx Acct. No. or Credit Card No. below.

☐ Sender Acct. No. in Section 1 will be billed ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque FedEx Use Only

FedEx Acct. No. 098413142 (Ref# 682283.TT.01)

Credit Card No.

Credit Card Exp. Date

*Bill duties and taxes to:* ALL shipments may be subject to Customs charges, which FedEx does not estimate prior to clearance. Enter FedEx Acct. No. below.

☐ Sender Acct. No. in Section 1 will be billed ☐ Recipient ☒ Third Party

FedEx Acct. No. 098113142 (Ref# 682283.TT.01)

**8 Your Internal Billing Reference** First 30 characters will appear on invoice.

OPTIONAL

**9 Required Signature**

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain dangerous goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: [signature]

This is not a commitment to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

568

FAST 1884/04 Rev. Date 11/03 ©1994-2008 FedEx PRINTED IN U.S.A. RRDA

FedEx Tracking Number 8083 3446 4310 Form ID No. 0402

Ship and track packages at fedex.com

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Or in the U.S., call 1.800.GoFedEx 1.800.463.3339. Outside the U.S., call your local FedEx office.

PACKAGE LABEL 8083344643 10
COMMERCIAL INVOICE LABEL 8083344643 10
DELIVERY RECORD LABEL 8083344643 10
DELIVERY REATTEMPT LABEL 8083344643 10

RETAIN THIS COPY FOR YOUR RECORDS.

04/15

USDA United States Department of Agriculture

APHIS Animal and Plant Health Inspection Service

Plant Protection & Quarantine

4700 River Road
Riverdale, Maryland
20737-1236

March 16, 2018

Re: P525-180312-001

Gerald Dodo

7411 Beach Drive East

Port Orchard, Washington 98366

Dear Gerald Dodo:

Your application to move soil or soil-like materials from a non-regulated area in Canada (and/or soils originating domestically from the continental United States outside of a quarantined area) for non-biological analysis does not require a permit. The Code of Federal Regulations (CFR), Title 7 Section 330.300a, exempts the requirements of a permit if the soil comes from such areas of Canada. However, all soil from Canada is subject to inspection at the port of U.S entry. In accordance with the Plant Protection Act, the inspector may refused entry if the inspection finds plant pests that are actionable to the United States.

Please keep in mind that you are also responsible for ensuring compliance with any applicable regulations of other State and Federal agencies (e.g., State Departments of Agriculture, U.S. Fish and Wildlife Service, etc.).

Thank you for your cooperation. If you have any questions regarding APHIS-PPQ permits, please contact the PPQ Permit Unit at 1-866-524-5421.

Sincerely,

Gibbs Smith

[State Plant Health Director]

APHIS Plant Health Programs

Plant Protection and Quarantine

## Certifying Origin of Environmental Samples for Destructive Analysis

DESCRIPTION OF CONTENTS:

Environmental samples were collected from the Quendall Terminals Superfund Site (QTSS) in Renton, Washington USA and were shipped to the University of Western Ontario (UWO), London, Ontario, Canada for a laboratory treatability study. The enclosed environmental samples are being transferred from the UWO laboratory to the Manchester Environmental Laboratory in Port Orchard, Washington, for destructive analysis in accordance with a treatability study plan developed by the United States Environmental Protection Agency. Attached is a copy of the Airway bill and sample chain-of-custody form from the original shipment from QTSS to UWO.

CERTIFICATION:

I certify that the information on this document is true and accurate and I assume the responsibility for proving such representations. I understand that I am liable for any false statements or material omissions made on or in connection with this document.

I agree to maintain, and present upon request, documentation necessary to support this certification, and to inform, in writing, all persons to whom the certificate was given of any changes that could affect the accuracy or validity of this certificate.

I further certify that these samples for destructive analysis originated in the United States.

Signature: _____ Organization: UWO

(printed): Joshua Brown Title: Research Engineer

Date: Mar. 20, 2018 Telephone Number: (519) 661-2111 x88288

EPA R10 Lab (MEL) (REGION COPY)
DateShipped:
CarrierName:
AirbillNo:

**CHAIN OF CUSTODY RECORD**
Quendall Terminals SF Site STAR Bench Scale TS/WA
Project Code: SFP-127A
Cooler #: 3

**No: 10-031218-092212-0003**
Account Number 2018T10P000DD21044LA00
Contact Name: Susan Moore
Contact Phone: 206-779-4176

| Sample Identifier | CLP Sample No. | Matrix/Sampler | Coll. Method | Analysis/Turnaround (Days) | Tag/Preservative/Bottles | Location | Collection Date/Time | Sample Type |
|---|---|---|---|---|---|---|---|---|
| 18114206 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | MAR 28/18 12:00 | PostTreatment Sample |
| 18114207 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | MAR 28/18 12:00 | PostTreatment Duplicate |
| 18114208 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP01-03072018 | MAR 28/18 12:00 | PostTreatment Triplicate |
| 18114209 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | | PostTreatment Sample |
| 18114210 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | | PostTreatment Duplicate |
| 18114211 | | Subsurface Soil/ Savron | Grab | TPH-Gx, PAHs, TPH-Dx + Motor Oil Range | N1 (< 6 C), N2 (< 6 C), N3 (< 6 C), N4 (< 6 C) (4) | 2018QT-SB-TP02-03072018 | | PostTreatment Triplicate |
| TB-2 | | Water/ Savron | Grab | VOCs | A1 (HCl), A2 (HCl), A3 (HCl) (3) | TB-2 | MAR 28/18 | Trip Blank |
| 18114214 | | Condensate/ Savron | Grab | VOCs | A1 (HCl), A2 (HCl), A3 (HCl) (3) | 2018QT-SB-TP02-0307201 | | PostTreatment Sample |
| 18114215 | | Condensate/ Savron | Grab | VOCs | A1 (HCl), A2 (HCl), A3 (HCl) (3) | 2018QT-SB-TP01-0307201 | MAR 28/18 12:00 | PostTreatment Sample |
| | | | | | | | | |
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Special Instructions: Post-Treatment Samples

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody #

Analysis Key: TPH-Gx=TPH-Gx, PAHs=PAHs

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| 5 | [signature] UWO | | | | |
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COPY OF INCOMING WAYBILL

FedEx Express International Air Waybill

For FedEx services worldwide. Packages up to 150 lbs. (68 kg), excluding consumer goods. Not all services and options are available to all destinations.

1 From Please print and press hard.

Date 3/2/18 Sender's FedEx Account Number 098113142

Sender's Name Joe Hauser Phone

Company CH2M/JACOBS

Address 1100 112th Ave NE Ste 500

Address

City Bellevue, State/Province WA

Country USA ZIP/Postal Code 98004

Email Address

Internal Billing Reference 682283.TT.01

2 To Joshua Brown ☐ Residential Delivery

Recipient's Name Sample Custodian Phone 519-661-2111 ex. 88698

Company The University of Western Ontario

Address 1151 Richmond St N

Address Dept/Floor Dock 59 - Faculty of Engineering

City London State/Province Ontario

Country Canada ZIP/Postal Code N6A3K7

Email Address

Recipient's Tax ID Number for Customs Purposes

3 Shipment Information

Total Packages 3 Total Weight lbs. kg DIM / / in. cm

Commodity Description

Number of Coos Country of Manufacture Value for Customs

(3) Soil Samples (for Research - not for human consumption) 250.00 00.00 1.00

Total Declared Value for Customs (Canada Customs) 1.00

The service order has changed in Section 4. Signature options have been moved to Section 6.

For Completion Instructions, and details on services and options, see back of this page.

FedEx Tracking Number 8103 5139 1060 Form ID No. 0402

4 Express Package Service

NOTE: Service and/or fees changed. Please select carefully.

☐ FedEx Intl First ☒ FedEx Intl. Priority ☐ FedEx Intl. Economy

5 Packaging

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling and Delivery Signature Options

☐ HOLD at FedEx Location ☐ SATURDAY Delivery

☐ Direct Signature ☐ Indirect Signature

7 Payment

Bill transportation charges to: ☒ Sender ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check/Charge

FedEx Acct. No.

Credit Card No.

Credit Card Exp. Date

Bill duties and taxes to: ☒ Sender ☐ Recipient ☐ Third Party

FedEx Acct. No.

8 Required Signature

Signature: Joe Hauser

662

For questions or to ship and track packages, go to fedex.com.

Or in the U.S. call 1.800.GoFedEx 1.800.463.3339.

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For a full version of the Conditions of Contract, go to fedex.com.

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ED_004220_00020298-00112

Copy of Incoming CoC



Savron
DateShipped: 3/12/2018
CarrierName:
AirbillNo:

**CHAIN OF CUSTODY RECORD**
Site #: LA00
Project Code:
Cooler #: 1

**No: 10-030718-140532-0001**
Account Number FILL IN
Contact Name: Joe Hauser
Contact Phone: 404-661-4305

| Lab # | Sample # | Location | Matrix | Collected | Numb Cont | Container | Preservative | Analyses | Lab QC |
|---|---|---|---|---|---|---|---|---|---|
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP01-03082018 | 2018QT-SB-TP01-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |
| | 2018QT-SB-TP02-03082018 | 2018QT-SB-TP02-03082018 | Subsurface Soil | 3/8/2018 | 1 | 2 Gallon Bucket | < 6 C | STAR Treatability Study | |

Special Instructions:

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

| Items/Reason | Relinquished by (Signature and Organization) | Date/Time | Received by (Signature and Organization) | Date/Time | Sample Condition Upon Receipt |
|---|---|---|---|---|---|
| | Joe Hauser CH2M | 11:30 3-12-18 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

FedEx Express

# International Air Waybill

For FedEx services worldwide.

Sender's Copy

PACKAGE LABEL 0083446430 0

COMMERCIAL INVOICE LABEL 0083446430 0

DELIVERY RECORD LABEL 0083446430 0

DELIVERY SIGNATURE LABEL 0083446430 0

RETAIN THIS COPY FOR YOUR RECORDS

**1 From** *Please print and press hard.*

Date 03/24/18 Sender's FedEx Account Number

Sender's Name Joshua Brown Phone (519) 661-2111 x88288

Company The University of Western Ontario

Address 1151 Richmond St. N.

Address Dock 59 - Thompson Engineering Building

City London State/Province Ontario

Country Canada ZIP/Postal Code N6A 3K7

**2 To** Kate Kameko

Recipient's Name Sample Receiving Phone (805) 526-7161 x20189

Company ALS Laboratories

Address 2655 Park Center Drive, Suite A

Dept./Floor

Address

City Simi Valley State/Province California

Country USA ZIP/Postal Code 93065

Recipient's Tax ID Number for Customs Purposes

**3 Shipment Information** ☐ For EEI Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/Load) 1 Total Weight 3.4 lbs. ☐ kg. ☒ DIM / / in. ☐ cm ☐

| Commodity Description | Harmonized Code | Country of Manufacture | Value for Customs |
|---|---|---|---|
| Gas sample for analysis | | | 1.00 |

Has EEI been filed in AES? ☒ No EEI required, value $2,500 or less per Sch. B Number, no license required (NLR), not subject to ITAR. Total Declared Value for Carriage

☐ No EEI required, enter exemption number. If other than NLR, enter License Exception

☐ Yes - Enter AES proof of filing citation

Total Value for Customs (Specify Currency) 1.00

**4 Express Package Service** *Packages up to 150 lbs. / 68 kg*

☒ FedEx Intl. Priority ☐ FedEx Intl. First ☐ FedEx Intl. Economy

Not all services and options are available to all destinations. Dangerous goods cannot be shipped using this Air Waybill.

**5 Packaging** *Those unique known boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube ☒ Other Box ☐ FedEx 10kg Box* ☐ FedEx 25kg Box*

**6 Special Handling**

☐ HOLD at FedEx Location ☐ SATURDAY Delivery

**7 Payment** Complete payment options for both transportation charges and duties and taxes.

*Bill transportation charges to:* Enter FedEx Acct. No. or Credit Card No. below.

☐ Sender ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash/Check/Cheque

FedEx Acct. No. 0981113142 (Ref # 682283.TT.01)

Credit Card No.

Credit Card Exp. Date

*Bill duties and taxes to:* All shipments may be subject to Customs charges, which FedEx does not estimate prior to clearance.

☐ Sender ☐ Recipient ☒ Third Party

FedEx Acct. No. 0981113142 (Ref # 682283.TT.01)

**8 Your Internal Billing Reference** First 24 characters will appear on invoice.

OPTIONAL

**9 Required Signature**

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and your representation that this shipment does not require a U.S. State Department License or contain dangerous goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature:

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

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# Air - Chain of Custody Record & Analytical Service Request



2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No

ALS Contact: Kate Kaneko

Company Name & Address (Reporting Information): The University of Western Ontario, CH2M Hill

Project Name: Quendall Treatability Study

Project Number: 682283.TT.01

Project Manager: Joshua Brown

P.O. # / Billing Information: 101001209

Phone: (519) 661-2111 x 88288

Fax:

Email Address for Result Reporting: jbrow227@uwo.ca

Sampler (Print & Sign): Joshua Brown [signature]

Analysis Method: $CO/CO_2$, VOCs, $H_2S$, CS, $CS_2$

| Client Sample ID | Laboratory ID Number | Date Collected | Time Collected | Canister ID (Bar code # - AC, SC, etc.) | Flow Controller ID (Bar code # - FC #) | Canister Start Pressure "Hg | Canister End Pressure "Hg/psig | Sample Volume | $CO/CO_2$, VOCs, $H_2S$, CS, $CS_2$ | | Comments e.g. Actual Preservative or specific instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-1 Emissions | | Mar 27 | 1999-20:11 | AS01016 | SOA00096 | -22" Hg | -2" Hg | | ✓ | | |
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Report Tier Levels - please select
Tier I - Results (Default in not specified) ____
Tier II (Results + QC Summaries ____
Tier III (Results + QC & Calibration Summaries) ____
Tier IV (Date Validation Package) 10% Surcharge ____

EDD required YES / No
Type: ____ Units: ____

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) | Date: | Time: |
|---|---|---|---|---|---|
| [signature] | Mar 29/18 | 10:00 | | | |
| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) | Date: | Time: |

Cooler / Blank Temperature ____°C

DEAN'S OFFICE
TestAmerica
Custody Seal
FedEx International Air Waybill
Joshua Brown
The University of Western Ontario
1151 Richmond St. N.
Dock 59 - Thompson Engineering Building
London
Ontario
Canada
N6A 3K7
Sample Receiving
ALS Laboratories
2655 Park Center Drive, Suite A
Simi Valley
California
USA
93065
Shipment Information
Gas sample for analysis
Packaging
Special Handling
Payment
Your Internal Billing Reference
Required Signature
8083 3446 4300 0402
568
TestAmerica
240989

# Appendix C

# Data Quality Summary and Usability Assessment

APPENDIX C

# Data Quality Summary and Usability Assessment

## Introduction

Samples were collected at the Quendall Terminals Superfund Site to support a Bench-Scale Treatability Study (TS) of the Self-Sustaining Technology for Active Remediation (STAR) technology. All analytical data were evaluated in accordance with the following guidance:

- *Self-Sustaining Technology for Active Remediation Bench-Scale Treatability Study Quendall Terminals Superfund Site Quality Assurance Project Plan* (QAPP), *Renton, Washington* (CH2M, 2018)

This data quality summary presents the results of the quality assurance and quality control (QA/QC) activities prescribed in the QAPP and provides the results of a data usability assessment.

## Sample Collection and Shipment

Two sets of baseline (pre-treatment) soil samples were collected from locations TP-1 and TP-2, as specified in the QAPP and described in Appendix A of this technical memorandum. The samples were shipped overnight to the University of Western Ontario (UWO) in Ontario, Canada for treatability testing. Savron's treatability study laboratory is located at the UWO. The samples were delayed in Canadian customs and were not received by UWO for four days, but sample temperatures were all 2-3 degrees Celsius upon arrival at the Savron laboratory, consistent with temperature requirements outlined in the QAPP.

UWO personnel individually homogenized the two bulk samples for the STAR TS. Portions of these two processed soil samples were sent to the U.S. Environmental Protection Agency (EPA) Region 10 Manchester Environmental Laboratory (MEL) in Port Orchard, WA for analysis of total petroleum hydrocarbons in the gasoline range (TPH-Gx) and diesel range (TPH-Dx), and polycyclic aromatic hydrocarbons (PAH) by method SW8270D to determine baseline concentrations. The samples were received at 7-10 degrees Celsius. Photographs of the samples taken by MEL staff show melted ice within the bags containing the sample jars, and dark oily materials on portions of the sample jars. These suggest that the melted ice came in contact with some sample jars and liberated sample residues in the threads of the sample lid; however, the appearance of the soil within the jars did not suggest the samples had been impacted, and data were not qualified for these issues during data validation performed by MEL.

One set of post-treatment samples were generated by UWO following completion of the TS using TP-1 soil. TPH concentrations in the soil sample from TP-2 were two low to complete the TS for soil from this location. One triplicate post-treatment soil sample and one process condensage from TP-1 were collected and shipped overnight to MEL. The samples were received intact and within QAPP-specified temperature requirements. One process vapor emission sample from TP-1 was collected and shipped overnight to ALS Environmental Laboratory, Simi Valley, CA (ALSS). The sample was received in good condition.



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# Analytical Data

The methods, sample delivery group (SDG) number, and laboratory name for all analyses are presented in Table 1.

**Table 1. Analytical Data Summary**
*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site*

| Laboratory | SDG | Method | Analyte |
|---|---|---|---|
| ALSS | P1801614 | ASTM D5504 MODIFIED | Sulfur Compounds |
| ALSS | P1801614 | E3C | Atmospheric Gases |
| ALSS | P1801614 | TO15 | VOCs |
| MEL | SFP-127A | NWTPH-Dx | TPH-DRO and RRO |
| MEL | SFP-127A | NWTPH-Gx | TPH-GRO |
| MEL | SFP-127A | SW8260C | VOCs |
| MEL | SFP-127A | SW8270D | SVOCs |

Notes:
ALSS = ALS Environmental Laboratory, Simi Valley, CA
MEL = Manchester Environmental Laboratory, U.S. Environmental Protection Agency (EPA), Region 10, Port Orchard, WA
SVOCs = Semi-volatile organic compounds
TPH-DRO and RRO = Total petroleum hydrocarbons – diesel range organics and residual range organics
TPH-GRO = Total petroleum hydrocarbons – gasoline range organics
VOCs = Volatile organic compounds

Vapor emission, liquid condensate, and soil samples were collected between March 19 and March 28, 2018 in support of the STAR TS. The liquid condensate sample was a multiphase sample comprised of a liquid aqueous phase and a liquid organic phase thereby creating two separate samples. One liquid aqueous, one liquid organic, and 9 soil samples were sent to MEL in Port Orchard, WA. One vapor emission sample was sent to ALS Environmental in Simi Valley, CA. Collection of field duplicates was not a QAPP requirement. The laboratories reported the samples in two SDGs and seven methods were used to analyze the environmental samples. Samples were collected and shipped to ALSS and MEL for analysis.

The QAPP identifies the following method-specific QC requirements directly or through reference:

- Level of effort (frequency of QC checks) for each QC procedure
- Quantitative acceptance limits for QC data
- Corrective action requirements for the laboratories for QC data that are outside the acceptance limits
- The detection limit requirements

These requirements were followed, with the exception of the samples and analytes listed in Attachment 1, Table 1, that do not meet the QAPP target reporting limit (TRL) objectives (attachments are located at the end of this document).

Before work started, the analytical laboratories established MDLs in accordance with Title 40 Code of Federal Regulations Part 136 (40 CFR 136), Appendix B, so that that laboratory-specific limits comply with the QA/QC specifications.



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# Data Validation and Findings

## Data Validation Methodology

MEL data were internally reviewed by MEL chemists in accordance with National Environmental Laboratory Accreditation standards and are considered final upon release. The review is equivalent to a Stage 4 validation as described in *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009).

CH2M performed Stage 4 manual validation on ALSS package SDG P1801614.

## Reporting

Sample- and parameter-specific data validation reports are provided in Attachment 2. The subsections in each report correspond to the internal QC check requirements for that specific method, as identified in the project plans and National Functional Guidelines for Organic Data Review (EPA, 2017). If laboratory data deviate from the specifications, the subsections (1) provide quantitative details for the QC data deviation, (2) list the associated affected samples, and (3) provide flags in accordance with defined conventions. The final data validation qualifications are summarized by SDG, sample identifier (ID), and analyte in Attachment 3, Table 1.

## Data Validation Findings

Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results (not qualified with an "R" flag) divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. The data set is 100 percent complete.

Of 496 normal data points, six results were qualified as estimated concentrations due to QC exceedances (1.2 percent).

Evaluation of 100 percent of the chemical data was performed by using the project documents as guides for data quality evaluation.

# Data Quality Assessment and Quality Control Data

The QAPP prescribes the data quality objectives in terms of precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS) parameters. The quality control indicators associated with the PARCCS are in laboratory hard copy packages, and a subset of these parameters is maintained in laboratory and project electronic databases. The PARCCS evaluations are summarized as follows:

- Precision (see Attachment 3: Tables 4 and 5)
- Accuracy (see Attachment 3: Tables 3, 4, and 6)
- Representativeness (see Attachment 3: Table 2)
- Sensitivity (see Attachment 1: Table 1)

Precision measurement data include matrix spike and laboratory duplicate data expressed as relative percent deviation (RPD). The following are included in Attachment 3: Table 4 shows the matrix spike duplicates; and Table 5 shows laboratory duplicates. Greater than ninety-seven percent of the duplicates were within RPD acceptance criteria.

Accuracy measurement data include laboratory control sample and matrix spike recovery data, as well as surrogate recoveries for organic analytical parameters. Table 3 in Attachment 3 summarizes laboratory control samples, Table 4 summarizes matrix spike recoveries, and Table 6 summarizes the



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surrogate recoveries. The matrix spike recoveries could not be determined in some instances because the sample concentration significantly exceeded the spike concentration. One hundred percent of the recoveries that could be determined were within control limits.

Representativeness measurement data indicate how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the sampled media. Representativeness is assessed in qualitative and quantitative terms. The project report discusses the qualitative aspects of representativeness in terms of the design of the field sampling plan, sampling techniques, sample handling protocols, and associated documentation. Quantitative measures of representativeness include field blank measurements (see Attachment 3, Table 2) and laboratory blank measurements to identify contamination introduced through field or laboratory operations. No data were qualified for laboratory or field blank contamination.

Comparability expresses the confidence with which one data set can be compared to another. Comparability of data has been established through use of following:

- Standard analytical methods and QC procedures established in the project plans
- Consistent reporting units for a specified procedure
- MDLs for all analytical parameters that were established in accordance with 40 CFR 136, Appendix B, before the start of the analyses to meet the project requirements

All comparability factors have been met for this data set.

Completeness in this report is assessed as a measure of the amount of valid data obtained from the analytical measurements. Field activity completeness is assessed within the context of the overall sampling design. Data completeness is 100 percent, exceeding the project plans completeness objectives.

Sensitivity has been assessed by the determination of ability to detect the target analytes at the levels of interest. Attachment 1, Table 1 shows the instances where the action levels were exceeded by non-detected results.

# Data Management

Backup information for the data evaluation and validation findings includes the following:

- ALSS and MEL hard copy packages assembled in SDG units, which include all QC data. These packages are stored at the laboratory.
- ALSS and MEL data packages are included in Attachment 4 of this report.
- Laboratory electronic databases, which include all sample concentration data with laboratory data flags and a subset of laboratory QC data.
- Chain-of-custody forms and tracking records in project files and in the laboratory.
- Laboratory bench records and sample custody logs maintained by the laboratory.
- Project electronic databases, including validation flags stored with project files. Electronic database structure and content comply with project and program specifications.

# Conclusion

The STAR TS performed on soils collected at the Quendall Terminals Superfund Site was carried out in accordance with the QAPP and all data were subjected to the equivalent of a U.S. Environmental Protection Agency (USEPA) stage 4 data validation.

All planned samples were collected, with exception of TP-02 post treatment soils and process analyses as noted in section *Sample Collection and Shipment.* All analytical data are acceptable for use as qualified and 100% complete (i.e., no data were rejected during validation).

# Works Cited

CH2M. 2018. *Self-Sustaining Technology for Active Remediation Bench-Scale Treatability Study Quendall Terminals Superfund Site Quality Assurance Project Plan, Renton, Washington.* Prepared for the U.S. Environmental Protection Agency, Region 10. March.

U.S. Environmental Protection Agency (EPA). 2017. *Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review.* USEPA-540-R-2017-002. https://www.epa.gov/clp/national-functional-guidelines-organic-superfund-methods-data-review-som024.

U.S. Environmental Protection Agency (EPA). 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use.* EPA 540-R-08-005. http://www2.epa.gov/clp/superfund-analytical-services-guidance-documents.



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# Attachment 1
# Non-Detect Results that Exceed Screening Level Objectives

Table 1. Non-detect Results that Exceed the Screening Level Objectives

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 1*

| Location | Method | Analyte | Sample Date | Matrix | Sample Type | Result | Qualifier | Target Reporting Limit | Units | Laboratory |
|---|---|---|---|---|---|---|---|---|---|---|
| TP-01 | NWTPH-Dx | Motor Oil | 3/19/18 10:00 | Soil | N | 6000 | U | 100 | mg/kg | MEL |
| TP-01 | NWTPH-Dx | Motor Oil | 3/19/18 10:00 | Soil | N | 6200 | U | 100 | mg/kg | MEL |
| TP-01 | NWTPH-Dx | Motor Oil | 3/19/18 10:00 | Soil | N | 6400 | U | 100 | mg/kg | MEL |
| TP-01 | SW8270D | 2-Chloronaphthalene | 3/19/18 10:00 | Soil | N | 4200 | U | 50 | ug/kg | MEL |
| TP-01 | SW8270D | 2-Chloronaphthalene | 3/19/18 10:00 | Soil | N | 4600 | U | 50 | ug/kg | MEL |
| TP-01 | SW8270D | 2-Chloronaphthalene | 3/19/18 10:00 | Soil | N | 5000 | U | 50 | ug/kg | MEL |
| TP-02 | NWTPH-Dx | Motor Oil | 3/19/18 10:00 | Soil | N | 110 | U | 100 | mg/kg | MEL |
| TP-02 | SW8270D | 2-Chloronaphthalene | 3/19/18 10:00 | Soil | N | 100 | U | 50 | ug/kg | MEL |
| TP-02 | SW8270D | 2-Chloronaphthalene | 3/19/18 10:00 | Soil | N | 110 | U | 50 | ug/kg | MEL |

Notes:

mg/kg = Milligram per kilogram

ug/kg = Microgram per kilogram

# Attachment 2
# Data Validation Reports

# Quendall Treatability Study
## Data Quality Evaluation

| | | | |
|---|---|---|---|
| **SDG** | **P1801614** | **Reviewer:** | **mfesler (Stage 4)** |
| **Method** | **ASTM D 5504-12** | **Date:** | **4/9/2018** |
| **Matrix** | **AIR** | **Reviewed:** | **4/13/2018** |

## *Field Samples*

Field blank association lot values: LotNumber / FieldID / SDG

| NativeID | QAQC Type | Dilution | ABLotValue | EBLotValue | TBLotValue |
|---|---|---|---|---|---|
| **AIR** | | | | | |
| TP-1 Emissions | N | 1.31 | | | |

**1. Case Narrative Items of Interest** There were no items of concern

**2. Blank Summary**

**Field Blanks** No Field Blanks were found.

**Method Blanks** No Method Blank detects were found.

**3. Spikes and Duplicates**

**Field Duplicates** No FD Associated.

**Laboratory Duplicates** None in this SDG

**Matrix Spike** Not applicable to this method.

**4. Laboratory Control Sample** All acceptance criteria were met. No spike dupes in this SDG. During Stage 4 validation, the LCS P180402-LCS concentration for Hydrogen Sulfide was re-calculated from the raw data values using average response factor and the following formula: percent recovery = concentration of LCS/True Value x 100%. (949/1,000 x 100%) = 95%. The recalculated percent recovery confirmed laboratory reported percent recovery.

**5. Surrogates** No surrogates in this SDG.

**6. Tuning and Mass Calibration** N/A

## 7. Internal Standard

N/A

## 8. Calibration Information

**Initial Calibration**

During Stage 4 validation, the initial calibration was re-calculated from the raw data values using response factors. Reported response factors were confirmed, as well as mean RRF and %RSD. No discrepancies were noted.

**Continuing Calibration**

During Stage 4 validation, two CCVs (CCAL Filenames 04021802 and 04021813) were re-calculated using response factors. Reported CCV response factors were confirmed.

## 9. Holding Time

All acceptance criteria were met.

## 10. Confirmation

N/A

## 11. Summary

**General Comments**

All acceptance criteria were met.

**Data Package Completeness**

Package was complete for Stage 4 validation

**Forms Review/ Items of Interest**

No samples were excluded for dilutions or re-extractions. During Stage 4 validation, the sample result for Hydrogen Sulfide in sample TP-1 Emissions was re-calculated from the raw data values using average response factor. Sample result was confirmed.

**COC Review**

No discrepancies were noted

Validated Form I

# Final Data Flags*

*When the data evaluation process results in multiple flags, the most severe flag becomes the final data flag. All flags are from the site-specific QAPP, except the "exclude" flag that is used to designate results that are not for risk assessment (for example, a result from a dilution where the original undiluted result is appropriate).

Field ID TP-1 Emissions

| Analyte | Result | Final Flag | Lab Flag | MDL | RL | Units | ValidationRea |
|---|---|---|---|---|---|---|---|
| 2,5-Dimethylthiophene | **3100** | | | 12 | 30 | UG/M3 | |
| 2-Ethylthiophene | **6100** | | | 12 | 30 | UG/M3 | |
| 3-Methylthiophene | **4200** | | | 11 | 26 | UG/M3 | |
| CARBON DISULFIDE | **1100** | | | 4.1 | 10 | UG/M3 | |
| Carbonyl Sulfide | **15000** | | | 6.1 | 16 | UG/M3 | |
| Diethyl Disulfide | 13 | U | U | 13 | 16 | UG/M3 | |
| Diethyl Sulfide | 9.7 | U | U | 9.7 | 24 | UG/M3 | |
| Dimethyl Sulfide | **440** | | | 6.7 | 17 | UG/M3 | |
| Ethyl Mercaptan | 6.7 | U | U | 6.7 | 17 | UG/M3 | |
| Ethyl Methyl Sulfide | **30** | | | 8.2 | 20 | UG/M3 | |
| HYDROGEN SULFIDE | **16** | | | 2.7 | 9.1 | UG/M3 | |
| Isobutyl Mercaptan | 9.7 | U | U | 9.7 | 24 | UG/M3 | |
| Isopropyl Mercaptan | 8.2 | U | U | 8.2 | 20 | UG/M3 | |
| METHYL DISULFIDE | **320** | | | 5 | 13 | UG/M3 | |
| Methyl Mercaptan | 5.2 | U | U | 5.2 | 13 | UG/M3 | |
| n-Butyl Mercaptan | 9.7 | U | U | 9.7 | 24 | UG/M3 | |
| n-Propyl Mercaptan | 8.2 | U | U | 8.2 | 20 | UG/M3 | |
| Tert-Butyl mercaptan | 9.7 | U | U | 9.7 | 24 | UG/M3 | |
| Tetrahydrothiophene | 9.4 | U | U | 9.4 | 24 | UG/M3 | |
| Thiophene | **1300** | | | 9 | 23 | UG/M3 | |

mfesler

Validated Form I

mfesler

# Quendall Treatability Study

## Data Quality Evaluation

| | | | |
|---|---|---|---|
| SDG | P1801614 | Reviewer: | mfesler (Stage 4) |
| Method | E3C | Date: | 4/9/2018 |
| Matrix | AIR | Reviewed: | 4/13/2018 |

### Field Samples

Field blank association lot values: LotNumber / FieldID / SDG

| NativeID | QAQC Type | Dilution | ABLotValue | EBLotValue | TBLotValue |
|---|---|---|---|---|---|
| AIR | | | | | |
| TP-1 Emissions | N | 1.31 | | | |

1. Case Narrative Items of Interest — There were no items of concern.

2. Blank Summary

Field Blanks — No Field Blanks were found.

Method Blanks — No Method Blank detects were found.

3. Spikes and Duplicates

Field Duplicates — No FD Associated.

Laboratory Duplicates — None in this SDG

Matrix Spike — Not applicable to this method.

4. Laboratory Control Sample — All acceptance criteria were met. No spike dupes in this SDG. During Stage 4 validation, the LCS S32-02151801 concentration for Nitrogen was re-calculated from the raw data values using average response factor and the following formula: percent recovery = concentration of LCS/True Value x 100%. (50,400/50,000 x 100%) = 101%. The recalculated percent recovery confirmed laboratory reported percent recovery.

5. Surrogates — No surrogates in this SDG.

6. Tuning and Mass Calibration — N/A

7. Internal Standard

N/A

8. Calibration Information

Initial Calibration

During Stage 4 validation, the initial calibration was re-calculated from the raw data values using response factors. Reported response factors were confirmed, as well as mean RRF and %RSD. No discrepancies were noted.

Continuing Calibration

During Stage 4 validation, two CCVs (CCAL Filenames 04031815 and 04031824) were re-calculated using response factors. Reported CCV response factors were confirmed.

9. Holding Time

All acceptance criteria were met.

10. Confirmation

N/A

11. Summary

General Comments

All acceptance criteria were me

Data Package Completeness

Package was complete for Stage 4 validation

Forms Review/ Items of Interest

No samples were excluded for dilutions or re-extractions. During Stage 4 validation, the sample result for Nitrogen in sample TP-1 Emissions was re-calculated from the raw data values using average response factor. Sample result was confirmed.

COC Review

No discrepancies were noted

Validated Form I

# Final Data Flags*

*When the data evaluation process results in multiple flags, the most severe flag becomes the final data flag. All flags are from the site-specific QAPP, except the "exclude" flag that is used to designate results that are not for risk assessment (for example, a result from a dilution where the original undiluted result is appropriate).

Field ID TP-1 Emissions

| Analyte | Result | Final Flag | Lab Flag | MDL | RL | Units | ValidationRea |
|---|---|---|---|---|---|---|---|
| CARBON DIOXIDE | 5.47 | | | 0.13 | 0.13 | %V/V | |
| CARBON MONOXIDE | 1.38 | | | 0.13 | 0.13 | %V/V | |
| HYDROGEN | 0.152 | | | 0.13 | 0.13 | %V/V | |
| METHANE | 0.13 | U | U | 0.13 | 0.13 | %V/V | |
| NITROGEN | 78.3 | | | 0.13 | 0.13 | %V/V | |
| OXYGEN | 14.7 | | | 0.13 | 0.13 | %V/V | |

mfesler

Validated Form I

mfesler

# Quendall Treatability Study

## Data Quality Evaluation

| | | | |
|---|---|---|---|
| SDG | P1801614 | Reviewer: | mfesler (Stage 4) |
| Method | TO15 | Date: | 4/9/2018 |
| Matrix | AIR | Reviewed: | 4/13/2018 |

### Field Samples

Field blank association lot values: LotNumber / FieldID / SDG

| NativeID | QAQC Type | Dilution | ABLotValue | EBLotValue | TBLotValue |
|---|---|---|---|---|---|
| AIR | | | | | |
| TP-1 Emissions | N | 2180 | | | |
| TP-1 Emissions | N | 40 | | | |

1. Case Narrative Items of Interest — There were no items of concern

2. Blank Summary

Field Blanks — No Field Blanks were found.

Method Blanks — No Method Blank detects were found.

3. Spikes and Duplicates

Field Duplicates — No FD Associated.

Laboratory Duplicates — None in this SDG

Matrix Spike — Not applicable to this method.

4. Laboratory Control Sample — All acceptance criteria were met. No spike dupes in this SDG. During Stage 4 validation, the LCS P180404-LCS concentration for propylene and benzene were re-calculated from the raw data values using average response factor and the following formula: percent recovery = concentration of LCS/True Value x 100% (Propene: 161/210 x 100% = 77%; Benzene: 186/213 x 100% = 87%). The recalculated percent recoveries confirmed laboratory reported percent recoveries.

5. Surrogates — All acceptance criteria were met. During Stage 4 validation, the surrogate concentration for 1,2-Dichloroethane-d4 in sample TP-1 Emissions was re-calculated from the raw data values using the following formula: percent recovery = concentration of LCS/True Value x 100% (12.256/12.5 x 100% = 98%. The recalculated percent recovery confirmed the laboratory reported percent recovery.

6. Tuning and Mass Calibration — All acceptance criteria were met.

7. Internal Standard — All acceptance criteria were met.

8. Calibration Information

Initial Calibration — During Stage 4 validation, the initial calibration was re-calculated from the raw data values using response factors. Reported response factors were confirmed, as well as mean RRF and %RSD. No discrepancies were noted.

Continuing Calibration — During Stage 4 validation, CCV (CCAL Filenames 04041801) was re-calculated using response factors. Reported CCV response factors were confirmed.

9. Holding Time — All acceptance criteria were met.

10. Confirmation — N/A

11. Summary

General Comments — All acceptance criteria were met.

Data Package Completeness — Package was complete for Stage 4 validation

Forms Review/ Items of Interest — No samples were excluded for dilutions or re-extractions. During Stage 4 validation, the sample result for propylene and benzene in sample TP-1 Emissions were re-calculated from the raw data values using average response factor. Sample results were confirmed.

COC Review — No discrepancies were noted

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# Final Data Flags*

*When the data evaluation process results in multiple flags, the most severe flag becomes the final data flag. All flags are from the site-specific QAPP, except the "exclude" flag that is used to designate results that are not for risk assessment (for example, a result from a dilution where the original undiluted result is appropriate).

Field ID TP-1 Emissions

| Analyte | Result | Final Flag | Lab Flag | MDL | RL | Units | ValidationRea |
|---|---|---|---|---|---|---|---|
| 1,1,1-TRICHLOROETHANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| 1,1,2,2-TETRACHLOROETHANE | 330 | U | U | 330 | 1100 | UG/M3 | |
| 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| 1,1,2-TRICHLOROETHANE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,1-DICHLOROETHANE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,1-DICHLOROETHENE | 370 | U | U | 370 | 1100 | UG/M3 | |
| 1,2,4-TRICHLOROBENZENE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,2,4-TRIMETHYLBENZENE | 36000 | | | 330 | 1100 | UG/M3 | |
| 1,2-DIBROMO-3-CHLOROPROPANE | 220 | U | U | 220 | 1100 | UG/M3 | |
| 1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE) | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (CFC 114) | 410 | U | U | 410 | 1100 | UG/M3 | |
| 1,2-DICHLOROBENZENE | 330 | U | U | 330 | 1100 | UG/M3 | |
| 1,2-DICHLOROETHANE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,2-DICHLOROPROPANE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 1,3,5-TRIMETHYLBENZENE (MESITYLENE) | 17000 | | | 350 | 1100 | UG/M3 | |
| 1,3-BUTADIENE | 480 | U | U | 480 | 1100 | UG/M3 | |
| 1,3-DICHLOROBENZENE | 330 | U | U | 330 | 1100 | UG/M3 | |
| 1,4-DICHLOROBENZENE | 310 | U | U | 310 | 1100 | UG/M3 | |
| 1,4-DIOXANE (P-DIOXANE) | 350 | U | U | 350 | 1100 | UG/M3 | |
| 2-HEXANONE | 350 | U | U | 350 | 1100 | UG/M3 | |
| 4-ETHYLTOLUENE | 23000 | | | 350 | 1100 | UG/M3 | |
| ACETONE | 15000 | | | 1700 | 11000 | UG/M3 | |
| ACETONITRILE | 15000 | | | 390 | 1100 | UG/M3 | |
| ACROLEIN | 6500 | | | 370 | 4400 | UG/M3 | |
| ACRYLONITRILE | 2400 | | | 370 | 1100 | UG/M3 | |
| ALLYL CHLORIDE (3-CHLOROPROPENE) | 350 | U | U | 350 | 1100 | UG/M3 | |
| alpha-Pinene | 310 | U | U | 310 | 1100 | UG/M3 | |
| BENZENE | 37000 | | | 350 | 1100 | UG/M3 | |
| BENZYL CHLORIDE | 240 | U | U | 240 | 2200 | UG/M3 | |
| BROMODICHLOROMETHANE | 330 | U | U | 330 | 1100 | UG/M3 | |
| BROMOFORM | 330 | U | U | 330 | 1100 | UG/M3 | |
| BROMOMETHANE | 410 | U | U | 410 | 1100 | UG/M3 | |
| CARBON DISULFIDE | 330 | U | U | 330 | 11000 | UG/M3 | |
| CARBON TETRACHLORIDE | 330 | U | U | 330 | 1100 | UG/M3 | |
| CHLOROBENZENE | 350 | U | U | 350 | 1100 | UG/M3 | |
| CHLOROETHANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| CHLOROFORM | 370 | U | U | 370 | 1100 | UG/M3 | |
| CHLOROMETHANE | 3800 | | | 330 | 1100 | UG/M3 | |
| cis-1,2-DICHLOROETHYLENE | 350 | U | U | 350 | 1100 | UG/M3 | |
| cis-1,3-DICHLOROPROPENE | 310 | U | U | 310 | 1100 | UG/M3 | |

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Field ID TP-1 Emissions

| Analyte | Result | Final Flag | Lab Flag | MDL | RL | Units | ValidationRea |
|---|---|---|---|---|---|---|---|
| CYCLOHEXANE | 630 | U | U | 630 | 2200 | UG/M3 | |
| DIBROMOCHLOROMETHANE | 350 | U | U | 350 | 1100 | UG/M3 | |
| DICHLORODIFLUOROMETHANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| d-Limonene | 310 | U | U | 310 | 1100 | UG/M3 | |
| ETHANOL | 1700 | U | U | 1700 | 11000 | UG/M3 | |
| ETHYL ACETATE | 760 | U | U | 760 | 2200 | UG/M3 | |
| ETHYLBENZENE | 160000 | | | 350 | 1100 | UG/M3 | |
| HEXACHLOROBUTADIENE | 310 | U | U | 310 | 1100 | UG/M3 | |
| ISOPROPANOL | 920 | U | U | 920 | 11000 | UG/M3 | |
| ISOPROPYLBENZENE (CUMENE) | 12000 | | | 330 | 1100 | UG/M3 | |
| m,p-Xylene | 240000 | | | 660 | 2200 | UG/M3 | |
| METHYL ETHYL KETONE (2-BUTANONE) | 460 | U | U | 460 | 11000 | UG/M3 | |
| METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE) | 350 | U | U | 350 | 1100 | UG/M3 | |
| METHYL METHACRYLATE | 680 | U | U | 680 | 2200 | UG/M3 | |
| METHYLENE CHLORIDE | 370 | U | U | 370 | 1100 | UG/M3 | |
| NAPHTHALENE | 390 | U | U | 390 | 1100 | UG/M3 | |
| n-BUTYL ACETATE | 350 | U | U | 350 | 1100 | UG/M3 | |
| n-HEPTANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| N-HEXANE | 330 | U | U | 330 | 1100 | UG/M3 | |
| n-NONANE | 1500 | | | 330 | 1100 | UG/M3 | |
| N-OCTANE | 390 | U | U | 390 | 1100 | UG/M3 | |
| n-PROPYLBENZENE | 4800 | | | 350 | 1100 | UG/M3 | |
| o-Xylene | 100000 | | | 330 | 1100 | UG/M3 | |
| PROPYLENE | 8500 | | | 310 | 1100 | UG/M3 | |
| STYRENE | 330 | U | U | 330 | 1100 | UG/M3 | |
| tert-BUTYL METHYL ETHER | 370 | U | U | 370 | 1100 | UG/M3 | |
| TETRACHLOROETHYLENE(PCE) | 310 | U | U | 310 | 1100 | UG/M3 | |
| TETRAHYDROFURAN | 440 | U | U | 440 | 1100 | UG/M3 | |
| TOLUENE | 200000 | | | 370 | 1100 | UG/M3 | |
| TRANS-1,2-DICHLOROETHENE | 410 | U | U | 410 | 1100 | UG/M3 | |
| TRANS-1,3-DICHLOROPROPENE | 350 | U | U | 350 | 1100 | UG/M3 | |
| TRICHLOROETHYLENE (TCE) | 310 | U | U | 310 | 1100 | UG/M3 | |
| TRICHLOROFLUOROMETHANE | 370 | U | U | 370 | 1100 | UG/M3 | |
| VINYL ACETATE | 1400 | U | U | 1400 | 11000 | UG/M3 | |
| VINYL CHLORIDE | 370 | U | U | 370 | 1100 | UG/M3 | |

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

# QUALITY ASSURANCE MEMORANDUM FOR ORGANIC CHEMICAL ANALYSES

**Date:** April 12, 2018

**To:** Kathy Cerise, RPM
Office of Environmental Cleanup, EPA Region 10

**From:** Dana Walker, Chemist
Office of Environmental Review and Assessment, EPA Region 10 Laboratory

**Subject:** Quality Assurance Review for the Polyaromatic Hydrocarbon Analysis from the Quendall Terminals: STAR Bench Scale Treatability Study

Project Code: SFP-127A
Account Code: 2018T10P000DD21044LA00

**CC:** Susan Moore, Mark Cichy, Leslie Karlewicz – CH2M

The following is a quality assurance review of the data for polyaromatic hydrocarbon analysis from the Quendall Terminals: STAR Bench Scale Treatability Study. The analyses were performed by the EPA Region 10 Laboratory in Port Orchard, WA, following EPA and Laboratory guidelines.

This review was conducted for the following samples:

| | | | | | |
|---|---|---|---|---|---|
| 18124200 | 18124201 | 18124202 | 18124203 | 18124204 | 18124205 |
| 18134206 | 18134207 | 18134208 | | | |

**Data Qualifications**

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "*Laboratory/QAPP Criteria Not Met*".

For those tests for which the EPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

**1. Sample Transport and Receipt**

Upon sample receipt, no conditions were noted that would impact data quality.

**2. Sample Holding Times**

The concentration of an analyte in a sample or extract of a sample may increase or decrease over time depending on the nature of the analyte. The holding time maximum criteria applied for the extraction of soil samples is 14 days from the time of collection. Extracts have a holding time maximum of 40 days from the time of preparation. All samples were extracted and analyzed within these criteria.

**3. Sample Preparation**

Samples were prepared according to the method.

**4. Initial Calibration/Continuing Calibration Verification (CCV)**

Initial calibration was performed on 3/15/18. Percent relative standard deviations (%RSDs) of the relative response factors (RRFs) met the criteria of ≤20% or correlation coefficients met the criteria of ≥0.99. The second source verification of the initial calibration met the percent accuracies criteria of 70-130%.

The CCVs met the criteria for frequency of analysis and the percent accuracies were all in control.

**5. Laboratory Control Samples/Laboratory Control Sample Duplicates (LCS/LCSD)**

LCS/LCSD are generated to provide information on the accuracy and precision of the analytical method and the laboratory performance. The LCS/LCSD recoveries were within the criteria of 70-130% with a relative percent difference (RPD) of ≤50.

**6. Blank Analysis**

Method blanks were prepared and analyzed with each sample extraction batch to evaluate the potential for laboratory contamination and effects on the sample results. Target analytes were not detected in the blanks.

**7. Surrogate Spikes**

Surrogate recoveries are used to help in the evaluation of laboratory performance on individual samples. The surrogate recoveries met the criteria of 50-150%.

**8. Matrix Spike/Matrix Spike Duplicate Analysis (MS/MSD)—*Laboratory/QAPP Criteria Not Met***

Data for MS/MSD are generated to provide information on the accuracy and precision of the analytical method and the laboratory performance. An MS/MSD analysis was performed using sample 18124200. The MS/MSD recoveries were within the criteria of 50-150% with a relative percent difference (RPD) of ≤50 except for following:

The recovery of many analytes could not be determined accurately due to the amount native to the sample and those analytes were qualified not applicable, "NA".

**9. Internal Standard Performance**

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. The retention time variations of all internal standards were within 30 seconds of the continuing calibration standard. The percent areas of all the internal standards were within the specified 50% to 200% of the continuing calibration standard for all reported results.

**10. Compound Quantitation**

The initial calibration functions were used for calculations. Reported quantitation limits were based on the initial calibration standards and sample size used for the analysis.

All manual integrations have been reviewed and found to comply with acceptable integration practices.

**11. Identification**

The retention times for all detected target compounds were within acceptable limits of the initial or continuing calibration standards. Criteria were met for mass spectral ion matching and ion abundance matching for those ions monitored in SIM scanning mode.

**12. Changes from Preliminary Data**

No changes to the results between the preliminary and final data were made.

## 13. Data Qualifiers

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Dana Walker at the Region 10 Laboratory, phone number (360) 871 - 8704.

| Qualifier | Definition |
|---|---|
| **U** | The analyte was not detected at or above the reported value. |
| **J** | The identification of the analyte is acceptable; the reported value is an estimate. |
| **UJ** | The analyte was not detected at or above the reported value. The reported value is an estimate. |
| **R** | The presence or absence of the analyte cannot be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification. |
| **NA** | Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification. |

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

# QUALITY ASSURANCE MEMORANDUM FOR ORGANIC CHEMICAL ANALYSES

**Date:** April 6, 2018

**To:** Kathy Cerise, RPM
Office of Environment Cleanup, USEPA Region 10

**From:** Chris Pace, Chemist
Office of Environmental Review and Assessment, USEPA Region 10 Laboratory

**Subject:** Quality Assurance Review for the Total Petroleum Hydrocarbon-Diesel Range Extended Analysis of Samples from the Quendall Terminals: STAR Bench Scale Treatability Study

Project Code: SFP-127A
Account Code: 2018T10P000DD21044LA00

**CC:** Susan Moore, Mark Cichy, Leslie Karlewicz – CH2M

The following is a quality assurance review of the data for total petroleum hydrocarbon - diesel range extended (TPH-Dx) analysis of samples from the above referenced site. The analyses were performed by the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

| | | | | | |
|---|---|---|---|---|---|
| 18124200 | 18124201 | 18124202 | 18124203 | 18124204 | 18124205 |
| 18134206 | 18134207 | 18134208 | | | |

**Data Qualifications**

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "*Laboratory/QAPP Criteria Not Met*".

For those tests for which the EPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

**1. Sample Transport and Receipt**

Upon sample receipt, no conditions were noted that would impact data quality.

**2. Sample Holding Times**

The concentration of an analyte in a sample or extract of a sample may increase or decrease over time depending on the nature of the analyte. The holding time maximum criteria applied to the extraction of soil/sediment samples is 14 days from the time of collection. Extracts have a holding time maximum of 40 days from the time of preparation. All samples were extracted and analyzed within these criteria.

**3. Sample Preparation**

Samples were prepared according to the method/SOP.

**4. Initial Calibration**

Initial calibrations were performed on 11/15/17 for #2 diesel, motor oil and surrogate. Percent relative standard deviations (%RSDs) of the response factors met the criteria of ≤20% or the correlation coefficients met the criteria of ≥0.99.

**5. Continuing Calibration Verification (CCV)**

The CCV met the criteria for frequency of analysis and relative retention time (RRT) windows for all target and surrogate compounds. The percent accuracies were 80-120% of the true values.

**6. Blank Analysis**

Method blanks were prepared and analyzed with each sample extraction batch to evaluate the potential for laboratory contamination and effects on the sample results. TPH-Dx was not detected in the blanks.

**7. Surrogates** - *Laboratory/QAPP Criteria Not Met*

Surrogate recoveries are used to help in the evaluation of laboratory performance on individual samples. All surrogate recoveries for the samples were within the criteria of 50-150% except for the following.

The surrogate, pentacosane, could not be determined in samples 18124200, 18124200 duplicate, 18124201 and 18124202 due to the large dilution necessary to bring the diesel range organics into calibration range. None of the data were qualified on this basis.

**8. LCS/LCSD**

Data for laboratory control sample/laboratory control sample duplicates (LCS/LCSD) are generated to provide information on the accuracy and precision of the analytical method and the laboratory performance. The LCS/LCSD recoveries were within the QAPP criteria of 50-150% with a relative percent difference (RPD) of ≤35.

## 9. Duplicate Sample Analysis

Duplicate sample analyses are performed to provide information on the precision, in the matrix of interest, of the analytical method. Duplicate analyses were performed using samples 18124200 and 18134206. All results which were above 5 times the reporting limit met the QAPP relative percent difference (RPD) criteria of ≤35.

## 10. Compound Identification/Quantitation

The initial calibration functions were used for calculations. Reported quantitation limits were based on the initial calibration standards and sample size used for the analysis.

Diesel range organics is a collective term for petroleum products that generally elute before motor oil but after gasoline from the gas chromatograph.

Motor oil range organics is a collective term for any petroleum product that chromatographically consists primarily of an unresolved envelope of compounds generally eluting after #2 diesel. Included in the definition are hydraulic fluids, motor oils, lubricating oils, cutting oils, mineral oils, transmission fluids, etc.

Chemical Abstract Service (CAS) numbers with a "*" indicates that the number was created at the Region 10 Laboratory due to lack of an existing one.

All manual integrations have been reviewed and found to comply with acceptable integration practices.

## 11. Data Qualifiers

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Chris Pace at the Region 10 Laboratory, phone number (360) 871 - 8703.

| Qualifier | Definition |
|---|---|
| **U** | The analyte was not detected at or above the reported value. |
| **J** | The identification of the analyte is acceptable; the reported value is an estimate. |
| **UJ** | The analyte was not detected at or above the reported value. The reported value is an estimate. |
| **R** | The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification. |
| **NA** | Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification. |

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

# QUALITY ASSURANCE MEMORANDUM FOR ORGANIC CHEMICAL ANALYSES

**Date:** April 6, 2018

**To:** Kathy Cerise, RPM
Office of Environment Cleanup, USEPA Region 10

**From:** Chris Pace, Chemist
Office of Environmental Review and Assessment, EPA Region 10 Laboratory

**Subject:** Quality Assurance Review for the Total Petroleum Hydrocarbon-Gasoline Range Extended Analysis of Samples from the Quendall Terminals: STAR Bench Scale Treatability Study

Project Code: SFP-127A
Account Code: 2018T10P000DD21044LA00

**CC:** Susan Moore, Mark Cichy, Leslie Karlewicz – CH2M

The following is a quality assurance review of the data for gasoline range organics (TPH-Gx) of samples from the above referenced site. The analyses were performed by the EPA Region 10 Laboratory in Port Orchard, WA, following EPA and Laboratory guidelines.

This review was conducted for the following samples:

| | | | | | |
|---|---|---|---|---|---|
| 18124200 | 18124201 | 18124202 | 18124203 | 18124204 | 18124205 |
| 18124216 | 18134206 | 18134207 | 18134208 | | |

## 1. Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "*Laboratory/QAPP Criteria Not Met*".

For those tests for which the EPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

**2. Sample Transport and Receipt**

Upon sample receipt, no conditions were noted that would impact data quality.

**3. Sample Holding Times**

The concentration of an analyte in a sample or extract of a sample may increase or decrease over time depending on the nature of the analyte. The holding time maximum criteria applied to preserved water and soil/sediment samples is 14 days from the time of collection. All samples were analyzed within the applicable criteria.

**4. Sample Preparation**

Samples were prepared according to the method/SOP.

**5. Initial Calibration**

Initial calibration was performed on 11/20/18 and 4/5/18 for gasoline range organics and the surrogate, 1,4-difluorobenzene. Percent relative standard deviations (%RSDs) of the RRFs met the criteria of ≤20% or the correlation coefficients met the criteria of ≥0.99.

**6. Continuing Calibration Verification (CCV)**

The CCV met the criteria for frequency of analysis. The percent accuracies were 80-120% of the true value for gasoline range organics.

**7. Blank Analysis**

Method blanks were prepared and analyzed with each sample extraction batch to evaluate the potential for laboratory contamination and effects on the sample results. Gasoline range organics were not detected in the blank(s).

**8. Surrogates**

Surrogate recoveries are used to help in the evaluation of laboratory performance on individual samples. All surrogate recoveries for the samples were within the Laboratory's SOP criteria of 50-150%.

**9. LCS/LCSD**

Data for laboratory control sample/laboratory control sample duplicates (LCS/LCSD) are generated to provide information on the accuracy and precision of the analytical method and the laboratory performance. The LCS/LCSD recoveries were within the QAPP criteria of 50-150% with a relative percent difference (RPD) of ≤35.

**10. Duplicate Sample Analysis**

Duplicate sample analyses are performed to provide information on the precision, in the matrix of interest, of the analytical method. Duplicate analysis was performed using sample 18124200 and 18134206. The duplicate results were within the QAPP RPD criteria of ≤35.

## 11. Compound Quantitation/ Identification

The initial calibration functions were used for calculations. Reported quantitation limits were based on the initial calibration standards and sample size used for the analysis.

All manual integrations have been reviewed and found to comply with acceptable integration practices.

Gasoline range organics is a collective term for volatile petroleum products, e.g., gasolines, naphtha, mineral spirits, Stoddard solvent, and other volatile petroleum products.

## 12. Data Qualifiers

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Dana Walker at the Region 10 Laboratory, phone number (360) 871-8704.

| Qualifier | Definition |
|---|---|
| **U** | The analyte was not detected at or above the reported value. |
| **J** | The identification of the analyte is acceptable; the reported value is an estimate. |
| **UJ** | The analyte was not detected at or above the reported value. The reported value is an estimate. |
| **R** | The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification. |
| **NA** | Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification. |

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

# QUALITY ASSURANCE MEMORANDUM FOR ORGANIC CHEMICAL ANALYSES

**Date:** April 11, 2018

**To:** Kathy Cerise, RPM
Office of Environmental Cleanup, USEPA Region 10

**From:** Chris Pace, Chemist
Office of Environmental Review and Assessment, USEPA Region 10 Laboratory

**Subject:** Quality Assurance Review for the Volatiles Analysis of Samples from the Quendall Terminals: STAR Bench Scale Treatability Study

Project Code: SFP-127A
Account Code: 2018T10P000DD21044LA00

**CC:** Susan Moore, Mark Cichy, Leslie Karlewicz – CH2M

The following is a quality assurance review of the data for volatiles analysis of samples from the above referenced project. The analyses were performed by the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

18134215 (water)
18134215A (product)
18134216 (trip blank)

## 1. Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "*Laboratory/QAPP Criteria Not Met*".

For those tests for which the EPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

**2. Sample Transport and Receipt**

Upon sample receipt, no conditions were noted that would impact data quality.

**3. Sample Holding Times**

The concentration of an analyte in a sample or extract of a sample may increase or decrease over time depending on the nature of the analyte. The holding time maximum criteria applied to preserved water samples is 14 days from the time of collection. All samples were analyzed within the applicable criteria.

**4. Sample Preparation**

Samples were prepared according to the method. Sample 18134215 contained two phases, water and product. The water and product phases were analyzed separately.

**5. GC/MS Tuning**

The tuning summary agreed with the raw data. All p-bromofluorobenze ion abundance ratios met criteria. Sample analyses were preceded by a tune less than 12 hours prior to analysis.

**6. Initial Calibration** - *Laboratory/QAPP Criteria Not Met*

Initial calibrations were performed on 4/5/18 for the target and surrogate compounds for water samples. Percent relative standard deviations (%RSDs) of the relative response factors (RRFs) met the criteria of ≤20% or correlation coefficients met the criteria of ≥0.99. The second source verification (SSV) percent accuracies were 70-130% of the true values.

One or more calibration levels failed to meet the SOP refit criteria for bromomethane, freon 113 and acetone. The results for these analytes were all non-detects and qualified estimated, 'UJ".

**7. Continuing Calibration Verification (CCV)** - *Laboratory/QAPP Criteria Not Met*

The CCV met the criteria for frequency of analysis and relative retention time (RRT) windows for all target and surrogate compounds. The percent accuracies were 80-120% of the true values for all reported results except for the following.

Bromomethane resulted with <80% accuracy in the associated CCV. The bromomethane results were non-detects and qualified as estimated, "UJ".

**8. LCS/LCSD**

Data for laboratory control sample/laboratory control sample duplicates (LCS/LCSD) are generated to provide information on the accuracy and precision of the analytical method and the laboratory performance. The LCS/LCSD recoveries were within the QAPP criteria of 50-150% with a relative percent difference (RPD) of ≤35.

**9. Blank Analysis**

Method blanks were analyzed with each sample batch to evaluate the potential for laboratory contamination and effects on the sample results. Target analytes detected in samples were reported without qualification if the responses were ≥5 times that of the blank(s). Detected sample results were qualified 'U' if the results were below this criteria. The sample concentration or the sample quantification limit, whichever is greater, was reported as the qualified result.

**10. Surrogate Spikes**

Surrogate recoveries are used to help in the evaluation of laboratory performance on individual samples. The surrogate recoveries in samples met the SOP specified control limits.

**11. Matrix Spike/Matrix Spike Duplicate Analysis (MS/MSD)**

None of the samples were designated for MS/MSD analyses.

**12. Internal Standard Performance**

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. The retention time variations of all internal standards were within 30 seconds of the continuing calibration standard. The percent areas of all the internal standards were within the specified 50% to 200% of the continuing calibration standard for all reported results.

**13. Compound Quantitation**

The initial calibration functions were used for calculations. Reported quantitation limits were based on the initial calibration standards and sample size used for the analysis.

All manual integrations have been reviewed and found to comply with acceptable integration practices.

**14. Identification**

All of the compounds detected in the analyses were within the RRT windows, met the USEPA spectral matching criteria and/or were judged to be acceptable.

In addition to the target analyte naphthalene, both the water and product contained non-target compounds (not included in this report).

**15. Data Qualifiers**

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Chris Pace at the Region 10 Laboratory, phone number (360) 871 - 8703.

| Qualifier | Definition |
|---|---|
| **U** | The analyte was not detected at or above the reported value. |
| **J** | The identification of the analyte is acceptable; the reported value is an estimate. |
| **UJ** | The analyte was not detected at or above the reported value. The reported value is an estimate. |
| **R** | The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification. |
| **NA** | Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification. |
| **NJ** | Tentatively identified with estimated concentration |

# Attachment 3
# Data Validation Summary Tables

**Table 1. Data Validation Summary**

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Analyte | Flag |
|---|---|---|---|
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | Acetone | UJ |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | Bromomethane | UJ |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | Freon 113 | UJ |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | Acetone | UJ |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | Bromomethane | UJ |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | Freon 113 | UJ |

Notes:

ID = Identifier

## Table 2. Field Blank Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Sample Date | Analysis Method | Analyte | Result | Final Validation Qualifier | Units | CRQL |
|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | TP-01_18124216/18124216 | TB | 3/19/18 10:00 | NWTPH-Gx | TPH-Gasoline | 50 | U | ug/l | 50 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1,1,2-Tetrachloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1,1-Trichloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1,2,2-Tetrachloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1,2-Trichloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1-Dichloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,1-Dichloroethene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2,3-Trichlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2,3-Trichloropropane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2,4-Trichlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2,4-Trimethylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2-Dibromo-3-chloropropane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2-Dibromoethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2-Dichlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2-Dichloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,2-Dichloropropane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,3,5-Trimethylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,3-Dichlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 1,4-Dichlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 2-Butanone | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 2-Hexanone | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | 4-Methyl-2-Pentanone | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Acetone | 1 | UJ | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Acrylonitrile | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Benzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Bromochloromethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Bromodichloromethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Bromoform | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Bromomethane | 1 | UJ | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Carbon Disulfide | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Carbon tetrachloride | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Chlorobenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Chlorodibromomethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Chloroethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Chloroform | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Chloromethane | 1 | U | ug/l | 1 |

## Table 2. Field Blank Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Sample Date | Analysis Method | Analyte | Result | Final Validation Qualifier | Units | CRQL |
|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | cis-1,2-Dichloroethene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | cis-1,3-Dichloropropene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Cyclohexane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Dibromomethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Dichlorodifluoromethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Dichloromethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Ethylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Freon 113 | 1 | UJ | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Hexachlorobutadiene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Isopropylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | m+p-Xylenes | 2 | U | ug/l | 2 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | METHYL ACETATE | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Methyl tert-butyl ether (MTBE) | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | METHYLCYCLOHEXANE | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Naphthalene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | n-Butylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | n-Propylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | p-Isopropyltoluene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | sec-Butylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Styrene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | tert-Butylbenzene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Tetrachloroethene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Toluene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | trans-1,2-Dichloroethene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | trans-1,3-Dichloropropene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Trichloroethylene | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Trichlorofluoromethane | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Vinyl Chloride | 1 | U | ug/l | 1 |
| SFP-127A | TB-2_18134216/18134216 | TB | 3/28/18 12:00 | SW8260C | Xylene, o | 1 | U | ug/l | 1 |

Notes:

ug/l = Microgram per liter

ID = Identifier

TB = Trip blank

## Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| P1801614 | P180402-LCS-P1801614-4/2/2018/SD13040218LCS1 | LCS | ASTM D5504 MOD | Carbonyl Sulfide | 94 | 81 - 147 |
| P1801614 | P180402-LCS-P1801614-4/2/2018/SD13040218LCS1 | LCS | ASTM D5504 MOD | Methyl Mercaptan | 99 | 80 - 144 |
| P1801614 | P180402-LCS-P1801614-4/2/2018/SD13040218LCS1 | LCS | ASTM D5504 MOD | Hydrogen Sulfide | 95 | 81 - 141 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Carbon Dioxide | 100 | 95 - 108 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Hydrogen | 100 | 94 - 107 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Carbon Monoxide | 102 | 98 - 109 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Methane | 103 | 98 - 110 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Nitrogen, Organic (as N) | 101 | 94 - 105 |
| P1801614 | P180403-LCS-P1801614-4/3/2018/TD1040318LCS1 | LCS | E3C | Oxygen | 102 | 98 - 109 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Ethylbenzene | 91 | 69 - 117 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Styrene | 104 | 70 - 128 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Benzyl chloride | 128 | 75 - 142 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | cis-1,3-Dichloropropene | 102 | 74 - 129 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | trans-1,3-Dichloropropene | 105 | 75 - 130 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | n-Propylbenzene | 93 | 70 - 118 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,4-Dichlorobenzene | 99 | 63 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dibromoethane | 116 | 70 - 127 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,3-Butadiene | 97 | 57 - 149 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Acrolein | 92 | 60 - 132 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Allyl chloride | 92 | 61 - 143 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dichloroethane | 93 | 62 - 120 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Acrylonitrile | 100 | 68 - 138 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Vinyl Acetate | 102 | 73 - 135 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 4-Methyl-2-Pentanone | 95 | 66 - 138 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | m+p-Xylenes | 90 | 67 - 117 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,3,5-Trimethylbenzene | 87 | 65 - 117 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Toluene | 88 | 66 - 114 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Chlorobenzene | 92 | 66 - 115 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Tetrahydrofuran | 83 | 66 - 121 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | n-Hexane | 78 | 61 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Cyclohexane | 84 | 69 - 115 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | OCTANE | 84 | 65 - 121 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Nonane | 83 | 61 - 127 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Propene | 77 | 54 - 133 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2,4-Trichlorobenzene | 117 | 70 - 141 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | N-BUTYL ACETATE | 103 | 62 - 140 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,4-Dioxane | 92 | 74 - 123 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Chlorodibromomethane | 105 | 67 - 130 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Tetrachloroethene | 95 | 62 - 119 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Ethyl acetate | 91 | 66 - 140 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | N-HEPTANE | 83 | 68 - 118 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | cis-1,2-Dichloroethene | 90 | 69 - 121 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | trans-1,2-Dichloroethene | 103 | 71 - 125 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Methyl tert-butyl ether (MTBE) | 87 | 60 - 123 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | P-Bromofluorobenzene | 103 | 70 - 130 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,3-Dichlorobenzene | 105 | 70 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Carbon tetrachloride | 92 | 64 - 122 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 2-Hexanone | 95 | 58 - 146 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | D-Limonene | 93 | 64 - 135 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 4-Ethyltoluene | 95 | 69 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | ETHANOL | 90 | 62 - 131 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | ISOPROPYL ALCOHOL (ISOPROPANOL) | 90 | 62 - 135 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Acetone | 83 | 63 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Chloroform | 87 | 69 - 113 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Benzene | 87 | 66 - 111 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,1,1-Trichloroethane | 89 | 65 - 116 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Bromomethane | 89 | 63 - 132 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Chloromethane | 82 | 47 - 140 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Chloroethane | 88 | 68 - 129 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Vinyl Chloride | 88 | 63 - 127 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Acetonitrile | 96 | 56 - 136 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Dichloromethane | 81 | 67 - 116 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Carbon Disulfide | 82 | 68 - 120 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Bromoform | 112 | 67 - 135 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Bromodichloromethane | 79 | 69 - 123 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,1-Dichloroethane | 85 | 68 - 118 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,1-Dichloroethene | 88 | 72 - 118 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Trichlorofluoromethane | 86 | 65 - 113 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Dichlorodifluoromethane | 83 | 64 - 115 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Freon 113 | 88 | 68 - 113 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 89 | 60 - 112 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dichloropropane | 85 | 69 - 121 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 2-Butanone | 97 | 70 - 129 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,1,2-Trichloroethane | 97 | 73 - 117 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Trichloroethylene | 91 | 69 - 112 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,1,2,2-Tetrachloroethane | 95 | 70 - 125 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | alpha-Pinene | 94 | 69 - 122 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Methyl methacrylate | 99 | 75 - 125 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Hexachlorobutadiene | 101 | 63 - 126 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Naphthalene | 115 | 71 - 146 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Xylene, o | 92 | 67 - 118 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dichlorobenzene | 103 | 66 - 125 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2,4-Trimethylbenzene | 92 | 67 - 124 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | 1,2-Dibromo-3-chloropropane | 116 | 73 - 136 |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | LCS | TO15 | Isopropylbenzene | 92 | 68 - 116 |
| SFP-127A | 91T032218L1-LCS | LCS | NWTPH-Gx | TPH-Gasoline | 82 | 50 - 150 |
| SFP-127A | 91T032218L2-LC2 | LCSD | NWTPH-Gx | TPH-Gasoline | 92 | 50 - 150 |
| SFP-127A | 91T040418L1-LCS | LCS | NWTPH-Gx | TPH-Gasoline | 94 | 50 - 150 |
| SFP-127A | 91T040418L2-LC2 | LCSD | NWTPH-Gx | TPH-Gasoline | 92 | 50 - 150 |
| SFP-127A | 92S032218L1-LCS | LCS | NWTPH-Dx | TPH-Diesel | 91 | 50 - 150 |
| SFP-127A | 92S032218L2-LC2 | LCSD | NWTPH-Dx | TPH-Diesel | 95 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Anthracene | 91 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Pyrene | 90 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Benzo(g,h,i)perylene | 90 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Indeno(1,2,3-Cd)Pyrene | 90 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Benzo(b)fluoranthene | 95 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Fluoranthene | 97 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Benzo(k)fluoranthene | 87 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Acenaphthylene | 89 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Chrysene | 87 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Benzo(a)pyrene | 89 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Dibenzo(a,h)anthracene | 91 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Benzo(a)anthracene | 96 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Acenaphthene | 83 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Phenanthrene | 85 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Fluorene | 86 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | Naphthalene | 79 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | 2-Methylnaphthalene | 84 | 50 - 150 |
| SFP-127A | 92S032318L1-LCS | LCS | SW8270D | 2-Chloronaphthalene | 81 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Anthracene | 92 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Pyrene | 93 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Benzo(g,h,i)perylene | 91 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Indeno(1,2,3-Cd)Pyrene | 92 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Benzo(b)fluoranthene | 98 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Fluoranthene | 98 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Benzo(k)fluoranthene | 88 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Acenaphthylene | 92 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Chrysene | 89 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Benzo(a)pyrene | 90 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Dibenzo(a,h)anthracene | 93 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Benzo(a)anthracene | 98 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Acenaphthene | 86 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Phenanthrene | 87 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Fluorene | 89 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | Naphthalene | 83 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | 2-Methylnaphthalene | 87 | 50 - 150 |
| SFP-127A | 92S032318L2-LC2 | LCSD | SW8270D | 2-Chloronaphthalene | 86 | 50 - 150 |
| SFP-127A | 92S040318L1-LCS | LCS | NWTPH-Dx | TPH-Diesel | 95 | 50 - 150 |
| SFP-127A | 92S040318L1-LCS | LCS | NWTPH-Dx | Motor Oil | 100 | 50 - 150 |
| SFP-127A | 92S040318L2-LC2 | LCSD | NWTPH-Dx | TPH-Diesel | 94 | 50 - 150 |
| SFP-127A | 92S040318L2-LC2 | LCSD | NWTPH-Dx | Motor Oil | 100 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Anthracene | 92 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Pyrene | 92 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Benzo(g,h,i)perylene | 93 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Indeno(1,2,3-Cd)Pyrene | 93 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Benzo(b)fluoranthene | 94 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Fluoranthene | 100 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Benzo(k)fluoranthene | 95 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Acenaphthylene | 91 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Chrysene | 89 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Benzo(a)pyrene | 93 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Dibenzo(a,h)anthracene | 93 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Benzo(a)anthracene | 98 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Acenaphthene | 84 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Phenanthrene | 87 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Fluorene | 90 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | Naphthalene | 81 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | 2-Methylnaphthalene | 87 | 50 - 150 |
| SFP-127A | 92S040418L1-LCS | LCS | SW8270D | 2-Chloronaphthalene | 83 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Anthracene | 93 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Pyrene | 93 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Benzo(g,h,i)perylene | 92 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Indeno(1,2,3-Cd)Pyrene | 92 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Benzo(b)fluoranthene | 92 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Fluoranthene | 101 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Benzo(k)fluoranthene | 97 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Acenaphthylene | 91 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Chrysene | 90 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Benzo(a)pyrene | 92 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Dibenzo(a,h)anthracene | 92 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Benzo(a)anthracene | 98 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Acenaphthene | 84 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Phenanthrene | 88 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Fluorene | 89 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | Naphthalene | 81 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | 2-Methylnaphthalene | 86 | 50 - 150 |
| SFP-127A | 92S040418L2-LC2 | LCSD | SW8270D | 2-Chloronaphthalene | 83 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Ethylbenzene | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Styrene | 95 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | cis-1,3-Dichloropropene | 94 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | trans-1,3-Dichloropropene | 95 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | n-Propylbenzene | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | n-Butylbenzene | 95 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,4-Dichlorobenzene | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2-Dibromoethane | 95 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2-Dichloroethane | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Acrylonitrile | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 4-Methyl-2-Pentanone | 94 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | m+p-Xylenes | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,3,5-Trimethylbenzene | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | METHYLCYCLOHEXANE | 96 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Toluene | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Chlorobenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Cyclohexane | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2,4-Trichlorobenzene | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Chlorodibromomethane | 91 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Tetrachloroethene | 105 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | sec-Butylbenzene | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | cis-1,2-Dichloroethene | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | trans-1,2-Dichloroethene | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Methyl tert-butyl ether (MTBE) | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,4-Difluorobenzene | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,3-Dichlorobenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Carbon tetrachloride | 92 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 2-Hexanone | 93 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1,1,2-Tetrachloroethane | 90 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Acetone | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Chloroform | 98 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Benzene | 90 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1,1-Trichloroethane | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Bromomethane | 82 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Chloromethane | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Dibromomethane | 96 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Bromochloromethane | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Chloroethane | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Vinyl Chloride | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Dichloromethane | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Carbon Disulfide | 88 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Bromoform | 87 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Bromodichloromethane | 90 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1-Dichloroethane | 101 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1-Dichloroethene | 107 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Trichlorofluoromethane | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Dichlorodifluoromethane | 89 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Freon 113 | 96 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2-Dichloropropane | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 2-Butanone | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1,2-Trichloroethane | 92 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Trichloroethylene | 94 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | METHYL ACETATE | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,1,2,2-Tetrachloroethane | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2,3-Trichlorobenzene | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Hexachlorobutadiene | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Naphthalene | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Xylene, o | 96 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2-Dichlorobenzene | 100 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2,4-Trimethylbenzene | 98 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2-Dibromo-3-chloropropane | 89 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | 1,2,3-Trichloropropane | 99 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | tert-Butylbenzene | 97 | 50 - 150 |
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | Isopropylbenzene | 98 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040518LCS1-LCS | LCS | SW8260C | p-Isopropyltoluene | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Ethylbenzene | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Styrene | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | cis-1,3-Dichloropropene | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | trans-1,3-Dichloropropene | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | n-Propylbenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | n-Butylbenzene | 96 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,4-Dichlorobenzene | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2-Dibromoethane | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2-Dichloroethane | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Acrylonitrile | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 4-Methyl-2-Pentanone | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | m+p-Xylenes | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,3,5-Trimethylbenzene | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | METHYLCYCLOHEXANE | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Toluene | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Chlorobenzene | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Cyclohexane | 99 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2,4-Trichlorobenzene | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Chlorodibromomethane | 94 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Tetrachloroethene | 109 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | sec-Butylbenzene | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | cis-1,2-Dichloroethene | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | trans-1,2-Dichloroethene | 99 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Methyl tert-butyl ether (MTBE) | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,4-Difluorobenzene | 99 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,3-Dichlorobenzene | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Carbon tetrachloride | 95 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 2-Hexanone | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1,1,2-Tetrachloroethane | 94 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Acetone | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Chloroform | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Benzene | 92 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1,1-Trichloroethane | 99 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Bromomethane | 73 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Chloromethane | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Dibromomethane | 96 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Bromochloromethane | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Chloroethane | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Vinyl Chloride | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Dichloromethane | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Carbon Disulfide | 91 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Bromoform | 85 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Bromodichloromethane | 90 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1-Dichloroethane | 104 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1-Dichloroethene | 107 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Trichlorofluoromethane | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Dichlorodifluoromethane | 90 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Freon 113 | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2-Dichloropropane | 103 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 2-Butanone | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1,2-Trichloroethane | 97 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Trichloroethylene | 102 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | METHYL ACETATE | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,1,2,2-Tetrachloroethane | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2,3-Trichlorobenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Hexachlorobutadiene | 98 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Naphthalene | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Xylene, o | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2-Dichlorobenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2,4-Trimethylbenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2-Dibromo-3-chloropropane | 90 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | 1,2,3-Trichloropropane | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | tert-Butylbenzene | 100 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | Isopropylbenzene | 101 | 50 - 150 |
| SFP-127A | K040518LCS2-LC2 | LCSD | SW8260C | p-Isopropyltoluene | 100 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Ethylbenzene | 90 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Styrene | 85 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | cis-1,3-Dichloropropene | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | trans-1,3-Dichloropropene | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | n-Propylbenzene | 94 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | n-Butylbenzene | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,4-Dichlorobenzene | 96 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2-Dibromoethane | 90 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2-Dichloroethane | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Acrylonitrile | 98 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 4-Methyl-2-Pentanone | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | m+p-Xylenes | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,3,5-Trimethylbenzene | 93 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | METHYLCYCLOHEXANE | 85 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Toluene | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Chlorobenzene | 94 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Cyclohexane | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2,4-Trichlorobenzene | 95 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Chlorodibromomethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Tetrachloroethene | 95 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | sec-Butylbenzene | 94 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | cis-1,2-Dichloroethene | 89 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | trans-1,2-Dichloroethene | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Methyl tert-butyl ether (MTBE) | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,4-Difluorobenzene | 100 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,3-Dichlorobenzene | 98 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Carbon tetrachloride | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 2-Hexanone | 92 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1,1,2-Tetrachloroethane | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Acetone | 111 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Chloroform | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Benzene | 80 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1,1-Trichloroethane | 89 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Bromomethane | 59 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Chloromethane | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Dibromomethane | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Bromochloromethane | 90 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Chloroethane | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Vinyl Chloride | 90 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Dichloromethane | 88 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Carbon Disulfide | 76 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Bromoform | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Bromodichloromethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1-Dichloroethane | 90 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1-Dichloroethene | 93 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Trichlorofluoromethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Dichlorodifluoromethane | 78 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Freon 113 | 86 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2-Dichloropropane | 92 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 2-Butanone | 100 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1,2-Trichloroethane | 89 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Trichloroethylene | 87 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | METHYL ACETATE | 85 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,1,2,2-Tetrachloroethane | 92 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2,3-Trichlorobenzene | 98 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Hexachlorobutadiene | 95 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Naphthalene | 93 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Xylene, o | 89 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2-Dichlorobenzene | 97 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2,4-Trimethylbenzene | 93 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2-Dibromo-3-chloropropane | 89 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | 1,2,3-Trichloropropane | 96 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | tert-Butylbenzene | 91 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | Isopropylbenzene | 94 | 50 - 150 |
| SFP-127A | K040618LCS1-LCS | LCS | SW8260C | p-Isopropyltoluene | 91 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Ethylbenzene | 88 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Styrene | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | cis-1,3-Dichloropropene | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | trans-1,3-Dichloropropene | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | n-Propylbenzene | 85 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | n-Butylbenzene | 82 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,4-Dichlorobenzene | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2-Dibromoethane | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2-Dichloroethane | 88 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Acrylonitrile | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 4-Methyl-2-Pentanone | 89 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | m+p-Xylenes | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,3,5-Trimethylbenzene | 88 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | METHYLCYCLOHEXANE | 77 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Toluene | 88 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Chlorobenzene | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Cyclohexane | 78 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2,4-Trichlorobenzene | 90 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Chlorodibromomethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Tetrachloroethene | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | sec-Butylbenzene | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | cis-1,2-Dichloroethene | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | trans-1,2-Dichloroethene | 84 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Methyl tert-butyl ether (MTBE) | 88 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,4-Difluorobenzene | 100 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,3-Dichlorobenzene | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Carbon tetrachloride | 77 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 2-Hexanone | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1,1,2-Tetrachloroethane | 85 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Acetone | 100 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Chloroform | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Benzene | 78 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1,1-Trichloroethane | 83 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Bromomethane | 59 | 50 - 150 |

Table 3. Laboratory Control Sample Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Chloromethane | 83 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Dibromomethane | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Bromochloromethane | 91 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Chloroethane | 89 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Vinyl Chloride | 82 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Dichloromethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Carbon Disulfide | 71 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Bromoform | 82 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Bromodichloromethane | 83 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1-Dichloroethane | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1-Dichloroethene | 83 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Trichlorofluoromethane | 81 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Dichlorodifluoromethane | 71 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Freon 113 | 75 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2-Dichloropropane | 92 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 2-Butanone | 100 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1,2-Trichloroethane | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Trichloroethylene | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | METHYL ACETATE | 90 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,1,2,2-Tetrachloroethane | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2,3-Trichlorobenzene | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Hexachlorobutadiene | 85 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Naphthalene | 91 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Xylene, o | 87 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2-Dichlorobenzene | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2,4-Trimethylbenzene | 88 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2-Dibromo-3-chloropropane | 85 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | 1,2,3-Trichloropropane | 93 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | tert-Butylbenzene | 85 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | Isopropylbenzene | 86 | 50 - 150 |
| SFP-127A | K040618LCS2-LC2 | LCSD | SW8260C | p-Isopropyltoluene | 85 | 50 - 150 |

Notes:

ID = Identifier

**Table 3. Laboratory Control Sample Summary**

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Type | Analysis Method | Analyte | Recovery | Acceptance Criteria |
|---|---|---|---|---|---|---|

LCS = Laboratory control sample

LCSD = Laboratory control sample duplicate

Table 4. Matrix Spike/Matrix Spike Duplicate Summary

Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3

| Sample Delivery Group | Sample ID | Sample Date | Lab Sample ID | Analysis Method | Analyte | MS Recovery | SD Recovery | RPD | Acceptance Critiera | RPD Criteria[a] | MS out | MSD out | RPD out |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | 2-Chloronaphthalene | 98 | 100 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Acenaphthylene | 73 | 98 | 29 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Benzo(a)pyrene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Benzo(g,h,i)perylene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Benzo(k)fluoranthene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Dibenzo(a,h)anthracene | 80 | 87 | 8 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Indeno(1,2,3-Cd)Pyrene | 57 | 86 | 41 | 50 - 150 | 35 | | | X |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | 2-Methylnaphthalene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Acenaphthene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Anthracene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Benzo(a)anthracene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Benzo(b)fluoranthene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Chrysene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Fluoranthene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Fluorene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Phenanthrene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Pyrene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | 18124200 | SW8270D | Naphthalene | NA | NA | NC | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | 2-Chloronaphthalene | 86 | 85 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Acenaphthylene | 93 | 91 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Anthracene | 96 | 96 | 0 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Benzo(a)anthracene | 104 | 102 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Benzo(a)pyrene | 94 | 93 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Benzo(b)fluoranthene | 96 | 98 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Benzo(g,h,i)perylene | 97 | 96 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Benzo(k)fluoranthene | 98 | 94 | 4 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Chrysene | 94 | 90 | 4 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Dibenzo(a,h)anthracene | 98 | 97 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Fluoranthene | 104 | 105 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Fluorene | 93 | 90 | 3 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Indeno(1,2,3-Cd)Pyrene | 98 | 97 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Naphthalene | 82 | 84 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Phenanthrene | 90 | 92 | 2 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Pyrene | 96 | 95 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | 2-Methylnaphthalene | 100 | 101 | 1 | 50 - 150 | 35 | | | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | 18134206 | SW8270D | Acenaphthene | 102 | 98 | 4 | 50 - 150 | 35 | | | |

Notes:

ID = Identifier

NA = Recovery is not applicable since the native concentration in the parent sample exceeded the spiking level by a factor of greater than four

NC = Not calculated

MS = Matrix spike

MSD = Matrix spike duplicate

RPD = Relative percent difference

Table 5. Laboratory Duplicate Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Parent Sample ID | LR Sample ID | Location | Analysis Method | Analyte | CRQL | Units | Primary Sample | | CRQL | Lab Duplicate | | RPD | RPD Control Limit | Exceeds Control Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 2018QT-SB-TP01_BASELINE_A-DU/18124200 | TP-01 | NWTPH-Dx | Motor Oil | 6400 | mg/kg | 6400 | U | 6100 | 6100 | U | NC | 35 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 2018QT-SB-TP01_BASELINE_A-DU/18124200 | TP-01 | NWTPH-Dx | TPH-Diesel | 2600 | mg/kg | 71000 | | 2500 | 67000 | | 6 | 35 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 2018QT-SB-TP01_BASELINE_A-DU/18124200 | TP-01 | NWTPH-Gx | TPH-Gasoline | 3600 | mg/kg | 24000 | | 3500 | 22000 | | 9 | 35 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 2018QT-SB-TP01_POSTTREATMENT_A-DU/18134206 | TP-01 | NWTPH-Dx | Motor Oil | 98 | mg/kg | 98 | U | 97 | 97 | U | NC | 35 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 2018QT-SB-TP01_POSTTREATMENT_A-DU/18134206 | TP-01 | NWTPH-Dx | TPH-Diesel | 39 | mg/kg | 180 | | 39 | 150 | | 18 | 35 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 2018QT-SB-TP01_POSTTREATMENT_A-DU/18134206 | TP-01 | NWTPH-Gx | TPH-Gasoline | 9.8 | mg/kg | 9.9 | | 9.6 | 9.8 | | 1 | 35 | |

Notes:

mg/kg = Milligram per kilogram

CRQL = Contract required quantitation limit

ID = Identifier

LR = Laboratory replicate

NC = Not calculated

RPD = Relative percent difference

Table 6. Surrogate Recovery Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Date | Analysis Method | Analyte | Surrogate Recovery | Acceptance Critiera | | | Surrogate out |
|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 95 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 104 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 107 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 102 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A/18124200 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 97 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_A-DU/18124200 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 100 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 96 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 104 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 107 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_B/18124201 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 90 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 97 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 107 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 104 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_BASELINE_C/18124202 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichloroethane-D4 | 100 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | Toluene-D8 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 103 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | P-Bromofluorobenzene | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,4-Difluorobenzene | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichloroethane-D4 | 97 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | Toluene-D8 | 101 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 104 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | P-Bromofluorobenzene | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE/18134215 | 3/28/18 12:00 | SW8260C | 1,4-Difluorobenzene | 101 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichloroethane-D4 | 97 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | 3/28/18 12:00 | SW8260C | Toluene-D8 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | 3/28/18 12:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 103 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | 3/28/18 12:00 | SW8260C | P-Bromofluorobenzene | 101 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_CONDENSATE_P/18134215 | 3/28/18 12:00 | SW8260C | 1,4-Difluorobenzene | 101 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | NWTPH-Dx | Pentacosane | 100 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | NWTPH-Gx | 1,4-Difluorobenzene | 89 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | SW8270D | Pyrene-d10 | 95 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | SW8270D | Anthracene-d10 | 89 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | SW8270D | Benzo(a)pyrene-d12 | 91 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | SW8270D | Fluorene-d10 | 81 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A/18134206 | 3/28/18 12:00 | SW8270D | Acenaphthylene-d8 | 87 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A-DU/18134206 | 3/28/18 12:00 | NWTPH-Dx | Pentacosane | 92 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_A-DU/18134206 | 3/28/18 12:00 | NWTPH-Gx | 1,4-Difluorobenzene | 92 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | NWTPH-Dx | Pentacosane | 97 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | NWTPH-Gx | 1,4-Difluorobenzene | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | SW8270D | Pyrene-d10 | 101 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | SW8270D | Anthracene-d10 | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | SW8270D | Benzo(a)pyrene-d12 | 97 | 50 | - | 150 | |

Table 6. Surrogate Recovery Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Date | Analysis Method | Analyte | Surrogate Recovery | Acceptance Critiera | | | Surrogate out |
|---|---|---|---|---|---|---|---|---|---|
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | SW8270D | Fluorene-d10 | 86 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_B/18134207 | 3/28/18 12:00 | SW8270D | Acenaphthylene-d8 | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | NWTPH-Dx | Pentacosane | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | NWTPH-Gx | 1,4-Difluorobenzene | 100 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | SW8270D | Pyrene-d10 | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | SW8270D | Anthracene-d10 | 91 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | SW8270D | Benzo(a)pyrene-d12 | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | SW8270D | Fluorene-d10 | 82 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP01_POSTTREATMENT_C/18134208 | 3/28/18 12:00 | SW8270D | Acenaphthylene-d8 | 90 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | NWTPH-Dx | Pentacosane | 100 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 82 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 94 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 99 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 85 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_A/18124203 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 92 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | NWTPH-Dx | Pentacosane | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 76 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 95 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 83 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_B/18124204 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 88 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | NWTPH-Dx | Pentacosane | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 77 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | SW8270D | Pyrene-d10 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | SW8270D | Anthracene-d10 | 93 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | SW8270D | Benzo(a)pyrene-d12 | 98 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | SW8270D | Fluorene-d10 | 83 | 50 | - | 150 | |
| SFP-127A | 2018QT-SB-TP02_BASELINE_C/18124205 | 3/19/18 10:00 | SW8270D | Acenaphthylene-d8 | 89 | 50 | - | 150 | |
| SFP-127A | 91T032218B1-BLK | 3/22/18 0:00 | NWTPH-Gx | 1,4-Difluorobenzene | 93 | 50 | - | 150 | |
| SFP-127A | 91T040418B1-BLK | 4/4/18 0:00 | NWTPH-Gx | 1,4-Difluorobenzene | 93 | 50 | - | 150 | |
| SFP-127A | 92S032218B1-BLK | 3/22/18 0:00 | NWTPH-Dx | Pentacosane | 97 | 50 | - | 150 | |
| SFP-127A | 92S032318B1-BLK | 3/23/18 0:00 | SW8270D | Pyrene-d10 | 98 | 50 | - | 150 | |
| SFP-127A | 92S032318B1-BLK | 3/23/18 0:00 | SW8270D | Anthracene-d10 | 89 | 50 | - | 150 | |
| SFP-127A | 92S032318B1-BLK | 3/23/18 0:00 | SW8270D | Benzo(a)pyrene-d12 | 89 | 50 | - | 150 | |
| SFP-127A | 92S032318B1-BLK | 3/23/18 0:00 | SW8270D | Fluorene-d10 | 81 | 50 | - | 150 | |
| SFP-127A | 92S032318B1-BLK | 3/23/18 0:00 | SW8270D | Acenaphthylene-d8 | 89 | 50 | - | 150 | |
| SFP-127A | 92S040318B1-BLK | 4/3/18 0:00 | NWTPH-Dx | Pentacosane | 89 | 50 | - | 150 | |
| SFP-127A | 92S040418B1-BLK | 4/4/18 0:00 | SW8270D | Pyrene-d10 | 99 | 50 | - | 150 | |
| SFP-127A | 92S040418B1-BLK | 4/4/18 0:00 | SW8270D | Anthracene-d10 | 90 | 50 | - | 150 | |
| SFP-127A | 92S040418B1-BLK | 4/4/18 0:00 | SW8270D | Benzo(a)pyrene-d12 | 91 | 50 | - | 150 | |
| SFP-127A | 92S040418B1-BLK | 4/4/18 0:00 | SW8270D | Fluorene-d10 | 84 | 50 | - | 150 | |
| SFP-127A | 92S040418B1-BLK | 4/4/18 0:00 | SW8270D | Acenaphthylene-d8 | 89 | 50 | - | 150 | |
| SFP-127A | K040518BL1-BLK | 4/5/18 0:00 | SW8260C | 1,2-Dichloroethane-D4 | 97 | 50 | - | 150 | |
| SFP-127A | K040518BL1-BLK | 4/5/18 0:00 | SW8260C | Toluene-D8 | 98 | 50 | - | 150 | |
| SFP-127A | K040518BL1-BLK | 4/5/18 0:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 101 | 50 | - | 150 | |
| SFP-127A | K040518BL1-BLK | 4/5/18 0:00 | SW8260C | P-Bromofluorobenzene | 98 | 50 | - | 150 | |

Table 6. Surrogate Recovery Summary

*Data Quality Summary: Self-Sustaining Technology for Active Remediation, Bench-Scale Treatability Study Quendall Terminals Superfund Site, Attachment 3*

| Sample Delivery Group | Sample ID | Sample Date | Analysis Method | Analyte | Surrogate Recovery | Acceptance Critiera | Surrogate out |
|---|---|---|---|---|---|---|---|
| SFP-127A | K040518BL1-BLK | 4/5/18 0:00 | SW8260C | 1,4-Difluorobenzene | 101 | 50 - 150 | |
| SFP-127A | K040618BL1-BLK | 4/6/18 0:00 | SW8260C | 1,2-Dichloroethane-D4 | 98 | 50 - 150 | |
| SFP-127A | K040618BL1-BLK | 4/6/18 0:00 | SW8260C | Toluene-D8 | 100 | 50 - 150 | |
| SFP-127A | K040618BL1-BLK | 4/6/18 0:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 103 | 50 - 150 | |
| SFP-127A | K040618BL1-BLK | 4/6/18 0:00 | SW8260C | P-Bromofluorobenzene | 98 | 50 - 150 | |
| SFP-127A | K040618BL1-BLK | 4/6/18 0:00 | SW8260C | 1,4-Difluorobenzene | 100 | 50 - 150 | |
| SFP-127A | TB-2_18134216/18134216 | 3/28/18 12:00 | SW8260C | 1,2-Dichloroethane-D4 | 97 | 50 - 150 | |
| SFP-127A | TB-2_18134216/18134216 | 3/28/18 12:00 | SW8260C | Toluene-D8 | 99 | 50 - 150 | |
| SFP-127A | TB-2_18134216/18134216 | 3/28/18 12:00 | SW8260C | 1,2-Dichlorobenzene-d4 | 103 | 50 - 150 | |
| SFP-127A | TB-2_18134216/18134216 | 3/28/18 12:00 | SW8260C | P-Bromofluorobenzene | 97 | 50 - 150 | |
| SFP-127A | TB-2_18134216/18134216 | 3/28/18 12:00 | SW8260C | 1,4-Difluorobenzene | 100 | 50 - 150 | |
| SFP-127A | TP-01_18124216/18124216 | 3/19/18 10:00 | NWTPH-Gx | 1,4-Difluorobenzene | 92 | 50 - 150 | |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | 4/4/18 4:27 | TO15 | 1,2-Dichloroethane-D4 | 97 | 70 - 130 | |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | 4/4/18 4:27 | TO15 | Toluene-D8 | 101 | 70 - 130 | |
| P1801614 | P180404-LCS-P1801614-4/4/2018/MS13040418LCS1 | 4/4/18 4:27 | TO15 | P-Bromofluorobenzene | 103 | 70 - 130 | |
| P1801614 | P180404-MB-P1801614-4/4/2018/MS13040418MB1 | 4/4/18 3:53 | TO15 | 1,2-Dichloroethane-D4 | 98 | 70 - 130 | |
| P1801614 | P180404-MB-P1801614-4/4/2018/MS13040418MB1 | 4/4/18 3:53 | TO15 | Toluene-D8 | 103 | 70 - 130 | |
| P1801614 | P180404-MB-P1801614-4/4/2018/MS13040418MB1 | 4/4/18 3:53 | TO15 | P-Bromofluorobenzene | 102 | 70 - 130 | |
| P1801614 | TP-1 EMISSIONS/TP-1 Emissions | 3/27/18 20:11 | TO15 | 1,2-Dichloroethane-D4 | 98 | 70 - 130 | |
| P1801614 | TP-1 EMISSIONS/TP-1 Emissions | 3/27/18 20:11 | TO15 | Toluene-D8 | 99 | 70 - 130 | |
| P1801614 | TP-1 EMISSIONS/TP-1 Emissions | 3/27/18 20:11 | TO15 | P-Bromofluorobenzene | 96 | 70 - 130 | |

Notes:

ID = Identifier

# Attachment 4
# Laboratory Reports

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
**T:** +1 805 526 7161
**F:** +1 805 526 7270
**www.alsglobal.com**

# LABORATORY REPORT

April 5, 2018

Bryan Jones
CH2M Hill
2525 Airpark Drive
Redding, CA 96001

**RE: Quendall Treatability Study / 682283.TT.01**

Dear Bryan:

Enclosed are the results of the sample submitted to our laboratory on March 30, 2018. For your reference, these analyses have been assigned our service request number P1801614.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

Kate Kaneko
*By Kate Kaneko at 11:22 am, 04/05/18*

Kate Kaneko
Project Manager

2655 Park Center Dr., Suite A
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**T:** +1 805 526 7161
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**www.alsglobal.com**

Client: CH2M Hill
Project: Quendall Treatability Study / 682283.TT.01

Service Request No: P1801614

## CASE NARRATIVE

The sample was received intact under chain of custody on March 30, 2018 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the sample at the time of sample receipt.

Fixed Gases Analysis

The sample was analyzed for fixed gases (hydrogen, oxygen, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This procedure is described in laboratory SOP VOA-EPA3C. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

Sulfur Analysis

The sample was also analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

Volatile Organic Compound Analysis

The sample was also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

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**www.alsglobal.com**

Client: CH2M Hill
Project: Quendall Treatability Study / 682283.TT.01

Service Request No: P1801614

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The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.1 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*

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**www.alsglobal.com**

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency | Web Site | Number |
|---|---|---|
| Arizona DHS | http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home | AZ0694 |
| Florida DOH (NELAP) | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E871020 |
| Louisiana DEQ (NELAP) | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 05071 |
| Maine DHHS | http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm | 2016036 |
| Minnesota DOH (NELAP) | http://www.health.state.mn.us/accreditation | 1347317 |
| New Jersey DEP (NELAP) | http://www.nj.gov/dep/oqa/ | CA009 |
| New York DOH (NELAP) | http://www.wadsworth.org/labcert/elap/elap.html | 11221 |
| Oregon PHD (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | 4068-005 |
| Pennsylvania DEP | http://www.depweb.state.pa.us/labs | 68-03307 (Registration) |
| PJLA (DoD ELAP) | http://www.pjlabs.com/search-accredited-labs | 65818 (Testing) |
| Texas CEQ (NELAP) | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704413-17-8 |
| Utah DOH (NELAP) | http://health.utah.gov/lab/environmental-lab-certification/ | CA016272017-8 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C946 |

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

# ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: CH2M Hill

Service Request: P1801614

Project ID: Quendall Treatability Study / 682283.TT.01

Date Received: 3/30/2018

Time Received: 09:30

| Client Sample ID | Lab Code | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | 3C Modified - Fxd Gases Can | ASTM D 5504-12 - Sulfur Can | TO-15 - VOC Cans |
|---|---|---|---|---|---|---|---|---|---|---|
| TP-1 Emissions | P1801614-001 | Air | 3/27/2018 | 20:11 | AS01016 | -1.03 | 3.20 | X | X | X |

# Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No. P1801614

ALS Contact: Kate Kanako

Company Name & Address (Reporting Information): The University of Western Ontario CH2M Hill

Project Name: Quendall Treatability Study

Project Number: 682283.TT.01

Project Manager: Joshua Brown

P.O. # / Billing Information: 101001209

Phone: (519) 661-2111 x 88288

Fax:

Email Address for Result Reporting: jbrow227@uwo.ca

Sampler (Print & Sign): Joshua Brown

Analysis Method: CO/$CO_2$, VOCs, $H_2S$, CS, $CS_2$

| Client Sample ID | Laboratory ID Number | Date Collected | Time Collected | Canister ID (Bar code # - AC, SC, etc.) | Flow Controller ID (Bar code # - FC #) | Canister Start Pressure "Hg | Canister End Pressure "Hg/psig | Sample Volume | CO/$CO_2$, VOCs, $H_2S$, CS, $CS_2$ | | Comments e.g. Actual Preservative or specific instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-1 Emissions | 1 | Mar 27 | 1979-20:11 | AS01016 | SOA00096 | -22" Hg | -2" Hg | | ✓ | | |
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Report Tier Levels - please select
Tier I - Results (Default in not specified) ____
Tier II (Results + QC Summaries ____
Tier III (Results + QC & Calibration Summaries) ____
Tier IV (Data Validation Package) 10% Surcharge ____

EDD required YES / No
Type: ____ Units: ____

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

| Relinquished by: (Signature) | Date: Mar 29/18 | Time: 10:00 | Received by: (Signature) | Date: | Time: |
|---|---|---|---|---|---|
| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) 3-30-18 | Date: | Time: 0930 |

Cooler / Blank Temperature ____ °C

# ALS Environmental
## Sample Acceptance Check Form

Client: CH2M Hill  Work order: P1801614
Project: Quendall Treatability Study / 682283.TT.01
Sample(s) received on: 3/30/18  Date opened: 3/30/18  by: ADAVID

*Note:* This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

| | | Yes | No | N/A |
|---|---|---|---|---|
| 1 | Were **sample containers** properly marked with client sample ID? | ☒ | ☐ | ☐ |
| 2 | Did **sample containers** arrive in good condition? | ☒ | ☐ | ☐ |
| 3 | Were **chain-of-custody** papers used and filled out? | ☒ | ☐ | ☐ |
| 4 | Did **sample container labels** and/or tags agree with custody papers? | ☒ | ☐ | ☐ |
| 5 | Was **sample volume** received adequate for analysis? | ☒ | ☐ | ☐ |
| 6 | Are samples within specified holding times? | ☒ | ☐ | ☐ |
| 7 | Was proper **temperature** (thermal preservation) of cooler at receipt adhered to? | ☐ | ☐ | ☒ |
| 8 | Were **custody seals** on outside of cooler/Box/Container? | ☐ | ☒ | ☐ |
| | Location of seal(s)? _____ Sealing Lid? | ☐ | ☐ | ☒ |
| | Were signature and date included? | ☐ | ☐ | ☒ |
| | Were seals intact? | ☐ | ☐ | ☒ |
| 9 | Do containers have appropriate **preservation**, according to method/SOP or Client specified information? | ☐ | ☐ | ☒ |
| | Is there a client indication that the submitted samples are **pH** preserved? | ☐ | ☐ | ☒ |
| | Were **VOA vials** checked for presence/absence of air bubbles? | ☐ | ☐ | ☒ |
| | Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it? | ☐ | ☐ | ☒ |
| 10 | **Tubes:** Are the tubes capped and intact? | ☐ | ☐ | ☒ |
| 11 | **Badges:** Are the badges properly capped and intact? | ☐ | ☐ | ☒ |
| | Are dual bed badges separated and individually capped and intact? | ☐ | ☐ | ☒ |

| Lab Sample ID | Container Description | Required pH * | Received pH | Adjusted pH | VOA Headspace (Presence/Absence) | Receipt / Preservation Comments |
|---|---|---|---|---|---|---|
| P1801614-001.01 | 6.0 L Silonite Can | | | | | |
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Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **TP-1 Emissions** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P1801614-001

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Gilbert Gutierrez
Sample Type: 6.0 L Silonite Canister
Test Notes:
Container ID: AS01016

Date Collected: 3/27/18
Date Received: 3/30/18
Date Analyzed: 4/3/18
Volume(s) Analyzed: 0.10 ml(s)

Initial Pressure (psig): -1.03 Final Pressure (psig): 3.20

Container Dilution Factor: 1.31

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | **Hydrogen** | **0.152** | 0.13 | |
| 7782-44-7 | **Oxygen*** | **14.7** | 0.13 | |
| 7727-37-9 | **Nitrogen** | **78.3** | 0.13 | |
| 630-08-0 | **Carbon Monoxide** | **1.38** | 0.13 | |
| 74-82-8 | Methane | ND | 0.13 | |
| 124-38-9 | **Carbon Dioxide** | **5.47** | 0.13 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **Method Blank** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180403-MB

Test Code: EPA Method 3C Modified Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Gilbert Gutierrez Date Analyzed: 4/03/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | Oxygen* | ND | 0.10 | |
| 7727-37-9 | Nitrogen | ND | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **CH2M Hill**
**Client Sample ID:** **Lab Control Sample** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180403-LCS

Test Code: EPA Method 3C Modified Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Gilbert Gutierrez Date Analyzed: 4/03/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

| CAS # | Compound | Spike Amount ppmV | Result ppmV | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 1333-74-0 | Hydrogen | 39,900 | **40,000** | **100** | 94-107 | |
| 7782-44-7 | Oxygen* | 25,000 | **25,500** | **102** | 98-109 | |
| 7727-37-9 | Nitrogen | 50,000 | **50,400** | **101** | 94-105 | |
| 630-08-0 | Carbon Monoxide | 50,000 | **51,100** | **102** | 98-109 | |
| 74-82-8 | Methane | 40,100 | **41,300** | **103** | 98-110 | |
| 124-38-9 | Carbon Dioxide | 50,000 | **50,000** | **100** | 95-108 | |

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **TP-1 Emissions** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P1801614-001

Test Code: ASTM D 5504-12 Date Collected: 3/27/18
Instrument ID: Agilent 6890A/GC13/SCD Time Collected: 20:11
Analyst: Mike Conejo Date Received: 3/30/18
Sample Type: 6.0 L Silonite Canister Date Analyzed: 4/2/18
Test Notes: Time Analyzed: 13:47
Container ID: AS01016 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.03 Final Pressure (psig): 3.20

Container Dilution Factor: 1.31

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 7783-06-4 | Hydrogen Sulfide | **16** | 9.1 | **11** | 6.6 | |
| 463-58-1 | Carbonyl Sulfide | **15,000** | 16 | **6,200** | 6.6 | |
| 74-93-1 | Methyl Mercaptan | ND | 13 | ND | 6.6 | |
| 75-08-1 | Ethyl Mercaptan | ND | 17 | ND | 6.6 | |
| 75-18-3 | Dimethyl Sulfide | **440** | 17 | **170** | 6.6 | |
| 75-15-0 | Carbon Disulfide | **1,100** | 10 | **370** | 3.3 | |
| 75-33-2 | Isopropyl Mercaptan | ND | 20 | ND | 6.6 | |
| 75-66-1 | tert-Butyl Mercaptan | ND | 24 | ND | 6.6 | |
| 107-03-9 | n-Propyl Mercaptan | ND | 20 | ND | 6.6 | |
| 624-89-5 | Ethyl Methyl Sulfide | **30** | 20 | **9.5** | 6.6 | |
| 110-02-1 | Thiophene | **1,300** | 23 | **380** | 6.6 | |
| 513-44-0 | Isobutyl Mercaptan | ND | 24 | ND | 6.6 | |
| 352-93-2 | Diethyl Sulfide | ND | 24 | ND | 6.6 | |
| 109-79-5 | n-Butyl Mercaptan | ND | 24 | ND | 6.6 | |
| 624-92-0 | Dimethyl Disulfide | **320** | 13 | **83** | 3.3 | |
| 616-44-4 | 3-Methylthiophene | **4,200** | 26 | **1,100** | 6.6 | |
| 110-01-0 | Tetrahydrothiophene | ND | 24 | ND | 6.6 | |
| 638-02-8 | 2,5-Dimethylthiophene | **3,100** | 30 | **670** | 6.6 | |
| 872-55-9 | 2-Ethylthiophene | **6,100** | 30 | **1,300** | 6.6 | |
| 110-81-6 | Diethyl Disulfide | ND | 16 | ND | 3.3 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **Method Blank**
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01**

ALS Project ID: P1801614
ALS Sample ID: P180402-MB

Test Code: ASTM D 5504-12
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Mike Conejo
Sample Type: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Time Collected: NA
Date Received: NA
Date Analyzed: 4/02/18
Time Analyzed: 08:05
Volume(s) Analyzed: 1.0 ml(s)

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 7783-06-4 | Hydrogen Sulfide | ND | 7.0 | ND | 5.0 | |
| 463-58-1 | Carbonyl Sulfide | ND | 12 | ND | 5.0 | |
| 74-93-1 | Methyl Mercaptan | ND | 9.8 | ND | 5.0 | |
| 75-08-1 | Ethyl Mercaptan | ND | 13 | ND | 5.0 | |
| 75-18-3 | Dimethyl Sulfide | ND | 13 | ND | 5.0 | |
| 75-15-0 | Carbon Disulfide | ND | 7.8 | ND | 2.5 | |
| 75-33-2 | Isopropyl Mercaptan | ND | 16 | ND | 5.0 | |
| 75-66-1 | tert-Butyl Mercaptan | ND | 18 | ND | 5.0 | |
| 107-03-9 | n-Propyl Mercaptan | ND | 16 | ND | 5.0 | |
| 624-89-5 | Ethyl Methyl Sulfide | ND | 16 | ND | 5.0 | |
| 110-02-1 | Thiophene | ND | 17 | ND | 5.0 | |
| 513-44-0 | Isobutyl Mercaptan | ND | 18 | ND | 5.0 | |
| 352-93-2 | Diethyl Sulfide | ND | 18 | ND | 5.0 | |
| 109-79-5 | n-Butyl Mercaptan | ND | 18 | ND | 5.0 | |
| 624-92-0 | Dimethyl Disulfide | ND | 9.6 | ND | 2.5 | |
| 616-44-4 | 3-Methylthiophene | ND | 20 | ND | 5.0 | |
| 110-01-0 | Tetrahydrothiophene | ND | 18 | ND | 5.0 | |
| 638-02-8 | 2,5-Dimethylthiophene | ND | 23 | ND | 5.0 | |
| 872-55-9 | 2-Ethylthiophene | ND | 23 | ND | 5.0 | |
| 110-81-6 | Diethyl Disulfide | ND | 12 | ND | 2.5 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **CH2M Hill**
**Client Sample ID:** **Lab Control Sample** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180402-LCS

Test Code: ASTM D 5504-12 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 4/02/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

| CAS # | Compound | Spike Amount ppbV | Result ppbV | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 7783-06-4 | Hydrogen Sulfide | 1,000 | **949** | **95** | 81-141 | |
| 463-58-1 | Carbonyl Sulfide | 1,000 | **946** | **95** | 81-147 | |
| 74-93-1 | Methyl Mercaptan | 1,000 | **995** | **100** | 80-144 | |

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **TP-1 Emissions** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P1801614-001

Test Code: EPA TO-15 Modified Date Collected: 3/27/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: 3/30/18
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.00060 Liter(s)
Test Notes:
Container ID: AS01016

Initial Pressure (psig): -1.03 Final Pressure (psig): 3.20

Container Dilution Factor: 1.31

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 115-07-1 | Propene | **8,500** | 1,100 | **4,900** | 630 | |
| 75-71-8 | Dichlorodifluoromethane (CFC 12) | ND | 1,100 | ND | 220 | |
| 74-87-3 | Chloromethane | **3,800** | 1,100 | **1,800** | 530 | |
| 76-14-2 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND | 1,100 | ND | 160 | |
| 75-01-4 | Vinyl Chloride | ND | 1,100 | ND | 430 | |
| 106-99-0 | 1,3-Butadiene | ND | 1,100 | ND | 490 | |
| 74-83-9 | Bromomethane | ND | 1,100 | ND | 280 | |
| 75-00-3 | Chloroethane | ND | 1,100 | ND | 410 | |
| 64-17-5 | Ethanol | ND | 11,000 | ND | 5,800 | |
| 75-05-8 | Acetonitrile | **15,000** | 1,100 | **8,900** | 650 | |
| 107-02-8 | Acrolein | **6,500** | 4,400 | **2,900** | 1,900 | |
| 67-64-1 | Acetone | **15,000** | 11,000 | **6,400** | 4,600 | |
| 75-69-4 | Trichlorofluoromethane (CFC 11) | ND | 1,100 | ND | 190 | |
| 67-63-0 | 2-Propanol (Isopropyl Alcohol) | ND | 11,000 | ND | 4,400 | |
| 107-13-1 | Acrylonitrile | **2,400** | 1,100 | **1,100** | 500 | |
| 75-35-4 | 1,1-Dichloroethene | ND | 1,100 | ND | 280 | |
| 75-09-2 | Methylene Chloride | ND | 1,100 | ND | 310 | |
| 107-05-1 | 3-Chloro-1-propene (Allyl Chloride) | ND | 1,100 | ND | 350 | |
| 76-13-1 | Trichlorotrifluoroethane (CFC 113) | ND | 1,100 | ND | 140 | |
| 75-15-0 | Carbon Disulfide | ND | 11,000 | ND | 3,500 | |
| 156-60-5 | trans-1,2-Dichloroethene | ND | 1,100 | ND | 280 | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1,100 | ND | 270 | |
| 1634-04-4 | Methyl tert-Butyl Ether | ND | 1,100 | ND | 300 | |
| 108-05-4 | Vinyl Acetate | ND | 11,000 | ND | 3,100 | |
| 78-93-3 | 2-Butanone (MEK) | ND | 11,000 | ND | 3,700 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **TP-1 Emissions** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P1801614-001

Test Code: EPA TO-15 Modified Date Collected: 3/27/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: 3/30/18
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.00060 Liter(s)
Test Notes:
Container ID: AS01016

Initial Pressure (psig): -1.03 Final Pressure (psig): 3.20

Container Dilution Factor: 1.31

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 156-59-2 | cis-1,2-Dichloroethene | ND | 1,100 | ND | 280 | |
| 141-78-6 | Ethyl Acetate | ND | 2,200 | ND | 610 | |
| 110-54-3 | n-Hexane | ND | 1,100 | ND | 310 | |
| 67-66-3 | Chloroform | ND | 1,100 | ND | 220 | |
| 109-99-9 | Tetrahydrofuran (THF) | ND | 1,100 | ND | 370 | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1,100 | ND | 270 | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1,100 | ND | 200 | |
| 71-43-2 | Benzene | **37,000** | 1,100 | **12,000** | 340 | |
| 56-23-5 | Carbon Tetrachloride | ND | 1,100 | ND | 170 | |
| 110-82-7 | Cyclohexane | ND | 2,200 | ND | 630 | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1,100 | ND | 240 | |
| 75-27-4 | Bromodichloromethane | ND | 1,100 | ND | 160 | |
| 79-01-6 | Trichloroethene | ND | 1,100 | ND | 200 | |
| 123-91-1 | 1,4-Dioxane | ND | 1,100 | ND | 300 | |
| 80-62-6 | Methyl Methacrylate | ND | 2,200 | ND | 530 | |
| 142-82-5 | n-Heptane | ND | 1,100 | ND | 270 | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1,100 | ND | 240 | |
| 108-10-1 | 4-Methyl-2-pentanone | ND | 1,100 | ND | 270 | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1,100 | ND | 240 | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1,100 | ND | 200 | |
| 108-88-3 | Toluene | **200,000** | 1,100 | **53,000** | 290 | |
| 591-78-6 | 2-Hexanone | ND | 1,100 | ND | 270 | |
| 124-48-1 | Dibromochloromethane | ND | 1,100 | ND | 130 | |
| 106-93-4 | 1,2-Dibromoethane | ND | 1,100 | ND | 140 | |
| 123-86-4 | n-Butyl Acetate | ND | 1,100 | ND | 230 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **TP-1 Emissions** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P1801614-001

Test Code: EPA TO-15 Modified Date Collected: 3/27/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: 3/30/18
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.00060 Liter(s)
Test Notes:
Container ID: AS01016

Initial Pressure (psig): -1.03 Final Pressure (psig): 3.20

Container Dilution Factor: 1.31

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 111-65-9 | n-Octane | ND | 1,100 | ND | 230 | |
| 127-18-4 | Tetrachloroethene | ND | 1,100 | ND | 160 | |
| 108-90-7 | Chlorobenzene | ND | 1,100 | ND | 240 | |
| 100-41-4 | Ethylbenzene | **160,000** | 1,100 | **36,000** | 250 | |
| 179601-23-1 | m,p-Xylenes | **240,000** | 2,200 | **56,000** | 500 | |
| 75-25-2 | Bromoform | ND | 1,100 | ND | 110 | |
| 100-42-5 | Styrene | ND | 1,100 | ND | 260 | |
| 95-47-6 | o-Xylene | **100,000** | 1,100 | **23,000** | 250 | |
| 111-84-2 | n-Nonane | **1,500** | 1,100 | **290** | 210 | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1,100 | ND | 160 | |
| 98-82-8 | Cumene | **12,000** | 1,100 | **2,400** | 220 | |
| 80-56-8 | alpha-Pinene | ND | 1,100 | ND | 200 | |
| 103-65-1 | n-Propylbenzene | **4,800** | 1,100 | **970** | 220 | |
| 622-96-8 | 4-Ethyltoluene | **23,000** | 1,100 | **4,800** | 220 | |
| 108-67-8 | 1,3,5-Trimethylbenzene | **17,000** | 1,100 | **3,400** | 220 | |
| 95-63-6 | 1,2,4-Trimethylbenzene | **36,000** | 1,100 | **7,300** | 220 | |
| 100-44-7 | Benzyl Chloride | ND | 2,200 | ND | 420 | |
| 541-73-1 | 1,3-Dichlorobenzene | ND | 1,100 | ND | 180 | |
| 106-46-7 | 1,4-Dichlorobenzene | ND | 1,100 | ND | 180 | |
| 95-50-1 | 1,2-Dichlorobenzene | ND | 1,100 | ND | 180 | |
| 5989-27-5 | d-Limonene | ND | 1,100 | ND | 200 | |
| 96-12-8 | 1,2-Dibromo-3-chloropropane | ND | 1,100 | ND | 110 | |
| 120-82-1 | 1,2,4-Trichlorobenzene | ND | 1,100 | ND | 150 | |
| 91-20-3 | Naphthalene | ND | 1,100 | ND | 210 | |
| 87-68-3 | Hexachlorobutadiene | ND | 1,100 | ND | 100 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **Method Blank** — ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** — ALS Sample ID: P180404-MB

Test Code: EPA TO-15 Modified — Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 — Date Received: NA
Analyst: Raneem Sahtah — Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister — Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 115-07-1 | Propene | ND | 0.50 | ND | 0.29 | |
| 75-71-8 | Dichlorodifluoromethane (CFC 12) | ND | 0.50 | ND | 0.10 | |
| 74-87-3 | Chloromethane | ND | 0.50 | ND | 0.24 | |
| 76-14-2 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND | 0.50 | ND | 0.072 | |
| 75-01-4 | Vinyl Chloride | ND | 0.50 | ND | 0.20 | |
| 106-99-0 | 1,3-Butadiene | ND | 0.50 | ND | 0.23 | |
| 74-83-9 | Bromomethane | ND | 0.50 | ND | 0.13 | |
| 75-00-3 | Chloroethane | ND | 0.50 | ND | 0.19 | |
| 64-17-5 | Ethanol | ND | 5.0 | ND | 2.7 | |
| 75-05-8 | Acetonitrile | ND | 0.50 | ND | 0.30 | |
| 107-02-8 | Acrolein | ND | 2.0 | ND | 0.87 | |
| 67-64-1 | Acetone | ND | 5.0 | ND | 2.1 | |
| 75-69-4 | Trichlorofluoromethane (CFC 11) | ND | 0.50 | ND | 0.089 | |
| 67-63-0 | 2-Propanol (Isopropyl Alcohol) | ND | 5.0 | ND | 2.0 | |
| 107-13-1 | Acrylonitrile | ND | 0.50 | ND | 0.23 | |
| 75-35-4 | 1,1-Dichloroethene | ND | 0.50 | ND | 0.13 | |
| 75-09-2 | Methylene Chloride | ND | 0.50 | ND | 0.14 | |
| 107-05-1 | 3-Chloro-1-propene (Allyl Chloride) | ND | 0.50 | ND | 0.16 | |
| 76-13-1 | Trichlorotrifluoroethane (CFC 113) | ND | 0.50 | ND | 0.065 | |
| 75-15-0 | Carbon Disulfide | ND | 5.0 | ND | 1.6 | |
| 156-60-5 | trans-1,2-Dichloroethene | ND | 0.50 | ND | 0.13 | |
| 75-34-3 | 1,1-Dichloroethane | ND | 0.50 | ND | 0.12 | |
| 1634-04-4 | Methyl tert-Butyl Ether | ND | 0.50 | ND | 0.14 | |
| 108-05-4 | Vinyl Acetate | ND | 5.0 | ND | 1.4 | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | ND | 1.7 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **Method Blank** — ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** — ALS Sample ID: P180404-MB

Test Code: EPA TO-15 Modified — Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 — Date Received: NA
Analyst: Raneem Sahtah — Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister — Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 156-59-2 | cis-1,2-Dichloroethene | ND | 0.50 | ND | 0.13 | |
| 141-78-6 | Ethyl Acetate | ND | 1.0 | ND | 0.28 | |
| 110-54-3 | n-Hexane | ND | 0.50 | ND | 0.14 | |
| 67-66-3 | Chloroform | ND | 0.50 | ND | 0.10 | |
| 109-99-9 | Tetrahydrofuran (THF) | ND | 0.50 | ND | 0.17 | |
| 107-06-2 | 1,2-Dichloroethane | ND | 0.50 | ND | 0.12 | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 0.50 | ND | 0.092 | |
| 71-43-2 | Benzene | ND | 0.50 | ND | 0.16 | |
| 56-23-5 | Carbon Tetrachloride | ND | 0.50 | ND | 0.080 | |
| 110-82-7 | Cyclohexane | ND | 1.0 | ND | 0.29 | |
| 78-87-5 | 1,2-Dichloropropane | ND | 0.50 | ND | 0.11 | |
| 75-27-4 | Bromodichloromethane | ND | 0.50 | ND | 0.075 | |
| 79-01-6 | Trichloroethene | ND | 0.50 | ND | 0.093 | |
| 123-91-1 | 1,4-Dioxane | ND | 0.50 | ND | 0.14 | |
| 80-62-6 | Methyl Methacrylate | ND | 1.0 | ND | 0.24 | |
| 142-82-5 | n-Heptane | ND | 0.50 | ND | 0.12 | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 0.50 | ND | 0.11 | |
| 108-10-1 | 4-Methyl-2-pentanone | ND | 0.50 | ND | 0.12 | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 0.50 | ND | 0.11 | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 0.50 | ND | 0.092 | |
| 108-88-3 | Toluene | ND | 0.50 | ND | 0.13 | |
| 591-78-6 | 2-Hexanone | ND | 0.50 | ND | 0.12 | |
| 124-48-1 | Dibromochloromethane | ND | 0.50 | ND | 0.059 | |
| 106-93-4 | 1,2-Dibromoethane | ND | 0.50 | ND | 0.065 | |
| 123-86-4 | n-Butyl Acetate | ND | 0.50 | ND | 0.11 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill**
**Client Sample ID:** **Method Blank**
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01**

ALS Project ID: P1801614
ALS Sample ID: P180404-MB

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13
Analyst: Raneem Sahtah
Sample Type: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 4/4/18
Volume(s) Analyzed: 1.00 Liter(s)

Container Dilution Factor: 1.00

| CAS # | Compound | Result µg/m³ | MRL µg/m³ | Result ppbV | MRL ppbV | Data Qualifier |
|---|---|---|---|---|---|---|
| 111-65-9 | n-Octane | ND | 0.50 | ND | 0.11 | |
| 127-18-4 | Tetrachloroethene | ND | 0.50 | ND | 0.074 | |
| 108-90-7 | Chlorobenzene | ND | 0.50 | ND | 0.11 | |
| 100-41-4 | Ethylbenzene | ND | 0.50 | ND | 0.12 | |
| 179601-23-1 | m,p-Xylenes | ND | 1.0 | ND | 0.23 | |
| 75-25-2 | Bromoform | ND | 0.50 | ND | 0.048 | |
| 100-42-5 | Styrene | ND | 0.50 | ND | 0.12 | |
| 95-47-6 | o-Xylene | ND | 0.50 | ND | 0.12 | |
| 111-84-2 | n-Nonane | ND | 0.50 | ND | 0.095 | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 0.50 | ND | 0.073 | |
| 98-82-8 | Cumene | ND | 0.50 | ND | 0.10 | |
| 80-56-8 | alpha-Pinene | ND | 0.50 | ND | 0.090 | |
| 103-65-1 | n-Propylbenzene | ND | 0.50 | ND | 0.10 | |
| 622-96-8 | 4-Ethyltoluene | ND | 0.50 | ND | 0.10 | |
| 108-67-8 | 1,3,5-Trimethylbenzene | ND | 0.50 | ND | 0.10 | |
| 95-63-6 | 1,2,4-Trimethylbenzene | ND | 0.50 | ND | 0.10 | |
| 100-44-7 | Benzyl Chloride | ND | 1.0 | ND | 0.19 | |
| 541-73-1 | 1,3-Dichlorobenzene | ND | 0.50 | ND | 0.083 | |
| 106-46-7 | 1,4-Dichlorobenzene | ND | 0.50 | ND | 0.083 | |
| 95-50-1 | 1,2-Dichlorobenzene | ND | 0.50 | ND | 0.083 | |
| 5989-27-5 | d-Limonene | ND | 0.50 | ND | 0.090 | |
| 96-12-8 | 1,2-Dibromo-3-chloropropane | ND | 0.50 | ND | 0.052 | |
| 120-82-1 | 1,2,4-Trichlorobenzene | ND | 0.50 | ND | 0.067 | |
| 91-20-3 | Naphthalene | ND | 0.50 | ND | 0.095 | |
| 87-68-3 | Hexachlorobutadiene | ND | 0.50 | ND | 0.047 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS



**Client:** **CH2M Hill**
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Project ID: P1801614

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date(s) Collected: 3/27/18
Analyst: Raneem Sahtah Date(s) Received: 3/30/18
Sample Type: 6.0 L Silonite Canister(s) Date(s) Analyzed: 4/4/18
Test Notes:

| Client Sample ID | ALS Sample ID | 1,2-Dichloroethane-d4 Percent Recovered | Toluene-d8 Percent Recovered | Bromofluorobenzene Percent Recovered | Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| Method Blank | P180404-MB | **98** | **103** | **102** | 70-130 | |
| Lab Control Sample | P180404-LCS | **97** | **101** | **103** | 70-130 | |
| TP-1 Emissions | P1801614-001 | **98** | **99** | **96** | 70-130 | |

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **CH2M Hill**
**Client Sample ID:** **Lab Control Sample** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180404-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: NA
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

| CAS # | Compound | Spike Amount µg/m³ | Result µg/m³ | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 115-07-1 | Propene | 210 | **161** | **77** | 54-133 | |
| 75-71-8 | Dichlorodifluoromethane (CFC 12) | 213 | **176** | **83** | 64-115 | |
| 74-87-3 | Chloromethane | 210 | **172** | **82** | 47-140 | |
| 76-14-2 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 211 | **187** | **89** | 60-112 | |
| 75-01-4 | Vinyl Chloride | 211 | **185** | **88** | 63-127 | |
| 106-99-0 | 1,3-Butadiene | 210 | **204** | **97** | 57-149 | |
| 74-83-9 | Bromomethane | 210 | **187** | **89** | 63-132 | |
| 75-00-3 | Chloroethane | 210 | **185** | **88** | 68-129 | |
| 64-17-5 | Ethanol | 1,040 | **934** | **90** | 62-131 | |
| 75-05-8 | Acetonitrile | 210 | **201** | **96** | 56-136 | |
| 107-02-8 | Acrolein | 209 | **192** | **92** | 60-132 | |
| 67-64-1 | Acetone | 1,050 | **867** | **83** | 63-124 | |
| 75-69-4 | Trichlorofluoromethane (CFC 11) | 208 | **179** | **86** | 65-113 | |
| 67-63-0 | 2-Propanol (Isopropyl Alcohol) | 422 | **378** | **90** | 62-135 | |
| 107-13-1 | Acrylonitrile | 212 | **212** | **100** | 68-138 | |
| 75-35-4 | 1,1-Dichloroethene | 213 | **188** | **88** | 72-118 | |
| 75-09-2 | Methylene Chloride | 213 | **172** | **81** | 67-116 | |
| 107-05-1 | 3-Chloro-1-propene (Allyl Chloride) | 212 | **196** | **92** | 61-143 | |
| 76-13-1 | Trichlorotrifluoroethane (CFC 113) | 214 | **189** | **88** | 68-113 | |
| 75-15-0 | Carbon Disulfide | 214 | **176** | **82** | 68-120 | |
| 156-60-5 | trans-1,2-Dichloroethene | 214 | **220** | **103** | 71-125 | |
| 75-34-3 | 1,1-Dichloroethane | 212 | **181** | **85** | 68-118 | |
| 1634-04-4 | Methyl tert-Butyl Ether | 213 | **186** | **87** | 60-123 | |
| 108-05-4 | Vinyl Acetate | 1,060 | **1080** | **102** | 73-135 | |
| 78-93-3 | 2-Butanone (MEK) | 212 | **205** | **97** | 70-129 | |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **CH2M Hill**
**Client Sample ID:** **Lab Control Sample** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180404-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: NA
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

| CAS # | Compound | Spike Amount µg/m³ | Result µg/m³ | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 156-59-2 | cis-1,2-Dichloroethene | 212 | **190** | **90** | 69-121 | |
| 141-78-6 | Ethyl Acetate | 426 | **389** | **91** | 66-140 | |
| 110-54-3 | n-Hexane | 213 | **167** | **78** | 61-124 | |
| 67-66-3 | Chloroform | 212 | **185** | **87** | 69-113 | |
| 109-99-9 | Tetrahydrofuran (THF) | 212 | **176** | **83** | 66-121 | |
| 107-06-2 | 1,2-Dichloroethane | 212 | **198** | **93** | 62-120 | |
| 71-55-6 | 1,1,1-Trichloroethane | 212 | **188** | **89** | 65-116 | |
| 71-43-2 | Benzene | 213 | **186** | **87** | 66-111 | |
| 56-23-5 | Carbon Tetrachloride | 214 | **196** | **92** | 64-122 | |
| 110-82-7 | Cyclohexane | 425 | **356** | **84** | 69-115 | |
| 78-87-5 | 1,2-Dichloropropane | 212 | **181** | **85** | 69-121 | |
| 75-27-4 | Bromodichloromethane | 214 | **169** | **79** | 69-123 | |
| 79-01-6 | Trichloroethene | 212 | **193** | **91** | 69-112 | |
| 123-91-1 | 1,4-Dioxane | 213 | **195** | **92** | 74-123 | |
| 80-62-6 | Methyl Methacrylate | 424 | **418** | **99** | 75-125 | |
| 142-82-5 | n-Heptane | 213 | **177** | **83** | 68-118 | |
| 10061-01-5 | cis-1,3-Dichloropropene | 208 | **213** | **102** | 74-129 | |
| 108-10-1 | 4-Methyl-2-pentanone | 213 | **203** | **95** | 66-138 | |
| 10061-02-6 | trans-1,3-Dichloropropene | 213 | **224** | **105** | 75-130 | |
| 79-00-5 | 1,1,2-Trichloroethane | 212 | **205** | **97** | 73-117 | |
| 108-88-3 | Toluene | 211 | **185** | **88** | 66-114 | |
| 591-78-6 | 2-Hexanone | 211 | **201** | **95** | 58-146 | |
| 124-48-1 | Dibromochloromethane | 212 | **222** | **105** | 67-130 | |
| 106-93-4 | 1,2-Dibromoethane | 211 | **245** | **116** | 70-127 | |
| 123-86-4 | n-Butyl Acetate | 215 | **222** | **103** | 62-140 | |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **CH2M Hill**
**Client Sample ID:** **Lab Control Sample** ALS Project ID: P1801614
**Client Project ID:** **Quendall Treatability Study / 682283.TT.01** ALS Sample ID: P180404-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Date Received: NA
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

| CAS # | Compound | Spike Amount µg/m³ | Result µg/m³ | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 111-65-9 | n-Octane | 212 | **178** | **84** | 65-121 | |
| 127-18-4 | Tetrachloroethene | 212 | **201** | **95** | 62-119 | |
| 108-90-7 | Chlorobenzene | 212 | **195** | **92** | 66-115 | |
| 100-41-4 | Ethylbenzene | 212 | **193** | **91** | 69-117 | |
| 179601-23-1 | m,p-Xylenes | 424 | **382** | **90** | 67-117 | |
| 75-25-2 | Bromoform | 212 | **237** | **112** | 67-135 | |
| 100-42-5 | Styrene | 211 | **220** | **104** | 70-128 | |
| 95-47-6 | o-Xylene | 211 | **195** | **92** | 67-118 | |
| 111-84-2 | n-Nonane | 212 | **176** | **83** | 61-127 | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | 212 | **201** | **95** | 70-125 | |
| 98-82-8 | Cumene | 212 | **194** | **92** | 68-116 | |
| 80-56-8 | alpha-Pinene | 213 | **200** | **94** | 69-122 | |
| 103-65-1 | n-Propylbenzene | 214 | **199** | **93** | 70-118 | |
| 622-96-8 | 4-Ethyltoluene | 211 | **200** | **95** | 69-124 | |
| 108-67-8 | 1,3,5-Trimethylbenzene | 212 | **185** | **87** | 65-117 | |
| 95-63-6 | 1,2,4-Trimethylbenzene | 212 | **196** | **92** | 67-124 | |
| 100-44-7 | Benzyl Chloride | 212 | **272** | **128** | 75-142 | |
| 541-73-1 | 1,3-Dichlorobenzene | 212 | **223** | **105** | 70-124 | |
| 106-46-7 | 1,4-Dichlorobenzene | 214 | **212** | **99** | 63-124 | |
| 95-50-1 | 1,2-Dichlorobenzene | 214 | **220** | **103** | 66-125 | |
| 5989-27-5 | d-Limonene | 213 | **199** | **93** | 64-135 | |
| 96-12-8 | 1,2-Dibromo-3-chloropropane | 210 | **244** | **116** | 73-136 | |
| 120-82-1 | 1,2,4-Trichlorobenzene | 218 | **256** | **117** | 70-141 | |
| 91-20-3 | Naphthalene | 209 | **240** | **115** | 71-146 | |
| 87-68-3 | Hexachlorobutadiene | 212 | **214** | **101** | 63-126 | |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **CH2M Hill** ALS Project ID: P1801614

**Client Project ID:** **Quendall Treatability Study / 682283.TT.01**

## Internal Standard Area and RT Summary

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13 Lab File ID: 04041801.D
Analyst: Raneem Sahtah Date Analyzed: 4/4/18
Sample Type: 6.0 L Silonite Canister(s) Time Analyzed: 01:37
Test Notes:

| | | IS1 (BCM) | | | IS2 (DFB) | | | IS3 (CBZ) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | AREA | # | RT | # | AREA | # | RT | # | AREA | # | RT | # |
| | **24 Hour Standard** | 81978 | | 11.14 | | 403641 | | 13.23 | | 132749 | | 17.51 | |
| | **Upper Limit** | 114769 | | 11.47 | | 565097 | | 13.56 | | 185849 | | 17.84 | |
| | **Lower Limit** | 49187 | | 10.81 | | 242185 | | 12.90 | | 79649 | | 17.18 | |
| | **Client Sample ID** | | | | | | | | | | | | |
| 01 | Method Blank | 74192 | | 11.13 | | 379542 | | 13.21 | | 122521 | | 17.51 | |
| 02 | Lab Control Sample | 79767 | | 11.14 | | 397520 | | 13.23 | | 128838 | | 17.51 | |
| 03 | TP-1 Emissions | 98191 | | 11.13 | | 484517 | | 13.22 | | 163923 | | 17.51 | |
| 04 | | | | | | | | | | | | | |
| 05 | | | | | | | | | | | | | |
| 06 | | | | | | | | | | | | | |
| 07 | | | | | | | | | | | | | |
| 08 | | | | | | | | | | | | | |
| 09 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = 140% of internal standard area
AREA LOWER LIMIT = 60% of internal standard area
RT UPPER LIMIT = 0.33 minutes of internal standard RT
RT LOWER LIMIT = 0.33 minutes of internal standard RT

# Column used to flag values outside QC limits with an I.
I = Internal standard not within the specified limits.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031821.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 1:55 pm
Operator : GG
Sample : P1801614-001
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 11:56:55 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Hydrogen | 0.726 | 1533 | 1130.072 | ppm | |
| 2) | Oxygen | 2.257 | 167469 | 109575.374 | ppm | |
| 3) | Nitrogen | 2.396 | 1037168 | 583451.141 | ppm | |
| 4) | Carbon Monoxide | 3.157 | 17614 | 10272.539 | ppm | m |
| 5) | Methane | 0.000 | 0 | N.D. | ppm | |
| 6) | Carbon Dioxide | 6.808 | 82995 | 40773.366 | ppm | |

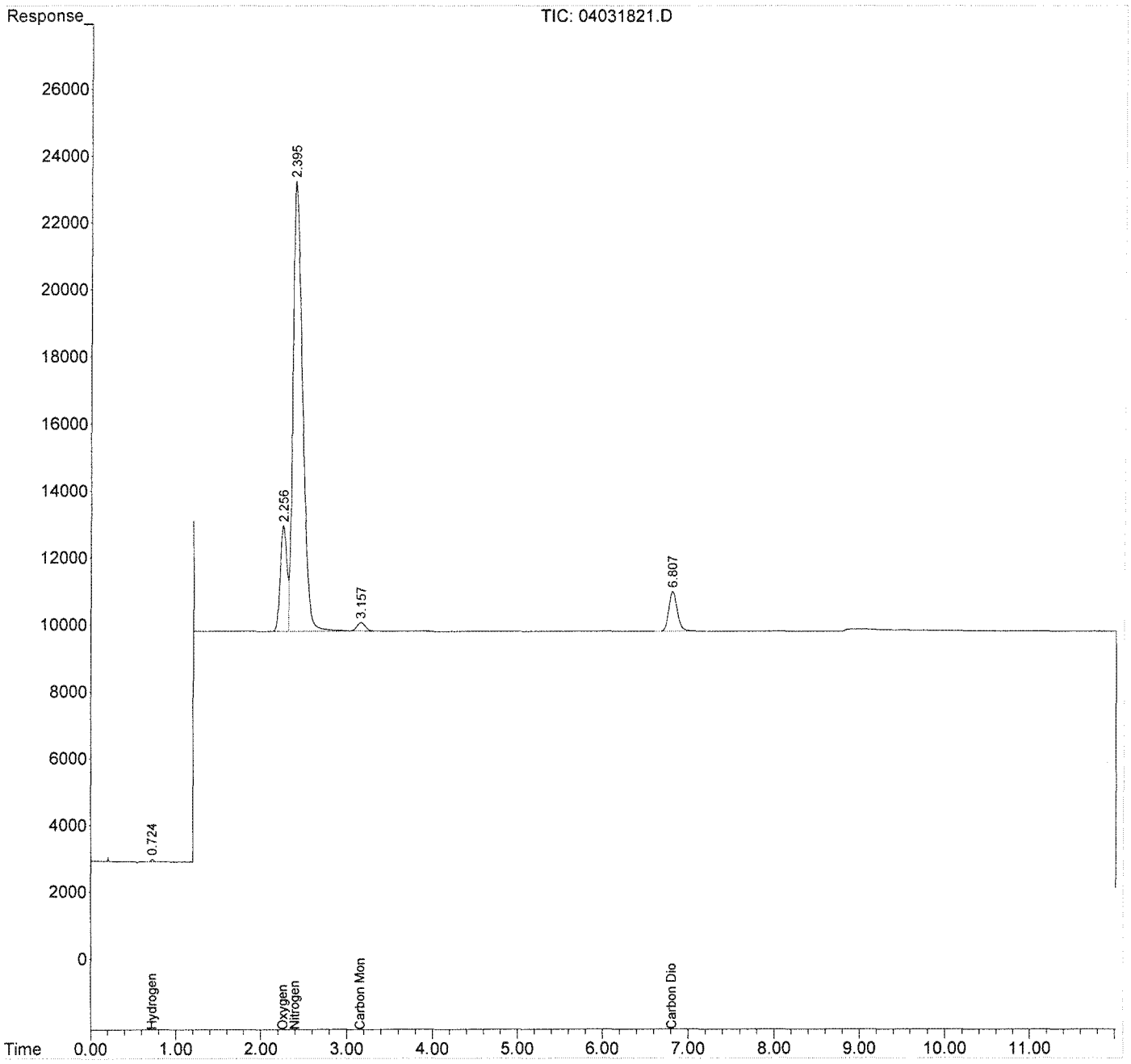
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031821.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 1:55 pm
Operator : GG
Sample : P1801614-001
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 11:56:55 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

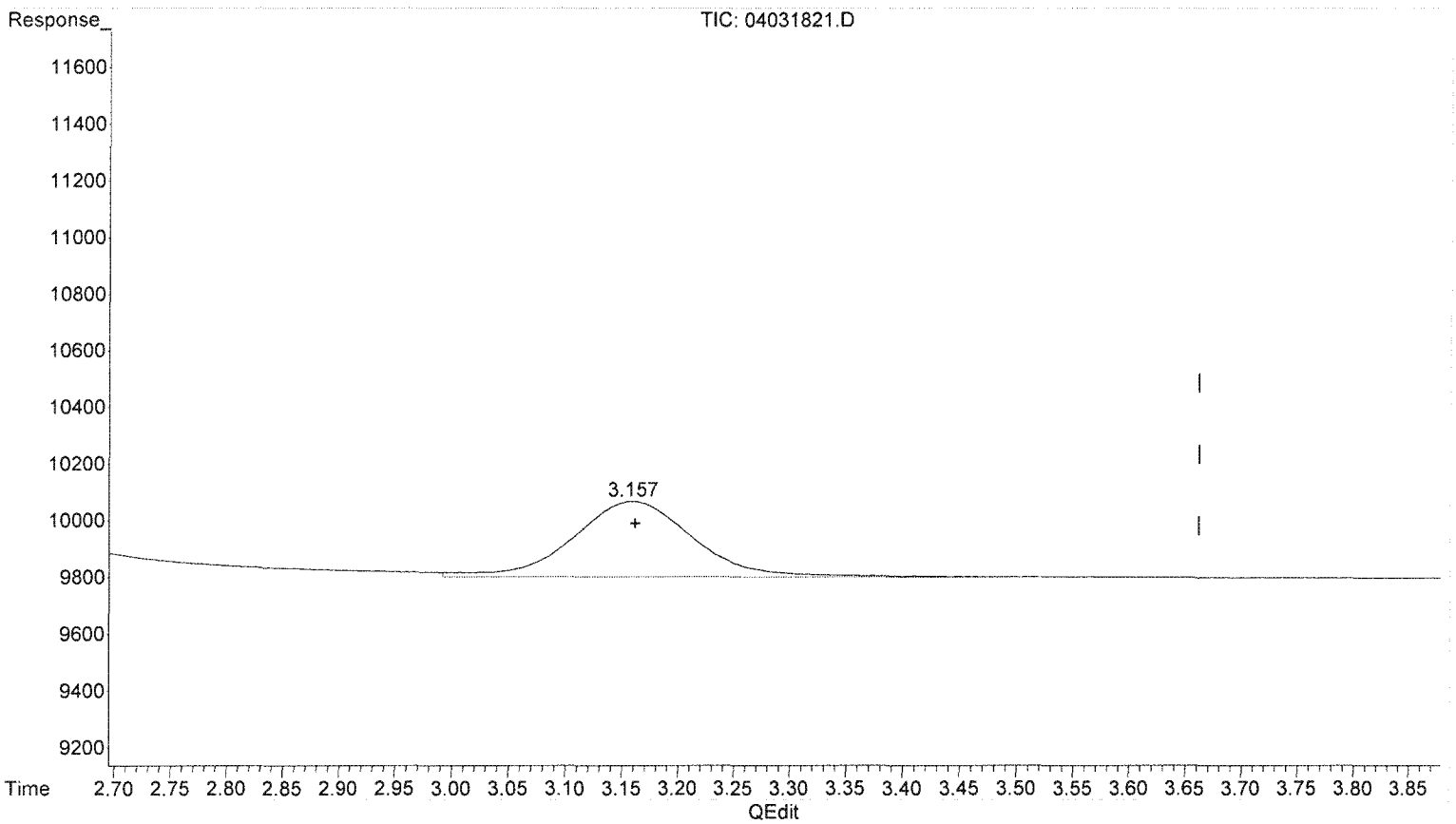


Quantitation Report (Qedit)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031821.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 1:55 pm
Operator : GG
Sample : P1801614-001
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 11:56:55 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :




(4) Carbon Monoxide

3.160min 11631.174 ppm

response 19944

(+) = Expected Retention Time

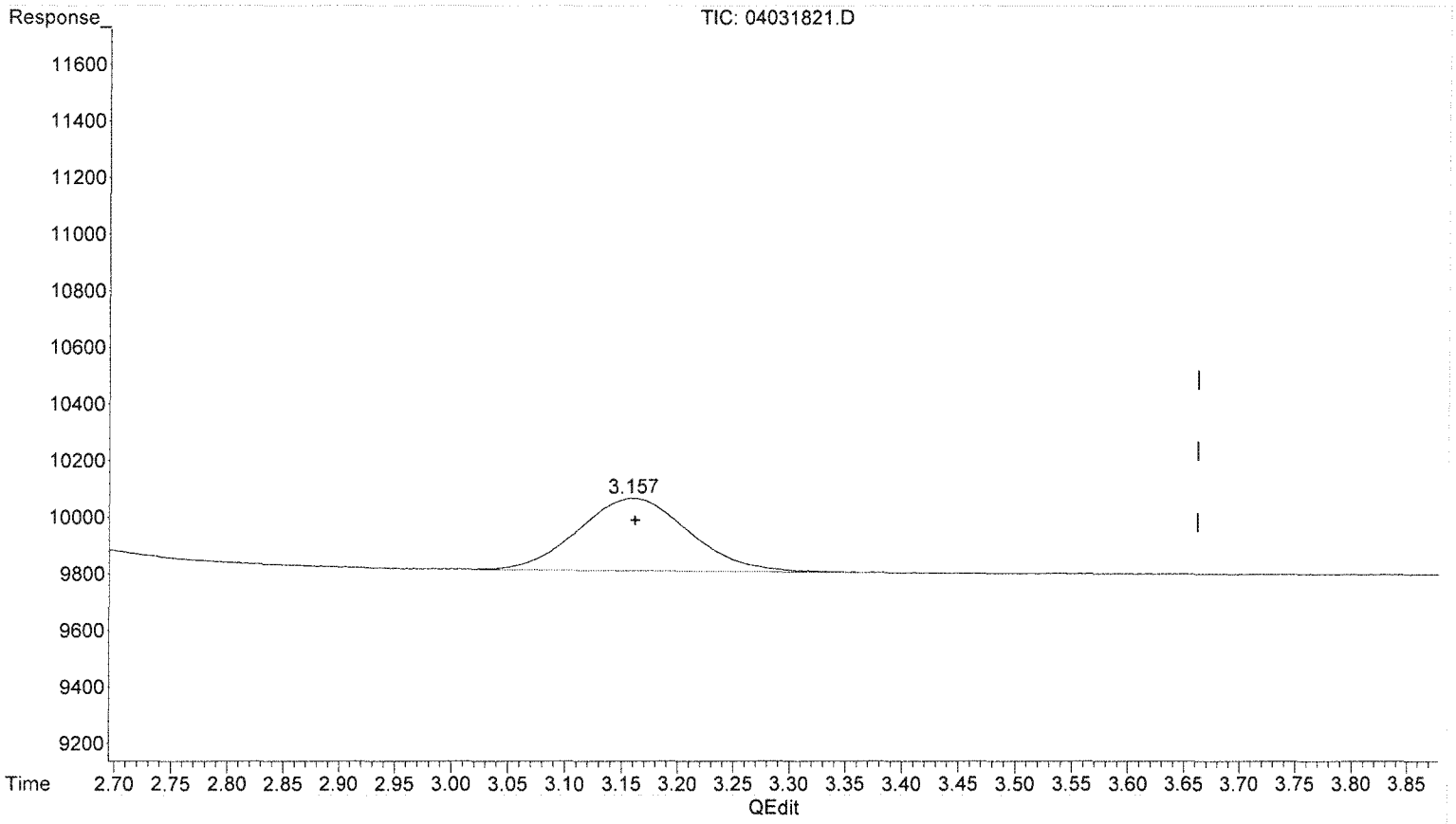
3C012417.M Wed Apr 04 12:00:49 2018

Quantitation Report (Qedit)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031821.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 1:55 pm
Operator : GG
Sample : P1801614-001
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 11:56:55 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :




(4) Carbon Monoxide
3.157min 10272.539 ppm m
response 17614

BLC 4/4/18

4/4/18

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031802.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 7:26 am
Operator : GG
Sample : MB
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:25:49 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.000 | 0 | N.D. | ppm |
| 2) | Oxygen | 0.000 | 0 | N.D. | ppm |
| 3) | Nitrogen | 0.000 | 0 | N.D. | ppm |
| 4) | Carbon Monoxide | 0.000 | 0 | N.D. | ppm |
| 5) | Methane | 0.000 | 0 | N.D. | ppm |
| 6) | Carbon Dioxide | 0.000 | 0 | N.D. | ppm |

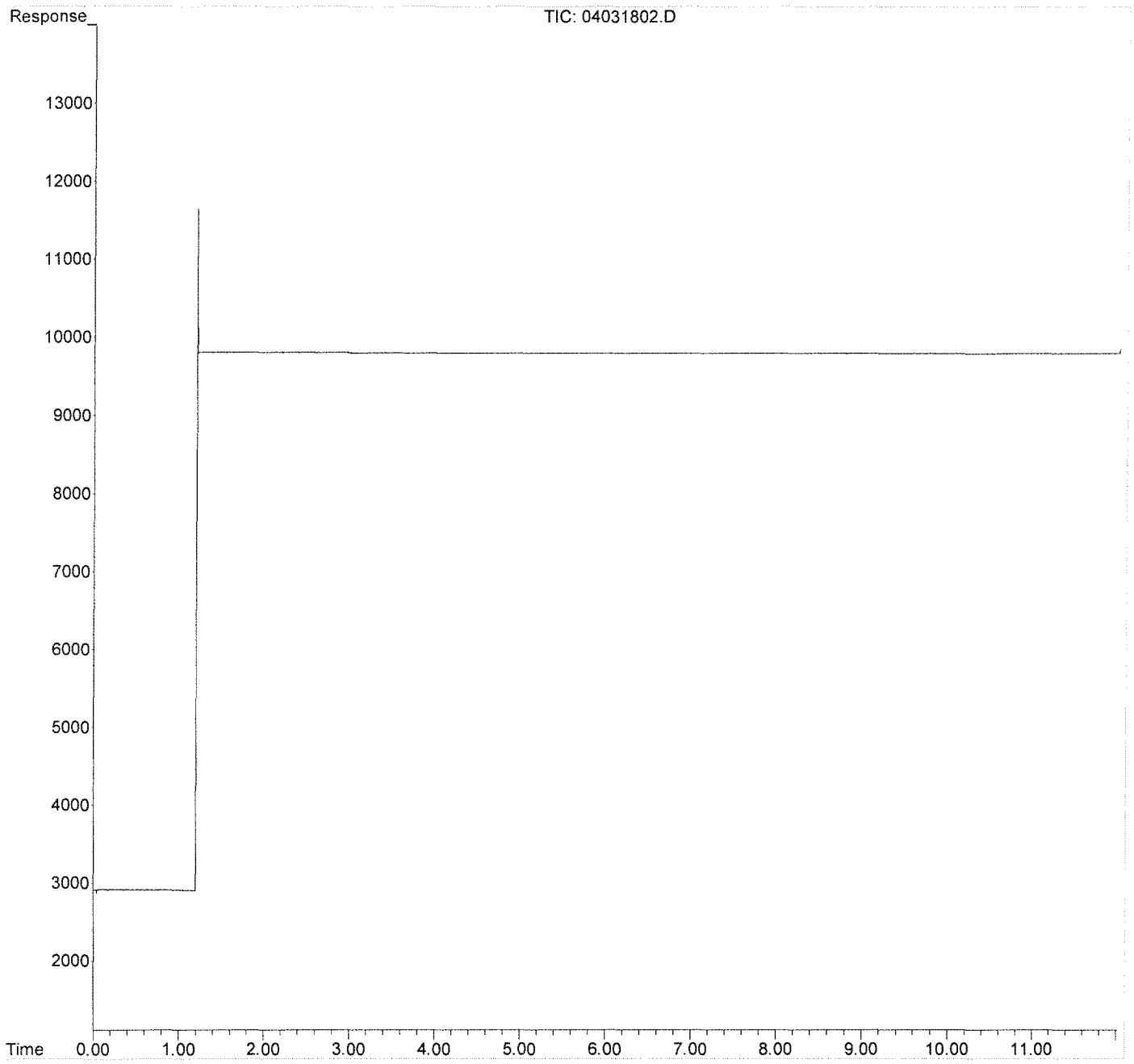
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031802.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 7:26 am
Operator : GG
Sample : MB
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:25:49 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031804.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 8:07 am
Operator : GG
Sample : LCS S32-02151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:28:47 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.733 | 54218 | 39966.339 | ppm |
| 2) | Oxygen | 2.299 | 39027 | 25535.382 | ppm |
| 3) | Nitrogen | 2.475 | 89606 | 50406.995 | ppm |
| 4) | Carbon Monoxide | 3.164 | 87702 | 51147.627 | ppm |
| 5) | Methane | 5.152 | 52779 | 41303.729 | ppm |
| 6) | Carbon Dioxide | 6.808 | 101790 | 50006.929 | ppm |

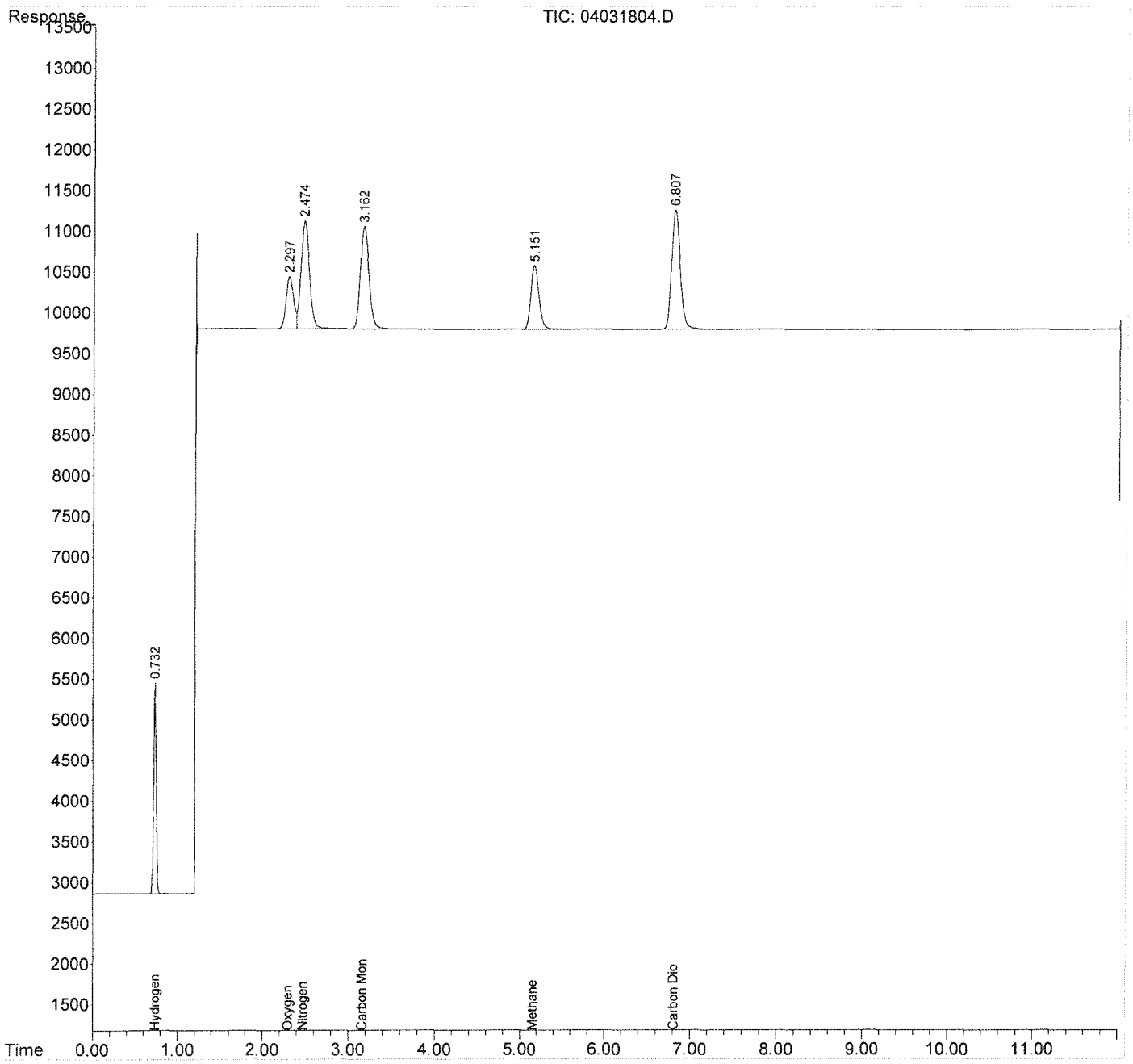
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031804.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 8:07 am
Operator : GG
Sample : LCS S32-02151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:28:47 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

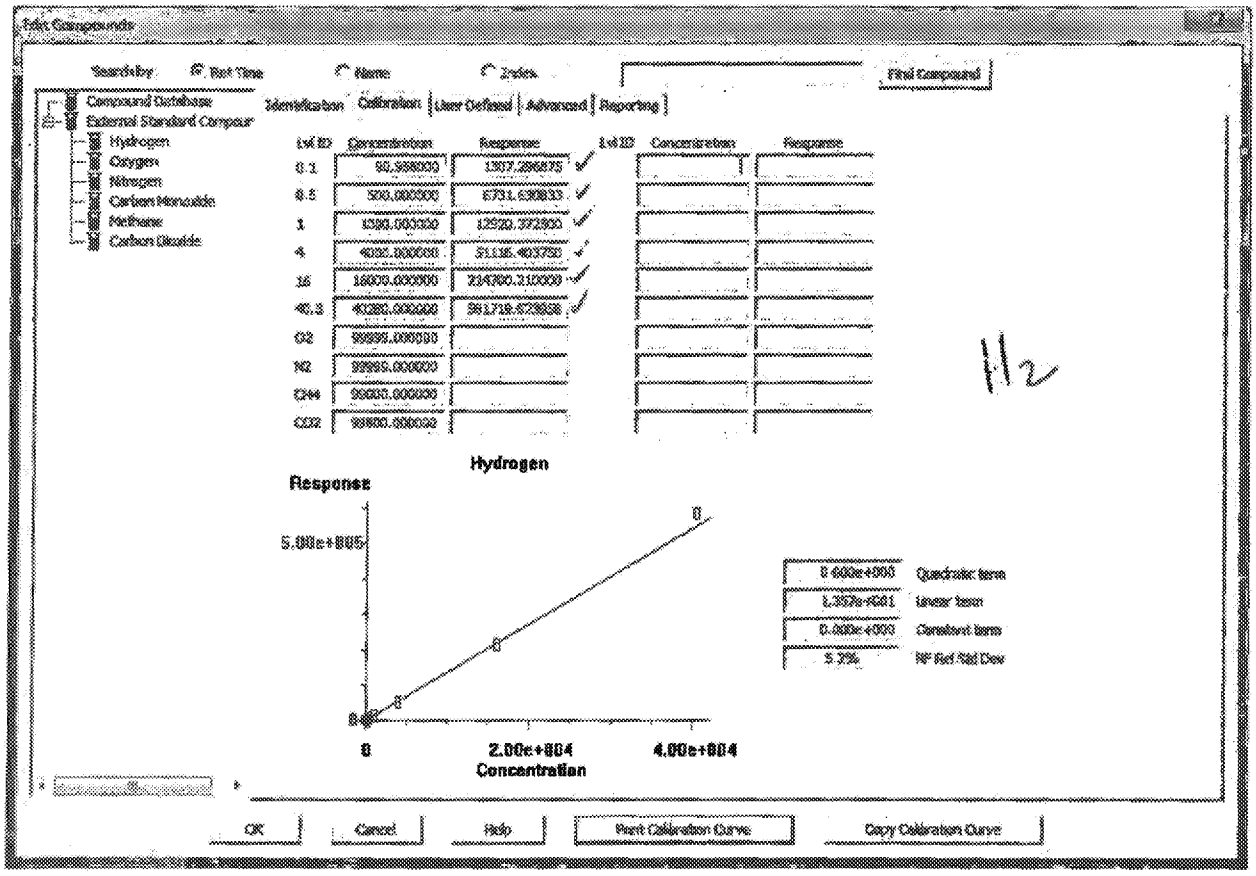


Method Path : I:\GC01\METHODS\
Method File : 3C012417.M
Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
Last Update : Tue Jan 24 17:15:32 2017
Response Via : Initial Calibration

Calibration Files
0.1 =01241708.D 0.5 =01241710.D 1 =01241711.D
4 =01241712.D 16 =01241713.D 40.3 =01241727.D

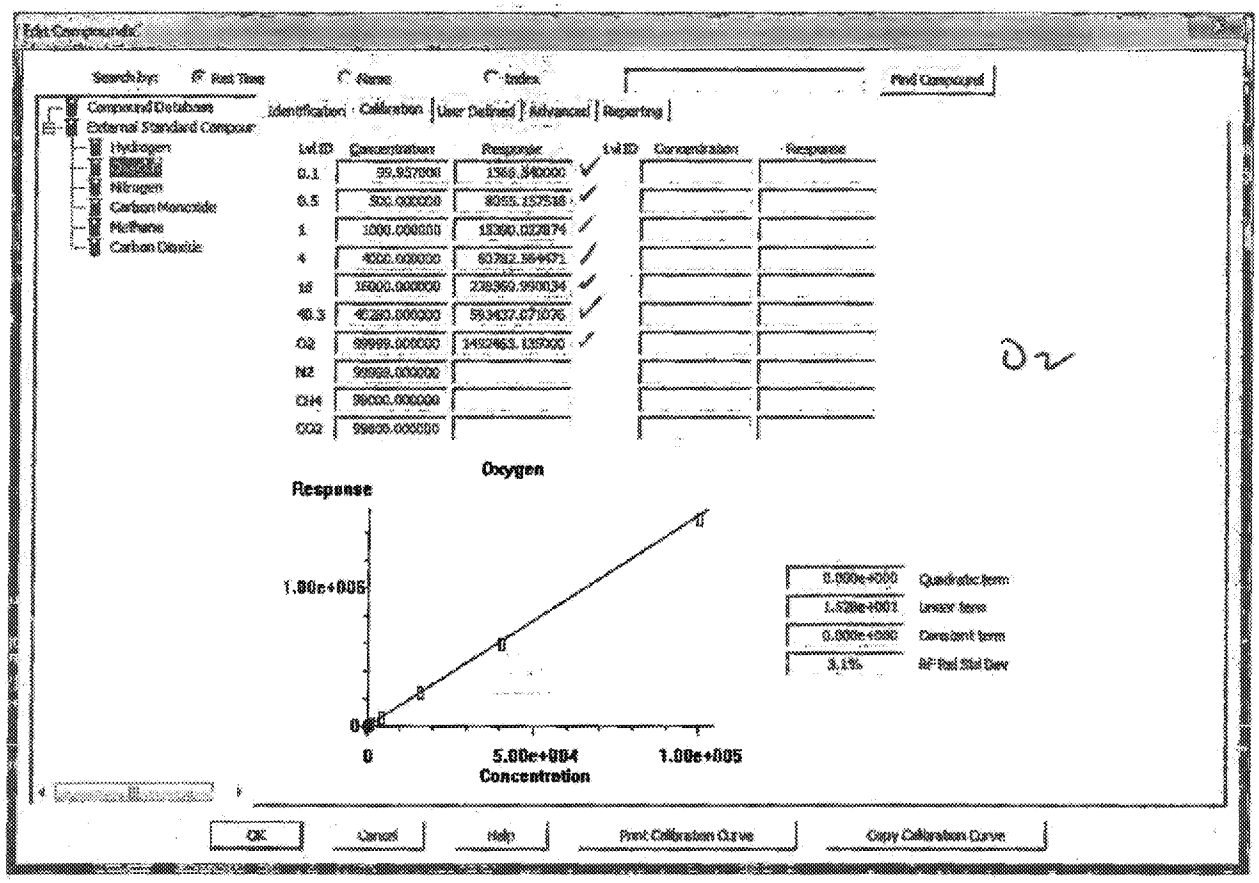
| | Compound | 0.1 | 0.5 | 1 | 4 | 16 | 40.3 | Avg | | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|
| 1) | Hydrogen | 1.437 | 1.346 | 1.292 | 1.278 | 1.342 | 1.444 | 1.357 | E1 | 5.20 |
| 2) | Oxygen | 1.567 | 1.611 | 1.539 | 1.520 | 1.496 | 1.473 | 1.528 | E1 | 3.15 |
| 3) | Nitrogen | 1.858 | 1.875 | 1.740 | 1.695 | 1.671 | 1.668 | 1.778 | E1 | 6.22 |
| 4) | Carbon Monoxide | 1.736 | 1.818 | 1.718 | 1.684 | 1.670 | 1.662 | 1.715 | E1 | 3.39 |
| 5) | Methane | 1.322 | 1.367 | 1.266 | 1.252 | 1.241 | 1.228 | 1.278 | E1 | 3.87 |
| 6) | Carbon Dioxide | 2.083 | 2.165 | 2.077 | 2.020 | 2.008 | 1.978 | 2.036 | E1 | 3.97 |

(#) = Out of Range ### Number of calibration levels exceeded format ###


Hydrogen
Response
Concentration
0
2.00e+004
4.00e+004
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

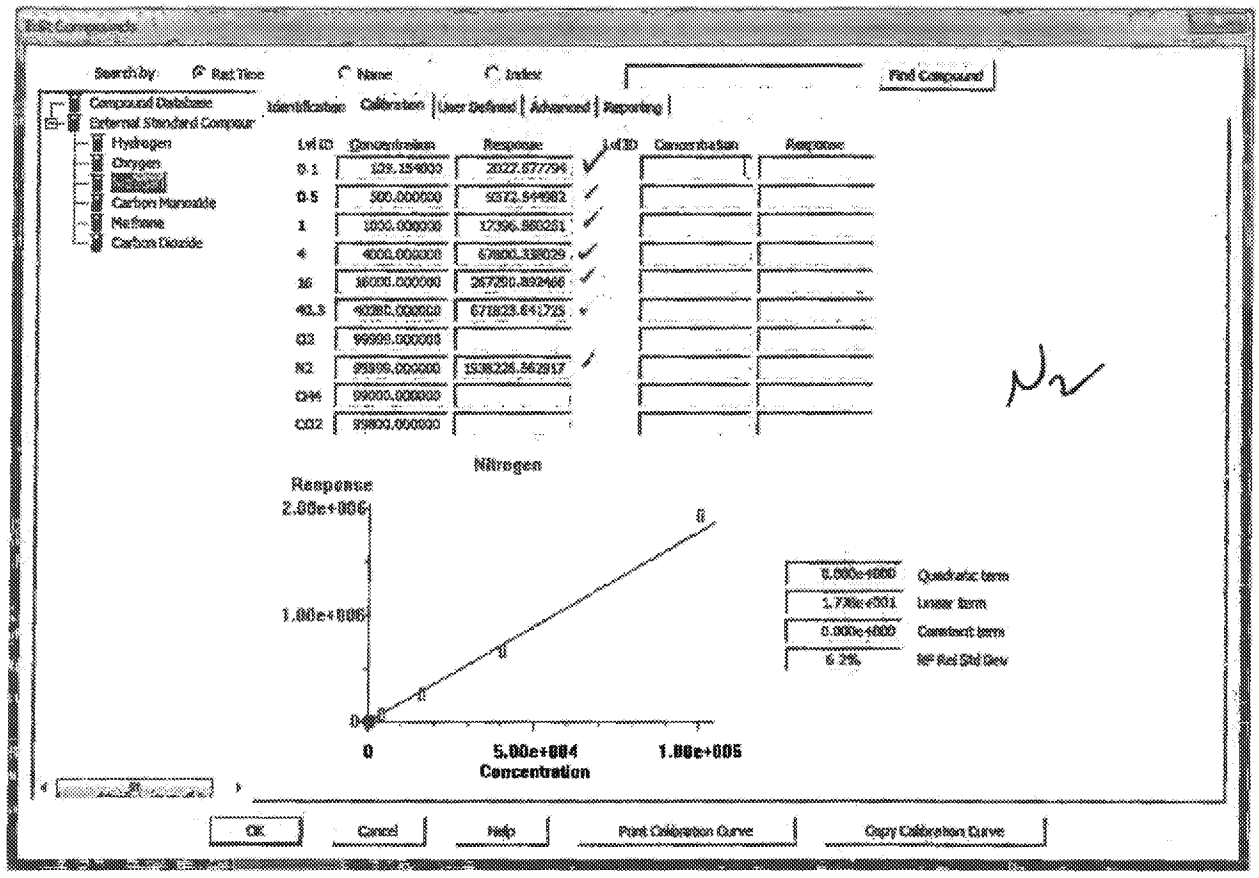
H2

1/26/17


Search by:
Find Compound
Compound Database
External Standard Compour
Hydrogen
Oxygen
Nitrogen
Carbon Monoxide
Methane
Carbon Dioxide
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
0.1
0.5
1
4
16
48.3
O2
N2
CH4
CO2
Oxygen
Response
1.00e+005
0
5.00e+004
1.00e+005
Concentration
Quadratic term
Linear term
Constant term
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

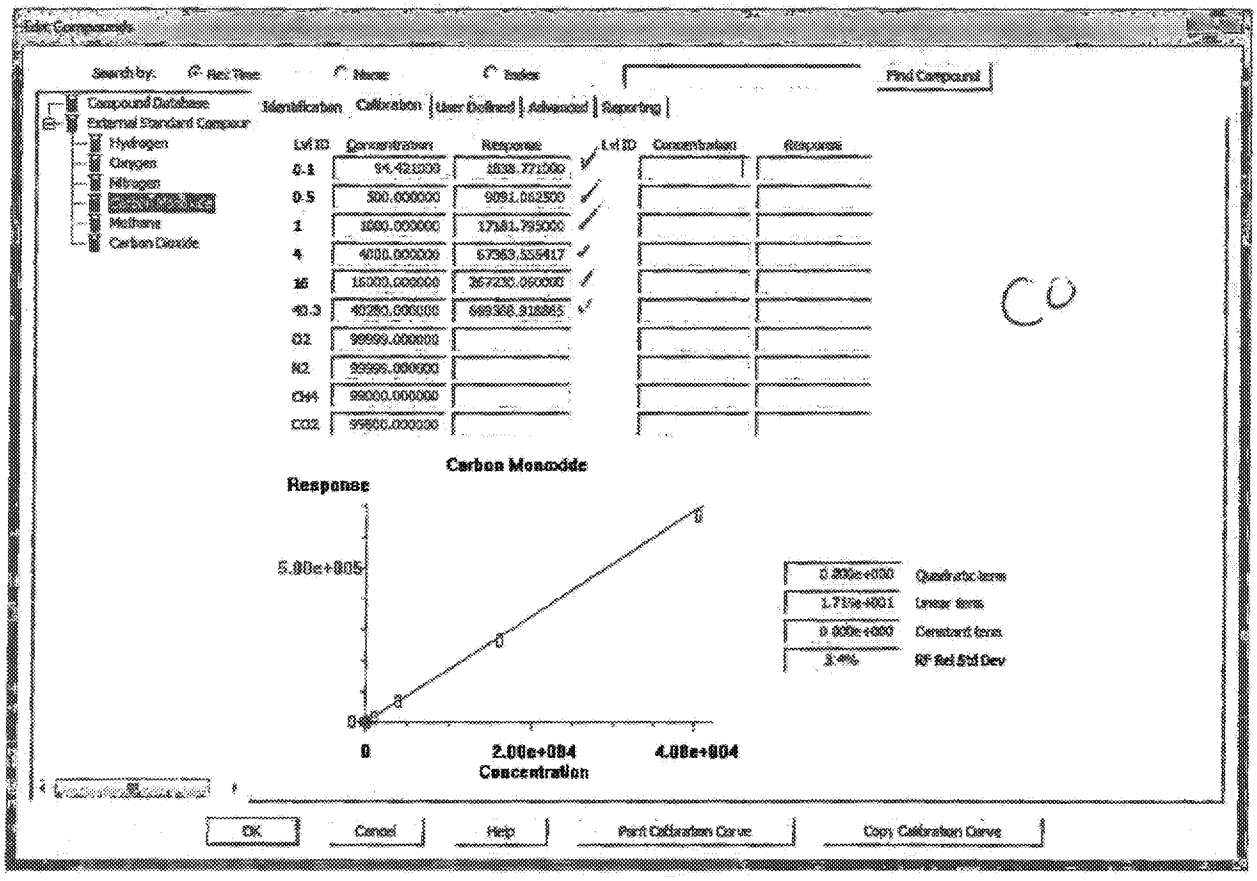
O2

W 1/21/17


Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Hydrogen
Oxygen
Nitrogen
Carbon Monoxide
Methane
Carbon Dioxide
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
0.1
0.5
1
4
16
40.5
O2
N2
CH4
CO2
Nitrogen
Response
2.00e+006
1.00e+006
0
5.00e+004
1.00e+005
Concentration
Quadratic term
Linear term
Constant term
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

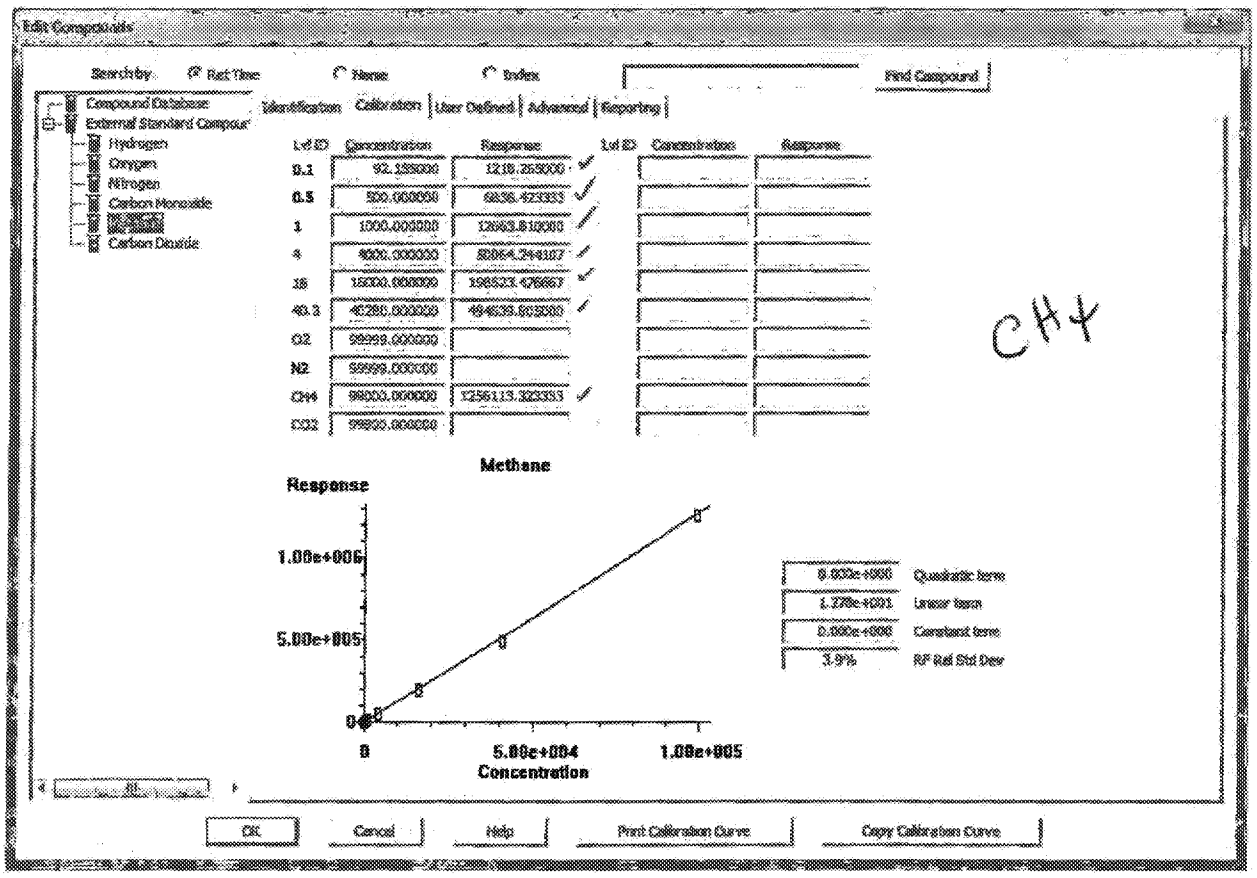
N2

W 1/26/17

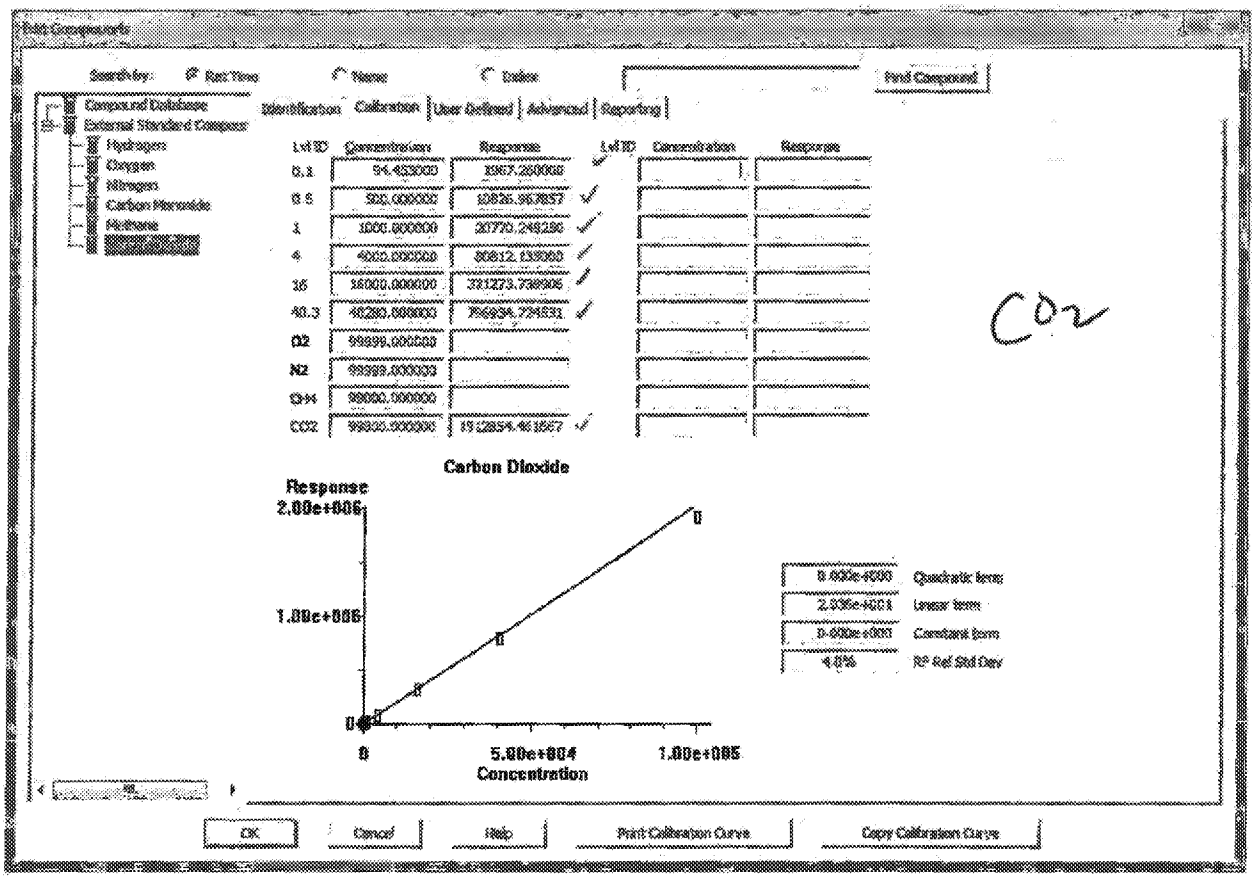

Search by:
Find Compound
Compound Database
External Standard Compound
Hydrogen
Oxygen
Nitrogen
Methane
Carbon Dioxide
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
0.1
0.5
1
4
16
40.3
O2
N2
CH4
CO2
Carbon Monoxide
Response
5.00e+005
0
2.00e+004
4.00e+004
Concentration
Quadratic term
Linear term
Constant term
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

CO

1/26/17


Edit Compounds
Search by
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Hydrogen
Oxygen
Nitrogen
Carbon Monoxide
Carbon Dioxide
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
0.1
0.5
1
4
16
40.3
O2
N2
CH4
CO2
Methane
Response
1.00e+006
5.00e+005
0
0
5.00e+004
1.00e+005
Concentration
Quadratic term
Linear term
Constant term
3.9%
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve
CH4

1/21/17


Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compound
Hydrogen
Oxygen
Nitrogen
Carbon Monoxide
Methane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
0.1
0.5
1
4
16
40.3
O2
N2
CH4
CO2
Carbon Dioxide
Response
2.00e+006
1.00e+006
0
5.00e+004
1.00e+005
Concentration
Quadratic term
Linear term
Constant term
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

CO2

Method Path : I:\GC01\METHODS\
Method File : 3C012417.M
Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
Last Update : Tue Jan 24 17:15:32 2017
Response Via : Initial Calibration

| # | ID | Conc | ISTD Conc | Path\File |
|---|---|---|---|---|
| 1 | 0.1 | 94 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241708.D |
| 2 | 0.5 | 500 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241710.D |
| 3 | 1 | 1000 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241711.D |
| 4 | 4 | 4000 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241712.D |
| 5 | 16 | 16000 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241713.D |
| 6 | 40.3 | 40280 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241726.D |
| 7 | O2 | 99999 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241714.D |
| 8 | N2 | 99999 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241724.D |
| 9 | CH4 | 99000 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241716.D |
| 10 | CO2 | 99800 | 0 | I:\GC01\DATA\FXG\2017_01\24\01241728.D |

| # | ID | Update Time | Quant Time | Acquisition Time |
|---|---|---|---|---|
| 1 | 0.1 | Jan 24 17:11 2017 | Jan 24 17:11 2017 | 24 Jan 2017 9:54 am |
| 2 | 0.5 | Jan 24 17:09 2017 | Jan 24 17:07 2017 | 24 Jan 2017 10:28 am |
| 3 | 1 | Jan 24 16:02 2017 | Jan 24 11:06 2017 | 24 Jan 2017 10:46 am |
| 4 | 4 | Jan 24 16:02 2017 | Jan 24 11:29 2017 | 24 Jan 2017 11:04 am |
| 5 | 16 | Jan 24 16:02 2017 | Jan 24 11:44 2017 | 24 Jan 2017 11:28 am |
| 6 | 40.3 | Jan 24 16:58 2017 | Jan 24 16:13 2017 | 24 Jan 2017 3:39 pm |
| 7 | O2 | Jan 24 16:47 2017 | Jan 24 12:03 2017 | 24 Jan 2017 11:45 am |
| 8 | N2 | Jan 24 16:50 2017 | Jan 24 15:54 2017 | 24 Jan 2017 3:08 pm |
| 9 | CH4 | Jan 24 16:49 2017 | Jan 24 15:50 2017 | 24 Jan 2017 12:21 pm |
| 10 | CO2 | Jan 24 17:15 2017 | Jan 24 17:14 2017 | 24 Jan 2017 4:51 pm |

3C012417.M Thu Jan 26 10:32:03 2017

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241708.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 9:54 am
Operator : MC
Sample : std s30-12301601 0.1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:11:21 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

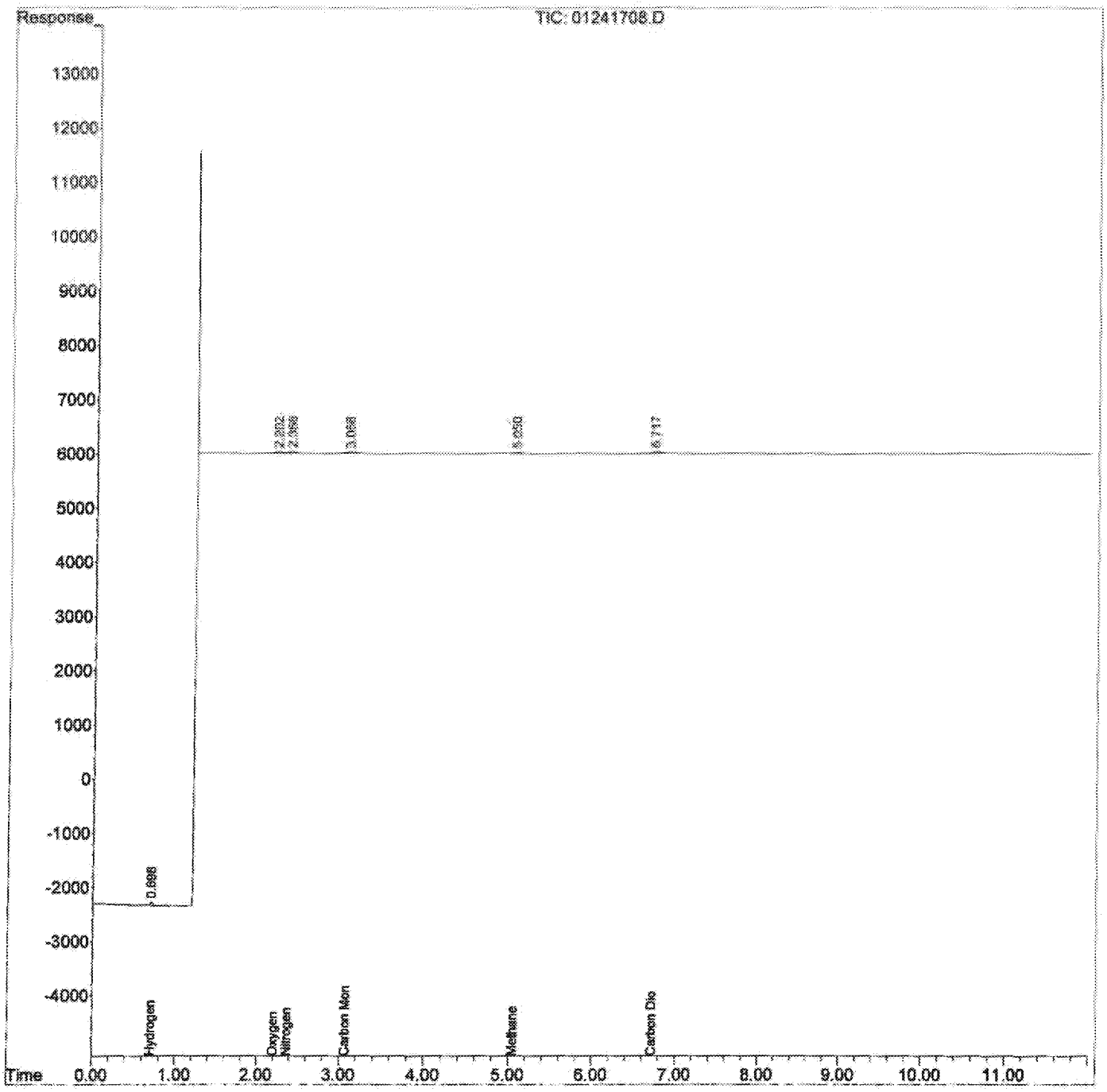
| | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Hydrogen | 0.699 | 1307 | 963.654 | ppm | |
| 2) | Oxygen | 2.202 | 1566 | 1022.329 | ppm | m |
| 3) | Nitrogen | 2.368 | 2028 | 1155.333 | ppm | m |
| 4) | Carbon Monoxide | 3.071 | 1639 | 955.727 | ppm | |
| 5) | Methane | 5.052 | 1218 | 953.387 | ppm | |
| 6) | Carbon Dioxide | 6.719 | 1967 | 957.152 | ppm | |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241708.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 9:54 am
Operator : MC
Sample : std s30-12301601 0.1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:11:21 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

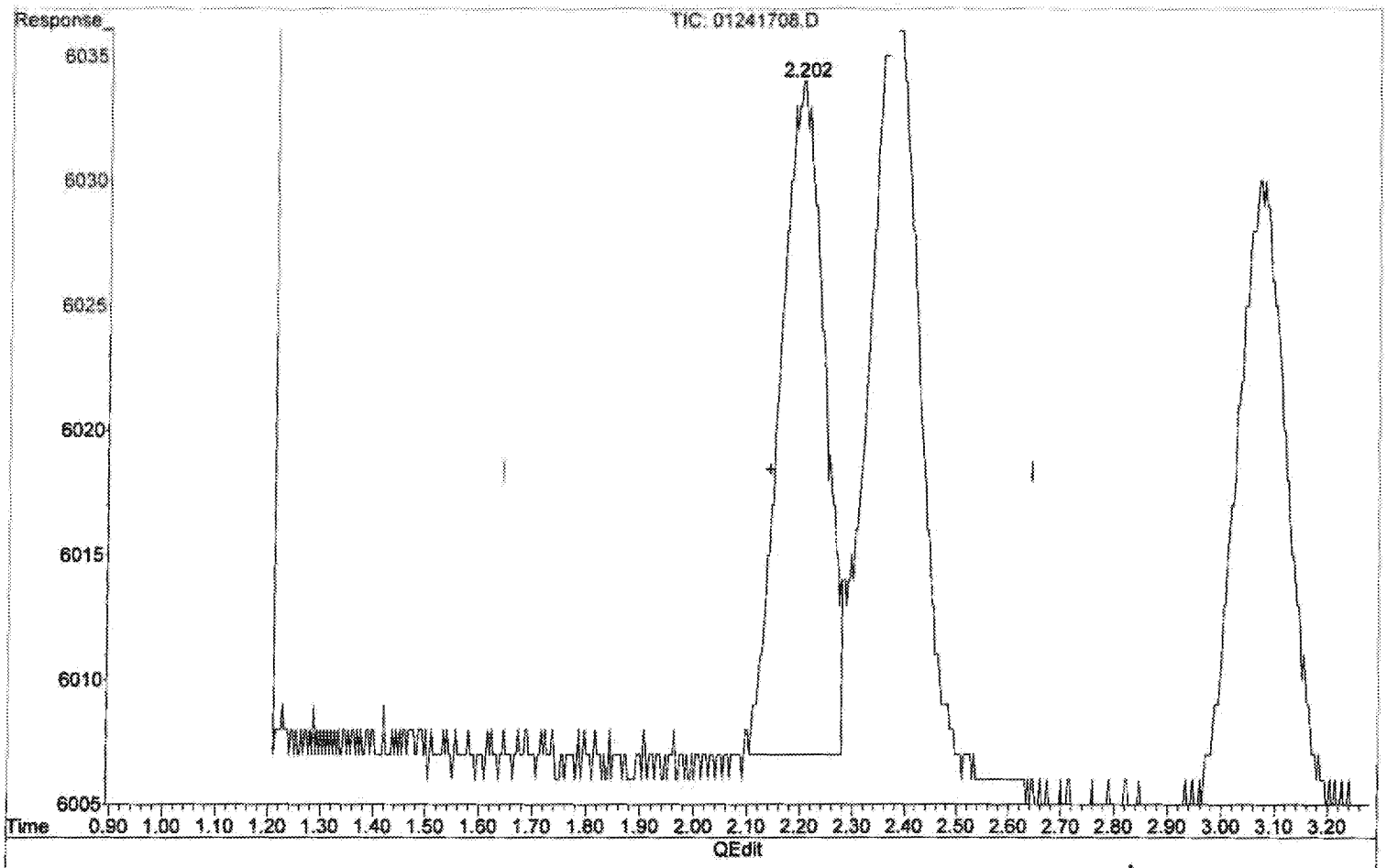
Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241708.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 9:54 am
Operator : MC
Sample : std s30-12301601 0.1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:11:21 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :




(2) Oxygen

2.202min 1022.329 ppm m

response 1566

M 1/26/17

WO 1/26/17

no previous

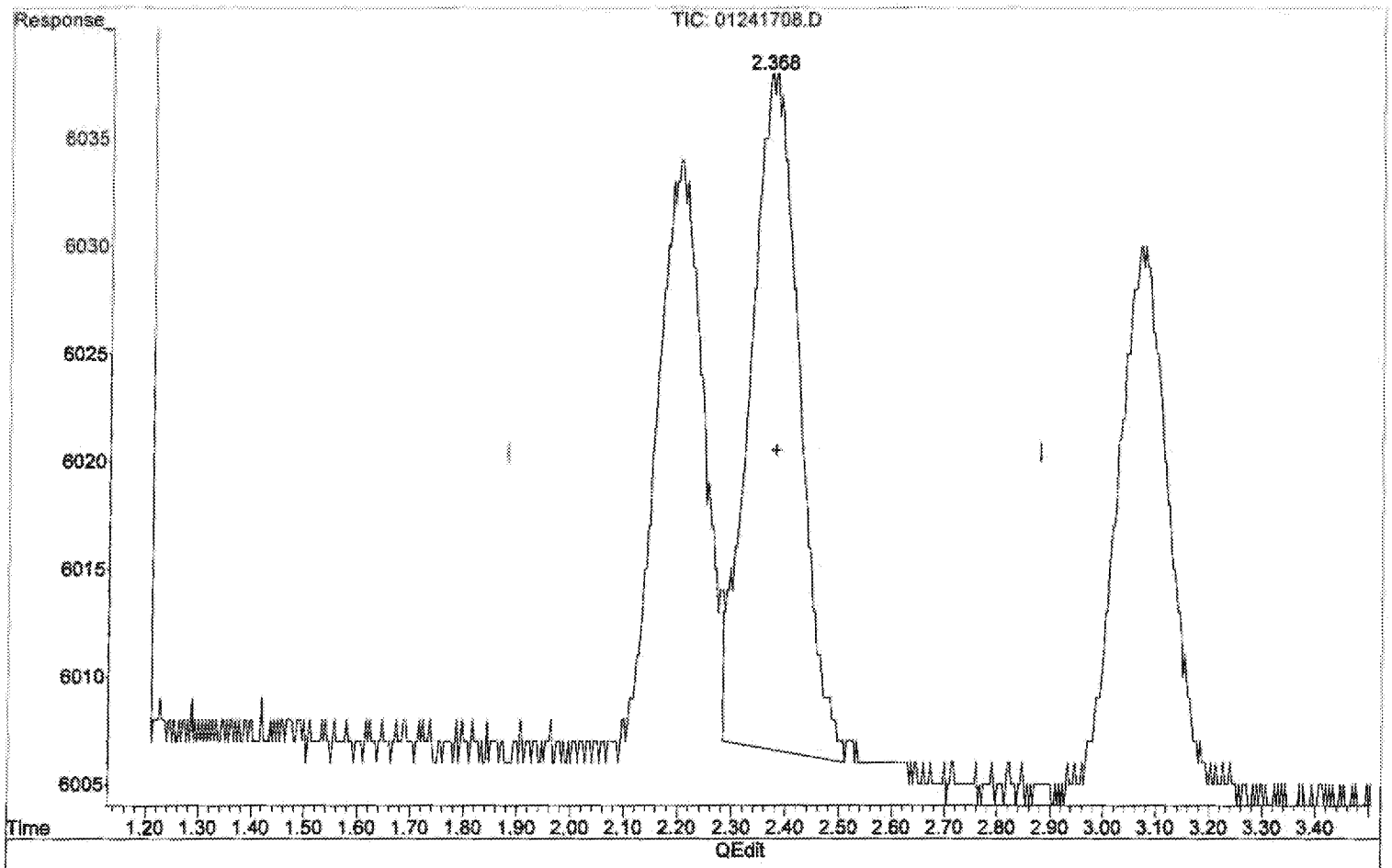
BLC

(+) = Expected Retention Time

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241708.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 9:54 am
Operator : MC
Sample : std s30-12301601 0.1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:11:21 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :




(3) Nitrogen

2.368min 1155.333 ppm m

response 2028

MC 1/24/17

LV 1/26/17
no previous
BLC

(+) = Expected Retention Time

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241710.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 10:28 am
Operator : MC
Sample : std s30-1231702 0.5%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:07:30 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

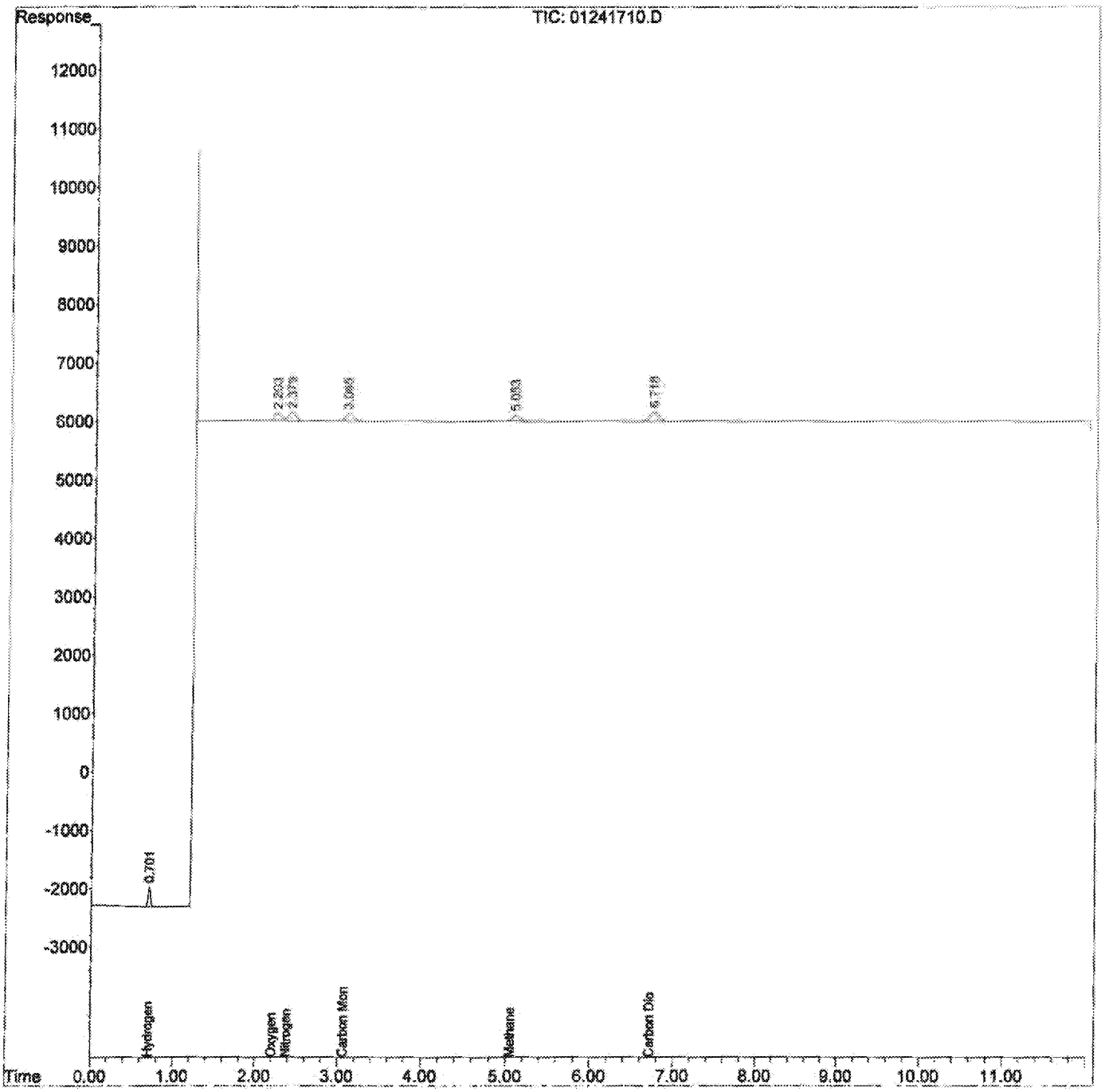
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.702 | 6732 | 4962.119 | ppm |
| 2) | Oxygen | 2.204 | 8055 | 5257.492 | ppm |
| 3) | Nitrogen | 2.380 | 9373 | 5340.301 | ppm |
| 4) | Carbon Monoxide | 3.070 | 9091 | 5301.886 | ppm |
| 5) | Methane | 5.056 | 6836 | 5350.030 | ppm |
| 6) | Carbon Dioxide | 6.719 | 10827 | 5267.759 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241710.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 10:28 am
Operator : MC
Sample : std s30-1231702 0.5%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:07:30 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:58:22 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241711.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 10:46 am
Operator : MC
Sample : std s30-01231701 1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:06:38 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:05:53 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

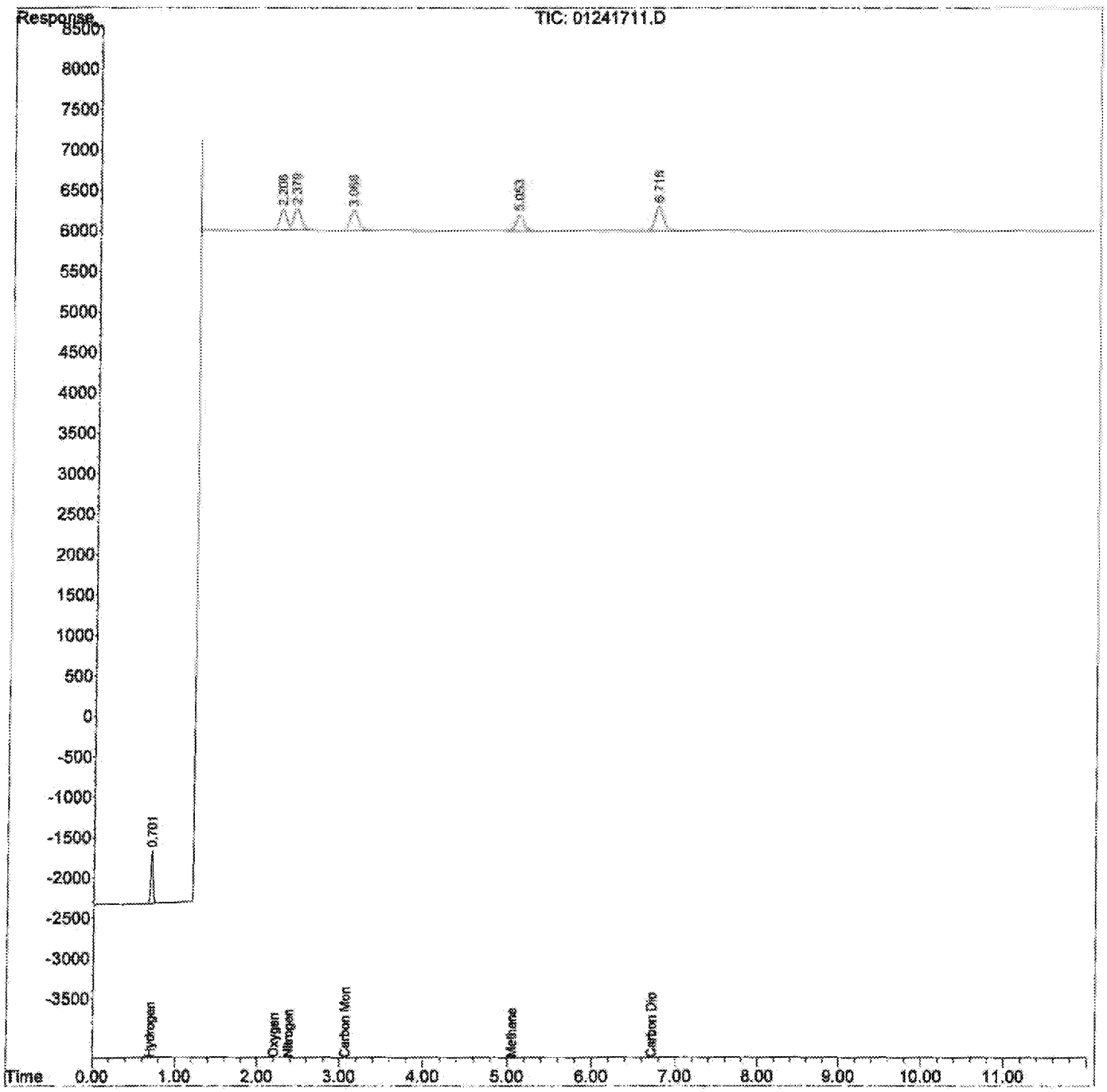
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.703 | 12920 | 9749.462 | ppm |
| 2) | Oxygen | 2.207 | 15390 | 10022.255 | ppm |
| 3) | Nitrogen | 2.381 | 17397 | 10088.258 | ppm |
| 4) | Carbon Monoxide | 3.070 | 17182 | 10123.136 | ppm |
| 5) | Methane | 5.056 | 12664 | 10035.134 | ppm |
| 6) | Carbon Dioxide | 6.720 | 20770 | 10324.389 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241711.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 10:46 am
Operator : MC
Sample : std s30-01231701 1%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:06:38 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:05:53 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241712.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:04 am
Operator : MC
Sample : std s30-12191601 4%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:29:02 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:06:54 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

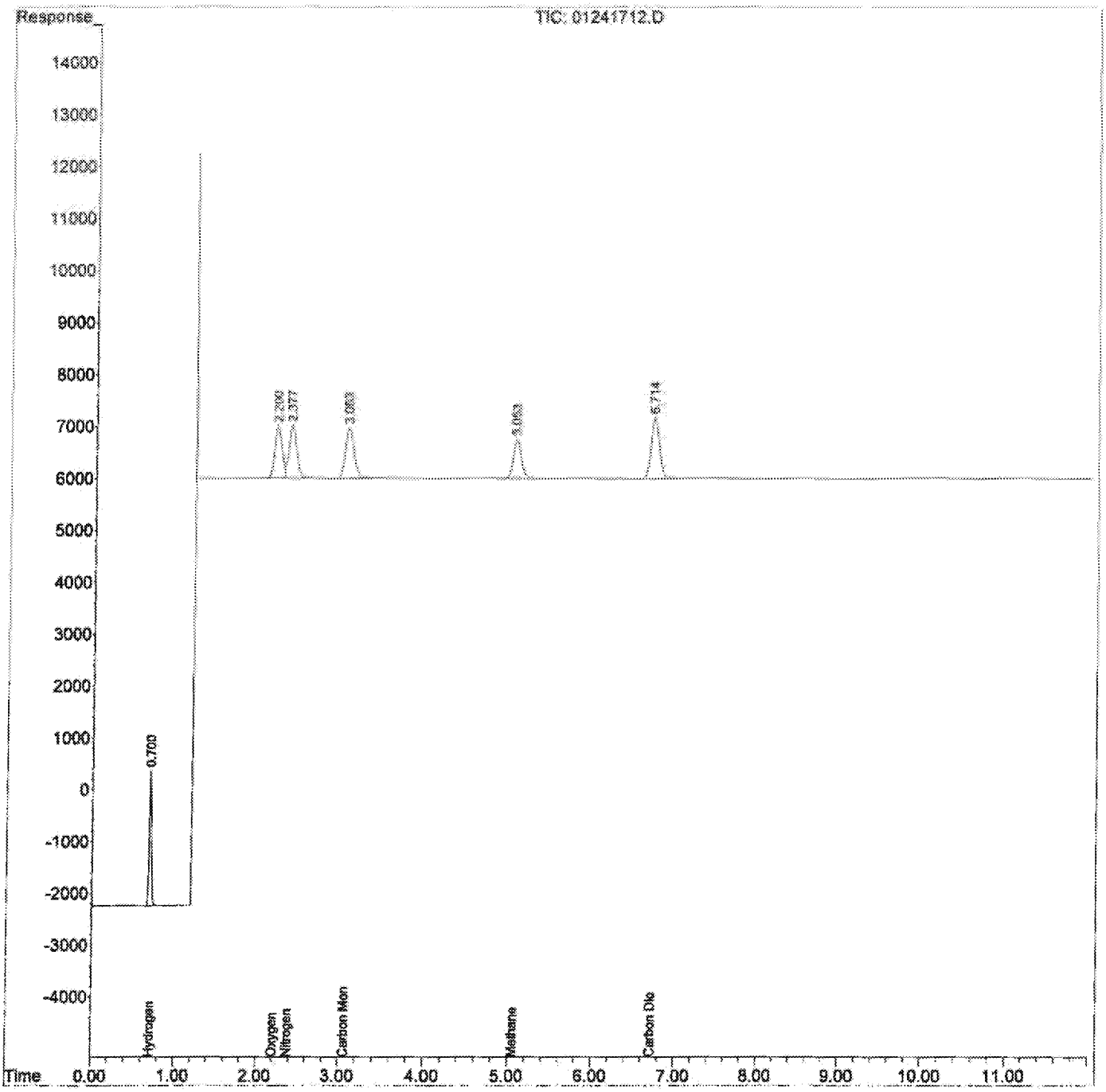
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.701 | 51116 | 38471.422 | ppm |
| 2) | Oxygen | 2.202 | 60783 | 39655.182 | ppm |
| 3) | Nitrogen | 2.378 | 67800 | 39325.034 | ppm |
| 4) | Carbon Monoxide | 3.065 | 67364 | 39718.927 | ppm |
| 5) | Methane | 5.054 | 50064 | 39812.023 | ppm |
| 6) | Carbon Dioxide | 6.716 | 80812 | 40218.015 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241712.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:04 am
Operator : MC
Sample : std s30-12191601 4%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:29:02 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:06:54 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241713.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:28 am
Operator : MC
Sample : std s30-01231703 16%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:44:36 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:30:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

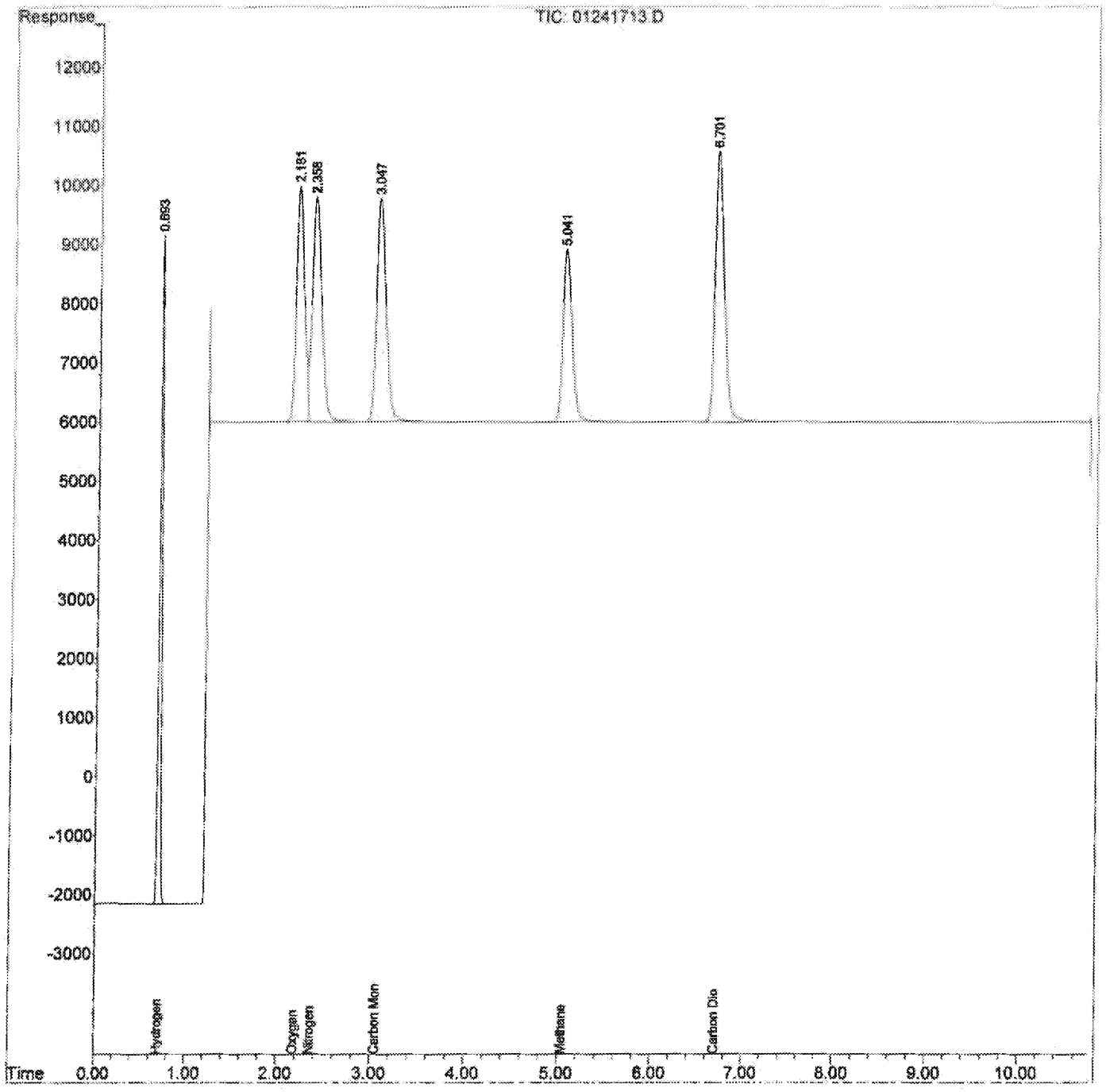
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.695 | 214700 | 160970.040 | ppm |
| 2) | Oxygen | 2.182 | 239370 | 156211.792 | ppm |
| 3) | Nitrogen | 2.360 | 267291 | 155149.115 | ppm |
| 4) | Carbon Monoxide | 3.048 | 267230 | 157650.776 | ppm |
| 5) | Methane | 5.043 | 198523 | 158115.703 | ppm |
| 6) | Carbon Dioxide | 6.703 | 321274 | 160126.033 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241713.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:28 am
Operator : MC
Sample : std s30-01231703 16%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 11:44:36 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:30:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241714.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:45 am
Operator : MC
Sample : s11-12021503 O2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 12:03:07 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:45:03 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

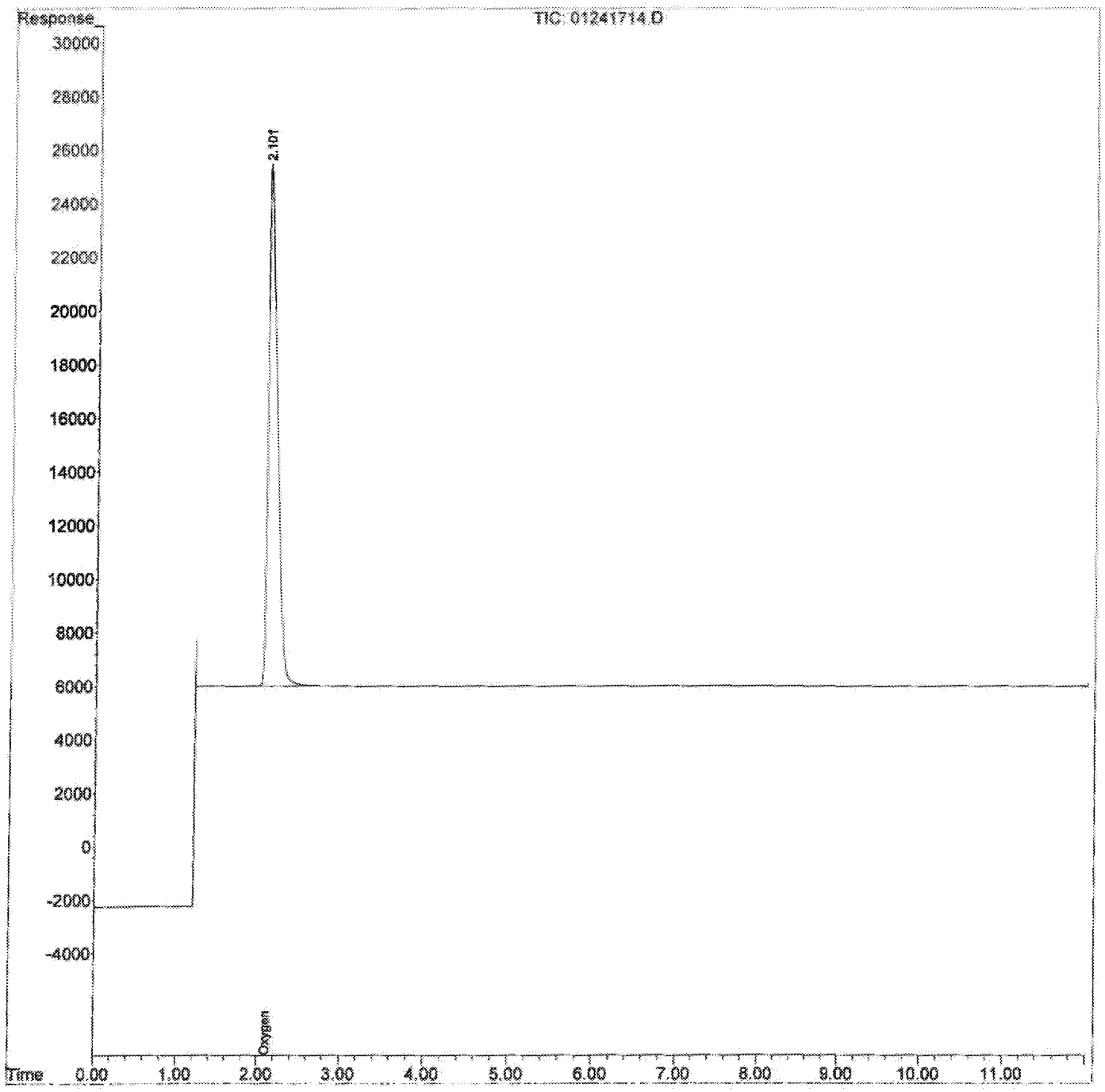
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.000 | 0 | N.D. | ppm |
| 2) | Oxygen | 2.102 | 1492463 | 975822.655 | ppm |
| 3) | Nitrogen | 0.000 | 0 | N.D. | ppm |
| 4) | Carbon Monoxide | 0.000 | 0 | N.D. | ppm |
| 5) | Methane | 0.000 | 0 | N.D. | ppm |
| 6) | Carbon Dioxide | 0.000 | 0 | N.D. | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241714.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 11:45 am
Operator : MC
Sample : s11-12021503 O2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 12:03:07 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 11:45:03 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241716.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 12:21 pm
Operator : MC
Sample : s30-01241701 CH4
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 15:50:33 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 12:21:02 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

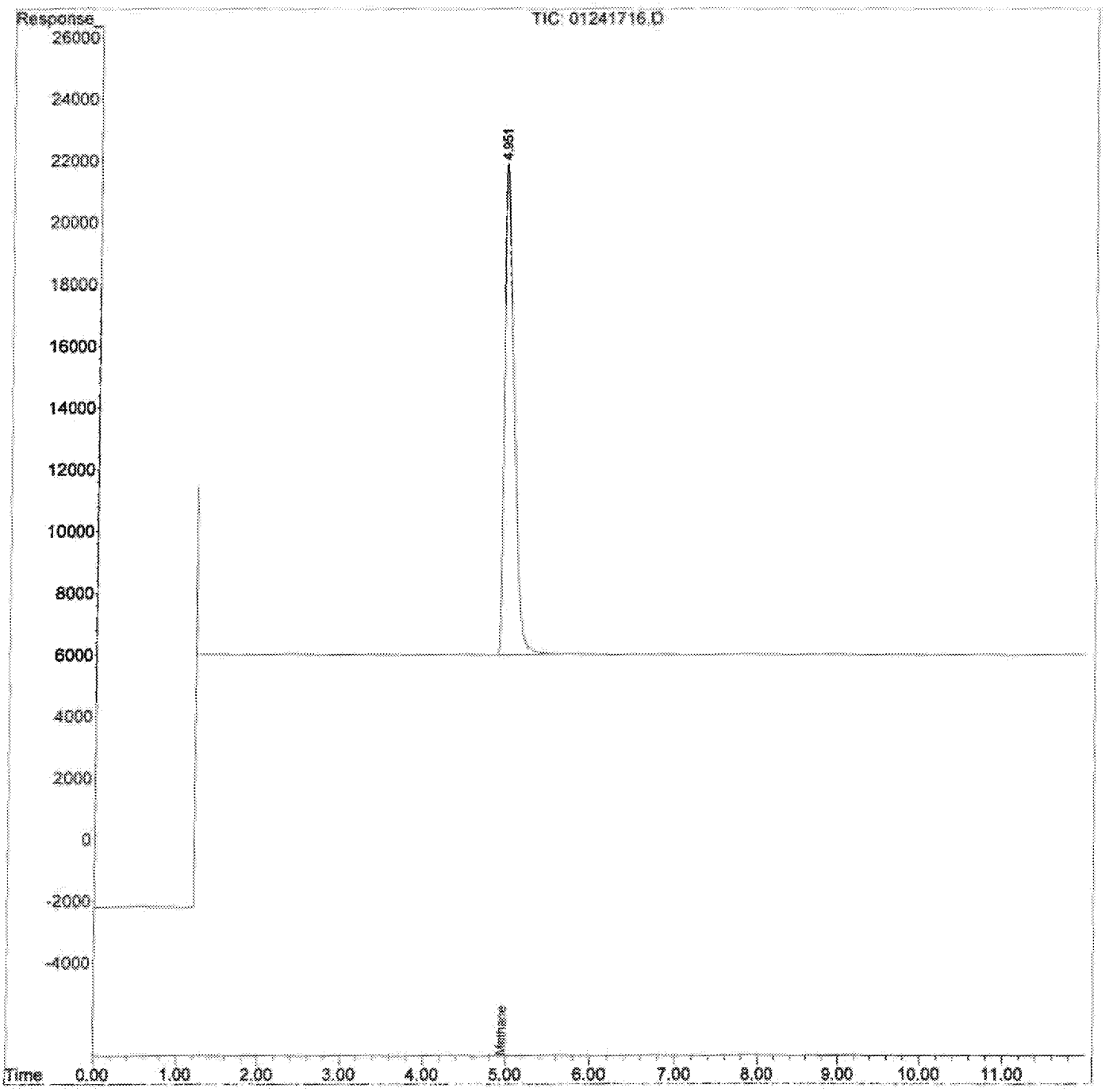
| | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Hydrogen | 0.000 | 0 | N.D. | ppm | |
| 2) | Oxygen | 0.000 | 0 | N.D. | ppm | d |
| 3) | Nitrogen | 0.000 | 0 | N.D. | ppm | d |
| 4) | Carbon Monoxide | 0.000 | 0 | N.D. | ppm | |
| 5) | Methane | 4.953 | 1256113 | 1001419.959 | ppm | |
| 6) | Carbon Dioxide | 0.000 | 0 | N.D. | ppm | |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241716.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 12:21 pm
Operator : MC
Sample : s30-01241701 CH4
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 15:50:33 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 12:21:02 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241724.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 3:08 pm
Operator : MC
Sample : s11-12021502 N2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 15:54:48 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 13:54:15 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

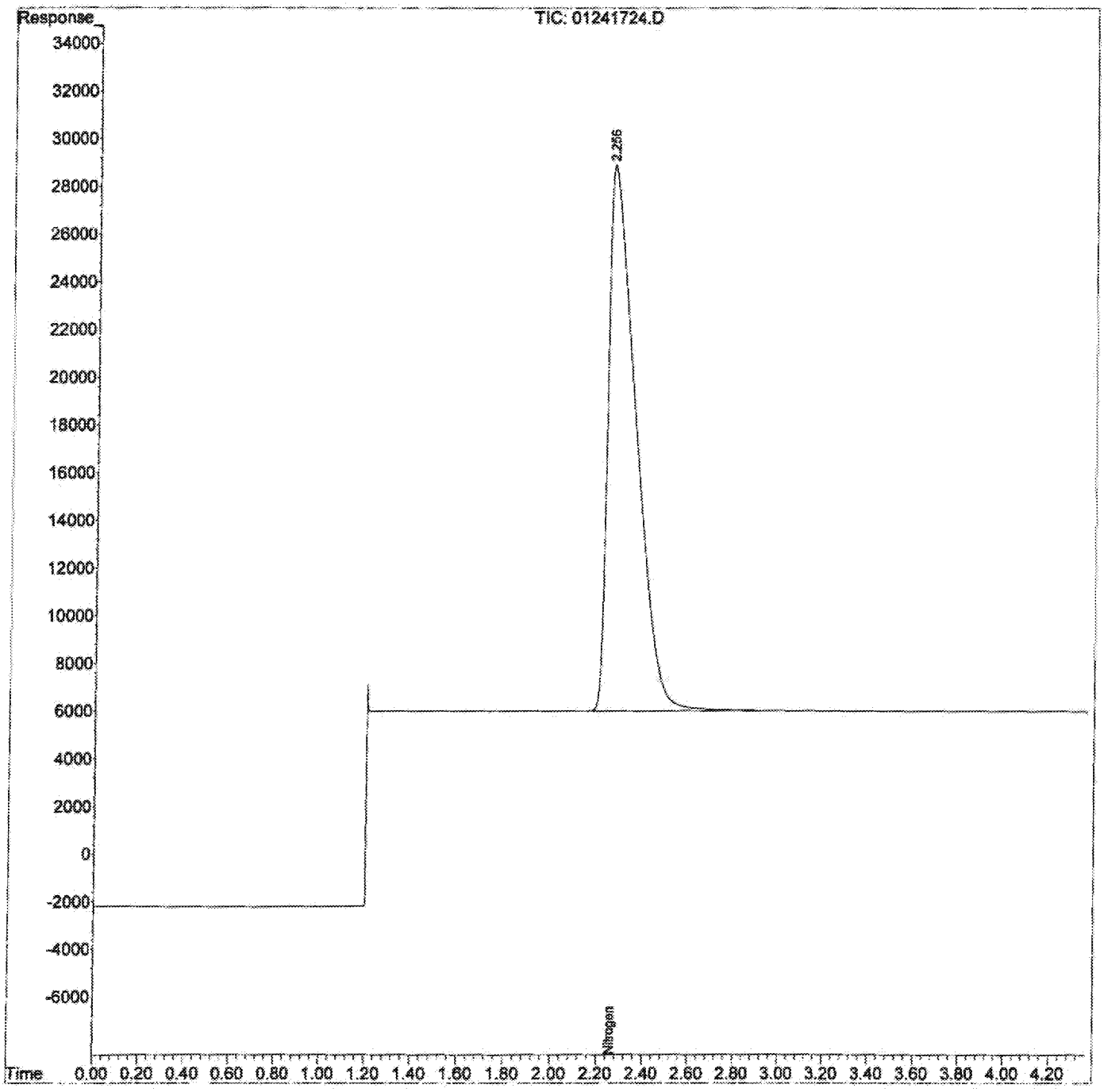
| | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Hydrogen | 0.000 | 0 | N.D. | ppm | |
| 2) | Oxygen | 0.000 | 0 | N.D. | ppm | d |
| 3) | Nitrogen | 2.258 | 1938227 | 1101353.052 | ppm | |
| 4) | Carbon Monoxide | 0.000 | 0 | N.D. | ppm | |
| 5) | Methane | 0.000 | 0 | N.D. | ppm | |
| 6) | Carbon Dioxide | 0.000 | 0 | N.D. | ppm | |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241724.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 3:08 pm
Operator : MC
Sample : s11-12021502 N2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 15:54:48 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 13:54:15 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241727.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 4:13 pm
Operator : MC
Sample : 1g loop S30-12191601 40.28%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 16:40:16 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:07:39 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

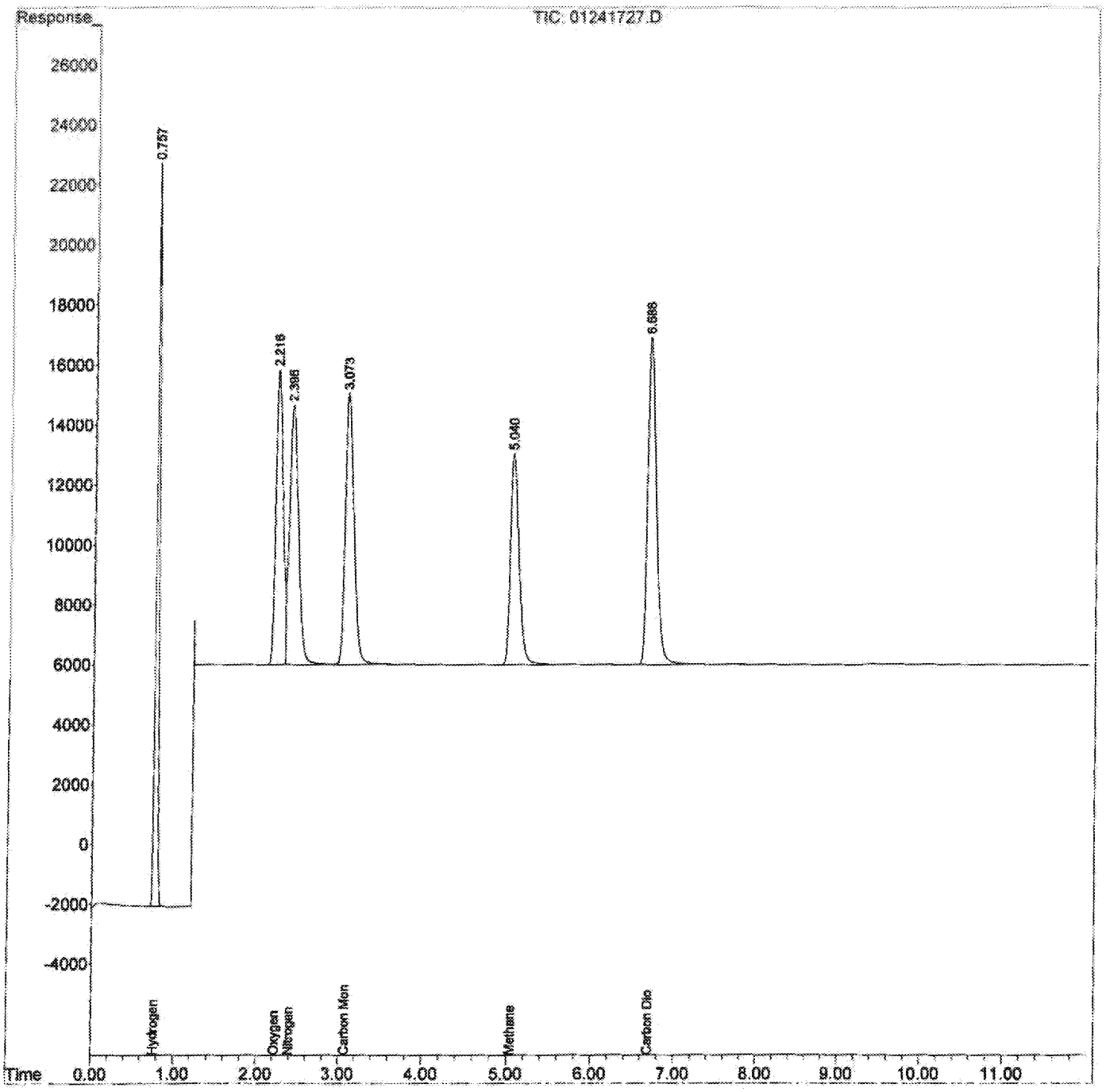
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.759 | 581720 | 434415.125 | ppm |
| 2) | Oxygen | 2.218 | 593437 | 384865.128 | ppm |
| 3) | Nitrogen | 2.397 | 671824 | 379650.320 | ppm |
| 4) | Carbon Monoxide | 3.075 | 669389 | 387994.466 | ppm |
| 5) | Methane | 5.042 | 494640 | 384594.565 | ppm |
| 6) | Carbon Dioxide | 6.690 | 796935 | 384863.394 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241727.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 4:13 pm
Operator : MC
Sample : lg loop S30-12191601 40.28%
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 16:40:16 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 16:07:39 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241728.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 4:51 pm
Operator : MC
Sample : S30-01241702 CO2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:14:40 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:11:31 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

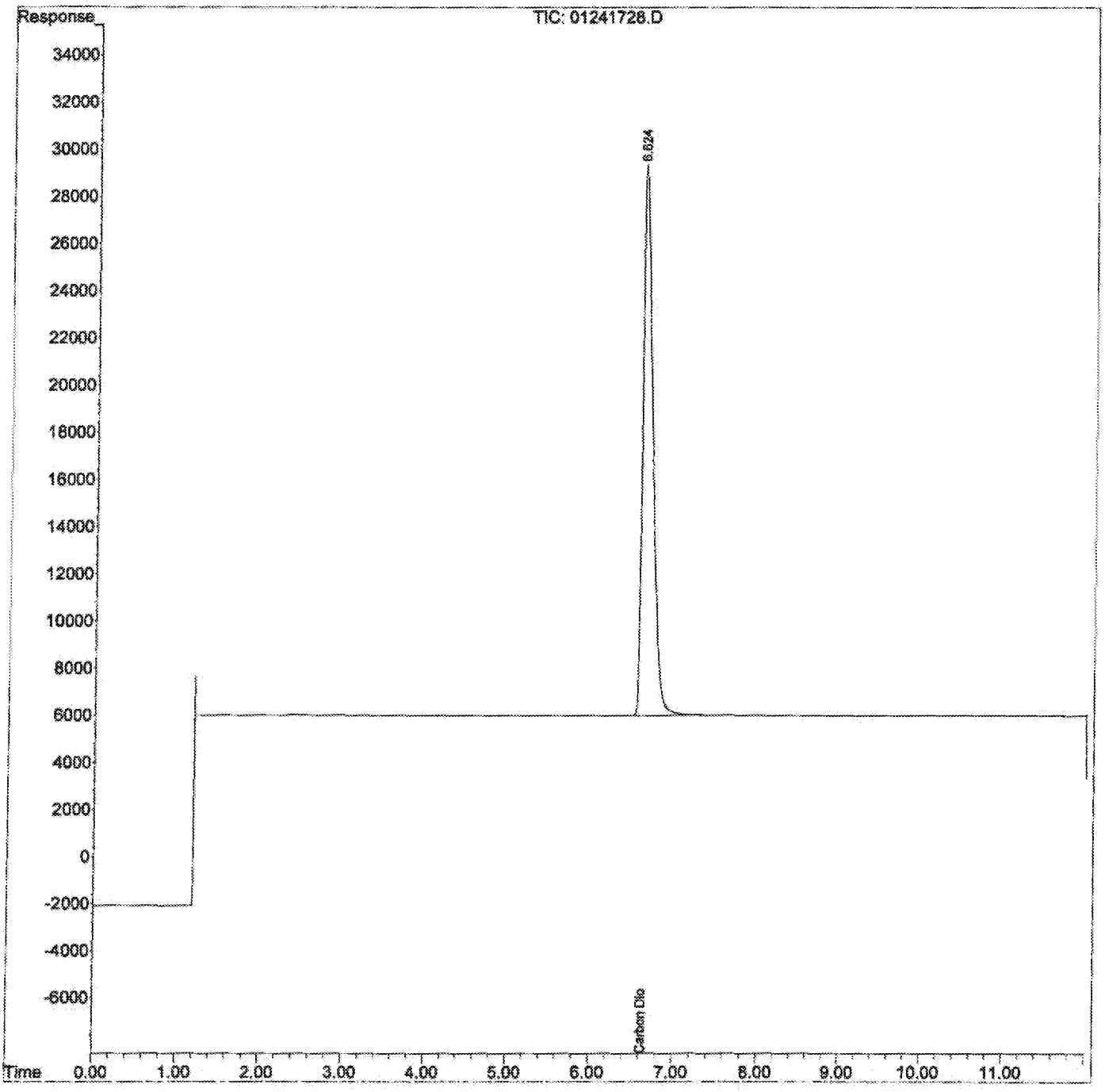
| | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Hydrogen | 0.000 | 0 | N.D. | ppm | |
| 2) | Oxygen | 0.000 | 0 | N.D. | ppm | |
| 3) | Nitrogen | 0.000 | 0 | N.D. | ppm | d |
| 4) | Carbon Monoxide | 0.000 | 0 | N.D. | ppm | |
| 5) | Methane | 0.000 | 0 | N.D. | ppm | |
| 6) | Carbon Dioxide | 6.625 | 1912854 | 930681.280 | ppm | |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241728.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 4:51 pm
Operator : MC
Sample : S30-01241702 CO2
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 24 17:14:40 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:11:31 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241729.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 5:13 pm
Operator : MC
Sample : icv S30-12091603
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 26 11:43:57 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

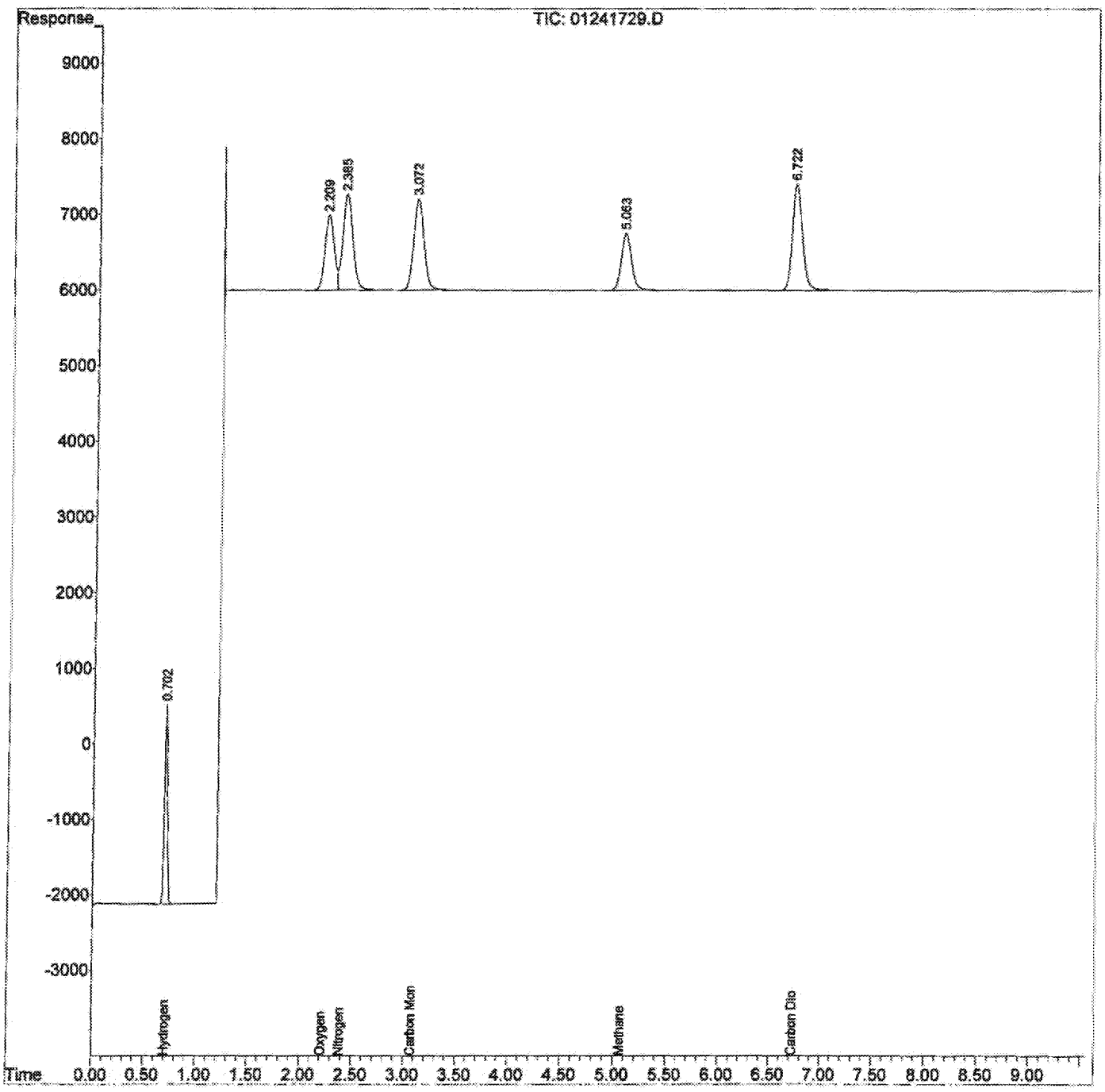
| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.704 | 52203 | 38480.504 | ppm |
| 2) | Oxygen | 2.211 | 60261 | 39428.995 | ppm |
| 3) | Nitrogen | 2.386 | 85544 | 48121.904 | ppm |
| 4) | Carbon Monoxide | 3.073 | 84807 | 49459.452 | ppm |
| 5) | Methane | 5.064 | 50827 | 39776.144 | ppm |
| 6) | Carbon Dioxide | 6.724 | 97748 | 48020.992 | ppm |

(f)=RT Delta > 1/2 Window (m)=manual int.

Data Path : I:\GC01\DATA\FXG\2017_01\24\
Data File : 01241729.D
Signal(s) : TCD1A.CH
Acq On : 24 Jan 2017 5:13 pm
Operator : MC
Sample : icv S30-12091603
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Jan 26 11:43:57 2017
Quant Method : I:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



# Modified EPA Method 3C Daily QC Summary

Client : CH2M Hill
Analyst : GG
Method Name : EPA 3C, ASTM D 1946-90, VOA-EPA3C

Instrument : GC01
Date Analyzed : 4/3/2018

## RT Summaries and QC Check (minutes)

| Sample ID | Hydrogen | Oxygen | Nitrogen | Carbon Monoxide | Methane | Carbon Dioxide | File ID | Time |
|---|---|---|---|---|---|---|---|---|
| **ICAL Mean RT** | **0.708** | **2.188** | **2.368** | **3.076** | **5.045** | **6.707** | | |
| **RT Windows (+/- min )** | **0.072** | **0.133** | **0.146** | **0.034** | **0.130** | **0.145** | | |
| STD S32-03151801 | 0.733 | 2.296 | 2.474 | 3.163 | 5.151 | 6.806 | 04031801.D | 06:56 |
| **+/- 0.33min of ICAL Mean RT** | Pass | Pass | Pass | Pass | Pass | Pass | | |
| MB | | | | | | | 04031802.D | 07:26 |
| Lab air | | 2.244 Pass | 2.384 Pass | | | 6.815 Pass | 04031803.D | 07:44 |
| LCS S32-02151801 | 0.733 Pass | 2.299 Pass | 2.475 Pass | 3.164 Pass | 5.152 Pass | 6.808 Pass | 04031804.D | 08:07 |
| STD S32-03151801 | 0.735 Pass | 2.300 Pass | 2.478 Pass | 3.167 Pass | 5.155 Pass | 6.811 Pass | 04031815.D | 11:34 |
| P1801614-001 | 0.726 Pass | 2.257 Pass | 2.396 Pass | 3.157 Pass | | 6.808 Pass | 04031821.D | 13:55 |
| STD S32-03151801 | 0.734 Pass | 2.299 Pass | 2.477 Pass | 3.166 Pass | 5.156 Pass | 6.811 Pass | 04031824.D | 15:00 |

## Continuing Calibration Standards Summary (ppm)

| Sample ID | Hydrogen | Oxygen | Nitrogen | Carbon Monoxide | Methane | Carbon Dioxide | File ID | Time |
|---|---|---|---|---|---|---|---|---|
| ACTUAL | 40000.0 | 40000.0 | 50000.0 | 50000.0 | 40000.0 | 50000.0 | | |
| **CCV Criteria (+/- %D)** | **15.0%** | **10.0%** | **10.0%** | **10.0%** | **10.0%** | **10.0%** | | |
| STD S32-03151801 | 42513.9 6.3% | 41934.2 4.8% | 51289.2 2.6% | 52818.4 5.6% | 42958.6 7.4% | 51339.6 2.7% | 04031801.D | 06:56 |
| STD S32-03151801 | 42063.2 5.2% | 41565.8 3.9% | 50592.1 1.2% | 52299.3 4.6% | 42536.2 6.3% | 50794.7 1.6% | 04031815.D | 11:34 |
| STD S32-03151801 | 42851.6 7.1% | 42222.0 5.6% | 51471.9 2.9% | 53096.4 6.2% | 43132.7 7.8% | 51697.1 3.4% | 04031824.D | 15:00 |
| | #### | #### | #### | #### | #### | ##### | | |

## Lab Dup Summary (ppm, without DF correction and nomalization)

| Sample ID | Hydrogen | Oxygen | Nitrogen | Carbon Monoxide | Methane | Carbon Dioxide | File ID | Time |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

## LCS / LCS Dup Summary (ppm, without DF correction)

| Sample ID | Hydrogen | Oxygen | Nitrogen | Carbon Monoxide | Methane | Carbon Dioxide | File ID | Time |
|---|---|---|---|---|---|---|---|---|
| LCS Actual Conc. (ppm) | 39900.0 | 25000.0 | 50000.0 | 50000.0 | 40100.0 | 50000.0 | | |
| **LCS Criteria (% Range)** | **94%-107%** | **98%-109%** | **94%-105%** | **98%-109%** | **98%-110%** | **95%-108%** | | |
| LCS S32-02151801 | 39966.3 | 25535.4 | 50407.0 | 51147.6 | 41303.7 | 50006.9 | 04031804.D | 08:07 |
| LCS % Recovery | 100% Pass | 102% Pass | 101% Pass | 102% Pass | 103% Pass | 100% Pass | | |
| | | | | | | | | |

## Lab Air QC Summary

| Sample ID | Hydrogen | Oxygen | Nitrogen | Carbon Monoxid | Methane | Carbon Dioxide | Lab Air Criteria Total (90%-110%) |
|---|---|---|---|---|---|---|---|
| Lab air | | 212888.6 | 752718.8 | | | 484.4 | 96.6% Pass |
| Lab Air Normalized (%) | | 22.03% | 77.91% | | | 0.05% | 100.0% |

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031801.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 6:56 am
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

4/3/18

Integration File: autoint1.e
Quant Time: Apr 04 07:25:12 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.733 | 57674 | 42513.873 | ppm |
| 2) | Oxygen | 2.296 | 64090 | 41934.205 | ppm |
| 3) | Nitrogen | 2.474 | 91174 | 51289.223 | ppm |
| 4) | Carbon Monoxide | 3.163 | 90567 | 52818.449 | ppm |
| 5) | Methane | 5.151 | 54894 | 42958.555 | ppm |
| 6) | Carbon Dioxide | 6.806 | 104503 | 51339.640 | ppm |

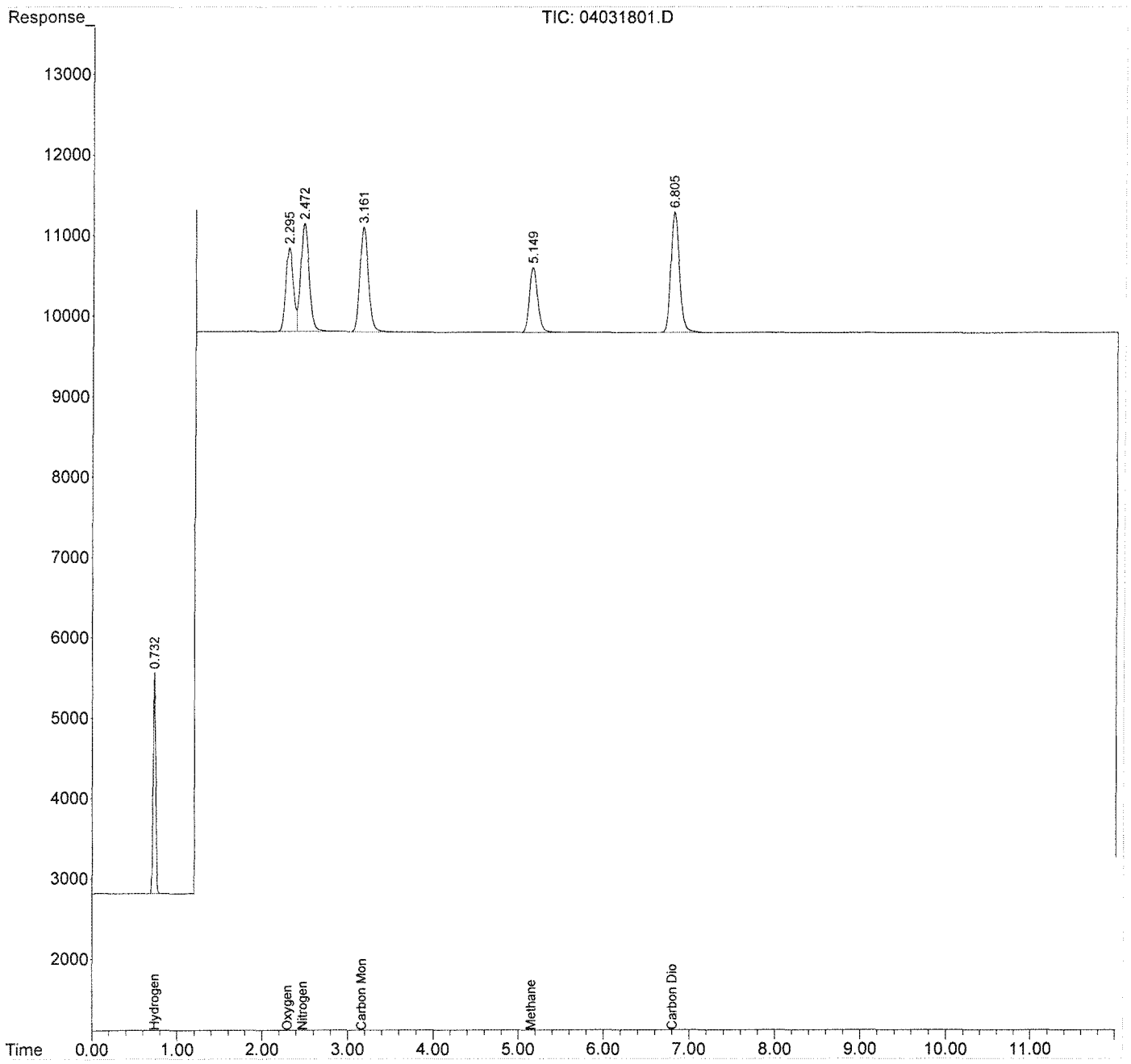
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031801.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 6:56 am
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:25:12 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031815.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 11:34 am
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:34:19 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.735 | 57063 | 42063.168 | ppm |
| 2) | Oxygen | 2.300 | 63527 | 41565.788 | ppm |
| 3) | Nitrogen | 2.478 | 89935 | 50592.135 | ppm |
| 4) | Carbon Monoxide | 3.167 | 89677 | 52299.311 | ppm |
| 5) | Methane | 5.155 | 54354 | 42536.248 | ppm |
| 6) | Carbon Dioxide | 6.811 | 103394 | 50794.702 | ppm |

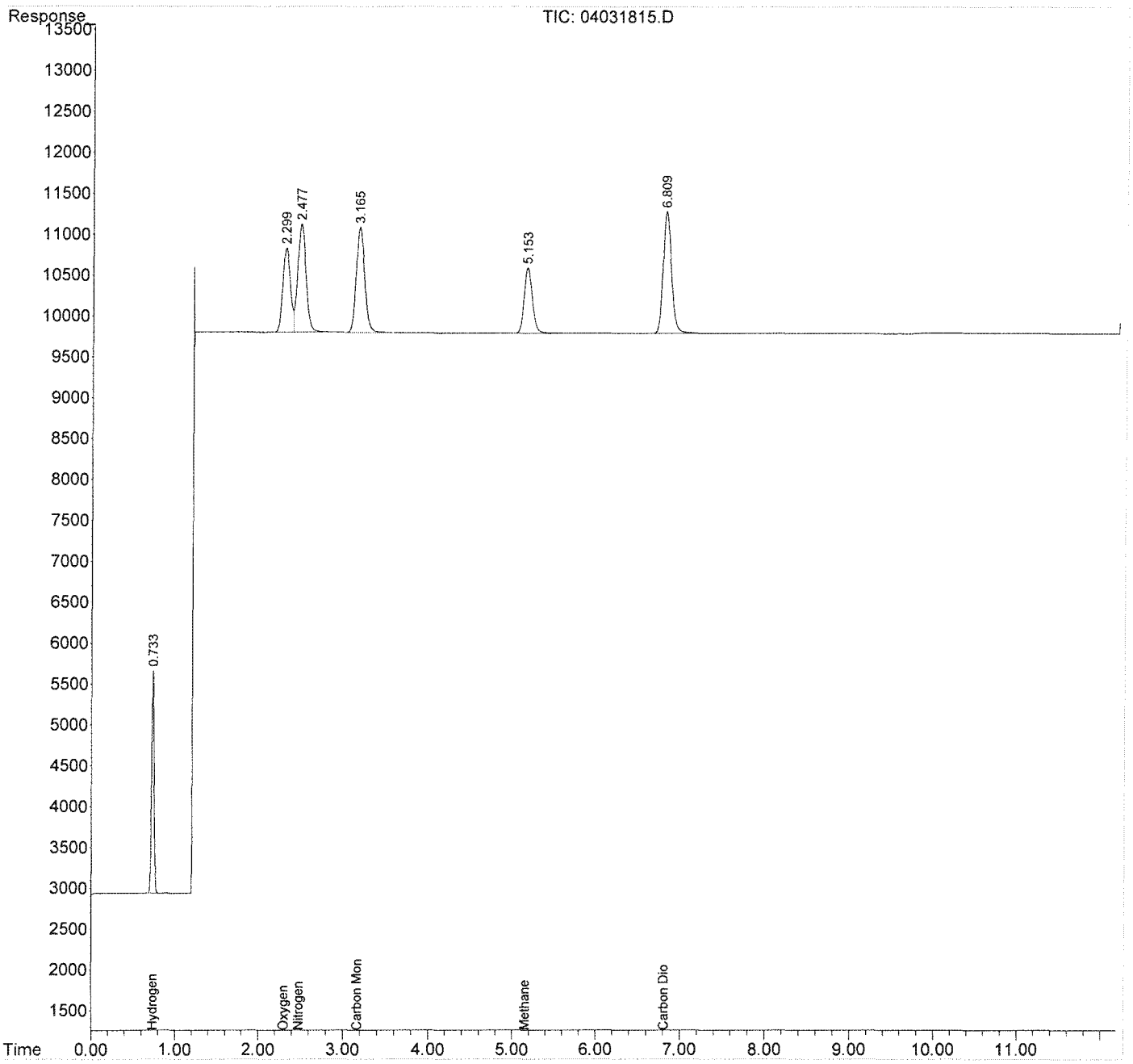
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031815.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 11:34 am
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:34:19 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031824.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 3:00 pm
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:37:01 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) | Hydrogen | 0.734 | 58133 | 42851.633 | ppm |
| 2) | Oxygen | 2.299 | 64530 | 42222.020 | ppm |
| 3) | Nitrogen | 2.477 | 91499 | 51471.940 | ppm |
| 4) | Carbon Monoxide | 3.166 | 91044 | 53096.448 | ppm |
| 5) | Methane | 5.156 | 55116 | 43132.741 | ppm |
| 6) | Carbon Dioxide | 6.811 | 105231 | 51697.119 | ppm |

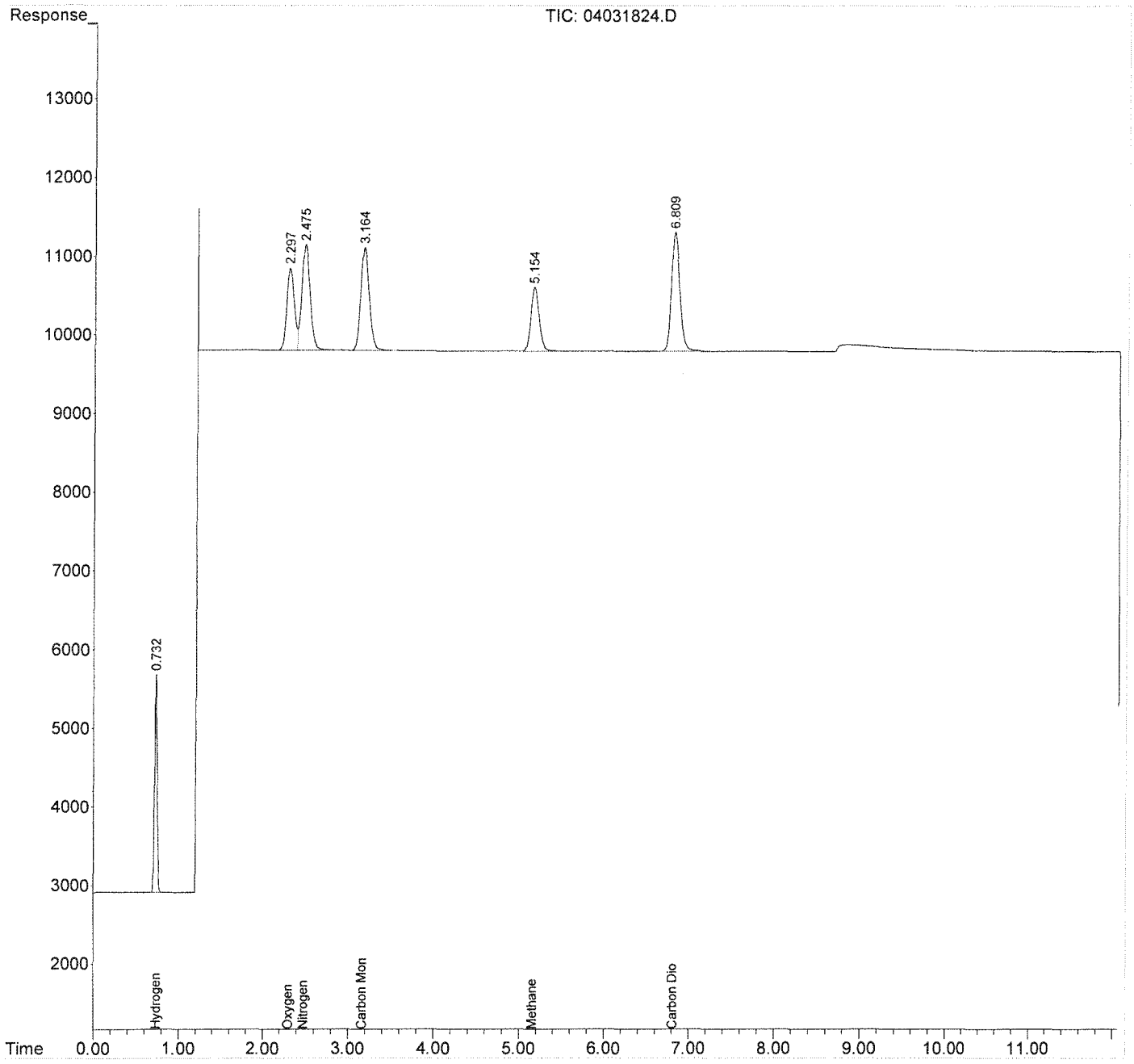
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC01\DATA\FXG\2018_04\03\
Data File : 04031824.D
Signal(s) : TCD1A.CH
Acq On : 3 Apr 2018 3:00 pm
Operator : GG
Sample : STD S32-03151801
Misc :
ALS Vial : 1 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Apr 04 07:37:01 2018
Quant Method : J:\GC01\METHODS\3C012417.M
Quant Title : EPA 3C, ASTM D 1946-90, VOA-EPA3C
QLast Update : Tue Jan 24 17:15:32 2017
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 100ul
Signal Phase : CarboSieve Packed Column
Signal Info :



# Injection Log

Directory: I:\GC01\DATA\FXG\2017_01\24\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Acquisition Method | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 24 Jan 117 8:04 am | 01241701.D | X | | MC | MFXGS25C.M | |
| 2 | 24 Jan 117 8:19 am | 01241702.D | xstd s30-01231703 | | MC | MFXGS25C.M | |
| 3 | 24 Jan 117 8:32 am | 01241703.D | std 30-12091603 | | MC | MFXGS25C.M | |
| 4 | 24 Jan 117 8:48 am | 01241704.D | mb | | MC | MFXGS25C.M | |
| 5 | 24 Jan 117 9:04 am | 01241705.D | lab air | | MC | MFXGS25C.M | |
| 6 | 24 Jan 117 9:22 am | 01241706.D | 0285-001 | | MC | MFXGS25C.M | |
| 7 | 24 Jan 117 9:38 am | 01241707.D | 0285-002 | | MC | MFXGS25C.M | |
| 8 | 24 Jan 117 9:54 am | 01241708.D | std s30-12301601 0.1% | | MC | MFXGS25C.M | |
| 9 | 24 Jan 117 10:12 am | 01241709.D | pressure check | | MC | MFXGS25C.M | |
| 10 | 24 Jan 117 10:28 am | 01241710.D | std s30-1231702 0.5% | | MC | MFXGS25C.M | |
| 11 | 24 Jan 117 10:46 am | 01241711.D | std s30-01231701 1% | | MC | MFXGS25C.M | |
| 12 | 24 Jan 117 11:04 am | 01241712.D | std s30-12191601 4% | | MC | MFXGS25C.M | |
| 13 | 24 Jan 117 11:28 am | 01241713.D | std s30-01231703 16% | | MC | MFXGS25C.M | |
| 14 | 24 Jan 117 11:45 am | 01241714.D | s11-12021503 O2 | | MC | MFXGS25C.M | |
| 15 | 24 Jan 117 12:02 pm | 01241715.D | pressure check | | MC | MFXGS25C.M | |
| 16 | 24 Jan 117 12:21 pm | 01241716.D | s30-01241701 CH4 | | MC | MFXGS25C.M | |
| 17 | 24 Jan 117 12:38 pm | 01241717.D | pressure check | | MC | MFXGS25C.M | |
| 18 | 24 Jan 117 1:55 pm | 01241718.D | pressure check | | MC | MFXGS25C.M | |
| 19 | 24 Jan 117 2:11 pm | 01241719.D | pressure check | | MC | MFXGS25C.M | |
| 20 | 24 Jan 117 2:32 pm | 01241720.D | pressure check | | MC | MFXGS25C.M | |
| 21 | 24 Jan 117 2:42 pm | 01241721.D | pressure check | | MC | MFXGS25C.M | |
| 22 | 24 Jan 117 2:54 pm | 01241722.D | pressure check | | MC | MFXGS25C.M | |
| 23 | 24 Jan 117 3:01 pm | 01241723.D | pressure check | | MC | MFXGS25C.M | |
| 24 | 24 Jan 117 3:08 pm | 01241724.D | s11-12021502 N2 | | MC | MFXGS25C.M | |
| 25 | 24 Jan 117 3:17 pm | 01241725.D | mb | | MC | MFXGS25C.M | |
| 26 | 24 Jan 117 3:39 pm | 01241726.D | pressure check | | MC | MFXGS25C.M | |
| 27 | 24 Jan 117 4:13 pm | 01241727.D | lg loop S30-12191601 40.28% | | MC | MFXGS25C.M | |
| 28 | 24 Jan 117 4:51 pm | 01241728.D | S30-01241702 CO2 | | MC | MFXGS25C.M | |
| 29 | 24 Jan 117 5:13 pm | 01241729.D | icv S30-12091603 | | MC | MFXGS25C.M | |
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# Injection Log

Directory: I:\GC01\DATA\FXG\2018_04\03\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Acquisition Method | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 3 Apr 118 6:56 am | 04031801.D | STD S32-03151801 | | GG | MFXGS25C.M | pass |
| 2 | 3 Apr 118 7:26 am | 04031802.D | MB | | GG | MFXGS25C.M | pass |
| 3 | 3 Apr 118 7:44 am | 04031803.D | Lab air | | GG | MFXGS25C.M | pass |
| 4 | 3 Apr 118 8:07 am | 04031804.D | LCS S32-02151801 | | GG | MFXGS25C.M | pass |
| 5 | 3 Apr 118 8:24 am | 04031805.D | P1801605-013 | | GG | MFXGS25C.M | |
| 6 | 3 Apr 118 8:42 am | 04031806.D | P1801605-013 | | GG | MFXGS25C.M | |
| 7 | 3 Apr 118 8:59 am | 04031807.D | P1801605-013 | | GG | MFXGS25C.M | |
| 8 | 3 Apr 118 9:16 am | 04031808.D | P1801629-001 | | GG | MFXGS25C.M | |
| 9 | 3 Apr 118 9:34 am | 04031809.D | P1801629-001 | | GG | MFXGS25C.M | |
| 10 | 3 Apr 118 9:52 am | 04031810.D | P1801629-001 | | GG | MFXGS25C.M | |
| 11 | 3 Apr 118 10:20 am | 04031811.D | P1801641-001 | | GG | MFXGS25C.M | |
| 12 | 3 Apr 118 10:37 am | 04031812.D | P1801641-003 | | GG | MFXGS25C.M | |
| 13 | 3 Apr 118 10:56 am | 04031813.D | P1801641-005 | | GG | MFXGS25C.M | |
| 14 | 3 Apr 118 11:12 am | 04031814.D | P1801641-007 | | GG | MFXGS25C.M | |
| 15 | 3 Apr 118 11:34 am | 04031815.D | STD S32-03151801 | | GG | MF25VCO2.M | pass |
| 16 | 3 Apr 118 11:55 am | 04031816.D | P1801641-009 | | GG | MF25VCO2.M | |
| 17 | 3 Apr 118 12:13 pm | 04031817.D | P1801641-011 | | GG | MFXGS25C.M | |
| 18 | 3 Apr 118 12:38 pm | 04031818.D | P1801641-013 | | GG | MFXGS25C.M | |
| 19 | 3 Apr 118 1:17 pm | 04031819.D | P1801648-001 | | GG | MFXGS25C.M | |
| 20 | 3 Apr 118 1:38 pm | 04031820.D | P1801648-002 | | GG | MFXGS25C.M | |
| 21 | 3 Apr 118 1:55 pm | 04031821.D | P1801614-001 | | GG | MFXGS25C.M | |
| 22 | 3 Apr 118 2:21 pm | 04031822.D | P1801649-001 | | GG | MFXGS25C.M | |
| 23 | 3 Apr 118 2:41 pm | 04031823.D | P1801651-001 | | GG | MF25VCH4.M | |
| 24 | 3 Apr 118 3:00 pm | 04031824.D | STD S32-03151801 | | GG | MF25VCH4.M | pass |

Quantitation Report (QT Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021811.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 1:47 pm
Operator : MC
Sample : P1801614-001 1.0
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:35:26 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|---|
| Target Compounds | | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.918 | 639234 | 8.641 | ppb | |
| 2) | W | Carbonyl_Sulfide | 1.144 | 391931978 | 4766.751 | ppb | |
| 3) | T | Methyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 5) | T | Dimethyl_Sulfide | 3.441 | 9890056 | 132.871 | ppb | |
| 6) | T | Carbon_Disulfide | 3.636 | 41896128 | 281.432 | ppb | |
| 7) | T | 2-Propyl_Mercaptan | 3.802f | 33596 | 0.451 | ppb | |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | d |
| 10) | T | Ethyl_Methyl_Sulfide | 4.572 | 541867 | 7.280 | ppb | |
| 11) | T | Thiophene | 5.392 | 21721225 | 291.820 | ppb | |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | d |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb | d |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | d |
| 15) | t | Dimethyl_Disulfide | 6.585 | 9447936 | 63.465 | ppb | |
| 16) | T | 2-Methyl_Thiophene | 7.117 | 70433094 | 946.252 | ppb | |
| 17) | t | 3-Methyl_Thiophene | 7.243 | 59815497 | 803.607 | ppb | |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb | |
| 19) | t | 2,5-Dimethyl_Thiophene | 8.802 | 38009525 | 510.649 | ppb | |
| 20) | T | 2-Ethyl_Thiophene | 8.893 | 75079866 | 1008.681 | ppb | |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb | d |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb | |

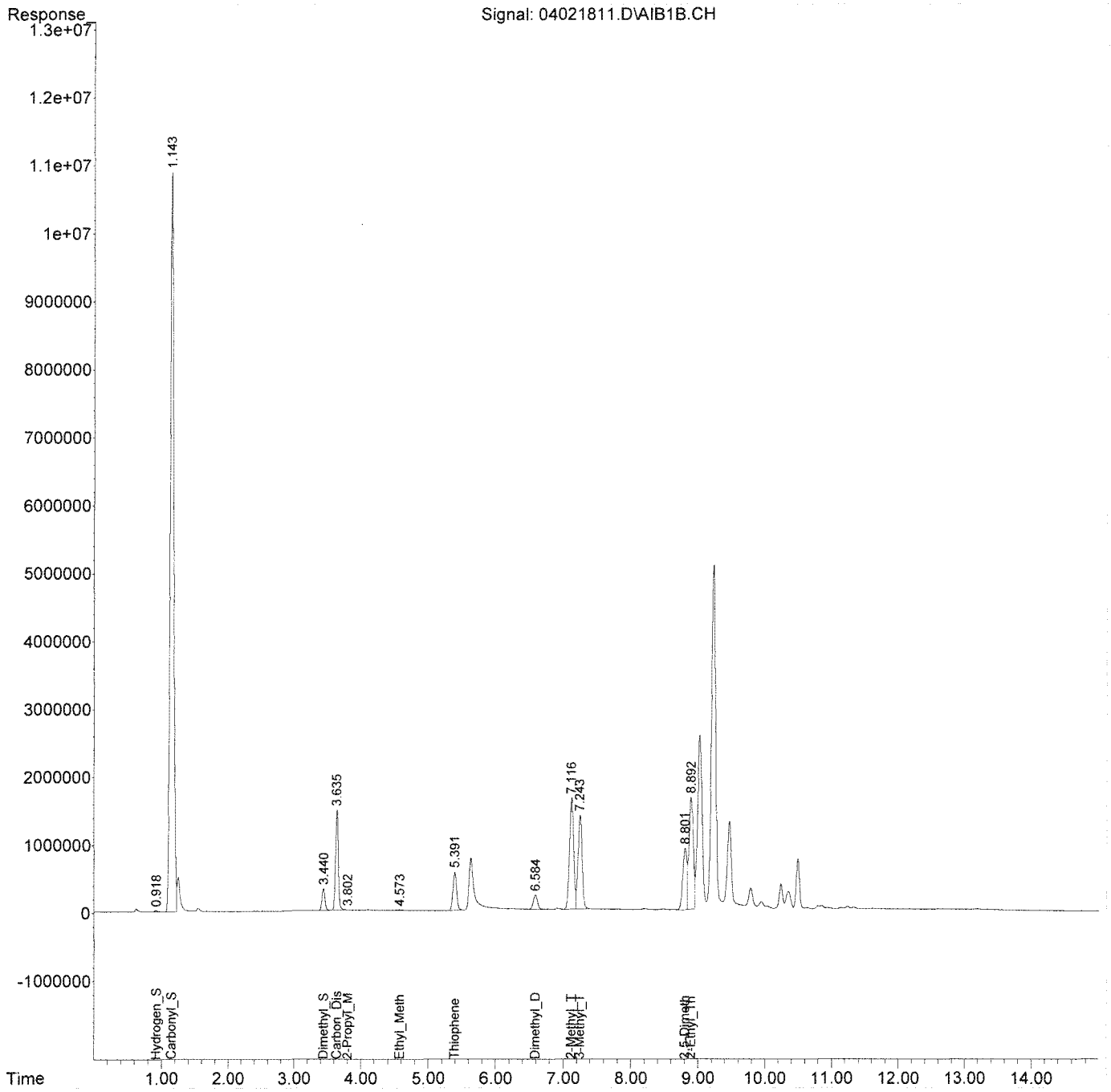
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021811.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 1:47 pm
Operator : MC
Sample : P1801614-001 1.0
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:35:26 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021806.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 8:05 am
Operator : MC
Sample : mb 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:35:04 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|
| Target Compounds | | | | | |
| 1) Z | Hydrogen_Sulfide | 0.000 | 0 | N.D. | ppb |
| 2) W | Carbonyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 3) T | Methyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 4) T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

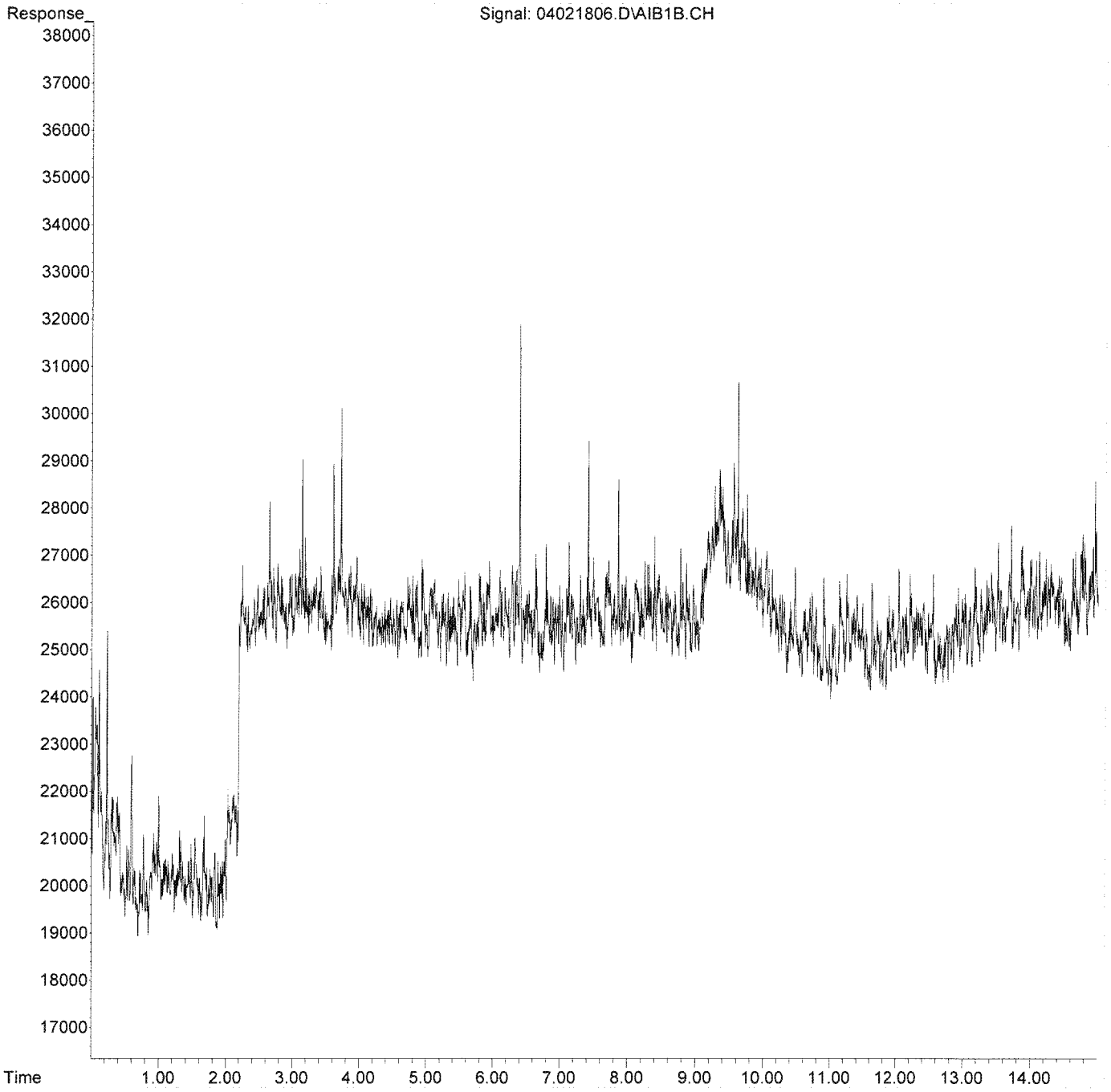
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021806.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 8:05 am
Operator : MC
Sample : mb 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:35:04 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021803.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 7:30 am
Operator : MC
Sample : lcs s32-02191802
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:34:21 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.902 | 70209147 | 949.054 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.139 | 77817312 | 946.429 | ppb |
| 3) | T | Methyl_Mercaptan | 2.254 | 74042294 | 994.741 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

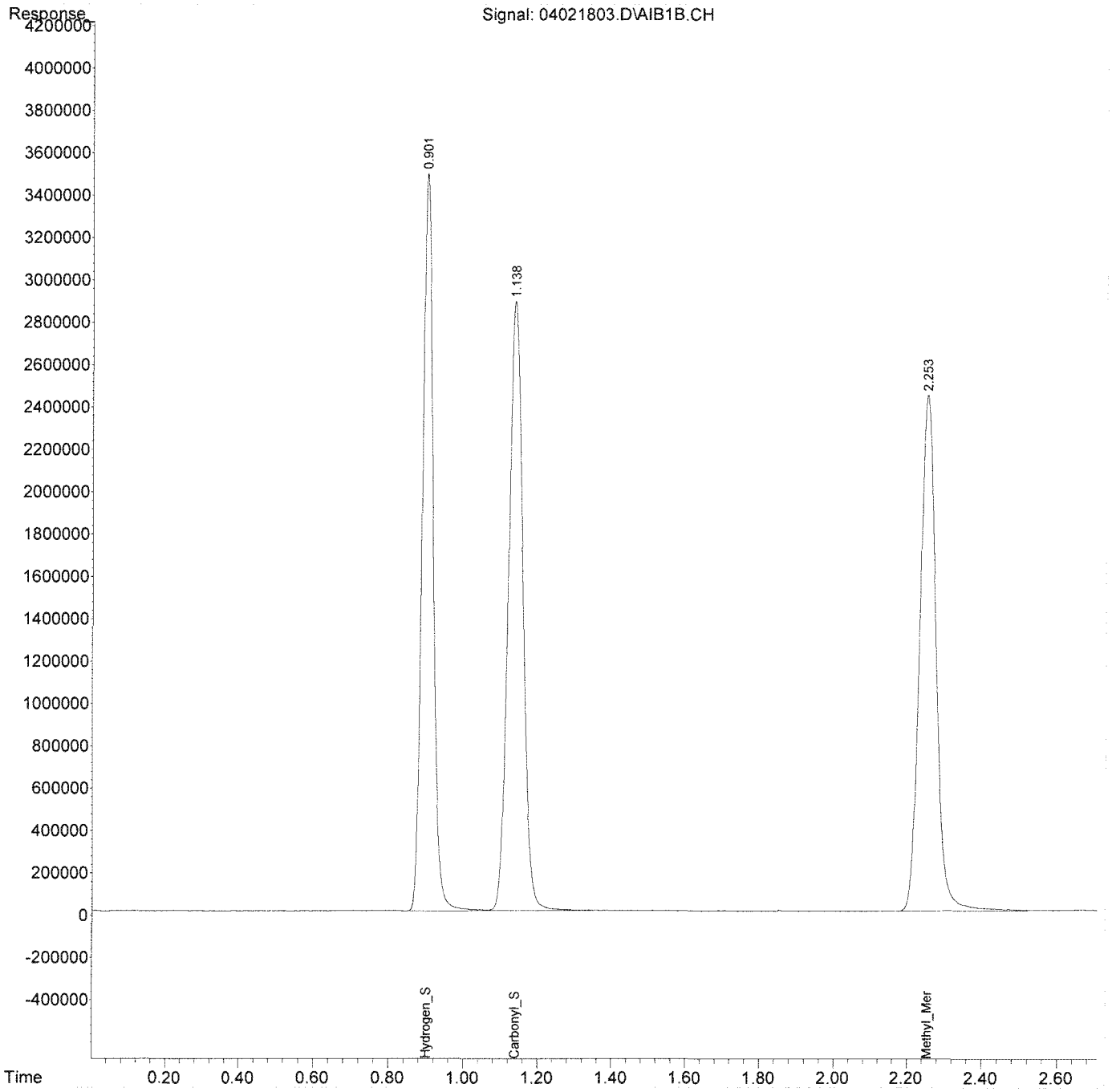
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021803.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 7:30 am
Operator : MC
Sample : lcs s32-02191802
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 04 11:34:21 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Response Factor Report HP G1530A

Method Path : J:\GC13\METHODS\
Method File : GC13_030818.M
Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
Last Update : Thu Mar 08 11:18:07 2018
Response Via : Initial Calibration

Calibration Files
2.5 =03081804.D 10 =03081805.D 50 =03081807.D
250 =03081808.D 1000 =03081809.D 2500 =03081810.D

| | | Compound | 2.5 | 10 | 50 | 250 | 1000 | 2500 | Avg | | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) | Z | Hydrogen_Sulfide | 8.269 | 7.517 | 7.879 | 7.333 | 7.107 | 6.762 | 7.398 | E4 | 6.97 |
| 2) | W | Carbonyl_Sulfide | 8.997 | 8.456 | 9.041 | 8.542 | 7.568 | 7.204 | 8.222 | E4 | 8.24 |
| 3) | T | Methyl_Mercaptan | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 4) | T | Ethyl_Mercaptan | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 5) | T | Dimethyl_Sulfide | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 6) | T | Carbon_Disulfide | 1.561 | 1.414 | 1.557 | 1.547 | 1.355 | 1.309 | 1.489 | E5 | 9.18 |
| 7) | T | 2-Propyl_Merc... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 8) | T | t-Butyl_Merca... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 9) | T | Propyl_Mercaptan | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 10) | T | Ethyl_Methyl_... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 11) | T | Thiophene | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 12) | T | i-Butyl_Merca... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 13) | T | Diethyl_Sulfide | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 14) | t | n-Butyl_Merca... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 15) | t | Dimethyl_Disu... | 1.561 | 1.414 | 1.557 | 1.547 | 1.355 | 1.309 | 1.489 | E5 | 9.18 |
| 16) | T | 2-Methyl_Thio... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 17) | t | 3-Methyl_Thio... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 18) | T | Tetrahydrothi... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 19) | t | 2,5-Dimethyl_... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 20) | T | 2-Ethyl_Thiop... | 7.803 | 7.071 | 7.787 | 7.737 | 6.776 | 6.543 | 7.443 | E4 | 9.18 |
| 21) | T | Diethyl_Disul... | 1.561 | 1.414 | 1.557 | 1.547 | 1.355 | 1.309 | 1.489 | E5 | 9.18 |
| 22) | T | Methyltrisulfide | 2.341 | 2.121 | 2.336 | 2.321 | 2.033 | 1.963 | 2.233 | E5 | 9.18 |

(#) = Out of Range ### Number of calibration levels exceeded format ###

GC13_030818.M Thu Mar 08 11:18:44 2018

# ALS Environmental - Simi Valley
## Initial Calibration Response Factor Summary

**Method:** Sulfur
**Analyst:** MC
**Detector:** SCD

**Printed:** 3/8/2018
**Instrument:** GC 13
**Analysis Date:** 3/8/2017

### AREA

| STD ID | Hydrogen Sulfide | Carbonyl Sulfide | Methyl Mercaptan | Carbon Disulfide |
|---|---|---|---|---|
| 1 | 206735 | 224918 | 195079 | 195079 |
| 2 | 751731 | 845605 | 707100 | 707100 |
| 3 | 3939360 | 4520645 | 3893265 | 3893265 |
| 4 | 18332891 | 21354709 | 19341424 | 19341424 |
| 5 | 71074518 | 75684561 | 67755863 | 67755863 |
| 6 | 169047256 | 180102291 | 163578224 | 163578224 |
| 7 | 358328855 | 399785199 | 372024003 | 372024003 |
| 8 | 710629838 | 798517450 | 790338277 | 790338277 |
| 9 | 1701170790 | 1866243881 | 1663093593 | 1663093593 |
| 10 | 4016280691 | 4483839188 | 4360760529 | 4360760529 |
| 11 | | | | |

### CONCENTRATION

| STD ID | Hydrogen Sulfide | Carbonyl Sulfide | Methyl Mercaptan | Carbon Disulfide |
|---|---|---|---|---|
| 1 | 2.500 | 2.500 | 2.500 | 1.250 |
| 2 | 10.000 | 10.000 | 10.000 | 5.000 |
| 3 | 50.000 | 50.000 | 50.000 | 25.000 |
| 4 | 250.000 | 250.000 | 250.000 | 125.000 |
| 5 | 1000.000 | 1000.000 | 1000.000 | 500.000 |
| 6 | 2500.000 | 2500.000 | 2500.000 | 1250.000 |
| 7 | 5000.000 | 5000.000 | 5000.000 | 2500.000 |
| 8 | 10000.000 | 10000.000 | 10000.000 | 5000.000 |
| 9 | 25000.000 | 25000.000 | 25000.000 | 12500.000 |
| 10 | 50000.000 | 50000.000 | 50000.000 | 25000.000 |
| 11 | | | | |

MA 3/8/18

# ALS Environmental - Simi Valley
## Initial Calibration Response Factor Summary

**RESPONSE FACTORS**

| STD ID | Hydrogen Sulfide | Carbonyl Sulfide | Methyl Mercaptan | Carbon Disulfide |
|---|---|---|---|---|
| 1 | 82693.81 | 89967.33 | 78031.50 | 156063.01 |
| 2 | 75173.13 | 84560.45 | 70710.04 | 141420.07 |
| 3 | 78787.20 | 90412.91 | 77865.29 | 155730.59 |
| 4 | 73331.56 | 85418.83 | 77365.70 | 154731.39 |
| 5 | 71074.52 | 75684.56 | 67755.86 | 135511.73 |
| 6 | 67618.90 | 72040.92 | 65431.29 | 130862.58 |
| 7 | 71665.77 | 79957.04 | 74404.80 | 148809.60 |
| 8 | 71062.98 | 79851.75 | 79033.83 | 158067.66 |
| 9 | 68046.83 | 74649.76 | 66523.74 | 133047.49 |
| 10 | 80325.61 | 89676.78 | 87215.21 | 174430.42 |
| 11 | | | | |

| | | | | |
|---|---|---|---|---|
| **AVERAGE RF'S** | 73978.03 | 82222.03 | 74433.73 | 148867.45 |
| **SD** | 5154.53 | 6772.68 | 6830.61 | 13661.23 |
| **%RSD** | 6.968 | 8.237 | 9.177 | 9.177 |

Edit Compounds -- Compound #1 -- Hydrogen_Sulfide

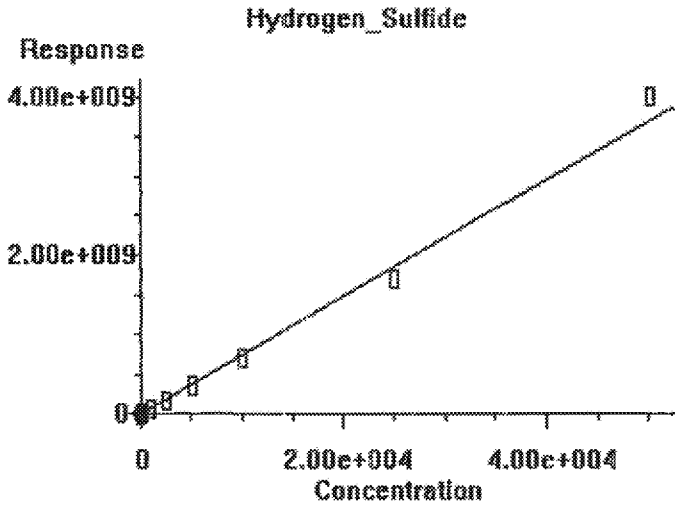
Search by: Ret Time | Name | Index | Find Compound

- Compound Database
- External Standard Compoun
  - Hydrogen_Sulfide
  - Carbonyl_Sulfide
  - Methyl_Mercaptan
  - Ethyl_Mercaptan
  - Dimethyl_Sulfide
  - Carbon_Disulfide
  - 2-Propyl_Mercaptan
  - t-Butyl_Mercaptan
  - Propyl_Mercaptan
  - Ethyl_Methyl_Sulfide
  - Thiophene
  - i-Butyl_Mercaptan
  - Diethyl_Sulfide
  - n-Butyl_Mercaptan
  - Dimethyl_Disulfide
  - 2-Methyl_Thiophene
  - 3-Methyl_Thiophene
  - Tetrahydrothiophene
  - 2,5-Dimethyl_Thiophene
  - 2-Ethyl_Thiophene
  - Diethyl_Disulfide
  - Methyltrisulfide

Identification | Calibration | User-Defined | Advanced | Reporting

| Lvl ID | Concentration | Response |
|---|---|---|
| 2.5 | 2.500000 | 206734.525250 |
| 10 | 10.000000 | 751731.273200 |
| 50 | 50.000000 | 3939359.977817 |
| 250 | 250.000000 | 18332890.847800 |
| 1000 | 1000.000000 | 71074518.365859 |
| 2500 | 2500.000000 | 169047256.360188 |
| 5000 | 5000.000000 | 358328854.502658 |
| 10pm | 10000.000000 | 710629837.991517 |
| 25pm | 25000.000000 | 1701170789.89279 |
| 50pm | 50000.000000 | 4016280691.16737 |

| Lvl ID | Concentration | Response |
|---|---|---|
| 100m | | |




| | |
|---|---|
| 0.000e+000 | Quadratic term |
| 7.398e+004 | Linear term |
| 0.000e+000 | Constant term |
| 6.968% | RF Rel Std Dev |

OK | Cancel | Help | Print Calibration Curve | Copy Calibration Curve

Edit Compounds -- Compound #2 -- Carbonyl_Sulfide

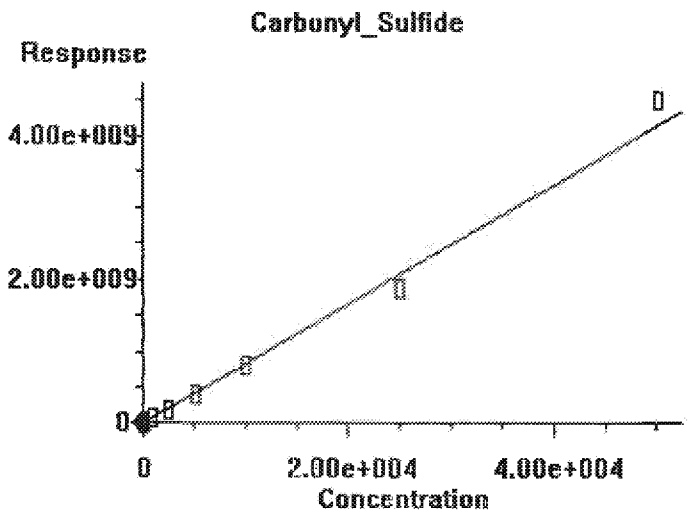
Search by: Ret Time | Name | Index | Find Compound

- Compound Database
- External Standard Compoun
  - Hydrogen_Sulfide
  - [illegible]
  - Methyl_Mercaptan
  - Ethyl_Mercaptan
  - Dimethyl_Sulfide
  - Carbon_Disulfide
  - 2-Propyl_Mercaptan
  - t-Butyl_Mercaptan
  - Propyl_Mercaptan
  - Ethyl_Methyl_Sulfide
  - Thiophene
  - i-Butyl_Mercaptan
  - Diethyl_Sulfide
  - n-Butyl_Mercaptan
  - Dimethyl_Disulfide
  - 2-Methyl_Thiophene
  - 3-Methyl_Thiophene
  - Tetrahydrothiophene
  - 2,5-Dimethyl_Thiophene
  - 2-Ethyl_Thiophene
  - Diethyl_Disulfide
  - Methyltrisulfide

Identification | Calibration | User-Defined | Advanced | Reporting

| Lvl ID | Concentration | Response |
|---|---|---|
| 2.5 | 2.500000 | 224918.321684 |
| 10 | 10.000000 | 845604.500000 |
| 50 | 50.000000 | 4520645.416349 |
| 250 | 250.000000 | 21354708.569039 |
| 1000 | 1000.000000 | 75684560.659141 |
| 2500 | 2500.000000 | 180102291.20481 |
| 5000 | 5000.000000 | 399785199.34234 |
| 10pm | 10000.000000 | 798517450.203487 |
| 25pm | 25000.000000 | 1866243881.00089 |
| 50pm | 50000.000000 | 4483839188.41017 |

| Lvl ID | Concentration | Response |
|---|---|---|
| 100m | | |




| | |
|---|---|
| 0.000e+000 | Quadratic term |
| 8.222e+004 | Linear term |
| 0.000e+000 | Constant term |
| 8.237% | RF Rel Std Dev |

OK | Cancel | Help | Print Calibration Curve | Copy Calibration Curve

Edit Compounds -- Compound #3 -- Methyl_Mercaptan

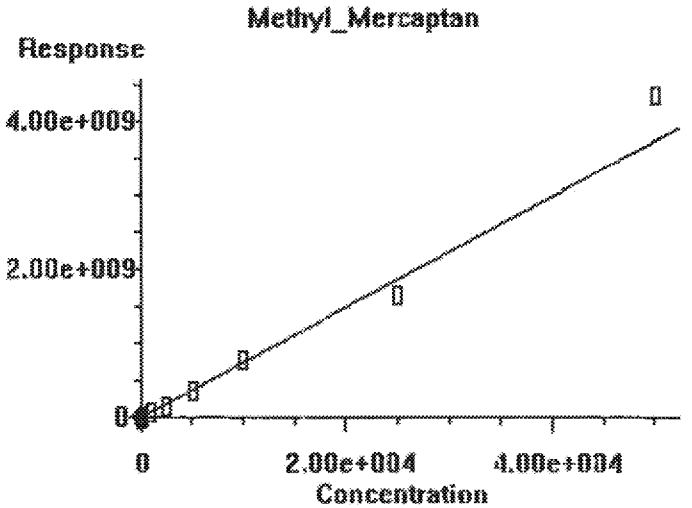
Search by: Ret Time | Name | Index | Find Compound

- Compound Database
- External Standard Compoun
  - Hydrogen_Sulfide
  - Carbonyl_Sulfide
  - [illegible]
  - Ethyl_Mercaptan
  - Dimethyl_Sulfide
  - Carbon_Disulfide
  - 2-Propyl_Mercaptan
  - t-Butyl_Mercaptan
  - Propyl_Mercaptan
  - Ethyl_Methyl_Sulfide
  - Thiophene
  - i-Butyl_Mercaptan
  - Diethyl_Sulfide
  - n-Butyl_Mercaptan
  - Dimethyl_Disulfide
  - 2-Methyl_Thiophene
  - 3-Methyl_Thiophene
  - Tetrahydrothiophene
  - 2,5-Dimethyl_Thiophene
  - 2-Ethyl_Thiophene
  - Diethyl_Disulfide
  - Methyltrisulfide

Identification | Calibration | User-Defined | Advanced | Reporting

| Lvl ID | Concentration | Response |
|---|---|---|
| 2.5 | 2.500000 | 195078.760200 |
| 10 | 10.000000 | 707100.363200 |
| 50 | 50.000000 | 3893264.710000 |
| 250 | 250.000000 | 19341424.320000 |
| 1000 | 1000.000000 | 67755862.590000 |
| 2500 | 2500.000000 | 163578223.990000 |
| 5000 | 5000.000000 | 372024002.670000 |
| 10pm | 10000.000000 | 790338277.390000 |
| 25pm | 25000.000000 | 1663093592.7700 |
| 50pm | 50000.000000 | 4360760529.1249 |

| Lvl ID | Concentration | Response |
|---|---|---|
| 100m | | |




| | |
|---|---|
| 0.000e+000 | Quadratic term |
| 7.443e+004 | Linear term |
| 0.000e+000 | Constant term |
| 9.177% | RF Rel Std Dev |

OK | Cancel | Help | Print Calibration Curve | Copy Calibration Curve

Calibration Status Report HP G1530A

Method Path : J:\GC13\METHODS\
Method File : GC13_030818.M
Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
Last Update : Thu Mar 08 11:18:07 2018
Response Via : Initial Calibration

| # | ID | Conc | ISTD Conc | Path\File |
|---|---|---|---|---|
| 1 | 2.5 | 1 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081804.D |
| 2 | 10 | 3 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081805.D |
| 3 | 50 | 17 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081807.D |
| 4 | 250 | 83 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081808.D |
| 5 | 1000 | 333 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081809.D |
| 6 | 2500 | 833 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081810.D |
| 7 | 5000 | 1667 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081811.D |
| 8 | 10pm | 3333 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081812.D |
| 9 | 25pm | 8333 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081813.D |
| 10 | 50pm | 16667 | 0 | J:\GC13\DATA\SCD\2018_03\08\03081814.D |
| 11 | 100m | Update calibration info does not match current calibration | | |

| # | ID | Update Time | Quant Time | Acquisition Time |
|---|---|---|---|---|
| 1 | 2.5 | Mar 08 08:16 2018 | Mar 08 08:15 2018 | 08 Mar 2018 8:08 |
| 2 | 10 | Mar 08 08:21 2018 | Mar 08 08:21 2018 | 08 Mar 2018 8:17 |
| 3 | 50 | Mar 08 08:37 2018 | Mar 08 08:37 2018 | 08 Mar 2018 8:32 |
| 4 | 250 | Mar 08 08:45 2018 | Mar 08 08:45 2018 | 08 Mar 2018 8:38 |
| 5 | 1000 | Mar 08 08:50 2018 | Mar 08 08:50 2018 | 08 Mar 2018 8:46 |
| 6 | 2500 | Mar 08 08:58 2018 | Mar 08 08:57 2018 | 08 Mar 2018 8:51 |
| 7 | 5000 | Mar 08 09:04 2018 | Mar 08 09:04 2018 | 08 Mar 2018 8:58 |
| 8 | 10pm | Mar 08 09:08 2018 | Mar 08 09:08 2018 | 08 Mar 2018 9:05 |
| 9 | 25pm | Mar 08 09:20 2018 | Mar 08 09:20 2018 | 08 Mar 2018 9:10 |
| 10 | 50pm | Mar 08 09:58 2018 | Mar 08 09:58 2018 | 08 Mar 2018 9:42 |
| 11 | 100m | | | |

GC13_030818.M Thu Mar 08 11:18:34 2018

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081804.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:08
Operator : MC
Sample : 2.5ppb s32-03081802 0.250ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:15:09 2018
Quant Method : J:\GC13\METHODS\GC13_030717.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Tue Oct 31 12:05:36 2017
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|---|
| Target Compounds | | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.897 | 206735 | 2.532 | ppb | m |
| 2) | W | Carbonyl_Sulfide | 1.138 | 224918 | 2.554 | ppb | m |
| 3) | T | Methyl_Mercaptan | 2.257 | 195079 | 2.321 | ppb | m |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb | |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb | |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb | |

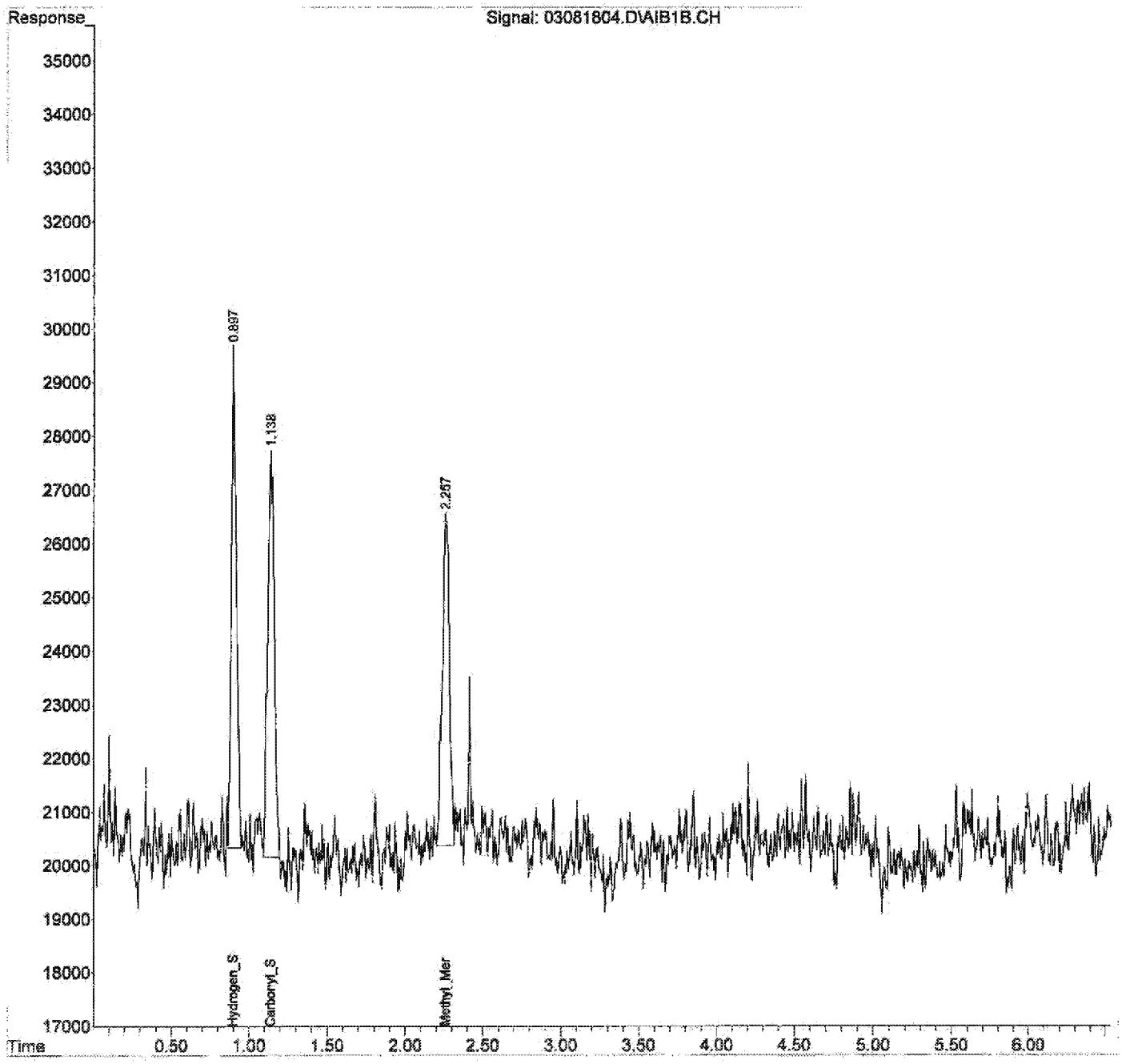
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081804.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:08
Operator : MC
Sample : 2.5ppb s32-03081802 0.250ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:15:09 2018
Quant Method : J:\GC13\METHODS\GC13_030717.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Tue Oct 31 12:05:36 2017
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

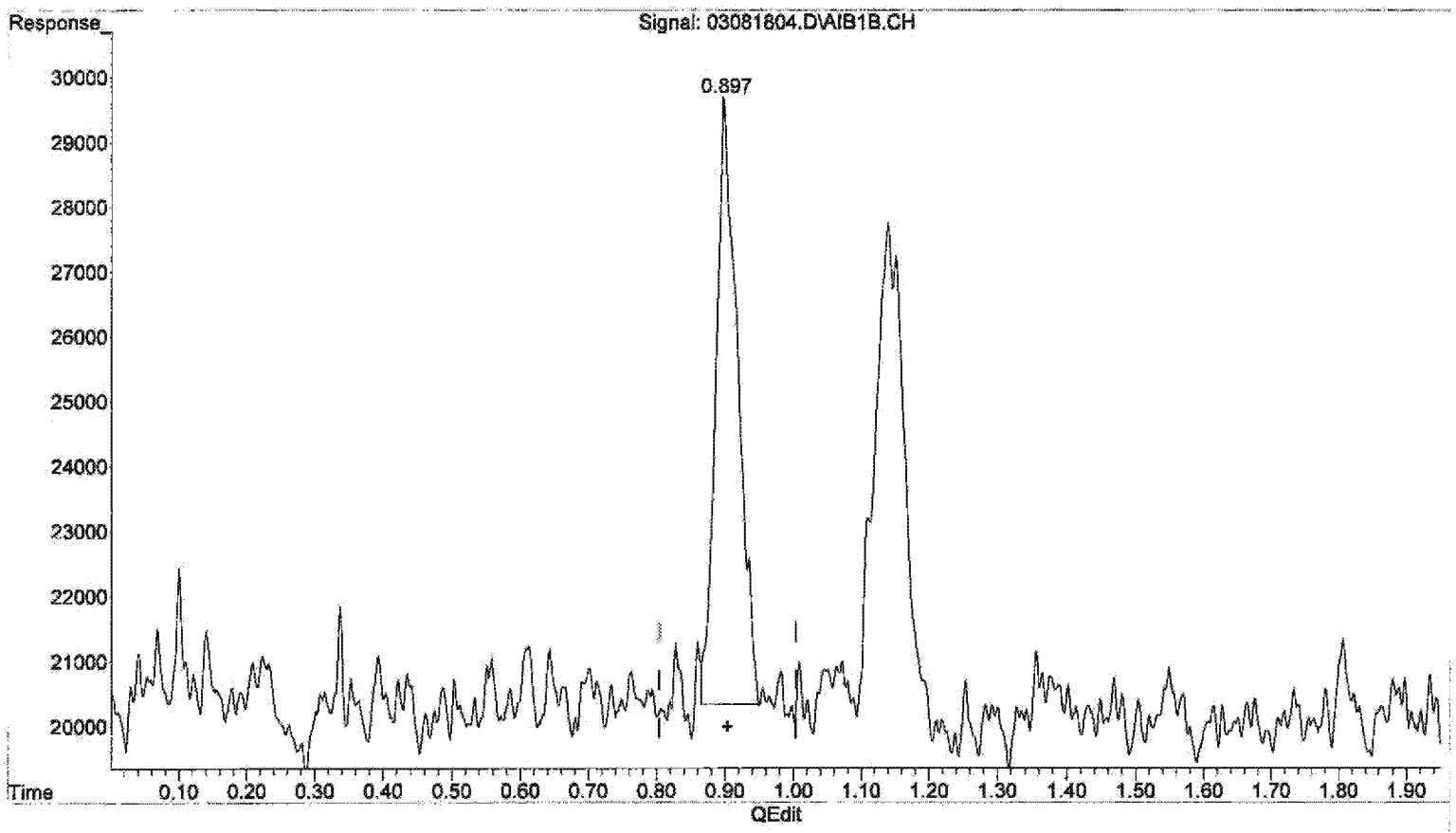


Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081804.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:08
Operator : MC
Sample : 2.5ppb s32-03081802 0.250ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:15:09 2018
Quant Method : J:\GC13\METHODS\GC13_030717.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Tue Oct 31 12:05:36 2017
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(1) Hydrogen_Sulfide (Z)
0.897min 2.532 ppb m
response 206735

M 3/8/18

7/8/18

BL
M
prevs

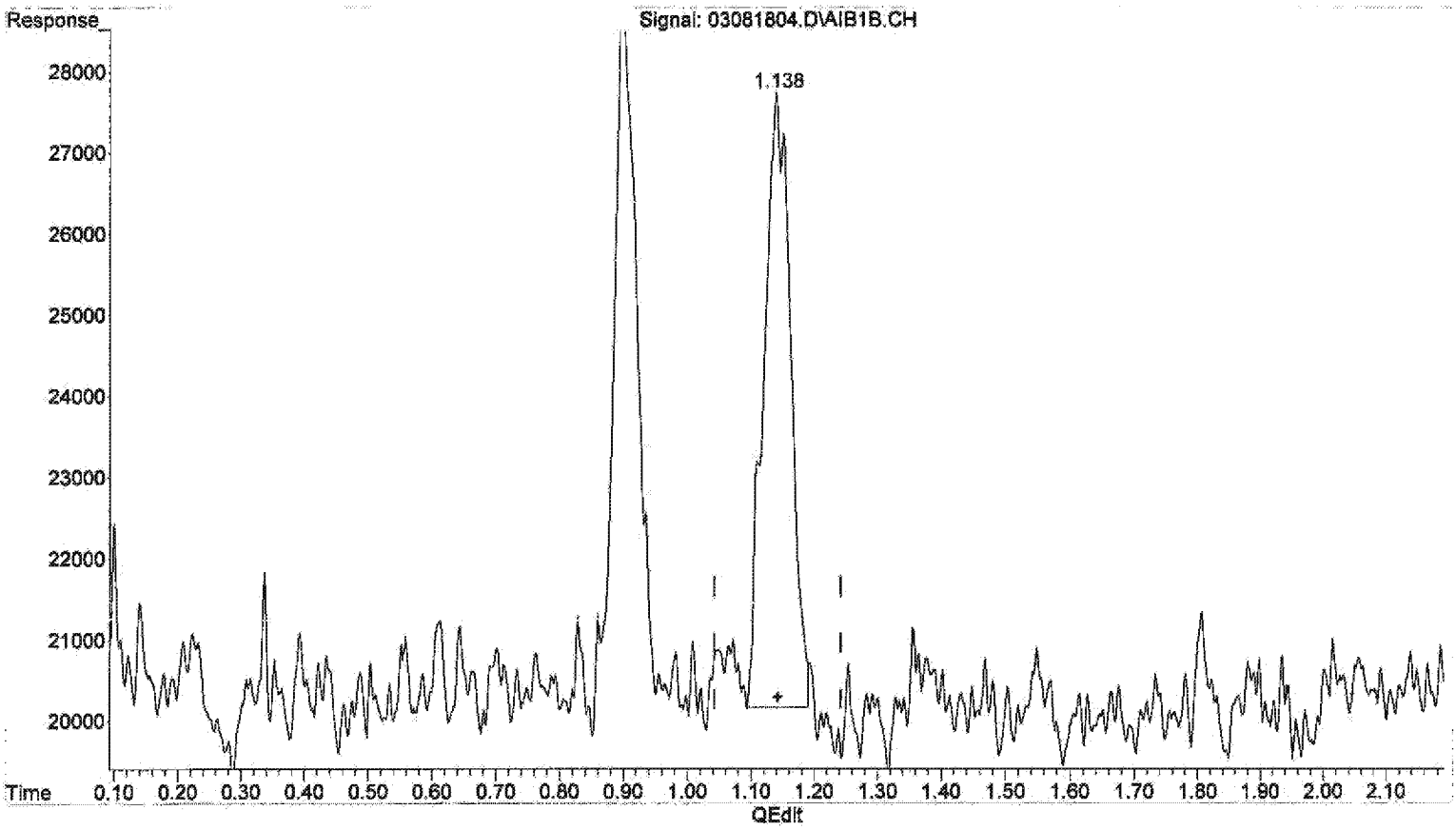
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081804.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:08
Operator : MC
Sample : 2.5ppb s32-03081802 0.250ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:15:09 2018
Quant Method : J:\GC13\METHODS\GC13_030717.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Tue Oct 31 12:05:36 2017
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(2) Carbonyl_Sulfide (W)

1.138min 2.554 ppb m

response 224918

M 3/8/18
Bk
M
pwa

3/8/18

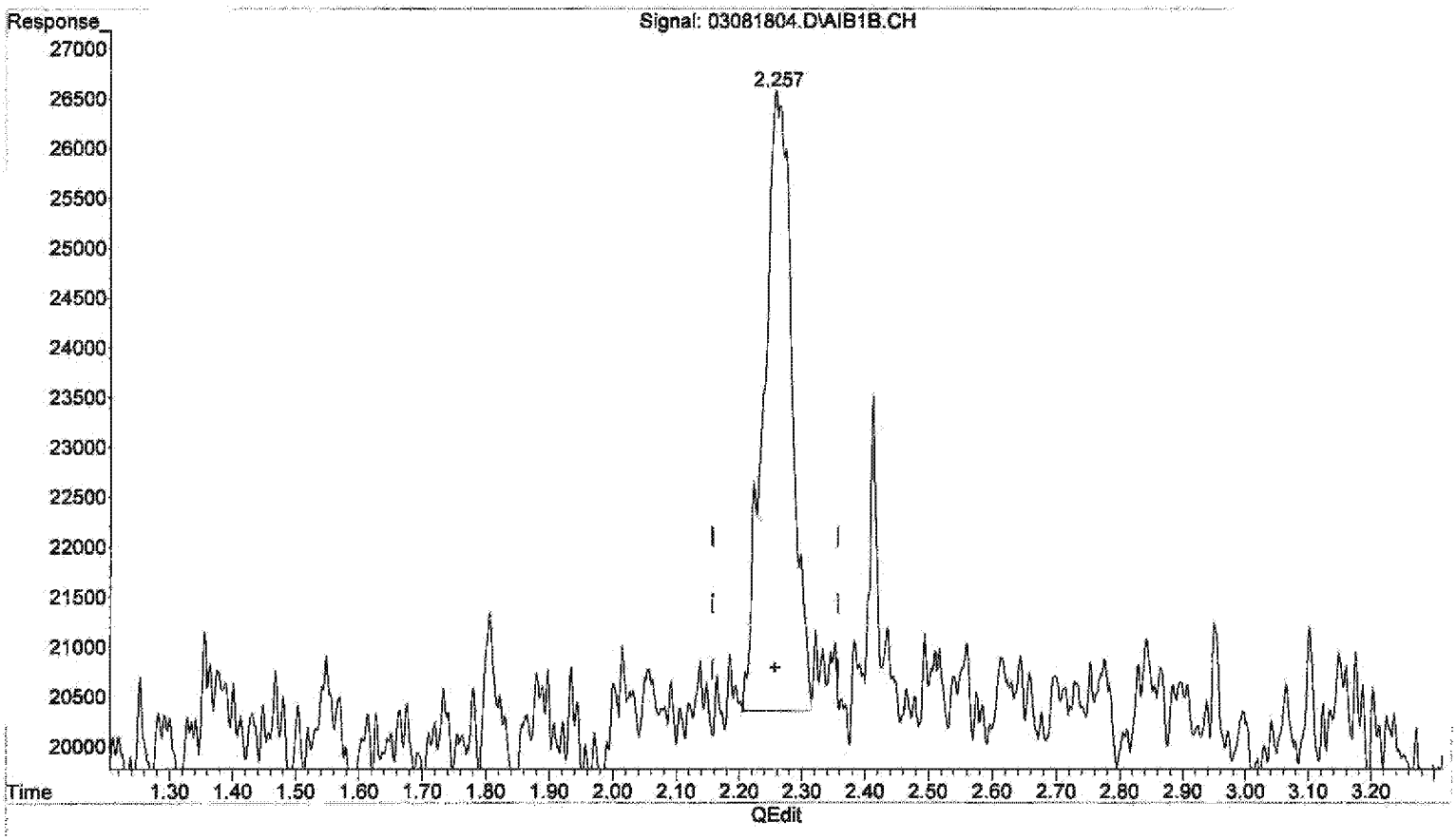
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081804.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:08
Operator : MC
Sample : 2.5ppb s32-03081802 0.250ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:15:09 2018
Quant Method : J:\GC13\METHODS\GC13_030717.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Tue Oct 31 12:05:36 2017
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(3) Methyl_Mercaptan (T)

2.257min 2.321 ppb m

response 195079

3/8/18

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081805.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:17
Operator : MC
Sample : 10ppb s32-03081802 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:20:38 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:16:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|---|
| Target Compounds | | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.910 | 751731 | 9.190 | ppb | m |
| 2) | W | Carbonyl_Sulfide | 1.150 | 845605 | 9.517 | ppb | m |
| 3) | T | Methyl_Mercaptan | 2.263 | 707100 | 8.399 | ppb | m |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb | |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb | |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb | |

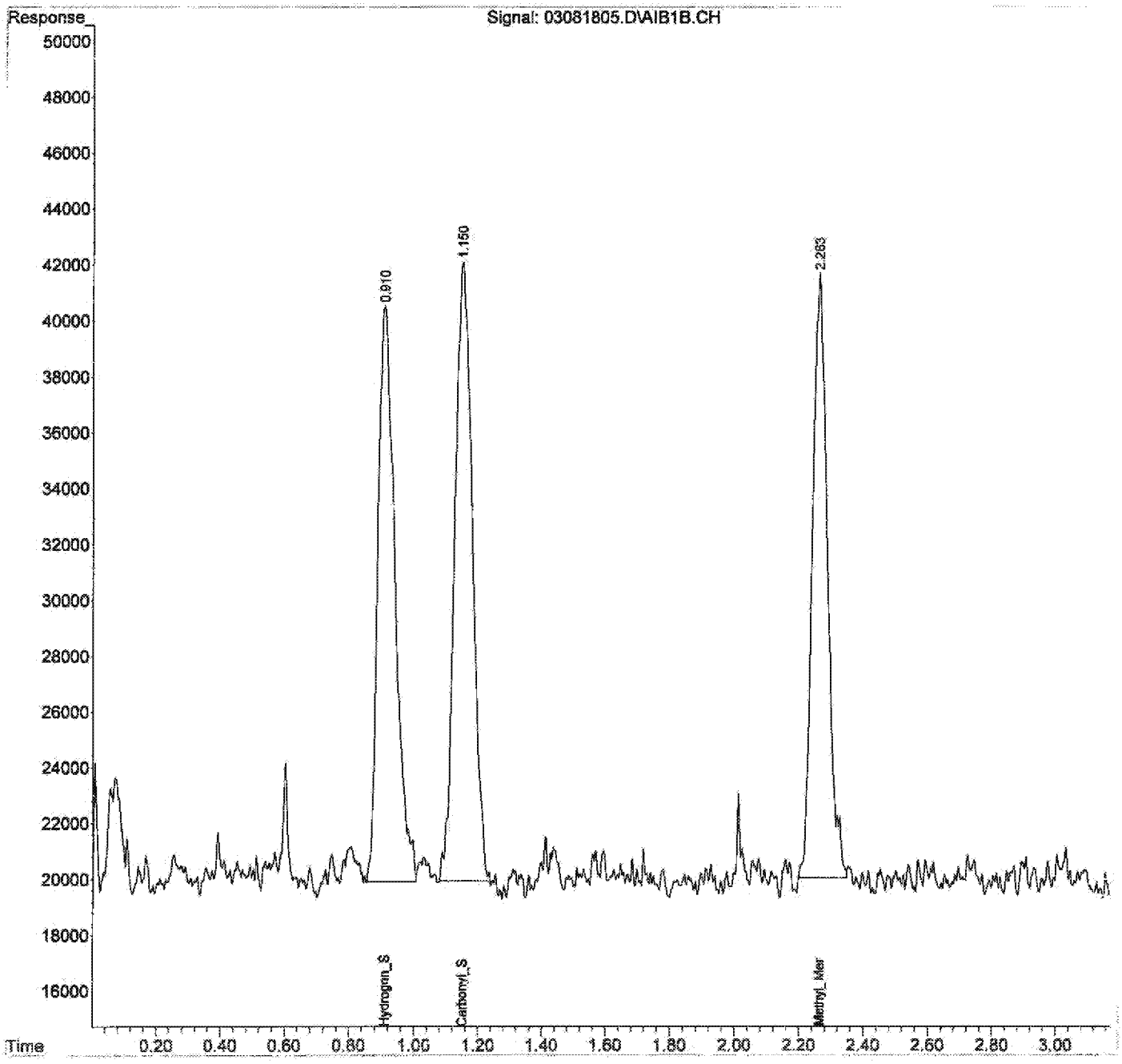
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081805.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:17
Operator : MC
Sample : 10ppb s32-03081802 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:20:38 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:16:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

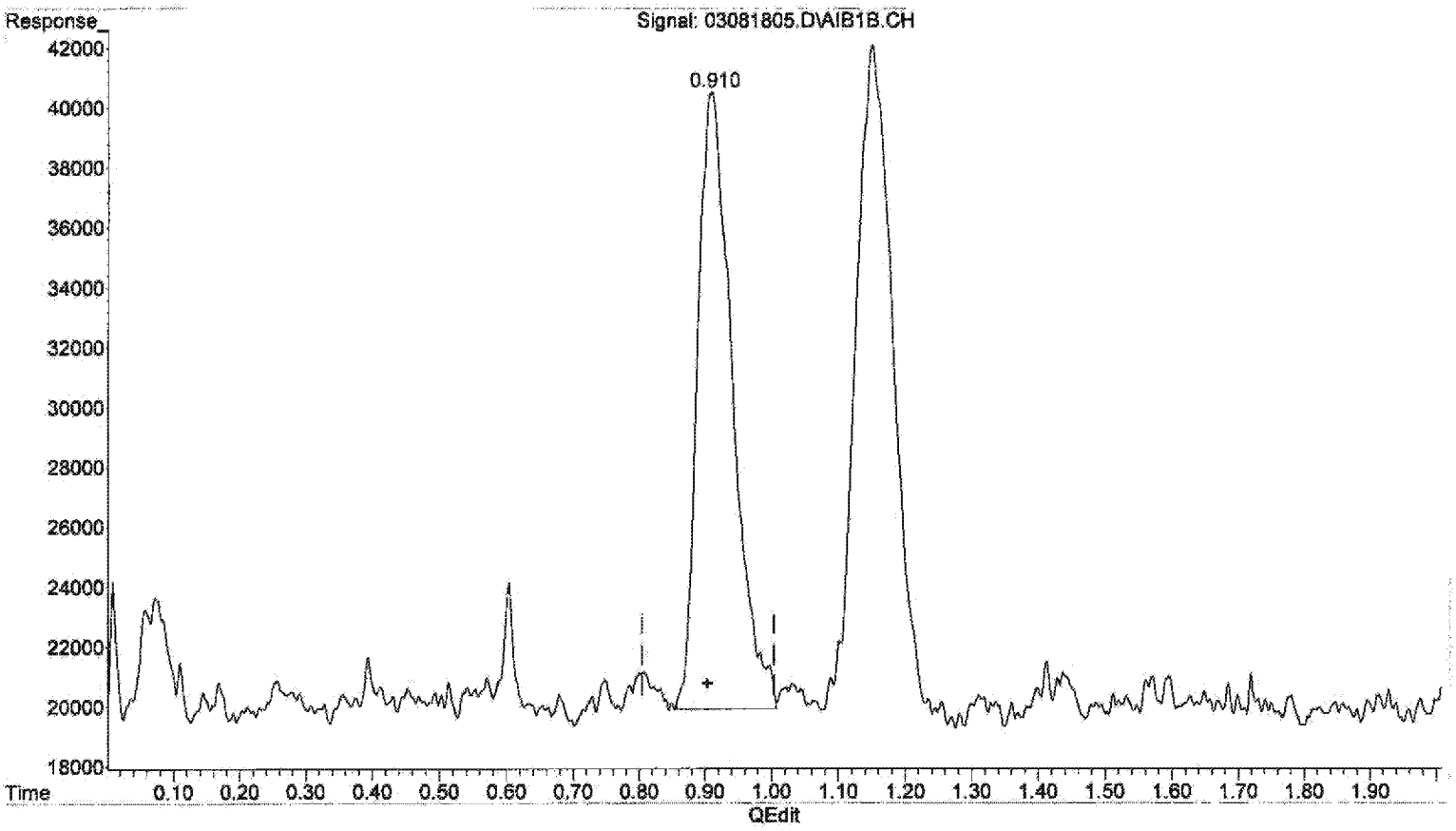


Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081805.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:17
Operator : MC
Sample : 10ppb s32-03081802 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:20:38 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:16:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(1) Hydrogen_Sulfide (Z)

0.910min 9.190 ppb m

response 751731

M 3/8/18 Blu No prevu

7/8/18

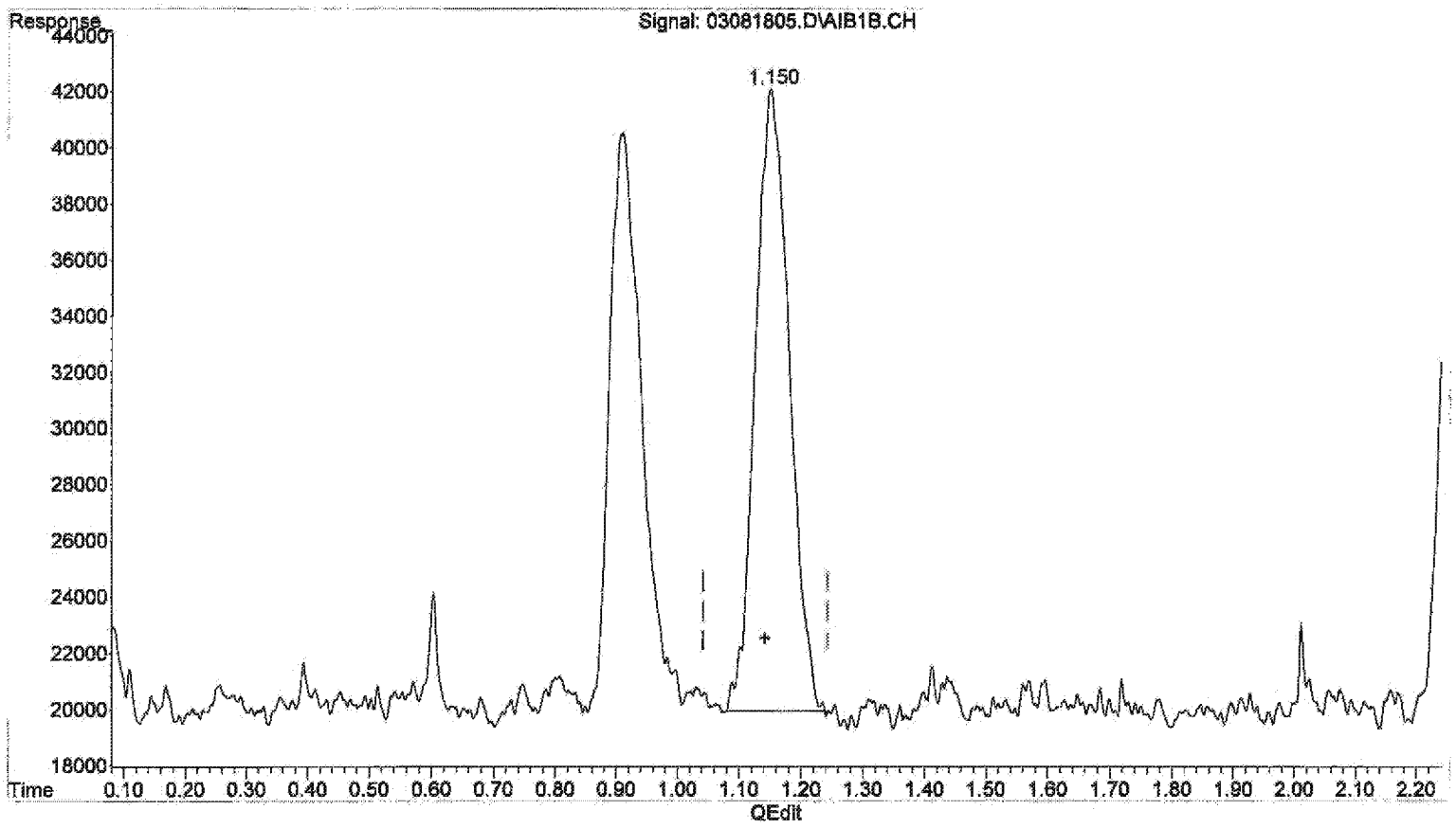
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081805.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:17
Operator : MC
Sample : 10ppb s32-03081802 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:20:38 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:16:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(2) Carbonyl_Sulfide (W)
1.150min 9.517 ppb m
response 845605

3/8/18
3/8/18

(+) = Expected Retention Time
GC13_030818.M Thu Mar 08 10:41:57 2018



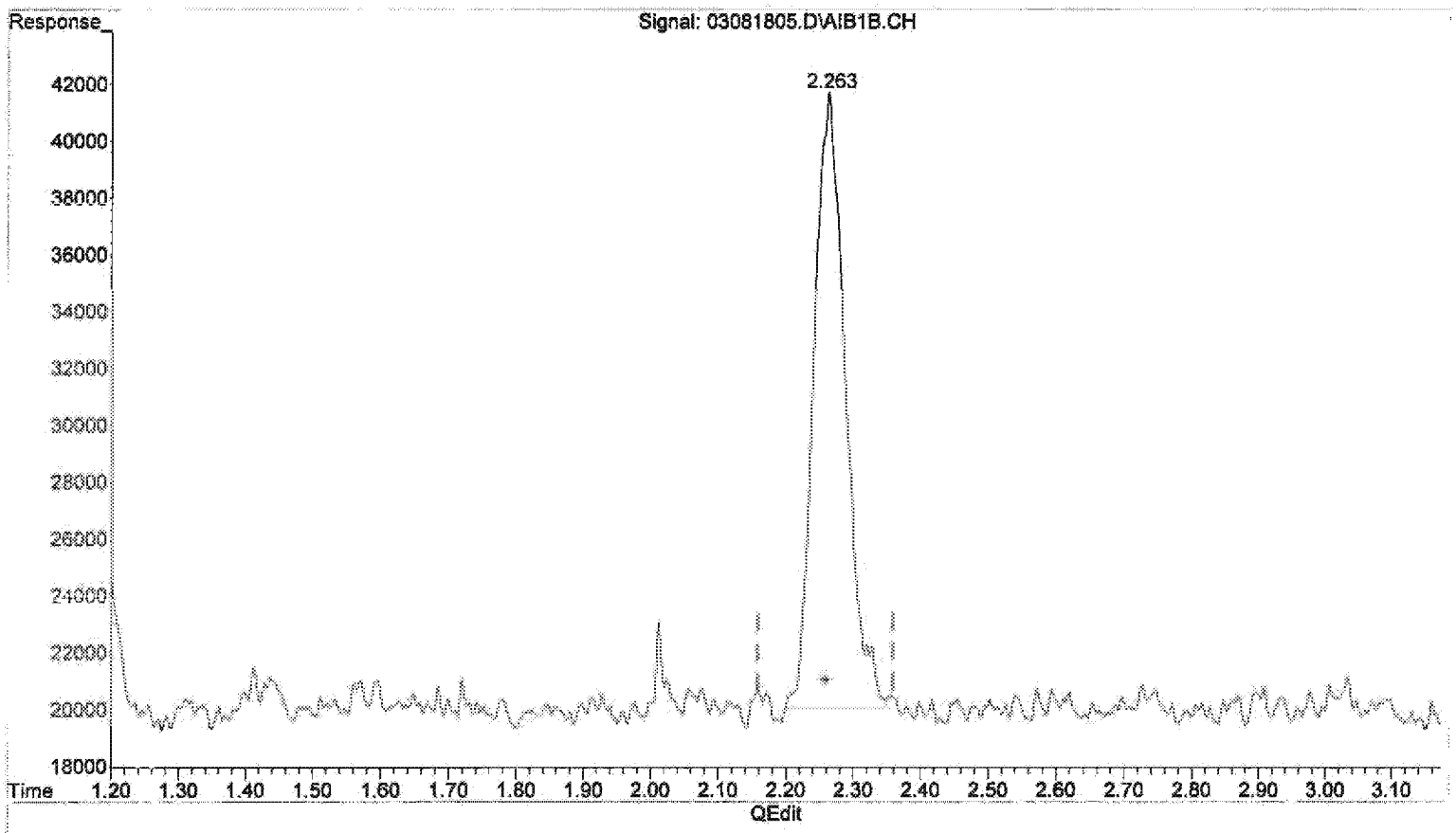
Page: 1

Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081805.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:17
Operator : MC
Sample : 10ppb s32-03081802 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:20:38 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:16:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(3) Methyl_Mercaptan (T)

2.263min 8.399 ppb m

response 707100

M 3/8/18
BLL
No
prevs

3/8/18

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081807.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:32
Operator : MC
Sample : 50ppb s32-03081803 0.2ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:37:10 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:21:19 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units | |
|---|---|---|---|---|---|---|---|
| Target Compounds | | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.901 | 3939360 | 48.194 | ppb | |
| 2) | W | Carbonyl_Sulfide | 1.139 | 4520645 | 50.625 | ppb | |
| 3) | T | Methyl_Mercaptan | 2.255 | 3893265 | 46.509 | ppb | m |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb | |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb | |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb | |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb | |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb | |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb | |

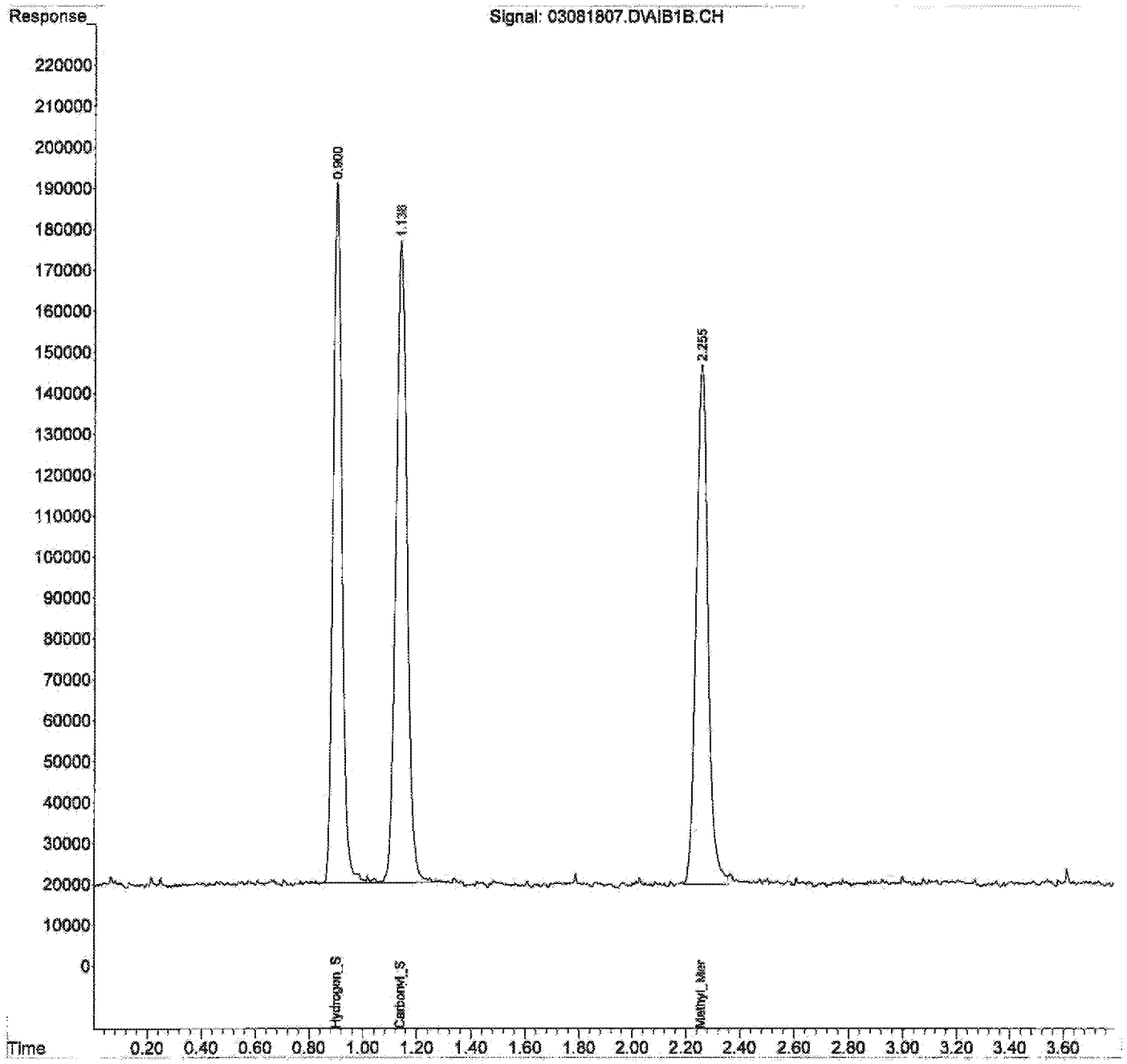
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081807.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:32
Operator : MC
Sample : 50ppb s32-03081803 0.2ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:37:10 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:21:19 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

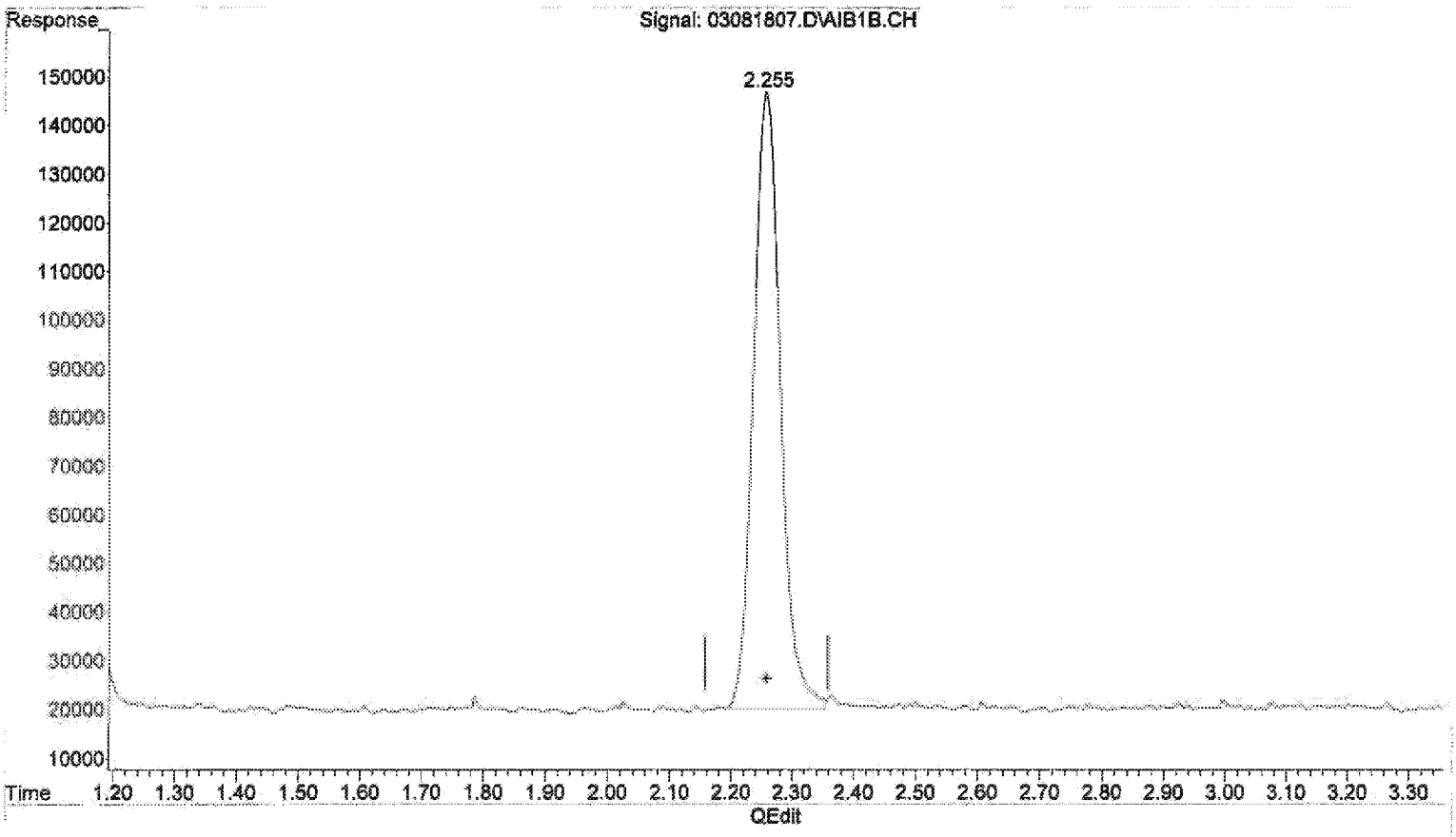


Quantitation Report (Qedit)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081807.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:32
Operator : MC
Sample : 50ppb s32-03081803 0.2ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:37:10 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:21:19 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :




(3) Methyl_Mercaptan (T)
2.255min 46.509 ppb m
response 3893265

M 3/8/18
Blw
No
prem

3/8/18

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081808.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:38
Operator : MC
Sample : 250ppb s32-03081803 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:45:06 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:37:28 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.906 | 18332891 | 226.843 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.150 | 21354709 | 240.614 | ppb |
| 3) | T | Methyl_Mercaptan | 2.261 | 19341424 | 234.266 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

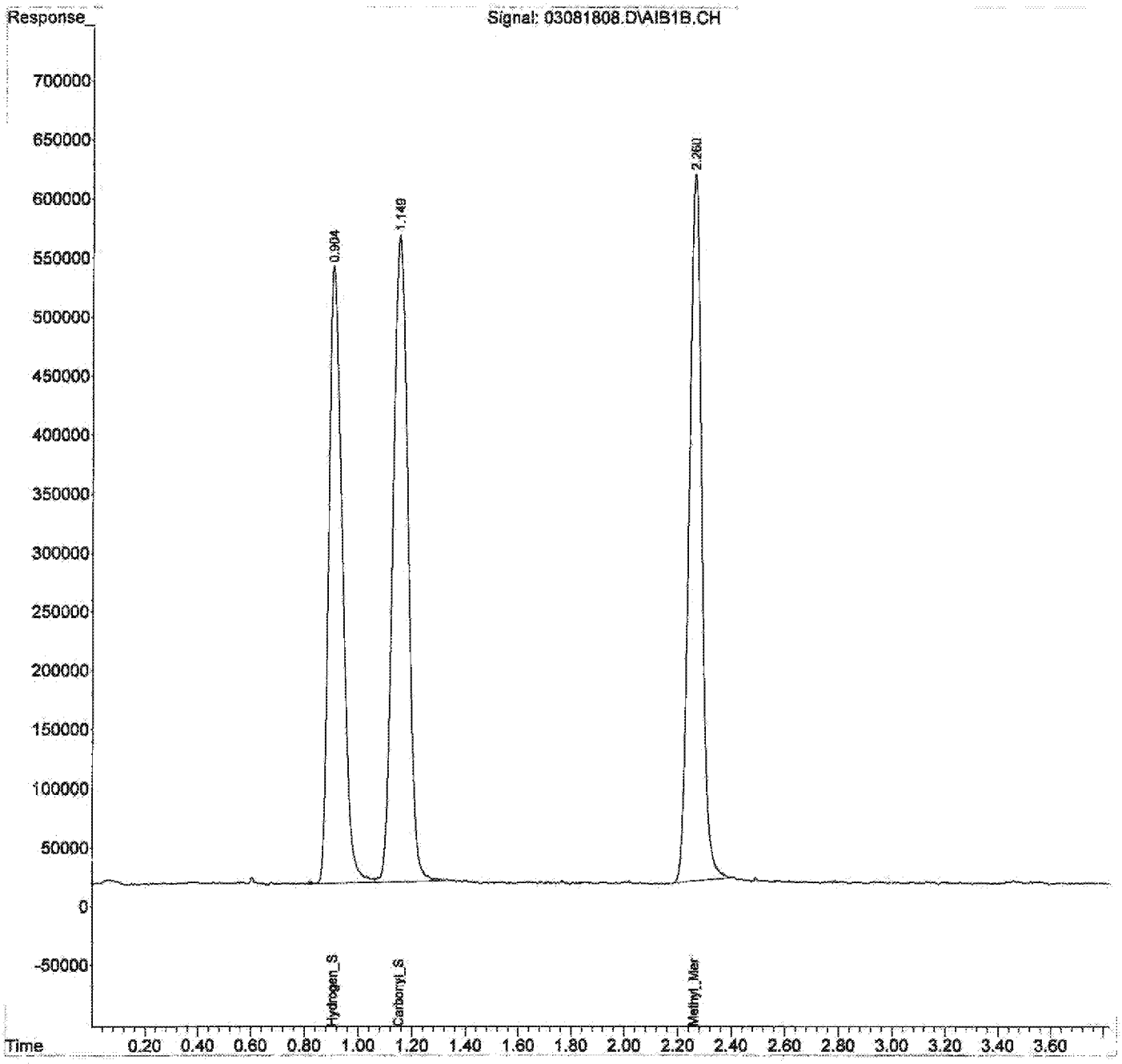
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081808.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:38
Operator : MC
Sample : 250ppb s32-03081803 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:45:06 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:37:28 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081809.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:46
Operator : MC
Sample : 1000ppb s32-03081801 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:50:31 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:45:16 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.903 | 71074518 | 892.881 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.141 | 75684561 | 860.342 | ppb |
| 3) | T | Methyl_Mercaptan | 2.256 | 67755863 | 832.814 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

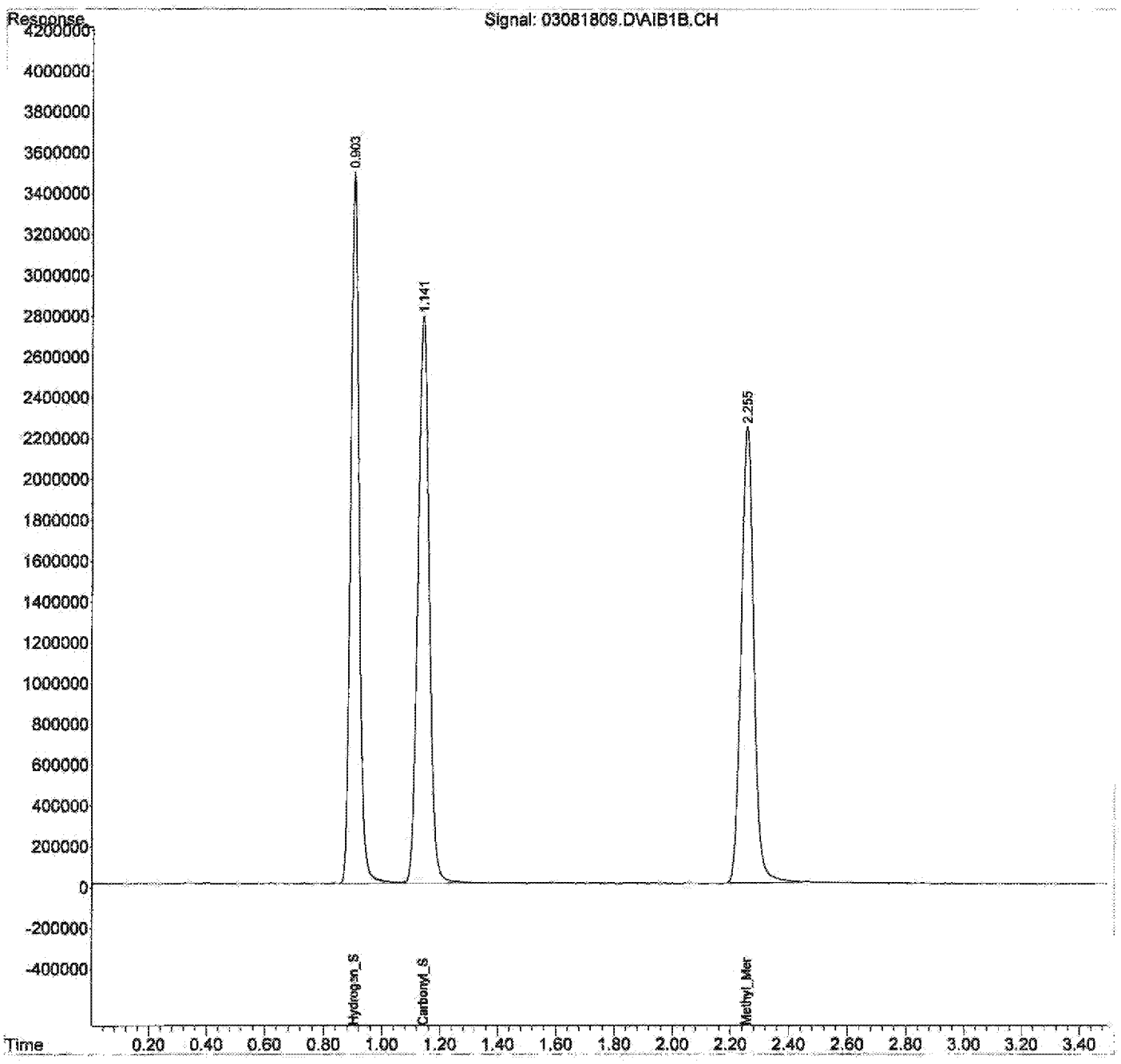
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081809.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:46
Operator : MC
Sample : 1000ppb s32-03081801 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:50:31 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:45:16 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081810.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:51
Operator : MC
Sample : 2500ppb s32-03081801 0.25ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:57:58 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:50:41 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.904 | 169047256 | 2160.301 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.142 | 180102291 | 2076.915 | ppb |
| 3) | T | Methyl_Mercaptan | 2.257 | 163578224 | 2055.360 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

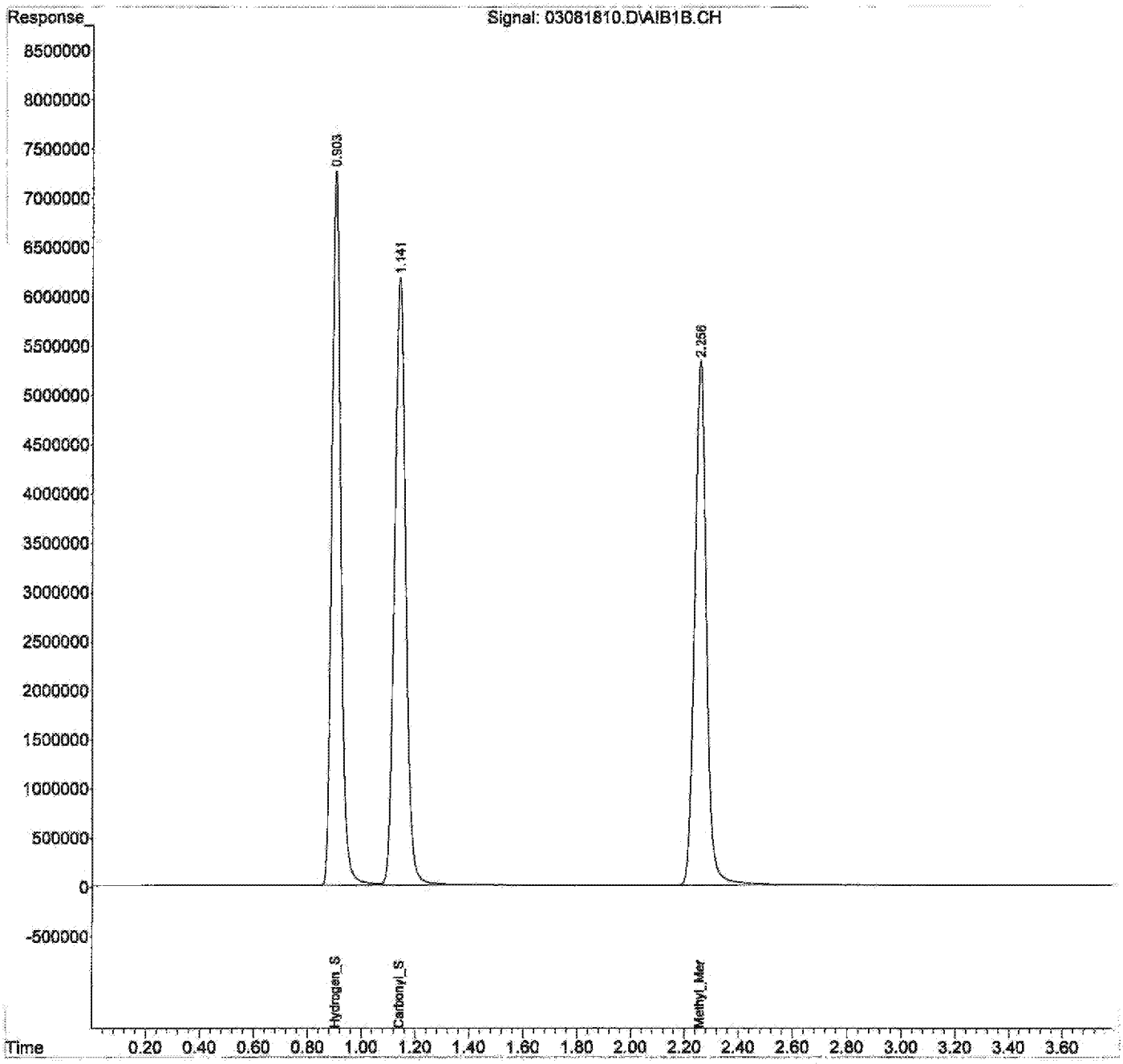
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081810.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:51
Operator : MC
Sample : 2500ppb s32-03081801 0.25ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 08:57:58 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:50:41 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081811.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:58
Operator : MC
Sample : 5000ppb s32-03081801 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:04:23 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:58:08 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.897 | 358328855 | 4700.151 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.136 | 399785199 | 4720.706 | ppb |
| 3) | T | Methyl_Mercaptan | 2.253 | 372024003 | 4821.991 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

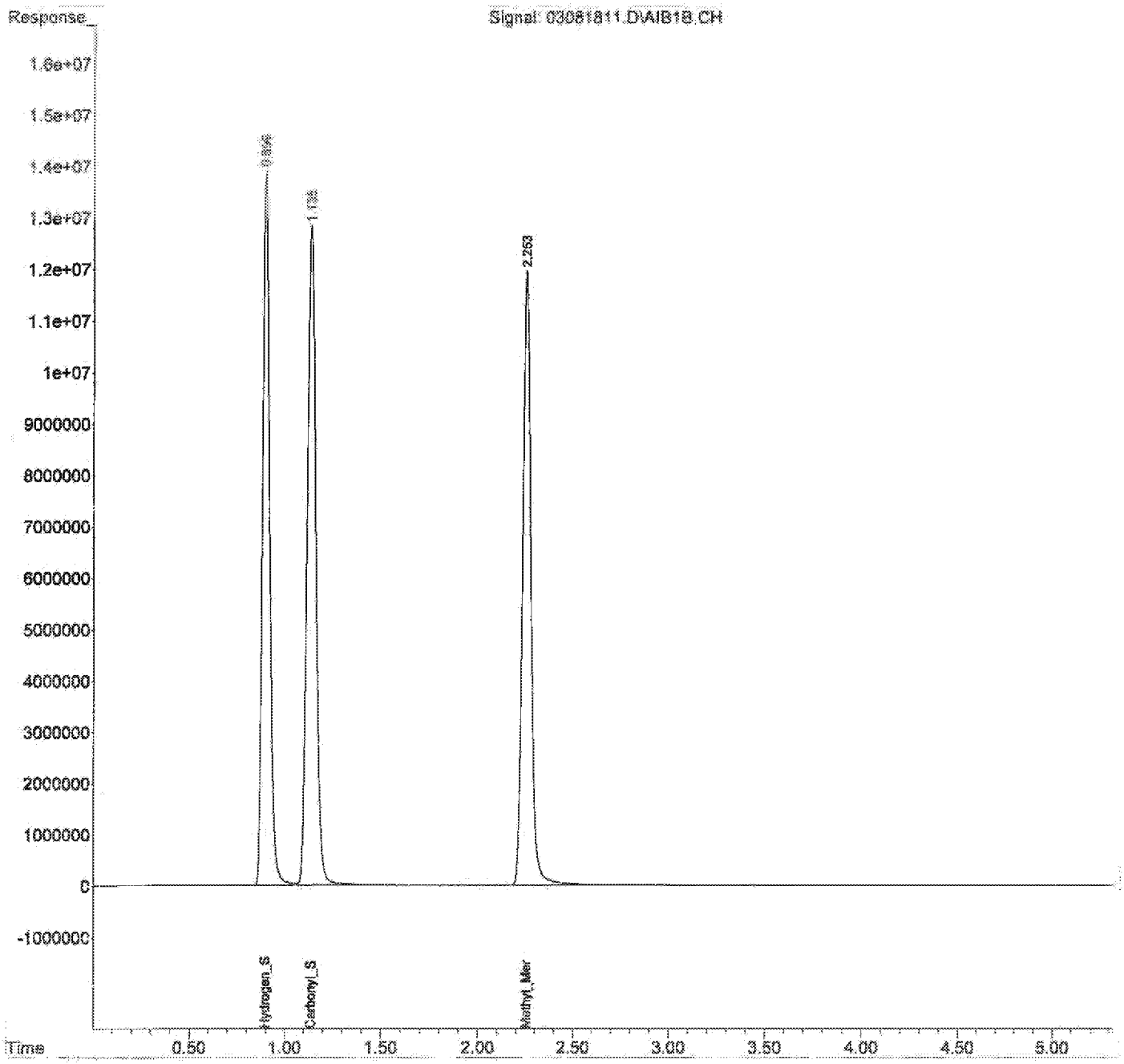
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081811.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 8:58
Operator : MC
Sample : 5000ppb s32-03081801 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:04:23 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 08:58:08 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081812.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:05
Operator : MC
Sample : 10000 s32-03081801 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:08:45 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:04:39 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.908 | 710629838 | 9505.563 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.152 | 798517450 | 9563.294 | ppb |
| 3) | T | Methyl_Mercaptan | 2.262 | 790338277 | 10439.115 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

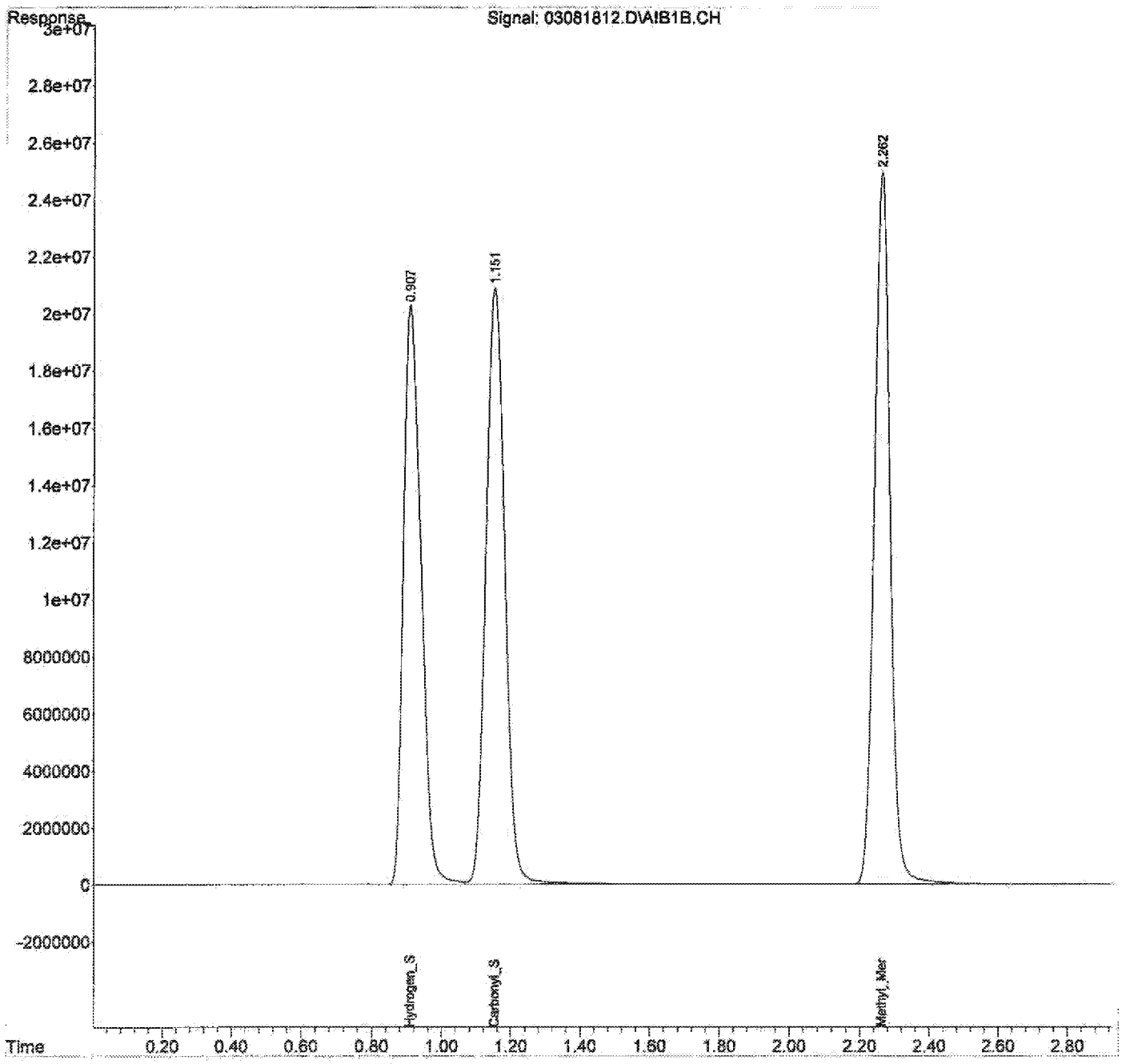
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081812.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:05
Operator : MC
Sample : 10000 s32-03081801 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:08:45 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:04:39 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081813.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:10
Operator : MC
Sample : 25ppm s32-03081804 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:20:24 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:08:58 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.904 | 1701170790 | 23134.740 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.143 | 1866243881 | 22629.407 | ppb |
| 3) | T | Methyl_Mercaptan | 2.256 | 1663093593 | 22162.155 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 3.439 | 643005 | 7.650 | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 3.933 | 2354052 | 28.008 | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 6.594 | 9633911 | 57.311 | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

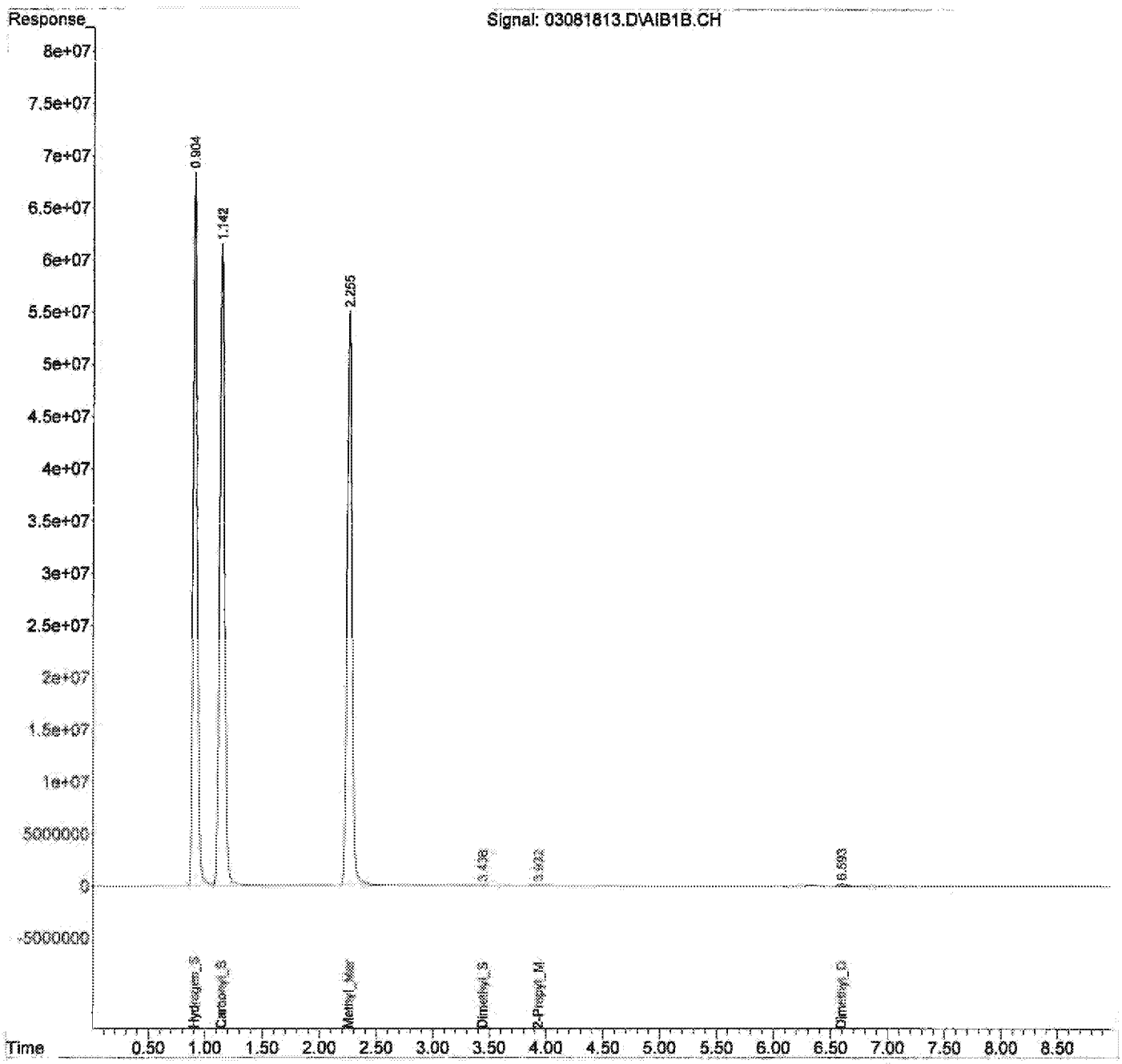
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081813.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:10
Operator : MC
Sample : 25ppm s32-03081804 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:20:24 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:08:58 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081814.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:42
Operator : MC
Sample : 50ppm s32-03081804 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:58:00 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:41:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.907 | 4016280691 | 56573.124 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.149 | 4483839188 | 56337.960 | ppb |
| 3) | T | Methyl_Mercaptan | 2.260 | 4360760529 | 60813.309 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 3.449 | 1245450 | 18.296 | ppb |
| 6) | T | Carbon_Disulfide | 3.644 | 312455 | 2.066 | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 6.599 | 34506573 | 253.169 | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

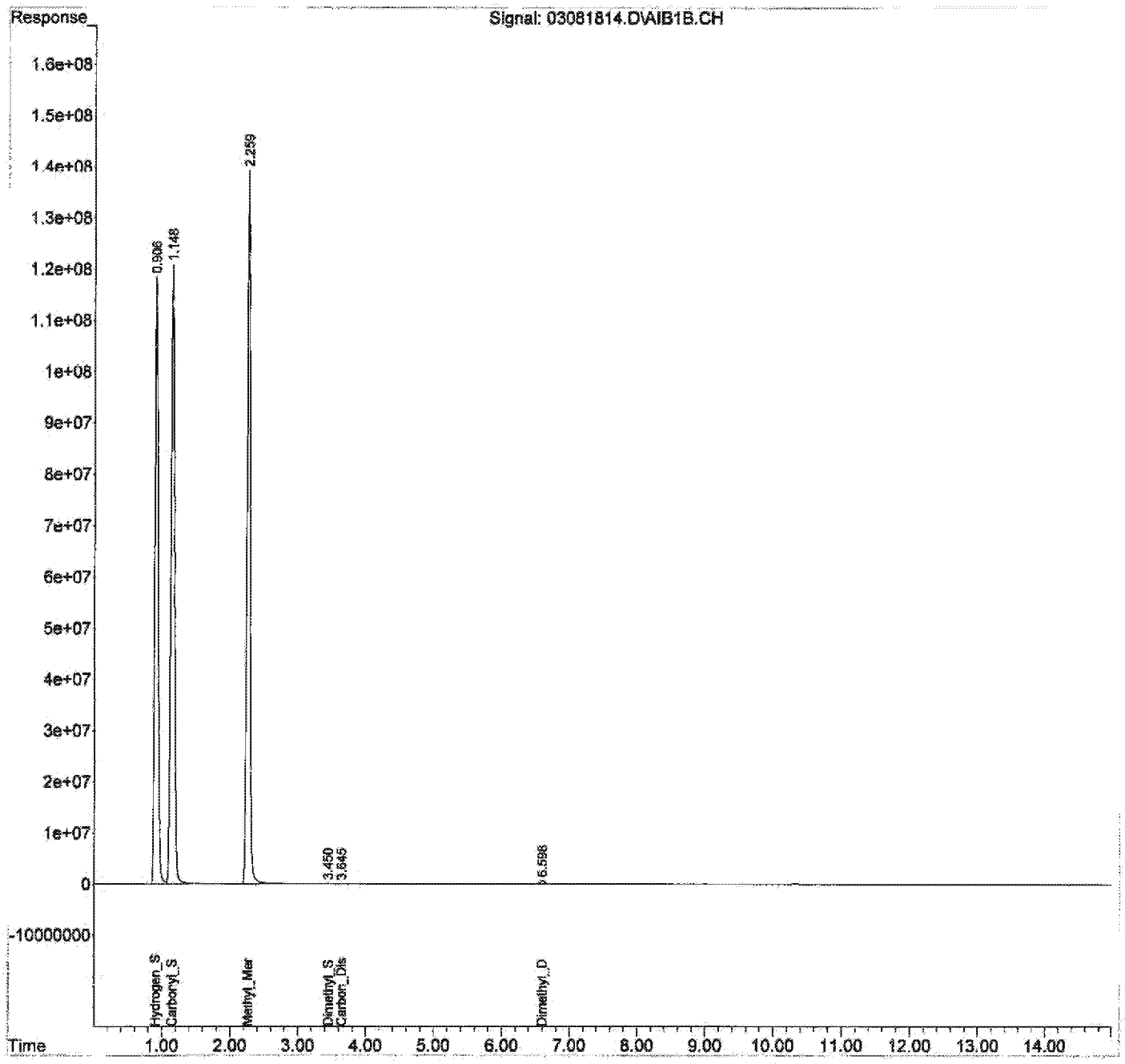
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081814.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 9:42
Operator : MC
Sample : 50ppm s32-03081804 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 09:58:00 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 09:41:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081818.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 10:55
Operator : MC
Sample : icv s32-02191802
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 10:58:29 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 10:58:21 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units | Actual | % D |
|---|---|---|---|---|---|---|---|---|
| Target Compounds | | | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.905 | 76686887 | 1036.617 | ppb | 1000 | 103.7 |
| 2) | W | Carbonyl_Sulfide | 1.143 | 81414643 | 990.180 | ppb | 1000 | 99 |
| 3) | T | Methyl_Mercaptan | 2.259 | 73556783 | 988.218 | ppb | 1000 | 98.8% |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb | | |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb | | |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb | | |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb | | |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb | | |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb | | |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb | | |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | | |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb | | |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb | | |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb | | |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb | | |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb | | |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb | | |

(f)=RT Delta > 1/2 Window (m)=manual int.

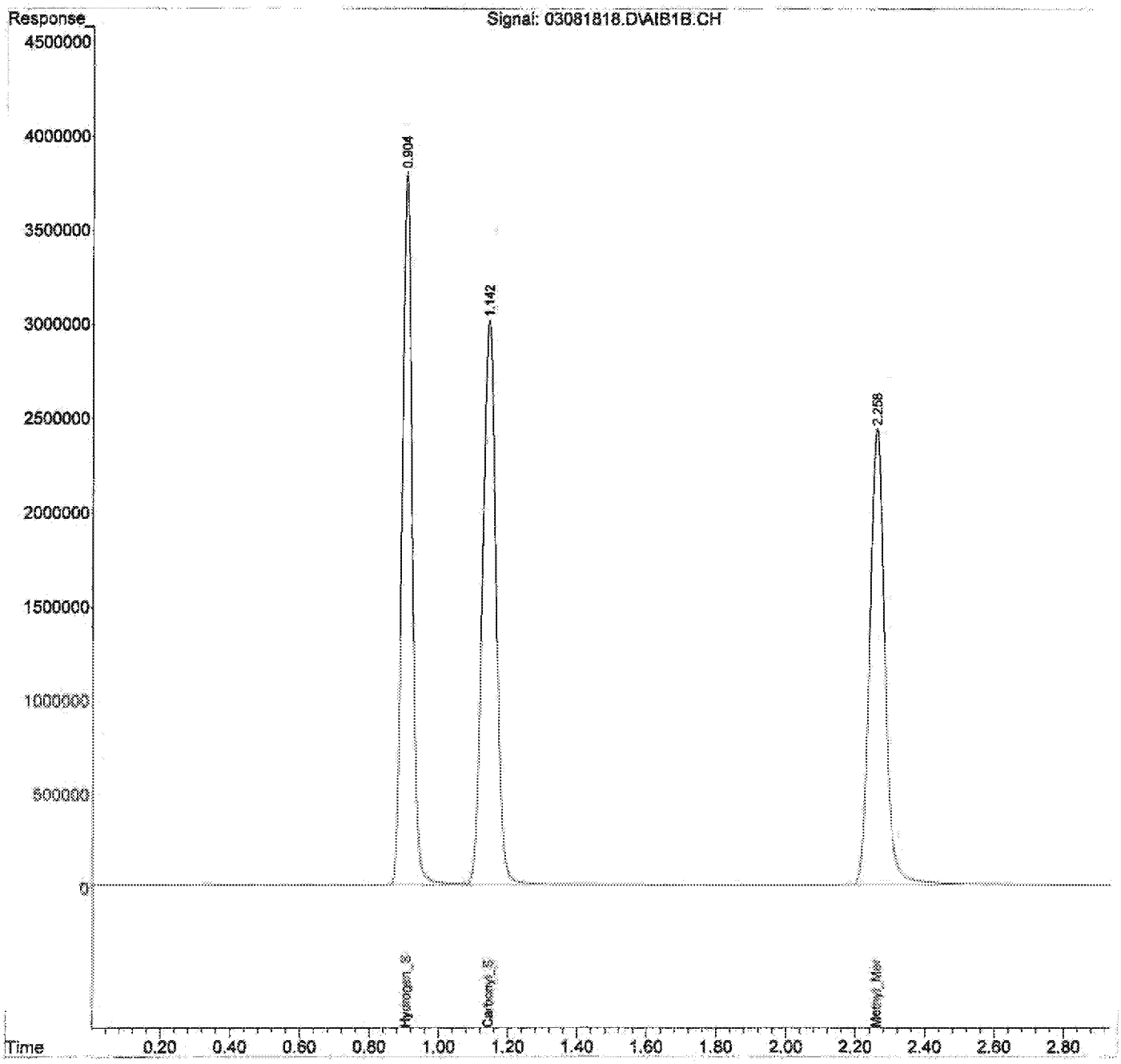
3/8/18

Quantitation Report (QT Reviewed)

Data Path : J:\GC13\DATA\SCD\2018_03\08\
Data File : 03081818.D
Signal(s) : AIB1B.CH
Acq On : 08 Mar 2018 10:55
Operator : MC
Sample : icv s32-02191802
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Mar 08 10:58:29 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 10:58:21 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



# ALS Environmental

## REPORT SUMMARY

**Method** : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
**Client** : CH2M Hill
**Analyst** : MC

Service Request : P1801614
Instrument : GC13
Date Acquired : 4/2/18

| Compounds | MDL | RL | MB QC | | Dry Wall QC | | Lab Dup | | | Continuing Calibration Standards Summary (ppbv) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MB | | | | | dup | %RSD | ppbv | % Diff | ppbv | % Diff | ppbv | % Diff | ppbv | % Diff | ppbv | % Diff | ppbv | % Diff | ppbv | % Diff |
| **Sample Information :** | ppb | ppb | mb 1ml | | | | | | | std s32-02191801 | | std S32-02191801 | | | | | | | | | | | |
| Inj. Vol. (ml) | 1.0 | 1.0 | 1.00 | | 1.0 | 1.0 | | | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 | |
| Dilution | 1.0 | 1.0 | 1.00 | | 1.0 | 1.0 | | | | | | | | | | | | | | | | | |
| Pi: | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | | | | | | | | | | | | | | | | | |
| Pi: | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | | | | | | | | | | | | | | | | | |
| PiPf DF: | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | | | | | | | | | | | | | | | | | |
| Hydrogen_Sulfide | 1.900 | 5.000 | ND | P | | | | | | 924.59 | 7.5% | 1118.631 | 11.9% | | | | | | | | | | |
| Carbonyl_Sulfide | 1.700 | 5.000 | ND | P | | | | | | 945.36 | 5.5% | 1128.023 | 12.8% | | | | | | | | | | |
| Methyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | 959.35 | 4.1% | 1111.857 | 11.2% | | | | | | | | | | |
| Ethyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Dimethyl_Sulfide | 1.200 | 5.000 | ND | P | | | | | | 7:27 AM | | 2:19 PM | | | | | | | | | | | |
| Carbon_Disulfide | 0.600 | 2.500 | ND | P | | | | | | 04021802.D | | 04021813.D | | | | | | | | | | | |
| 2-Propyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| t-Butyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Propyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Ethyl_Methyl_Sulfide | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Thiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| i-Butyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Diethyl_Sulfide | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| n-Butyl_Mercaptan | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Dimethyl_Disulfide | 0.600 | 2.500 | ND | P | | | | | | | | | | | | | | | | | | | |
| 2-Methylthiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| 3-Methylthiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Tetrahydrothiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| 2,5-Dimethylthiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| 2-Ethylthiophene | 1.200 | 5.000 | ND | P | | | | | | | | | | | | | | | | | | | |
| Diethyl_Disulfide | 0.600 | 2.500 | ND | P | | | | | | | | | | | | | | | | | | | |
| Methyltrisulfide | 0.600 | 2.500 | ND | P | | | | | | | | | | | | | | | | | | | |
| Acqisition Time | | | 8:05 AM | | | | | | | | | | | | | | | | | | | | |
| DataFile | | | 04021806.D | | | | | | | | | | | | | | | | | | | | |

### LCS / LCS Dup Summary (ppbv)

| | ppbv | %R | | ppbv | %R | %RPD | Actual |
|---|---|---|---|---|---|---|---|
| Hydrogen_Sulfide | 949.05 | 94.9% | | 969.16 | 96.9% | 2.10% | 1000.00 |
| Carbonyl_Sulfide | 946.43 | 94.6% | | 955.79 | 95.6% | 0.98% | 1000.00 |
| Methyl_Mercaptan | 994.74 | 99.5% | | 999.87 | 100.0% | 0.51% | 1000.00 |
| Acqisition Time | 7:30 AM | | | 7:34 AM | | | |
| DataFile | 04021803.D | | | 04021804.D | | | |

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ED_004220_00020298-00306

Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021802.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 7:27 am
Operator : MC
Sample : std s32-02191801
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 02 14:20:39 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.901 | 68399242 | 924.589 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.139 | 77729598 | 945.362 | ppb |
| 3) | T | Methyl_Mercaptan | 2.256 | 71408092 | 959.351 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

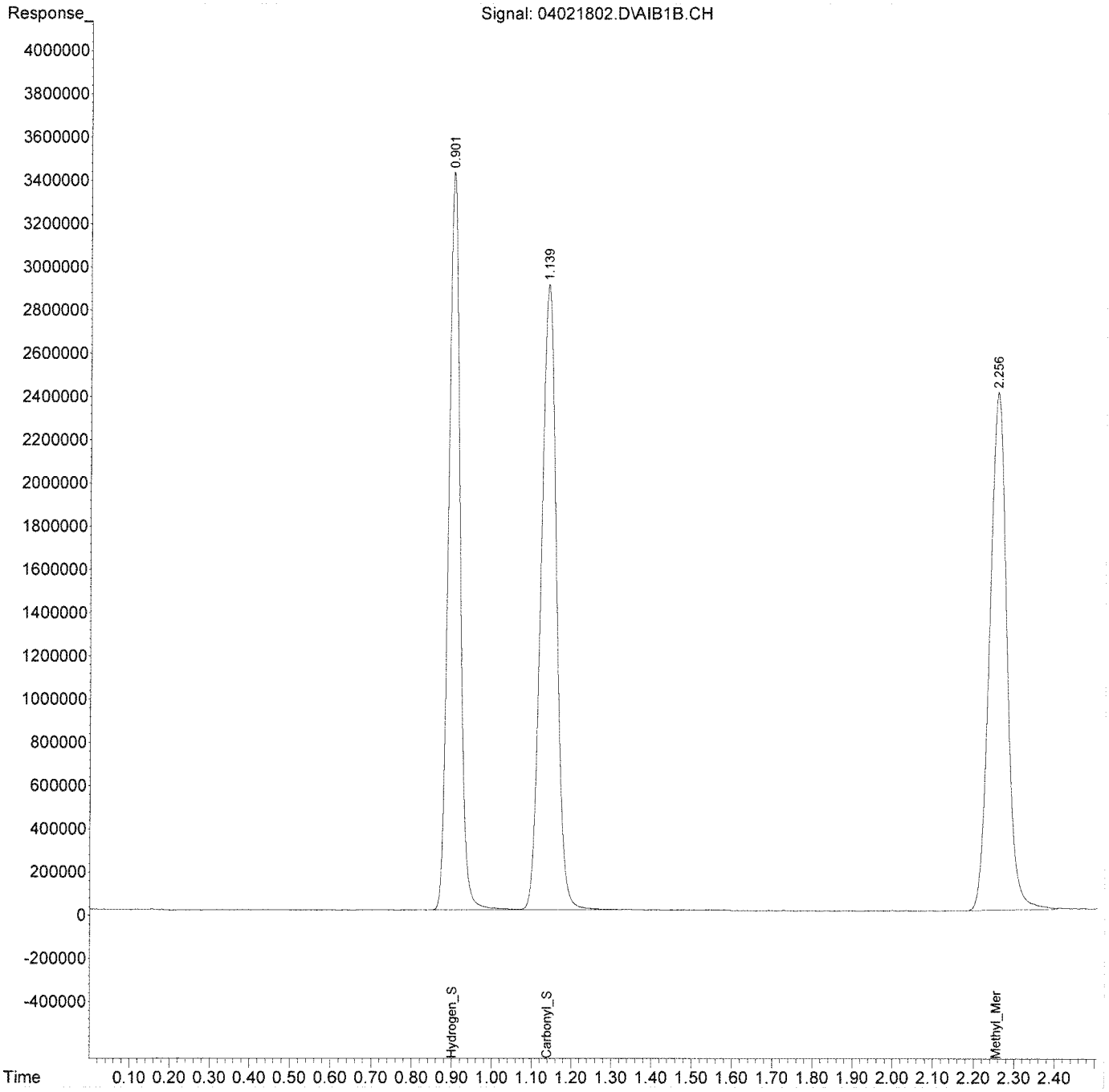
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (Not Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021802.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 7:27 am
Operator : MC
Sample : std s32-02191801
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 02 14:20:39 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021813.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 2:19 pm
Operator : MC
Sample : std S32-02191801
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 02 14:22:12 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :

| | | Compound | R.T. | Response | Conc | Units |
|---|---|---|---|---|---|---|
| Target Compounds | | | | | | |
| 1) | Z | Hydrogen_Sulfide | 0.894 | 82754154 | 1118.631 | ppb |
| 2) | W | Carbonyl_Sulfide | 1.132 | 92748378 | 1128.023 | ppb |
| 3) | T | Methyl_Mercaptan | 2.249 | 82759654 | 1111.857 | ppb |
| 4) | T | Ethyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 5) | T | Dimethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 6) | T | Carbon_Disulfide | 0.000 | 0 | N.D. | ppb |
| 7) | T | 2-Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 8) | T | t-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 9) | T | Propyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 10) | T | Ethyl_Methyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 11) | T | Thiophene | 0.000 | 0 | N.D. | ppb |
| 12) | T | i-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 13) | T | Diethyl_Sulfide | 0.000 | 0 | N.D. | ppb |
| 14) | t | n-Butyl_Mercaptan | 0.000 | 0 | N.D. | ppb |
| 15) | t | Dimethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 16) | T | 2-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 17) | t | 3-Methyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 18) | T | Tetrahydrothiophene | 0.000 | 0 | N.D. | ppb |
| 19) | t | 2,5-Dimethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 20) | T | 2-Ethyl_Thiophene | 0.000 | 0 | N.D. | ppb |
| 21) | T | Diethyl_Disulfide | 0.000 | 0 | N.D. | ppb |
| 22) | T | Methyltrisulfide | 0.000 | 0 | N.D. | ppb |

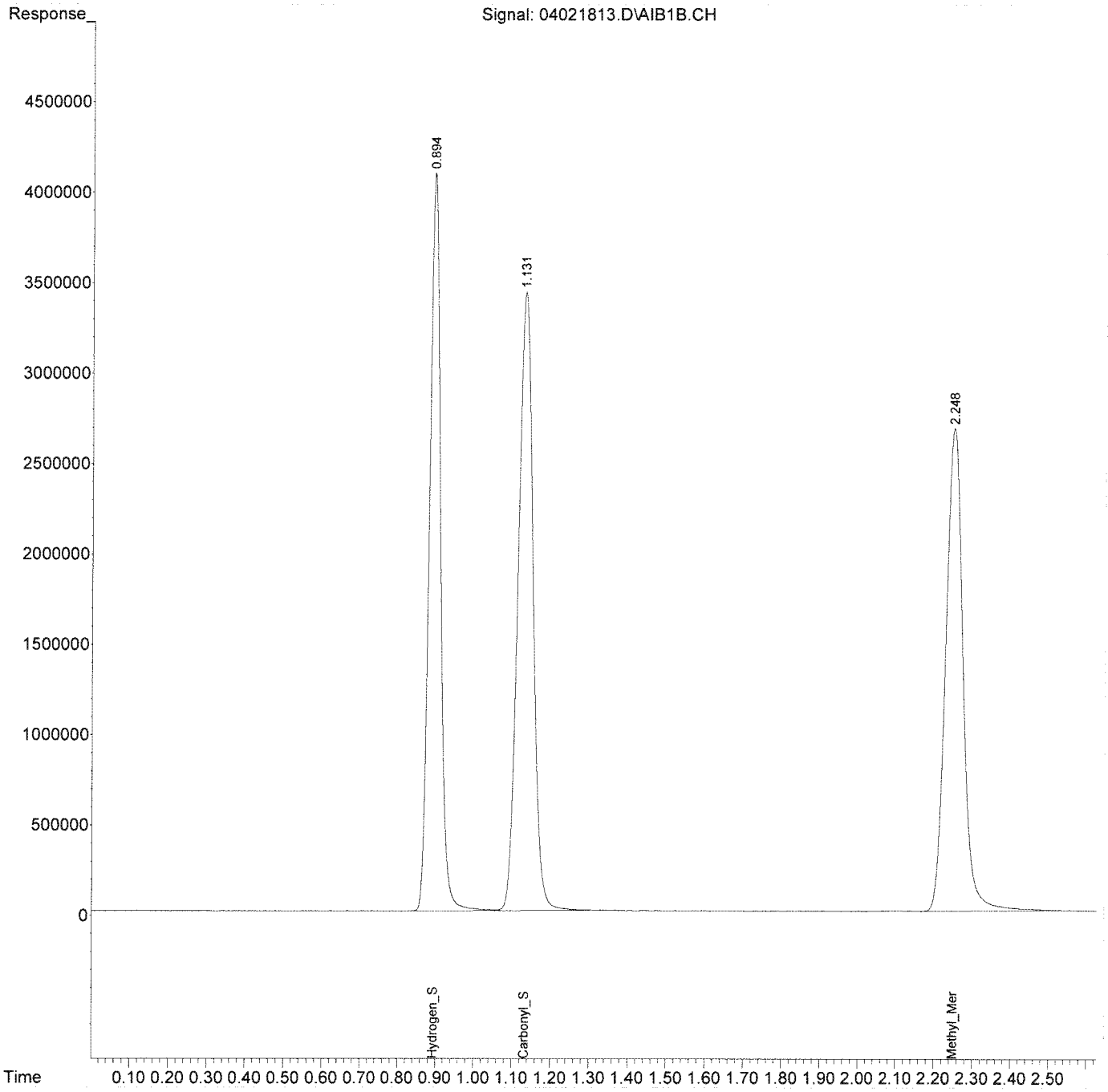
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : I:\GC13\DATA\SCD\2018_04\02\
Data File : 04021813.D
Signal(s) : AIB1B.CH
Acq On : 02 Apr 2018 2:19 pm
Operator : MC
Sample : std S32-02191801
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 02 14:22:12 2018
Quant Method : J:\GC13\METHODS\GC13_030818.M
Quant Title : ASTM D5504, VOA-S307M_SCD, VOA SH2O_SCD
QLast Update : Thu Mar 08 11:18:07 2018
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. :
Signal Phase :
Signal Info :



# Injection Log

Directory: I:\GC13\DATA\SCD\2018_03\08\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Acquisition Method | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 3/8/18 7:30 | 03081801.D | std s32-02191801 | | MC | GC13SCD2.M | |
| 2 | 3/8/18 7:53 | 03081802.D | test | | MC | GC13SCD2.M | |
| 3 | 3/8/18 7:59 | 03081803.D | .250ml | | MC | GC13SCD2.M | Curve |
| 4 | 3/8/18 8:08 | 03081804.D | 2.5ppb s32-03081802 0.250ml | | MC | GC13SCD2.M | Curve |
| 5 | 3/8/18 8:17 | 03081805.D | 10ppb s32-03081802 1ml | | MC | GC13SCD2.M | Curve |
| 6 | 3/8/18 8:22 | 03081806.D | x50ppb s32-03081803 0.2ml | | MC | GC13SCD2.M | not used |
| 7 | 3/8/18 8:32 | 03081807.D | 50ppb s32-03081803 0.2ml | | MC | GC13SCD2.M | Curve |
| 8 | 3/8/18 8:38 | 03081808.D | 250ppb s32-03081803 1ml | | MC | GC13SCD2.M | Curve |
| 9 | 3/8/18 8:46 | 03081809.D | 1000ppb s32-03081801 0.1ml | | MC | GC13SCD2.M | Curve |
| 10 | 3/8/18 8:51 | 03081810.D | 2500ppb s32-03081801 0.25ml | | MC | GC13SCD2.M | Curve |
| 11 | 3/8/18 8:58 | 03081811.D | 5000ppb s32-03081801 0.5ml | | MC | GC13SCD2.M | Curve |
| 12 | 3/8/18 9:05 | 03081812.D | 10000 s32-03081801 1ml | | MC | GC13SCD2.M | Curve |
| 13 | 3/8/18 9:10 | 03081813.D | 25ppm s32-03081804 0.5ml | | MC | GC13SCD2.M | Curve |
| 14 | 3/8/18 9:42 | 03081814.D | 50ppm s32-03081804 1ml | | MC | GC13SCD2.M | Curve |
| 15 | 3/8/18 10:10 | 03081815.D | rt | | MC | GC13SCD2.M | Pass |
| 16 | 3/8/18 10:30 | 03081816.D | mb 1ml | | MC | GC13SCD2.M | Pass |
| 17 | 3/8/18 10:50 | 03081817.D | icv s32-02191802 | | MC | GC13SCD2.M | Fail |
| 18 | 3/8/18 10:55 | 03081818.D | icv s32-02191802 | | MC | GC13SCD2.M | Pass |
| 19 | 3/8/18 10:59 | 03081819.D | std s32-02191801 | | MC | GC13SCD2.M | Pass |
| 20 | 3/8/18 11:02 | 03081820.D | lcs s32-02191802 | | MC | GC13SCD2.M | Pass |
| 21 | 3/8/18 11:06 | 03081821.D | lcsd s32-02191802 | | MC | GC13SCD2.M | Pass |
| 22 | 3/8/18 11:11 | 03081822.D | rt | | MC | GC13SCD2.M | Pass |
| 23 | 3/8/18 11:29 | 03081823.D | mb 1ml | | MC | GC13SCD2.M | Pass |
| 24 | 3/8/18 11:50 | 03081824.D | P1801092-001 1ml | | MC | GC13SCD2.M | |
| 25 | 3/8/18 12:10 | 03081825.D | 1091-004 0.1ml | | MC | GC13SCD2.M | Pass |
| 26 | 3/8/18 12:23 | 03081826.D | 1091-004 0.8mlx | | MC | GC13SCD2.M | |
| 27 | 3/8/18 12:30 | 03081827.D | P1801091-004 0.6ml(x100) | | MC | GC13SCD2.M | |
| 28 | 3/8/18 12:53 | 03081828.D | P1801091-007 1ml(x100) | | MC | GC13SCD2.M | |
| 29 | 3/8/18 12:59 | 03081829.D | 1091-007 0.1ml | | MC | GC13SCD2.M | |
| 30 | 3/8/18 13:28 | 03081830.D | std s32-02191801 | | MC | GC13SCD2.M | Pass |
| 31 | 3/8/18 13:48 | 03081831.D | P1801106-001 1ml | | MC | GC13SCD2.M | |
| 32 | 3/8/18 14:09 | 03081832.D | P1801106-002 1ml | | MC | GC13SCD2.M | |
| 33 | 3/8/18 14:24 | 03081833.D | P1801106-003 1ml | | MC | GC13SCD2.M | |
| 34 | 3/8/18 14:42 | 03081834.D | P1801106-004 1ml | | MC | GC13SCD2.M | |
| 35 | 3/8/18 14:55 | 03081835.D | P1801106-005 1ml | | MC | GC13SCD2.M | |
| 36 | 3/8/18 15:10 | 03081836.D | P1801106-006 1ml | | MC | GC13SCD2.M | |
| 37 | 3/8/18 15:26 | 03081837.D | P1801106-007 1ml | | MC | GC13SCD2.M | |
| 38 | 3/8/18 15:44 | 03081838.D | P1801106-008 1ml | | MC | GC13SCD2.M | |

# Injection Log

Directory: I:\GC13\DATA\SCD\2018_03\08\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Acquisition Method | Comments |
|---|---|---|---|---|---|---|---|
| 39 | 3/8/18 16:04 | 03081839.D | allyl sulfide rt | | MC | GC13SCD2.M | |
| 40 | 3/8/18 16:22 | 03081840.D | std s32-02191801 | | MC | GC13SCD2.M | Pass |

# Injection Log

Directory: I:\GC13\DATA\SCD\2018_04\02\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Acquisition Method | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 4/2/18 7:24 | 04021801.D | std s32-02191801 | | MC | GC13SCD2.M | |
| 2 | 4/2/18 7:27 | 04021802.D | std s32-02191801 | | MC | GC13SCD2.M | pass |
| 3 | 4/2/18 7:30 | 04021803.D | lcs s32-02191802 | | MC | GC13SCD2.M | pass |
| 4 | 4/2/18 7:34 | 04021804.D | lcsd s32-02191802 | | MC | GC13SCD2.M | pass |
| 5 | 4/2/18 7:37 | 04021805.D | rt | | MC | GC13SCD2.M | pass |
| 6 | 4/2/18 8:05 | 04021806.D | mb 1ml | | MC | GC13SCD2.M | pass |
| 7 | 4/2/18 10:21 | 04021807.D | P1801627-001 1.0 | | MC | GC13SCD2.M | |
| 8 | 4/2/18 11:47 | 04021808.D | xP1801272-001 0.1 | | MC | GC13SCD2.M | |
| 9 | 4/2/18 12:09 | 04021809.D | P1801272-001 1.0 | | MC | GC13SCD2.M | |
| 10 | 4/2/18 12:43 | 04021810.D | xP1801614-001 0.1 | | MC | GC13SCD2.M | |
| 11 | 4/2/18 13:47 | 04021811.D | P1801614-001 1.0ml | | MC | GC13SCD2.M | |
| 12 | 4/2/18 14:14 | 04021812.D | std S32-02191801 | | MC | GC13SCD2.M | |
| 13 | 4/2/18 14:19 | 04021813.D | std S32-02191801 | | MC | GC13SCD2.M | pass |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018 04\04\04041813.D Vial: 4
Acq On : 4 Apr 2018 10:24 Operator: RS
Sample : P1801614-001 (0.6mL) Inst : MS13
Misc : S31-03281803

Quant Time: Apr 04 10:59:24 2018 RS 4/4/18
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 98191 | 12.500 | ng | | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.22 | 114 | 484517 | 12.500 | ng | | -0.01 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 163923 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.97 | 65 | 111022 | 12.256 | ng | | -0.02 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 98.08% | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 446275 | 12.321 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 98.56% | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 122368 | 11.979 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 95.84% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 37047 | 3.887 | ng | | 95 |
| 3) Dichlorodifluoromethan... | 0.00 | 85 | 0 | N.D. | | | |
| 4) Chloromethane | 4.78 | 50 | 22463 | 1.739 | ng | | 99 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 0.00 | 135 | 0 | N.D. | | | |
| 6) Vinyl Chloride | 0.00 | 62 | 0 | N.D. | | | |
| 7) 1,3-Butadiene | 5.44 | 54 | 170 | N.D. | | | |
| 8) Bromomethane | 5.86 | 94 | 550 | N.D. | | | |
| 9) Chloroethane | 0.00 | 64 | 0 | N.D. | | | |
| 10) Ethanol | 6.55 | 45 | 468 | N.D. | | | |
| 11) Acetonitrile | 6.75 | 41 | 93951 | 6.841 | ng | | 99 |
| 12) Acrolein | 6.95 | 56 | 15822 | 2.994 | ng | | 99 |
| 13) Acetone | 7.14 | 58 | 45800 | 6.951 | ng | # | 77 |
| 14) Trichlorofluoromethane | 0.00 | 101 | 0 | N.D. | | | |
| 15) 2-Propanol (Isopropanol) | 7.65 | 45 | 8917 | 0.449 | ng | | 98 |
| 16) Acrylonitrile | 7.88 | 53 | 11114 | 1.083 | ng | | 96 |
| 17) 1,1-Dichloroethene | 0.00 | 96 | 0 | N.D. | | | |
| 18) 2-Methyl-2-Propanol (t... | 8.55 | 59 | 302 | N.D. | | | |
| 19) Methylene Chloride | 8.50 | 84 | 4069 | 0.385 | ng | | 95 |
| 20) 3-Chloro-1-propene (Al... | 8.58 | 41 | 659 | N.D. | | | |
| 21) Trichlorotrifluoroethane | 0.00 | 151 | 0 | N.D. | | | |
| 22) Carbon Disulfide | 8.76 | 76 | 19603 | 0.537 | ng | | 98 |
| 23) trans-1,2-Dichloroethene | 0.00 | 61 | 0 | N.D. | | | |
| 24) 1,1-Dichloroethane | 0.00 | 63 | 0 | N.D. | | | |
| 25) Methyl tert-Butyl Ether | 0.00 | 73 | 0 | N.D. | | | |
| 26) Vinyl Acetate | 10.19 | 86 | 5120 | 2.663 | ng | # | 42 |
| 27) 2-Butanone (MEK) | 10.49 | 72 | 7901 | 1.372 | ng | | 98 |
| 28) cis-1,2-Dichloroethene | 0.00 | 61 | 0 | N.D. | | | |
| 29) Diisopropyl Ether | 0.00 | 87 | 0 | N.D. | | | |
| 30) Ethyl Acetate | 0.00 | 61 | 0 | N.D. | | | |
| 31) n-Hexane | 11.24 | 57 | 2473 | 0.174 | ng | # | 90 |
| 32) Chloroform | 0.00 | 83 | 0 | N.D. | | | |
| 34) Tetrahydrofuran (THF) | 11.81 | 72 | 272 | N.D. | | | |
| 35) Ethyl tert-Butyl Ether | 0.00 | 87 | 0 | N.D. | | | |
| 36) 1,2-Dichloroethane | 0.00 | 62 | 0 | N.D. | | | |
| 38) 1,1,1-Trichloroethane | 0.00 | 97 | 0 | N.D. | | | |
| 39) Isopropyl Acetate | 0.00 | 61 | 0 | N.D. | d | | |
| 40) 1-Butanol | 12.88 | 56 | 102 | N.D. | | | |
| 41) Benzene | 12.83 | 78 | 627758 | 17.083 | ng | | 100 |
| 42) Carbon Tetrachloride | 0.00 | 117 | 0 | N.D. | | | |
| 43) Cyclohexane | 0.00 | 84 | 0 | N.D. | d | | |
| 44) tert-Amyl Methyl Ether | 0.00 | 73 | 0 | N.D. | d | | |
| 45) 1,2-Dichloropropane | 0.00 | 63 | 0 | N.D. | | | |
| 46) Bromodichloromethane | 13.92 | 83 | 110 | N.D. | | | |
| 47) Trichloroethene | 0.00 | 130 | 0 | N.D. | | | |
| 48) 1,4-Dioxane | 0.00 | 88 | 0 | N.D. | | | |
| 49) 2,2,4-Trimethylpentane... | 13.93 | 57 | 1138 | N.D. | | | |
| 50) Methyl Methacrylate | 0.00 | 100 | 0 | N.D. | d | | |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018 04\04\04041813.D Vial: 4
Acq On : 4 Apr 2018 10:24 Operator: RS
Sample : P1801614-001 (0.6mL) Inst : MS13
Misc : S31-03281803

Quant Time: Apr 04 10:59:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

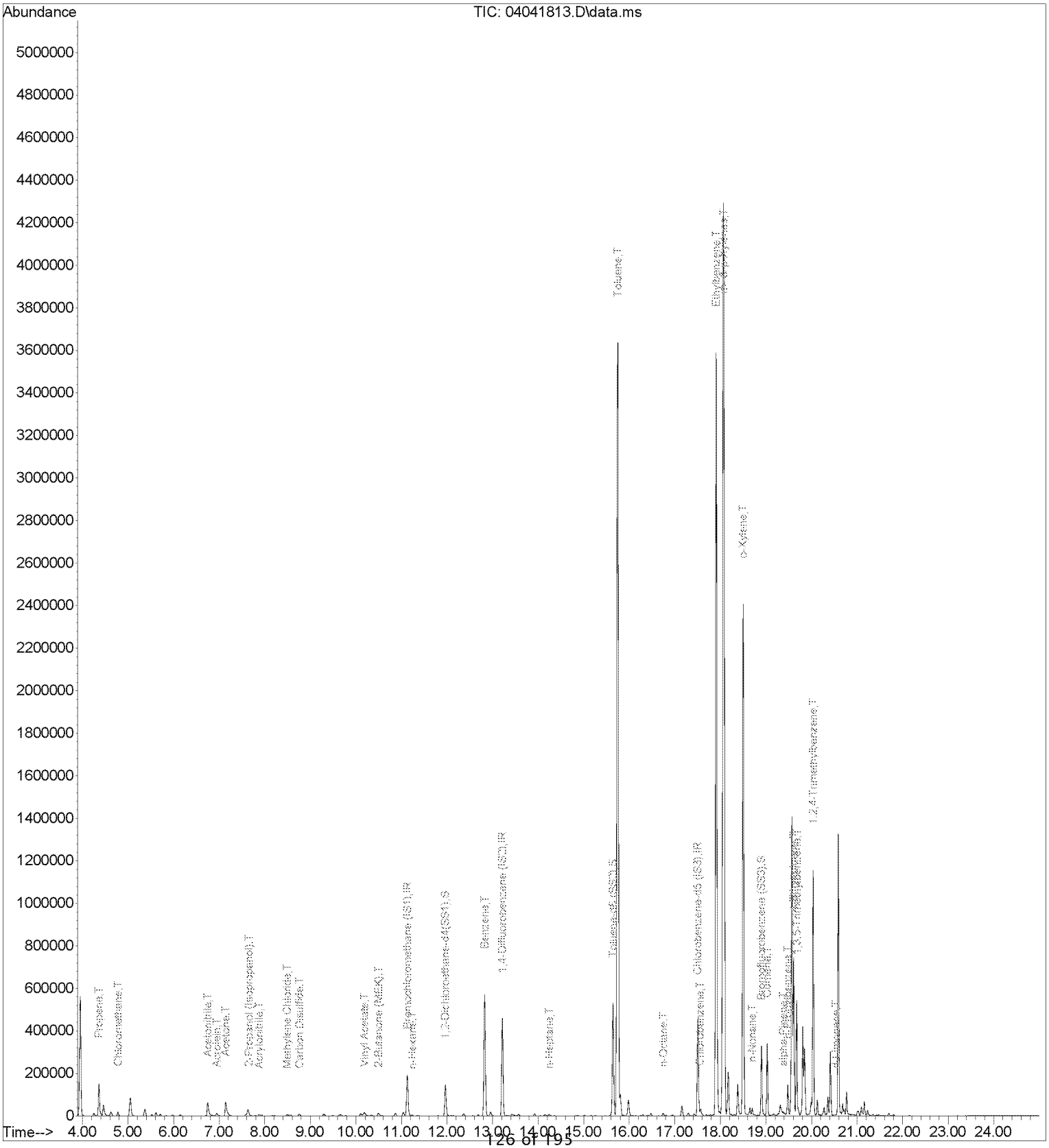
| Internal Standards | R.T. | QIon | Response | Conc Units | | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 1742 | 0.185 ng | | 97 |
| 52) cis-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | | |
| 53) 4-Methyl-2-pentanone | 0.00 | 58 | 0 | N.D. | | |
| 54) trans-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | | |
| 55) 1,1,2-Trichloroethane | 0.00 | 97 | 0 | N.D. | | |
| 58) Toluene | 15.75 | 91 | 3753688 | 91.806 ng | | 99 |
| 59) 2-Hexanone | 0.00 | 43 | 0 | N.D. d | | |
| 60) Dibromochloromethane | 0.00 | 129 | 0 | N.D. | | |
| 61) 1,2-Dibromoethane | 0.00 | 107 | 0 | N.D. | | |
| 62) n-Butyl Acetate | 0.00 | 43 | 0 | N.D. d | | |
| 63) n-Octane | 16.75 | 57 | 2674 | 0.335 ng | | 94 |
| 64) Tetrachloroethene | 0.00 | 166 | 0 | N.D. | | |
| 65) Chlorobenzene | 17.55 | 112 | 2741 | 0.099 ng | | 86 |
| 66) Ethylbenzene | 17.91 | 91 | 3128514 | 71.020 ng | | 97 |
| 67) m- & p-Xylenes | 18.07 | 91 | 3889824 | 111.505 ng | | 97 |
| 68) Bromoform | 0.00 | 173 | 0 | N.D. | | |
| 69) Styrene | 0.00 | 104 | 0 | N.D. d | | |
| 70) o-Xylene | 18.50 | 91 | 1599682 | 46.023 ng | | 99 |
| 71) n-Nonane | 18.70 | 43 | 11773 | 0.688 ng | | 94 |
| 72) 1,1,2,2-Tetrachloroethane | 0.00 | 83 | 0 | N.D. d | | |
| 74) Cumene | 19.03 | 105 | 243084 | 5.294 ng | | 99 |
| 75) alpha-Pinene | 19.38 | 93 | 5891 | 0.260 ng | # | 1 |
| 76) n-Propylbenzene | 19.48 | 91 | 113552 | 2.193 ng | | 99 |
| 77) 3-Ethyltoluene | 0.00 | 105 | 0 | N.D. d | | |
| 78) 4-Ethyltoluene | 19.61 | 105 | 450231 | 10.721 ng | | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 308897 | 7.720 ng | | 100 |
| 80) alpha-Methylstyrene | 0.00 | 118 | 0 | N.D. d | | |
| 81) 2-Ethyltoluene | 0.00 | 105 | 0 | N.D. d | | |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 613449 | 16.442 ng | | 90 |
| 83) n-Decane | 0.00 | 57 | 0 | N.D. d | | |
| 84) Benzyl Chloride | 20.11 | 91 | 808 | N.D. | | |
| 85) 1,3-Dichlorobenzene | 0.00 | 146 | 0 | N.D. | | |
| 86) 1,4-Dichlorobenzene | 0.00 | 146 | 0 | N.D. | | |
| 87) sec-Butylbenzene | 0.00 | 105 | 0 | N.D. d | | |
| 88) 4-Isopropyltoluene (p-... | 0.00 | 119 | 0 | N.D. d | | |
| 89) 1,2,3-Trimethylbenzene | 0.00 | 105 | 0 | N.D. d | | |
| 90) 1,2-Dichlorobenzene | 20.53 | 146 | 169 | N.D. | | |
| 91) d-Limonene | 20.54 | 68 | 1482 | 0.109 ng | | 78 |
| 92) 1,2-Dibromo-3-Chloropr... | 0.00 | 157 | 0 | N.D. | | |
| 93) n-Undecane | 0.00 | 57 | 0 | N.D. d | | |
| 94) 1,2,4-Trichlorobenzene | 0.00 | 180 | 0 | N.D. | | |
| 95) Naphthalene | 22.17 | 128 | 1031 | N.D. | | |
| 96) n-Dodecane | 22.14 | 57 | 395 | N.D. | | |
| 97) Hexachlorobutadiene | 0.00 | 225 | 0 | N.D. | | |
| 98) Cyclohexanone | 18.23 | 55 | 945 | N.D. | | |
| 99) tert-Butylbenzene | 0.00 | 119 | 0 | N.D. d | | |
| 100) n-Butylbenzene | 0.00 | 91 | 0 | N.D. d | | |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018 04\04\04041813.D Vial: 4
Acq On : 4 Apr 2018 10:24 Operator: RS
Sample : P1801614-001 (0.6mL) Inst : MS13
Misc : S31-03281803

Quant Time: Apr 04 10:59:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041813.D Vial: 4
Acq On : 4 Apr 2018 10:24 Operator: RS
Sample : P1801614-001 (0.6mL) Inst : MS13
Msc : S31-03281803

RS 4/4/18

Quant Time: Apr 04 10:59:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

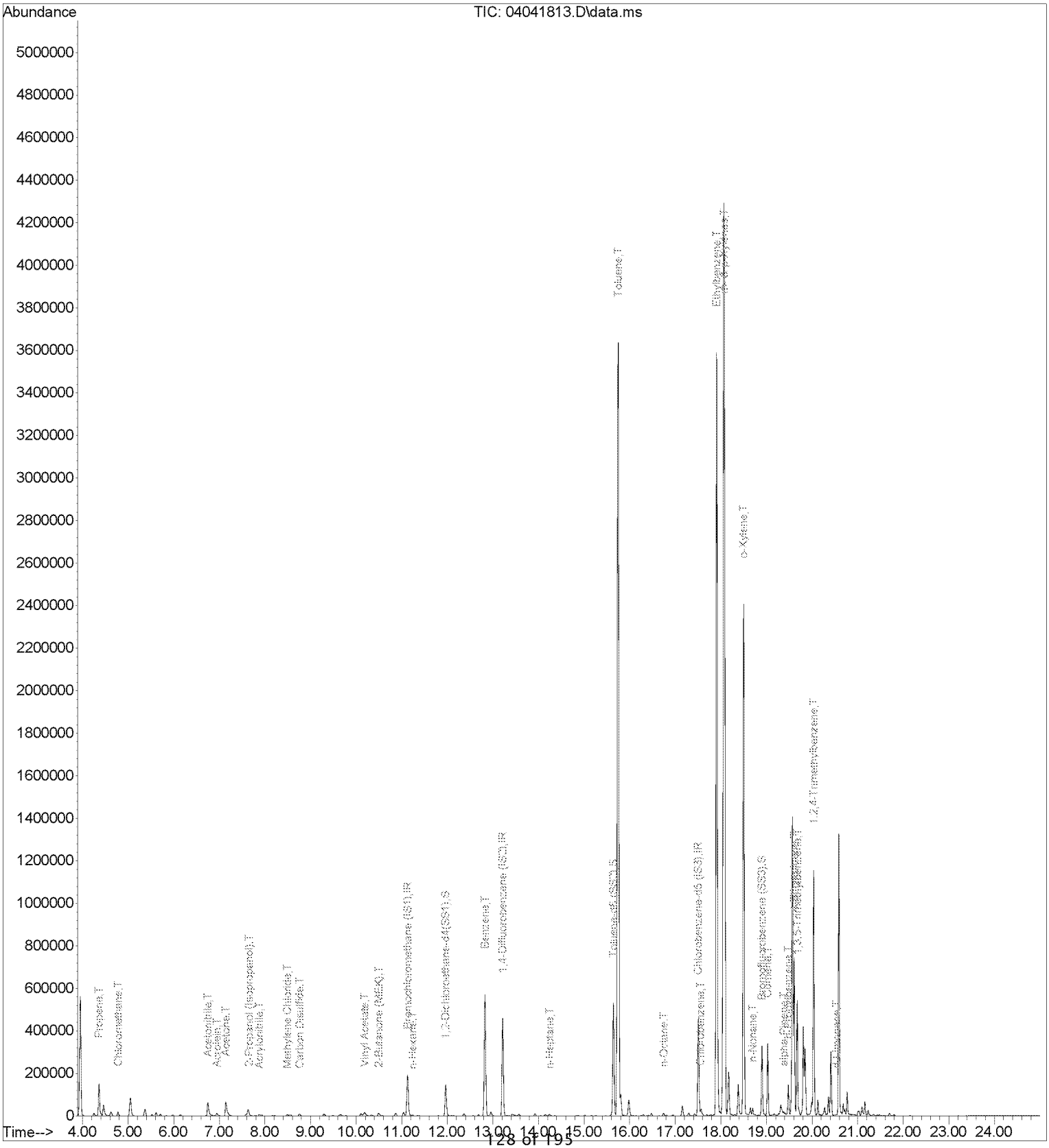
| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 98191 | 12.500 | ng | | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.22 | 114 | 484517 | 12.500 | ng | | -0.01 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 163923 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.97 | 65 | 111022 | 12.256 | ng | | -0.02 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 98.08% | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 446275 | 12.321 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 98.56% | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 122368 | 11.979 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 95.84% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 37047 | 3.887 | ng | | 95 |
| 4) Chloromethane | 4.78 | 50 | 22463 | 1.739 | ng | | 99 |
| 11) Acetonitrile | 6.75 | 41 | 93951 | 6.841 | ng | | 99 |
| 12) Acrolein | 6.95 | 56 | 15822 | 2.994 | ng | | 99 |
| 13) Acetone | 7.14 | 58 | 45800 | 6.951 | ng | # | 77 |
| 15) 2-Propanol (Isopropanol) | 7.65 | 45 | 8917 | 0.449 | ng | | 98 |
| 16) Acrylonitrile | 7.88 | 53 | 11114 | 1.083 | ng | | 96 |
| 19) Methylene Chloride | 8.50 | 84 | 4069 | 0.385 | ng | | 95 |
| 22) Carbon Disulfide | 8.76 | 76 | 19603 | 0.537 | ng | | 98 |
| 26) Vinyl Acetate | 10.19 | 86 | 5120 | 2.663 | ng | # | 42 |
| 27) 2-Butanone (MEK) | 10.49 | 72 | 7901 | 1.372 | ng | | 98 |
| 31) n-Hexane | 11.24 | 57 | 2473 | 0.174 | ng | # | 90 |
| 41) Benzene | 12.83 | 78 | 627758 | 17.083 | ng | | 100 |
| 51) n-Heptane | 14.24 | 71 | 1742 | 0.185 | ng | | 97 |
| 58) Toluene | 15.75 | 91 | 3753688 | 91.806 | ng | | 99 |
| 63) n-Octane | 16.75 | 57 | 2674 | 0.335 | ng | | 94 |
| 65) Chlorobenzene | 17.55 | 112 | 2741 | 0.099 | ng | | 86 |
| 66) Ethylbenzene | 17.91 | 91 | 3128514 | 71.020 | ng | | 97 |
| 67) m- & p-Xylenes | 18.07 | 91 | 3889824 | 111.505 | ng | | 97 |
| 70) o-Xylene | 18.50 | 91 | 1599682 | 46.023 | ng | | 99 |
| 71) n-Nonane | 18.70 | 43 | 11773 | 0.688 | ng | | 94 |
| 74) Cumene | 19.03 | 105 | 243084 | 5.294 | ng | | 99 |
| 75) alpha-Pinene | 19.38 | 93 | 5891 | 0.260 | ng | # | 1 |
| 76) n-Propylbenzene | 19.48 | 91 | 113552 | 2.193 | ng | | 99 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 450231 | 10.721 | ng | | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 308897 | 7.720 | ng | | 100 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 613449 | 16.442 | ng | | 90 |
| 91) d-Limonene | 20.54 | 68 | 1482 | 0.109 | ng | | 78 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

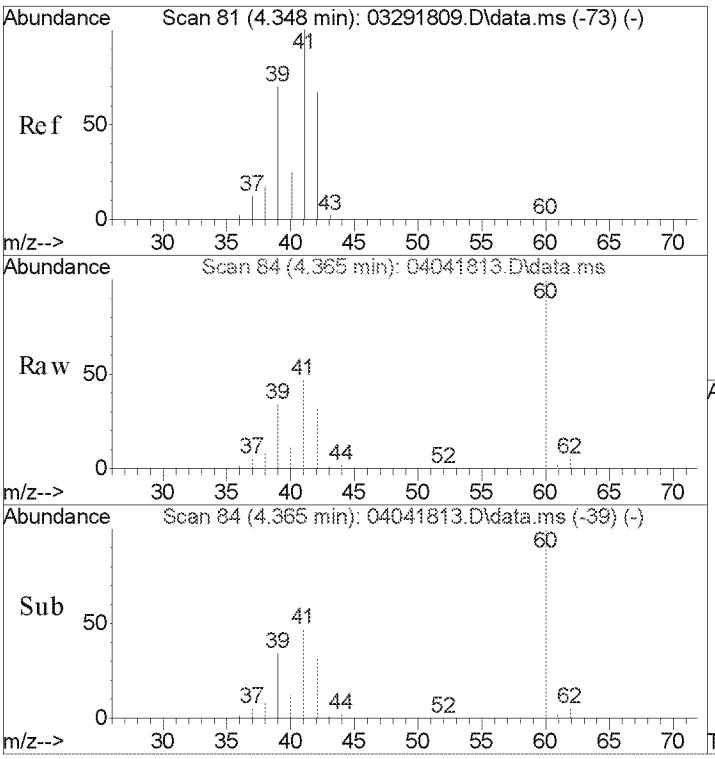
Data File : I:\MS13\DATA\2018_04\04\04041813.D Vial: 4
Acq On : 4 Apr 2018 10:24 Operator: RS
Sample : P1801614-001 (0.6mL) Inst : MS13
Msc : S31-03281803

Quant Time: Apr 04 10:59:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M





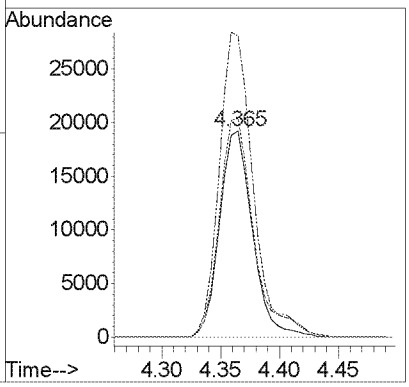

R13032918.M Wed Apr 04 11:01:46 2018 Page: 2

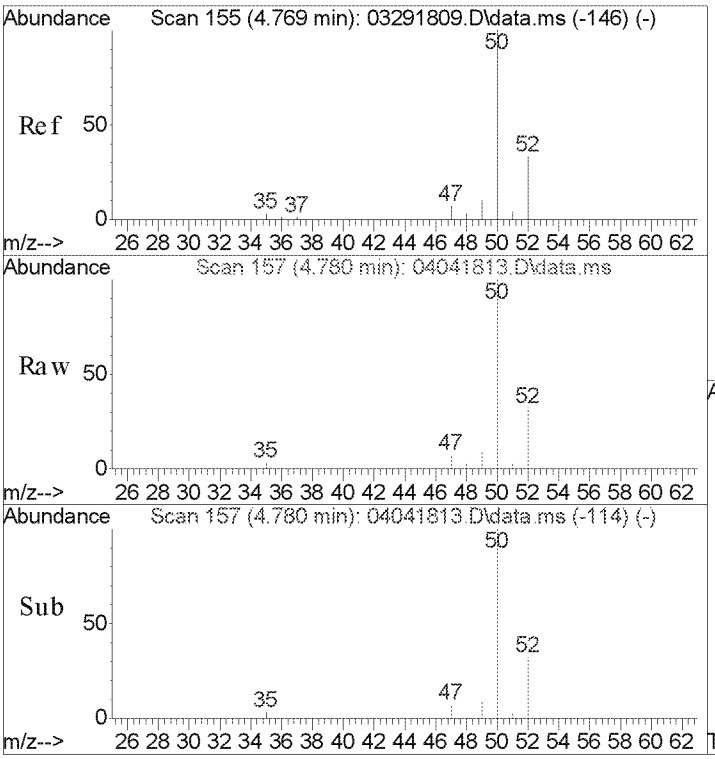



#2
Propene
Concen: 3.89 ng
RT: 4.36 min Scan# 84
Delta R.T. 0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 42 Resp: 37047

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 42 | 100 | | |
| 39 | 112.3 | 84.6 | 124.6 |
| 41 | 153.2 | 129.8 | 169.8 |

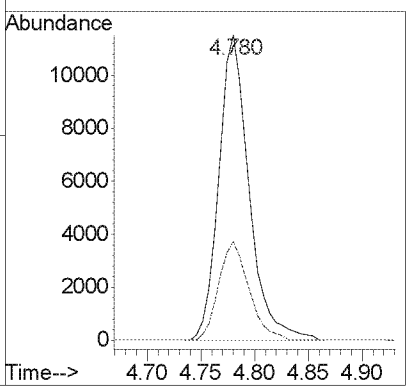


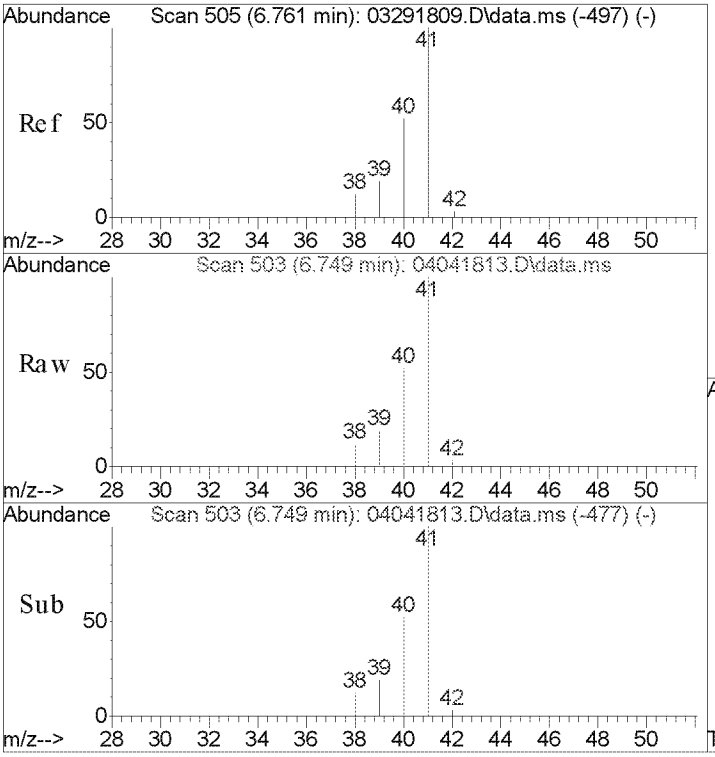




#4
Chloromethane
Concen: 1.74 ng
RT: 4.78 min Scan# 157
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 50 Resp: 22463

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 50 | 100 | | |
| 52 | 32.2 | 13.0 | 53.0 |

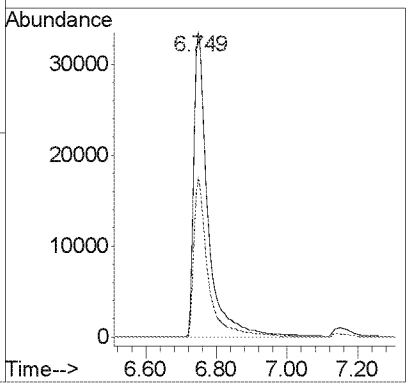


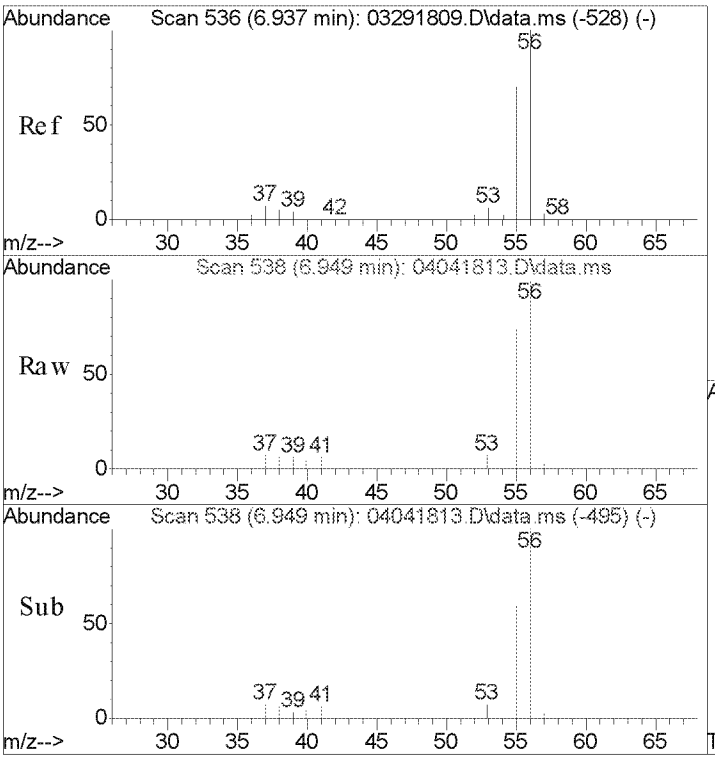



#11
Acetonitrile
Concen: 6.84 ng
RT: 6.75 min Scan# 503
Delta R.T. -0.051 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 41 Resp: 93951

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 41 | 100 | | |
| 40 | 51.7 | 32.6 | 72.6 |

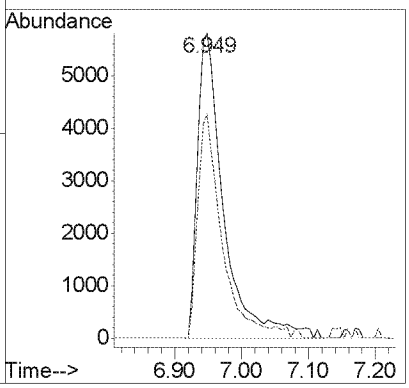


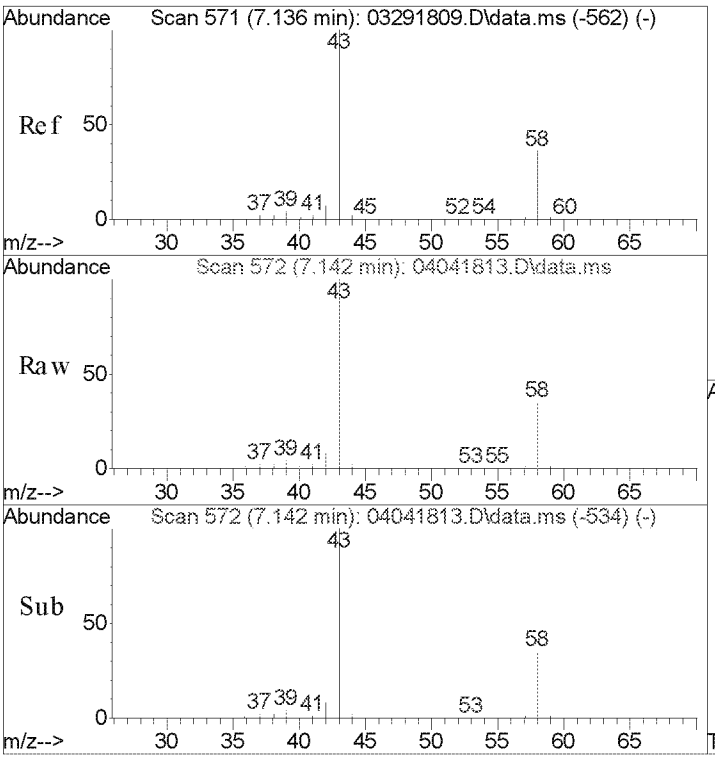




#12
Acrolein
Concen: 2.99 ng
RT: 6.95 min Scan# 538
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 56 Resp: 15822

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 56 | 100 | | |
| 55 | 68.3 | 49.1 | 89.1 |

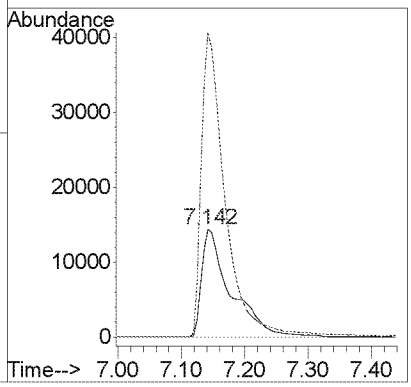


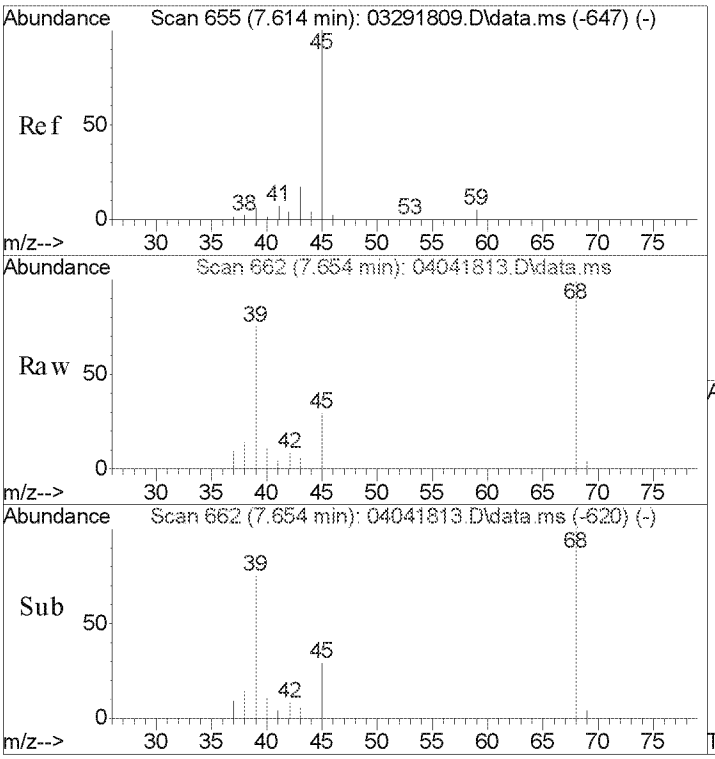



#13
Acetone
Concen: 6.95 ng
RT: 7.14 min Scan# 572
Delta R.T. -0.034 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 58 Resp: 45800

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 58 | 100 | | |
| 43 | 232.0 | 244.3 | 304.3# |

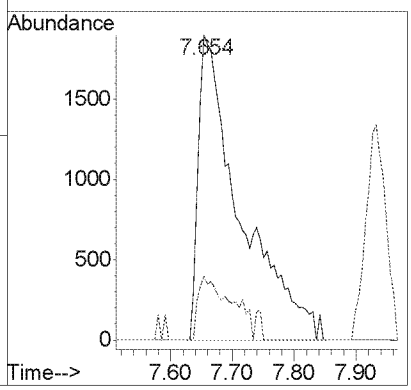


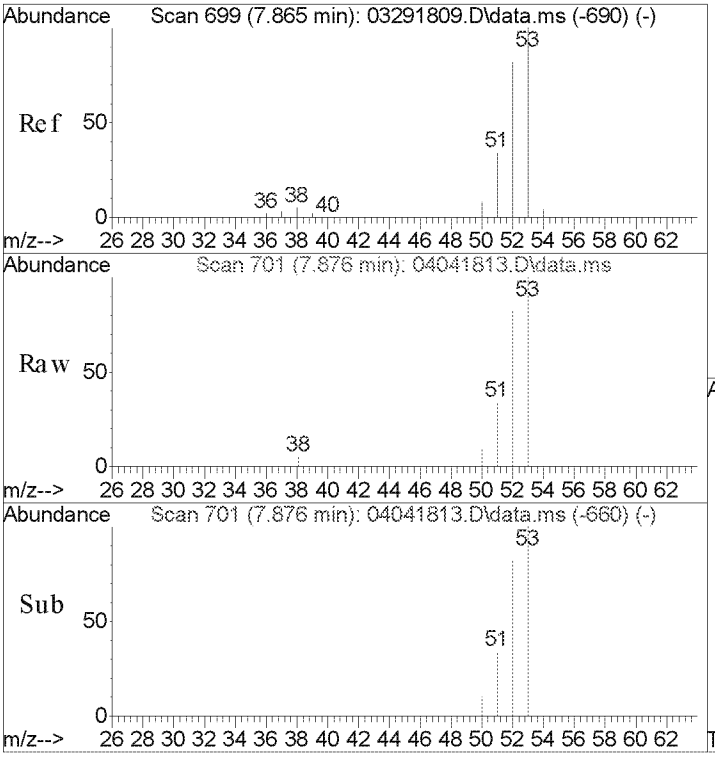




#15
2-Propanol (Isopropanol)
Concen: 0.45 ng
RT: 7.65 min Scan# 662
Delta R.T. -0.011 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 45 Resp: 8917

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 45 | 100 | | |
| 43 | 16.5 | 0.0 | 37.2 |

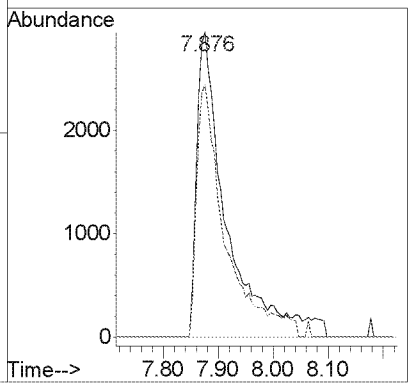


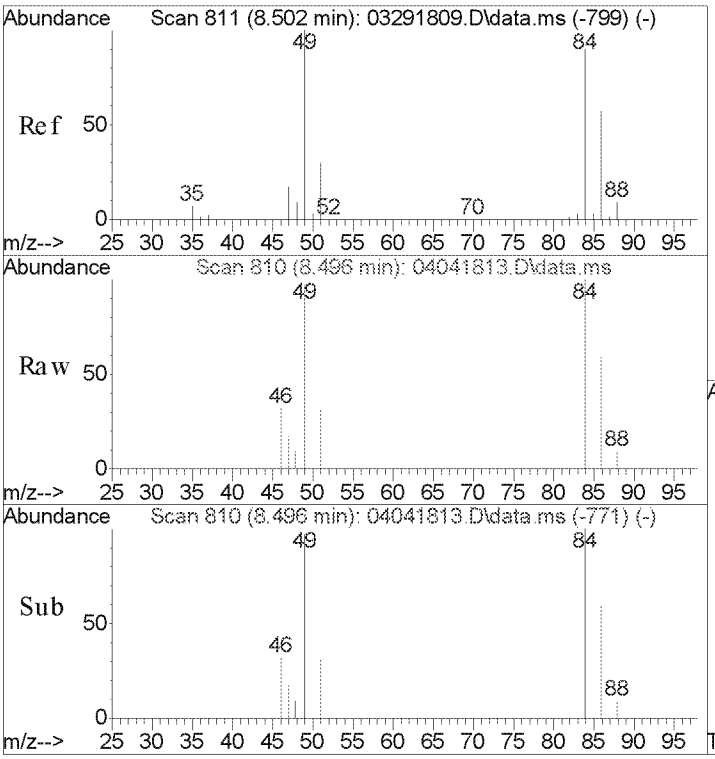



#16
Acrylonitrile
Concen: 1.08 ng
RT: 7.88 min Scan# 701
Delta R.T. -0.017 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 53 Resp: 11114

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 53 | 100 | | |
| 52 | 79.2 | 62.6 | 102.6 |

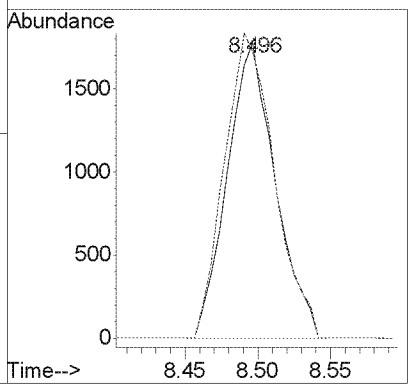


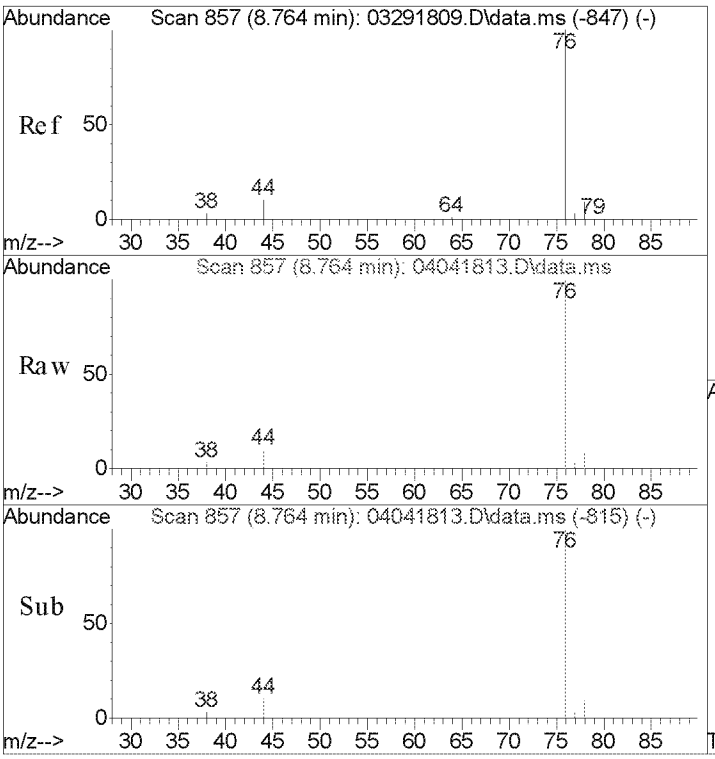




#19
Methylene Chloride
Concen: 0.39 ng
RT: 8.50 min Scan# 810
Delta R.T. -0.029 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 84 Resp: 4069

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 84 | 100 | | |
| 49 | 107.6 | 87.7 | 137.7 |

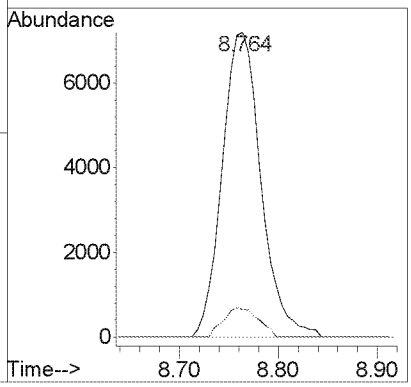


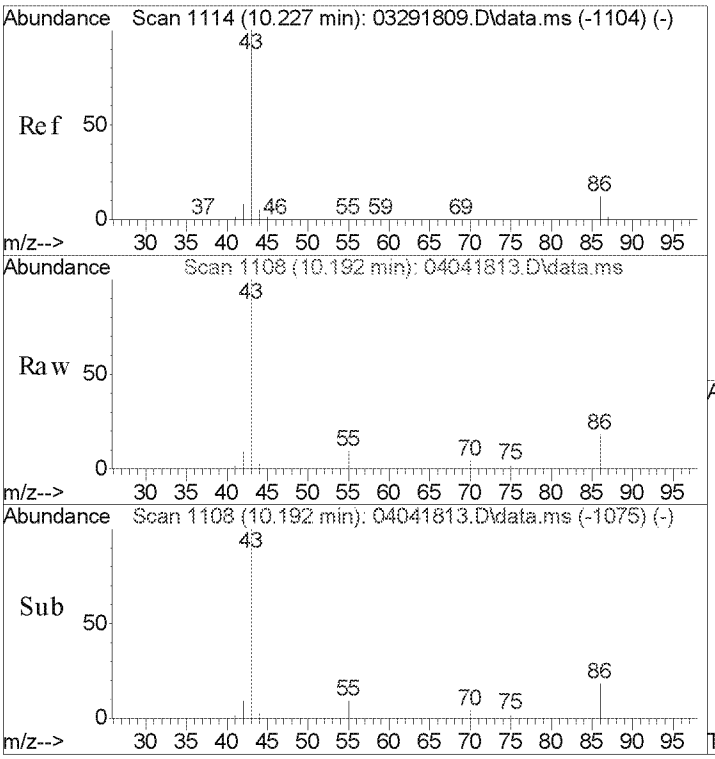



#22
Carbon Disulfide
Concen: 0.54 ng
RT: 8.76 min Scan# 857
Delta R.T. -0.011 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 76 Resp: 19603

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 76 | 100 | | |
| 78 | 8.5 | 0.0 | 29.2 |

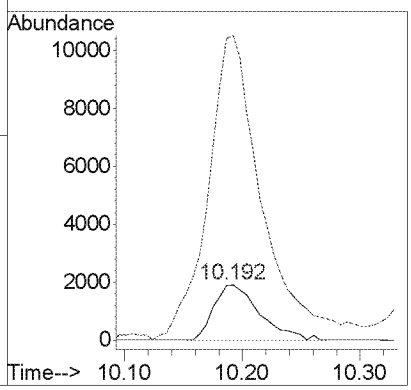


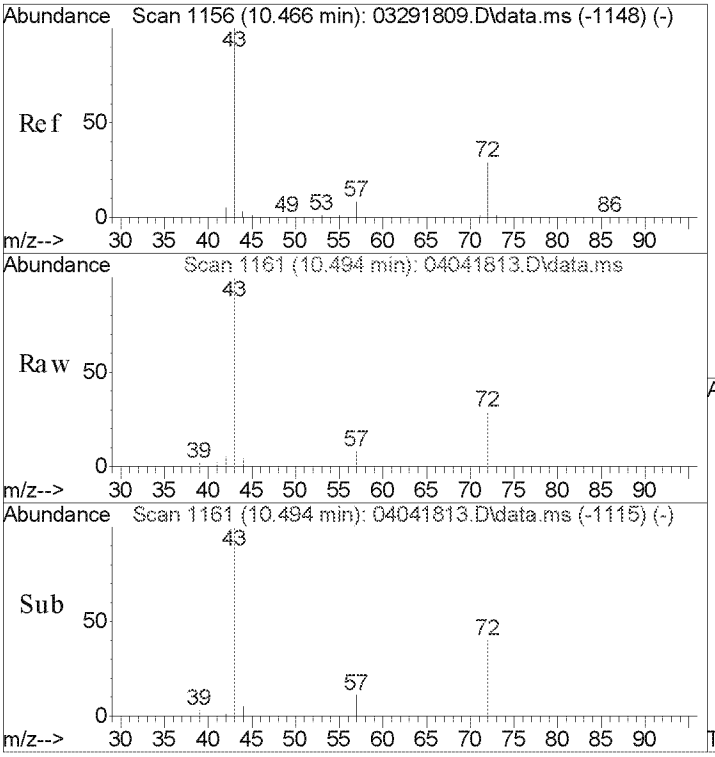




#26
Vinyl Acetate
Concen: 2.66 ng
RT: 10.19 min Scan# 1108
Delta R.T. -0.063 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 86 Resp: 5120

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 86 | 100 | | |
| 43 | 663.2 | 884.4 | 924.4# |

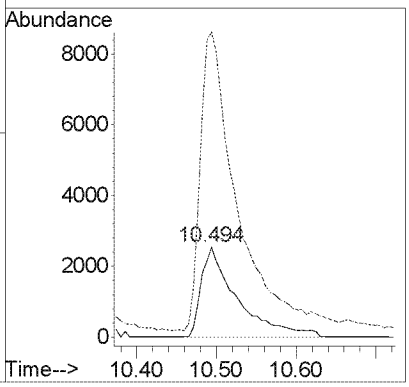


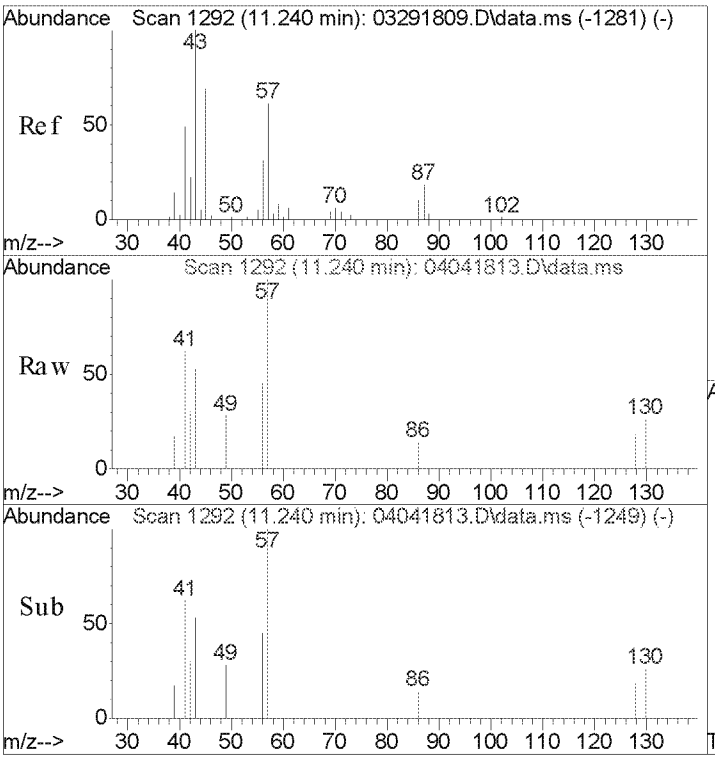



#27
2-Butanone (MEK)
Concen: 1.37 ng
RT: 10.49 min Scan# 1161
Delta R.T. 0.011 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 72 Resp: 7901

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 72 | 100 | | |
| 43 | 345.7 | 331.0 | 371.0 |

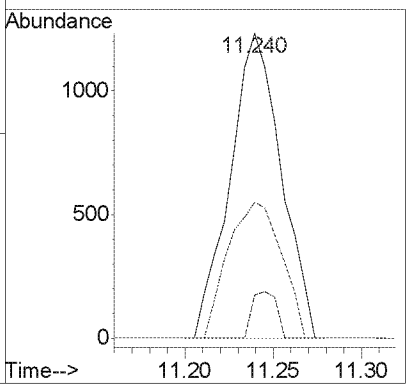


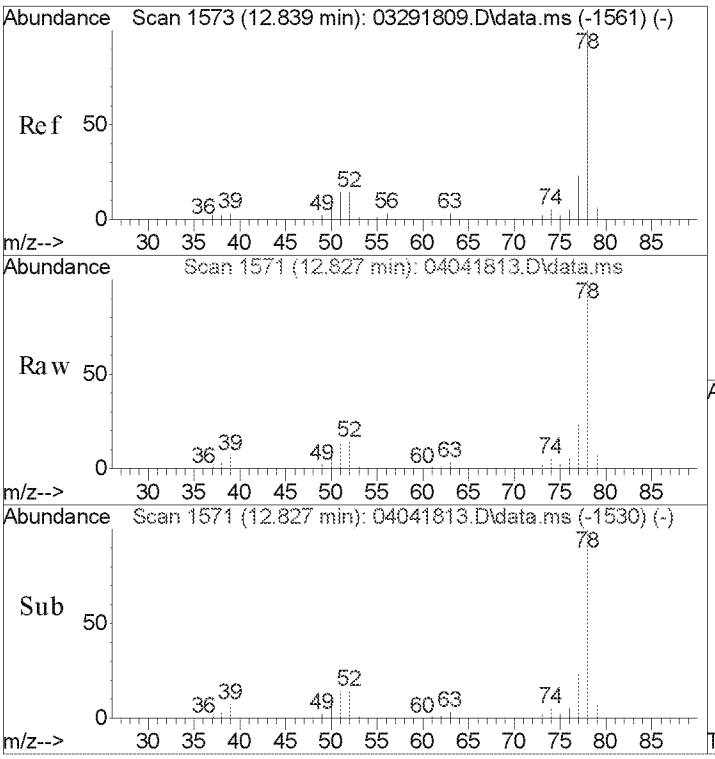




#31
n-Hexane
Concen: 0.17 ng
RT: 11.24 min Scan# 1292
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 57 Resp: 2473

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 57 | 100 | | |
| 56 | 46.7 | 40.9 | 61.3 |
| 86 | 7.3 | 13.7 | 20.5# |

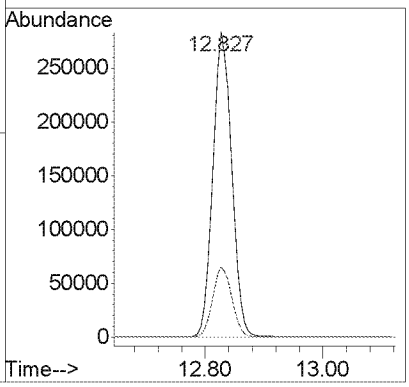


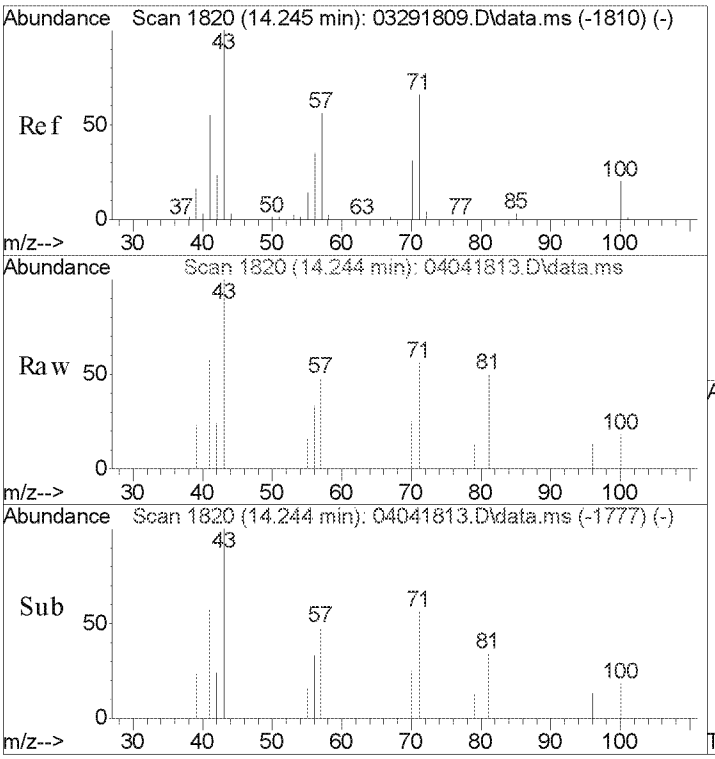



#41
Benzene
Concen: 17.08 ng
RT: 12.83 min Scan# 1571
Delta R.T. -0.018 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 78 Resp: 627758

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 78 | 100 | | |
| 77 | 23.1 | 3.2 | 43.2 |

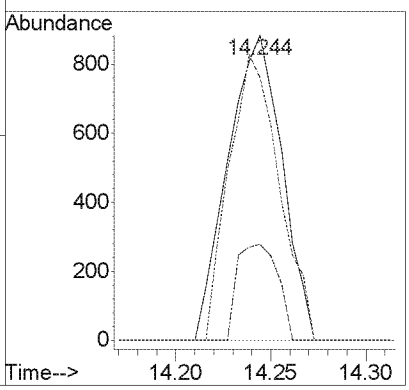


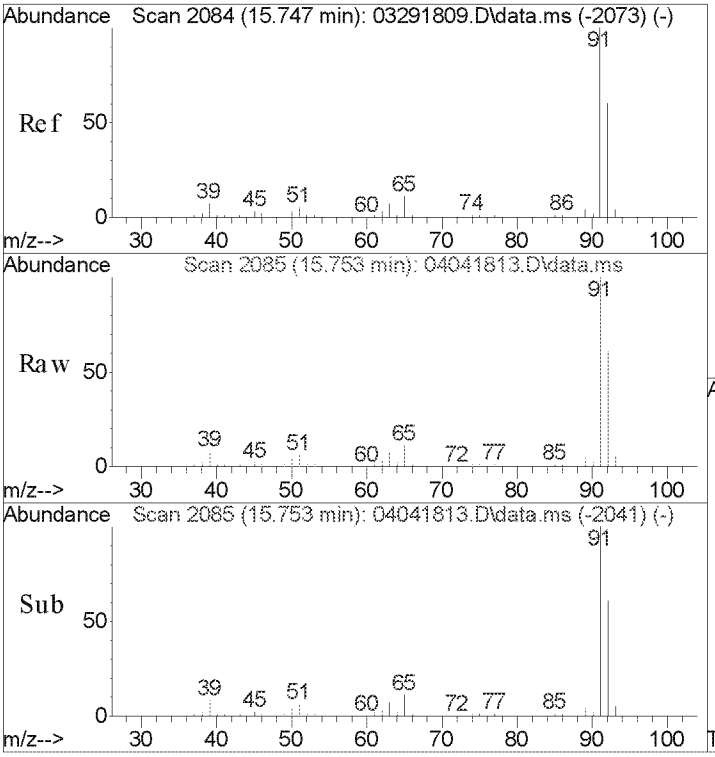




#51
n-Heptane
Concen: 0.19 ng
RT: 14.24 min Scan# 1820
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 71 Resp: 1742

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 71 | 100 | | |
| 57 | 87.1 | 66.8 | 106.8 |
| 100 | 23.5 | 9.9 | 49.9 |

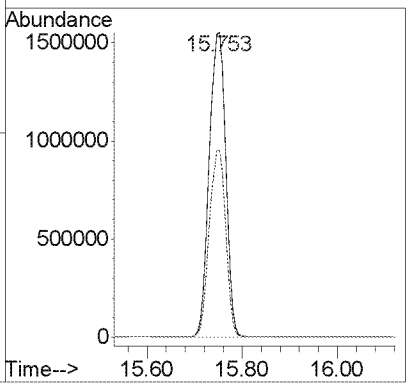


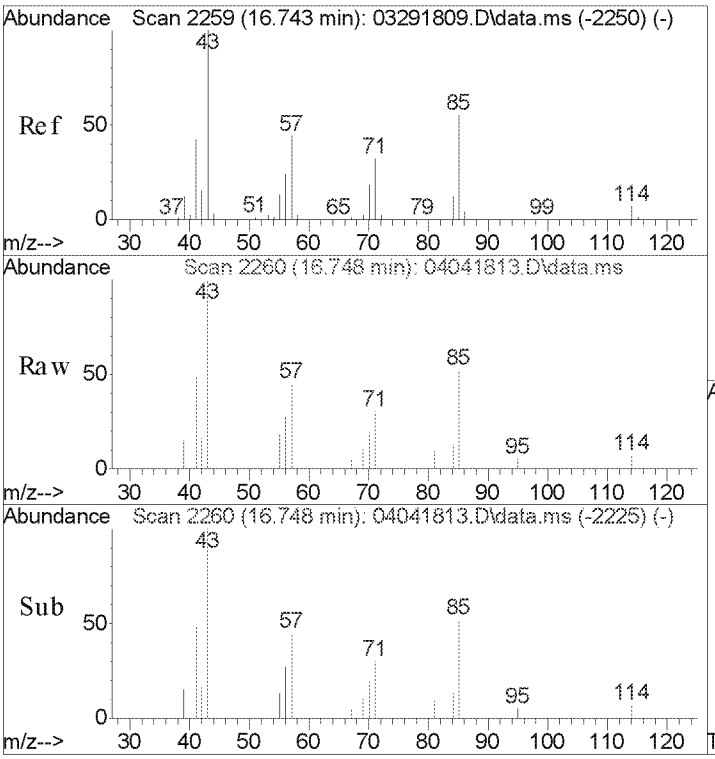



#58
Toluene
Concen: 91.81 ng
RT: 15.75 min Scan# 2085
Delta R.T. -0.000 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 91 Resp: 3753688

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 92 | 61.1 | 40.1 | 80.1 |

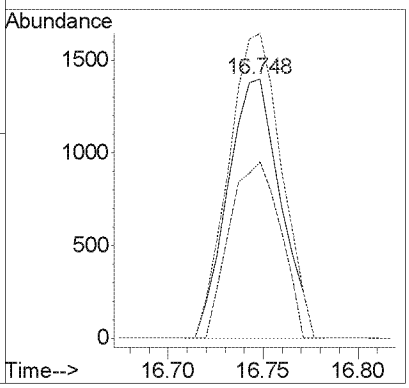


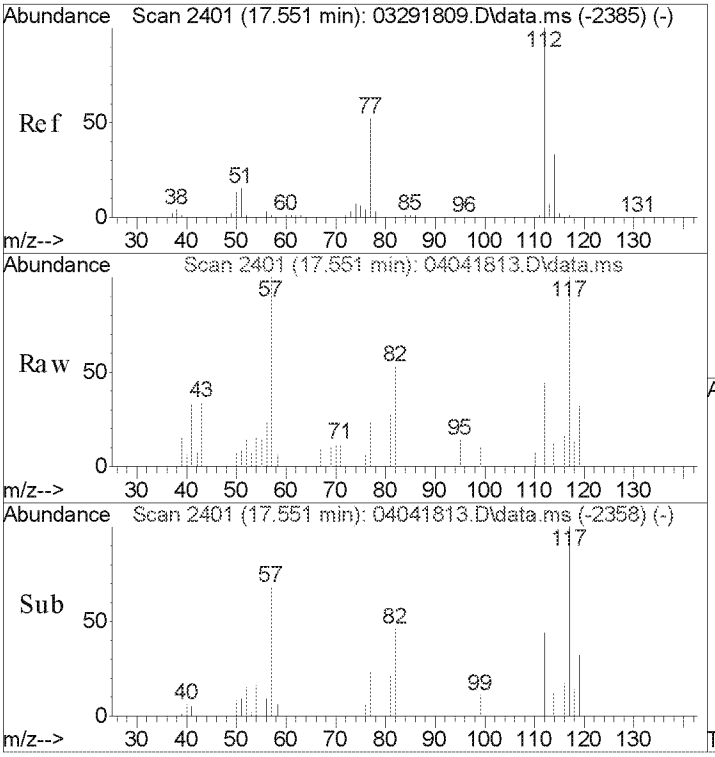




#63
n-Octane
Concen: 0.33 ng
RT: 16.75 min Scan# 2260
Delta R.T. -0.000 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 57 Resp: 2674

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 57 | 100 | | |
| 85 | 119.0 | 99.3 | 148.9 |
| 71 | 66.2 | 58.0 | 87.0 |

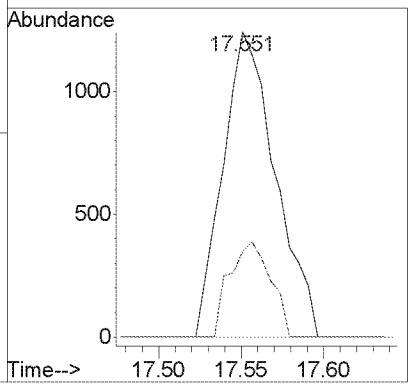


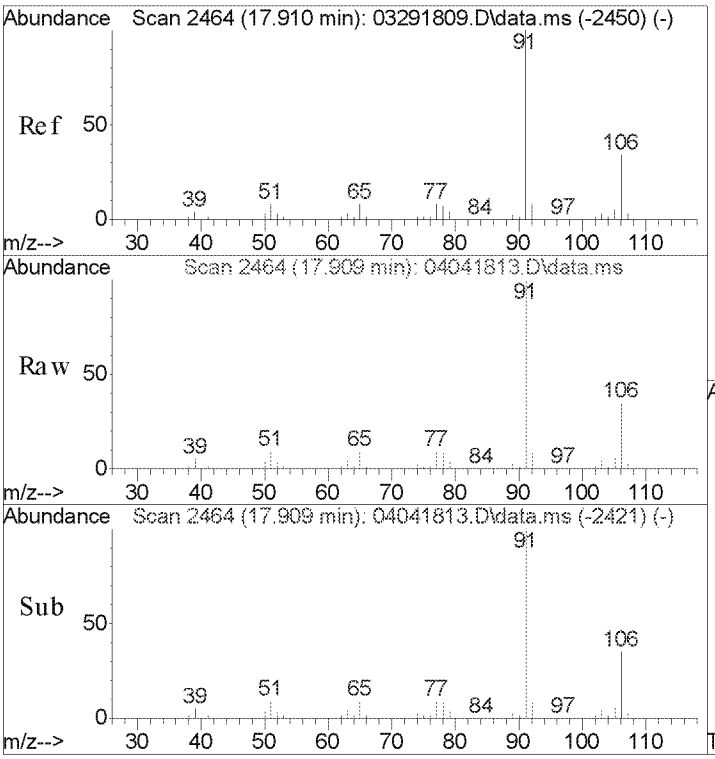



#65
Chlorobenzene
Concen: 0.10 ng
RT: 17.55 min Scan# 2401
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 112 Resp: 2741

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 112 | 100 | | |
| 114 | 24.6 | 12.4 | 52.4 |

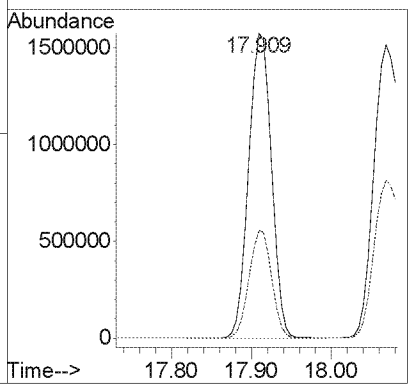


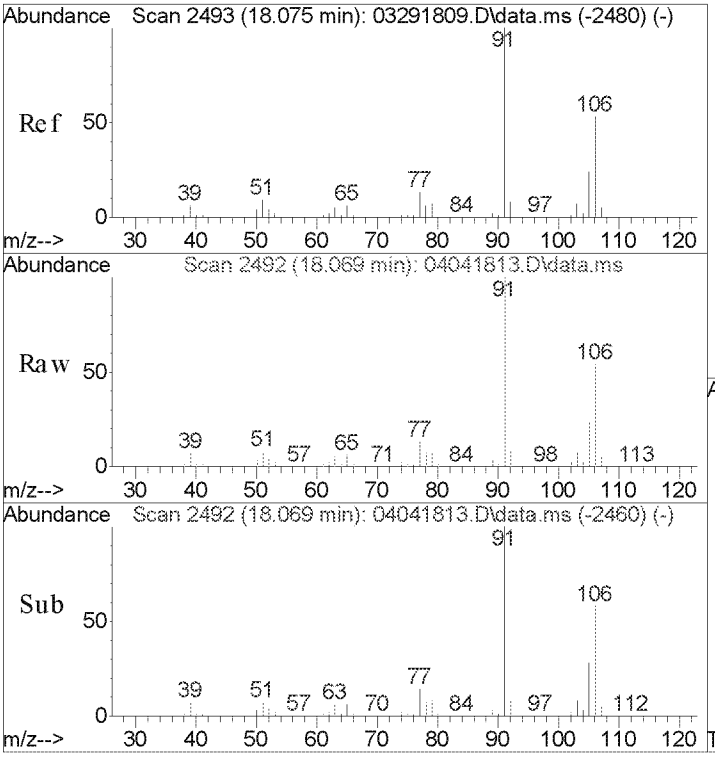




#66
Ethylbenzene
Concen: 71.02 ng
RT: 17.91 min Scan# 2464
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 91 Resp: 3128514

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 106 | 34.6 | 13.1 | 53.1 |

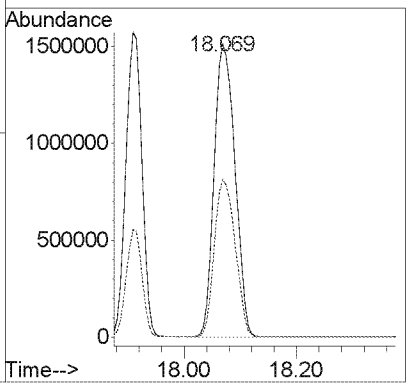


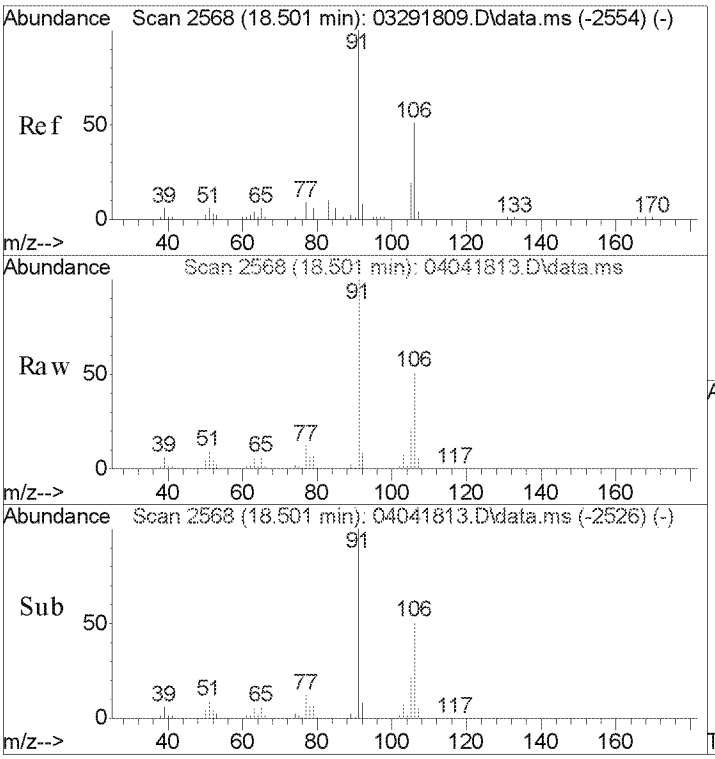



#67
m- & p-Xylenes
Concen: 111.51 ng
RT: 18.07 min Scan# 2492
Delta R.T. -0.017 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 91 Resp: 3889824

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 106 | 53.8 | 32.0 | 72.0 |

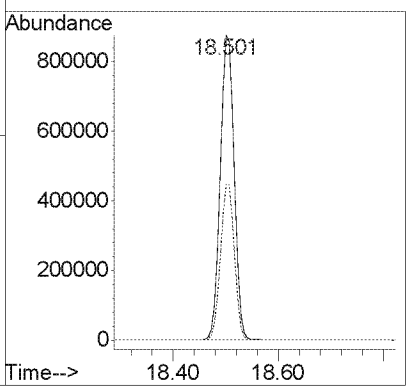


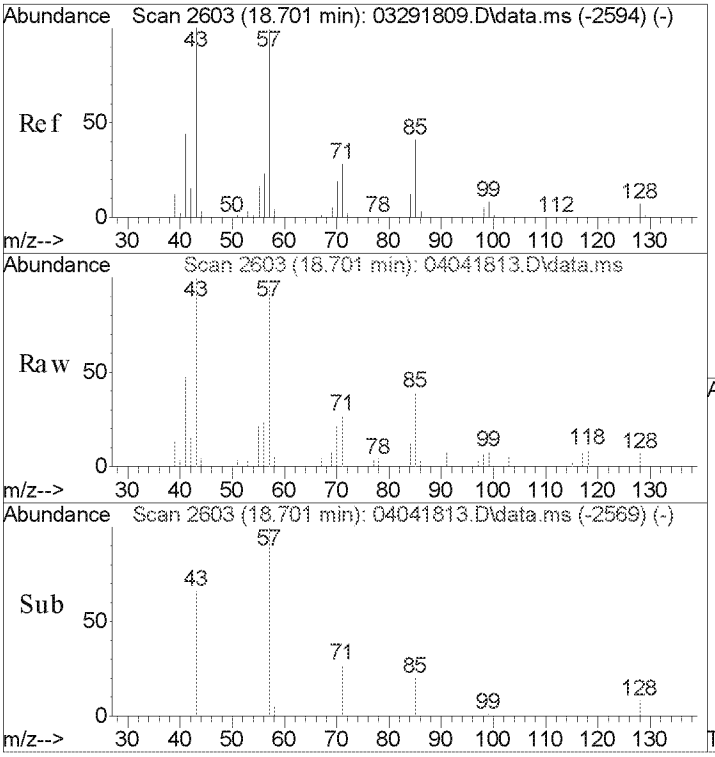




#70
o-Xylene
Concen: 46.02 ng
RT: 18.50 min Scan# 2568
Delta R.T. -0.011 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 91 Resp: 1599682

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 106 | 51.1 | 30.5 | 70.5 |

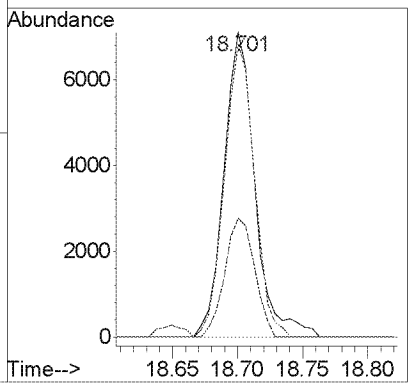


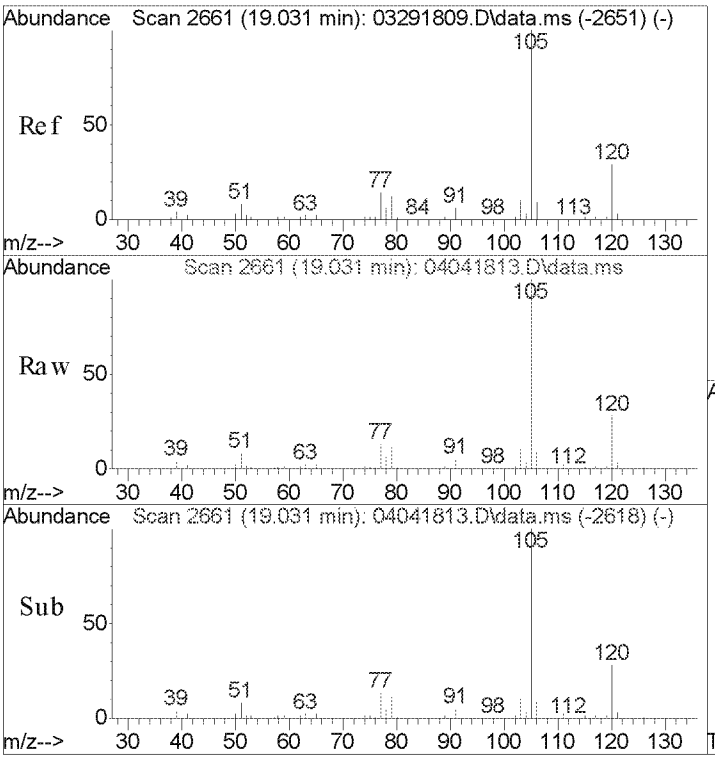



#71
n-Nonane
Concen: 0.69 ng
RT: 18.70 min Scan# 2603
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 43 Resp: 11773

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 43 | 100 | | |
| 57 | 92.5 | 78.4 | 118.4 |
| 85 | 37.4 | 20.3 | 60.3 |

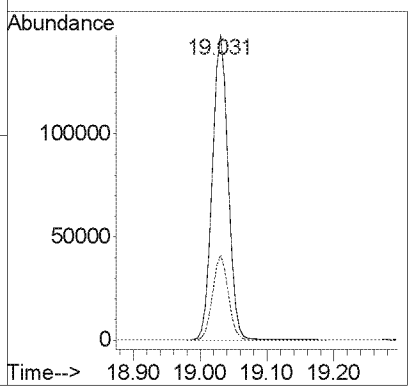


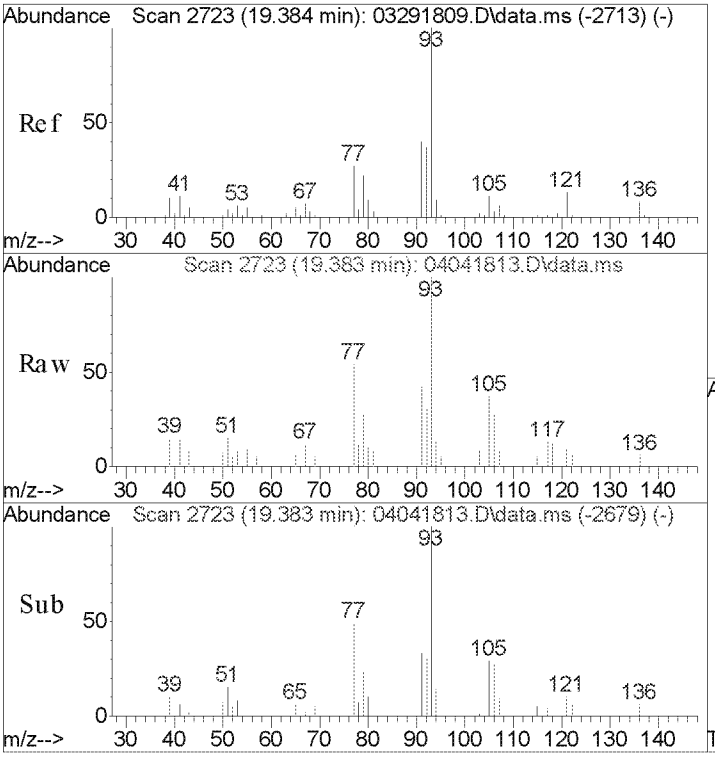




#74
Cumene
Concen: 5.29 ng
RT: 19.03 min Scan# 2661
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion:105 Resp: 243084

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 27.3 | 8.1 | 48.1 |

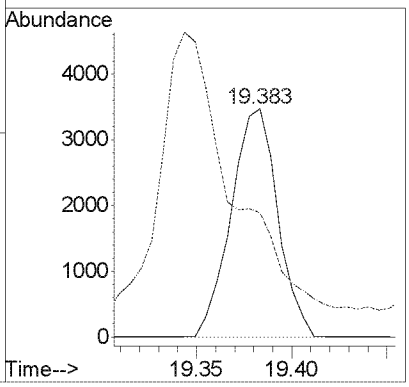


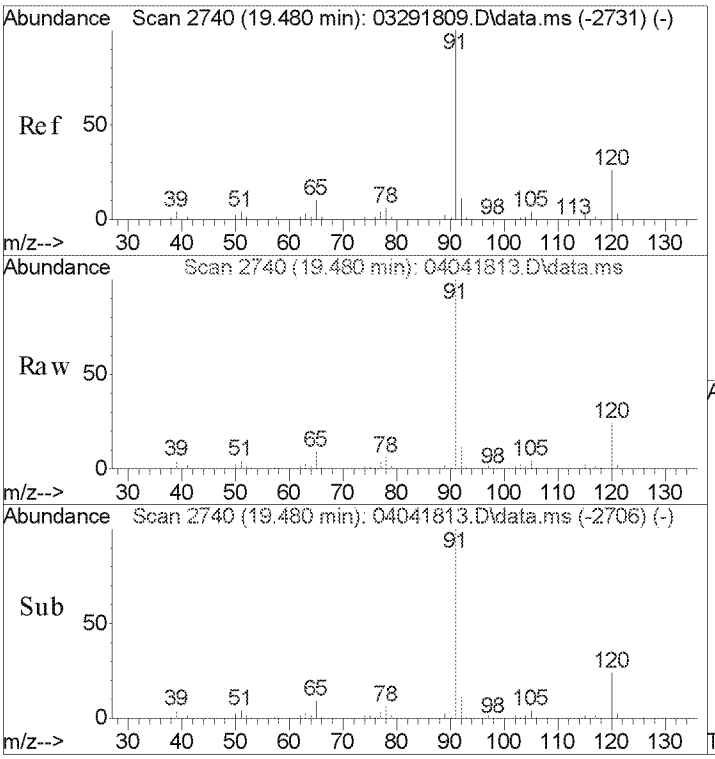



#75
alpha-Pinene
Concen: 0.26 ng
RT: 19.38 min Scan# 2723
Delta R.T. -0.000 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 93 Resp: 5891

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 93 | 100 | | |
| 77 | 252.4 | 8.0 | 48.0# |

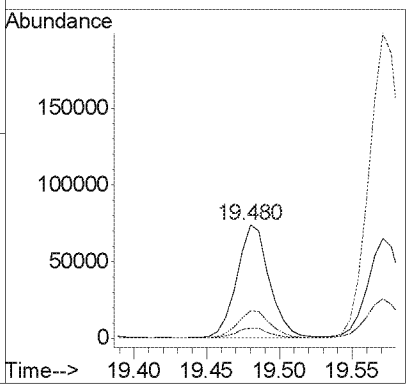


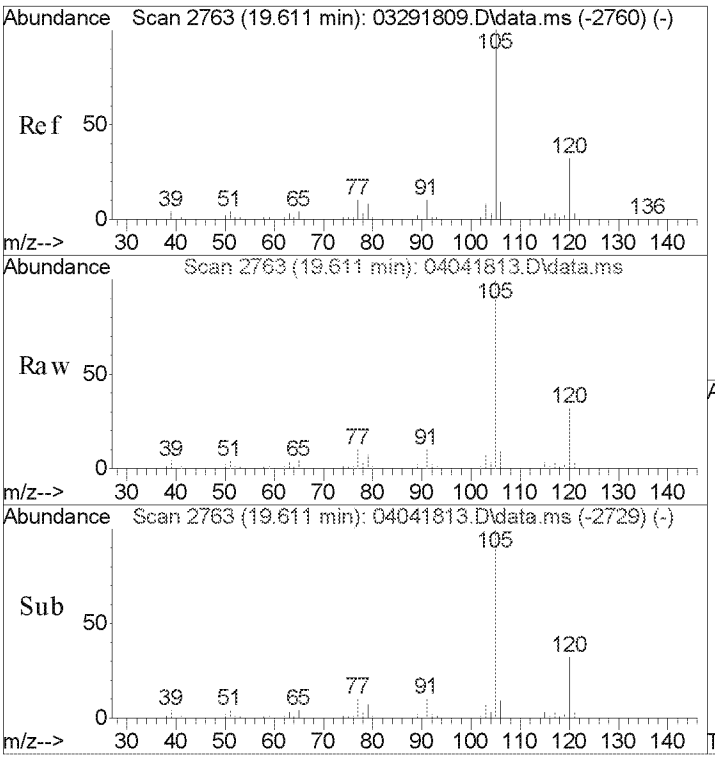




#76
n-Propylbenzene
Concen: 2.19 ng
RT: 19.48 min Scan# 2740
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 91 Resp: 113552

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 120 | 24.6 | 5.4 | 45.4 |
| 65 | 9.2 | 0.0 | 29.2 |

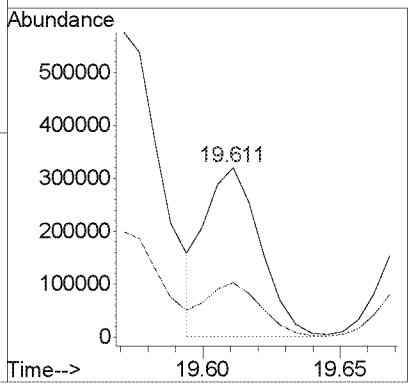


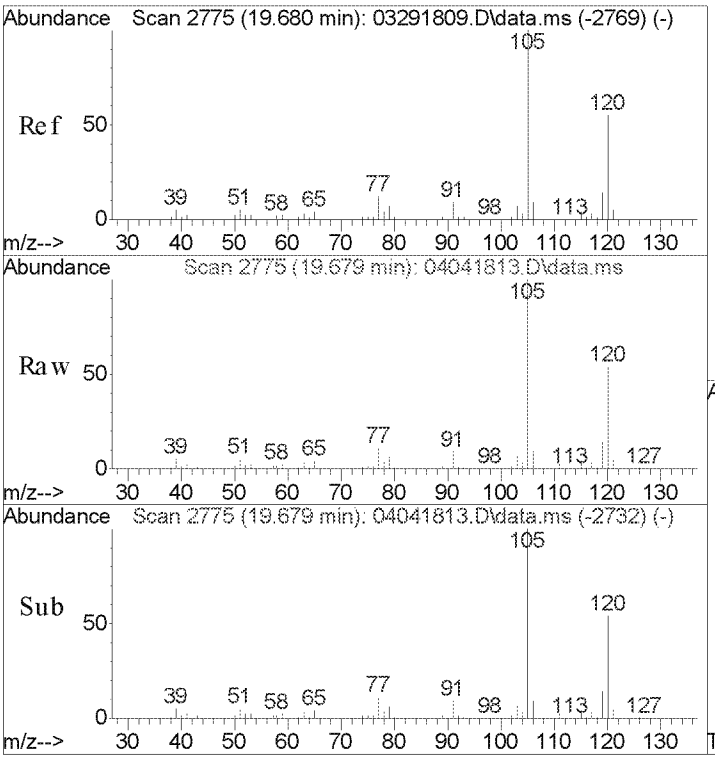



#78
4-Ethyltoluene
Concen: 10.72 ng
RT: 19.61 min Scan# 2763
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 105 Resp: 450231

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 32.0 | 12.1 | 52.1 |

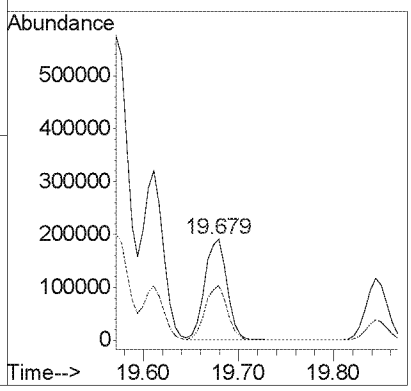


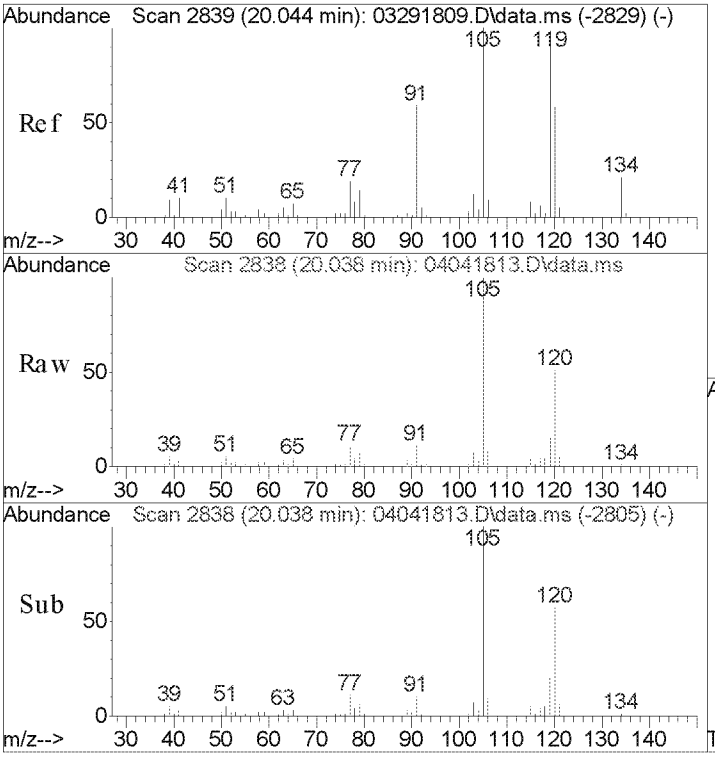




#79
1,3,5-Trimethylbenzene
Concen: 7.72 ng
RT: 19.68 min Scan# 2775
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 105 Resp: 308897

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 53.5 | 33.8 | 73.8 |

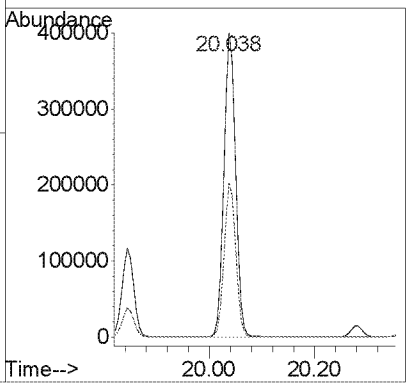


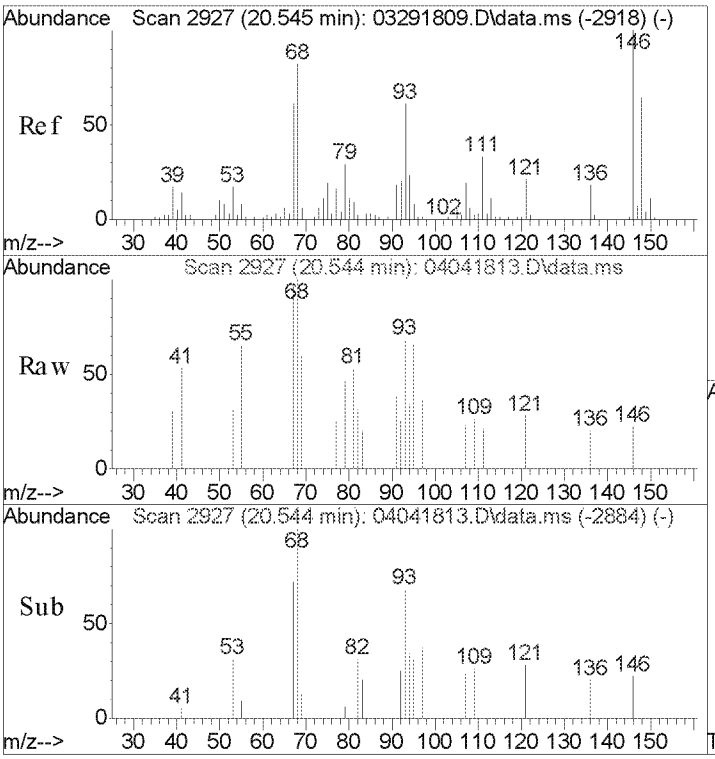



#82
1,2,4-Trimethylbenzene
Concen: 16.44 ng
RT: 20.04 min Scan# 2838
Delta R.T. -0.011 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 105 Resp: 613449

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 50.5 | 38.1 | 78.1 |

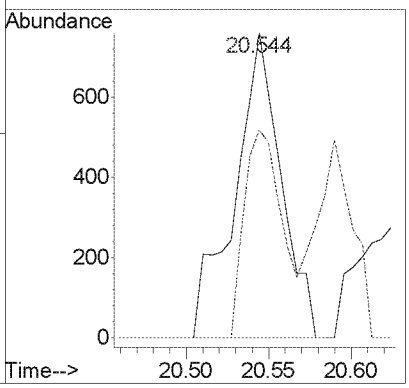



#91
d-Limonene
Concen: 0.11 ng
RT: 20.54 min Scan# 2927
Delta R.T. -0.006 min
Lab File: 04041813.D
Acq: 4 Apr 2018 10:24

Tgt Ion: 68 Resp: 1482

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 68 | 100 | | |
| 93 | 55.9 | 54.7 | 94.7 |



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\03\04041805.D Vial: 3
Acq On : 4 Apr 2018 3:53 Operator: RS
Sample : MB R13040418_1000mL Inst : MS13
Msc : S31-03281803/AC00880

Quant Time: Apr 04 07:45:16 2018
Quant Method : I:\MS13\METHODS\R13032918.M RS 4/4/18
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 74192 | 12.500 | ng | -0.03 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 379542 | 12.500 | ng | -0.02 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 122521 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 83452 | 12.192 | ng | -0.02 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 97.52% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 347637 | 12.841 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 102.72% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 97283 | 12.741 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 101.92% | | | | | | |

| Target Compounds | | | | | | Qvalue |
|---|---|---|---|---|---|---|
| 2) Propene | 0.00 | 42 | 0 | N.D. | | |
| 3) Dichlorodifluoromethan... | 0.00 | 85 | 0 | N.D. | | |
| 4) Chloromethane | 0.00 | 50 | 0 | N.D. | | |
| 5) 1,2-Dichloro-1,1,2,2-t... | 0.00 | 135 | 0 | N.D. | | |
| 6) Vinyl Chloride | 0.00 | 62 | 0 | N.D. | | |
| 7) 1,3-Butadiene | 0.00 | 54 | 0 | N.D. | | |
| 8) Bromomethane | 0.00 | 94 | 0 | N.D. | | |
| 9) Chloroethane | 0.00 | 64 | 0 | N.D. | | |
| 10) Ethanol | 6.56 | 45 | 58 | N.D. | | |
| 11) Acetonitrile | 0.00 | 41 | 0 | N.D. | | |
| 12) Acrolein | 0.00 | 56 | 0 | N.D. | | |
| 13) Acetone | 7.22 | 58 | 3012 | 0.605 | ng # | 79 |
| 14) Trichlorofluoromethane | 0.00 | 101 | 0 | N.D. | | |
| 15) 2-Propanol (Isopropanol) | 0.00 | 45 | 0 | N.D. | | |
| 16) Acrylonitrile | 0.00 | 53 | 0 | N.D. | | |
| 17) 1,1-Dichloroethene | 0.00 | 96 | 0 | N.D. | | |
| 18) 2-Methyl-2-Propanol (t... | 0.00 | 59 | 0 | N.D. | | |
| 19) Methylene Chloride | 8.50 | 84 | 897 | 0.112 | ng | 95 |
| 20) 3-Chloro-1-propene (Al... | 0.00 | 41 | 0 | N.D. | | |
| 21) Trichlorotrifluoroethane | 0.00 | 151 | 0 | N.D. | | |
| 22) Carbon Disulfide | 0.00 | 76 | 0 | N.D. | d | |
| 23) trans-1,2-Dichloroethene | 0.00 | 61 | 0 | N.D. | | |
| 24) 1,1-Dichloroethane | 0.00 | 63 | 0 | N.D. | | |
| 25) Methyl tert-Butyl Ether | 0.00 | 73 | 0 | N.D. | | |
| 26) Vinyl Acetate | 0.00 | 86 | 0 | N.D. | | |
| 27) 2-Butanone (MEK) | 10.36 | 72 | 223 | N.D. | | |
| 28) cis-1,2-Dichloroethene | 0.00 | 61 | 0 | N.D. | | |
| 29) Diisopropyl Ether | 0.00 | 87 | 0 | N.D. | | |
| 30) Ethyl Acetate | 0.00 | 61 | 0 | N.D. | | |
| 31) n-Hexane | 0.00 | 57 | 0 | N.D. | | |
| 32) Chloroform | 0.00 | 83 | 0 | N.D. | | |
| 34) Tetrahydrofuran (THF) | 0.00 | 72 | 0 | N.D. | | |
| 35) Ethyl tert-Butyl Ether | 0.00 | 87 | 0 | N.D. | | |
| 36) 1,2-Dichloroethane | 0.00 | 62 | 0 | N.D. | | |
| 38) 1,1,1-Trichloroethane | 0.00 | 97 | 0 | N.D. | | |
| 39) Isopropyl Acetate | 0.00 | 61 | 0 | N.D. | | |
| 40) 1-Butanol | 0.00 | 56 | 0 | N.D. | | |
| 41) Benzene | 12.84 | 78 | 663 | N.D. | | |
| 42) Carbon Tetrachloride | 0.00 | 117 | 0 | N.D. | | |
| 43) Cyclohexane | 0.00 | 84 | 0 | N.D. | | |
| 44) tert-Amyl Methyl Ether | 0.00 | 73 | 0 | N.D. | | |
| 45) 1,2-Dichloropropane | 0.00 | 63 | 0 | N.D. | | |
| 46) Bromodichloromethane | 0.00 | 83 | 0 | N.D. | | |
| 47) Trichloroethene | 0.00 | 130 | 0 | N.D. | | |
| 48) 1,4-Dioxane | 0.00 | 88 | 0 | N.D. | | |
| 49) 2,2,4-Trimethylpentane... | 0.00 | 57 | 0 | N.D. | | |
| 50) Methyl Methacrylate | 0.00 | 100 | 0 | N.D. | | |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\03\04041805.D Vial: 3
Acq On : 4 Apr 2018 3:53 Operator: RS
Sample : MB R13040418_1000mL Inst : MS13
Msc : S31-03281803/AC00880

Quant Time: Apr 04 07:45:16 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

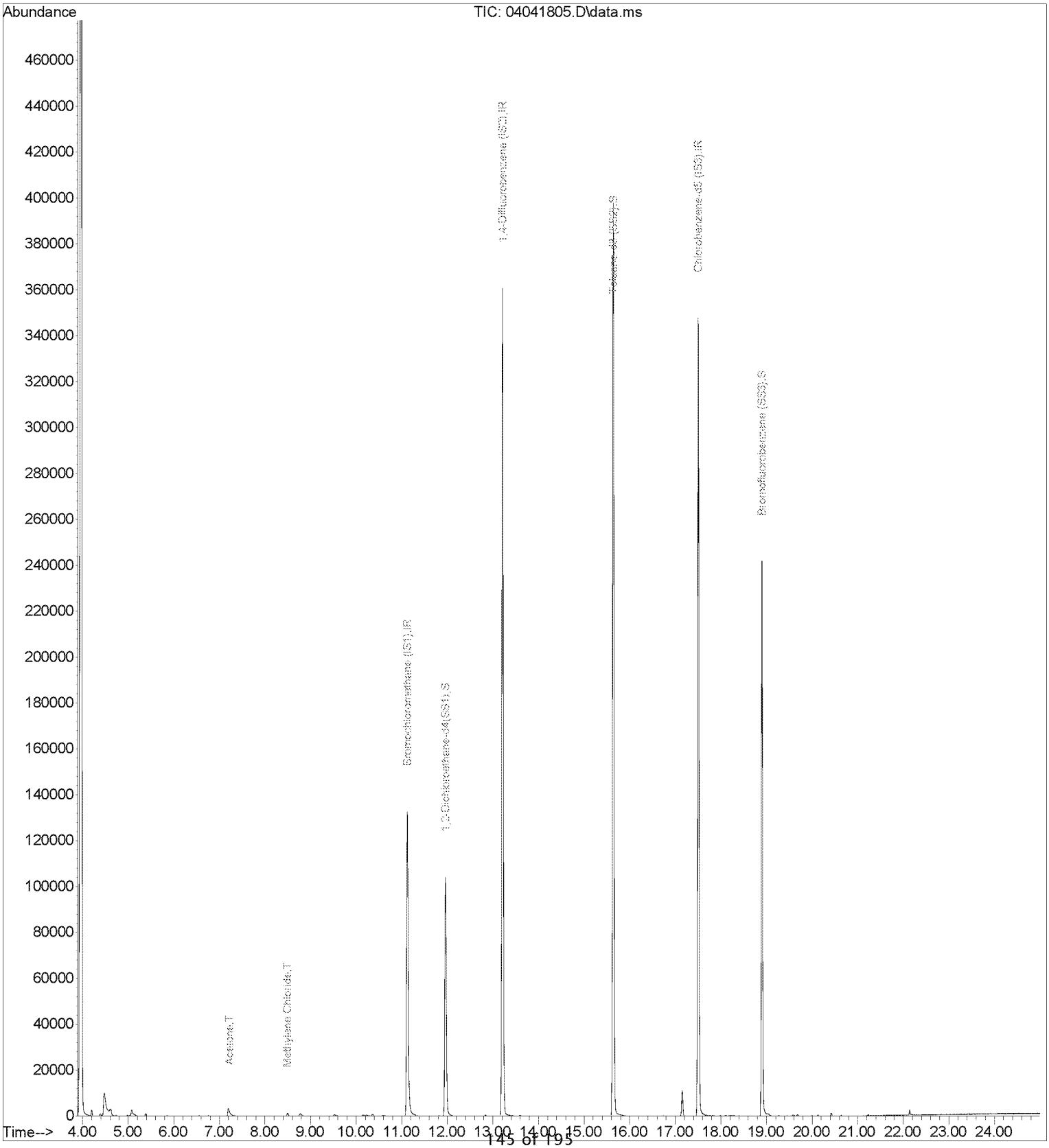
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 0.00 | 71 | 0 | N.D. | |
| 52) cis-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | |
| 53) 4-Methyl-2-pentanone | 0.00 | 58 | 0 | N.D. | |
| 54) trans-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | |
| 55) 1,1,2-Trichloroethane | 0.00 | 97 | 0 | N.D. | |
| 58) Toluene | 0.00 | 91 | 0 | N.D. | |
| 59) 2-Hexanone | 0.00 | 43 | 0 | N.D. | |
| 60) Dibromochloromethane | 0.00 | 129 | 0 | N.D. | |
| 61) 1,2-Dibromoethane | 0.00 | 107 | 0 | N.D. | |
| 62) n-Butyl Acetate | 0.00 | 43 | 0 | N.D. | |
| 63) n-Octane | 0.00 | 57 | 0 | N.D. | |
| 64) Tetrachloroethene | 0.00 | 166 | 0 | N.D. | |
| 65) Chlorobenzene | 0.00 | 112 | 0 | N.D. | |
| 66) Ethylbenzene | 0.00 | 91 | 0 | N.D. | |
| 67) m- & p-Xylenes | 0.00 | 91 | 0 | N.D. | |
| 68) Bromoform | 0.00 | 173 | 0 | N.D. | |
| 69) Styrene | 0.00 | 104 | 0 | N.D. | |
| 70) o-Xylene | 0.00 | 91 | 0 | N.D. | |
| 71) n-Nonane | 0.00 | 43 | 0 | N.D. | |
| 72) 1,1,2,2-Tetrachloroethane | 0.00 | 83 | 0 | N.D. | |
| 74) Cumene | 19.04 | 105 | 692 | N.D. | |
| 75) alpha-Pinene | 0.00 | 93 | 0 | N.D. | |
| 76) n-Propylbenzene | 0.00 | 91 | 0 | N.D. | |
| 77) 3-Ethyltoluene | 19.59 | 105 | 978 | N.D. | |
| 78) 4-Ethyltoluene | 19.59 | 105 | 978 | N.D. | |
| 79) 1,3,5-Trimethylbenzene | 19.69 | 105 | 715 | N.D. | |
| 80) alpha-Methylstyrene | 0.00 | 118 | 0 | N.D. | |
| 81) 2-Ethyltoluene | 19.69 | 105 | 715 | N.D. | |
| 82) 1,2,4-Trimethylbenzene | 0.00 | 105 | 0 | N.D. | |
| 83) n-Decane | 20.13 | 57 | 182 | N.D. | |
| 84) Benzyl Chloride | 0.00 | 91 | 0 | N.D. | |
| 85) 1,3-Dichlorobenzene | 0.00 | 146 | 0 | N.D. | |
| 86) 1,4-Dichlorobenzene | 0.00 | 146 | 0 | N.D. | |
| 87) sec-Butylbenzene | 20.42 | 105 | 714 | N.D. | |
| 88) 4-Isopropyltoluene (p-... | 20.43 | 119 | 811 | N.D. | |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 714 | N.D. | |
| 90) 1,2-Dichlorobenzene | 0.00 | 146 | 0 | N.D. | |
| 91) d-Limonene | 0.00 | 68 | 0 | N.D. | |
| 92) 1,2-Dibromo-3-Chloropr... | 0.00 | 157 | 0 | N.D. | |
| 93) n-Undecane | 21.23 | 57 | 316 | N.D. | |
| 94) 1,2,4-Trichlorobenzene | 0.00 | 180 | 0 | N.D. | |
| 95) Naphthalene | 22.18 | 128 | 636 | N.D. | |
| 96) n-Dodecane | 0.00 | 57 | 0 | N.D. | d |
| 97) Hexachlorobutadiene | 0.00 | 225 | 0 | N.D. | |
| 98) Cyclohexanone | 0.00 | 55 | 0 | N.D. | |
| 99) tert-Butylbenzene | 0.00 | 119 | 0 | N.D. | |
| 100) n-Butylbenzene | 0.00 | 91 | 0 | N.D. | |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\03\04041805.D Vial: 3
Acq On : 4 Apr 2018 3:53 Operator: RS
Sample : MB R13040418_1000mL Inst : MS13
Msc : S31-03281803/AC00880

Quant Time: Apr 04 07:45:16 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M






R13032918.M Wed Apr 04 07:45:36 2018 Page: 3

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041806.D Vial: 3
Acq On : 4 Apr 2018 4:27 Operator: RS
Sample : LCS R13040318_25ng Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

RS 4/4/18

Quant Time: Apr 04 08:13:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

| Internal Standards | R.T. | Qion | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.14 | 130 | 79767 | 12.500 | ng | | -0.01 |
| 37) 1,4-Difluorobenzene (IS2) | 13.23 | 114 | 397520 | 12.500 | ng | | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 128838 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.97 | 65 | 88935 | 12.085 | ng | | -0.01 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 96.72% | | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 359361 | 12.623 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 100.96% | | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 103847 | 12.934 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 103.44% | | | | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 155891 | 20.135 | ng | | 99 |
| 3) Dichlorodifluoromethan... | 4.51 | 85 | 294798 | 21.945 | ng | | 100 |
| 4) Chloromethane | 4.77 | 50 | 225432 | 21.478 | ng | | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.03 | 135 | 198993 | 23.402 | ng | | 100 |
| 6) Vinyl Chloride | 5.18 | 62 | 240863 | 23.173 | ng | | 100 |
| 7) 1,3-Butadiene | 5.43 | 54 | 172077 | 25.505 | ng | | 99 |
| 8) Bromomethane | 5.85 | 94 | 164499 | 23.316 | ng | | 100 |
| 9) Chloroethane | 6.16 | 64 | 123226 | 23.105 | ng | | 99 |
| 10) Ethanol | 6.52 | 45 | 537898 | 116.802 | ng | | 99 |
| 11) Acetonitrile | 6.76 | 41 | 280775 | 25.168 | ng | | 100 |
| 12) Acrolein | 6.94 | 56 | 103176 | 24.030 | ng | | 100 |
| 13) Acetone | 7.14 | 58 | 580400 | 108.425 | ng | | 98 |
| 14) Trichlorofluoromethane | 7.37 | 101 | 263187 | 22.376 | ng | | 99 |
| 15) 2-Propanol (Isopropanol) | 7.61 | 45 | 762296 | 47.277 | ng | | 99 |
| 16) Acrylonitrile | 7.86 | 53 | 220473 | 26.455 | ng | | 100 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 180755 | 23.542 | ng | | 95 |
| 18) 2-Methyl-2-Propanol (t... | 8.45 | 59 | 762412 | 46.552 | ng | | 99 |
| 19) Methylene Chloride | 8.51 | 84 | 184399 | 21.497 | ng | | 94 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 234361 | 24.521 | ng | | 97 |
| 21) Trichlorotrifluoroethane | 8.90 | 151 | 187729 | 23.682 | ng | | 96 |
| 22) Carbon Disulfide | 8.76 | 76 | 651659 | 21.955 | ng | | 100 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 233838 | 27.470 | ng | | 96 |
| 24) 1,1-Dichloroethane | 9.98 | 63 | 287726 | 22.578 | ng | | 100 |
| 25) Methyl tert-Butyl Ether | 10.07 | 73 | 506115 | 23.259 | ng | | 99 |
| 26) Vinyl Acetate | 10.23 | 86 | 210744 | 134.938 | ng | # | 93 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 119621 | 25.571 | ng | | 94 |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 219511 | 23.735 | ng | | 96 |
| 29) Diisopropyl Ether | 11.26 | 87 | 173806 | 24.818 | ng | # | 89 |
| 30) Ethyl Acetate | 11.26 | 61 | 118921 | 48.568 | ng | | 97 |
| 31) n-Hexane | 11.25 | 57 | 241421 | 20.854 | ng | | 99 |
| 32) Chloroform | 11.31 | 83 | 282089 | 23.070 | ng | | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 119595 | 22.014 | ng | | 96 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 212747 | 24.504 | ng | | 96 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 193223 | 24.784 | ng | | 100 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 245706 | 23.446 | ng | | 99 |
| 39) Isopropyl Acetate | 12.78 | 61 | 207330 | 46.752 | ng | | 97 |
| 40) 1-Butanol | 12.80 | 56 | 310071 | 49.286 | ng | | 99 |
| 41) Benzene | 12.84 | 78 | 699911 | 23.215 | ng | | 100 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 229210 | 24.548 | ng | | 100 |
| 43) Cyclohexane | 13.12 | 84 | 549015 | 44.506 | ng | | 97 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 490043 | 23.395 | ng | | 99 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 166085 | 22.644 | ng | | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 225401 | 21.180 | ng | | 100 |
| 47) Trichloroethene | 13.91 | 130 | 218341 | 24.104 | ng | | 99 |
| 48) 1,4-Dioxane | 13.89 | 88 | 156294 | 24.347 | ng | | 98 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 687416 | 20.770 | ng | | 99 |
| 50) Methyl Methacrylate | 14.12 | 100 | 164390 | 52.218 | ng | | 94 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041806.D Vial: 3
Acq On : 4 Apr 2018 4:27 Operator: RS
Sample : LCS R13040318_25ng Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

Quant Time: Apr 04 08:13:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

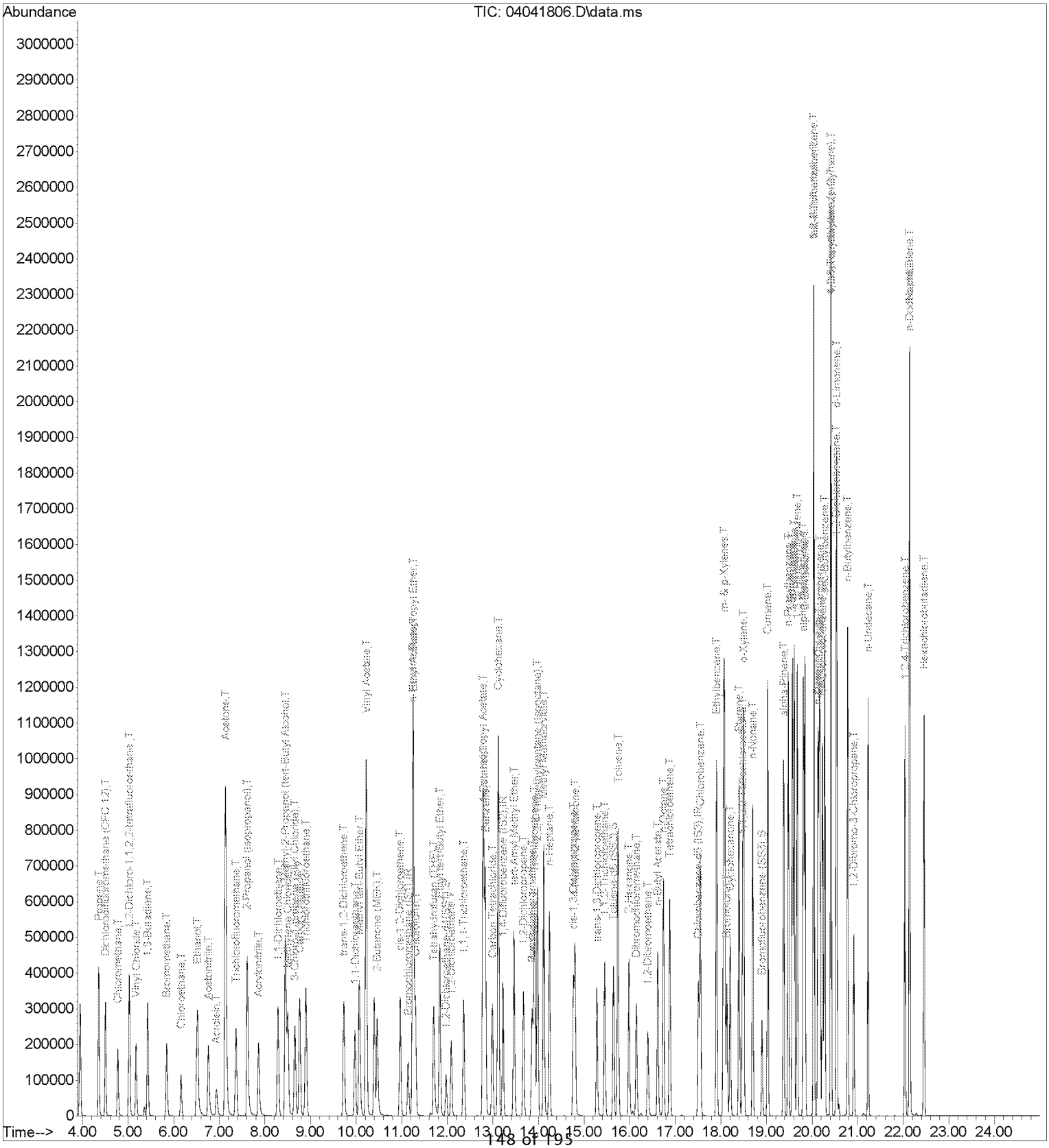
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 170417 | 22.065 ng | 98 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 283628 | 26.663 ng | 100 |
| 53) 4-Methyl-2-pentanone | 14.80 | 58 | 157750 | 25.426 ng | 97 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 253763 | 27.987 ng | 100 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 181219 | 25.565 ng | 98 |
| 58) Toluene | 15.75 | 91 | 741758 | 23.082 ng | 100 |
| 59) 2-Hexanone | 15.99 | 43 | 337784 | 25.100 ng | 99 |
| 60) Dibromochloromethane | 16.15 | 129 | 221258 | 27.725 ng | 100 |
| 61) 1,2-Dibromoethane | 16.40 | 107 | 209524 | 30.626 ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 379140 | 27.703 ng | 99 |
| 63) n-Octane | 16.74 | 57 | 139493 | 22.218 ng | 96 |
| 64) Tetrachloroethene | 16.89 | 166 | 253333 | 25.112 ng | 100 |
| 65) Chlorobenzene | 17.55 | 112 | 531118 | 24.397 ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 834793 | 24.111 ng | 99 |
| 67) m- & p-Xylenes | 18.07 | 91 | 1309017 | 47.743 ng | 100 |
| 68) Bromoform | 18.13 | 173 | 217136 | 29.632 ng | 100 |
| 69) Styrene | 18.40 | 104 | 568536 | 27.486 ng | 100 |
| 70) o-Xylene | 18.50 | 91 | 664948 | 24.340 ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 295673 | 21.996 ng | 97 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 308364 | 25.118 ng | 100 |
| 74) Cumene | 19.03 | 105 | 876539 | 24.290 ng | 100 |
| 75) alpha-Pinene | 19.38 | 93 | 445992 | 25.001 ng | 100 |
| 76) n-Propylbenzene | 19.48 | 91 | 1014109 | 24.918 ng | 100 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 903633 | 25.086 ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 823129 | 24.939 ng | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 727568 | 23.135 ng | 100 |
| 80) alpha-Methylstyrene | 19.81 | 118 | 431247 | 28.684 ng | 99 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 866456 | 24.303 ng | 100 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 717155 | 24.456 ng | 100 |
| 83) n-Decane | 20.13 | 57 | 345271 | 23.090 ng | 98 |
| 84) Benzyl Chloride | 20.16 | 91 | 602975 | 34.055 ng | 99 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 491126 | 27.855 ng | 99 |
| 86) 1,4-Dichlorobenzene | 20.23 | 146 | 507192 | 26.466 ng | 99 |
| 87) sec-Butylbenzene | 20.28 | 105 | 986069 | 24.378 ng | 99 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 928463 | 24.484 ng | 99 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 737253 | 24.711 ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.53 | 146 | 471828 | 27.498 ng | 100 |
| 91) d-Limonene | 20.54 | 68 | 265716 | 24.850 ng | 98 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 181192 | 30.523 ng | 96 |
| 93) n-Undecane | 21.23 | 57 | 359734 | 24.365 ng | 98 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 403784 | 31.981 ng | 100 |
| 95) Naphthalene | 22.14 | 128 | 1065922 | 29.984 ng | 100 |
| 96) n-Dodecane | 22.14 | 57 | 328769 | 28.554 ng | 98 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 263100 | 26.709 ng | 100 |
| 98) Cyclohexanone | 18.21 | 55 | 230095 | 25.708 ng | 98 |
| 99) tert-Butylbenzene | 20.04 | 119 | 719452 | 24.166 ng | 100 |
| 100) n-Butylbenzene | 20.78 | 91 | 760872 | 25.486 ng | 99 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041806.D Vial: 3
Acq On : 4 Apr 2018 4:27 Operator: RS
Sample : LCS R13040318_25ng Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

Quant Time: Apr 04 08:13:24 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



# Response Factor Report MS13

Method Path : I:\MS13\METHODS\
Method File : R13032918.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri Mar 30 11:14:38 2018
Response Via : Initial Calibration

RS 4/3/18

Calibration Files
0.08=03291803.D 0.10=03291804.D 0.20=03291805.D 0.40=03291806.D 1.0 =03291807.D 5.0 =03291808.D 25 =03291809.D
50 =03291810.D 100 =03291811.D

| | | Compound | 0.08 | 0.10 | 0.20 | 0.40 | 1.0 | 5.0 | 25 | 50 | 100 | Avg | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) | IR | Bromochloromethane... | ---------- | ---------- | ---------- | ISTD | ---------- | ---------- | ---------- | ---------- | ---------- | | |
| 2) | T | Propene | 1.784 | 1.133 | 1.184 | 1.441 | 1.263 | 1.131 | 1.046 | 0.958 | 0.978 | 1.213 | 21.48 |
| 3) | T | Dichlorodifluo... | 2.958 | 2.114 | 1.980 | 2.648 | 2.201 | 1.970 | 1.820 | 1.692 | 1.562 | 2.105 | 21.33 |
| 4) | T | Chloromethane | 2.302 | 1.506 | 1.479 | 2.122 | 1.845 | 1.612 | 1.506 | 1.362 | 1.070 | 1.645 | 23.32 |
| 5) | T | 1,2-Dichloro-1... | 1.815 | 1.311 | 1.248 | 1.659 | 1.395 | 1.256 | 1.163 | 1.105 | 1.040 | 1.333 | 19.18 |
| 6) | T | Vinyl Chloride | 2.145 | 1.425 | 1.407 | 2.067 | 1.790 | 1.624 | 1.514 | 1.400 | 1.287 | 1.629 | 18.90 |
| 7) | T | 1,3-Butadiene | 1.315 | 0.861 | 0.868 | 1.289 | 1.131 | 1.083 | 1.069 | 0.997 | 0.902 | 1.057 | 15.97 |
| 8) | T | Bromomethane | 1.561 | 1.035 | 1.003 | 1.366 | 1.158 | 1.000 | 1.014 | 0.961 | 0.852 | 1.106 | 20.18 |
| 9) | T | Chloroethane | | | 0.730 | 1.072 | 0.936 | 0.851 | 0.802 | 0.760 | 0.699 | 0.836 | 15.67 |
| 10) | T | Ethanol | 0.874 | 0.531 | 0.618 | 0.924 | 0.841 | 0.766 | 0.716 | 0.650 | 0.575 | 0.722 | 19.22 |
| 11) | T | Acetonitrile | | | 0.936 | 2.011 | 1.915 | 1.960 | 1.911 | 1.808 | 1.696 | 1.748 | 21.33 |
| 12) | T | Acrolein | | | | 0.710 | 0.720 | 0.741 | 0.660 | 0.620 | 0.586 | 0.673 | 9.13 |
| 13) | T | Acetone | 1.229 | 0.792 | 0.768 | 1.057 | 0.924 | 0.856 | 0.748 | 0.642 | 0.533 | 0.839 | 25.11 |
| 14) | T | Trichlorofluor... | 2.559 | 1.696 | 1.703 | 2.316 | 1.952 | 1.745 | 1.626 | 1.541 | 1.451 | 1.843 | 20.04 |
| 15) | T | 2-Propanol (Is... | 2.991 | 2.088 | 2.229 | 3.223 | 2.890 | 2.737 | 2.526 | 2.279 | 1.777 | 2.527 | 18.68 |
| 16) | T | Acrylonitrile | | | | 1.044 | 1.247 | 1.428 | 1.449 | 1.373 | 1.294 | 1.306 | 11.47 |
| 17) | T | 1,1-Dichloroet... | 1.613 | 1.035 | 1.030 | 1.539 | 1.301 | 1.169 | 1.101 | 1.051 | 0.989 | 1.203 | 19.24 |
| 18) | T | 2-Methyl-2-Pro... | 3.264 | 2.310 | 2.403 | 3.416 | 2.948 | 2.707 | 2.461 | 2.145 | 1.444 | 2.566 | 23.52 |
| 19) | T | Methylene Chlo... | | | 1.777 | 1.851 | 1.419 | 1.214 | 1.122 | 1.062 | 0.964 | 1.344 | 26.14 |
| 20) | T | 3-Chloro-1-pro... | | | 1.251 | 1.866 | 1.630 | 1.537 | 1.489 | 1.406 | 1.305 | 1.498 | 13.92 |
| 21) | T | Trichlorotrifl... | 1.744 | 1.141 | 1.143 | 1.502 | 1.301 | 1.176 | 1.103 | 1.064 | 1.007 | 1.242 | 19.16 |
| 22) | T | Carbon Disulfide | | | 5.512 | 6.443 | 5.012 | 4.332 | 4.037 | 3.785 | 3.438 | 4.651 | 22.86 |
| 23) | T | trans-1,2-Dich... | 1.374 | 0.681 | 1.018 | 1.671 | 1.579 | 1.539 | 1.462 | 1.388 | 1.294 | 1.334 | 23.17 |
| 24) | T | 1,1-Dichloroet... | 2.653 | 1.803 | 1.755 | 2.428 | 2.166 | 1.988 | 1.835 | 1.730 | 1.614 | 1.997 | 17.57 |
| 25) | T | Methyl tert-Bu... | 4.481 | 3.113 | 3.089 | 4.168 | 3.684 | 3.349 | 3.127 | 2.963 | 2.714 | 3.410 | 17.21 |
| 26) | T | Vinyl Acetate | | | | 0.234 | 0.249 | 0.271 | 0.264 | 0.242 | 0.209 | 0.245 | 9.08 |
| 27) | T | 2-Butanone (MEK) | | | | 0.661 | 0.767 | 0.803 | 0.764 | 0.724 | 0.679 | 0.733 | 7.52 |
| 28) | T | cis-1,2-Dichlo... | 1.896 | 1.124 | 1.214 | 1.806 | 1.583 | 1.468 | 1.407 | 1.318 | 1.228 | 1.449 | 18.48 |
| 29) | T | Diisopropyl Ether | 1.427 | 0.827 | 1.062 | 1.489 | 1.277 | 1.176 | 1.072 | 0.837 | 0.709 | 1.097 | 24.83 |
| 30) | T | Ethyl Acetate | | | | 0.433 | 0.443 | 0.429 | 0.386 | 0.336 | 0.275 | 0.384 | 17.29 |
| 31) | T | n-Hexane | | 1.949 | 1.790 | 2.535 | 2.147 | 1.907 | 1.602 | 1.405 | 1.178 | 1.814 | 23.52 |
| 32) | T | Chloroform | 2.572 | 1.689 | 1.721 | 2.378 | 2.037 | 1.880 | 1.757 | 1.663 | 1.549 | 1.916 | 18.20 |
| 33) | S | 1,2-Dichloroet... | 1.145 | 1.151 | 1.157 | 1.159 | 1.147 | 1.155 | 1.159 | 1.146 | 1.160 | 1.153 | 0.53 |
| 34) | T | Tetrahydrofura... | 1.214 | 0.791 | 0.788 | 1.042 | 0.883 | 0.810 | 0.751 | 0.718 | 0.663 | 0.851 | 20.40 |
| 35) | T | Ethyl tert-But... | 1.688 | 1.104 | 1.155 | 1.717 | 1.505 | 1.378 | 1.307 | 1.242 | 1.150 | 1.361 | 16.93 |
| 36) | T | 1,2-Dichloroet... | | | 1.003 | 1.506 | 1.328 | 1.272 | 1.208 | 1.148 | 1.087 | 1.222 | 13.61 |
| 37) | IR | 1,4-Difluorobenzen... | ---------- | ---------- | ---------- | ISTD | ---------- | ---------- | ---------- | ---------- | ---------- | | |
| 38) | T | 1,1,1-Trichlor... | 0.451 | 0.299 | 0.298 | 0.409 | 0.347 | 0.314 | 0.298 | 0.283 | 0.266 | 0.330 | 18.80 |
| 39) | T | Isopropyl Acetate | 0.164 | 0.119 | 0.118 | 0.184 | 0.163 | 0.151 | 0.134 | 0.121 | 0.102 | 0.139 | 19.57 |
| 40) | T | 1-Butanol | | | | 0.197 | 0.208 | 0.224 | 0.209 | 0.190 | 0.159 | 0.198 | 11.36 |
| 41) | T | Benzene | | 1.077 | 0.972 | 1.256 | 1.062 | 0.953 | 0.860 | 0.779 | 0.625 | 0.948 | 20.55 |
| 42) | T | Carbon Tetrach... | 0.372 | 0.281 | 0.261 | 0.356 | 0.306 | 0.282 | 0.273 | 0.263 | 0.248 | 0.294 | 14.77 |

ED_004220_00020298-00339

Method Path : I:\MS13\METHODS\
Method File : R13032918.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43) | T | Cyclohexane | 0.555 | 0.387 | 0.365 | 0.488 | 0.418 | 0.371 | 0.337 | 0.308 | 0.262 | 0.388 | 23.15 |
| 44) | T | tert-Amyl Meth... | 0.890 | 0.601 | 0.603 | 0.804 | 0.696 | 0.643 | 0.605 | 0.571 | 0.516 | 0.659 | 18.11 |
| 45) | T | 1,2-Dichloropr... | 0.305 | 0.207 | 0.203 | 0.286 | 0.252 | 0.230 | 0.212 | 0.201 | 0.181 | 0.231 | 18.20 |
| 46) | T | Bromodichlorom.. | | 0.491 | 0.363 | 0.420 | 0.334 | 0.293 | 0.274 | 0.261 | 0.241 | 0.335 | 25.76 |
| 47) | T | Trichloroethene | 0.389 | 0.270 | 0.250 | 0.346 | 0.298 | 0.273 | 0.260 | 0.249 | 0.228 | 0.285 | 18.20 |
| 48) | T | 1,4-Dioxane | | | | 0.243 | 0.218 | 0.206 | 0.195 | 0.185 | 0.165 | 0.202 | 13.44 |
| 49) | T | 2,2,4-Trimethy... | 1.546 | 1.062 | 0.988 | 1.314 | 1.094 | 0.972 | 0.884 | 0.811 | 0.696 | 1.041 | 24.89 |
| 50) | T | Methyl Methacr... | | | | 0.107 | 0.105 | 0.104 | 0.099 | 0.094 | 0.083 | 0.099 | 9.04 |
| 51) | T | n-Heptane | 0.339 | 0.212 | 0.226 | 0.308 | 0.267 | 0.238 | 0.216 | 0.202 | 0.178 | 0.243 | 21.56 |
| 52) | T | cis-1,3-Dichlo... | | | 0.222 | 0.389 | 0.370 | 0.368 | 0.351 | 0.336 | 0.306 | 0.334 | 16.85 |
| 53) | T | 4-Methyl-2-pen... | | | 0.123 | 0.237 | 0.227 | 0.218 | 0.204 | 0.190 | 0.168 | 0.195 | 20.27 |
| 54) | T | trans-1,3-Dich... | | | | 0.238 | 0.278 | 0.305 | 0.312 | 0.300 | 0.278 | 0.285 | 9.44 |
| 55) | T | 1,1,2-Trichlor... | 0.252 | 0.185 | 0.185 | 0.284 | 0.250 | 0.233 | 0.218 | 0.208 | 0.190 | 0.223 | 15.49 |
| 56) | IR | Chlorobenzene-d5 (... | ----------ISTD---------- | | | | | | | | | | |
| 57) | S | Toluene-d8 (SS2) | 2.766 | 2.751 | 2.761 | 2.761 | 2.756 | 2.762 | 2.764 | 2.772 | 2.766 | 2.762 | 0.22 |
| 58) | T | Toluene | 4.518 | 3.160 | 2.824 | 3.833 | 3.274 | 2.974 | 2.723 | 2.538 | 2.218 | 3.118 | 22.41 |
| 59) | T | 2-Hexanone | | | | 1.401 | 1.378 | 1.413 | 1.326 | 1.234 | 1.083 | 1.306 | 9.75 |
| 60) | T | Dibromochlorom.. | 0.928 | 0.558 | 0.649 | 0.930 | 0.843 | 0.804 | 0.782 | 0.761 | 0.714 | 0.774 | 15.79 |
| 61) | T | 1,2-Dibromoethane | 0.614 | 0.312 | 0.494 | 0.848 | 0.787 | 0.769 | 0.751 | 0.726 | 0.673 | 0.664 | 25.40 |
| 62) | T | n-Butyl Acetate | | | 0.715 | 1.471 | 1.488 | 1.552 | 1.480 | 1.381 | 1.208 | 1.328 | 22.00 |
| 63) | T | n-Octane | 0.877 | 0.554 | 0.570 | 0.756 | 0.670 | 0.591 | 0.538 | 0.497 | 0.430 | 0.609 | 22.61 |
| 64) | T | Tetrachloroethene | 1.390 | 0.857 | 0.900 | 1.213 | 1.017 | 0.924 | 0.878 | 0.846 | 0.784 | 0.979 | 20.26 |
| 65) | T | Chlorobenzene | 3.007 | 2.054 | 1.886 | 2.571 | 2.216 | 2.004 | 1.893 | 1.785 | 1.595 | 2.112 | 20.57 |
| 66) | T | Ethylbenzene | 4.731 | 3.024 | 3.027 | 4.269 | 3.633 | 3.301 | 3.036 | 2.798 | 2.415 | 3.359 | 21.88 |
| 67) | T | m- & p-Xylenes | 3.854 | 2.561 | 2.420 | 3.349 | 2.860 | 2.571 | 2.350 | 2.154 | 1.822 | 2.660 | 23.29 |
| 68) | T | Bromoform | 0.768 | 0.508 | 0.564 | 0.845 | 0.762 | 0.751 | 0.755 | 0.742 | 0.703 | 0.711 | 15.01 |
| 69) | T | Styrene | 2.405 | 1.708 | 1.551 | 2.431 | 2.197 | 2.130 | 2.045 | 1.920 | 1.674 | 2.007 | 15.83 |
| 70) | T | o-Xylene | 3.822 | 2.429 | 2.365 | 3.315 | 2.847 | 2.589 | 2.396 | 2.205 | 1.887 | 2.651 | 22.45 |
| 71) | T | n-Nonane | 1.806 | 1.295 | 1.198 | 1.676 | 1.433 | 1.288 | 1.152 | 1.037 | 0.853 | 1.304 | 22.95 |
| 72) | T | 1,1,2,2-Tetrac... | 1.563 | 0.961 | 1.037 | 1.506 | 1.311 | 1.221 | 1.152 | 1.062 | 0.907 | 1.191 | 19.43 |
| 73) | S | Bromofluoroben... | 0.787 | 0.778 | 0.769 | 0.775 | 0.772 | 0.770 | 0.782 | 0.789 | 0.788 | 0.779 | 1.01 |
| 74) | T | Cumene | 4.949 | 3.388 | 3.145 | 4.479 | 3.743 | 3.397 | 3.118 | 2.862 | 2.429 | 3.501 | 22.50 |
| 75) | T | alpha-Pinene | 2.343 | 1.645 | 1.566 | 2.106 | 1.818 | 1.696 | 1.606 | 1.500 | 1.298 | 1.731 | 18.46 |
| 76) | T | n-Propylbenzene | 5.490 | 3.719 | 3.492 | 4.979 | 4.331 | 3.944 | 3.595 | 3.263 | 2.724 | 3.949 | 21.82 |
| 77) | T | 3-Ethyltoluene | 4.878 | 3.213 | 2.883 | 4.356 | 3.838 | 3.578 | 3.259 | 2.884 | 2.565 | 3.495 | 21.52 |
| 78) | T | 4-Ethyltoluene | 4.672 | 3.013 | 2.998 | 3.945 | 3.387 | 3.032 | 2.855 | 2.730 | 2.189 | 3.202 | 22.68 |
| 79) | T | 1,3,5-Trimethy... | 4.508 | 3.134 | 2.789 | 3.890 | 3.244 | 2.788 | 2.599 | 2.429 | 2.082 | 3.051 | 24.69 |
| 80) | T | alpha-Methylst... | 1.666 | 1.164 | 1.189 | 1.766 | 1.629 | 1.530 | 1.520 | 1.424 | 1.240 | 1.459 | 15.02 |
| 81) | T | 2-Ethyltoluene | 5.053 | 3.330 | 3.144 | 4.347 | 3.728 | 3.324 | 3.041 | 2.794 | 2.371 | 3.459 | 23.62 |
| 82) | T | 1,2,4-Trimethy... | 4.098 | 2.683 | 2.550 | 3.650 | 3.113 | 2.818 | 2.552 | 2.284 | 1.859 | 2.845 | 24.14 |
| 83) | T | n-Decane | 2.103 | 1.339 | 1.340 | 1.839 | 1.608 | 1.442 | 1.300 | 1.156 | 0.930 | 1.451 | 24.46 |
| 84) | T | Benzyl Chloride | | | 0.832 | 1.648 | 1.646 | 1.944 | 2.150 | 2.047 | 1.759 | 1.718 | 25.41 |
| 85) | T | 1,3-Dichlorobe... | 2.135 | 1.404 | 1.434 | 2.121 | 1.893 | 1.737 | 1.686 | 1.592 | 1.394 | 1.711 | 16.90 |
| 86) | T | 1,4-Dichlorobe... | 2.470 | 1.708 | 1.576 | 2.286 | 2.019 | 1.822 | 1.748 | 1.648 | 1.459 | 1.859 | 18.06 |
| 87) | T | sec-Butylbenzene | 5.738 | 3.684 | 3.565 | 4.961 | 4.230 | 3.809 | 3.494 | 3.197 | 2.642 | 3.924 | 23.87 |
| 88) | T | 4-Isopropyltol... | 5.367 | 3.436 | 3.351 | 4.788 | 4.074 | 3.658 | 3.303 | 2.883 | 2.254 | 3.679 | 25.81 |
| 89) | T | 1,2,3-Trimethy... | 4.236 | 2.781 | 2.628 | 3.624 | 3.173 | 2.831 | 2.590 | 2.310 | 1.878 | 2.895 | 24.32 |
| 90) | T | 1,2-Dichlorobe... | 2.282 | 1.431 | 1.398 | 2.088 | 1.819 | 1.681 | 1.602 | 1.466 | 1.215 | 1.665 | 20.77 |
| 91) | T | d-Limonene | 1.317 | 0.975 | 0.961 | 1.310 | 1.127 | 1.054 | 1.008 | 0.886 | 0.700 | 1.037 | 18.91 |
| 92) | T | 1,2-Dibromo-3-... | | | 0.358 | 0.657 | 0.597 | 0.606 | 0.627 | 0.610 | 0.576 | 0.576 | 17.24 |
| 93) | T | n-Undecane | 1.954 | 1.117 | 1.182 | 1.919 | 1.597 | 1.511 | 1.389 | 1.233 | 0.991 | 1.432 | 23.94 |
| 94) | T | 1,2,4-Trichlor... | 1.397 | 0.866 | 0.871 | 1.456 | 1.364 | 1.300 | 1.326 | 1.277 | 1.168 | 1.225 | 17.75 |

RS 3/30/18



ED_004220_00020298-00340

Method Path : I:\MS13\METHODS\
Method File : R13032918.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95) | T | Naphthalene | 4.185 | 2.499 | 2.222 | 4.225 | 4.039 | 3.894 | 3.824 | 3.412 | 2.742 | 3.449 | 22.32 |
| 96) | T | n-Dodecane | 1.336 | 0.832 | 0.807 | 1.376 | 1.260 | 1.254 | 1.257 | 1.083 | 0.849 | 1.117 | 20.60 |
| 97) | T | Hexachlorobuta... | 1.306 | 0.886 | 0.818 | 1.118 | 0.998 | 0.903 | 0.895 | 0.870 | 0.806 | 0.956 | 17.00 |
| 98) | T | Cyclohexanone | 0.943 | 0.582 | 0.673 | 1.084 | 1.017 | 0.959 | 0.910 | 0.867 | 0.780 | 0.868 | 18.75 |
| 99) | T | tert-Butylbenzene | 4.237 | 2.815 | 2.704 | 3.701 | 3.140 | 2.804 | 2.527 | 2.247 | 1.821 | 2.888 | 25.29 |
| 100) | T | n-Butylbenzene | 3.829 | 2.489 | 2.478 | 3.782 | 3.231 | 2.978 | 2.741 | 2.484 | 2.058 | 2.897 | 21.18 |

(#) = Out of Range



ED_004220_00020298-00341

RS 4/3/18

## Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S31-02281806
20ng/L Std. ID: S31-03271803
200ng/L Std. ID: S31-03201804

| Dilution Factors: | | 5 | 50 | 250 | 1000 | Working STD Conc.(ng/L): | 4 | 4 | 4 | 20 | 20 | 20 | 200 | 200 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Source Std. | Primary Working Standards | | | | Injection (L): | 0.020 | 0.025 | 0.050 | 0.020 | 0.050 | 0.25 | 0.125 | 0.25 | 0.50 |
| Compounds | mg/m$^3$ | 200ng/L | 20ng/L | 4ng/L | 1ng/L | ICAL Points: | 0.08ng | 0.1ng | 0.2ng | 0.4ng | 1ng | 5ng | 25ng | 50ng | 100ng |
| Propene | 1.037 | 207.4 | 20.74 | 4.148 | 1.037 | | 0.08296 | 0.1037 | 0.2074 | 0.4148 | 1.037 | 5.185 | 25.925 | 51.85 | 103.7 |
| Dichlorodifluoromethane | 1.048 | 209.6 | 20.96 | 4.192 | 1.048 | | 0.08384 | 0.1048 | 0.2096 | 0.4192 | 1.048 | 5.240 | 26.200 | 52.40 | 104.8 |
| Chloromethane | 1.006 | 201.2 | 20.12 | 4.024 | 1.006 | | 0.08048 | 0.1006 | 0.2012 | 0.4024 | 1.006 | 5.030 | 25.150 | 50.30 | 100.6 |
| Freon-114 | 1.021 | 204.2 | 20.42 | 4.084 | 1.021 | | 0.08168 | 0.1021 | 0.2042 | 0.4084 | 1.021 | 5.105 | 25.525 | 51.05 | 102.1 |
| Vinyl Chloride | 1.032 | 206.4 | 20.64 | 4.128 | 1.032 | | 0.08256 | 0.1032 | 0.2064 | 0.4128 | 1.032 | 5.160 | 25.800 | 51.60 | 103.2 |
| 1,3-Butadiene | 1.059 | 211.8 | 21.18 | 4.236 | 1.059 | | 0.08472 | 0.1059 | 0.2118 | 0.4236 | 1.059 | 5.295 | 26.475 | 52.95 | 105.9 |
| Bromomethane | 0.993 | 198.6 | 19.86 | 3.972 | 0.993 | | 0.07944 | 0.0993 | 0.1986 | 0.3972 | 0.993 | 4.965 | 24.825 | 49.65 | 99.3 |
| Chloroethane | 1.012 | 202.4 | 20.24 | 4.048 | 1.012 | | 0.08096 | 0.1012 | 0.2024 | 0.4048 | 1.012 | 5.060 | 25.300 | 50.60 | 101.2 |
| Ethanol | 5.271 | 1054.2 | 105.42 | 21.084 | 5.271 | | 0.42168 | 0.5271 | 1.0542 | 2.1084 | 5.271 | 26.355 | 131.775 | 263.55 | 527.1 |
| Acetonitrile | 1.059 | 211.8 | 21.18 | 4.236 | 1.059 | | 0.08472 | 0.1059 | 0.2118 | 0.4236 | 1.059 | 5.295 | 26.475 | 52.95 | 105.9 |
| Acrolein | 1.054 | 210.8 | 21.08 | 4.216 | 1.054 | | 0.08432 | 0.1054 | 0.2108 | 0.4216 | 1.054 | 5.270 | 26.350 | 52.70 | 105.4 |
| Acetone | 5.322 | 1064.4 | 106.44 | 21.288 | 5.322 | | 0.42576 | 0.5322 | 1.0644 | 2.1288 | 5.322 | 26.610 | 133.050 | 266.10 | 532.2 |
| Trichlorofluoromethane | 1.051 | 210.2 | 21.02 | 4.204 | 1.051 | | 0.08408 | 0.1051 | 0.2102 | 0.4204 | 1.051 | 5.255 | 26.275 | 52.55 | 105.1 |
| Isopropanol | 2.107 | 421.4 | 42.14 | 8.428 | 2.107 | | 0.16856 | 0.2107 | 0.4214 | 0.8428 | 2.107 | 10.535 | 52.675 | 105.35 | 210.7 |
| Acrylonitrile | 1.056 | 211.2 | 21.12 | 4.224 | 1.056 | | 0.08448 | 0.1056 | 0.2112 | 0.4224 | 1.056 | 5.280 | 26.400 | 52.80 | 105.6 |
| 1,1-Dichloroethene | 1.061 | 212.2 | 21.22 | 4.244 | 1.061 | | 0.08488 | 0.1061 | 0.2122 | 0.4244 | 1.061 | 5.305 | 26.525 | 53.05 | 106.1 |
| tert-Butanol | 2.120 | 424.0 | 42.40 | 8.480 | 2.120 | | 0.16960 | 0.2120 | 0.4240 | 0.8480 | 2.120 | 10.600 | 53.000 | 106.00 | 212.0 |
| Methylene Chloride | 1.058 | 211.6 | 21.16 | 4.232 | 1.058 | | 0.08464 | 0.1058 | 0.2116 | 0.4232 | 1.058 | 5.290 | 26.450 | 52.90 | 105.8 |
| Allyl Chloride | 1.054 | 210.8 | 21.08 | 4.216 | 1.054 | | 0.08432 | 0.1054 | 0.2108 | 0.4216 | 1.054 | 5.270 | 26.350 | 52.70 | 105.4 |
| Trichlorotrifluoroethane | 1.053 | 210.6 | 21.06 | 4.212 | 1.053 | | 0.08424 | 0.1053 | 0.2106 | 0.4212 | 1.053 | 5.265 | 26.325 | 52.65 | 105.3 |
| Carbon Disulfide | 1.063 | 212.6 | 21.26 | 4.252 | 1.063 | | 0.08504 | 0.1063 | 0.2126 | 0.4252 | 1.063 | 5.315 | 26.575 | 53.15 | 106.3 |
| trans-1,2-Dichloroethene | 1.081 | 216.2 | 21.62 | 4.324 | 1.081 | | 0.08648 | 0.1081 | 0.2162 | 0.4324 | 1.081 | 5.405 | 27.025 | 54.05 | 108.1 |
| 1,1-Dichloroethane | 1.022 | 204.4 | 20.44 | 4.088 | 1.022 | | 0.08176 | 0.1022 | 0.2044 | 0.4088 | 1.022 | 5.110 | 25.550 | 51.10 | 102.2 |
| Methyl tert-Butyl Ether | 1.070 | 214.0 | 21.40 | 4.280 | 1.070 | | 0.08560 | 0.1070 | 0.2140 | 0.4280 | 1.070 | 5.350 | 26.750 | 53.50 | 107.0 |
| Vinyl Acetate | 5.281 | 1056.2 | 105.62 | 21.124 | 5.281 | | 0.42248 | 0.5281 | 1.0562 | 2.1124 | 5.281 | 26.405 | 132.025 | 264.05 | 528.1 |
| 2-Butanone | 1.052 | 210.4 | 21.04 | 4.208 | 1.052 | | 0.08416 | 0.1052 | 0.2104 | 0.4208 | 1.052 | 5.260 | 26.300 | 52.60 | 105.2 |
| cis-1,2-Dichloroethene | 1.067 | 213.4 | 21.34 | 4.268 | 1.067 | | 0.08536 | 0.1067 | 0.2134 | 0.4268 | 1.067 | 5.335 | 26.675 | 53.35 | 106.7 |
| Diisopropyl Ether | 1.065 | 213.0 | 21.30 | 4.260 | 1.065 | | 0.08520 | 0.1065 | 0.2130 | 0.4260 | 1.065 | 5.325 | 26.625 | 53.25 | 106.5 |
| Ethyl Acetate | 2.136 | 427.2 | 42.72 | 8.544 | 2.136 | | 0.17088 | 0.2136 | 0.4272 | 0.8544 | 2.136 | 10.680 | 53.400 | 106.80 | 213.6 |
| n-Hexane | 1.066 | 213.2 | 21.32 | 4.264 | 1.066 | | 0.08528 | 0.1066 | 0.2132 | 0.4264 | 1.066 | 5.330 | 26.650 | 53.30 | 106.6 |
| Chloroform | 1.061 | 212.2 | 21.22 | 4.244 | 1.061 | | 0.08488 | 0.1061 | 0.2122 | 0.4244 | 1.061 | 5.305 | 26.525 | 53.05 | 106.1 |
| Tetrahydrofuran | 1.064 | 212.8 | 21.28 | 4.256 | 1.064 | | 0.08512 | 0.1064 | 0.2128 | 0.4256 | 1.064 | 5.320 | 26.600 | 53.20 | 106.4 |
| Ethyl tert-Butyl Ether | 1.059 | 211.8 | 21.18 | 4.236 | 1.059 | | 0.08472 | 0.1059 | 0.2118 | 0.4236 | 1.059 | 5.295 | 26.475 | 52.95 | 105.9 |
| 1,2-Dichloroethane | 1.055 | 211.0 | 21.10 | 4.220 | 1.055 | | 0.08440 | 0.1055 | 0.2110 | 0.4220 | 1.055 | 5.275 | 26.375 | 52.75 | 105.5 |
| 1,1,1-Trichloroethane | 1.077 | 215.4 | 21.54 | 4.308 | 1.077 | | 0.08616 | 0.1077 | 0.2154 | 0.4308 | 1.077 | 5.385 | 26.925 | 53.85 | 107.7 |
| Isopropyl Acetate | 2.113 | 422.6 | 42.26 | 8.452 | 2.113 | | 0.16904 | 0.2113 | 0.4226 | 0.8452 | 2.113 | 10.565 | 52.825 | 105.65 | 211.3 |
| 1-Butanol | 2.114 | 422.8 | 42.28 | 8.456 | 2.114 | | 0.16912 | 0.2114 | 0.4228 | 0.8456 | 2.114 | 10.570 | 52.850 | 105.70 | 211.4 |
| Benzene | 1.057 | 211.4 | 21.14 | 4.228 | 1.057 | | 0.08456 | 0.1057 | 0.2114 | 0.4228 | 1.057 | 5.285 | 26.425 | 52.85 | 105.7 |
| Carbon Tetrachloride | 1.060 | 212.0 | 21.20 | 4.240 | 1.060 | | 0.08480 | 0.1060 | 0.2120 | 0.4240 | 1.060 | 5.300 | 26.500 | 53.00 | 106.0 |
| Cyclohexane | 2.135 | 427.0 | 42.70 | 8.540 | 2.135 | | 0.17080 | 0.2135 | 0.4270 | 0.8540 | 2.135 | 10.675 | 53.375 | 106.75 | 213.5 |
| tert-Amyl Methyl Ether | 1.057 | 211.4 | 21.14 | 4.228 | 1.057 | | 0.08456 | 0.1057 | 0.2114 | 0.4228 | 1.057 | 5.285 | 26.425 | 52.85 | 105.7 |
| 1,2-Dichloropropane | 1.066 | 213.2 | 21.32 | 4.264 | 1.066 | | 0.08528 | 0.1066 | 0.2132 | 0.4264 | 1.066 | 5.330 | 26.650 | 53.30 | 106.6 |
| Bromodichloromethane | 1.067 | 213.4 | 21.34 | 4.268 | 1.067 | | 0.08536 | 0.1067 | 0.2134 | 0.4268 | 1.067 | 5.335 | 26.675 | 53.35 | 106.7 |
| Trichloroethene | 1.061 | 212.2 | 21.22 | 4.244 | 1.061 | | 0.08488 | 0.1061 | 0.2122 | 0.4244 | 1.061 | 5.305 | 26.525 | 53.05 | 106.1 |
| 1,4-Dioxane | 1.063 | 212.6 | 21.26 | 4.252 | 1.063 | | 0.08504 | 0.1063 | 0.2126 | 0.4252 | 1.063 | 5.315 | 26.575 | 53.15 | 106.3 |
| Isooctane | 1.060 | 212.0 | 21.20 | 4.240 | 1.060 | | 0.08480 | 0.1060 | 0.2120 | 0.4240 | 1.060 | 5.300 | 26.500 | 53.00 | 106.0 |
| Methyl Methacrylate | 2.112 | 422.4 | 42.24 | 8.448 | 2.112 | | 0.16896 | 0.2112 | 0.4224 | 0.8448 | 2.112 | 10.560 | 52.800 | 105.60 | 211.2 |
| n-Heptane | 1.065 | 213.0 | 21.30 | 4.260 | 1.065 | | 0.08520 | 0.1065 | 0.2130 | 0.4260 | 1.065 | 5.325 | 26.625 | 53.25 | 106.5 |

Q:\TO15 Std. Concentrations\MS13 Std. Conc\2018\R13032918\ICAL Conc. (Primary Source)

Date Updated: 08/29/17
Version: 0



ED_004220_00020298-00342

## Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S31-02281806
20ng/L Std. ID: S31-03271803
200ng/L Std. ID: S31-03201804

| Dilution Factors: | | 5 | 50 | 250 | 1000 | Working STD Conc.(ng/L): | 4 | 4 | 4 | 20 | 20 | 20 | 200 | 200 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Source Std. | Primary Working Standards | | | | Injection (L): | 0.020 | 0.025 | 0.050 | 0.020 | 0.050 | 0.25 | 0.125 | 0.25 | 0.50 |
| Compounds | mg/m$^3$ | 200ng/L | 20ng/L | 4ng/L | 1ng/L | ICAL Points: | 0.08ng | 0.1ng | 0.2ng | 0.4ng | 1ng | 5ng | 25ng | 50ng | 100ng |
| cis-1,3-Dichloropropene | 1.120 | 224.0 | 22.40 | 4.480 | 1.120 | | 0.08960 | 0.1120 | 0.2240 | 0.4480 | 1.120 | 5.600 | 28.000 | 56.00 | 112.0 |
| 4-Methyl-2-pentanone | 1.059 | 211.8 | 21.18 | 4.236 | 1.059 | | 0.08472 | 0.1059 | 0.2118 | 0.4236 | 1.059 | 5.295 | 26.475 | 52.95 | 105.9 |
| trans-1,3-Dichloropropene | 1.067 | 213.4 | 21.34 | 4.268 | 1.067 | | 0.08536 | 0.1067 | 0.2134 | 0.4268 | 1.067 | 5.335 | 26.675 | 53.35 | 106.7 |
| 1,1,2-Trichloroethane | 1.064 | 212.8 | 21.28 | 4.256 | 1.064 | | 0.08512 | 0.1064 | 0.2128 | 0.4256 | 1.064 | 5.320 | 26.600 | 53.20 | 106.4 |
| Toluene | 1.054 | 210.8 | 21.08 | 4.216 | 1.054 | | 0.08432 | 0.1054 | 0.2108 | 0.4216 | 1.054 | 5.270 | 26.350 | 52.70 | 105.4 |
| 2-Hexanone | 1.060 | 212.0 | 21.20 | 4.240 | 1.060 | | 0.08480 | 0.1060 | 0.2120 | 0.4240 | 1.060 | 5.300 | 26.500 | 53.00 | 106.0 |
| Dibromochloromethane | 1.061 | 212.2 | 21.22 | 4.244 | 1.061 | | 0.08488 | 0.1061 | 0.2122 | 0.4244 | 1.061 | 5.305 | 26.525 | 53.05 | 106.1 |
| 1,2-Dibromoethane | 1.064 | 212.8 | 21.28 | 4.256 | 1.064 | | 0.08512 | 0.1064 | 0.2128 | 0.4256 | 1.064 | 5.320 | 26.600 | 53.20 | 106.4 |
| n-Butyl Acetate | 1.068 | 213.6 | 21.36 | 4.272 | 1.068 | | 0.08544 | 0.1068 | 0.2136 | 0.4272 | 1.068 | 5.340 | 26.700 | 53.40 | 106.8 |
| n-Octane | 1.060 | 212.0 | 21.20 | 4.240 | 1.060 | | 0.08480 | 0.1060 | 0.2120 | 0.4240 | 1.060 | 5.300 | 26.500 | 53.00 | 106.0 |
| Tetrachloroethene | 1.063 | 212.6 | 21.26 | 4.252 | 1.063 | | 0.08504 | 0.1063 | 0.2126 | 0.4252 | 1.063 | 5.315 | 26.575 | 53.15 | 106.3 |
| Chlorobenzene | 1.066 | 213.2 | 21.32 | 4.264 | 1.066 | | 0.08528 | 0.1066 | 0.2132 | 0.4264 | 1.066 | 5.330 | 26.650 | 53.30 | 106.6 |
| Ethylbenzene | 1.052 | 210.4 | 21.04 | 4.208 | 1.052 | | 0.08416 | 0.1052 | 0.2104 | 0.4208 | 1.052 | 5.260 | 26.300 | 52.60 | 105.2 |
| m-&p-Xylene | 2.123 | 424.6 | 42.46 | 8.492 | 2.123 | | 0.16984 | 0.2123 | 0.4246 | 0.8492 | 2.123 | 10.615 | 53.075 | 106.15 | 212.3 |
| Bromoform | 1.063 | 212.6 | 21.26 | 4.252 | 1.063 | | 0.08504 | 0.1063 | 0.2126 | 0.4252 | 1.063 | 5.315 | 26.575 | 53.15 | 106.3 |
| Styrene | 1.058 | 211.6 | 21.16 | 4.232 | 1.058 | | 0.08464 | 0.1058 | 0.2116 | 0.4232 | 1.058 | 5.290 | 26.450 | 52.90 | 105.8 |
| o-Xylene | 1.055 | 211.0 | 21.10 | 4.220 | 1.055 | | 0.08440 | 0.1055 | 0.2110 | 0.4220 | 1.055 | 5.275 | 26.375 | 52.75 | 105.5 |
| n-Nonane | 1.054 | 210.8 | 21.08 | 4.216 | 1.054 | | 0.08432 | 0.1054 | 0.2108 | 0.4216 | 1.054 | 5.270 | 26.350 | 52.70 | 105.4 |
| 1,1,2,2-Tetrachloroethane | 1.057 | 211.4 | 21.14 | 4.228 | 1.057 | | 0.08456 | 0.1057 | 0.2114 | 0.4228 | 1.057 | 5.285 | 26.425 | 52.85 | 105.7 |
| Cumene | 1.052 | 210.4 | 21.04 | 4.208 | 1.052 | | 0.08416 | 0.1052 | 0.2104 | 0.4208 | 1.052 | 5.260 | 26.300 | 52.60 | 105.2 |
| alpha-Pinene | 1.046 | 209.2 | 20.92 | 4.184 | 1.046 | | 0.08368 | 0.1046 | 0.2092 | 0.4184 | 1.046 | 5.230 | 26.150 | 52.30 | 104.6 |
| n-Propylbenzene | 1.064 | 212.8 | 21.28 | 4.256 | 1.064 | | 0.08512 | 0.1064 | 0.2128 | 0.4256 | 1.064 | 5.320 | 26.600 | 53.20 | 106.4 |
| 3-Ethyltoluene | 1.050 | 210.0 | 21.00 | 4.200 | 1.050 | | 0.08400 | 0.1050 | 0.2100 | 0.4200 | 1.050 | 5.250 | 26.250 | 52.50 | 105.0 |
| 4-Ethyltoluene | 1.049 | 209.8 | 20.98 | 4.196 | 1.049 | | 0.08392 | 0.1049 | 0.2098 | 0.4196 | 1.049 | 5.245 | 26.225 | 52.45 | 104.9 |
| 1,3,5-Trimethylbenzene | 1.049 | 209.8 | 20.98 | 4.196 | 1.049 | | 0.08392 | 0.1049 | 0.2098 | 0.4196 | 1.049 | 5.245 | 26.225 | 52.45 | 104.9 |
| alpha-Methylstyrene | 1.049 | 209.8 | 20.98 | 4.196 | 1.049 | | 0.08392 | 0.1049 | 0.2098 | 0.4196 | 1.049 | 5.245 | 26.225 | 52.45 | 104.9 |
| 2-Ethyltoluene | 1.060 | 212.0 | 21.20 | 4.240 | 1.060 | | 0.08480 | 0.1060 | 0.2120 | 0.4240 | 1.060 | 5.300 | 26.500 | 53.00 | 106.0 |
| 1,2,4-Trimethylbenzene | 1.051 | 210.2 | 21.02 | 4.204 | 1.051 | | 0.08408 | 0.1051 | 0.2102 | 0.4204 | 1.051 | 5.255 | 26.275 | 52.55 | 105.1 |
| n-Decane | 1.059 | 211.8 | 21.18 | 4.236 | 1.059 | | 0.08472 | 0.1059 | 0.2118 | 0.4236 | 1.059 | 5.295 | 26.475 | 52.95 | 105.9 |
| Benzyl Chloride | 1.074 | 214.8 | 21.48 | 4.296 | 1.074 | | 0.08592 | 0.1074 | 0.2148 | 0.4296 | 1.074 | 5.370 | 26.850 | 53.70 | 107.4 |
| 1,3-Dichlorobenzene | 1.071 | 214.2 | 21.42 | 4.284 | 1.071 | | 0.08568 | 0.1071 | 0.2142 | 0.4284 | 1.071 | 5.355 | 26.775 | 53.55 | 107.1 |
| 1,4-Dichlorobenzene | 1.064 | 212.8 | 21.28 | 4.256 | 1.064 | | 0.08512 | 0.1064 | 0.2128 | 0.4256 | 1.064 | 5.320 | 26.600 | 53.20 | 106.4 |
| sec-Butylbenzene | 1.055 | 211.0 | 21.10 | 4.220 | 1.055 | | 0.08440 | 0.1055 | 0.2110 | 0.4220 | 1.055 | 5.275 | 26.375 | 52.75 | 105.5 |
| p-Isopropyltoluene | 1.026 | 205.2 | 20.52 | 4.104 | 1.026 | | 0.08208 | 0.1026 | 0.2052 | 0.4104 | 1.026 | 5.130 | 25.650 | 51.30 | 102.6 |
| 1,2,3-Trimethylbenzene | 1.026 | 205.2 | 20.52 | 4.104 | 1.026 | | 0.08208 | 0.1026 | 0.2052 | 0.4104 | 1.026 | 5.130 | 25.650 | 51.30 | 102.6 |
| 1,2-Dichlorobenzene | 1.083 | 216.6 | 21.66 | 4.332 | 1.083 | | 0.08664 | 0.1083 | 0.2166 | 0.4332 | 1.083 | 5.415 | 27.075 | 54.15 | 108.3 |
| d-Limonene | 1.005 | 201.0 | 20.10 | 4.020 | 1.005 | | 0.08040 | 0.1005 | 0.2010 | 0.4020 | 1.005 | 5.025 | 25.125 | 50.25 | 100.5 |
| 1,2-Dibromo-3-chloropropane | 1.051 | 210.2 | 21.02 | 4.204 | 1.051 | | 0.08408 | 0.1051 | 0.2102 | 0.4204 | 1.051 | 5.255 | 26.275 | 52.55 | 105.1 |
| n-Undecane | 1.053 | 210.6 | 21.06 | 4.212 | 1.053 | | 0.08424 | 0.1053 | 0.2106 | 0.4212 | 1.053 | 5.265 | 26.325 | 52.65 | 105.3 |
| 1,2,4-Trichlorobenzene | 1.097 | 219.4 | 21.94 | 4.388 | 1.097 | | 0.08776 | 0.1097 | 0.2194 | 0.4388 | 1.097 | 5.485 | 27.425 | 54.85 | 109.7 |
| Naphthalene | 1.056 | 211.2 | 21.12 | 4.224 | 1.056 | | 0.08448 | 0.1056 | 0.2112 | 0.4224 | 1.056 | 5.280 | 26.400 | 52.80 | 105.6 |
| n-Dodecane | 1.056 | 211.2 | 21.12 | 4.224 | 1.056 | | 0.08448 | 0.1056 | 0.2112 | 0.4224 | 1.056 | 5.280 | 26.400 | 52.80 | 105.6 |
| Hexachloro-1,3-butadiene | 1.057 | 211.4 | 21.14 | 4.228 | 1.057 | | 0.08456 | 0.1057 | 0.2114 | 0.4228 | 1.057 | 5.285 | 26.425 | 52.85 | 105.7 |
| Methacrylonitrile | 1.067 | 213.4 | 21.34 | 4.268 | 1.067 | | 0.08536 | 0.1067 | 0.2134 | 0.4268 | 1.067 | 5.335 | 26.675 | 53.35 | 106.7 |
| Cyclohexanone | 1.039 | 207.8 | 20.78 | 4.156 | 1.039 | | 0.08312 | 0.1039 | 0.2078 | 0.4156 | 1.039 | 5.195 | 25.975 | 51.95 | 103.9 |
| tert-Butylbenzene | 1.050 | 210.0 | 21.00 | 4.200 | 1.050 | | 0.08400 | 0.1050 | 0.2100 | 0.4200 | 1.050 | 5.250 | 26.250 | 52.50 | 105.0 |
| n-Butylbenzene | 1.054 | 210.8 | 21.08 | 4.216 | 1.054 | | 0.08432 | 0.1054 | 0.2108 | 0.4216 | 1.054 | 5.270 | 26.350 | 52.70 | 105.4 |



ED_004220_00020298-00343

Calibration Status Report MS13

Method : I:\MS13\METHODS\R13032918.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration

| # | ID | Conc | ISTD Conc | Path\File |
|---|---|---|---|---|
| 1 | 0.08 | 0 | 13 | I:\MS13\DATA\2018_03\29\03291803.D |
| 2 | 0.10 | 0 | 13 | I:\MS13\DATA\2018_03\29\03291804.D |
| 3 | 0.20 | 0 | 13 | I:\MS13\DATA\2018_03\29\03291805.D |
| 4 | 0.40 | 0 | 13 | I:\MS13\DATA\2018_03\29\03291806.D |
| 5 | 1.0 | 1 | 13 | I:\MS13\DATA\2018_03\29\03291807.D |
| 6 | 5.0 | 5 | 13 | I:\MS13\DATA\2018_03\29\03291808.D |
| 7 | 25 | 26 | 13 | I:\MS13\DATA\2018_03\29\03291809.D |
| 8 | 50 | 52 | 13 | I:\MS13\DATA\2018_03\29\03291810.D |
| 9 | 100 | 104 | 13 | I:\MS13\DATA\2018_03\29\03291811.D |

RS 3/30/18

| # | ID | Update Time | Quant Time | Acquisition Time |
|---|---|---|---|---|
| 1 | 0.08 | Mar 30 08:57 2018 | Mar 30 08:53 2018 | 29 Mar 2018 16:40 |
| 2 | 0.10 | Mar 30 08:57 2018 | Mar 30 08:53 2018 | 29 Mar 2018 17:13 |
| 3 | 0.20 | Mar 30 08:57 2018 | Mar 30 08:54 2018 | 29 Mar 2018 17:47 |
| 4 | 0.40 | Mar 30 08:57 2018 | Mar 30 08:47 2018 | 29 Mar 2018 18:21 |
| 5 | 1.0 | Mar 30 08:57 2018 | Mar 30 08:47 2018 | 29 Mar 2018 18:55 |
| 6 | 5.0 | Mar 30 08:57 2018 | Mar 30 08:47 2018 | 29 Mar 2018 19:28 |
| 7 | 25 | Mar 30 08:58 2018 | Mar 30 08:47 2018 | 29 Mar 2018 20:02 |
| 8 | 50 | Mar 30 08:58 2018 | Mar 30 08:47 2018 | 29 Mar 2018 20:36 |
| 9 | 100 | Mar 30 08:58 2018 | Mar 30 08:47 2018 | 29 Mar 2018 21:10 |

R13032918.M Fri Mar 30 09:10:35 2018

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291803.D Vial: 8
Acq On : 29 Mar 2018 16:40 Operator: RS
Sample : 0.08ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M RS 3/30/18
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 108753 | 12.500 | ng | | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 546845 | 12.500 | ng | | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 185111 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 124476 | 9.162 | ng | | -0.02 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 73.28% | | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 512037 | 13.731 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.84% | | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 145647 | 12.460 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 99.68% | | | | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.41 | 42 | 1288 | 0.093 | ng | | 89 |
| 3) Dichlorodifluoromethan... | 4.55 | 85 | 2158 | 0.085 | ng | # | 88 |
| 4) Chloromethane | 4.83 | 50 | 1612 | 0.078 | ng | | 89 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.06 | 135 | 1290 | 0.092 | ng | | 95 |
| 6) Vinyl Chloride | 5.22 | 62 | 1541 | 0.071 | ng | | 85 |
| 7) 1,3-Butadiene | 5.47 | 54 | 969 | 0.060 | ng | | 95 |
| 8) Bromomethane | 5.88 | 94 | 1079 | 0.090 | ng | | 97 |
| 9) Chloroethane | 0.00 | 64 | 0 | N.D. | d | | |
| 10) Ethanol | 6.56 | 45 | 3206 | 0.358 | ng | # | 65 |
| 11) Acetonitrile | 0.00 | 41 | 0 | N.D. | d | | |
| 12) Acrolein | 0.00 | 56 | 0 | N.D. | | | |
| 13) Acetone | 7.20 | 58 | 4551 | 0.429 | ng | | 98 |
| 14) Trichlorofluoromethane | 7.39 | 101 | 1872 | 0.086 | ng | | 96 |
| 15) 2-Propanol (Isopropanol) | 7.72 | 45 | 4387 | 0.140 | ng | | 78 |
| 16) Acrylonitrile | 0.00 | 53 | 0 | N.D. | | | |
| 17) 1,1-Dichloroethene | 8.31 | 96 | 1191 | 0.095 | ng | | 98 |
| 18) 2-Methyl-2-Propanol (t... | 8.56 | 59 | 4816 | 0.160 | ng | # | 80 |
| 19) Methylene Chloride | 0.00 | 84 | 0 | N.D. | d | | |
| 20) 3-Chloro-1-propene (Al... | 0.00 | 41 | 0 | N.D. | d | | |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 1278 | 0.111 | ng | | 97 |
| 22) Carbon Disulfide | 0.00 | 76 | 0 | N.D. | d | | |
| 23) trans-1,2-Dichloroethene | 9.75 | 61 | 1034 | 0.062 | ng | | 93 |
| 24) 1,1-Dichloroethane | 9.98 | 63 | 1887 | 0.081 | ng | | 85 |
| 25) Methyl tert-Butyl Ether | 10.16 | 73 | 3337 | 0.088 | ng | | 83 |
| 26) Vinyl Acetate | 0.00 | 86 | 0 | N.D. | | | |
| 27) 2-Butanone (MEK) | 0.00 | 72 | 0 | N.D. | | | |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 1408 | 0.082 | ng | | 93 |
| 29) Diisopropyl Ether | 11.30 | 87 | 1058 | 0.093 | ng | # | 1 |
| 30) Ethyl Acetate | 0.00 | 61 | 0 | N.D. | | | |
| 31) n-Hexane | 0.00 | 57 | 0 | N.D. | d | | |
| 32) Chloroform | 11.30 | 83 | 1899 | 0.087 | ng | | 94 |
| 34) Tetrahydrofuran (THF) | 11.80 | 72 | 899 | 0.112 | ng | # | 86 |
| 35) Ethyl tert-Butyl Ether | 11.88 | 87 | 1244 | 0.086 | ng | | 91 |
| 36) 1,2-Dichloroethane | 0.00 | 62 | 0 | N.D. | d | | |
| 38) 1,1,1-Trichloroethane | 12.37 | 97 | 1700 | 0.093 | ng | | 94 |
| 39) Isopropyl Acetate | 12.82 | 61 | 1212 | 0.147 | ng | # | 78 |
| 40) 1-Butanol | 0.00 | 56 | 0 | N.D. | | | |
| 41) Benzene | 12.83 | 78 | 5992 | 0.115 | ng | | 94 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 1381 | 0.088 | ng | | 94 |
| 43) Cyclohexane | 13.12 | 84 | 4147 | 0.195 | ng | | 90 |
| 44) tert-Amyl Methyl Ether | 13.50 | 73 | 3292 | 0.092 | ng | | 94 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 1138 | 0.090 | ng | | 89 |
| 46) Bromodichloromethane | 0.00 | 83 | 0 | N.D. | d | | |
| 47) Trichloroethene | 13.92 | 130 | 1445 | 0.105 | ng | | 97 |
| 48) 1,4-Dioxane | 0.00 | 88 | 0 | N.D. | d | | |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 5734 | 0.099 | ng | | 95 |
| 50) Methyl Methacrylate | 14.16 | 100 | 125 | 0.029 | ng | # | 1 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291803.D Vial: 8
Acq On : 29 Mar 2018 16:40 Operator: RS
Sample : 0.08ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

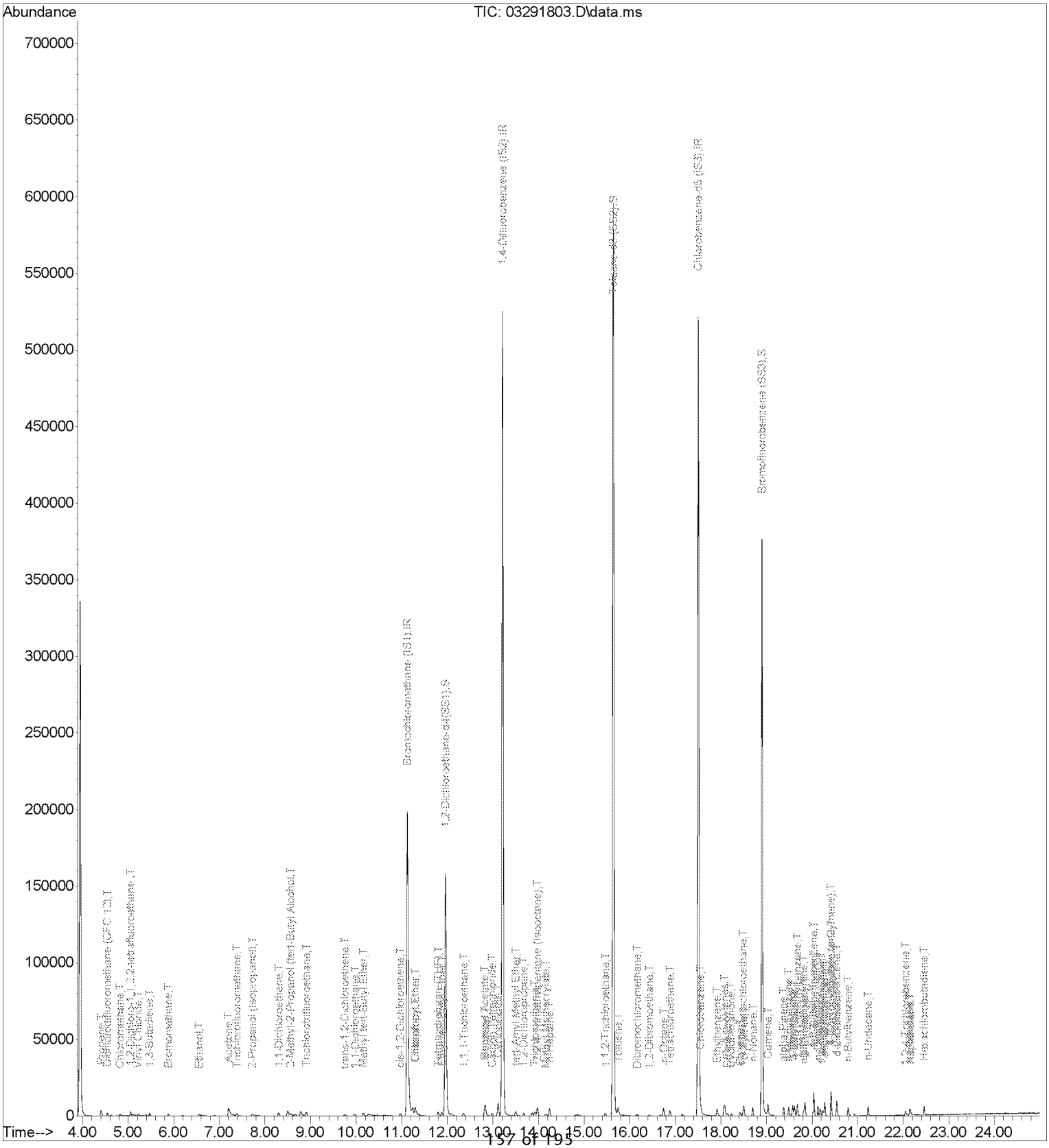
| Internal Standards | R.T. | QIon | Response | Conc Units | | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 1265 | 0.088 ng | | 97 |
| 52) cis-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. d | | |
| 53) 4-Methyl-2-pentanone | 0.00 | 58 | 0 | N.D. d | | |
| 54) trans-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | | |
| 55) 1,1,2-Trichloroethane | 15.47 | 97 | 937 | 0.081 ng | | 98 |
| 58) Toluene | 15.75 | 91 | 5641 | 0.127 ng | | 99 |
| 59) 2-Hexanone | 0.00 | 43 | 0 | N.D. d | | |
| 60) Dibromochloromethane | 16.17 | 129 | 1166 | 0.110 ng | | 90 |
| 61) 1,2-Dibromoethane | 16.44 | 107 | 774 | 0.078 ng | | 90 |
| 62) n-Butyl Acetate | 0.00 | 43 | 0 | N.D. d | | |
| 63) n-Octane | 16.75 | 57 | 1101 | 0.106 ng | | 88 |
| 64) Tetrachloroethene | 16.89 | 166 | 1750 | 0.144 ng | | 97 |
| 65) Chlorobenzene | 17.55 | 112 | 3797 | 0.130 ng | | 98 |
| 66) Ethylbenzene | 17.92 | 91 | 5896 | 0.119 ng | | 95 |
| 67) m- & p-Xylenes | 18.09 | 91 | 9694 | 0.248 ng | | 98 |
| 68) Bromoform | 18.15 | 173 | 967 | 0.112 ng | | 87 |
| 69) Styrene | 18.42 | 104 | 3015 | 0.109 ng | | 84 |
| 70) o-Xylene | 18.51 | 91 | 4777 | 0.121 ng | | 95 |
| 71) n-Nonane | 18.71 | 43 | 2255 | 0.091 ng | | 98 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 1957 | 0.111 ng | | 92 |
| 74) Cumene | 19.04 | 105 | 6168 | 0.112 ng | | 96 |
| 75) alpha-Pinene | 19.38 | 93 | 2904 | 0.118 ng | | 93 |
| 76) n-Propylbenzene | 19.49 | 91 | 6920 | 0.107 ng | | 94 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 6068 | 0.111 ng | | 99 |
| 78) 4-Ethyltoluene | 19.62 | 105 | 5806 | 0.127 ng | | 97 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 5602 | 0.121 ng | | 95 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 2071 | 0.106 ng | | 94 |
| 81) 2-Ethyltoluene | 19.85 | 105 | 6346 | 0.130 ng | | 94 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 5102 | 0.126 ng | | 97 |
| 83) n-Decane | 20.13 | 57 | 2639 | 0.103 ng | | 90 |
| 84) Benzyl Chloride | 0.00 | 91 | 0 | N.D. d | | |
| 85) 1,3-Dichlorobenzene | 20.19 | 146 | 2709 | 0.115 ng | | 95 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 3113 | 0.128 ng | | 98 |
| 87) sec-Butylbenzene | 20.28 | 105 | 7172 | 0.131 ng | | 95 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 6524 | 0.120 ng | | 98 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 5149 | 0.116 ng | | 94 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 2928 | 0.131 ng | | 100 |
| 91) d-Limonene | 20.55 | 68 | 1568 | 0.100 ng | | 99 |
| 92) 1,2-Dibromo-3-Chloropr... | 0.00 | 157 | 0 | N.D. d | | |
| 93) n-Undecane | 21.23 | 57 | 2437 | 0.098 ng | | 89 |
| 94) 1,2,4-Trichlorobenzene | 22.05 | 180 | 1815 | 0.121 ng | # | 95 |
| 95) Naphthalene | 22.16 | 128 | 5236 | 0.111 ng | | 76 |
| 96) n-Dodecane | 22.14 | 57 | 1671 | 0.082 ng | | 87 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 1636 | 0.144 ng | | 98 |
| 98) Cyclohexanone | 18.23 | 55 | 1161 | 0.077 ng | # | 83 |
| 99) tert-Butylbenzene | 20.04 | 119 | 5270 | 0.135 ng | | 98 |
| 100) n-Butylbenzene | 20.79 | 91 | 4781 | 0.111 ng | | 96 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291803.D Vial: 8
Acq On : 29 Mar 2018 16:40 Operator: RS
Sample : 0.08ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291804.D Vial: 8
Acq On : 29 Mar 2018 17:13 Operator: RS
Sample : 0.10ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:17 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

RS 3/30/18

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 108113 | 12.500 | ng | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 544215 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 187001 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 124483 | 9.217 | ng | -0.02 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 73.76% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 514409 | 13.656 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.28% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 145567 | 12.327 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 98.64% | | | | | | |

| Target Compounds | | | | | | Qvalue |
|---|---|---|---|---|---|---|
| 2) Propene | 4.40 | 42 | 1016 | 0.074 | ng # | 83 |
| 3) Dichlorodifluoromethan... | 4.55 | 85 | 1916 | 0.076 | ng # | 88 |
| 4) Chloromethane | 4.82 | 50 | 1310 | 0.064 | ng | 74 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.06 | 135 | 1158 | 0.083 | ng | 81 |
| 6) Vinyl Chloride | 5.22 | 62 | 1272 | 0.059 | ng | 73 |
| 7) 1,3-Butadiene | 5.47 | 54 | 789 | 0.049 | ng | 91 |
| 8) Bromomethane | 5.88 | 94 | 889 | 0.075 | ng | 95 |
| 9) Chloroethane | 0.00 | 64 | 0 | N.D. | d | |
| 10) Ethanol | 6.57 | 45 | 2423 | 0.272 | ng # | 56 |
| 11) Acetonitrile | 0.00 | 41 | 0 | N.D. | | |
| 12) Acrolein | 0.00 | 56 | 0 | N.D. | | |
| 13) Acetone | 7.21 | 58 | 3647 | 0.346 | ng | 97 |
| 14) Trichlorofluoromethane | 7.39 | 101 | 1542 | 0.071 | ng | 96 |
| 15) 2-Propanol (Isopropanol) | 7.75 | 45 | 3805 | 0.122 | ng | 70 |
| 16) Acrylonitrile | 0.00 | 53 | 0 | N.D. | | |
| 17) 1,1-Dichloroethene | 8.31 | 96 | 950 | 0.076 | ng | 97 |
| 18) 2-Methyl-2-Propanol (t... | 8.57 | 59 | 4236 | 0.142 | ng # | 78 |
| 19) Methylene Chloride | 0.00 | 84 | 0 | N.D. | d | |
| 20) 3-Chloro-1-propene (Al... | 0.00 | 41 | 0 | N.D. | d | |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 1039 | 0.091 | ng | 91 |
| 22) Carbon Disulfide | 0.00 | 76 | 0 | N.D. | d | |
| 23) trans-1,2-Dichloroethene | 9.75 | 61 | 637 | 0.039 | ng | 85 |
| 24) 1,1-Dichloroethane | 9.97 | 63 | 1594 | 0.069 | ng | 84 |
| 25) Methyl tert-Butyl Ether | 10.16 | 73 | 2881 | 0.077 | ng | 87 |
| 26) Vinyl Acetate | 0.00 | 86 | 0 | N.D. | | |
| 27) 2-Butanone (MEK) | 0.00 | 72 | 0 | N.D. | | |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 1037 | 0.061 | ng | 90 |
| 29) Diisopropyl Ether | 11.30 | 87 | 762 | 0.067 | ng # | 1 |
| 30) Ethyl Acetate | 0.00 | 61 | 0 | N.D. | | |
| 31) n-Hexane | 11.25 | 57 | 1797 | 0.075 | ng # | 86 |
| 32) Chloroform | 11.29 | 83 | 1550 | 0.071 | ng | 100 |
| 34) Tetrahydrofuran (THF) | 11.80 | 72 | 728 | 0.091 | ng # | 84 |
| 35) Ethyl tert-Butyl Ether | 11.88 | 87 | 1011 | 0.070 | ng # | 80 |
| 36) 1,2-Dichloroethane | 0.00 | 62 | 0 | N.D. | d | |
| 38) 1,1,1-Trichloroethane | 12.35 | 97 | 1403 | 0.077 | ng | 91 |
| 39) Isopropyl Acetate | 12.82 | 61 | 1093 | 0.133 | ng | 95 |
| 40) 1-Butanol | 0.00 | 56 | 0 | N.D. | | |
| 41) Benzene | 12.84 | 78 | 4957 | 0.096 | ng | 92 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 1297 | 0.083 | ng | 91 |
| 43) Cyclohexane | 13.12 | 84 | 3595 | 0.170 | ng | 89 |
| 44) tert-Amyl Methyl Ether | 13.50 | 73 | 2764 | 0.077 | ng | 93 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 962 | 0.076 | ng | 85 |
| 46) Bromodichloromethane | 13.87 | 83 | 2281 | 0.145 | ng | 97 |
| 47) Trichloroethene | 13.91 | 130 | 1246 | 0.091 | ng | 93 |
| 48) 1,4-Dioxane | 0.00 | 88 | 0 | N.D. | d | |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 4901 | 0.085 | ng | 94 |
| 50) Methyl Methacrylate | 0.00 | 100 | 0 | N.D. | d | |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291804.D Vial: 8
Acq On : 29 Mar 2018 17:13 Operator: RS
Sample : 0.10ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:17 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

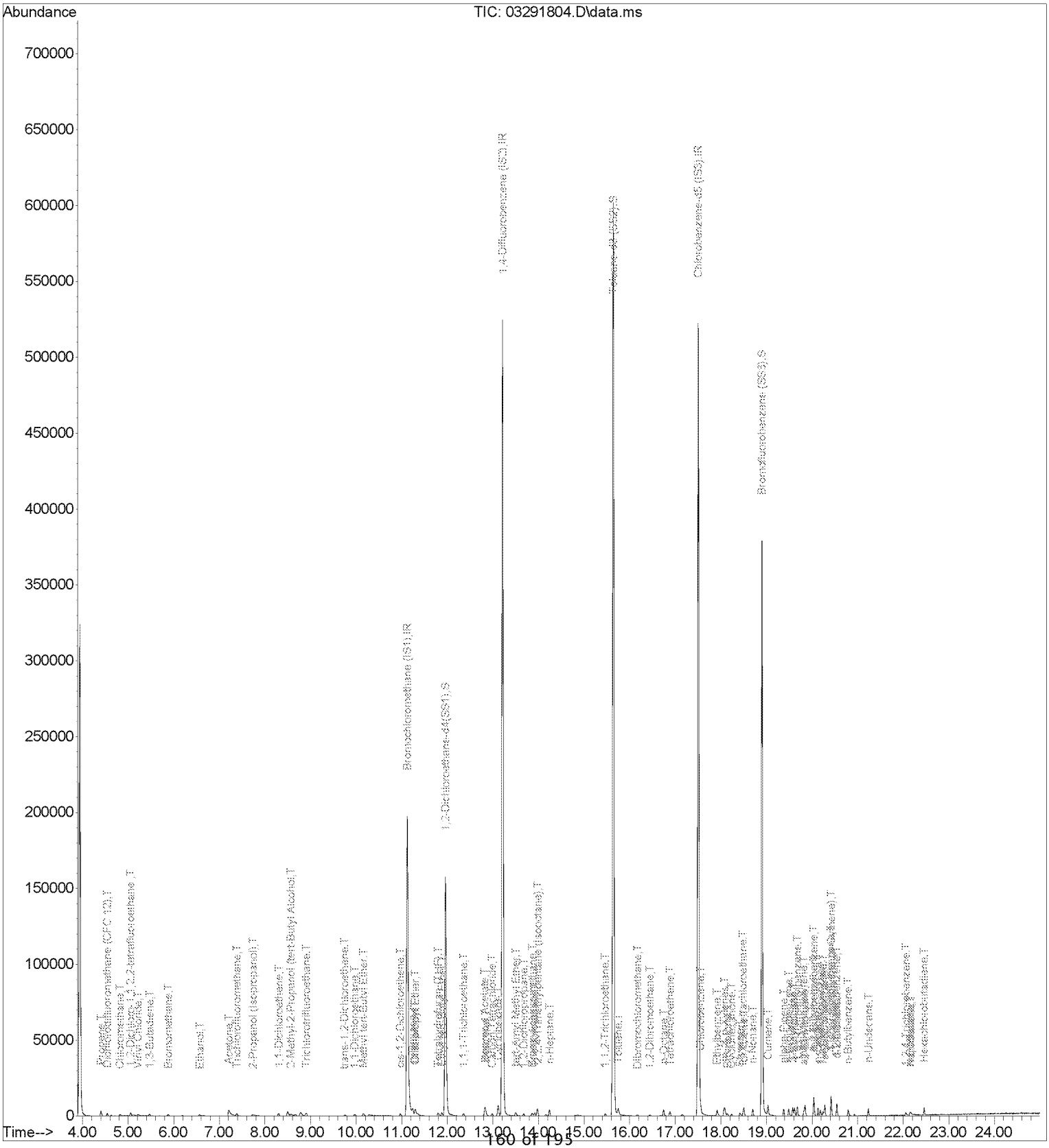
| Internal Standards | R.T. | QIon | Response | Conc Units | | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 981 | 0.068 ng | | 92 |
| 52) cis-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. d | | |
| 53) 4-Methyl-2-pentanone | 0.00 | 58 | 0 | N.D. d | | |
| 54) trans-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. | | |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 859 | 0.074 ng | | 88 |
| 58) Toluene | 15.75 | 91 | 4982 | 0.111 ng | | 94 |
| 59) 2-Hexanone | 0.00 | 43 | 0 | N.D. | | |
| 60) Dibromochloromethane | 16.17 | 129 | 886 | 0.083 ng | | 86 |
| 61) 1,2-Dibromoethane | 16.44 | 107 | 496 | 0.049 ng | | 97 |
| 62) n-Butyl Acetate | 0.00 | 43 | 0 | N.D. d | | |
| 63) n-Octane | 16.75 | 57 | 878 | 0.084 ng | | 93 |
| 64) Tetrachloroethene | 16.89 | 166 | 1363 | 0.111 ng | | 98 |
| 65) Chlorobenzene | 17.55 | 112 | 3275 | 0.111 ng | | 92 |
| 66) Ethylbenzene | 17.92 | 91 | 4759 | 0.095 ng | | 97 |
| 67) m- & p-Xylenes | 18.09 | 91 | 8134 | 0.206 ng | | 96 |
| 68) Bromoform | 18.15 | 173 | 808 | 0.092 ng | | 81 |
| 69) Styrene | 18.42 | 104 | 2703 | 0.097 ng | | 80 |
| 70) o-Xylene | 18.51 | 91 | 3834 | 0.096 ng | | 99 |
| 71) n-Nonane | 18.70 | 43 | 2042 | 0.082 ng | | 91 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 1520 | 0.085 ng | | 96 |
| 74) Cumene | 19.04 | 105 | 5332 | 0.096 ng | | 96 |
| 75) alpha-Pinene | 19.38 | 93 | 2574 | 0.104 ng | | 95 |
| 76) n-Propylbenzene | 19.49 | 91 | 5920 | 0.091 ng | | 90 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 5047 | 0.091 ng | | 97 |
| 78) 4-Ethyltoluene | 19.62 | 105 | 4728 | 0.102 ng | | 99 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 4918 | 0.105 ng | | 92 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 1827 | 0.092 ng | | 96 |
| 81) 2-Ethyltoluene | 19.85 | 105 | 5281 | 0.107 ng | | 96 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 4218 | 0.104 ng | | 95 |
| 83) n-Decane | 20.13 | 57 | 2121 | 0.082 ng | | 88 |
| 84) Benzyl Chloride | 0.00 | 91 | 0 | N.D. d | | |
| 85) 1,3-Dichlorobenzene | 20.19 | 146 | 2249 | 0.095 ng | | 99 |
| 86) 1,4-Dichlorobenzene | 20.25 | 146 | 2718 | 0.110 ng | | 93 |
| 87) sec-Butylbenzene | 20.28 | 105 | 5815 | 0.105 ng | | 96 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 5274 | 0.096 ng | | 97 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 4269 | 0.095 ng | | 98 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 2318 | 0.103 ng | | 95 |
| 91) d-Limonene | 20.55 | 68 | 1466 | 0.093 ng | | 98 |
| 92) 1,2-Dibromo-3-Chloropr... | 0.00 | 157 | 0 | N.D. d | | |
| 93) n-Undecane | 21.24 | 57 | 1759 | 0.070 ng | | 99 |
| 94) 1,2,4-Trichlorobenzene | 22.06 | 180 | 1421 | 0.093 ng | # | 87 |
| 95) Naphthalene | 22.17 | 128 | 3948 | 0.083 ng | # | 71 |
| 96) n-Dodecane | 22.15 | 57 | 1315 | 0.064 ng | # | 71 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 1401 | 0.122 ng | | 97 |
| 98) Cyclohexanone | 18.23 | 55 | 904 | 0.060 ng | # | 85 |
| 99) tert-Butylbenzene | 20.04 | 119 | 4422 | 0.112 ng | | 96 |
| 100) n-Butylbenzene | 20.79 | 91 | 3925 | 0.091 ng | # | 89 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291804.D Vial: 8
Acq On : 29 Mar 2018 17:13 Operator: RS
Sample : 0.10ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:53:17 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M






R13032918.M Fri Mar 30 09:29:41 2018 Page: 3

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291805.D Vial: 8
Acq On : 29 Mar 2018 17:47 Operator: RS
Sample : 0.20ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

RS 3/30/18

Quant Time: Mar 30 08:54:42 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | Qion | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 108559 | 12.500 | ng | | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 549176 | 12.500 | ng | | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 186972 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 125570 | 9.259 | ng | | -0.02 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 74.08% | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 516313 | 13.708 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 109.68% | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 143857 | 12.184 | ng | | 0.00 |
| Spiked Amount 12.500 | Range 70 - 130 | | Recovery = 97.44% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.40 | 42 | 2132 | 0.154 | ng | | 96 |
| 3) Dichlorodifluoromethan... | 4.54 | 85 | 3604 | 0.142 | ng | # | 92 |
| 4) Chloromethane | 4.81 | 50 | 2585 | 0.125 | ng | | 91 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.05 | 135 | 2213 | 0.158 | ng | | 92 |
| 6) Vinyl Chloride | 5.21 | 62 | 2522 | 0.116 | ng | | 93 |
| 7) 1,3-Butadiene | 5.46 | 54 | 1596 | 0.099 | ng | | 95 |
| 8) Bromomethane | 5.87 | 94 | 1730 | 0.145 | ng | | 98 |
| 9) Chloroethane | 6.18 | 64 | 1283 | 0.130 | ng | | 87 |
| 10) Ethanol | 6.53 | 45 | 5654 | 0.633 | ng | | 78 |
| 11) Acetonitrile | 6.83 | 41 | 1722 | 0.085 | ng | | 99 |
| 12) Acrolein | 0.00 | 56 | 0 | N.D. | d | | |
| 13) Acetone | 7.19 | 58 | 7100 | 0.671 | ng | | 90 |
| 14) Trichlorofluoromethane | 7.38 | 101 | 3109 | 0.142 | ng | | 99 |
| 15) 2-Propanol (Isopropanol) | 7.69 | 45 | 8156 | 0.260 | ng | | 92 |
| 16) Acrylonitrile | 0.00 | 53 | 0 | N.D. | | | |
| 17) 1,1-Dichloroethene | 8.30 | 96 | 1899 | 0.152 | ng | | 100 |
| 18) 2-Methyl-2-Propanol (t... | 8.54 | 59 | 8849 | 0.295 | ng | | 86 |
| 19) Methylene Chloride | 8.50 | 84 | 3266 | 0.262 | ng | | 98 |
| 20) 3-Chloro-1-propene (Al... | 8.67 | 41 | 2291 | 0.119 | ng | | 82 |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 2091 | 0.183 | ng | | 99 |
| 22) Carbon Disulfide | 8.78 | 76 | 10178 | 0.229 | ng | | 91 |
| 23) trans-1,2-Dichloroethene | 9.74 | 61 | 1911 | 0.115 | ng | | 99 |
| 24) 1,1-Dichloroethane | 9.97 | 63 | 3116 | 0.135 | ng | | 96 |
| 25) Methyl tert-Butyl Ether | 10.14 | 73 | 5741 | 0.152 | ng | | 93 |
| 26) Vinyl Acetate | 0.00 | 86 | 0 | N.D. | d | | |
| 27) 2-Butanone (MEK) | 0.00 | 72 | 0 | N.D. | d | | |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 2250 | 0.131 | ng | | 99 |
| 29) Diisopropyl Ether | 11.29 | 87 | 1965 | 0.172 | ng | # | 62 |
| 30) Ethyl Acetate | 0.00 | 61 | 0 | N.D. | d | | |
| 31) n-Hexane | 11.25 | 57 | 3314 | 0.137 | ng | # | 97 |
| 32) Chloroform | 11.30 | 83 | 3171 | 0.145 | ng | | 95 |
| 34) Tetrahydrofuran (THF) | 11.79 | 72 | 1457 | 0.182 | ng | | 90 |
| 35) Ethyl tert-Butyl Ether | 11.87 | 87 | 2124 | 0.147 | ng | | 90 |
| 36) 1,2-Dichloroethane | 12.10 | 62 | 1838 | 0.113 | ng | | 78 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 2819 | 0.153 | ng | | 98 |
| 39) Isopropyl Acetate | 12.81 | 61 | 2182 | 0.264 | ng | # | 83 |
| 40) 1-Butanol | 0.00 | 56 | 0 | N.D. | d | | |
| 41) Benzene | 12.83 | 78 | 9027 | 0.173 | ng | | 97 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 2427 | 0.154 | ng | | 94 |
| 43) Cyclohexane | 13.12 | 84 | 6848 | 0.320 | ng | | 93 |
| 44) tert-Amyl Methyl Ether | 13.49 | 73 | 5600 | 0.155 | ng | | 96 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 1897 | 0.149 | ng | | 93 |
| 46) Bromodichloromethane | 13.86 | 83 | 3399 | 0.214 | ng | | 99 |
| 47) Trichloroethene | 13.92 | 130 | 2330 | 0.169 | ng | | 99 |
| 48) 1,4-Dioxane | 0.00 | 88 | 0 | N.D. | d | | |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 9199 | 0.159 | ng | | 98 |
| 50) Methyl Methacrylate | 0.00 | 100 | 0 | N.D. | d | | |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291805.D Vial: 8
Acq On : 29 Mar 2018 17:47 Operator: RS
Sample : 0.20ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:54:42 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

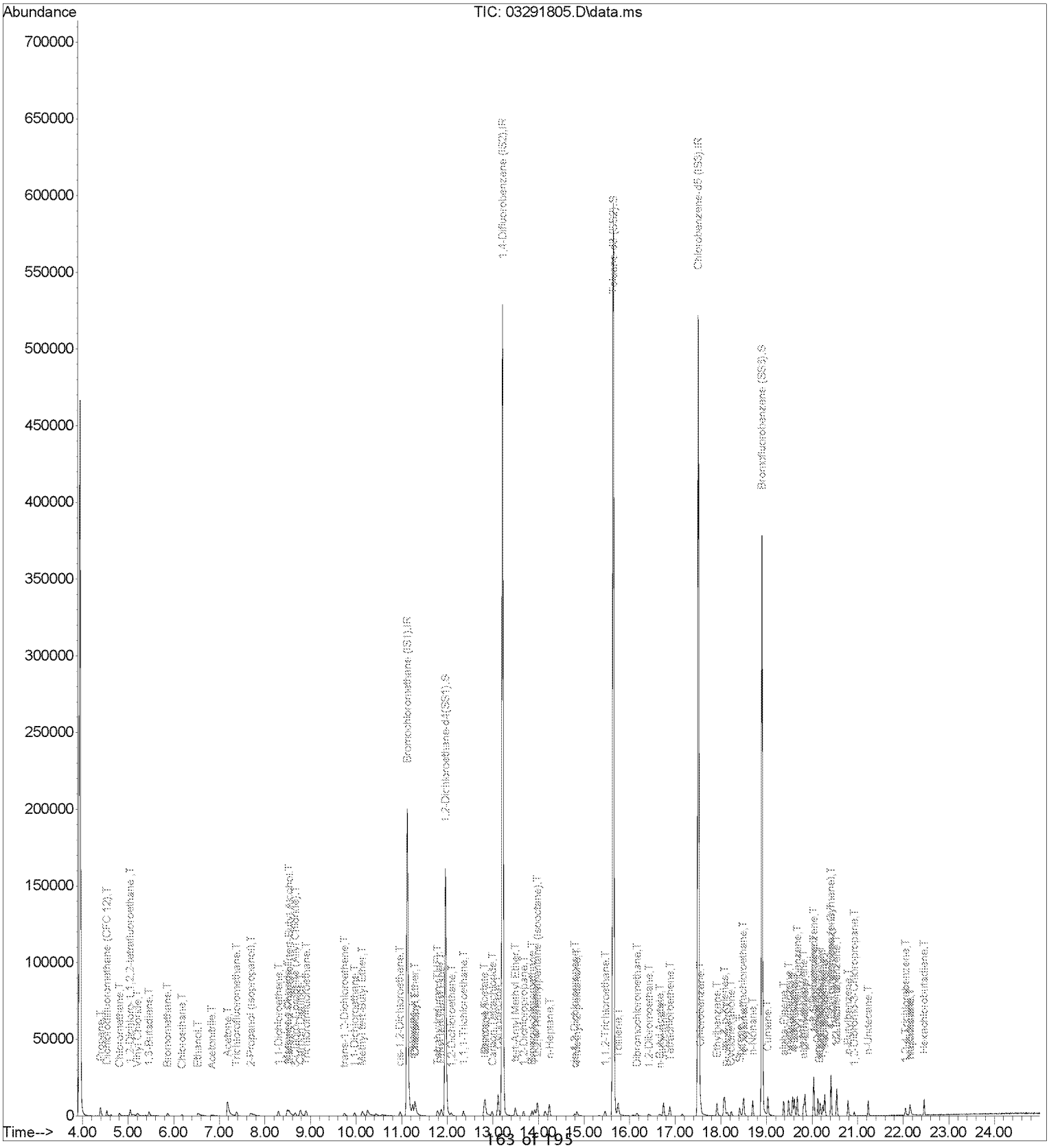
| Internal Standards | R.T. | QIon | Response | Conc Units | | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 2113 | 0.146 ng | | 98 |
| 52) cis-1,3-Dichloropropene | 14.80 | 75 | 2187 | 0.121 ng | | 79 |
| 53) 4-Methyl-2-pentanone | 14.85 | 58 | 1140 | 0.104 ng | # | 49 |
| 54) trans-1,3-Dichloropropene | 0.00 | 75 | 0 | N.D. d | | |
| 55) 1,1,2-Trichloroethane | 15.47 | 97 | 1733 | 0.148 ng | | 100 |
| 58) Toluene | 15.75 | 91 | 8905 | 0.198 ng | | 98 |
| 59) 2-Hexanone | 0.00 | 43 | 0 | N.D. d | | |
| 60) Dibromochloromethane | 16.16 | 129 | 2060 | 0.192 ng | | 92 |
| 61) 1,2-Dibromoethane | 16.42 | 107 | 1571 | 0.156 ng | | 98 |
| 62) n-Butyl Acetate | 16.66 | 43 | 2285 | 0.090 ng | # | 82 |
| 63) n-Octane | 16.75 | 57 | 1808 | 0.173 ng | | 93 |
| 64) Tetrachloroethene | 16.89 | 166 | 2862 | 0.233 ng | | 95 |
| 65) Chlorobenzene | 17.55 | 112 | 6013 | 0.204 ng | | 99 |
| 66) Ethylbenzene | 17.92 | 91 | 9525 | 0.190 ng | | 96 |
| 67) m- & p-Xylenes | 18.08 | 91 | 15367 | 0.389 ng | | 96 |
| 68) Bromoform | 18.14 | 173 | 1794 | 0.205 ng | | 89 |
| 69) Styrene | 18.42 | 104 | 4909 | 0.175 ng | | 96 |
| 70) o-Xylene | 18.51 | 91 | 7464 | 0.187 ng | | 99 |
| 71) n-Nonane | 18.70 | 43 | 3778 | 0.151 ng | | 99 |
| 72) 1,1,2,2-Tetrachloroethane | 18.49 | 83 | 3280 | 0.184 ng | | 94 |
| 74) Cumene | 19.03 | 105 | 9899 | 0.178 ng | | 96 |
| 75) alpha-Pinene | 19.38 | 93 | 4899 | 0.198 ng | | 96 |
| 76) n-Propylbenzene | 19.49 | 91 | 11116 | 0.170 ng | | 95 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 9056 | 0.164 ng | | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 9407 | 0.203 ng | | 98 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 8751 | 0.188 ng | | 96 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 3731 | 0.188 ng | | 99 |
| 81) 2-Ethyltoluene | 19.85 | 105 | 9969 | 0.202 ng | | 96 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 8016 | 0.197 ng | | 98 |
| 83) n-Decane | 20.13 | 57 | 4245 | 0.164 ng | | 94 |
| 84) Benzyl Chloride | 20.17 | 91 | 2672 | 0.093 ng | | 80 |
| 85) 1,3-Dichlorobenzene | 20.18 | 146 | 4596 | 0.193 ng | | 98 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 5016 | 0.204 ng | | 96 |
| 87) sec-Butylbenzene | 20.28 | 105 | 11250 | 0.203 ng | | 97 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 10284 | 0.188 ng | | 97 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 8067 | 0.180 ng | | 99 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 4528 | 0.201 ng | | 98 |
| 91) d-Limonene | 20.54 | 68 | 2888 | 0.182 ng | | 93 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.93 | 157 | 1126 | 0.159 ng | | 97 |
| 93) n-Undecane | 21.23 | 57 | 3723 | 0.148 ng | | 95 |
| 94) 1,2,4-Trichlorobenzene | 22.05 | 180 | 2858 | 0.188 ng | # | 94 |
| 95) Naphthalene | 22.16 | 128 | 7018 | 0.148 ng | | 86 |
| 96) n-Dodecane | 22.15 | 57 | 2549 | 0.124 ng | | 87 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 2587 | 0.225 ng | | 95 |
| 98) Cyclohexanone | 18.23 | 55 | 2093 | 0.138 ng | | 93 |
| 99) tert-Butylbenzene | 20.04 | 119 | 8495 | 0.215 ng | | 99 |
| 100) n-Butylbenzene | 20.79 | 91 | 7812 | 0.180 ng | | 94 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291805.D Vial: 8
Acq On : 29 Mar 2018 17:47 Operator: RS
Sample : 0.20ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-02281806 (3/29)

Quant Time: Mar 30 08:54:42 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291806.D Vial: 7
Acq On : 29 Mar 2018 18:21 Operator: RS
Sample : 0.40ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

RS 3/30/18

Quant Time: Mar 30 08:47:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 106834 | 12.500 | ng | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 542080 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 184149 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 123852 | 9.280 | ng | -0.02 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 74.24% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 508500 | 13.708 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.68% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 142796 | 12.280 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 98.24% | | | | | | |

| Target Compounds | | | | | | | Qvalue |
|---|---|---|---|---|---|---|---|
| 2) Propene | 4.39 | 42 | 5110 | 0.375 | ng | | 93 |
| 3) Dichlorodifluoromethan... | 4.54 | 85 | 9489 | 0.381 | ng | | 98 |
| 4) Chloromethane | 4.80 | 50 | 7297 | 0.360 | ng | | 93 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.04 | 135 | 5789 | 0.419 | ng | | 97 |
| 6) Vinyl Chloride | 5.20 | 62 | 7293 | 0.341 | ng | | 96 |
| 7) 1,3-Butadiene | 5.45 | 54 | 4665 | 0.293 | ng | | 97 |
| 8) Bromomethane | 5.86 | 94 | 4637 | 0.394 | ng | | 97 |
| 9) Chloroethane | 6.18 | 64 | 3710 | 0.382 | ng | | 94 |
| 10) Ethanol | 6.50 | 45 | 16654 | 1.895 | ng | | 94 |
| 11) Acetonitrile | 6.80 | 41 | 7281 | 0.366 | ng | | 96 |
| 12) Acrolein | 6.98 | 56 | 2558 | 0.399 | ng | # | 73 |
| 13) Acetone | 7.15 | 58 | 19240 | 1.847 | ng | | 97 |
| 14) Trichlorofluoromethane | 7.38 | 101 | 8321 | 0.388 | ng | | 98 |
| 15) 2-Propanol (Isopropanol) | 7.64 | 45 | 23217 | 0.753 | ng | | 95 |
| 16) Acrylonitrile | 7.92 | 53 | 3769 | 0.249 | ng | | 86 |
| 17) 1,1-Dichloroethene | 8.30 | 96 | 5583 | 0.454 | ng | | 95 |
| 18) 2-Methyl-2-Propanol (t... | 8.49 | 59 | 24759 | 0.839 | ng | | 98 |
| 19) Methylene Chloride | 8.50 | 84 | 6696 | 0.545 | ng | | 99 |
| 20) 3-Chloro-1-propene (Al... | 8.67 | 41 | 6722 | 0.354 | ng | | 88 |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 5406 | 0.480 | ng | | 95 |
| 22) Carbon Disulfide | 8.78 | 76 | 23414 | 0.536 | ng | | 98 |
| 23) trans-1,2-Dichloroethene | 9.74 | 61 | 6175 | 0.379 | ng | | 96 |
| 24) 1,1-Dichloroethane | 9.96 | 63 | 8483 | 0.373 | ng | | 97 |
| 25) Methyl tert-Butyl Ether | 10.11 | 73 | 15247 | 0.411 | ng | | 98 |
| 26) Vinyl Acetate | 10.23 | 86 | 4224 | 1.618 | ng | # | 36 |
| 27) 2-Butanone (MEK) | 10.53 | 72 | 2377 | 0.315 | ng | # | 87 |
| 28) cis-1,2-Dichloroethene | 10.96 | 61 | 6586 | 0.390 | ng | | 96 |
| 29) Diisopropyl Ether | 11.28 | 87 | 5421 | 0.483 | ng | # | 87 |
| 30) Ethyl Acetate | 11.29 | 61 | 3161 | 0.742 | ng | | 93 |
| 31) n-Hexane | 11.25 | 57 | 9239 | 0.388 | ng | | 98 |
| 32) Chloroform | 11.29 | 83 | 8627 | 0.401 | ng | | 96 |
| 34) Tetrahydrofuran (THF) | 11.76 | 72 | 3790 | 0.480 | ng | | 91 |
| 35) Ethyl tert-Butyl Ether | 11.85 | 87 | 6215 | 0.438 | ng | | 98 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 5430 | 0.338 | ng | | 94 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 7642 | 0.421 | ng | | 98 |
| 39) Isopropyl Acetate | 12.80 | 61 | 6748 | 0.827 | ng | | 96 |
| 40) 1-Butanol | 12.84 | 56 | 7227 | 0.645 | ng | # | 70 |
| 41) Benzene | 12.83 | 78 | 23031 | 0.447 | ng | | 97 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 6544 | 0.422 | ng | | 100 |
| 43) Cyclohexane | 13.12 | 84 | 18063 | 0.856 | ng | | 96 |
| 44) tert-Amyl Methyl Ether | 13.48 | 73 | 14745 | 0.415 | ng | | 97 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 5290 | 0.420 | ng | | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 7771 | 0.495 | ng | | 99 |
| 47) Trichloroethene | 13.91 | 130 | 6375 | 0.468 | ng | | 100 |
| 48) 1,4-Dioxane | 13.94 | 88 | 4486 | 0.457 | ng | | 88 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 24162 | 0.423 | ng | | 99 |
| 50) Methyl Methacrylate | 14.14 | 100 | 3935 | 0.925 | ng | | 92 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291806.D Vial: 7
Acq On : 29 Mar 2018 18:21 Operator: RS
Sample : 0.40ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

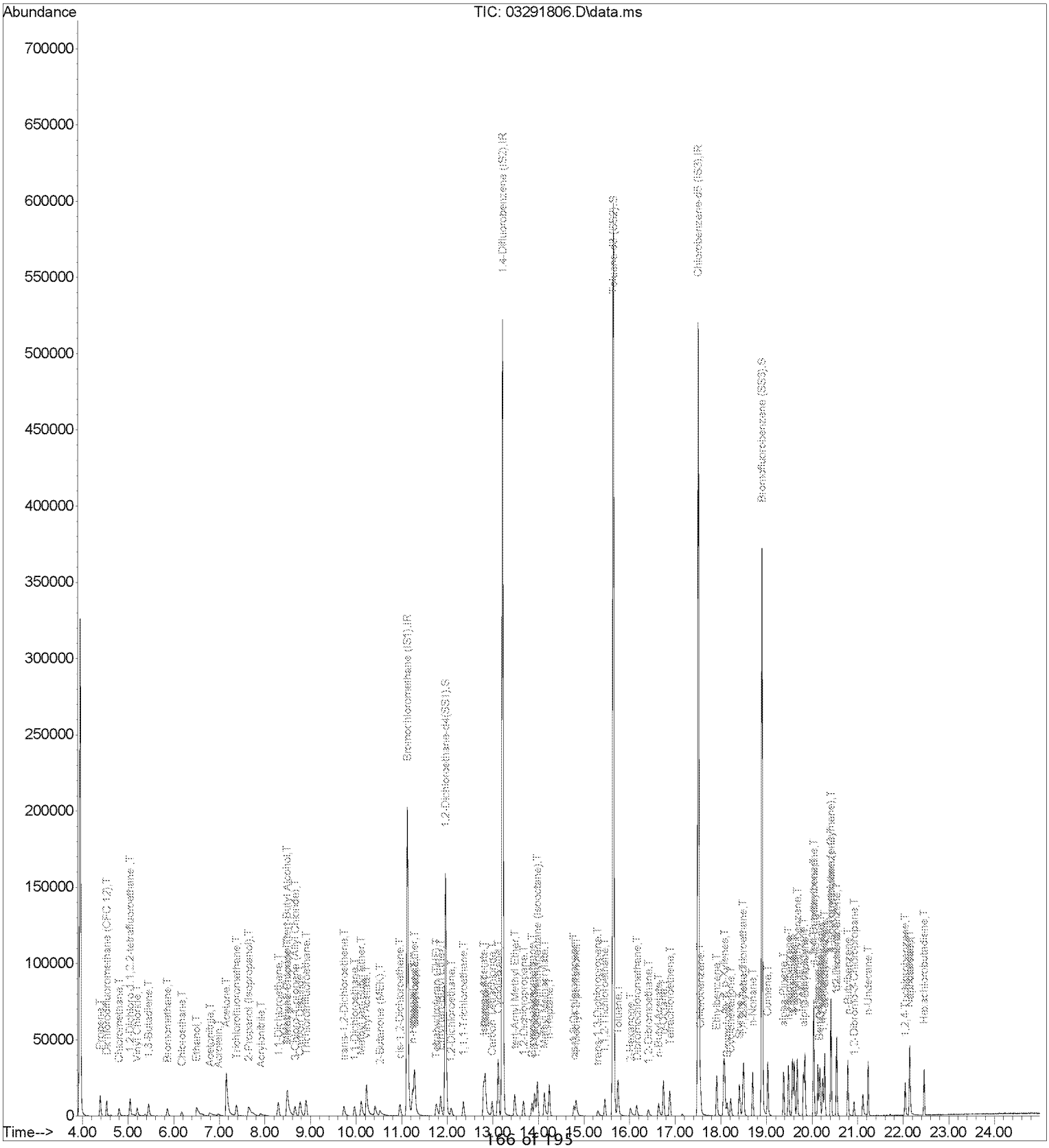
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 5682 | 0.398 ng | 96 |
| 52) cis-1,3-Dichloropropene | 14.78 | 75 | 7561 | 0.425 ng | 93 |
| 53) 4-Methyl-2-pentanone | 14.83 | 58 | 4348 | 0.404 ng | 84 |
| 54) trans-1,3-Dichloropropene | 15.30 | 75 | 4408 | 0.297 ng | 93 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 5243 | 0.455 ng | 98 |
| 58) Toluene | 15.75 | 91 | 23807 | 0.537 ng | 100 |
| 59) 2-Hexanone | 16.02 | 43 | 8749 | 0.404 ng | 89 |
| 60) Dibromochloromethane | 16.16 | 129 | 5812 | 0.550 ng | 99 |
| 61) 1,2-Dibromoethane | 16.41 | 107 | 5317 | 0.536 ng | 99 |
| 62) n-Butyl Acetate | 16.63 | 43 | 9259 | 0.370 ng | 97 |
| 63) n-Octane | 16.74 | 57 | 4725 | 0.459 ng | 96 |
| 64) Tetrachloroethene | 16.89 | 166 | 7599 | 0.628 ng | 95 |
| 65) Chlorobenzene | 17.55 | 112 | 16149 | 0.556 ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 26464 | 0.536 ng | 97 |
| 67) m- & p-Xylenes | 18.08 | 91 | 41903 | 1.078 ng | 99 |
| 68) Bromoform | 18.14 | 173 | 5293 | 0.614 ng | 99 |
| 69) Styrene | 18.41 | 104 | 15156 | 0.550 ng | 99 |
| 70) o-Xylene | 18.50 | 91 | 20610 | 0.525 ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 10410 | 0.422 ng | 97 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 9383 | 0.534 ng | 100 |
| 74) Cumene | 19.03 | 105 | 27765 | 0.507 ng | 97 |
| 75) alpha-Pinene | 19.38 | 93 | 12983 | 0.532 ng | 99 |
| 76) n-Propylbenzene | 19.49 | 91 | 31217 | 0.486 ng | 98 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 26955 | 0.496 ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 24383 | 0.535 ng | 99 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 24044 | 0.524 ng | 94 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 10917 | 0.559 ng | 97 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 27152 | 0.559 ng | 97 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 22604 | 0.563 ng | 99 |
| 83) n-Decane | 20.13 | 57 | 11476 | 0.451 ng | 96 |
| 84) Benzyl Chloride | 20.16 | 91 | 10429 | 0.370 ng | 94 |
| 85) 1,3-Dichlorobenzene | 20.18 | 146 | 13389 | 0.572 ng | 100 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 14332 | 0.591 ng | 98 |
| 87) sec-Butylbenzene | 20.28 | 105 | 30845 | 0.566 ng | 98 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 28950 | 0.536 ng | 99 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 21910 | 0.495 ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 13326 | 0.600 ng | 99 |
| 91) d-Limonene | 20.54 | 68 | 7756 | 0.497 ng | 96 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.93 | 157 | 4069 | 0.583 ng | 97 |
| 93) n-Undecane | 21.23 | 57 | 11907 | 0.480 ng | 95 |
| 94) 1,2,4-Trichlorobenzene | 22.05 | 180 | 9412 | 0.628 ng | 98 |
| 95) Naphthalene | 22.15 | 128 | 26289 | 0.562 ng | 95 |
| 96) n-Dodecane | 22.14 | 57 | 8563 | 0.423 ng | 95 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 6964 | 0.616 ng | 99 |
| 98) Cyclohexanone | 18.22 | 55 | 6636 | 0.445 ng | 98 |
| 99) tert-Butylbenzene | 20.04 | 119 | 22900 | 0.589 ng | 99 |
| 100) n-Butylbenzene | 20.79 | 91 | 23489 | 0.551 ng | 95 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291806.D Vial: 7
Acq On : 29 Mar 2018 18:21 Operator: RS
Sample : 0.40ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:37 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291807.D Vial: 7
Acq On : 29 Mar 2018 18:55 Operator: RS
Sample : 1.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

RS 3/30/18

Quant Time: Mar 30 08:47:39 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.13 | 130 | 109332 | 12.500 | ng | -0.02 |
| 37) 1,4-Difluorobenzene (IS2) | 13.21 | 114 | 550344 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 186681 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.96 | 65 | 125440 | 9.184 | ng | -0.02 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 73.44% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 514480 | 13.681 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.44% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 144104 | 12.224 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 97.76% | | | | | | |
| **Target Compounds** | | | | | | Qvalue |
| 2) Propene | 4.38 | 42 | 11460 | 0.821 | ng | 98 |
| 3) Dichlorodifluoromethan... | 4.52 | 85 | 20171 | 0.791 | ng | 99 |
| 4) Chloromethane | 4.80 | 50 | 16230 | 0.782 | ng | 98 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.04 | 135 | 12458 | 0.881 | ng | 98 |
| 6) Vinyl Chloride | 5.20 | 62 | 16153 | 0.738 | ng | 97 |
| 7) 1,3-Butadiene | 5.44 | 54 | 10478 | 0.643 | ng | 98 |
| 8) Bromomethane | 5.86 | 94 | 10060 | 0.834 | ng | 99 |
| 9) Chloroethane | 6.17 | 64 | 8283 | 0.833 | ng | 99 |
| 10) Ethanol | 6.49 | 45 | 38761 | 4.310 | ng | 98 |
| 11) Acetonitrile | 6.76 | 41 | 17740 | 0.870 | ng | 97 |
| 12) Acrolein | 6.95 | 56 | 6641 | 1.013 | ng | 98 |
| 13) Acetone | 7.14 | 58 | 43007 | 4.034 | ng | 98 |
| 14) Trichlorofluoromethane | 7.38 | 101 | 17945 | 0.817 | ng | 99 |
| 15) 2-Propanol (Isopropanol) | 7.61 | 45 | 53265 | 1.687 | ng | 97 |
| 16) Acrylonitrile | 7.88 | 53 | 11522 | 0.744 | ng | 99 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 12072 | 0.960 | ng | 96 |
| 18) 2-Methyl-2-Propanol (t... | 8.46 | 59 | 54665 | 1.809 | ng | 99 |
| 19) Methylene Chloride | 8.50 | 84 | 13135 | 1.046 | ng | 97 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 15031 | 0.774 | ng | 93 |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 11980 | 1.039 | ng | 100 |
| 22) Carbon Disulfide | 8.77 | 76 | 46601 | 1.043 | ng | 98 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 14927 | 0.895 | ng | 100 |
| 24) 1,1-Dichloroethane | 9.96 | 63 | 19366 | 0.832 | ng | 98 |
| 25) Methyl tert-Butyl Ether | 10.10 | 73 | 34481 | 0.907 | ng | 99 |
| 26) Vinyl Acetate | 10.22 | 86 | 11507 | 4.306 | ng # | 63 |
| 27) 2-Butanone (MEK) | 10.49 | 72 | 7057 | 0.915 | ng | 93 |
| 28) cis-1,2-Dichloroethene | 10.96 | 61 | 14769 | 0.854 | ng | 99 |
| 29) Diisopropyl Ether | 11.27 | 87 | 11897 | 1.035 | ng # | 83 |
| 30) Ethyl Acetate | 11.27 | 61 | 8275 | 1.897 | ng | 93 |
| 31) n-Hexane | 11.24 | 57 | 20018 | 0.822 | ng | 99 |
| 32) Chloroform | 11.29 | 83 | 18899 | 0.859 | ng | 99 |
| 34) Tetrahydrofuran (THF) | 11.74 | 72 | 8221 | 1.017 | ng | 92 |
| 35) Ethyl tert-Butyl Ether | 11.85 | 87 | 13941 | 0.960 | ng | 99 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 12255 | 0.745 | ng | 99 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 16445 | 0.891 | ng | 100 |
| 39) Isopropyl Acetate | 12.79 | 61 | 15182 | 1.832 | ng | 96 |
| 40) 1-Butanol | 12.82 | 56 | 19387 | 1.704 | ng | 90 |
| 41) Benzene | 12.83 | 78 | 49431 | 0.944 | ng | 99 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 14301 | 0.908 | ng | 99 |
| 43) Cyclohexane | 13.12 | 84 | 39328 | 1.836 | ng | 97 |
| 44) tert-Amyl Methyl Ether | 13.48 | 73 | 32389 | 0.897 | ng | 98 |
| 45) 1,2-Dichloropropane | 13.67 | 63 | 11809 | 0.925 | ng | 98 |
| 46) Bromodichloromethane | 13.86 | 83 | 15699 | 0.985 | ng | 99 |
| 47) Trichloroethene | 13.91 | 130 | 13912 | 1.006 | ng | 99 |
| 48) 1,4-Dioxane | 13.91 | 88 | 10189 | 1.023 | ng | 94 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 51076 | 0.880 | ng | 99 |
| 50) Methyl Methacrylate | 14.13 | 100 | 9755 | 2.260 | ng | 88 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291807.D Vial: 7
Acq On : 29 Mar 2018 18:55 Operator: RS
Sample : 1.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:39 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

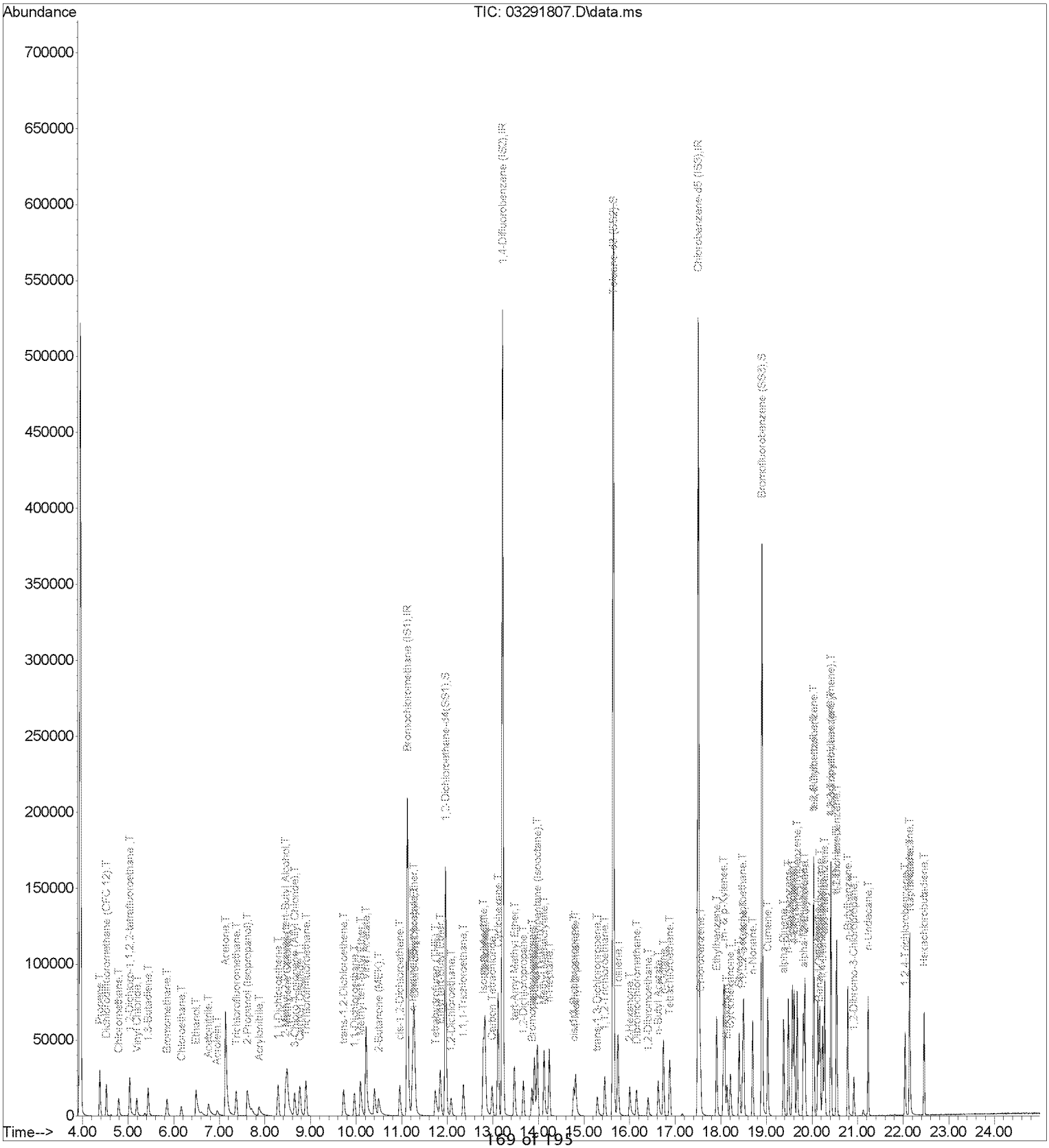
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 12518 | 0.863 ng | 99 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 18234 | 1.010 ng | 97 |
| 53) 4-Methyl-2-pentanone | 14.82 | 58 | 10580 | 0.968 ng | 93 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 13050 | 0.866 ng | 95 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 11716 | 1.002 ng | 100 |
| 58) Toluene | 15.75 | 91 | 51528 | 1.147 ng | 100 |
| 59) 2-Hexanone | 16.00 | 43 | 21812 | 0.994 ng | 98 |
| 60) Dibromochloromethane | 16.16 | 129 | 13361 | 1.248 ng | 99 |
| 61) 1,2-Dibromoethane | 16.41 | 107 | 12513 | 1.243 ng | 99 |
| 62) n-Butyl Acetate | 16.63 | 43 | 23730 | 0.936 ng | 98 |
| 63) n-Octane | 16.74 | 57 | 10599 | 1.015 ng | 97 |
| 64) Tetrachloroethene | 16.88 | 166 | 16139 | 1.316 ng | 98 |
| 65) Chlorobenzene | 17.55 | 112 | 35285 | 1.199 ng | 98 |
| 66) Ethylbenzene | 17.91 | 91 | 57074 | 1.141 ng | 98 |
| 67) m- & p-Xylenes | 18.07 | 91 | 90666 | 2.301 ng | 99 |
| 68) Bromoform | 18.14 | 173 | 12095 | 1.385 ng | 99 |
| 69) Styrene | 18.40 | 104 | 34717 | 1.243 ng | 99 |
| 70) o-Xylene | 18.50 | 91 | 44852 | 1.128 ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 22549 | 0.902 ng | 97 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 20696 | 1.161 ng | 99 |
| 74) Cumene | 19.03 | 105 | 58811 | 1.059 ng | 98 |
| 75) alpha-Pinene | 19.38 | 93 | 28396 | 1.149 ng | 98 |
| 76) n-Propylbenzene | 19.48 | 91 | 68820 | 1.056 ng | 98 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 60185 | 1.092 ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 53061 | 1.149 ng | 99 |
| 79) 1,3,5-Trimethylbenzene | 19.67 | 105 | 50819 | 1.092 ng | 96 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 25514 | 1.289 ng | 100 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 59014 | 1.199 ng | 97 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 48857 | 1.201 ng | 99 |
| 83) n-Decane | 20.13 | 57 | 25437 | 0.987 ng | 97 |
| 84) Benzyl Chloride | 20.16 | 91 | 26407 | 0.925 ng | 95 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 30277 | 1.276 ng | 99 |
| 86) 1,4-Dichlorobenzene | 20.23 | 146 | 32081 | 1.306 ng | 97 |
| 87) sec-Butylbenzene | 20.28 | 105 | 66647 | 1.207 ng | 99 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 62423 | 1.140 ng | 98 |
| 89) 1,2,3-Trimethylbenzene | 20.41 | 105 | 48617 | 1.084 ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 29428 | 1.308 ng | 100 |
| 91) d-Limonene | 20.54 | 68 | 16908 | 1.069 ng | 99 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 9376 | 1.326 ng | 96 |
| 93) n-Undecane | 21.23 | 57 | 25109 | 0.998 ng | 97 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 22348 | 1.472 ng | 98 |
| 95) Naphthalene | 22.15 | 128 | 63696 | 1.344 ng | 97 |
| 96) n-Dodecane | 22.14 | 57 | 19868 | 0.968 ng | 96 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 15757 | 1.375 ng | 99 |
| 98) Cyclohexanone | 18.21 | 55 | 15773 | 1.043 ng | 98 |
| 99) tert-Butylbenzene | 20.04 | 119 | 49236 | 1.248 ng | 99 |
| 100) n-Butylbenzene | 20.79 | 91 | 50855 | 1.176 ng | 97 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291807.D Vial: 7
Acq On : 29 Mar 2018 18:55 Operator: RS
Sample : 1.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:39 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291808.D Vial: 7
Acq On : 29 Mar 2018 19:28 Operator: RS
Sample : 5.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

RS 3/30/18

Quant Time: Mar 30 08:47:41 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.14 | 130 | 107148 | 12.500 | ng | | 0.00 |
| 37) 1,4-Difluorobenzene (IS2) | 13.22 | 114 | 540280 | 12.500 | ng | | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 182159 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.97 | 65 | 123706 | 9.242 | ng | | -0.01 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 73.92% | | | | | | | |
| 57) Toluene-d8 (SS2) | 15.64 | 98 | 503102 | 13.710 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.68% | | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 140217 | 12.189 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 97.52% | | | | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 50268 | 3.677 | ng | | 100 |
| 3) Dichlorodifluoromethan... | 4.51 | 85 | 88504 | 3.541 | ng | | 100 |
| 4) Chloromethane | 4.77 | 50 | 69494 | 3.417 | ng | | 98 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.03 | 135 | 54983 | 3.969 | ng | | 100 |
| 6) Vinyl Chloride | 5.18 | 62 | 71852 | 3.351 | ng | | 99 |
| 7) 1,3-Butadiene | 5.43 | 54 | 49174 | 3.080 | ng | | 99 |
| 8) Bromomethane | 5.84 | 94 | 42568 | 3.603 | ng | | 100 |
| 9) Chloroethane | 6.16 | 64 | 36917 | 3.787 | ng | | 99 |
| 10) Ethanol | 6.49 | 45 | 172991 | 19.627 | ng | | 100 |
| 11) Acetonitrile | 6.75 | 41 | 88967 | 4.453 | ng | | 100 |
| 12) Acrolein | 6.94 | 56 | 33479 | 5.211 | ng | | 100 |
| 13) Acetone | 7.13 | 58 | 195340 | 18.695 | ng | | 99 |
| 14) Trichlorofluoromethane | 7.36 | 101 | 78587 | 3.649 | ng | | 99 |
| 15) 2-Propanol (Isopropanol) | 7.60 | 45 | 247167 | 7.990 | ng | | 99 |
| 16) Acrylonitrile | 7.85 | 53 | 64644 | 4.258 | ng | | 99 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 53149 | 4.314 | ng | | 99 |
| 18) 2-Methyl-2-Propanol (t... | 8.44 | 59 | 245969 | 8.307 | ng | | 99 |
| 19) Methylene Chloride | 8.50 | 84 | 55047 | 4.471 | ng | | 99 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 69422 | 3.646 | ng | | 98 |
| 21) Trichlorotrifluoroethane | 8.90 | 151 | 53080 | 4.695 | ng | | 100 |
| 22) Carbon Disulfide | 8.76 | 76 | 197342 | 4.506 | ng | | 100 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 71296 | 4.360 | ng | | 100 |
| 24) 1,1-Dichloroethane | 9.97 | 63 | 87098 | 3.816 | ng | | 99 |
| 25) Methyl tert-Butyl Ether | 10.08 | 73 | 153589 | 4.124 | ng | | 100 |
| 26) Vinyl Acetate | 10.22 | 86 | 61282 | 23.400 | ng | # | 79 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 36198 | 4.789 | ng | | 99 |
| 28) cis-1,2-Dichloroethene | 10.96 | 61 | 67135 | 3.959 | ng | | 99 |
| 29) Diisopropyl Ether | 11.26 | 87 | 53665 | 4.763 | ng | # | 85 |
| 30) Ethyl Acetate | 11.26 | 61 | 39262 | 9.184 | ng | | 98 |
| 31) n-Hexane | 11.24 | 57 | 87137 | 3.651 | ng | | 100 |
| 32) Chloroform | 11.30 | 83 | 85504 | 3.964 | ng | | 100 |
| 34) Tetrahydrofuran (THF) | 11.72 | 72 | 36950 | 4.666 | ng | | 99 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 62526 | 4.393 | ng | | 98 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 57528 | 3.569 | ng | | 100 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 73166 | 4.039 | ng | | 100 |
| 39) Isopropyl Acetate | 12.79 | 61 | 68757 | 8.452 | ng | | 96 |
| 40) 1-Butanol | 12.80 | 56 | 102470 | 9.176 | ng | | 97 |
| 41) Benzene | 12.83 | 78 | 217691 | 4.237 | ng | | 100 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 64679 | 4.183 | ng | | 100 |
| 43) Cyclohexane | 13.12 | 84 | 171196 | 8.140 | ng | | 98 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 146887 | 4.145 | ng | | 99 |
| 45) 1,2-Dichloropropane | 13.67 | 63 | 52880 | 4.217 | ng | | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 67650 | 4.325 | ng | | 99 |
| 47) Trichloroethene | 13.91 | 130 | 62590 | 4.609 | ng | | 99 |
| 48) 1,4-Dioxane | 13.90 | 88 | 47274 | 4.834 | ng | | 98 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 222747 | 3.909 | ng | | 99 |
| 50) Methyl Methacrylate | 14.12 | 100 | 47695 | 11.254 | ng | | 97 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291808.D Vial: 7
Acq On : 29 Mar 2018 19:28 Operator: RS
Sample : 5.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:41 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

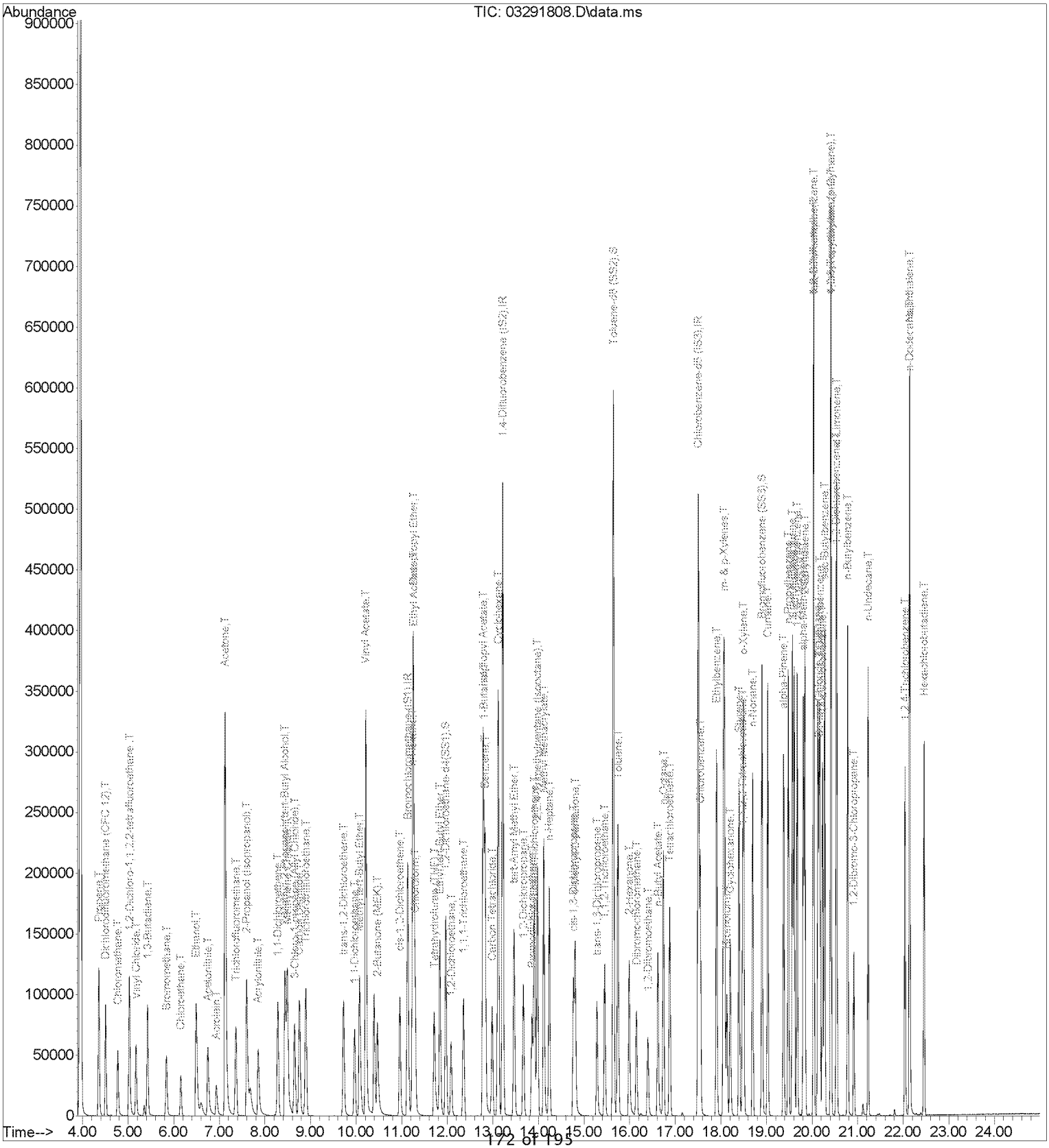
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 54776 | 3.848 ng | 99 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 88996 | 5.021 ng | 99 |
| 53) 4-Methyl-2-pentanone | 14.81 | 58 | 49913 | 4.650 ng | 96 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 70282 | 4.749 ng | 100 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 53612 | 4.669 ng | 100 |
| 58) Toluene | 15.75 | 91 | 228377 | 5.210 ng | 99 |
| 59) 2-Hexanone | 15.99 | 43 | 109137 | 5.098 ng | 100 |
| 60) Dibromochloromethane | 16.15 | 129 | 62136 | 5.949 ng | 100 |
| 61) 1,2-Dibromoethane | 16.40 | 107 | 59653 | 6.074 ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 120756 | 4.881 ng | 99 |
| 63) n-Octane | 16.74 | 57 | 45616 | 4.478 ng | 99 |
| 64) Tetrachloroethene | 16.88 | 166 | 71539 | 5.978 ng | 100 |
| 65) Chlorobenzene | 17.55 | 112 | 155658 | 5.419 ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 252998 | 5.185 ng | 99 |
| 67) m- & p-Xylenes | 18.07 | 91 | 397752 | 10.346 ng | 100 |
| 68) Bromoform | 18.13 | 173 | 58177 | 6.826 ng | 99 |
| 69) Styrene | 18.40 | 104 | 164198 | 6.024 ng | 99 |
| 70) o-Xylene | 18.50 | 91 | 199002 | 5.127 ng | 99 |
| 71) n-Nonane | 18.70 | 43 | 98919 | 4.057 ng | 98 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 94043 | 5.407 ng | 100 |
| 74) Cumene | 19.03 | 105 | 260425 | 4.806 ng | 98 |
| 75) alpha-Pinene | 19.38 | 93 | 129243 | 5.358 ng | 96 |
| 76) n-Propylbenzene | 19.48 | 91 | 305774 | 4.810 ng | 98 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 273714 | 5.088 ng | 98 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 231718 | 5.143 ng | 99 |
| 79) 1,3,5-Trimethylbenzene | 19.67 | 105 | 213102 | 4.691 ng | 99 |
| 80) alpha-Methylstyrene | 19.81 | 118 | 116959 | 6.058 ng | 99 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 256755 | 5.348 ng | 98 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 215794 | 5.437 ng | 99 |
| 83) n-Decane | 20.13 | 57 | 111263 | 4.424 ng | 98 |
| 84) Benzyl Chloride | 20.16 | 91 | 152096 | 5.458 ng | 98 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 135522 | 5.854 ng | 99 |
| 86) 1,4-Dichlorobenzene | 20.23 | 146 | 141283 | 5.894 ng | 99 |
| 87) sec-Butylbenzene | 20.28 | 105 | 292816 | 5.434 ng | 99 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 273432 | 5.118 ng | 99 |
| 89) 1,2,3-Trimethylbenzene | 20.41 | 105 | 211660 | 4.836 ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.53 | 146 | 132671 | 6.043 ng | 99 |
| 91) d-Limonene | 20.54 | 68 | 77171 | 5.000 ng | 99 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 46389 | 6.725 ng | 98 |
| 93) n-Undecane | 21.23 | 57 | 115961 | 4.725 ng | 98 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 103908 | 7.014 ng | 100 |
| 95) Naphthalene | 22.14 | 128 | 299626 | 6.481 ng | 99 |
| 96) n-Dodecane | 22.14 | 57 | 96459 | 4.817 ng | 97 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 69539 | 6.217 ng | 99 |
| 98) Cyclohexanone | 18.21 | 55 | 72613 | 4.920 ng | 99 |
| 99) tert-Butylbenzene | 20.04 | 119 | 214527 | 5.575 ng | 99 |
| 100) n-Butylbenzene | 20.78 | 91 | 228738 | 5.421 ng | 98 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291808.D Vial: 7
Acq On : 29 Mar 2018 19:28 Operator: RS
Sample : 5.0ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03271803 (4/25)

Quant Time: Mar 30 08:47:41 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291809.D Vial: 3
Acq On : 29 Mar 2018 20:02 Operator: RS
Sample : 25ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

RS 3/30/18

Quant Time: Mar 30 08:47:43 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.14 | 130 | 112102 | 12.500 | ng | 0.00 |
| 37) 1,4-Difluorobenzene (IS2) | 13.22 | 114 | 563733 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 188376 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.98 | 65 | 129928 | 9.278 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 74.24% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.65 | 98 | 520671 | 13.721 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.76% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 147328 | 12.385 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 99.04% | | | | | | |
| **Target Compounds** | | | | | | Qvalue |
| 2) Propene | 4.35 | 42 | 243308 | 17.009 | ng | 100 |
| 3) Dichlorodifluoromethan... | 4.50 | 85 | 427597 | 16.352 | ng | 100 |
| 4) Chloromethane | 4.77 | 50 | 339751 | 15.969 | ng | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.03 | 135 | 266237 | 18.369 | ng | 100 |
| 6) Vinyl Chloride | 5.17 | 62 | 350342 | 15.616 | ng | 100 |
| 7) 1,3-Butadiene | 5.43 | 54 | 253919 | 15.203 | ng | 100 |
| 8) Bromomethane | 5.84 | 94 | 225691 | 18.257 | ng | 100 |
| 9) Chloroethane | 6.16 | 64 | 181934 | 17.840 | ng | 100 |
| 10) Ethanol | 6.53 | 45 | 846256 | 91.769 | ng | 100 |
| 11) Acetonitrile | 6.76 | 41 | 453811 | 21.713 | ng | 100 |
| 12) Acrolein | 6.94 | 56 | 156013 | 23.210 | ng | 100 |
| 13) Acetone | 7.14 | 58 | 892317 | 81.627 | ng | 100 |
| 14) Trichlorofluoromethane | 7.36 | 101 | 383102 | 17.003 | ng | 100 |
| 15) 2-Propanol (Isopropanol) | 7.61 | 45 | 1193460 | 36.874 | ng | 100 |
| 16) Acrylonitrile | 7.86 | 53 | 343013 | 21.597 | ng | 100 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 261804 | 20.309 | ng | 100 |
| 18) 2-Methyl-2-Propanol (t... | 8.45 | 59 | 1169574 | 37.754 | ng | 100 |
| 19) Methylene Chloride | 8.50 | 84 | 266193 | 20.665 | ng | 100 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 351974 | 17.668 | ng | 100 |
| 21) Trichlorotrifluoroethane | 8.90 | 151 | 260365 | 22.014 | ng | 100 |
| 22) Carbon Disulfide | 8.76 | 76 | 962175 | 21.000 | ng | 100 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 354437 | 20.719 | ng | 100 |
| 24) 1,1-Dichloroethane | 9.98 | 63 | 420468 | 17.607 | ng | 100 |
| 25) Methyl tert-Butyl Ether | 10.07 | 73 | 750273 | 19.257 | ng | 100 |
| 26) Vinyl Acetate | 10.23 | 86 | 312674 | 114.115 | ng | 100 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 180255 | 22.792 | ng | 100 |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 336705 | 18.979 | ng | 100 |
| 29) Diisopropyl Ether | 11.26 | 87 | 255966 | 21.713 | ng | 100 |
| 30) Ethyl Acetate | 11.26 | 61 | 184914 | 41.343 | ng | 100 |
| 31) n-Hexane | 11.24 | 57 | 382833 | 15.330 | ng | 100 |
| 32) Chloroform | 11.30 | 83 | 417851 | 18.515 | ng | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 179258 | 21.638 | ng | 100 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 310360 | 20.842 | ng | 100 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 285774 | 16.947 | ng | 100 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 362249 | 19.167 | ng | 100 |
| 39) Isopropyl Acetate | 12.78 | 61 | 318723 | 37.547 | ng | 100 |
| 40) 1-Butanol | 12.80 | 56 | 497399 | 42.689 | ng | 100 |
| 41) Benzene | 12.84 | 78 | 1024403 | 19.109 | ng | 100 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 326177 | 20.215 | ng | 100 |
| 43) Cyclohexane | 13.12 | 84 | 811988 | 37.002 | ng | 100 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 720660 | 19.490 | ng | 100 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 254664 | 19.465 | ng | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 329384 | 20.182 | ng | 100 |
| 47) Trichloroethene | 13.91 | 130 | 310728 | 21.928 | ng | 100 |
| 48) 1,4-Dioxane | 13.89 | 88 | 233340 | 22.868 | ng | 100 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 1056741 | 17.773 | ng | 100 |
| 50) Methyl Methacrylate | 14.12 | 100 | 236902 | 53.571 | ng | 100 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291809.D Vial: 3
Acq On : 29 Mar 2018 20:02 Operator: RS
Sample : 25ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:43 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

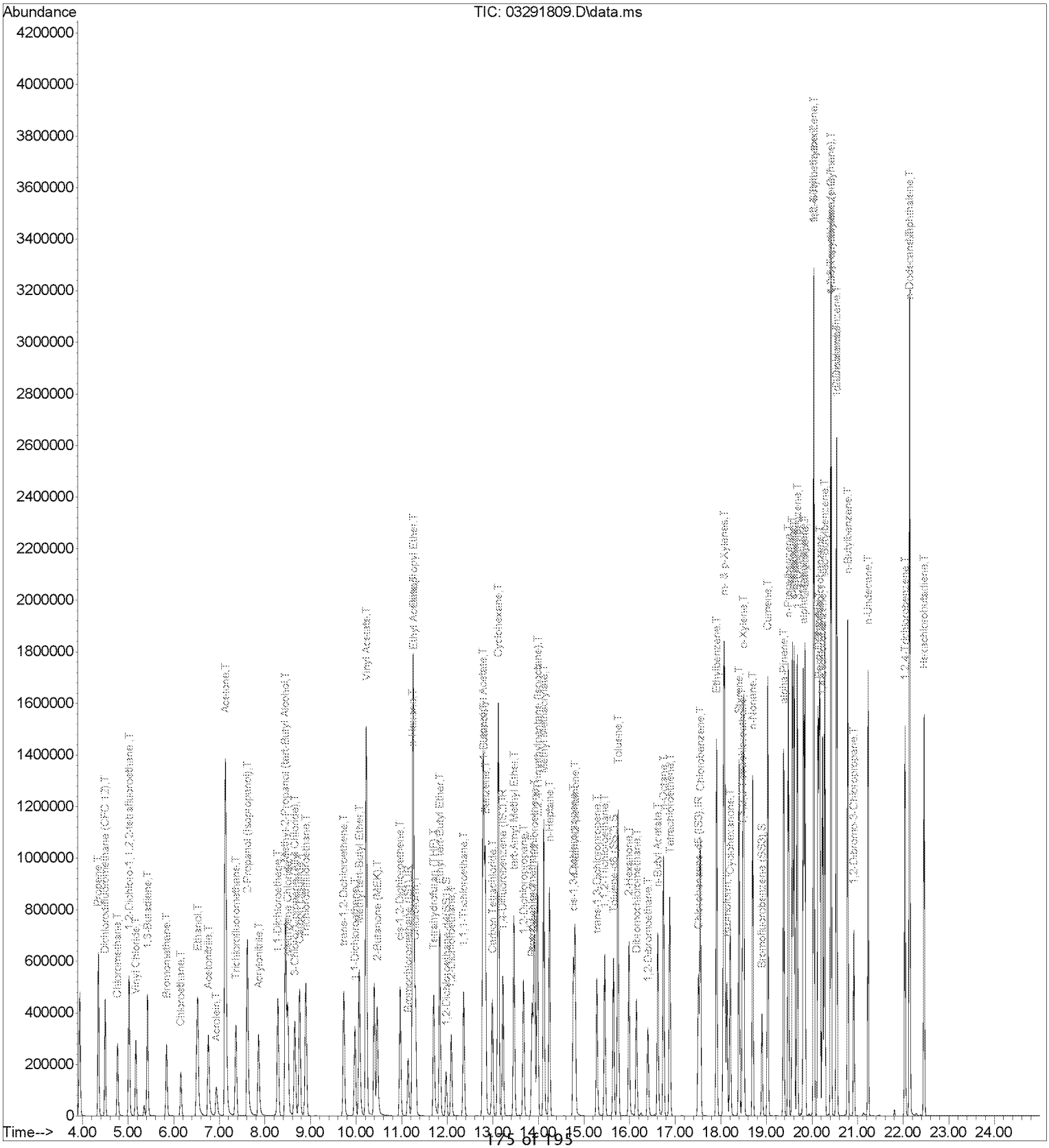
| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 259460 | 17.467 | ng | 100 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 443448 | 23.980 | ng | 100 |
| 53) 4-Methyl-2-pentanone | 14.80 | 58 | 243233 | 21.717 | ng | 100 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 375287 | 24.305 | ng | 100 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 261762 | 21.846 | ng | 100 |
| 58) Toluene | 15.75 | 91 | 1081481 | 23.858 | ng | 100 |
| 59) 2-Hexanone | 15.99 | 43 | 529503 | 23.919 | ng | 100 |
| 60) Dibromochloromethane | 16.15 | 129 | 312702 | 28.952 | ng | 100 |
| 61) 1,2-Dibromoethane | 16.40 | 107 | 301008 | 29.637 | ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 595611 | 23.281 | ng | 100 |
| 63) n-Octane | 16.74 | 57 | 215005 | 20.412 | ng | 100 |
| 64) Tetrachloroethene | 16.89 | 166 | 351814 | 28.429 | ng | 100 |
| 65) Chlorobenzene | 17.55 | 112 | 760212 | 25.590 | ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 1203453 | 23.848 | ng | 100 |
| 67) m- & p-Xylenes | 18.07 | 91 | 1879906 | 47.286 | ng | 100 |
| 68) Bromoform | 18.14 | 173 | 302501 | 34.320 | ng | 100 |
| 69) Styrene | 18.40 | 104 | 815185 | 28.919 | ng | 100 |
| 70) o-Xylene | 18.50 | 91 | 952197 | 23.722 | ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 457316 | 18.139 | ng | 100 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 458620 | 25.497 | ng | 100 |
| 74) Cumene | 19.03 | 105 | 1235638 | 22.052 | ng | 100 |
| 75) alpha-Pinene | 19.38 | 93 | 632797 | 25.366 | ng | 100 |
| 76) n-Propylbenzene | 19.48 | 91 | 1440992 | 21.918 | ng | 100 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 1289088 | 23.174 | ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 1128529 | 24.220 | ng | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 1026971 | 21.860 | ng | 100 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 600532 | 30.078 | ng | 100 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 1214272 | 24.457 | ng | 100 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 1010478 | 24.618 | ng | 100 |
| 83) n-Decane | 20.13 | 57 | 518596 | 19.942 | ng | 100 |
| 84) Benzyl Chloride | 20.16 | 91 | 869948 | 30.188 | ng | 100 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 680113 | 28.409 | ng | 100 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 700522 | 28.261 | ng | 100 |
| 87) sec-Butylbenzene | 20.28 | 105 | 1388790 | 24.921 | ng | 100 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 1276765 | 23.108 | ng | 100 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 1001060 | 22.115 | ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 653591 | 28.789 | ng | 100 |
| 91) d-Limonene | 20.54 | 68 | 381663 | 23.911 | ng | 100 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 248454 | 34.828 | ng | 100 |
| 93) n-Undecane | 21.23 | 57 | 551081 | 21.714 | ng | 100 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 548169 | 35.780 | ng | 100 |
| 95) Naphthalene | 22.14 | 128 | 1521512 | 31.823 | ng | 100 |
| 96) n-Dodecane | 22.14 | 57 | 500223 | 24.157 | ng | 100 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 356574 | 30.828 | ng | 100 |
| 98) Cyclohexanone | 18.21 | 55 | 356389 | 23.350 | ng | 100 |
| 99) tert-Butylbenzene | 20.04 | 119 | 999714 | 25.120 | ng | 100 |
| 100) n-Butylbenzene | 20.79 | 91 | 1088311 | 24.940 | ng | 100 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291809.D Vial: 3
Acq On : 29 Mar 2018 20:02 Operator: RS
Sample : 25ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:43 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291810.D Vial: 3
Acq On : 29 Mar 2018 20:36 Operator: RS
Sample : 50ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

RS 3/30/18

Quant Time: Mar 30 08:47:45 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.15 | 130 | 113183 | 12.500 | ng | 0.00 |
| 37) 1,4-Difluorobenzene (IS2) | 13.23 | 114 | 566966 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 188431 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.99 | 65 | 129696 | 9.173 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 73.36% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.65 | 98 | 522264 | 13.759 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 110.08% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 148765 | 12.502 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 100.00% | | | | | | |
| **Target Compounds** | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 449658 | 31.135 | ng | 99 |
| 3) Dichlorodifluoromethan... | 4.51 | 85 | 803012 | 30.415 | ng | 100 |
| 4) Chloromethane | 4.79 | 50 | 620205 | 28.873 | ng | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.04 | 135 | 510956 | 34.917 | ng | 100 |
| 6) Vinyl Chloride | 5.19 | 62 | 653939 | 28.870 | ng | 100 |
| 7) 1,3-Butadiene | 5.45 | 54 | 478069 | 28.350 | ng | 100 |
| 8) Bromomethane | 5.86 | 94 | 431954 | 34.609 | ng | 100 |
| 9) Chloroethane | 6.17 | 64 | 348250 | 33.822 | ng | 100 |
| 10) Ethanol | 6.56 | 45 | 1550811 | 166.565 | ng | 100 |
| 11) Acetonitrile | 6.78 | 41 | 866730 | 41.073 | ng | 100 |
| 12) Acrolein | 6.95 | 56 | 295633 | 43.560 | ng | 100 |
| 13) Acetone | 7.15 | 58 | 1545848 | 140.059 | ng | 100 |
| 14) Trichlorofluoromethane | 7.38 | 101 | 733109 | 32.227 | ng | 100 |
| 15) 2-Propanol (Isopropanol) | 7.64 | 45 | 2173788 | 66.522 | ng | 99 |
| 16) Acrylonitrile | 7.88 | 53 | 656575 | 40.945 | ng | 100 |
| 17) 1,1-Dichloroethene | 8.30 | 96 | 505045 | 38.804 | ng | 99 |
| 18) 2-Methyl-2-Propanol (t... | 8.47 | 59 | 2059100 | 65.833 | ng | 100 |
| 19) Methylene Chloride | 8.51 | 84 | 508488 | 39.097 | ng | 98 |
| 20) 3-Chloro-1-propene (Al... | 8.67 | 41 | 670790 | 33.349 | ng | 99 |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 507249 | 42.479 | ng | 99 |
| 22) Carbon Disulfide | 8.78 | 76 | 1821439 | 39.374 | ng | 100 |
| 23) trans-1,2-Dichloroethene | 9.74 | 61 | 679056 | 39.316 | ng | 99 |
| 24) 1,1-Dichloroethane | 9.99 | 63 | 800351 | 33.195 | ng | 99 |
| 25) Methyl tert-Butyl Ether | 10.08 | 73 | 1435537 | 36.493 | ng | 100 |
| 26) Vinyl Acetate | 10.24 | 86 | 577608 | 208.794 | ng # | 84 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 345045 | 43.212 | ng | 99 |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 636885 | 35.556 | ng | 99 |
| 29) Diisopropyl Ether | 11.26 | 87 | 403575 | 33.908 | ng # | 84 |
| 30) Ethyl Acetate | 11.27 | 61 | 325151 | 72.003 | ng | 96 |
| 31) n-Hexane | 11.25 | 57 | 678139 | 26.896 | ng | 99 |
| 32) Chloroform | 11.31 | 83 | 798840 | 35.059 | ng | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 345999 | 41.366 | ng | 98 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 595604 | 39.616 | ng | 98 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 548119 | 32.194 | ng | 99 |
| 38) 1,1,1-Trichloroethane | 12.37 | 97 | 692039 | 36.408 | ng | 100 |
| 39) Isopropyl Acetate | 12.79 | 61 | 581216 | 68.080 | ng | 96 |
| 40) 1-Butanol | 12.82 | 56 | 910651 | 77.710 | ng | 100 |
| 41) Benzene | 12.84 | 78 | 1867517 | 34.637 | ng | 99 |
| 42) Carbon Tetrachloride | 13.00 | 117 | 631402 | 38.909 | ng | 100 |
| 43) Cyclohexane | 13.13 | 84 | 1492097 | 67.607 | ng | 99 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 1368385 | 36.797 | ng | 100 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 485645 | 36.908 | ng | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 631744 | 38.488 | ng | 100 |
| 47) Trichloroethene | 13.92 | 130 | 599838 | 42.088 | ng | 100 |
| 48) 1,4-Dioxane | 13.90 | 88 | 444901 | 43.352 | ng | 100 |
| 49) 2,2,4-Trimethylpentane... | 13.99 | 57 | 1948904 | 32.592 | ng | 99 |
| 50) Methyl Methacrylate | 14.12 | 100 | 451182 | 101.445 | ng | 97 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291810.D Vial: 3
Acq On : 29 Mar 2018 20:36 Operator: RS
Sample : 50ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:45 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

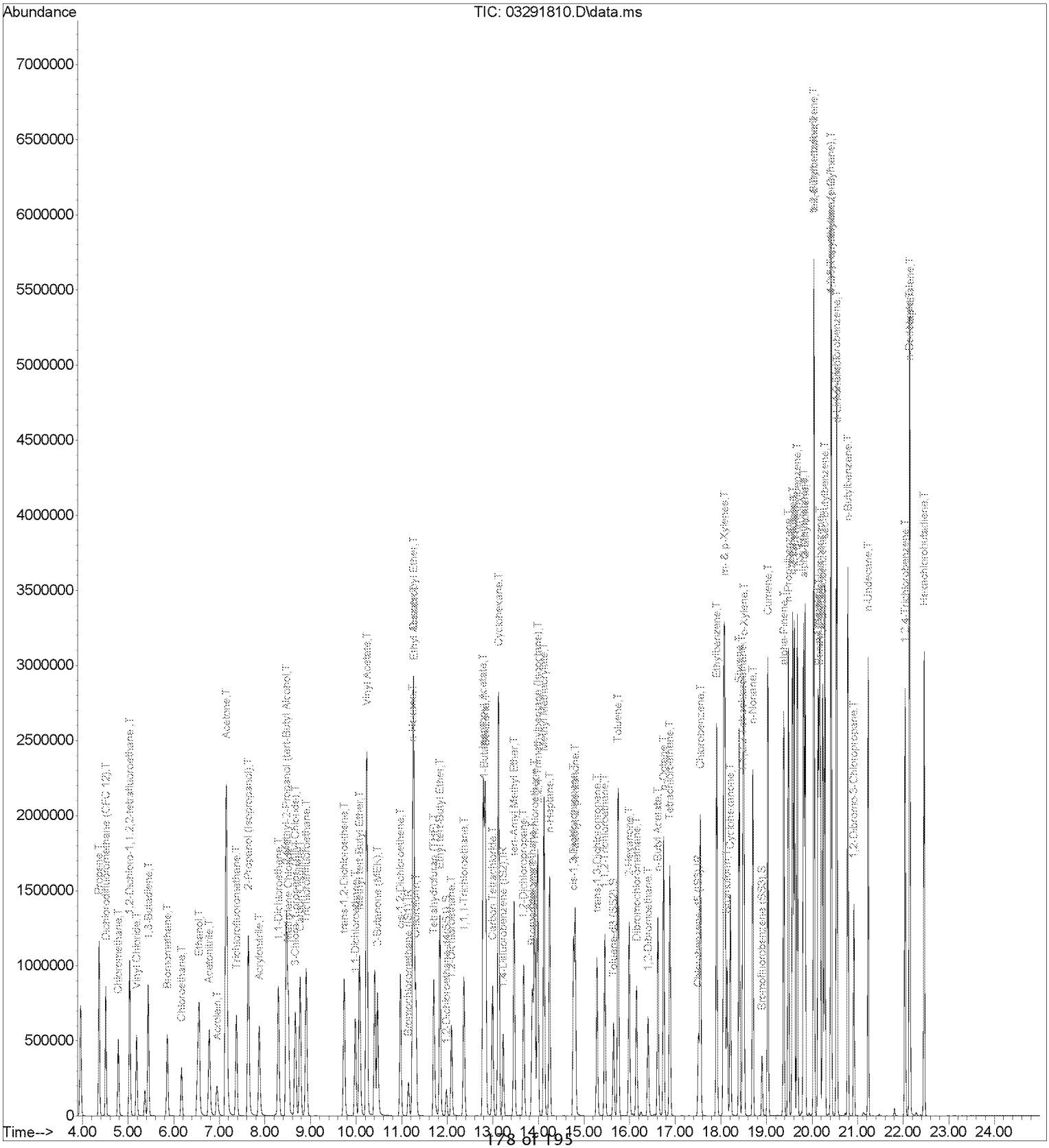
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.25 | 71 | 488739 | 32.714 ng | 99 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 852935 | 45.860 ng | 100 |
| 53) 4-Methyl-2-pentanone | 14.81 | 58 | 456028 | 40.483 ng | 98 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 725035 | 46.689 ng | 99 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 501444 | 41.611 ng | 100 |
| 58) Toluene | 15.75 | 91 | 2016335 | 44.468 ng | 100 |
| 59) 2-Hexanone | 15.99 | 43 | 985859 | 44.521 ng | 99 |
| 60) Dibromochloromethane | 16.16 | 129 | 608316 | 56.305 ng | 99 |
| 61) 1,2-Dibromoethane | 16.41 | 107 | 582230 | 57.309 ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 1111583 | 43.436 ng | 99 |
| 63) n-Octane | 16.75 | 57 | 397290 | 37.706 ng | 98 |
| 64) Tetrachloroethene | 16.89 | 166 | 677715 | 54.749 ng | 100 |
| 65) Chlorobenzene | 17.55 | 112 | 1433928 | 48.255 ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 2218509 | 43.949 ng | 99 |
| 67) m- & p-Xylenes | 18.08 | 91 | 3446368 | 86.663 ng | 100 |
| 68) Bromoform | 18.14 | 173 | 594669 | 67.448 ng | 99 |
| 69) Styrene | 18.40 | 104 | 1531003 | 54.297 ng | 99 |
| 70) o-Xylene | 18.51 | 91 | 1753384 | 43.669 ng | 99 |
| 71) n-Nonane | 18.71 | 43 | 823979 | 32.672 ng | 98 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 845783 | 47.008 ng | 100 |
| 74) Cumene | 19.04 | 105 | 2269456 | 40.490 ng | 99 |
| 75) alpha-Pinene | 19.38 | 93 | 1182371 | 47.382 ng | 99 |
| 76) n-Propylbenzene | 19.49 | 91 | 2617087 | 39.795 ng | 98 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 2282067 | 41.013 ng | 99 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 2158466 | 46.310 ng | 99 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 1920252 | 40.863 ng | 100 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 1125756 | 56.367 ng | 99 |
| 81) 2-Ethyltoluene | 19.85 | 105 | 2231897 | 44.940 ng | 99 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 1809605 | 44.074 ng | 99 |
| 83) n-Decane | 20.13 | 57 | 922352 | 35.457 ng | 99 |
| 84) Benzyl Chloride | 20.16 | 91 | 1657010 | 57.483 ng | 98 |
| 85) 1,3-Dichlorobenzene | 20.18 | 146 | 1285283 | 53.671 ng | 100 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 1321300 | 53.290 ng | 99 |
| 87) sec-Butylbenzene | 20.28 | 105 | 2541981 | 45.601 ng | 99 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 2229107 | 40.332 ng | 98 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 1786588 | 39.458 ng | 99 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 1197053 | 52.712 ng | 100 |
| 91) d-Limonene | 20.55 | 68 | 671132 | 42.033 ng | 97 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 483150 | 67.707 ng | 100 |
| 93) n-Undecane | 21.23 | 57 | 978766 | 38.555 ng | 98 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 1055950 | 68.904 ng | 100 |
| 95) Naphthalene | 22.15 | 128 | 2715730 | 56.784 ng | 99 |
| 96) n-Dodecane | 22.14 | 57 | 861748 | 41.604 ng | 97 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 693327 | 59.925 ng | 100 |
| 98) Cyclohexanone | 18.21 | 55 | 678901 | 44.468 ng | 99 |
| 99) tert-Butylbenzene | 20.04 | 119 | 1777908 | 44.662 ng | 99 |
| 100) n-Butylbenzene | 20.79 | 91 | 1973297 | 45.208 ng | 99 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291810.D Vial: 3
Acq On : 29 Mar 2018 20:36 Operator: RS
Sample : 50ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:45 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291811.D Vial: 3
Acq On : 29 Mar 2018 21:10 Operator: RS
Sample : 100ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

RS 3/30/18

Quant Time: Mar 30 08:47:47 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.15 | 130 | 114931 | 12.500 | ng | | 0.01 |
| 37) 1,4-Difluorobenzene (IS2) | 13.23 | 114 | 580071 | 12.500 | ng | | 0.01 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 192431 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.99 | 65 | 133327 | 9.286 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 74.32% | | | | | | | |
| 57) Toluene-d8 (SS2) | 15.65 | 98 | 532212 | 13.729 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 109.84% | | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 151560 | 12.472 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 99.76% | | | | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 932736 | 63.602 | ng | | 98 |
| 3) Dichlorodifluoromethan... | 4.51 | 85 | 1504969 | 56.136 | ng | | 99 |
| 4) Chloromethane | 4.79 | 50 | 989719 | 45.375 | ng | | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.04 | 135 | 975936 | 65.677 | ng | | 100 |
| 6) Vinyl Chloride | 5.18 | 62 | 1221459 | 53.105 | ng | | 99 |
| 7) 1,3-Butadiene | 5.45 | 54 | 878272 | 51.290 | ng | | 99 |
| 8) Bromomethane | 5.86 | 94 | 778034 | 61.389 | ng | | 100 |
| 9) Chloroethane | 6.17 | 64 | 650555 | 62.222 | ng | | 100 |
| 10) Ethanol | 6.60 | 45 | 2788726 | 294.968 | ng | | 100 |
| 11) Acetonitrile | 6.80 | 41 | 1651087 | 77.052 | ng | | 100 |
| 12) Acrolein | 6.95 | 56 | 567802 | 82.391 | ng | | 100 |
| 13) Acetone | 7.18 | 58 | 2610545 | 232.927 | ng | | 98 |
| 14) Trichlorofluoromethane | 7.38 | 101 | 1402309 | 60.708 | ng | | 99 |
| 15) 2-Propanol (Isopropanol) | 7.67 | 45 | 3442493 | 103.744 | ng | | 99 |
| 16) Acrylonitrile | 7.89 | 53 | 1256285 | 77.152 | ng | | 100 |
| 17) 1,1-Dichloroethene | 8.30 | 96 | 965216 | 73.032 | ng | | 98 |
| 18) 2-Methyl-2-Propanol (t... | 8.50 | 59 | 2814532 | 88.617 | ng | | 99 |
| 19) Methylene Chloride | 8.53 | 84 | 937624 | 70.996 | ng | | 95 |
| 20) 3-Chloro-1-propene (Al... | 8.67 | 41 | 1264252 | 61.898 | ng | | 98 |
| 21) Trichlorotrifluoroethane | 8.91 | 151 | 974739 | 80.387 | ng | | 98 |
| 22) Carbon Disulfide | 8.78 | 76 | 3359914 | 71.526 | ng | | 99 |
| 23) trans-1,2-Dichloroethene | 9.74 | 61 | 1286005 | 73.325 | ng | | 98 |
| 24) 1,1-Dichloroethane | 9.99 | 63 | 1516359 | 61.935 | ng | | 99 |
| 25) Methyl tert-Butyl Ether | 10.08 | 73 | 2670157 | 66.846 | ng | | 100 |
| 26) Vinyl Acetate | 10.26 | 86 | 1014788 | 361.246 | ng | # | 69 |
| 27) 2-Butanone (MEK) | 10.48 | 72 | 656769 | 81.000 | ng | | 94 |
| 28) cis-1,2-Dichloroethene | 10.98 | 61 | 1204469 | 66.219 | ng | | 99 |
| 29) Diisopropyl Ether | 11.26 | 87 | 694564 | 57.469 | ng | # | 94 |
| 30) Ethyl Acetate | 11.28 | 61 | 540416 | 117.851 | ng | | 93 |
| 31) n-Hexane | 11.25 | 57 | 1154737 | 45.102 | ng | | 98 |
| 32) Chloroform | 11.32 | 83 | 1511201 | 65.313 | ng | | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 648783 | 76.385 | ng | | 97 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 1119732 | 73.345 | ng | | 95 |
| 36) 1,2-Dichloroethane | 12.10 | 62 | 1054716 | 61.007 | ng | | 99 |
| 38) 1,1,1-Trichloroethane | 12.37 | 97 | 1328711 | 68.324 | ng | | 100 |
| 39) Isopropyl Acetate | 12.79 | 61 | 998915 | 114.363 | ng | | 94 |
| 40) 1-Butanol | 12.84 | 56 | 1556541 | 129.825 | ng | | 98 |
| 41) Benzene | 12.84 | 78 | 3067508 | 55.608 | ng | | 98 |
| 42) Carbon Tetrachloride | 13.00 | 117 | 1221435 | 73.568 | ng | | 100 |
| 43) Cyclohexane | 13.13 | 84 | 2591886 | 114.785 | ng | | 96 |
| 44) tert-Amyl Methyl Ether | 13.47 | 73 | 2529242 | 66.477 | ng | | 99 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 894896 | 66.474 | ng | | 100 |
| 46) Bromodichloromethane | 13.87 | 83 | 1194531 | 71.131 | ng | | 100 |
| 47) Trichloroethene | 13.93 | 130 | 1124968 | 77.152 | ng | | 100 |
| 48) 1,4-Dioxane | 13.90 | 88 | 814708 | 77.594 | ng | | 98 |
| 49) 2,2,4-Trimethylpentane... | 13.99 | 57 | 3421941 | 55.933 | ng | | 96 |
| 50) Methyl Methacrylate | 14.13 | 100 | 818010 | 179.769 | ng | | 93 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291811.D Vial: 3
Acq On : 29 Mar 2018 21:10 Operator: RS
Sample : 100ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:47 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

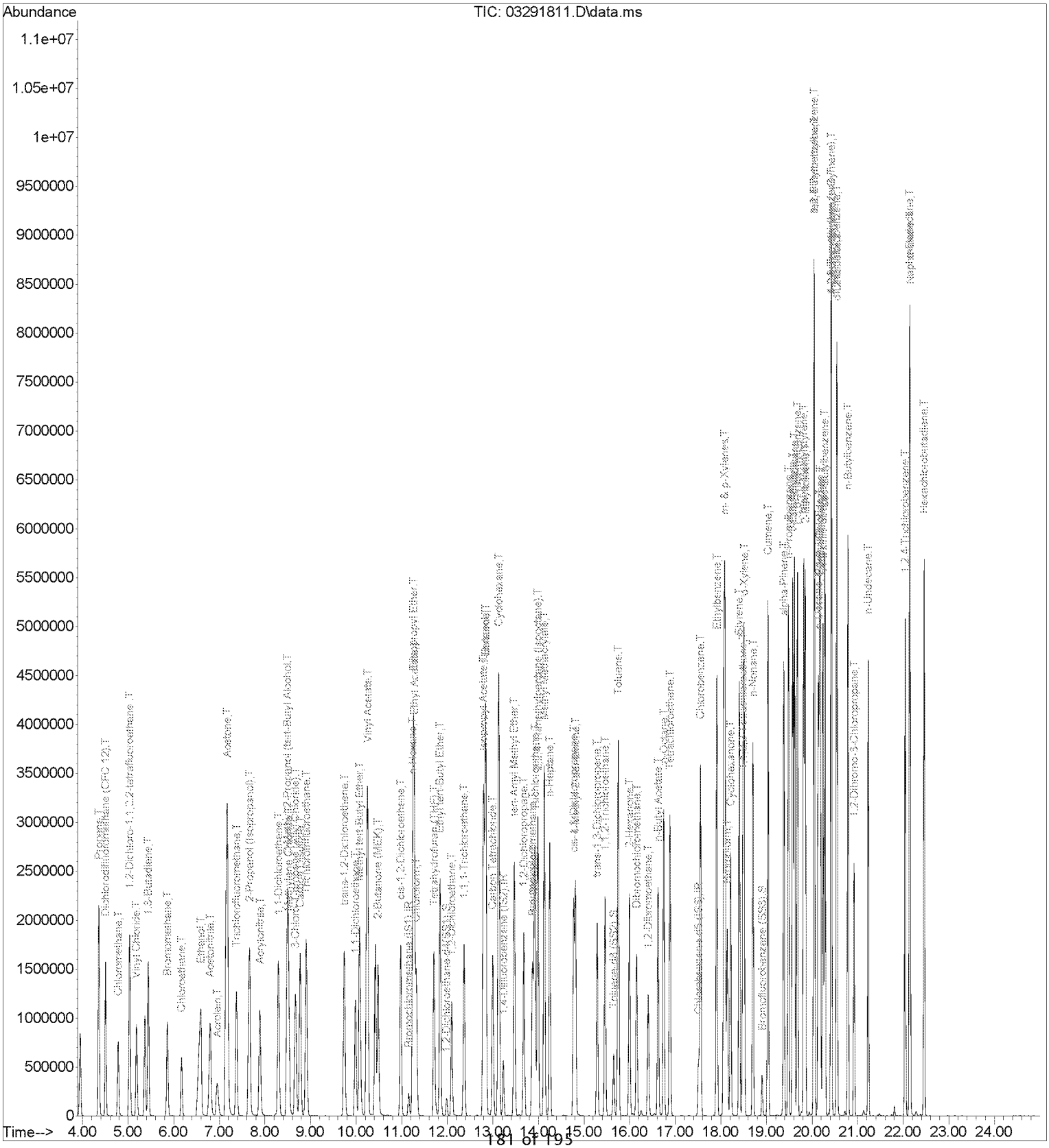
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.25 | 71 | 879846 | 57.563 ng | 98 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 1588377 | 83.474 ng | 99 |
| 53) 4-Methyl-2-pentanone | 14.81 | 58 | 825001 | 71.584 ng | 96 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 1378249 | 86.747 ng | 99 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 939728 | 76.219 ng | 99 |
| 58) Toluene | 15.75 | 91 | 3598255 | 77.705 ng | 99 |
| 59) 2-Hexanone | 16.00 | 43 | 1766592 | 78.120 ng | 98 |
| 60) Dibromochloromethane | 16.16 | 129 | 1166293 | 105.707 ng | 99 |
| 61) 1,2-Dibromoethane | 16.41 | 107 | 1102052 | 106.220 ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 1985715 | 75.981 ng | 98 |
| 63) n-Octane | 16.75 | 57 | 700871 | 65.136 ng | 95 |
| 64) Tetrachloroethene | 16.89 | 166 | 1283734 | 101.550 ng | 99 |
| 65) Chlorobenzene | 17.56 | 112 | 2617211 | 86.244 ng | 99 |
| 66) Ethylbenzene | 17.92 | 91 | 3910491 | 75.857 ng | 97 |
| 67) m- & p-Xylenes | 18.09 | 91 | 5954481 | 146.620 ng | 99 |
| 68) Bromoform | 18.14 | 173 | 1150158 | 127.741 ng | 99 |
| 69) Styrene | 18.40 | 104 | 2727140 | 94.708 ng | 97 |
| 70) o-Xylene | 18.51 | 91 | 3064928 | 74.747 ng | 99 |
| 71) n-Nonane | 18.71 | 43 | 1383581 | 53.721 ng | 96 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 1475574 | 80.307 ng | 99 |
| 74) Cumene | 19.04 | 105 | 3933201 | 68.715 ng | 97 |
| 75) alpha-Pinene | 19.38 | 93 | 2089631 | 81.999 ng | 97 |
| 76) n-Propylbenzene | 19.49 | 91 | 4462030 | 66.439 ng | 95 |
| 77) 3-Ethyltoluene | 19.58 | 105 | 4146913 | 72.978 ng | 97 |
| 78) 4-Ethyltoluene | 19.62 | 105 | 3535746 | 74.283 ng | 96 |
| 79) 1,3,5-Trimethylbenzene | 19.69 | 105 | 3362118 | 70.058 ng | 99 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 2002323 | 98.173 ng | 99 |
| 81) 2-Ethyltoluene | 19.86 | 105 | 3868423 | 76.273 ng | 97 |
| 82) 1,2,4-Trimethylbenzene | 20.05 | 105 | 3008469 | 71.749 ng | 99 |
| 83) n-Decane | 20.14 | 57 | 1516953 | 57.103 ng | 96 |
| 84) Benzyl Chloride | 20.16 | 91 | 2907471 | 98.765 ng | 96 |
| 85) 1,3-Dichlorobenzene | 20.19 | 146 | 2298021 | 93.967 ng | 100 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 2389425 | 94.366 ng | 99 |
| 87) sec-Butylbenzene | 20.28 | 105 | 4290365 | 75.365 ng | 96 |
| 88) 4-Isopropyltoluene (p-... | 20.43 | 119 | 3559625 | 63.067 ng | 95 |
| 89) 1,2,3-Trimethylbenzene | 20.43 | 105 | 2965526 | 64.134 ng | 98 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 2025829 | 87.354 ng | 100 |
| 91) d-Limonene | 20.55 | 68 | 1083124 | 66.426 ng | 92 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.93 | 157 | 931874 | 127.875 ng | 99 |
| 93) n-Undecane | 21.23 | 57 | 1605820 | 61.941 ng | 95 |
| 94) 1,2,4-Trichlorobenzene | 22.05 | 180 | 1972454 | 126.033 ng | 99 |
| 95) Naphthalene | 22.15 | 128 | 4457287 | 91.262 ng | 98 |
| 96) n-Dodecane | 22.14 | 57 | 1380677 | 65.271 ng | 95 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 1311362 | 110.987 ng | 100 |
| 98) Cyclohexanone | 18.22 | 55 | 1248263 | 80.062 ng | 98 |
| 99) tert-Butylbenzene | 20.05 | 119 | 2943639 | 72.408 ng | 98 |
| 100) n-Butylbenzene | 20.79 | 91 | 3338758 | 74.901 ng | 97 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291811.D Vial: 3
Acq On : 29 Mar 2018 21:10 Operator: RS
Sample : 100ng TO15 ICAL std Inst : MS13
Msc : S31-03281803/S31-03201804 (4/18)

Quant Time: Mar 30 08:47:47 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:47:08 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291814.D Vial: 3
Acq On : 29 Mar 2018 22:52 Operator: RS
Sample : 25ng ICV TO15 std Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

RS 3/30/18

Quant Time: Mar 30 09:35:50 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.14 | 130 | 108310 | 12.500 | ng | -0.01 |
| 37) 1,4-Difluorobenzene (IS2) | 13.23 | 114 | 535447 | 12.500 | ng | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 183372 | 12.500 | ng | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.97 | 65 | 124603 | 12.470 | ng | -0.01 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 99.76% | | | | | | |
| 57) Toluene-d8 (SS2) | 15.65 | 98 | 496079 | 12.243 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 97.92% | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 147864 | 12.939 | ng | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 103.52% | | | | | | |
| **Target Compounds** | | | | | | Qvalue |
| 2) Propene | 4.35 | 42 | 227926 | 21.681 | ng | 100 |
| 3) Dichlorodifluoromethan... | 4.50 | 85 | 406724 | 22.298 | ng | 100 |
| 4) Chloromethane | 4.77 | 50 | 336434 | 23.606 | ng | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.03 | 135 | 266165 | 23.053 | ng | 100 |
| 6) Vinyl Chloride | 5.17 | 62 | 335900 | 23.800 | ng | 100 |
| 7) 1,3-Butadiene | 5.43 | 54 | 236288 | 25.793 | ng | 99 |
| 8) Bromomethane | 5.84 | 94 | 229478 | 23.954 | ng | 100 |
| 9) Chloroethane | 6.16 | 64 | 180081 | 24.868 | ng | 100 |
| 10) Ethanol | 6.52 | 45 | 803972 | 128.572 | ng | 99 |
| 11) Acetonitrile | 6.76 | 41 | 423959 | 27.988 | ng | 100 |
| 12) Acrolein | 6.94 | 56 | 150986 | 25.898 | ng | 99 |
| 13) Acetone | 7.14 | 58 | 844559 | 116.195 | ng | 99 |
| 14) Trichlorofluoromethane | 7.36 | 101 | 365877 | 22.909 | ng | 100 |
| 15) 2-Propanol (Isopropanol) | 7.61 | 45 | 1131479 | 51.681 | ng | 100 |
| 16) Acrylonitrile | 7.86 | 53 | 325662 | 28.779 | ng | 100 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 254244 | 24.387 | ng | 97 |
| 18) 2-Methyl-2-Propanol (t... | 8.45 | 59 | 1122998 | 50.499 | ng | 100 |
| 19) Methylene Chloride | 8.51 | 84 | 261362 | 22.440 | ng | 99 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 346586 | 26.707 | ng | 100 |
| 21) Trichlorotrifluoroethane | 8.90 | 151 | 254357 | 23.631 | ng | 100 |
| 22) Carbon Disulfide | 8.76 | 76 | 926033 | 22.977 | ng | 100 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 338424 | 29.279 | ng | 99 |
| 24) 1,1-Dichloroethane | 9.98 | 63 | 416282 | 24.058 | ng | 100 |
| 25) Methyl tert-Butyl Ether | 10.07 | 73 | 717116 | 24.271 | ng | 100 |
| 26) Vinyl Acetate | 10.23 | 86 | 297573 | 140.323 | ng | 100 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 171647 | 27.023 | ng | 100 |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 317738 | 25.303 | ng | 99 |
| 29) Diisopropyl Ether | 11.26 | 87 | 244625 | 25.726 | ng | 98 |
| 30) Ethyl Acetate | 11.26 | 61 | 174359 | 52.444 | ng | 99 |
| 31) n-Hexane | 11.24 | 57 | 354008 | 22.520 | ng | 100 |
| 32) Chloroform | 11.31 | 83 | 399823 | 24.082 | ng | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 173105 | 23.467 | ng | 98 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 298303 | 25.304 | ng | 99 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 273669 | 25.852 | ng | 100 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 341764 | 24.211 | ng | 100 |
| 39) Isopropyl Acetate | 12.79 | 61 | 303171 | 50.753 | ng | 98 |
| 40) 1-Butanol | 12.80 | 56 | 457745 | 54.017 | ng | 99 |
| 41) Benzene | 12.84 | 78 | 993879 | 24.473 | ng | 100 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 315318 | 25.071 | ng | 100 |
| 43) Cyclohexane | 13.12 | 84 | 777023 | 46.764 | ng | 100 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 692331 | 24.539 | ng | 100 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 241633 | 24.458 | ng | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 319676 | 22.301 | ng | 100 |
| 47) Trichloroethene | 13.91 | 130 | 299619 | 24.557 | ng | 99 |
| 48) 1,4-Dioxane | 13.89 | 88 | 223969 | 25.902 | ng | 100 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 1006684 | 22.581 | ng | 99 |
| 50) Methyl Methacrylate | 14.12 | 100 | 228271 | 53.832 | ng | 99 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291814.D Vial: 3
Acq On : 29 Mar 2018 22:52 Operator: RS
Sample : 25ng ICV TO15 std Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

Quant Time: Mar 30 09:35:50 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

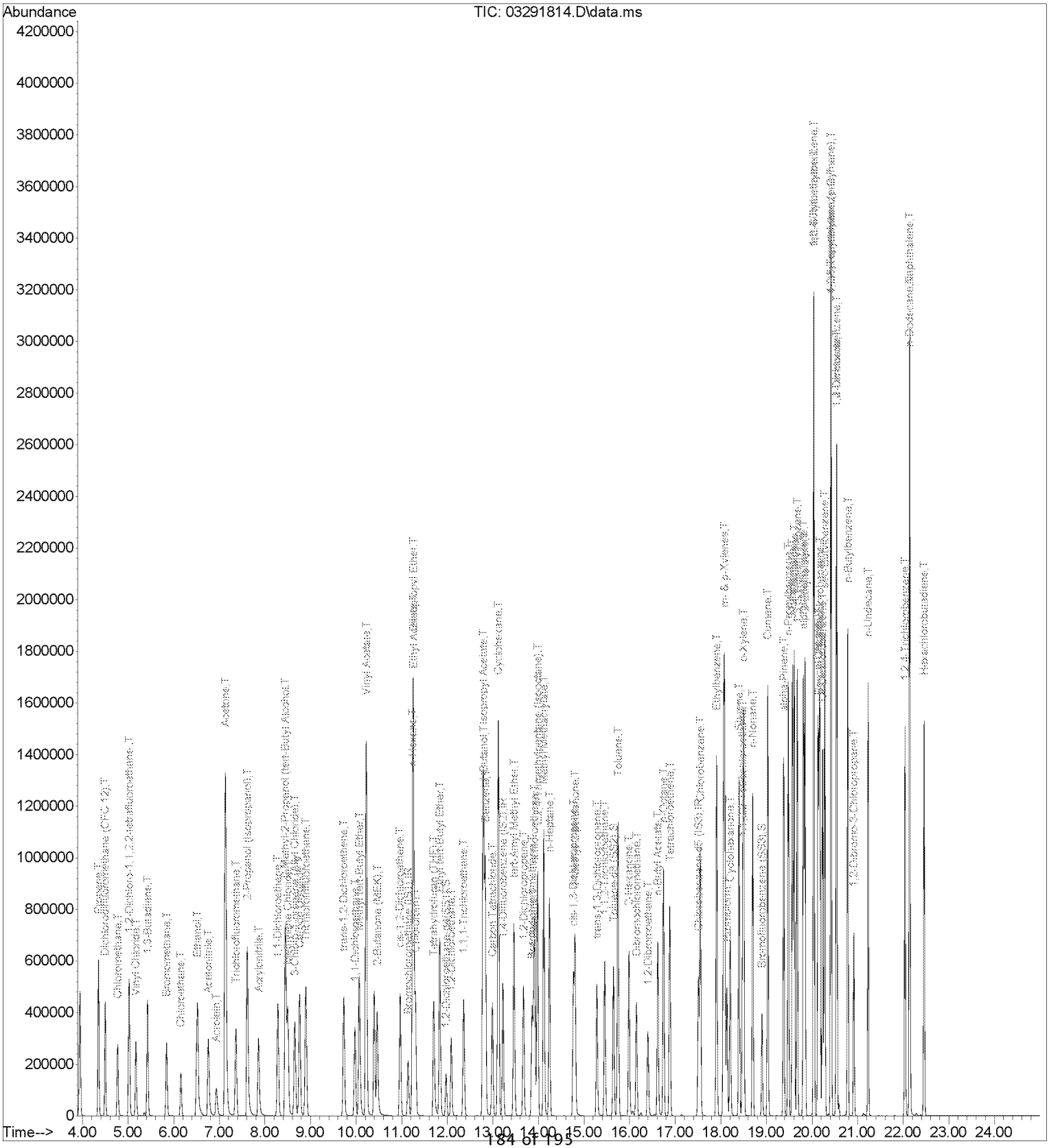
| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 247503 | 23.791 | ng | 99 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 404231 | 28.212 | ng | 100 |
| 53) 4-Methyl-2-pentanone | 14.80 | 58 | 231104 | 27.654 | ng | 100 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 359601 | 29.444 | ng | 100 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 251673 | 26.359 | ng | 100 |
| 58) Toluene | 15.75 | 91 | 1039381 | 22.724 | ng | 100 |
| 59) 2-Hexanone | 15.99 | 43 | 501090 | 26.161 | ng | 100 |
| 60) Dibromochloromethane | 16.15 | 129 | 302631 | 26.644 | ng | 100 |
| 61) 1,2-Dibromoethane | 16.40 | 107 | 289893 | 29.772 | ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 563714 | 28.940 | ng | 100 |
| 63) n-Octane | 16.74 | 57 | 202561 | 22.668 | ng | 99 |
| 64) Tetrachloroethene | 16.89 | 166 | 341188 | 23.763 | ng | 100 |
| 65) Chlorobenzene | 17.55 | 112 | 731750 | 23.617 | ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 1164185 | 23.625 | ng | 100 |
| 67) m- & p-Xylenes | 18.08 | 91 | 1813535 | 46.473 | ng | 100 |
| 68) Bromoform | 18.14 | 173 | 291149 | 27.916 | ng | 100 |
| 69) Styrene | 18.40 | 104 | 785784 | 26.691 | ng | 100 |
| 70) o-Xylene | 18.50 | 91 | 923403 | 23.749 | ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 440319 | 23.015 | ng | 100 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 436144 | 24.961 | ng | 100 |
| 74) Cumene | 19.03 | 105 | 1199850 | 23.361 | ng | 100 |
| 75) alpha-Pinene | 19.38 | 93 | 617155 | 24.307 | ng | 100 |
| 76) n-Propylbenzene | 19.48 | 91 | 1397661 | 24.129 | ng | 100 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 1221427 | 23.824 | ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 1130854 | 24.073 | ng | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 997508 | 22.285 | ng | 100 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 591103 | 27.624 | ng | 100 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 1176507 | 23.186 | ng | 100 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 984461 | 23.587 | ng | 100 |
| 83) n-Decane | 20.13 | 57 | 500080 | 23.497 | ng | 100 |
| 84) Benzyl Chloride | 20.16 | 91 | 839407 | 33.309 | ng | 100 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 669767 | 26.690 | ng | 99 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 676095 | 24.787 | ng | 99 |
| 87) sec-Butylbenzene | 20.28 | 105 | 1348949 | 23.431 | ng | 100 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 1253829 | 23.231 | ng | 100 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 1008409 | 23.748 | ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 635380 | 26.017 | ng | 100 |
| 91) d-Limonene | 20.54 | 68 | 379503 | 24.937 | ng | 100 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 241787 | 28.618 | ng | 100 |
| 93) n-Undecane | 21.23 | 57 | 522598 | 24.870 | ng | 99 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 538298 | 29.955 | ng | 100 |
| 95) Naphthalene | 22.14 | 128 | 1454469 | 28.746 | ng | 100 |
| 96) n-Dodecane | 22.14 | 57 | 474287 | 28.942 | ng | 100 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 350044 | 24.968 | ng | 100 |
| 98) Cyclohexanone | 18.21 | 55 | 338402 | 26.564 | ng | 100 |
| 99) tert-Butylbenzene | 20.04 | 119 | 974800 | 23.006 | ng | 100 |
| 100) n-Butylbenzene | 20.79 | 91 | 1051416 | 24.744 | ng | 100 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_03\29\03291814.D Vial: 3
Acq On : 29 Mar 2018 22:52 Operator: RS
Sample : 25ng ICV TO15 std Inst : MS13
Msc : S31-03281803/S31-03231802 (4/21)

Quant Time: Mar 30 09:35:50 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M



# Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

RS 3/30/18

Data File Name: **03291814.D**
Data File Path: **I:\MS13\DATA\2018_03\29**
Operator: **RS**
Date Acquired: **3/29/2018** **22:52**

Acq. Method File: **TO15.M**
Sample Name: **25ng ICV TO15 std**
Misc Info: **S31-03281803/S31-03231802 (**
Instrument Name: **MS13**

| # | Compound Name | Ret. Time | Amt. (ng) | Spike Amt.(ng) | % Rec. | Lower Limit | Upper Limit | * OR Fail | ICV/AZ 70-130% |
|---|---|---|---|---|---|---|---|---|---|
| **2)** | **Propene** | **4.35** | **21.681** | 26.275 | 83 | **54** | **133** | * | * |
| **3)** | **Dichlorodifluoromethane (CFC 1** | **4.50** | **22.298** | **26.600** | 84 | **64** | **115** | * | * |
| **4)** | **Chloromethane** | **4.77** | **23.606** | **26.250** | 90 | **47** | **140** | * | * |
| **5)** | **1,2-Dichloro-1,1,2,2-tetrafluoroet** | **5.03** | **23.053** | **26.325** | 88 | **60** | **112** | * | * |
| **6)** | **Vinyl Chloride** | **5.17** | **23.800** | **26.350** | 90 | **63** | **127** | * | * |
| **7)** | **1,3-Butadiene** | **5.43** | **25.793** | **26.225** | 98 | **57** | **149** | * | * |
| **8)** | **Bromomethane** | **5.84** | **23.954** | **26.225** | 91 | **63** | **132** | * | * |
| **9)** | **Chloroethane** | **6.16** | **24.868** | **26.250** | 95 | **68** | **129** | * | * |
| **10)** | **Ethanol** | **6.52** | **128.572** | **130.375** | 99 | **62** | **131** | * | * |
| **11)** | **Acetonitrile** | **6.76** | **27.988** | **26.200** | 107 | **56** | **136** | * | * |
| **12)** | **Acrolein** | **6.94** | **25.898** | **26.075** | 99 | **60** | **132** | * | * |
| **13)** | **Acetone** | **7.14** | **116.195** | **131.825** | 88 | **63** | **124** | * | * |
| **14)** | **Trichlorofluoromethane** | **7.36** | **22.909** | **26.025** | 88 | **65** | **113** | * | * |
| **15)** | **2-Propanol (Isopropanol)** | **7.61** | **51.681** | **52.775** | 98 | **62** | **135** | * | * |
| **16)** | **Acrylonitrile** | **7.86** | **28.779** | **26.450** | 109 | **68** | **138** | * | * |
| **17)** | **1,1-Dichloroethene** | **8.29** | **24.387** | **26.675** | 91 | **72** | **118** | * | * |
| 18) | 2-Methyl-2-Propanol (tert-Butyl Alc | 8.45 | 50.499 | 53.350 | 95 | 61 | 128 | * | * |
| **19)** | **Methylene Chloride** | **8.51** | **22.440** | **26.600** | 84 | **67** | **116** | * | * |
| **20)** | **3-Chloro-1-propene (Allyl Chloric** | **8.66** | **26.707** | **26.525** | 101 | **61** | **143** | * | * |
| **21)** | **Trichlorotrifluoroethane** | **8.90** | **23.631** | **26.750** | 88 | **68** | **113** | * | * |
| **22)** | **Carbon Disulfide** | **8.76** | **22.977** | **26.725** | 86 | **68** | **120** | * | * |
| **23)** | **trans-1,2-Dichloroethene** | **9.73** | **29.279** | **26.700** | 110 | **71** | **125** | * | * |
| **24)** | **1,1-Dichloroethane** | **9.98** | **24.058** | **26.525** | 91 | **68** | **118** | * | * |
| **25)** | **Methyl tert-Butyl Ether** | **10.07** | **24.271** | **26.625** | 91 | **60** | **123** | * | * |
| **26)** | **Vinyl Acetate** | **10.23** | **140.323** | **132.750** | 106 | **73** | **135** | * | * |
| **27)** | **2-Butanone (MEK)** | **10.47** | **27.023** | **26.450** | 102 | **70** | **129** | * | * |
| **28)** | **cis-1,2-Dichloroethene** | **10.97** | **25.303** | **26.475** | 96 | **69** | **121** | * | * |
| 29) | Diisopropyl Ether | 11.26 | 25.726 | 26.600 | 97 | 65 | 117 | * | * |
| **30)** | **Ethyl Acetate** | **11.26** | **52.444** | **53.300** | 98 | **66** | **140** | * | * |
| **31)** | **n-Hexane** | **11.24** | **22.520** | **26.625** | 85 | **61** | **124** | * | * |
| **32)** | **Chloroform** | **11.31** | **24.082** | **26.500** | 91 | **69** | **113** | * | * |
| **34)** | **Tetrahydrofuran (THF)** | **11.71** | **23.467** | **26.550** | 88 | **66** | **121** | * | * |
| 35) | Ethyl tert-Butyl Ether | 11.84 | 25.304 | 26.525 | 95 | 69 | 120 | * | * |
| **36)** | **1,2-Dichloroethane** | **12.09** | **25.852** | **26.500** | 98 | **62** | **120** | * | * |
| **38)** | **1,1,1-Trichloroethane** | **12.36** | **24.211** | **26.525** | 91 | **65** | **116** | * | * |
| 39) | Isopropyl Acetate | 12.79 | 50.753 | 53.275 | 95 | 70 | 126 | * | * |
| 40) | 1-Butanol | 12.80 | 54.017 | 53.300 | 101 | 62 | 141 | * | * |
| **41)** | **Benzene** | **12.84** | **24.473** | **26.625** | 92 | **66** | **111** | * | * |
| **42)** | **Carbon Tetrachloride** | **12.99** | **25.071** | **26.700** | 94 | **64** | **122** | * | * |
| **43)** | **Cyclohexane** | **13.12** | **46.764** | **53.150** | 88 | **69** | **115** | * | * |
| **44)** | tert-Amyl Methyl Ether | 13.46 | 24.539 | **26.550** | 92 | 68 | 119 | * | * |
| **45)** | **1,2-Dichloropropane** | **13.68** | **24.458** | **26.525** | 92 | **69** | **121** | * | * |
| **46)** | **Bromodichloromethane** | **13.86** | **22.301** | **26.700** | 84 | **69** | **123** | * | * |
| **47)** | **Trichloroethene** | **13.91** | **24.557** | **26.550** | 92 | **69** | **112** | * | * |
| **48)** | **1,4-Dioxane** | **13.89** | **25.902** | **26.600** | 97 | **74** | **123** | * | * |
| 49) | 2,2,4-Trimethylpentane (Isooctane) | 13.98 | 22.581 | 26.525 | 85 | 67 | 120 | * | * |

**Bold = 75 Compound List**
*** = Pass**

# Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: **03291814.D** TO15.M
Data File Path: **I:\MS13\DATA\2018_03\29** Sample Name: **25ng ICV TO15 std**
Operator: **RS** Misc Info: **S31-03281803/S31-03231802 (**
Date Acquired: **3/29/2018 22:52** Instrument Name: **MS13**

| # | Compound Name | Ret. Time | Amt. (ng) | Spike Amt.(ng) | % Rec. | Lower Limit | Upper Limit | * OR Fail | ICV/AZ 70-130% |
|---|---|---|---|---|---|---|---|---|---|
| 50) | Methyl Methacrylate | 14.12 | 53.832 | 52.950 | 102 | 75 | 125 | * | * |
| 51) | n-Heptane | 14.24 | 23.791 | 26.625 | 89 | 68 | 118 | * | * |
| 52) | cis-1,3-Dichloropropene | 14.77 | 28.212 | 26.025 | 108 | 74 | 129 | * | * |
| 53) | 4-Methyl-2-pentanone | 14.80 | 27.654 | 26.650 | 104 | 66 | 138 | * | * |
| 54) | trans-1,3-Dichloropropene | 15.29 | 29.444 | 26.625 | 111 | 75 | 130 | * | * |
| 55) | 1,1,2-Trichloroethane | 15.46 | 26.359 | 26.500 | 99 | 73 | 117 | * | * |
| 58) | Toluene | 15.75 | 22.724 | 26.400 | 86 | 66 | 114 | * | * |
| 59) | 2-Hexanone | 15.99 | 26.161 | 26.425 | 99 | 58 | 146 | * | * |
| 60) | Dibromochloromethane | 16.15 | 26.644 | 26.450 | 101 | 67 | 130 | * | * |
| 61) | 1,2-Dibromoethane | 16.40 | 29.772 | 26.425 | 113 | 70 | 127 | * | * |
| 62) | n-Butyl Acetate | 16.62 | 28.940 | 26.850 | 108 | 62 | 140 | * | * |
| 63) | n-Octane | 16.74 | 22.668 | 26.525 | 85 | 65 | 121 | * | * |
| 64) | Tetrachloroethene | 16.89 | 23.763 | 26.500 | 90 | 62 | 119 | * | * |
| 65) | Chlorobenzene | 17.55 | 23.617 | 26.525 | 89 | 66 | 115 | * | * |
| 66) | Ethylbenzene | 17.91 | 23.625 | 26.475 | 89 | 69 | 117 | * | * |
| 67) | m- & p-Xylenes | 18.08 | 46.473 | 52.975 | 88 | 67 | 117 | * | * |
| 68) | Bromoform | 18.14 | 27.916 | 26.525 | 105 | 67 | 135 | * | * |
| 69) | Styrene | 18.40 | 26.691 | 26.350 | 101 | 70 | 128 | * | * |
| 70) | o-Xylene | 18.50 | 23.749 | 26.400 | 90 | 67 | 118 | * | * |
| 71) | n-Nonane | 18.70 | 23.015 | 26.500 | 87 | 61 | 127 | * | * |
| 72) | 1,1,2,2-Tetrachloroethane | 18.48 | 24.961 | 26.450 | 94 | 70 | 125 | * | * |
| 74) | Cumene | 19.03 | 23.361 | 26.525 | 88 | 68 | 116 | * | * |
| 75) | alpha-Pinene | 19.38 | 24.307 | 26.600 | 91 | 69 | 122 | * | * |
| 76) | n-Propylbenzene | 19.48 | 24.129 | 26.750 | 90 | 70 | 118 | * | * |
| 77) | 3-Ethyltoluene | 19.57 | 23.824 | 26.450 | 90 | 68 | 117 | * | * |
| 78) | 4-Ethyltoluene | 19.61 | 24.073 | 26.425 | 91 | 69 | 124 | * | * |
| 79) | 1,3,5-Trimethylbenzene | 19.68 | 22.285 | 26.500 | 84 | 65 | 117 | * | * |
| 80) | alpha-Methylstyrene | 19.82 | 27.624 | 26.525 | 104 | 71 | 132 | * | * |
| 81) | 2-Ethyltoluene | 19.84 | 23.186 | 26.700 | 87 | 67 | 119 | * | * |
| 82) | 1,2,4-Trimethylbenzene | 20.04 | 23.587 | 26.550 | 89 | 67 | 124 | * | * |
| 83) | n-Decane | 20.13 | 23.497 | 26.625 | 88 | 63 | 129 | * | * |
| 84) | Benzyl Chloride | 20.16 | 33.309 | 26.550 | 125 | 75 | 142 | * | * |
| 85) | 1,3-Dichlorobenzene | 20.17 | 26.690 | 26.475 | 101 | 70 | 124 | * | * |
| 86) | 1,4-Dichlorobenzene | 20.24 | 24.787 | 26.750 | 93 | 63 | 124 | * | * |
| 87) | sec-Butylbenzene | 20.28 | 23.431 | 26.575 | 88 | 68 | 119 | * | * |
| 88) | 4-Isopropyltoluene (p-Cymene) | 20.42 | 23.231 | 26.600 | 87 | 65 | 122 | * | * |
| 89) | 1,2,3-Trimethylbenzene | 20.42 | 23.748 | 26.600 | 89 | 66 | 128 | * | * |
| 90) | 1,2-Dichlorobenzene | 20.54 | 26.017 | 26.750 | 97 | 66 | 125 | * | * |
| 91) | d-Limonene | 20.54 | 24.937 | 26.625 | 94 | 64 | 135 | * | * |
| 92) | 1,2-Dibromo-3-Chloropropane | 20.92 | 28.618 | 26.300 | 109 | 73 | 136 | * | * |
| 93) | n-Undecane | 21.23 | 24.870 | 26.775 | 93 | 67 | 135 | * | * |
| 94) | 1,2,4-Trichlorobenzene | 22.04 | 29.955 | 27.200 | 110 | 70 | 141 | * | * |
| 95) | Naphthalene | 22.14 | 28.746 | 26.125 | 110 | 71 | 146 | * | * |
| 96) | n-Dodecane | 22.14 | 28.942 | 26.825 | 108 | 69 | 152 | * | * |
| 97) | Hexachlorobutadiene | 22.46 | 24.968 | 26.550 | 94 | 63 | 126 | * | * |
| 98) | Cyclohexanone | 18.21 | 26.564 | 26.150 | 102 | 58 | 138 | * | * |
| 99) | tert-Butylbenzene | 20.04 | 23.006 | 26.525 | 87 | 65 | 121 | * | * |
| 100) | n-Butylbenzene | 20.79 | 24.744 | 26.575 | 93 | 71 | 125 | * | * |

# Evaluate Continuing Calibration Report

Data File : I:\MS13\DATA\2018_04\04\04041801.D  Vial: 3
Acq On : 4 Apr 2018 1:37  Operator: RS
Sample : CCV R130404018_25ng  Inst : MS13
Msc : S31-03281703/S31-03201804 (4/18)

RS 4/4/18

Quant Time: Apr 04 07:43:59 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

| | | Compound | AvgRF | CCRF | %Dev | Area% | Dev(min) |
|---|---|---|---|---|---|---|---|
| 1 | IR | Bromochloromethane (IS1) | 1.000 | 1.000 | 0.0 | 73 | -0.01 |
| 2 | T | Propene | 1.213 | 0.920 | 24.2 | 64 | 0.00 |
| 3 | T | Dichlorodifluoromethane (CF | 2.105 | 1.728 | 17.9 | 69 | 0.00 |
| 4 | T | Chloromethane | 1.645 | 1.332 | 19.0 | 65 | 0.00 |
| 5 | T | 1,2-Dichloro-1,1,2,2-tetraf | 1.333 | 1.133 | 15.0 | 71 | -0.01 |
| 6 | T | Vinyl Chloride | 1.629 | 1.346 | 17.4 | 65 | 0.00 |
| 7 | T | 1,3-Butadiene | 1.057 | 0.974 | 7.9 | 67 | -0.02 |
| 8 | T | Bromomethane | 1.106 | 0.960 | 13.2 | 69 | -0.01 |
| 9 | T | Chloroethane | 0.836 | 0.728 | 12.9 | 66 | -0.01 |
| 10 | T | Ethanol | 0.722 | 0.636 | 11.9 | 65 | -0.07 |
| 11 | T | Acetonitrile | 1.748 | 1.665 | 4.7 | 64 | -0.04 |
| 12 | T | Acrolein | 0.673 | 0.598 | 11.1 | 66 | -0.02 |
| 13 | T | Acetone | 0.839 | 0.674 | 19.7 | 66 | -0.04 |
| 14 | T | Trichlorofluoromethane | 1.843 | 1.532 | 16.9 | 69 | -0.01 |
| 15 | T | 2-Propanol (Isopropanol) | 2.527 | 2.269 | 10.2 | 66 | -0.05 |
| 16 | T | Acrylonitrile | 1.306 | 1.298 | 0.6 | 66 | -0.03 |
| 17 | T | 1,1-Dichloroethene | 1.203 | 1.044 | 13.2 | 69 | 0.00 |
| 18 | T | 2-Methyl-2-Propanol (tert-B | 2.566 | 2.299 | 10.4 | 68 | -0.05 |
| 19 | T | Methylene Chloride | 1.344 | 1.047 | 22.1 | 68 | -0.02 |
| 20 | T | 3-Chloro-1-propene (Allyl C | 1.498 | 1.329 | 11.3 | 65 | -0.01 |
| 21 | T | Trichlorotrifluoroethane | 1.242 | 1.084 | 12.7 | 72 | 0.00 |
| 22 | T | Carbon Disulfide | 4.651 | 3.747 | 19.4 | 68 | -0.01 |
| 23 | T | trans-1,2-Dichloroethene | 1.334 | 1.336 | -0.1 | 67 | -0.01 |
| 24 | T | 1,1-Dichloroethane | 1.997 | 1.660 | 16.9 | 66 | -0.01 |
| 25 | T | Methyl tert-Butyl Ether | 3.410 | 2.918 | 14.4 | 68 | 0.00 |
| 26 | T | Vinyl Acetate | 0.245 | 0.243 | 0.8 | 67 | -0.03 |
| 27 | T | 2-Butanone (MEK) | 0.733 | 0.697 | 4.9 | 67 | -0.02 |
| 28 | T | cis-1,2-Dichloroethene | 1.449 | 1.268 | 12.5 | 66 | -0.01 |
| 29 | T | Diisopropyl Ether | 1.097 | 0.993 | 9.5 | 68 | 0.00 |
| 30 | T | Ethyl Acetate | 0.384 | 0.337 | 12.2 | 64 | -0.02 |
| 31 | T | n-Hexane | 1.814 | 1.382 | 23.8 | 63 | 0.00 |
| 32 | T | Chloroform | 1.916 | 1.637 | 14.6 | 68 | -0.02 |
| 33 | S | 1,2-Dichloroethane-d4(SS1) | 1.153 | 1.108 | 3.9 | 70 | 0.00 |
| 34 | T | Tetrahydrofuran (THF) | 0.851 | 0.690 | 18.9 | 67 | 0.00 |
| 35 | T | Ethyl tert-Butyl Ether | 1.361 | 1.227 | 9.8 | 69 | 0.00 |
| 36 | T | 1,2-Dichloroethane | 1.222 | 1.114 | 8.8 | 67 | -0.01 |
| 37 | IR | 1,4-Difluorobenzene (IS2) | 1.000 | 1.000 | 0.0 | 72 | 0.00 |
| 38 | T | 1,1,1-Trichloroethane | 0.330 | 0.288 | 12.7 | 69 | -0.01 |
| 39 | T | Isopropyl Acetate | 0.139 | 0.122 | 12.2 | 65 | -0.01 |
| 40 | T | 1-Butanol | 0.198 | 0.191 | 3.5 | 66 | -0.03 |
| 41 | T | Benzene | 0.948 | 0.809 | 14.7 | 67 | -0.01 |
| 42 | T | Carbon Tetrachloride | 0.294 | 0.266 | 9.5 | 70 | 0.00 |
| 43 | T | Cyclohexane | 0.388 | 0.320 | 17.5 | 68 | 0.00 |
| 44 | T | tert-Amyl Methyl Ether | 0.659 | 0.575 | 12.7 | 68 | 0.00 |
| 45 | T | 1,2-Dichloropropane | 0.231 | 0.192 | 16.9 | 65 | 0.00 |
| 46 | T | Bromodichloromethane | 0.335 | 0.260 | 22.4 | 68 | 0.00 |
| 47 | T | Trichloroethene | 0.285 | 0.254 | 10.9 | 70 | -0.01 |
| 48 | T | 1,4-Dioxane | 0.202 | 0.186 | 7.9 | 68 | 0.00 |
| 49 | T | 2,2,4-Trimethylpentane (Iso | 1.041 | 0.808 | 22.4 | 65 | 0.00 |
| 50 | T | Methyl Methacrylate | 0.099 | 0.096 | 3.0 | 69 | -0.01 |
| 51 | T | n-Heptane | 0.243 | 0.198 | 18.5 | 65 | 0.00 |
| 52 | T | cis-1,3-Dichloropropene | 0.334 | 0.330 | 1.2 | 67 | 0.00 |
| 53 | T | 4-Methyl-2-pentanone | 0.195 | 0.186 | 4.6 | 65 | -0.01 |
| 54 | T | trans-1,3-Dichloropropene | 0.285 | 0.294 | -3.2 | 67 | 0.00 |
| 55 | T | 1,1,2-Trichloroethane | 0.223 | 0.210 | 5.8 | 69 | 0.00 |

# Evaluate Continuing Calibration Report

Data File : I:\MS13\DATA\2018_04\04\04041801.D Vial: 3
Acq On : 4 Apr 2018 1:37 Operator: RS
Sample : CCV R130404018_25ng Inst : MS13
Msc : S31-03281703/S31-03201804 (4/18)

Quant Time: Apr 04 07:43:59 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

| | | Compound | AvgRF | CCRF | %Dev | Area% | Dev(min) |
|---|---|---|---|---|---|---|---|
| 56 | IR | Chlorobenzene-d5 (IS3) | 1.000 | 1.000 | 0.0 | 70 | 0.00 |
| 57 | S | Toluene-d8 (SS2) | 2.762 | 2.775 | -0.5 | 71 | 0.00 |
| 58 | T | Toluene | 3.118 | 2.660 | 14.7 | 69 | 0.00 |
| 59 | T | 2-Hexanone | 1.306 | 1.214 | 7.0 | 65 | -0.01 |
| 60 | T | Dibromochloromethane | 0.774 | 0.782 | -1.0 | 70 | 0.00 |
| 61 | T | 1,2-Dibromoethane | 0.664 | 0.738 | -11.1 | 69 | 0.00 |
| 62 | T | n-Butyl Acetate | 1.328 | 1.344 | -1.2 | 64 | 0.00 |
| 63 | T | n-Octane | 0.609 | 0.496 | 18.6 | 65 | 0.00 |
| 64 | T | Tetrachloroethene | 0.979 | 0.894 | 8.7 | 72 | 0.00 |
| 65 | T | Chlorobenzene | 2.112 | 1.879 | 11.0 | 70 | 0.00 |
| 66 | T | Ethylbenzene | 3.359 | 2.979 | 11.3 | 69 | 0.00 |
| 67 | T | m- & p-Xylenes | 2.660 | 2.335 | 12.2 | 70 | 0.00 |
| 68 | T | Bromoform | 0.711 | 0.782 | -10.0 | 73 | 0.00 |
| 69 | T | Styrene | 2.007 | 2.038 | -1.5 | 70 | 0.00 |
| 70 | T | o-Xylene | 2.651 | 2.375 | 10.4 | 70 | -0.01 |
| 71 | T | n-Nonane | 1.304 | 1.056 | 19.0 | 65 | 0.00 |
| 72 | T | 1,1,2,2-Tetrachloroethane | 1.191 | 1.120 | 6.0 | 69 | 0.00 |
| 73 | S | Bromofluorobenzene (SS3) | 0.779 | 0.834 | -7.1 | 75 | 0.00 |
| 74 | T | Cumene | 3.501 | 3.120 | 10.9 | 71 | 0.00 |
| 75 | T | alpha-Pinene | 1.731 | 1.573 | 9.1 | 69 | 0.00 |
| 76 | T | n-Propylbenzene | 3.949 | 3.579 | 9.4 | 70 | 0.00 |
| 77 | T | 3-Ethyltoluene | 3.495 | 3.269 | 6.5 | 71 | 0.00 |
| 78 | T | 4-Ethyltoluene | 3.202 | 2.869 | 10.4 | 71 | 0.00 |
| 79 | T | 1,3,5-Trimethylbenzene | 3.051 | 2.631 | 13.8 | 71 | 0.00 |
| 80 | T | alpha-Methylstyrene | 1.459 | 1.533 | -5.1 | 71 | 0.00 |
| 81 | T | 2-Ethyltoluene | 3.459 | 3.073 | 11.2 | 71 | -0.01 |
| 82 | T | 1,2,4-Trimethylbenzene | 2.845 | 2.580 | 9.3 | 71 | 0.00 |
| 83 | T | n-Decane | 1.451 | 1.218 | 16.1 | 66 | 0.00 |
| 84 | T | Benzyl Chloride | 1.718 | 2.141 | -24.6 | 70 | 0.00 |
| 85 | T | 1,3-Dichlorobenzene | 1.711 | 1.731 | -1.2 | 72 | -0.01 |
| 86 | T | 1,4-Dichlorobenzene | 1.859 | 1.801 | 3.1 | 73 | 0.00 |
| 87 | T | sec-Butylbenzene | 3.924 | 3.525 | 10.2 | 71 | 0.00 |
| 88 | T | 4-Isopropyltoluene (p-Cymen | 3.679 | 3.344 | 9.1 | 71 | 0.00 |
| 89 | T | 1,2,3-Trimethylbenzene | 2.895 | 2.611 | 9.8 | 71 | 0.00 |
| 90 | T | 1,2-Dichlorobenzene | 1.665 | 1.644 | 1.3 | 72 | 0.00 |
| 91 | T | d-Limonene | 1.037 | 0.970 | 6.5 | 68 | 0.00 |
| 92 | T | 1,2-Dibromo-3-Chloropropane | 0.576 | 0.652 | -13.2 | 73 | 0.00 |
| 93 | T | n-Undecane | 1.432 | 1.308 | 8.7 | 66 | 0.00 |
| 94 | T | 1,2,4-Trichlorobenzene | 1.225 | 1.380 | -12.7 | 73 | 0.00 |
| 95 | T | Naphthalene | 3.449 | 3.938 | -14.2 | 73 | 0.00 |
| 96 | T | n-Dodecane | 1.117 | 1.208 | -8.1 | 68 | 0.00 |
| 97 | T | Hexachlorobutadiene | 0.956 | 0.944 | 1.3 | 74 | 0.00 |
| 98 | T | Cyclohexanone | 0.868 | 0.843 | 2.9 | 65 | -0.01 |
| 99 | T | tert-Butylbenzene | 2.888 | 2.558 | 11.4 | 71 | 0.00 |
| 100 | T | n-Butylbenzene | 2.897 | 2.731 | 5.7 | 70 | 0.00 |

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041801.D Vial: 3
Acq On : 4 Apr 2018 1:37 Operator: RS
Sample : CCV R130404018_25ng Inst : MS13
Msc : S31-03281703/S31-03201804 (4/18)

Quant Time: Apr 04 07:43:59 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS) RS 4/4/18
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Bromochloromethane (IS1) | 11.14 | 130 | 81978 | 12.500 | ng | | -0.01 |
| 37) 1,4-Difluorobenzene (IS2) | 13.23 | 114 | 403641 | 12.500 | ng | | 0.00 |
| 56) Chlorobenzene-d5 (IS3) | 17.51 | 82 | 132749 | 12.500 | ng | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 33) 1,2-Dichloroethane-d4(... | 11.98 | 65 | 90820 | 12.008 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 96.08% | | | | | | | |
| 57) Toluene-d8 (SS2) | 15.65 | 98 | 368377 | 12.558 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 100.48% | | | | | | | |
| 73) Bromofluorobenzene (SS3) | 18.91 | 174 | 110711 | 13.382 | ng | | 0.00 |
| Spiked Amount 12.500 Range 70 - 130 Recovery = 107.04% | | | | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Propene | 4.36 | 42 | 156404 | 19.657 | ng | | 99 |
| 3) Dichlorodifluoromethan... | 4.51 | 85 | 296939 | 21.509 | ng | | 100 |
| 4) Chloromethane | 4.78 | 50 | 219620 | 20.360 | ng | | 100 |
| 5) 1,2-Dichloro-1,1,2,2-t... | 5.02 | 135 | 189733 | 21.711 | ng | | 99 |
| 6) Vinyl Chloride | 5.18 | 62 | 227820 | 21.327 | ng | | 100 |
| 7) 1,3-Butadiene | 5.43 | 54 | 169160 | 24.396 | ng | | 99 |
| 8) Bromomethane | 5.85 | 94 | 156244 | 21.548 | ng | | 99 |
| 9) Chloroethane | 6.16 | 64 | 120872 | 22.053 | ng | | 100 |
| 10) Ethanol | 6.52 | 45 | 549606 | 116.126 | ng | | 99 |
| 11) Acetonitrile | 6.76 | 41 | 289103 | 25.216 | ng | | 100 |
| 12) Acrolein | 6.94 | 56 | 103260 | 23.401 | ng | | 100 |
| 13) Acetone | 7.14 | 58 | 587964 | 106.876 | ng | | 97 |
| 14) Trichlorofluoromethane | 7.37 | 101 | 264014 | 21.841 | ng | | 100 |
| 15) 2-Propanol (Isopropanol) | 7.61 | 45 | 783763 | 47.297 | ng | | 99 |
| 16) Acrylonitrile | 7.86 | 53 | 224745 | 26.240 | ng | | 99 |
| 17) 1,1-Dichloroethene | 8.29 | 96 | 181653 | 23.021 | ng | | 96 |
| 18) 2-Methyl-2-Propanol (t... | 8.45 | 59 | 798968 | 47.468 | ng | | 99 |
| 19) Methylene Chloride | 8.50 | 84 | 181703 | 20.611 | ng | | 95 |
| 20) 3-Chloro-1-propene (Al... | 8.66 | 41 | 229591 | 23.374 | ng | | 97 |
| 21) Trichlorotrifluoroethane | 8.90 | 151 | 187112 | 22.967 | ng | | 97 |
| 22) Carbon Disulfide | 8.76 | 76 | 652999 | 21.407 | ng | | 100 |
| 23) trans-1,2-Dichloroethene | 9.73 | 61 | 236764 | 27.064 | ng | | 96 |
| 24) 1,1-Dichloroethane | 9.98 | 63 | 278170 | 21.240 | ng | | 100 |
| 25) Methyl tert-Butyl Ether | 10.07 | 73 | 511959 | 22.893 | ng | | 99 |
| 26) Vinyl Acetate | 10.23 | 86 | 210586 | 131.201 | ng | # | 95 |
| 27) 2-Butanone (MEK) | 10.47 | 72 | 120136 | 24.989 | ng | | 94 |
| 28) cis-1,2-Dichloroethene | 10.97 | 61 | 221761 | 23.332 | ng | | 96 |
| 29) Diisopropyl Ether | 11.26 | 87 | 173407 | 24.094 | ng | # | 91 |
| 30) Ethyl Acetate | 11.26 | 61 | 117886 | 46.847 | ng | | 97 |
| 31) n-Hexane | 11.24 | 57 | 241606 | 20.307 | ng | | 100 |
| 32) Chloroform | 11.30 | 83 | 284728 | 22.658 | ng | | 100 |
| 34) Tetrahydrofuran (THF) | 11.71 | 72 | 120290 | 21.545 | ng | | 95 |
| 35) Ethyl tert-Butyl Ether | 11.84 | 87 | 213063 | 23.878 | ng | | 96 |
| 36) 1,2-Dichloroethane | 12.09 | 62 | 192740 | 24.056 | ng | | 100 |
| 38) 1,1,1-Trichloroethane | 12.36 | 97 | 250073 | 23.500 | ng | | 99 |
| 39) Isopropyl Acetate | 12.78 | 61 | 208686 | 46.344 | ng | | 98 |
| 40) 1-Butanol | 12.80 | 56 | 326379 | 51.092 | ng | | 99 |
| 41) Benzene | 12.83 | 78 | 690503 | 22.555 | ng | | 100 |
| 42) Carbon Tetrachloride | 12.99 | 117 | 227261 | 23.971 | ng | | 100 |
| 43) Cyclohexane | 13.12 | 84 | 552382 | 44.100 | ng | | 97 |
| 44) tert-Amyl Methyl Ether | 13.46 | 73 | 490308 | 23.053 | ng | | 99 |
| 45) 1,2-Dichloropropane | 13.68 | 63 | 165658 | 22.243 | ng | | 100 |
| 46) Bromodichloromethane | 13.86 | 83 | 224334 | 20.760 | ng | | 100 |
| 47) Trichloroethene | 13.91 | 130 | 217588 | 23.657 | ng | | 100 |
| 48) 1,4-Dioxane | 13.89 | 88 | 159480 | 24.466 | ng | | 97 |
| 49) 2,2,4-Trimethylpentane... | 13.98 | 57 | 691256 | 20.569 | ng | | 99 |
| 50) Methyl Methacrylate | 14.12 | 100 | 163681 | 51.204 | ng | | 94 |

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041801.D Vial: 3
Acq On : 4 Apr 2018 1:37 Operator: RS
Sample : CCV R130404018_25ng Inst : MS13
Msc : S31-03281703/S31-03201804 (4/18)

Quant Time: Apr 04 07:43:59 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

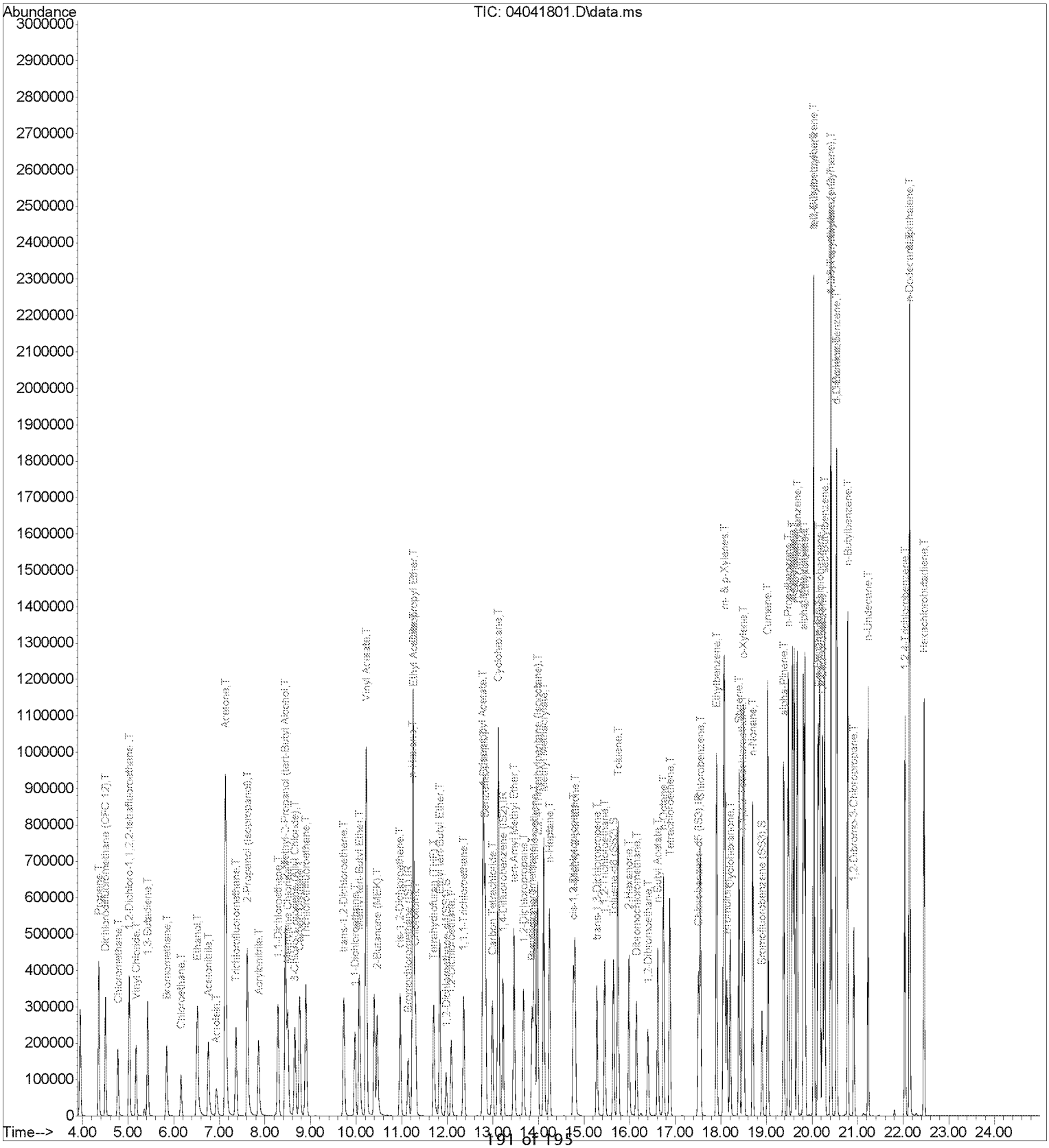
| Internal Standards | R.T. | QIon | Response | Conc Units | Dev(Min) |
|---|---|---|---|---|---|
| 51) n-Heptane | 14.24 | 71 | 169906 | 21.665 ng | 97 |
| 52) cis-1,3-Dichloropropene | 14.77 | 75 | 298272 | 27.615 ng | 100 |
| 53) 4-Methyl-2-pentanone | 14.80 | 58 | 158942 | 25.229 ng | 98 |
| 54) trans-1,3-Dichloropropene | 15.29 | 75 | 252894 | 27.469 ng | 100 |
| 55) 1,1,2-Trichloroethane | 15.46 | 97 | 180643 | 25.097 ng | 98 |
| 58) Toluene | 15.75 | 91 | 744455 | 22.483 ng | 100 |
| 59) 2-Hexanone | 15.99 | 43 | 341694 | 24.643 ng | 99 |
| 60) Dibromochloromethane | 16.15 | 129 | 220190 | 26.779 ng | 100 |
| 61) 1,2-Dibromoethane | 16.40 | 107 | 208462 | 29.573 ng | 100 |
| 62) n-Butyl Acetate | 16.62 | 43 | 381042 | 27.021 ng | 99 |
| 63) n-Octane | 16.74 | 57 | 139473 | 21.560 ng | 96 |
| 64) Tetrachloroethene | 16.89 | 166 | 252350 | 24.278 ng | 99 |
| 65) Chlorobenzene | 17.55 | 112 | 531914 | 23.714 ng | 100 |
| 66) Ethylbenzene | 17.91 | 91 | 832099 | 23.325 ng | 99 |
| 67) m- & p-Xylenes | 18.08 | 91 | 1316244 | 46.592 ng | 100 |
| 68) Bromoform | 18.14 | 173 | 220829 | 29.248 ng | 99 |
| 69) Styrene | 18.40 | 104 | 572439 | 26.859 ng | 99 |
| 70) o-Xylene | 18.50 | 91 | 665273 | 23.635 ng | 100 |
| 71) n-Nonane | 18.70 | 43 | 295426 | 21.331 ng | 98 |
| 72) 1,1,2,2-Tetrachloroethane | 18.48 | 83 | 314329 | 24.849 ng | 100 |
| 74) Cumene | 19.03 | 105 | 871349 | 23.435 ng | 100 |
| 75) alpha-Pinene | 19.38 | 93 | 436935 | 23.771 ng | 100 |
| 76) n-Propylbenzene | 19.48 | 91 | 1011039 | 24.110 ng | 99 |
| 77) 3-Ethyltoluene | 19.57 | 105 | 911405 | 24.556 ng | 100 |
| 78) 4-Ethyltoluene | 19.61 | 105 | 799049 | 23.496 ng | 100 |
| 79) 1,3,5-Trimethylbenzene | 19.68 | 105 | 732689 | 22.611 ng | 100 |
| 80) alpha-Methylstyrene | 19.82 | 118 | 426972 | 27.563 ng | 99 |
| 81) 2-Ethyltoluene | 19.84 | 105 | 864750 | 23.541 ng | 100 |
| 82) 1,2,4-Trimethylbenzene | 20.04 | 105 | 719928 | 23.827 ng | 100 |
| 83) n-Decane | 20.13 | 57 | 342584 | 22.235 ng | 98 |
| 84) Benzyl Chloride | 20.16 | 91 | 610512 | 33.465 ng | 99 |
| 85) 1,3-Dichlorobenzene | 20.17 | 146 | 492334 | 27.101 ng | 100 |
| 86) 1,4-Dichlorobenzene | 20.24 | 146 | 508655 | 25.760 ng | 100 |
| 87) sec-Butylbenzene | 20.28 | 105 | 987428 | 23.692 ng | 100 |
| 88) 4-Isopropyltoluene (p-... | 20.42 | 119 | 910905 | 23.313 ng | 99 |
| 89) 1,2,3-Trimethylbenzene | 20.42 | 105 | 711219 | 23.136 ng | 100 |
| 90) 1,2-Dichlorobenzene | 20.54 | 146 | 472572 | 26.730 ng | 100 |
| 91) d-Limonene | 20.54 | 68 | 258831 | 23.493 ng | 98 |
| 92) 1,2-Dibromo-3-Chloropr... | 20.92 | 157 | 181961 | 29.750 ng | 96 |
| 93) n-Undecane | 21.23 | 57 | 365662 | 24.037 ng | 98 |
| 94) 1,2,4-Trichlorobenzene | 22.04 | 180 | 401848 | 30.890 ng | 100 |
| 95) Naphthalene | 22.14 | 128 | 1104146 | 30.144 ng | 100 |
| 96) n-Dodecane | 22.14 | 57 | 338681 | 28.549 ng | 98 |
| 97) Hexachlorobutadiene | 22.46 | 225 | 264824 | 26.092 ng | 99 |
| 98) Cyclohexanone | 18.21 | 55 | 232680 | 25.230 ng | 98 |
| 99) tert-Butylbenzene | 20.04 | 119 | 712990 | 23.244 ng | 100 |
| 100) n-Butylbenzene | 20.79 | 91 | 764207 | 24.843 ng | 99 |

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : I:\MS13\DATA\2018_04\04\04041801.D Vial: 3
Acq On : 4 Apr 2018 1:37 Operator: RS
Sample : CCV R130404018_25ng Inst : MS13
Msc : S31-03281703/S31-03201804 (4/18)

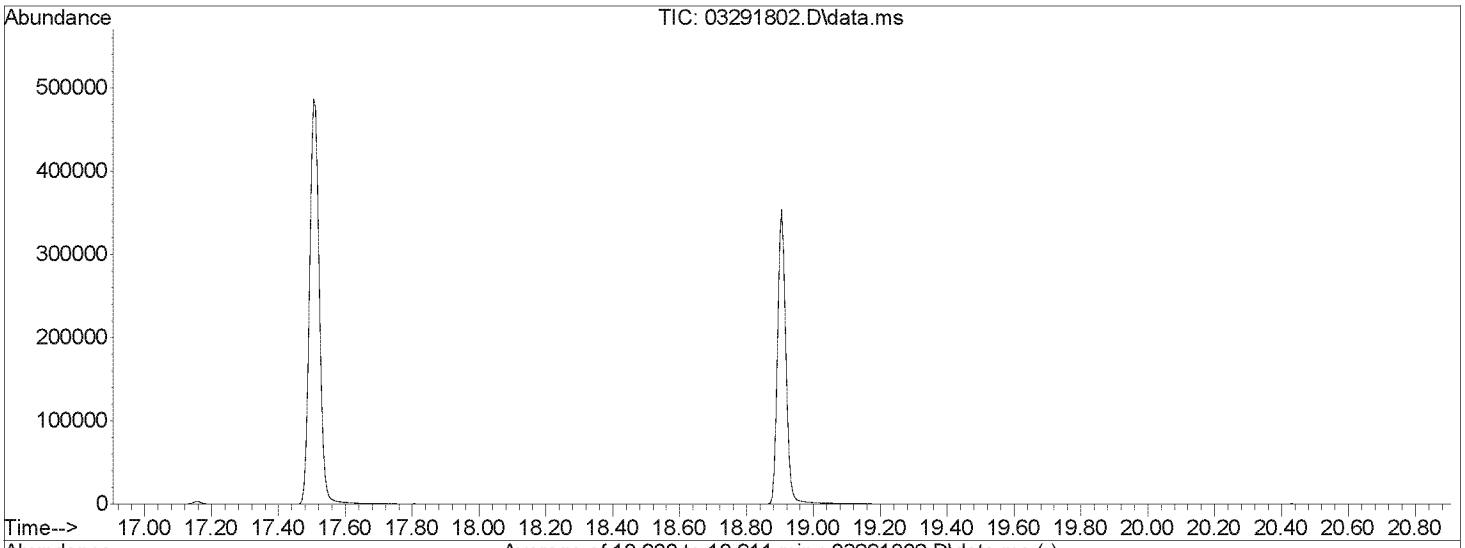
Quant Time: Apr 04 07:43:59 2018
Quant Method : I:\MS13\METHODS\R13032918.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Mar 30 08:58:13 2018
Response via : Initial Calibration
DataAcq Meth: TO15.M

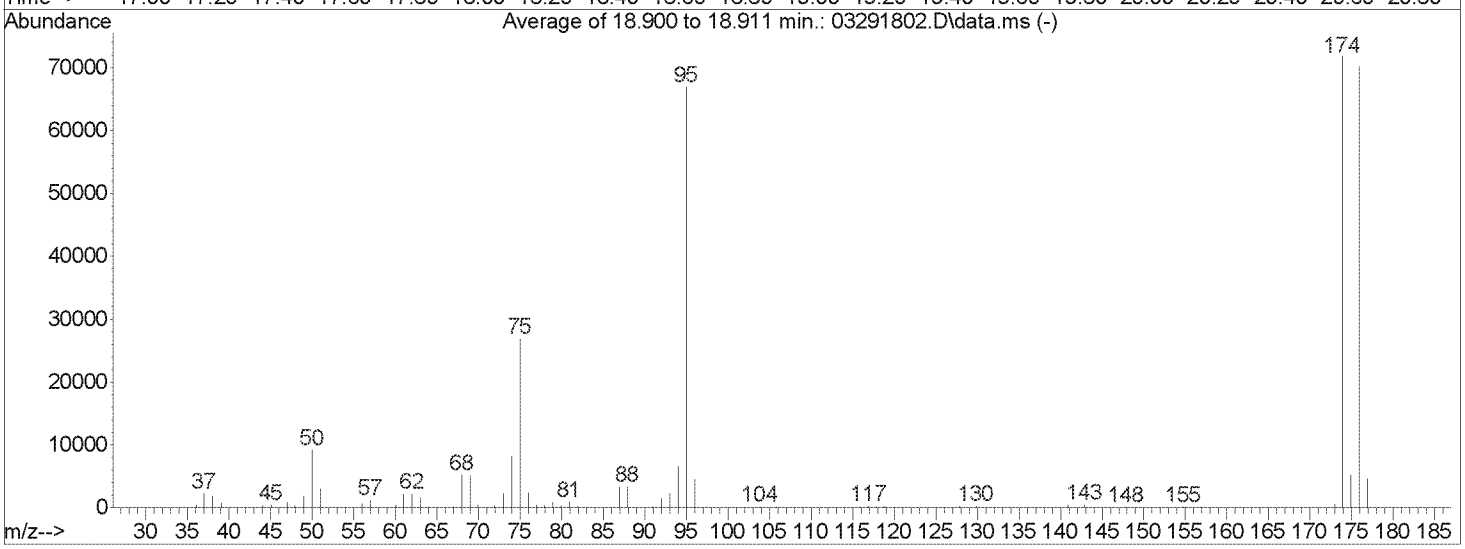


Data Path : I:\MS13\DATA\2018_03\29\
Data File : 03291802.D
Acq On : 29 Mar 2018 16:06
Operator : RS
Sample : BFB Std
Msc : S31-03281803
ALS Vial : 3 Sample Multiplier: 1

Integration File: LSCINT.P

Method : I:\MS13\METHODS\R13032918.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri Mar 30 08:58:13 2018




AutoFind: Scans 2638, 2639, 2640; Background Corrected with Scan 2631

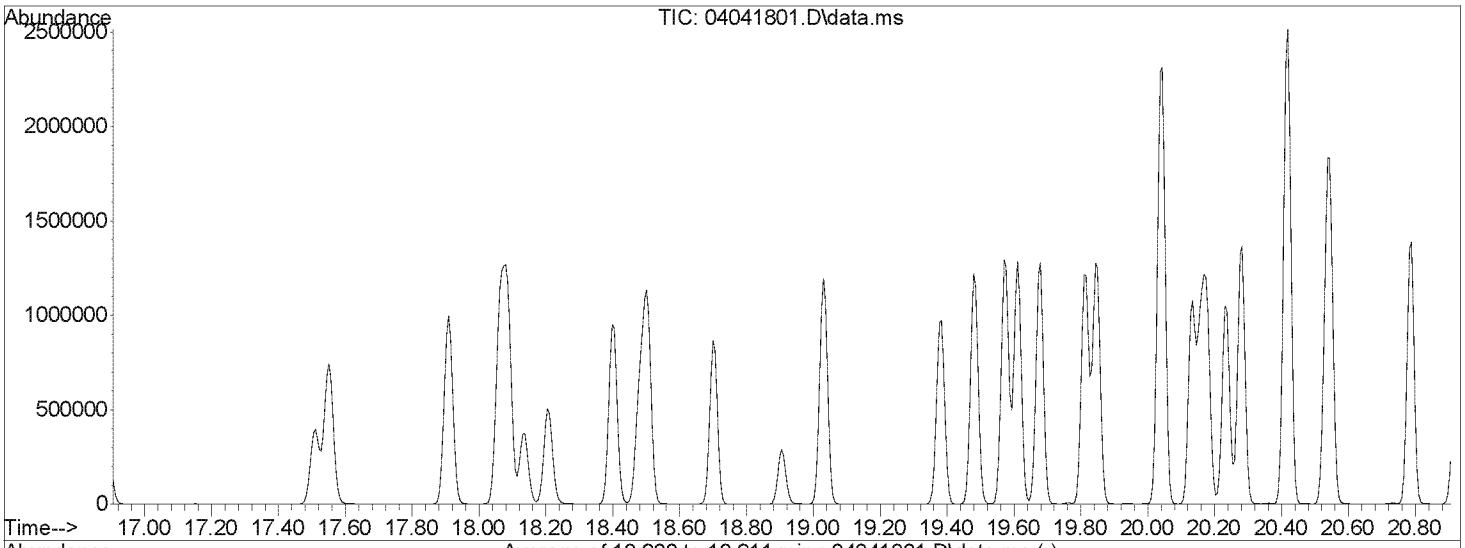
| Target Mass | Rel. to Mass | Lower Limit% | Upper Limit% | Rel. Abn% | Raw Abn | Result Pass/Fail |
|---|---|---|---|---|---|---|
| 50 | 95 | 8 | 40 | 13.7 | 9125 | PASS |
| 75 | 95 | 30 | 66 | 40.2 | 26853 | PASS |
| 95 | 95 | 100 | 100 | 100.0 | 66840 | PASS |
| 96 | 95 | 5 | 9 | 6.7 | 4453 | PASS |
| 173 | 174 | 0.00 | 2 | 0.7 | 515 | PASS |
| 174 | 95 | 50 | 120 | 107.4 | 71795 | PASS |
| 175 | 174 | 4 | 9 | 7.2 | 5154 | PASS |
| 176 | 174 | 93 | 101 | 97.7 | 70147 | PASS |
| 177 | 176 | 5 | 9 | 6.5 | 4564 | PASS |

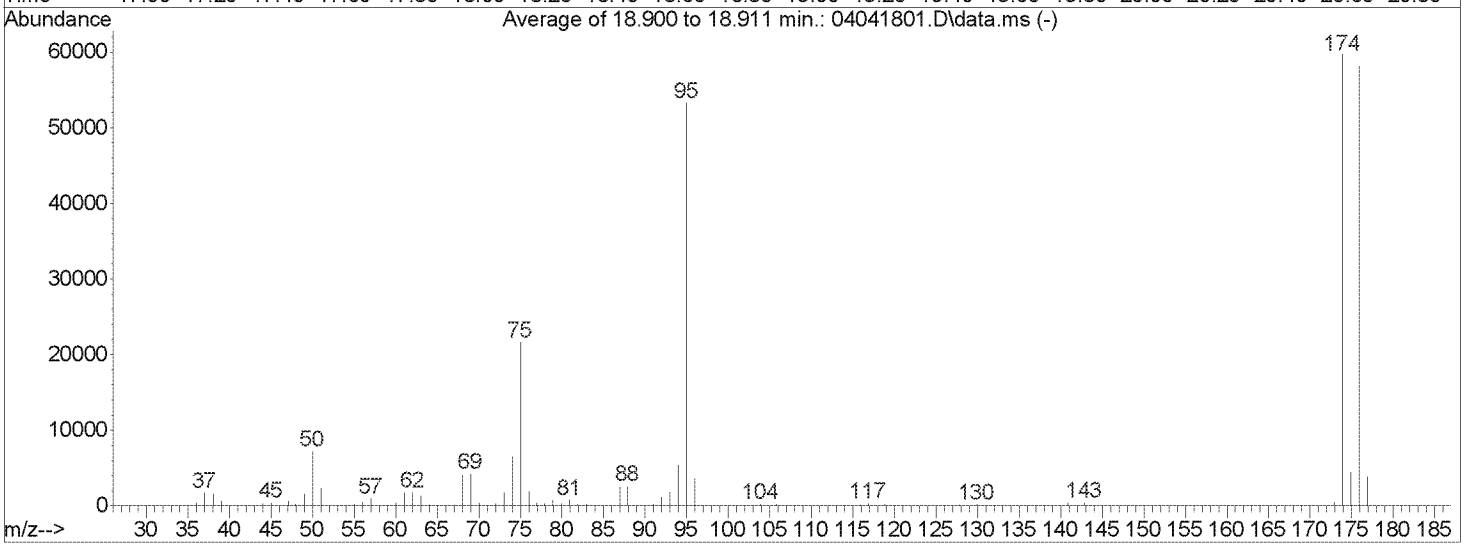
RS 3/30/18

Data Path : I:\MS13\DATA\2018_04\04\
Data File : 04041801.D
Acq On : 4 Apr 2018 1:37
Operator : RS
Sample : CCV R130404018_25ng
Misc : S31-03281703/S31-03201804 (4/18)
ALS Vial : 3 Sample Multiplier: 1

Integration File: LSCINT.P

Method : I:\MS13\METHODS\R13032918.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri Mar 30 08:58:13 2018




AutoFind: Scans 2638, 2639, 2640; Background Corrected with Scan 2631

| Target Mass | Rel. to Mass | Lower Limit% | Upper Limit% | Rel. Abn% | Raw Abn | Result Pass/Fail |
|---|---|---|---|---|---|---|
| 50 | 95 | 8 | 40 | 13.5 | 7187 | PASS |
| 75 | 95 | 30 | 66 | 40.5 | 21541 | PASS |
| 95 | 95 | 100 | 100 | 100.0 | 53200 | PASS |
| 96 | 95 | 5 | 9 | 6.6 | 3527 | PASS |
| 173 | 174 | 0.00 | 2 | 0.6 | 386 | PASS |
| 174 | 95 | 50 | 120 | 112.2 | 59701 | PASS |
| 175 | 174 | 4 | 9 | 7.4 | 4420 | PASS |
| 176 | 174 | 93 | 101 | 97.2 | 58051 | PASS |
| 177 | 176 | 5 | 9 | 6.6 | 3841 | PASS |

RS 4/4/18

# Injection Log

Directory: J:\MS13\DATA\2018_03\29\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Vial | Comment |
|---|---|---|---|---|---|---|---|
| 1 | 3/29/18 15:32 | 03291801.D | blank | S31-03281703 | RS | 3 | |
| 2 | 3/29/18 16:06 | 03291802.D | BFB Std | S31-03281703 | RS | 3 | *passes* |
| 3 | 3/29/18 16:40 | 03291803.D | 0.08ng TO15 ICAL std | S31-03281703/S31-02281806 (3/29) | RS | 8 | |
| 4 | 3/29/18 17:13 | 03291804.D | 0.10ng TO15 ICAL std | S31-03281703/S31-02281806 (3/29) | RS | 8 | |
| 5 | 3/29/18 17:47 | 03291805.D | 0.20ng TO15 ICAL std | S31-03281703/S31-02281806 (3/29) | RS | 8 | |
| 6 | 3/29/18 18:21 | 03291806.D | 0.40ng TO15 ICAL std | S31-03281703/S31-03271803 (4/25) | RS | 7 | |
| 7 | 3/29/18 18:55 | 03291807.D | 1.0ng TO15 ICAL std | S31-03281703/S31-03271803 (4/25) | RS | 7 | R13032918.M |
| 8 | 3/29/18 19:28 | 03291808.D | 5.0ng TO15 ICAL std | S31-03281703/S31-03271803 (4/25) | RS | 7 | |
| 9 | 3/29/18 20:02 | 03291809.D | 25ng TO15 ICAL std | S31-03281703/S31-03201804 (4/18) | RS | 3 | |
| 10 | 3/29/18 20:36 | 03291810.D | 50ng TO15 ICAL std | S31-03281703/S31-03201804 (4/18) | RS | 3 | |
| 11 | 3/29/18 21:10 | 03291811.D | 100ng TO15 ICAL std | S31-03281703/S31-03201804 (4/18) | RS | 3 | |
| 12 | 3/29/18 21:44 | 03291812.D | blank | S31-03281703 | RS | 3 | |
| 13 | 3/29/18 22:18 | 03291813.D | 0.40ng TO15 ICAL std | S31-03281703/S31-02281806 (3/29) | RS | 8 | *not used* |
| 14 | 3/29/18 22:52 | 03291814.D | 25ng ICV TO15 std | S31-03281703/S31-03231802 (4/21) | RS | 3 | *passes* |
| 15 | 3/29/18 23:26 | 03291815.D | 25ng ICV TO15 std | S31-03281703/S31-03231802 (4/21) | RS | 3 | |

**R13032918.M ranges from 0.08ng --> 100ng Except: n-hexane, benzene and bromodichloromethane 0.10ng-->100ng.** 0.20ng

**chloroethane, acetonitrile, methylene chloride, allyl chloride, CS2, 1,2-dichloroethane, cis-1,3DCP, MIBK, n-butyl acetate, benzyl chloride, 1,2-dibromo-chloropropane: ~~0.40~~ng -->100ng.** RS 3/30/18

**acrolein, acrylonitrile, vinyl acetate, MEK, ethyl acetate, 1-butanol, 1,4-dioxane, methyl methacrylate, trans-1,3-DCP, 2-hexanon: ~~0.20~~ng --> 100ng.** 0.40ng

RS 3/30/18

# Injection Log

Directory: I:\MS13\DATA\2018_04\04\

| | Date/Time | File Name | Sample ID | Misc Info | Operator | Vial | Comment |
|---|---|---|---|---|---|---|---|
| 1 | 4/4/18 1:37 | 04041801.D | CCV R130404018_25ng | S31-03281703/S31-03201804 (4/18) | RS | 3 | *passed* |
| 2 | 4/4/18 2:11 | 04041802.D | CCV C130404018_25ng | S31-03281703/S31-03261801 (4/24) | RS | 16 | *passed* |
| 3 | 4/4/18 2:45 | 04041803.D | System | S31-03281703/S31-03201804 (4/18) | RS | 3 | |
| 4 | 4/4/18 3:19 | 04041804.D | CCV M130404018_25ng | S31-03281703/S31-03271804 (5/24) | RS | 1 | *passed* |
| 5 | 4/4/18 3:53 | 04041805.D | MB R13040418_1000mL | S31-03281803/AC00880 | RS | 3 | *passed* |
| 6 | 4/4/18 4:27 | 04041806.D | LCS R13040318_25ng | S31-03281803/S31-03231802 (4/21) | RS | 3 | *passed* |
| 7 | 4/4/18 5:00 | 04041807.D | LCSD R13040318_25ng | S31-03281803/S31-03231802 (4/21) | RS | 3 | *passed* |
| 8 | 4/4/18 5:34 | 04041808.D | P1801551-005dil (100mL) | S31-03281803 | RS | 11 | |
| 9 | 4/4/18 6:08 | 04041809.D | P1801551-006dil (100mL) | S31-03281803 | RS | 12 | |
| 10 | 4/4/18 8:06 | 04041810.D | Screen1628-001 (0.3mL) | S31-03281803 | RS | 4 | *screen* |
| 11 | 4/4/18 9:16 | 04041811.D | System | S31-03281803 | RS | 4 | |
| 12 | 4/4/18 9:50 | 04041812.D | P1801627-002 (0.2mL) | S31-03281803 | RS | 4 | |
| 13 | 4/4/18 10:24 | 04041813.D | P1801614-001 (0.6mL) | S31-03281803 | RS | 4 | |
| 14 | 4/4/18 11:02 | 04041814.D | P1801614-001dil (0.3mL) | S31-03281803 | RS | 4 | |
| 15 | 4/4/18 11:36 | 04041815.D | P1801628-002 (0.1mL) | S31-03281803 | RS | 4 | |
| 16 | 4/4/18 12:24 | 04041816.D | xP1801628-003 (0.1mL)x | S31-03281803 | RS | 4 | *ran hgher* |
| 17 | 4/4/18 12:58 | 04041817.D | P1801488-001 (400mL) | S31-03281803 | RS | 12 | |
| 18 | 4/4/18 14:08 | 04041818.D | P1801628-003 (0.2mL) | S31-03281803 | RS | 4 | |
| 19 | 4/4/18 14:42 | 04041819.D | P1801628-001 (0.3mL) | S31-03281803 | RS | 4 | |
| 20 | 4/4/18 15:15 | 04041820.D | P1801628-004 (0.5mL) | S31-03281803 | RS | 4 | |
| 21 | 4/4/18 15:50 | 04041821.D | P1801628-005 (0.05mL) | S31-03281803 | RS | 4 | |
| 22 | 4/4/18 16:24 | 04041822.D | P1801628-005 (0.1mL) | S31-03281803 | RS | 4 | *rerun* |
| 23 | 4/4/18 16:58 | 04041823.D | blank | S31-03281803 | RS | 3 | |
| 24 | 4/4/18 17:32 | 04041824.D | P1801558-001 (1000mL) | S31-03281803 | RS | 5 | |
| 25 | 4/4/18 18:06 | 04041825.D | P1801558-002 (1000mL) | S31-03281803 | RS | 6 | |
| 26 | 4/4/18 18:40 | 04041826.D | P1801558-002dup (1000mL) | S31-03281803 | RS | 6 | *passed* |
| 27 | 4/4/18 19:14 | 04041827.D | P1801491-001 (400mL) | S31-03281803 | RS | 14 | |
| 28 | 4/4/18 19:48 | 04041828.D | P1801491-001dil (40mL) | S31-03281803 | RS | 14 | |
| 29 | 4/4/18 20:22 | 04041829.D | P1801496-001 (400mL) | S31-03281803 | RS | 15 | |
| 30 | 4/4/18 20:56 | 04041830.D | P1801496-001dil (40mL) | S31-03281803 | RS | 15 | *not needed* |
| 31 | 4/4/18 21:30 | 04041831.D | P1801084-001 (1000mL) | S31-03281803 | RS | 7 | |
| 32 | 4/4/18 22:04 | 04041832.D | P1801084-001dil (100mL) | S31-03281803 | RS | 7 | *not needed* |
| | | | | | | | |

RS 4/5/18

# US EPA Region 10 Laboratory

## Multi-Analyte Final Report

**Project Code :** SFP-127A
**Site :** QUENDALL TERMINALS : STAR Bench Scale Treatability Study
**Contact :** Kathy Cerise
**Account :** 2018T10P000DD21044LA00

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**Sample :** 18124200

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 5000 | ug/kg | U | 3/27/18 | 1 |
| **86737** | **9H-Fluorene** | **1200000** | **ug/kg** | | 3/27/18 | 10 |
| **83329** | **Acenaphthene** | **1700000** | **ug/kg** | | 3/27/18 | 10 |
| **208968** | **Acenaphthylene** | **81000** | **ug/kg** | | 3/27/18 | 1 |
| **120127** | **Anthracene** | **690000** | **ug/kg** | | 3/27/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **500000** | **ug/kg** | | 3/27/18 | 10 |
| **50328** | **Benzo(a)pyrene** | **270000** | **ug/kg** | | 3/27/18 | 1 |
| **191242** | **Benzo(g,h,i)perylene** | **110000** | **ug/kg** | | 3/27/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **370000** | **ug/kg** | | 3/27/18 | 10 |
| **207089** | **Benzo[k]fluoranthene** | **140000** | **ug/kg** | | 3/27/18 | 1 |
| **218019** | **Chrysene** | **430000** | **ug/kg** | | 3/27/18 | 10 |
| **53703** | **Dibenzo[a,h]anthracene** | **35000** | **ug/kg** | | 3/27/18 | 1 |
| **206440** | **Fluoranthene** | **2000000** | **ug/kg** | | 3/27/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **96000** | **ug/kg** | | 3/27/18 | 1 |
| **91203** | **Naphthalene** | **6200000** | **ug/kg** | | 3/27/18 | 50 |
| **91576** | **Naphthalene, 2-methyl-** | **2300000** | **ug/kg** | | 3/27/18 | 10 |
| **85018** | **Phenanthrene** | **3800000** | **ug/kg** | | 3/27/18 | 50 |
| **129000** | **Pyrene** | **1700000** | **ug/kg** | | 3/27/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 97 | %Rec | | 3/27/18 | 1 |
| 1719068 | Anthracene-D10 | 99 | %Rec | | 3/27/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 107 | %Rec | | 3/27/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 102 | %Rec | | 3/27/18 | 1 |
| 1718521 | D10-Pyrene | 104 | %Rec | | 3/27/18 | 1 |

**Sample :** 18124201

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 4600 | ug/kg | U | 3/27/18 | 1 |
| **86737** | **9H-Fluorene** | **1100000** | **ug/kg** | | 3/27/18 | 10 |
| **83329** | **Acenaphthene** | **1600000** | **ug/kg** | | 3/27/18 | 10 |
| **208968** | **Acenaphthylene** | **76000** | **ug/kg** | | 3/27/18 | 1 |
| **120127** | **Anthracene** | **650000** | **ug/kg** | | 3/27/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **480000** | **ug/kg** | | 3/27/18 | 10 |
| **50328** | **Benzo(a)pyrene** | **250000** | **ug/kg** | | 3/27/18 | 1 |
| **191242** | **Benzo(g,h,i)perylene** | **110000** | **ug/kg** | | 3/27/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **330000** | **ug/kg** | | 3/27/18 | 10 |
| **207089** | **Benzo[k]fluoranthene** | **130000** | **ug/kg** | | 3/27/18 | 1 |
| **218019** | **Chrysene** | **420000** | **ug/kg** | | 3/27/18 | 10 |
| **53703** | **Dibenzo[a,h]anthracene** | **32000** | **ug/kg** | | 3/27/18 | 1 |
| **206440** | **Fluoranthene** | **1800000** | **ug/kg** | | 3/27/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **89000** | **ug/kg** | | 3/27/18 | 1 |
| **91203** | **Naphthalene** | **6000000** | **ug/kg** | | 3/27/18 | 50 |
| **91576** | **Naphthalene, 2-methyl-** | **2300000** | **ug/kg** | | 3/27/18 | 10 |
| **85018** | **Phenanthrene** | **3600000** | **ug/kg** | | 3/27/18 | 50 |
| **129000** | **Pyrene** | **1600000** | **ug/kg** | | 3/27/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 90 | %Rec | | 3/27/18 | 1 |
| 1719068 | Anthracene-D10 | 96 | %Rec | | 3/27/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 104 | %Rec | | 3/27/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 107 | %Rec | | 3/27/18 | 1 |
| 1718521 | D10-Pyrene | 100 | %Rec | | 3/27/18 | 1 |

**Sample :** 18124202

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 4200 | ug/kg | U | 3/27/18 | 1 |
| **86737** | **9H-Fluorene** | **1200000** | **ug/kg** | | 3/27/18 | 10 |
| **83329** | **Acenaphthene** | **1700000** | **ug/kg** | | 3/27/18 | 10 |
| **208968** | **Acenaphthylene** | **84000** | **ug/kg** | | 3/27/18 | 1 |
| **120127** | **Anthracene** | **690000** | **ug/kg** | | 3/27/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **530000** | **ug/kg** | | 3/27/18 | 10 |
| **50328** | **Benzo(a)pyrene** | **280000** | **ug/kg** | | 3/27/18 | 10 |
| **191242** | **Benzo(g,h,i)perylene** | **120000** | **ug/kg** | | 3/27/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **360000** | **ug/kg** | | 3/27/18 | 10 |
| **207089** | **Benzo[k]fluoranthene** | **150000** | **ug/kg** | | 3/27/18 | 1 |
| **218019** | **Chrysene** | **420000** | **ug/kg** | | 3/27/18 | 10 |
| **53703** | **Dibenzo[a,h]anthracene** | **35000** | **ug/kg** | | 3/27/18 | 1 |
| **206440** | **Fluoranthene** | **2000000** | **ug/kg** | | 3/27/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **98000** | **ug/kg** | | 3/27/18 | 1 |
| **91203** | **Naphthalene** | **6500000** | **ug/kg** | | 3/27/18 | 50 |
| **91576** | **Naphthalene, 2-methyl-** | **2500000** | **ug/kg** | | 3/27/18 | 10 |
| **85018** | **Phenanthrene** | **3900000** | **ug/kg** | | 3/27/18 | 50 |
| **129000** | **Pyrene** | **1700000** | **ug/kg** | | 3/27/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 98 | %Rec | | 3/27/18 | 1 |
| 1719068 | Anthracene-D10 | 97 | %Rec | | 3/27/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 107 | %Rec | | 3/27/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 104 | %Rec | | 3/27/18 | 1 |
| 1718521 | D10-Pyrene | 99 | %Rec | | 3/27/18 | 1 |

**Sample :** 18124203

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 110 | ug/kg | U | 3/26/18 | 1 |
| **86737** | **9H-Fluorene** | **14000** | **ug/kg** | | 3/26/18 | 10 |
| **83329** | **Acenaphthene** | **15000** | **ug/kg** | | 3/26/18 | 10 |
| **208968** | **Acenaphthylene** | **700** | **ug/kg** | | 3/26/18 | 1 |
| **120127** | **Anthracene** | **8200** | **ug/kg** | | 3/26/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **3100** | **ug/kg** | | 3/26/18 | 1 |
| **50328** | **Benzo(a)pyrene** | **1900** | **ug/kg** | | 3/26/18 | 1 |
| **191242** | **Benzo(g,h,i)perylene** | **910** | **ug/kg** | | 3/26/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **2500** | **ug/kg** | | 3/26/18 | 1 |
| **207089** | **Benzo[k]fluoranthene** | **1100** | **ug/kg** | | 3/26/18 | 1 |
| **218019** | **Chrysene** | **3500** | **ug/kg** | | 3/26/18 | 1 |
| **53703** | **Dibenzo[a,h]anthracene** | **320** | **ug/kg** | | 3/26/18 | 1 |
| **206440** | **Fluoranthene** | **10000** | **ug/kg** | | 3/26/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **740** | **ug/kg** | | 3/26/18 | 1 |
| **91203** | **Naphthalene** | **55000** | **ug/kg** | | 3/26/18 | 10 |
| **91576** | **Naphthalene, 2-methyl-** | **38000** | **ug/kg** | | 3/26/18 | 10 |
| **85018** | **Phenanthrene** | **28000** | **ug/kg** | | 3/26/18 | 10 |
| **129000** | **Pyrene** | **9400** | **ug/kg** | | 3/26/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 92 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 94 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 99 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 85 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 99 | %Rec | | 3/26/18 | 1 |

**Sample :** 18124204

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 100 | ug/kg | U | 3/26/18 | 1 |
| **86737** | **9H-Fluorene** | **17000** | **ug/kg** | | 3/26/18 | 10 |
| **83329** | **Acenaphthene** | **19000** | **ug/kg** | | 3/26/18 | 10 |
| **208968** | **Acenaphthylene** | **890** | **ug/kg** | | 3/26/18 | 1 |
| **120127** | **Anthracene** | **10000** | **ug/kg** | | 3/26/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **3900** | **ug/kg** | | 3/26/18 | 1 |
| **50328** | **Benzo(a)pyrene** | **2400** | **ug/kg** | | 3/26/18 | 1 |
| **191242** | **Benzo(g,h,i)perylene** | **1200** | **ug/kg** | | 3/26/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **3100** | **ug/kg** | | 3/26/18 | 1 |
| **207089** | **Benzo[k]fluoranthene** | **1300** | **ug/kg** | | 3/26/18 | 1 |
| **218019** | **Chrysene** | **4200** | **ug/kg** | | 3/26/18 | 1 |
| **53703** | **Dibenzo[a,h]anthracene** | **410** | **ug/kg** | | 3/26/18 | 1 |
| **206440** | **Fluoranthene** | **13000** | **ug/kg** | | 3/26/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **960** | **ug/kg** | | 3/26/18 | 1 |
| **91203** | **Naphthalene** | **86000** | **ug/kg** | | 3/27/18 | 20 |
| **91576** | **Naphthalene, 2-methyl-** | **53000** | **ug/kg** | | 3/26/18 | 10 |
| **85018** | **Phenanthrene** | **35000** | **ug/kg** | | 3/26/18 | 10 |
| **129000** | **Pyrene** | **12000** | **ug/kg** | | 3/26/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 88 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 95 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 98 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 83 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 98 | %Rec | | 3/26/18 | 1 |

**Sample :** 18124205

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 110 | ug/kg | U | 3/26/18 | 1 |
| **86737** | **9H-Fluorene** | **15000** | **ug/kg** | | 3/26/18 | 10 |
| **83329** | **Acenaphthene** | **16000** | **ug/kg** | | 3/26/18 | 10 |
| **208968** | **Acenaphthylene** | **790** | **ug/kg** | | 3/26/18 | 1 |
| **120127** | **Anthracene** | **9100** | **ug/kg** | | 3/26/18 | 10 |
| **56553** | **Benzo(a)anthracene** | **3600** | **ug/kg** | | 3/26/18 | 1 |
| **50328** | **Benzo(a)pyrene** | **2200** | **ug/kg** | | 3/26/18 | 1 |
| **191242** | **Benzo(g,h,i)perylene** | **1100** | **ug/kg** | | 3/26/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **3100** | **ug/kg** | | 3/26/18 | 1 |
| **207089** | **Benzo[k]fluoranthene** | **1200** | **ug/kg** | | 3/26/18 | 1 |
| **218019** | **Chrysene** | **3900** | **ug/kg** | | 3/26/18 | 1 |
| **53703** | **Dibenzo[a,h]anthracene** | **390** | **ug/kg** | | 3/26/18 | 1 |
| **206440** | **Fluoranthene** | **11000** | **ug/kg** | | 3/26/18 | 10 |
| **193395** | **Indeno(1,2,3-cd)pyrene** | **890** | **ug/kg** | | 3/26/18 | 1 |
| **91203** | **Naphthalene** | **66000** | **ug/kg** | | 3/26/18 | 10 |
| **91576** | **Naphthalene, 2-methyl-** | **44000** | **ug/kg** | | 3/26/18 | 10 |
| **85018** | **Phenanthrene** | **30000** | **ug/kg** | | 3/26/18 | 10 |
| **129000** | **Pyrene** | **10000** | **ug/kg** | | 3/26/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 89 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 93 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 98 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 83 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 98 | %Rec | | 3/26/18 | 1 |

**Sample :** 18134206

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **86737** | **9H-Fluorene** | **450** | **ug/kg** | | 4/ 4/18 | 1 |
| **83329** | **Acenaphthene** | **5800** | **ug/kg** | | 4/ 4/18 | 10 |
| **208968** | **Acenaphthylene** | **240** | **ug/kg** | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 218019 | Chrysene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **206440** | **Fluoranthene** | **56** | **ug/kg** | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **91203** | **Naphthalene** | **940** | **ug/kg** | | 4/ 4/18 | 1 |
| **91576** | **Naphthalene, 2-methyl-** | **14000** | **ug/kg** | | 4/ 4/18 | 10 |
| **85018** | **Phenanthrene** | **150** | **ug/kg** | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 87 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 89 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 91 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 81 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 95 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 18134207

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **86737** | **9H-Fluorene** | **520** | **ug/kg** | | 4/ 4/18 | 1 |
| **83329** | **Acenaphthene** | **4600** | **ug/kg** | | 4/ 4/18 | 10 |
| **208968** | **Acenaphthylene** | **220** | **ug/kg** | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 218019 | Chrysene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **206440** | **Fluoranthene** | **78** | **ug/kg** | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **91203** | **Naphthalene** | **890** | **ug/kg** | | 4/ 4/18 | 1 |
| **91576** | **Naphthalene, 2-methyl-** | **13000** | **ug/kg** | | 4/ 4/18 | 10 |
| **85018** | **Phenanthrene** | **400** | **ug/kg** | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 49 | ug/kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 94 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 94 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 97 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 86 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 101 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 18134208

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **86737** | **9H-Fluorene** | **530** | **ug/kg** | | 4/ 4/18 | 1 |
| **83329** | **Acenaphthene** | **4700** | **ug/kg** | | 4/ 4/18 | 10 |
| **208968** | **Acenaphthylene** | **230** | **ug/kg** | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **56553** | **Benzo(a)anthracene** | **290** | **ug/kg** | | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **205992** | **Benzo[b]Fluoranthene** | **48** | **ug/kg** | | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **218019** | **Chrysene** | **280** | **ug/kg** | | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **206440** | **Fluoranthene** | **100** | **ug/kg** | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 48 | ug/kg | U | 4/ 4/18 | 1 |
| **91203** | **Naphthalene** | **1000** | **ug/kg** | | 4/ 4/18 | 1 |
| **91576** | **Naphthalene, 2-methyl-** | **11000** | **ug/kg** | | 4/ 4/18 | 10 |
| **85018** | **Phenanthrene** | **200** | **ug/kg** | | 4/ 4/18 | 1 |
| **129000** | **Pyrene** | **100** | **ug/kg** | | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 90 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 91 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 94 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 82 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 94 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 18124200 Matrix Spike

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 98 | %Rec | | 3/27/18 | 1 |
| 86737 | 9H-Fluorene | | | NA | 3/27/18 | 10 |
| 83329 | Acenaphthene | | | NA | 3/27/18 | 10 |
| 208968 | Acenaphthylene | 73 | %Rec | | 3/27/18 | 1 |
| 120127 | Anthracene | | | NA | 3/27/18 | 10 |
| 56553 | Benzo(a)anthracene | | | NA | 3/27/18 | 10 |
| 50328 | Benzo(a)pyrene | | | NA | 3/27/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | | | NA | 3/27/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | | | NA | 3/27/18 | 10 |
| 207089 | Benzo[k]fluoranthene | | | NA | 3/27/18 | 1 |
| 218019 | Chrysene | | | NA | 3/27/18 | 10 |
| 53703 | Dibenzo[a,h]anthracene | 80 | %Rec | | 3/27/18 | 1 |
| 206440 | Fluoranthene | | | NA | 3/27/18 | 10 |
| 193395 | Indeno(1,2,3-cd)pyrene | 57 | %Rec | | 3/27/18 | 1 |
| 91203 | Naphthalene | | | NA | 3/27/18 | 50 |
| 91576 | Naphthalene, 2-methyl- | | | NA | 3/27/18 | 10 |
| 85018 | Phenanthrene | | | NA | 3/27/18 | 10 |
| 129000 | Pyrene | | | NA | 3/27/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 99 | %Rec | | 3/27/18 | 1 |
| 1719068 | Anthracene-D10 | 98 | %Rec | | 3/27/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 107 | %Rec | | 3/27/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 107 | %Rec | | 3/27/18 | 1 |
| 1718521 | D10-Pyrene | 101 | %Rec | | 3/27/18 | 1 |

**Sample :** 18134206 Matrix Spike

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 86 | %Rec | | 4/ 4/18 | 1 |
| 86737 | 9H-Fluorene | 93 | %Rec | | 4/ 4/18 | 1 |
| 83329 | Acenaphthene | 102 | %Rec | | 4/ 4/18 | 10 |
| 208968 | Acenaphthylene | 93 | %Rec | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 96 | %Rec | | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 104 | %Rec | | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 94 | %Rec | | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 97 | %Rec | | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 96 | %Rec | | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 98 | %Rec | | 4/ 4/18 | 1 |
| 218019 | Chrysene | 94 | %Rec | | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 98 | %Rec | | 4/ 4/18 | 1 |
| 206440 | Fluoranthene | 104 | %Rec | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 98 | %Rec | | 4/ 4/18 | 1 |
| 91203 | Naphthalene | 82 | %Rec | | 4/ 4/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 100 | %Rec | | 4/ 4/18 | 10 |
| 85018 | Phenanthrene | 90 | %Rec | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 96 | %Rec | | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 95 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 94 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 98 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 87 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 98 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 18124200 Matrix Spike#2

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 100 | %Rec | | 3/27/18 | 1 |
| 86737 | 9H-Fluorene | | | NA | 3/27/18 | 10 |
| 83329 | Acenaphthene | | | NA | 3/27/18 | 10 |
| 208968 | Acenaphthylene | 98 | %Rec | | 3/27/18 | 1 |
| 120127 | Anthracene | | | NA | 3/27/18 | 10 |
| 56553 | Benzo(a)anthracene | | | NA | 3/27/18 | 10 |
| 50328 | Benzo(a)pyrene | | | NA | 3/27/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | | | NA | 3/27/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | | | NA | 3/27/18 | 10 |
| 207089 | Benzo[k]fluoranthene | | | NA | 3/27/18 | 1 |
| 218019 | Chrysene | | | NA | 3/27/18 | 10 |
| 53703 | Dibenzo[a,h]anthracene | 87 | %Rec | | 3/27/18 | 1 |
| 206440 | Fluoranthene | | | NA | 3/27/18 | 10 |
| 193395 | Indeno(1,2,3-cd)pyrene | 86 | %Rec | | 3/27/18 | 1 |
| 91203 | Naphthalene | | | NA | 3/27/18 | 50 |
| 91576 | Naphthalene, 2-methyl- | | | NA | 3/27/18 | 10 |
| 85018 | Phenanthrene | | | NA | 3/27/18 | 50 |
| 129000 | Pyrene | | | NA | 3/27/18 | 10 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 98 | %Rec | | 3/27/18 | 1 |
| 1719068 | Anthracene-D10 | 99 | %Rec | | 3/27/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 107 | %Rec | | 3/27/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 104 | %Rec | | 3/27/18 | 1 |
| 1718521 | D10-Pyrene | 99 | %Rec | | 3/27/18 | 1 |

**Sample :** 18134206 Matrix Spike#2

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** PAH
**Prep Method:** 3541 - Automated soxhlet extraction
**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 85 | %Rec | | 4/ 4/18 | 1 |
| 86737 | 9H-Fluorene | 90 | %Rec | | 4/ 4/18 | 1 |
| 83329 | Acenaphthene | 98 | %Rec | | 4/ 4/18 | 10 |
| 208968 | Acenaphthylene | 91 | %Rec | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 96 | %Rec | | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 102 | %Rec | | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 93 | %Rec | | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 96 | %Rec | | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 98 | %Rec | | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 94 | %Rec | | 4/ 4/18 | 1 |
| 218019 | Chrysene | 90 | %Rec | | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 97 | %Rec | | 4/ 4/18 | 1 |
| 206440 | Fluoranthene | 105 | %Rec | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 97 | %Rec | | 4/ 4/18 | 1 |
| 91203 | Naphthalene | 84 | %Rec | | 4/ 4/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 101 | %Rec | | 4/ 4/18 | 10 |
| 85018 | Phenanthrene | 92 | %Rec | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 95 | %Rec | | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 93 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 94 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 97 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 88 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 96 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 92S032318B1 Blank

**Information :** Blank

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 50 | ug/kg | U | 3/26/18 | 1 |
| 86737 | 9H-Fluorene | 50 | ug/kg | U | 3/26/18 | 1 |
| 83329 | Acenaphthene | 50 | ug/kg | U | 3/26/18 | 1 |
| 208968 | Acenaphthylene | 50 | ug/kg | U | 3/26/18 | 1 |
| 120127 | Anthracene | 50 | ug/kg | U | 3/26/18 | 1 |
| 56553 | Benzo(a)anthracene | 50 | ug/kg | U | 3/26/18 | 1 |
| 50328 | Benzo(a)pyrene | 50 | ug/kg | U | 3/26/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 50 | ug/kg | U | 3/26/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 50 | ug/kg | U | 3/26/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 50 | ug/kg | U | 3/26/18 | 1 |
| 218019 | Chrysene | 50 | ug/kg | U | 3/26/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 50 | ug/kg | U | 3/26/18 | 1 |
| 206440 | Fluoranthene | 50 | ug/kg | U | 3/26/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 50 | ug/kg | U | 3/26/18 | 1 |
| 91203 | Naphthalene | 50 | ug/kg | U | 3/26/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 50 | ug/kg | U | 3/26/18 | 1 |
| 85018 | Phenanthrene | 50 | ug/kg | U | 3/26/18 | 1 |
| 129000 | Pyrene | 50 | ug/kg | U | 3/26/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 89 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 89 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 89 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 81 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 98 | %Rec | | 3/26/18 | 1 |

**Sample :** 92S040418B1 Blank

**Information :** Blank

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 86737 | 9H-Fluorene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 83329 | Acenaphthene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 208968 | Acenaphthylene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 120127 | Anthracene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 218019 | Chrysene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 206440 | Fluoranthene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 91203 | Naphthalene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 85018 | Phenanthrene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| 129000 | Pyrene | 50 | ug/kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 89 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 90 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 91 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 84 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 99 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 92S032318L1 Lab Control Std

**Information :** Lab Control Standard

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 81 | %Rec | | 3/26/18 | 1 |
| 86737 | 9H-Fluorene | 86 | %Rec | | 3/26/18 | 1 |
| 83329 | Acenaphthene | 83 | %Rec | | 3/26/18 | 1 |
| 208968 | Acenaphthylene | 89 | %Rec | | 3/26/18 | 1 |
| 120127 | Anthracene | 91 | %Rec | | 3/26/18 | 1 |
| 56553 | Benzo(a)anthracene | 96 | %Rec | | 3/26/18 | 1 |
| 50328 | Benzo(a)pyrene | 89 | %Rec | | 3/26/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 90 | %Rec | | 3/26/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 95 | %Rec | | 3/26/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 87 | %Rec | | 3/26/18 | 1 |
| 218019 | Chrysene | 87 | %Rec | | 3/26/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 91 | %Rec | | 3/26/18 | 1 |
| 206440 | Fluoranthene | 97 | %Rec | | 3/26/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 90 | %Rec | | 3/26/18 | 1 |
| 91203 | Naphthalene | 79 | %Rec | | 3/26/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 84 | %Rec | | 3/26/18 | 1 |
| 85018 | Phenanthrene | 85 | %Rec | | 3/26/18 | 1 |
| 129000 | Pyrene | 90 | %Rec | | 3/26/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 91 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 90 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 92 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 84 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 94 | %Rec | | 3/26/18 | 1 |

**Sample :** 92S040418L1 Lab Control Std

**Information :** Lab Control Standard

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 83 | %Rec | | 4/ 4/18 | 1 |
| 86737 | 9H-Fluorene | 90 | %Rec | | 4/ 4/18 | 1 |
| 83329 | Acenaphthene | 84 | %Rec | | 4/ 4/18 | 1 |
| 208968 | Acenaphthylene | 91 | %Rec | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 92 | %Rec | | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 98 | %Rec | | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 93 | %Rec | | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 93 | %Rec | | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 94 | %Rec | | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 95 | %Rec | | 4/ 4/18 | 1 |
| 218019 | Chrysene | 89 | %Rec | | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 93 | %Rec | | 4/ 4/18 | 1 |
| 206440 | Fluoranthene | 100 | %Rec | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 93 | %Rec | | 4/ 4/18 | 1 |
| 91203 | Naphthalene | 81 | %Rec | | 4/ 4/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 87 | %Rec | | 4/ 4/18 | 1 |
| 85018 | Phenanthrene | 87 | %Rec | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 92 | %Rec | | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 93 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 91 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 95 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 87 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 94 | %Rec | | 4/ 4/18 | 1 |

**Sample :** 92S032318L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 86 | %Rec | | 3/26/18 | 1 |
| 86737 | 9H-Fluorene | 89 | %Rec | | 3/26/18 | 1 |
| 83329 | Acenaphthene | 86 | %Rec | | 3/26/18 | 1 |
| 208968 | Acenaphthylene | 92 | %Rec | | 3/26/18 | 1 |
| 120127 | Anthracene | 92 | %Rec | | 3/26/18 | 1 |
| 56553 | Benzo(a)anthracene | 98 | %Rec | | 3/26/18 | 1 |
| 50328 | Benzo(a)pyrene | 90 | %Rec | | 3/26/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 91 | %Rec | | 3/26/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 98 | %Rec | | 3/26/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 88 | %Rec | | 3/26/18 | 1 |
| 218019 | Chrysene | 89 | %Rec | | 3/26/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 93 | %Rec | | 3/26/18 | 1 |
| 206440 | Fluoranthene | 98 | %Rec | | 3/26/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 92 | %Rec | | 3/26/18 | 1 |
| 91203 | Naphthalene | 83 | %Rec | | 3/26/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 87 | %Rec | | 3/26/18 | 1 |
| 85018 | Phenanthrene | 87 | %Rec | | 3/26/18 | 1 |
| 129000 | Pyrene | 93 | %Rec | | 3/26/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 93 | %Rec | | 3/26/18 | 1 |
| 1719068 | Anthracene-D10 | 91 | %Rec | | 3/26/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 92 | %Rec | | 3/26/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 86 | %Rec | | 3/26/18 | 1 |
| 1718521 | D10-Pyrene | 95 | %Rec | | 3/26/18 | 1 |

**Sample :** 92S040418L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** PAH

**Prep Method:** 3541 - Automated soxhlet extraction

**Analysis Method:** 8270D - Semivolatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 91587 | 2-Chloronaphthalene | 83 | %Rec | | 4/ 4/18 | 1 |
| 86737 | 9H-Fluorene | 89 | %Rec | | 4/ 4/18 | 1 |
| 83329 | Acenaphthene | 84 | %Rec | | 4/ 4/18 | 1 |
| 208968 | Acenaphthylene | 91 | %Rec | | 4/ 4/18 | 1 |
| 120127 | Anthracene | 93 | %Rec | | 4/ 4/18 | 1 |
| 56553 | Benzo(a)anthracene | 98 | %Rec | | 4/ 4/18 | 1 |
| 50328 | Benzo(a)pyrene | 92 | %Rec | | 4/ 4/18 | 1 |
| 191242 | Benzo(g,h,i)perylene | 92 | %Rec | | 4/ 4/18 | 1 |
| 205992 | Benzo[b]Fluoranthene | 92 | %Rec | | 4/ 4/18 | 1 |
| 207089 | Benzo[k]fluoranthene | 97 | %Rec | | 4/ 4/18 | 1 |
| 218019 | Chrysene | 90 | %Rec | | 4/ 4/18 | 1 |
| 53703 | Dibenzo[a,h]anthracene | 92 | %Rec | | 4/ 4/18 | 1 |
| 206440 | Fluoranthene | 101 | %Rec | | 4/ 4/18 | 1 |
| 193395 | Indeno(1,2,3-cd)pyrene | 92 | %Rec | | 4/ 4/18 | 1 |
| 91203 | Naphthalene | 81 | %Rec | | 4/ 4/18 | 1 |
| 91576 | Naphthalene, 2-methyl- | 86 | %Rec | | 4/ 4/18 | 1 |
| 85018 | Phenanthrene | 88 | %Rec | | 4/ 4/18 | 1 |
| 129000 | Pyrene | 93 | %Rec | | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 93951974 | Acenaphthylene-D8 | 93 | %Rec | | 4/ 4/18 | 1 |
| 1719068 | Anthracene-D10 | 93 | %Rec | | 4/ 4/18 | 1 |
| 63466717 | Benzo[a]pyrene-D12 | 94 | %Rec | | 4/ 4/18 | 1 |
| 81103799 | D10-Fluorene (SS) | 87 | %Rec | | 4/ 4/18 | 1 |
| 1718521 | D10-Pyrene | 95 | %Rec | | 4/ 4/18 | 1 |

# US EPA Region 10 Laboratory

## Multi-Analyte Final Report

**Project Code :** SFP-127A
**Site :** QUENDALL TERMINALS : STAR Bench Scale Treatability Study
**Contact :** Kathy Cerise
**Account :** 2018T10P000DD21044LA00

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### Sample : 18124200

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **24000** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 95 | %Rec | | 3/23/18 | 1 |

### Sample : 18124201

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **26000** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 94 | %Rec | | 3/23/18 | 1 |

## Sample : 18124202

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **26000** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 99 | %Rec | | 3/23/18 | 1 |

## Sample : 18124203

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **270** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 82 | %Rec | | 3/23/18 | 1 |

## Sample : 18124204

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **370** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 76 | %Rec | | 3/23/18 | 1 |

## Sample : 18124205

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **280** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 77 | %Rec | | 3/23/18 | 1 |

## Sample : 18124216

**Information :** TP-01
**Matrix :** Water **Weight Basis :** Wet
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 50 | ug/L | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 92 | %Rec | | 3/23/18 | 1 |

## Sample : 18134206

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **9.9** | **mg/Kg** | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 89 | %Rec | | 4/ 5/18 | 1 |

## Sample : 18134207

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **10** | **mg/Kg** | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 94 | %Rec | | 4/ 5/18 | 1 |

## Sample : 18134208

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **11** | **mg/Kg** | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | | 4/ 5/18 | 1 |

## Sample : 18124200 Sample Duplicate

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **22000** | **mg/Kg** | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 94 | %Rec | | 3/23/18 | 1 |

## Sample : 18134206 Sample Duplicate

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***90209** | **TPH-Gx Gasoline Range Organics** | **9.8** | **mg/Kg** | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 92 | %Rec | | 4/ 5/18 | 1 |

## Sample : 91T032218B1 Blank

**Information :** Blank
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 5.0 | mg/Kg | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 93 | %Rec | | 3/23/18 | 1 |

## Sample : 91T040418B1 Blank

**Information :** Blank
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 10 | mg/Kg | U | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 93 | %Rec | | 4/ 5/18 | 1 |

## Sample : 91T032218L1 Lab Control Std

**Information :** Lab Control Standard
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 82 | %Rec | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 90 | %Rec | | 3/23/18 | 1 |

## Sample : 91T040418L1 Lab Control Std

**Information :** Lab Control Standard
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 94 | %Rec | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 94 | %Rec | | 4/ 5/18 | 1 |

## Sample : 91T032218L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx
**Prep Method:** NWTPH-Gx - Gasoline range organics
**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 92 | %Rec | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 94 | %Rec | | 3/23/18 | 1 |

**Sample :** 91T040418L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.

**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Gx

**Prep Method:** NWTPH-Gx - Gasoline range organics

**Analysis Method:** NWTPH-Gx - Gasoline range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *90209 | TPH-Gx Gasoline Range Organics | 92 | %Rec | | 4/ 5/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 540363 | Benzene, 1,4-difluoro- | 98 | %Rec | | 4/ 5/18 | 1 |

# US EPA Region 10 Laboratory

## Multi-Analyte Final Report

**Project Code :** SFP-127A
**Site :** QUENDALL TERMINALS : STAR Bench Scale Treatability Study
**Contact :** Kathy Cerise
**Account :** 2018T10P000DD21044LA00

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### Sample : 18124200

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 629992 | Pentacosane | | | NA | 3/26/18 | 50 |
| ***400009** | **TPH-GC/Diesel Range Organics** | **71000** | **mg/Kg** | | 3/26/18 | 50 |
| *400010 | TPH-GC/Motor Oil Range Organics | 6400 | mg/Kg | U | 3/26/18 | 50 |

### Sample : 18124201

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 629992 | Pentacosane | | | NA | 3/26/18 | 50 |
| ***400009** | **TPH-GC/Diesel Range Organics** | **68000** | **mg/Kg** | | 3/26/18 | 50 |
| *400010 | TPH-GC/Motor Oil Range Organics | 6000 | mg/Kg | U | 3/26/18 | 50 |

## Sample : 18124202

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 629992 | Pentacosane | | | NA | 3/26/18 | 50 |
| ***400009** | **TPH-GC/Diesel Range Organics** | **71000** | **mg/Kg** | | 3/26/18 | 50 |
| *400010 | TPH-GC/Motor Oil Range Organics | 6200 | mg/Kg | U | 3/26/18 | 50 |

## Sample : 18124203

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **790** | **mg/Kg** | | 3/23/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 110 | mg/Kg | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 100 | %Rec | | 3/23/18 | 1 |

## Sample : 18124204

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **890** | **mg/Kg** | | 3/23/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 100 | mg/Kg | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 98 | %Rec | | 3/23/18 | 1 |

## Sample : 18124205

**Information :** 2018QT-SB-TP02-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **1100** | **mg/Kg** | | 3/23/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 110 | mg/Kg | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 98 | %Rec | | 3/23/18 | 1 |

## Sample : 18134206

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **180** | **mg/Kg** | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 98 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 100 | %Rec | | 4/ 4/18 | 1 |

## Sample : 18134207

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **140** | **mg/Kg** | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 97 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 97 | %Rec | | 4/ 4/18 | 1 |

## Sample : 18134208

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **130** | **mg/Kg** | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 98 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 94 | %Rec | | 4/ 4/18 | 1 |

## Sample : 18124200 Sample Duplicate

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/19/2018 10:00:00AM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 629992 | Pentacosane | | | NA | 3/26/18 | 50 |
| ***400009** | **TPH-GC/Diesel Range Organics** | **67000** | **mg/Kg** | | 3/26/18 | 50 |
| *400010 | TPH-GC/Motor Oil Range Organics | 6100 | mg/Kg | U | 3/26/18 | 50 |

## Sample : 18134206 Sample Duplicate

**Information :** 2018QT-SB-TP01-03072018
**Matrix :** Soil **Weight Basis :** Dry
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| ***400009** | **TPH-GC/Diesel Range Organics** | **150** | **mg/Kg** | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 97 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 92 | %Rec | | 4/ 4/18 | 1 |

## Sample : 92S032218B1 Blank

**Information :** Blank
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 40 | mg/Kg | U | 3/23/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 100 | mg/Kg | U | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 97 | %Rec | | 3/23/18 | 1 |

## Sample : 92S040318B1 Blank

**Information :** Blank
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 40 | mg/Kg | U | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 100 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 89 | %Rec | | 4/ 4/18 | 1 |

## Sample : 92S032218L1 Lab Control Std

**Information :** Lab Control Standard
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 91 | %Rec | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 93 | %Rec | | 3/23/18 | 1 |

## Sample : 92S040318L1 Lab Control Std

**Information :** Lab Control Standard
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 95 | mg/Kg | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 100 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 93 | %Rec | | 4/ 4/18 | 1 |

## Sample : 92S032218L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 95 | %Rec | | 3/23/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 97 | %Rec | | 3/23/18 | 1 |

## Sample : 92S040318L2 Lab Control Std#2

**Information :** Lab Control Standard Dup.
**Matrix :** Solid **Weight Basis :** Dry

**Parameter :** TPH-Dx
**Prep Method:** Ultrasonication - Ultrasonic Extraction
**Analysis Method:** NWTPH-Dx - Diesel range organics

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| *400009 | TPH-GC/Diesel Range Organics | 94 | mg/Kg | | 4/ 4/18 | 1 |
| *400010 | TPH-GC/Motor Oil Range Organics | 100 | mg/Kg | U | 4/ 4/18 | 1 |
| **Surrogate Compounds:** | | | | | | |
| 629992 | Pentacosane | 94 | %Rec | | 4/ 4/18 | 1 |

# US EPA Region 10 Laboratory

## Multi-Analyte Final Report

**Project Code :** SFP-127A
**Site :** QUENDALL TERMINALS : STAR Bench Scale Treatability Study
**Contact :** Kathy Cerise
**Account :** 2018T10P000DD21044LA00

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**Sample :** 18134215
**Information :** 2018QT-SB-TP01-0307201
**Matrix :** Water
**Weight Basis :** Unspecified
**Collected :** 3/28/2018 12:00:00PM

**Parameter :** VOA
**Prep Method:** 5030C - Purge and Trap
**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 71556 | 1,1,1-Trichloroethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 79005 | 1,1,2-Trichloroethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75343 | 1,1-Dichloroethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75354 | 1,1-Dichloroethene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 87616 | 1,2,3-Trichlorobenzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 96184 | 1,2,3-Trichloropropane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 120821 | 1,2,4-Trichlorobenzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 96128 | 1,2-Dibromo-3-chloropropane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 107062 | 1,2-Dichloroethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 78875 | 1,2-Dichloropropane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 78933 | 2-Butanone | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 591786 | 2-Hexanone | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 108101 | 2-Pentanone, 4-methyl- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 67641 | 2-Propanone | 2000 | ug/L | UJ | 4/ 5/18 | 2000 |
| 79209 | Acetic acid, methyl ester | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 107131 | Acrylonitrile | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 71432 | Benzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 98828 | Benzene, (1-methylethyl)- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| **95636** | **Benzene, 1,2,4-trimethyl-** | **1300** | **ug/L** | J | 4/ 5/18 | 2000 |
| 95501 | Benzene, 1,2-dichloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 108678 | Benzene, 1,3,5-trimethyl- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 541731 | Benzene, 1,3-dichloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 106467 | Benzene, 1,4-dichloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 108907 | Benzene, chloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 100425 | Benzene, ethenyl- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 103651 | Benzene, propyl-, (103651) | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 98066 | Benzene, tert-butyl- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 74975 | Bromochloromethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75274 | Bromodichloromethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |

**Target Analyte Results (cont.):**

| | | | | | | |
|---|---|---|---|---|---|---|
| 75252 | Bromoform | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 74839 | Bromomethane | 2000 | ug/L | UJ | 4/ 5/18 | 2000 |
| 75150 | Carbon disulfide | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 56235 | Carbon Tetrachloride | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 156592 | cis-1,2-Dichloroethene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 10061015 | cis-1,3-Dichloropropene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 110827 | Cyclohexane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 108872 | Cyclohexane, methyl- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 124481 | Dibromochloromethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 74953 | Dibromomethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75092 | Dichloromethane | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 106934 | Ethane, 1,2-dibromo- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 79016 | Ethene, trichloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75003 | Ethyl Chloride | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 100414 | Ethylbenzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75694 | Freon 11 | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 76131 | Freon 113 | 2000 | ug/L | UJ | 4/ 5/18 | 2000 |
| 75718 | Freon 12 | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 87683 | Hexachlorobutadiene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 74873 | Methane, chloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 67663 | Methane, trichloro- | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 1634044 | Methyl tert butylether (MTBE) | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| *1330207 | MP-Xylene | 4000 | ug/L | U | 4/ 5/18 | 2000 |
| **91203** | **Naphthalene** | **120000** | **ug/L** | | 4/ 6/18 | 20000 |
| 104518 | n-Butylbenzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 95476 | o-Xylene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 135988 | sec-Butylbenzene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 127184 | Tetrachloroethene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 108883 | Toluene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 10061026 | Trans-1,3-Dichloropropene | 2000 | ug/L | U | 4/ 5/18 | 2000 |
| 75014 | Vinyl Chloride | 2000 | ug/L | U | 4/ 5/18 | 2000 |

**Surrogate Compounds:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 104 | %Rec | | 4/ 6/18 | 20000 |
| 2199691 | 1,2-Dichlorobenzene-d4 | 103 | %Rec | | 4/ 5/18 | 2000 |
| 17060070 | 1,2-Dichloroethane-d4 | 97 | %Rec | | 4/ 6/18 | 20000 |
| 17060070 | 1,2-Dichloroethane-d4 | 100 | %Rec | | 4/ 5/18 | 2000 |
| 540363 | Benzene, 1,4-difluoro- | 101 | %Rec | | 4/ 6/18 | 20000 |
| 540363 | Benzene, 1,4-difluoro- | 99 | %Rec | | 4/ 5/18 | 2000 |
| 460004 | p-Bromofluorobenzene | 99 | %Rec | | 4/ 5/18 | 2000 |
| 460004 | p-Bromofluorobenzene | 98 | %Rec | | 4/ 6/18 | 20000 |
| 2037265 | Toluene-d8 | 98 | %Rec | | 4/ 5/18 | 2000 |
| 2037265 | Toluene-d8 | 101 | %Rec | | 4/ 6/18 | 20000 |

## Sample : 18134215-A

**Information :** 2018QT-SB-TP01-0307201

**Matrix :** Water **Weight Basis :** Unspecified

**Collected :** 3/28/2018 12:00:00PM

**Parameter :** VOA

**Lab Matrix :** Product
**Prep Method:** 5035A - Closed Loop Purge and Trap
**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 71556 | 1,1,1-Trichloroethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 79005 | 1,1,2-Trichloroethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75343 | 1,1-Dichloroethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75354 | 1,1-Dichloroethene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 87616 | 1,2,3-Trichlorobenzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 96184 | 1,2,3-Trichloropropane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 120821 | 1,2,4-Trichlorobenzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 96128 | 1,2-Dibromo-3-chloropropane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 107062 | 1,2-Dichloroethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 78875 | 1,2-Dichloropropane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 78933 | 2-Butanone | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 591786 | 2-Hexanone | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 108101 | 2-Pentanone, 4-methyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 67641 | 2-Propanone | 3200000 | ug/L | UJ | 4/ 5/18 | 3200000 |
| 79209 | Acetic acid, methyl ester | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 107131 | Acrylonitrile | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 71432 | Benzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 98828 | Benzene, (1-methylethyl)- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 95636 | Benzene, 1,2,4-trimethyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 95501 | Benzene, 1,2-dichloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 108678 | Benzene, 1,3,5-trimethyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 541731 | Benzene, 1,3-dichloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 106467 | Benzene, 1,4-dichloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 108907 | Benzene, chloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 100425 | Benzene, ethenyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 103651 | Benzene, propyl-, (103651) | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 98066 | Benzene, tert-butyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 74975 | Bromochloromethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75274 | Bromodichloromethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75252 | Bromoform | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 74839 | Bromomethane | 3200000 | ug/L | UJ | 4/ 5/18 | 3200000 |
| 75150 | Carbon disulfide | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 56235 | Carbon Tetrachloride | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 156592 | cis-1,2-Dichloroethene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 10061015 | cis-1,3-Dichloropropene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 110827 | Cyclohexane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 108872 | Cyclohexane, methyl- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 124481 | Dibromochloromethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 74953 | Dibromomethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75092 | Dichloromethane | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 106934 | Ethane, 1,2-dibromo- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 79016 | Ethene, trichloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |

**Target Analyte Results (cont.):**

| | | | | | | |
|---|---|---|---|---|---|---|
| 75003 | Ethyl Chloride | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 100414 | Ethylbenzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75694 | Freon 11 | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 76131 | Freon 113 | 3200000 | ug/L | UJ | 4/ 5/18 | 3200000 |
| 75718 | Freon 12 | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 87683 | Hexachlorobutadiene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 74873 | Methane, chloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 67663 | Methane, trichloro- | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 1634044 | Methyl tert butylether (MTBE) | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| *1330207 | MP-Xylene | 6400000 | ug/L | U | 4/ 5/18 | 3200000 |
| **91203** | **Naphthalene** | **71000000** | **ug/L** | | 4/ 5/18 | 3200000 |
| 104518 | n-Butylbenzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 95476 | o-Xylene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 135988 | sec-Butylbenzene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 127184 | Tetrachloroethene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 108883 | Toluene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 10061026 | Trans-1,3-Dichloropropene | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |
| 75014 | Vinyl Chloride | 3200000 | ug/L | U | 4/ 5/18 | 3200000 |

**Surrogate Compounds:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 103 | %Rec | | 4/ 5/18 | 3200000 |
| 17060070 | 1,2-Dichloroethane-d4 | 97 | %Rec | | 4/ 5/18 | 3200000 |
| 540363 | Benzene, 1,4-difluoro- | 101 | %Rec | | 4/ 5/18 | 3200000 |
| 460004 | p-Bromofluorobenzene | 101 | %Rec | | 4/ 5/18 | 3200000 |
| 2037265 | Toluene-d8 | 98 | %Rec | | 4/ 5/18 | 3200000 |

**Sample :** 18134216

**Information :** TB-2
**Matrix :** Water
**Collected :** 3/28/2018 12:00:00PM

**Weight Basis :** Unspecified

**Parameter :** VOA
**Prep Method:** 5030C - Purge and Trap
**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75343 | 1,1-Dichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75354 | 1,1-Dichloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 107062 | 1,2-Dichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 78875 | 1,2-Dichloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 78933 | 2-Butanone | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 591786 | 2-Hexanone | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 67641 | 2-Propanone | 1.0 | ug/L | UJ | 4/ 5/18 | 1 |
| 79209 | Acetic acid, methyl ester | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 107131 | Acrylonitrile | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 71432 | Benzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108907 | Benzene, chloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 100425 | Benzene, ethenyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 98066 | Benzene, tert-butyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74975 | Bromochloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75274 | Bromodichloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75252 | Bromoform | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74839 | Bromomethane | 1.0 | ug/L | UJ | 4/ 5/18 | 1 |
| 75150 | Carbon disulfide | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 56235 | Carbon Tetrachloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 110827 | Cyclohexane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108872 | Cyclohexane, methyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 124481 | Dibromochloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74953 | Dibromomethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |

**Target Analyte Results (cont.):**

| | | | | | | |
|---|---|---|---|---|---|---|
| 75092 | Dichloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79016 | Ethene, trichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75003 | Ethyl Chloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 100414 | Ethylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75694 | Freon 11 | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 76131 | Freon 113 | 1.0 | ug/L | UJ | 4/ 5/18 | 1 |
| 75718 | Freon 12 | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 87683 | Hexachlorobutadiene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74873 | Methane, chloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 67663 | Methane, trichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| *1330207 | MP-Xylene | 2.0 | ug/L | U | 4/ 5/18 | 1 |
| 91203 | Naphthalene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 104518 | n-Butylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95476 | o-Xylene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 135988 | sec-Butylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 127184 | Tetrachloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108883 | Toluene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75014 | Vinyl Chloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |

**Surrogate Compounds:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 103 | %Rec | | 4/ 5/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 97 | %Rec | | 4/ 5/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | | 4/ 5/18 | 1 |
| 460004 | p-Bromofluorobenzene | 97 | %Rec | | 4/ 5/18 | 1 |
| 2037265 | Toluene-d8 | 99 | %Rec | | 4/ 5/18 | 1 |

**Sample :** K040518BL1 Blank

**Information :** Blank

**Matrix :** Liquid **Weight Basis :** Unspecified

**Parameter :** VOA

**Prep Method:** 5030C - Purge and Trap

**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75343 | 1,1-Dichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75354 | 1,1-Dichloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 107062 | 1,2-Dichloroethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 78875 | 1,2-Dichloropropane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 78933 | 2-Butanone | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 591786 | 2-Hexanone | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 67641 | 2-Propanone | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79209 | Acetic acid, methyl ester | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 107131 | Acrylonitrile | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 71432 | Benzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108907 | Benzene, chloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 100425 | Benzene, ethenyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 98066 | Benzene, tert-butyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74975 | Bromochloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75274 | Bromodichloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75252 | Bromoform | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74839 | Bromomethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75150 | Carbon disulfide | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 56235 | Carbon Tetrachloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 110827 | Cyclohexane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108872 | Cyclohexane, methyl- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 124481 | Dibromochloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74953 | Dibromomethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75092 | Dichloromethane | 1.0 | ug/L | U | 4/ 5/18 | 1 |

**Target Analyte Results (cont.):**

| | | | | | | |
|---|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 79016 | Ethene, trichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75003 | Ethyl Chloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 100414 | Ethylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75694 | Freon 11 | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 76131 | Freon 113 | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75718 | Freon 12 | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 87683 | Hexachlorobutadiene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 74873 | Methane, chloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 67663 | Methane, trichloro- | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| *1330207 | MP-Xylene | 2.0 | ug/L | U | 4/ 5/18 | 1 |
| 91203 | Naphthalene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 104518 | n-Butylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 95476 | o-Xylene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 135988 | sec-Butylbenzene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 127184 | Tetrachloroethene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 108883 | Toluene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 5/18 | 1 |
| 75014 | Vinyl Chloride | 1.0 | ug/L | U | 4/ 5/18 | 1 |

**Surrogate Compounds:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 101 | %Rec | | 4/ 5/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 97 | %Rec | | 4/ 5/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 101 | %Rec | | 4/ 5/18 | 1 |
| 460004 | p-Bromofluorobenzene | 98 | %Rec | | 4/ 5/18 | 1 |
| 2037265 | Toluene-d8 | 98 | %Rec | | 4/ 5/18 | 1 |

**Sample :** K040618BL1 Blank

**Information :** Blank
**Matrix :** Liquid

**Parameter :** VOA
**Prep Method:** 5030C - Purge and Trap
**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Target Analyte Results:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75343 | 1,1-Dichloroethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75354 | 1,1-Dichloroethene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 107062 | 1,2-Dichloroethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 78875 | 1,2-Dichloropropane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 78933 | 2-Butanone | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 591786 | 2-Hexanone | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 67641 | 2-Propanone | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 79209 | Acetic acid, methyl ester | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 107131 | Acrylonitrile | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 71432 | Benzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 108907 | Benzene, chloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 100425 | Benzene, ethenyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 98066 | Benzene, tert-butyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 74975 | Bromochloromethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75274 | Bromodichloromethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75252 | Bromoform | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 74839 | Bromomethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75150 | Carbon disulfide | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 56235 | Carbon Tetrachloride | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 110827 | Cyclohexane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 108872 | Cyclohexane, methyl- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 124481 | Dibromochloromethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 74953 | Dibromomethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75092 | Dichloromethane | 1.0 | ug/L | U | 4/ 6/18 | 1 |

**Target Analyte Results (cont.):**

| | | | | | | |
|---|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 79016 | Ethene, trichloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75003 | Ethyl Chloride | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 100414 | Ethylbenzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75694 | Freon 11 | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 76131 | Freon 113 | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75718 | Freon 12 | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 87683 | Hexachlorobutadiene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 74873 | Methane, chloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 67663 | Methane, trichloro- | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| *1330207 | MP-Xylene | 2.0 | ug/L | U | 4/ 6/18 | 1 |
| 91203 | Naphthalene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 104518 | n-Butylbenzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 95476 | o-Xylene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 135988 | sec-Butylbenzene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 127184 | Tetrachloroethene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 108883 | Toluene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 1.0 | ug/L | U | 4/ 6/18 | 1 |
| 75014 | Vinyl Chloride | 1.0 | ug/L | U | 4/ 6/18 | 1 |

**Surrogate Compounds:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 103 | %Rec | | 4/ 6/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 98 | %Rec | | 4/ 6/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | | 4/ 6/18 | 1 |
| 460004 | p-Bromofluorobenzene | 98 | %Rec | | 4/ 6/18 | 1 |
| 2037265 | Toluene-d8 | 100 | %Rec | | 4/ 6/18 | 1 |

**Sample :** K040518LCS1 Lab Control Std

**Information :** Lab Control Standard

**Matrix :** Liquid **Weight Basis :** Unspecified

**Parameter :** VOA

**Prep Method:** 5030C - Purge and Trap

**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 90 | %Rec | | 4/ 5/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 98 | %Rec | | 4/ 5/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 92 | %Rec | | 4/ 5/18 | 1 |
| 75343 | 1,1-Dichloroethane | 101 | %Rec | | 4/ 5/18 | 1 |
| 75354 | 1,1-Dichloroethene | 107 | %Rec | | 4/ 5/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 99 | %Rec | | 4/ 5/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 99 | %Rec | | 4/ 5/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 98 | %Rec | | 4/ 5/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 89 | %Rec | | 4/ 5/18 | 1 |
| 107062 | 1,2-Dichloroethane | 100 | %Rec | | 4/ 5/18 | 1 |
| 78875 | 1,2-Dichloropropane | 97 | %Rec | | 4/ 5/18 | 1 |
| 78933 | 2-Butanone | 100 | %Rec | | 4/ 5/18 | 1 |
| 591786 | 2-Hexanone | 93 | %Rec | | 4/ 5/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 94 | %Rec | | 4/ 5/18 | 1 |
| 67641 | 2-Propanone | 97 | %Rec | | 4/ 5/18 | 1 |
| 79209 | Acetic acid, methyl ester | 97 | %Rec | | 4/ 5/18 | 1 |
| 107131 | Acrylonitrile | 99 | %Rec | | 4/ 5/18 | 1 |
| 71432 | Benzene | 90 | %Rec | | 4/ 5/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 98 | %Rec | | 4/ 5/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 98 | %Rec | | 4/ 5/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 100 | %Rec | | 4/ 5/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 99 | %Rec | | 4/ 5/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 101 | %Rec | | 4/ 5/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 98 | %Rec | | 4/ 5/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 98 | %Rec | | 4/ 5/18 | 1 |
| 108907 | Benzene, chloro- | 101 | %Rec | | 4/ 5/18 | 1 |
| 100425 | Benzene, ethenyl- | 95 | %Rec | | 4/ 5/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 99 | %Rec | | 4/ 5/18 | 1 |
| 98066 | Benzene, tert-butyl- | 97 | %Rec | | 4/ 5/18 | 1 |
| 74975 | Bromochloromethane | 98 | %Rec | | 4/ 5/18 | 1 |
| 75274 | Bromodichloromethane | 90 | %Rec | | 4/ 5/18 | 1 |
| 75252 | Bromoform | 87 | %Rec | | 4/ 5/18 | 1 |
| 74839 | Bromomethane | 82 | %Rec | | 4/ 5/18 | 1 |
| 75150 | Carbon disulfide | 88 | %Rec | | 4/ 5/18 | 1 |
| 56235 | Carbon Tetrachloride | 92 | %Rec | | 4/ 5/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 100 | %Rec | | 4/ 5/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 94 | %Rec | | 4/ 5/18 | 1 |
| 110827 | Cyclohexane | 97 | %Rec | | 4/ 5/18 | 1 |
| 108872 | Cyclohexane, methyl- | 96 | %Rec | | 4/ 5/18 | 1 |
| 124481 | Dibromochloromethane | 91 | %Rec | | 4/ 5/18 | 1 |
| 74953 | Dibromomethane | 96 | %Rec | | 4/ 5/18 | 1 |
| 75092 | Dichloromethane | 100 | %Rec | | 4/ 5/18 | 1 |

**Spiked Compounds (cont.):**

| | | | | | |
|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 98 | %Rec | 4/ 5/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 95 | %Rec | 4/ 5/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 97 | %Rec | 4/ 5/18 | 1 |
| 79016 | Ethene, trichloro- | 94 | %Rec | 4/ 5/18 | 1 |
| 75003 | Ethyl Chloride | 99 | %Rec | 4/ 5/18 | 1 |
| 100414 | Ethylbenzene | 97 | %Rec | 4/ 5/18 | 1 |
| 75694 | Freon 11 | 97 | %Rec | 4/ 5/18 | 1 |
| 76131 | Freon 113 | 96 | %Rec | 4/ 5/18 | 1 |
| 75718 | Freon 12 | 89 | %Rec | 4/ 5/18 | 1 |
| 87683 | Hexachlorobutadiene | 99 | %Rec | 4/ 5/18 | 1 |
| 74873 | Methane, chloro- | 98 | %Rec | 4/ 5/18 | 1 |
| 67663 | Methane, trichloro- | 98 | %Rec | 4/ 5/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 97 | %Rec | 4/ 5/18 | 1 |
| *1330207 | MP-Xylene | 97 | %Rec | 4/ 5/18 | 1 |
| 91203 | Naphthalene | 97 | %Rec | 4/ 5/18 | 1 |
| 104518 | n-Butylbenzene | 95 | %Rec | 4/ 5/18 | 1 |
| 95476 | o-Xylene | 96 | %Rec | 4/ 5/18 | 1 |
| 135988 | sec-Butylbenzene | 97 | %Rec | 4/ 5/18 | 1 |
| 127184 | Tetrachloroethene | 105 | %Rec | 4/ 5/18 | 1 |
| 108883 | Toluene | 99 | %Rec | 4/ 5/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 95 | %Rec | 4/ 5/18 | 1 |
| 75014 | Vinyl Chloride | 99 | %Rec | 4/ 5/18 | 1 |

**Surrogate Compounds:**

| | | | | | |
|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 100 | %Rec | 4/ 5/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 99 | %Rec | 4/ 5/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | 4/ 5/18 | 1 |
| 460004 | p-Bromofluorobenzene | 102 | %Rec | 4/ 5/18 | 1 |
| 2037265 | Toluene-d8 | 99 | %Rec | 4/ 5/18 | 1 |

**Sample :** K040618LCS1 Lab Control Std

**Information :** Lab Control Standard

**Matrix :** Liquid

**Parameter :** VOA

**Prep Method:** 5030C - Purge and Trap

**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 87 | %Rec | | 4/ 6/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 89 | %Rec | | 4/ 6/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 89 | %Rec | | 4/ 6/18 | 1 |
| 75343 | 1,1-Dichloroethane | 90 | %Rec | | 4/ 6/18 | 1 |
| 75354 | 1,1-Dichloroethene | 93 | %Rec | | 4/ 6/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 98 | %Rec | | 4/ 6/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 96 | %Rec | | 4/ 6/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 95 | %Rec | | 4/ 6/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 89 | %Rec | | 4/ 6/18 | 1 |
| 107062 | 1,2-Dichloroethane | 91 | %Rec | | 4/ 6/18 | 1 |
| 78875 | 1,2-Dichloropropane | 92 | %Rec | | 4/ 6/18 | 1 |
| 78933 | 2-Butanone | 100 | %Rec | | 4/ 6/18 | 1 |
| 591786 | 2-Hexanone | 92 | %Rec | | 4/ 6/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 87 | %Rec | | 4/ 6/18 | 1 |
| 67641 | 2-Propanone | 111 | %Rec | | 4/ 6/18 | 1 |
| 79209 | Acetic acid, methyl ester | 85 | %Rec | | 4/ 6/18 | 1 |
| 107131 | Acrylonitrile | 98 | %Rec | | 4/ 6/18 | 1 |
| 71432 | Benzene | 80 | %Rec | | 4/ 6/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 94 | %Rec | | 4/ 6/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 93 | %Rec | | 4/ 6/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 97 | %Rec | | 4/ 6/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 93 | %Rec | | 4/ 6/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 98 | %Rec | | 4/ 6/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 96 | %Rec | | 4/ 6/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 91 | %Rec | | 4/ 6/18 | 1 |
| 108907 | Benzene, chloro- | 94 | %Rec | | 4/ 6/18 | 1 |
| 100425 | Benzene, ethenyl- | 85 | %Rec | | 4/ 6/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 94 | %Rec | | 4/ 6/18 | 1 |
| 98066 | Benzene, tert-butyl- | 91 | %Rec | | 4/ 6/18 | 1 |
| 74975 | Bromochloromethane | 90 | %Rec | | 4/ 6/18 | 1 |
| 75274 | Bromodichloromethane | 86 | %Rec | | 4/ 6/18 | 1 |
| 75252 | Bromoform | 87 | %Rec | | 4/ 6/18 | 1 |
| 74839 | Bromomethane | 59 | %Rec | | 4/ 6/18 | 1 |
| 75150 | Carbon disulfide | 76 | %Rec | | 4/ 6/18 | 1 |
| 56235 | Carbon Tetrachloride | 86 | %Rec | | 4/ 6/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 89 | %Rec | | 4/ 6/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 87 | %Rec | | 4/ 6/18 | 1 |
| 110827 | Cyclohexane | 88 | %Rec | | 4/ 6/18 | 1 |
| 108872 | Cyclohexane, methyl- | 85 | %Rec | | 4/ 6/18 | 1 |
| 124481 | Dibromochloromethane | 86 | %Rec | | 4/ 6/18 | 1 |
| 74953 | Dibromomethane | 91 | %Rec | | 4/ 6/18 | 1 |
| 75092 | Dichloromethane | 88 | %Rec | | 4/ 6/18 | 1 |

**Spiked Compounds (cont.):**

| | | | | | |
|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 92 | %Rec | 4/ 6/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 90 | %Rec | 4/ 6/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 88 | %Rec | 4/ 6/18 | 1 |
| 79016 | Ethene, trichloro- | 87 | %Rec | 4/ 6/18 | 1 |
| 75003 | Ethyl Chloride | 88 | %Rec | 4/ 6/18 | 1 |
| 100414 | Ethylbenzene | 90 | %Rec | 4/ 6/18 | 1 |
| 75694 | Freon 11 | 86 | %Rec | 4/ 6/18 | 1 |
| 76131 | Freon 113 | 86 | %Rec | 4/ 6/18 | 1 |
| 75718 | Freon 12 | 78 | %Rec | 4/ 6/18 | 1 |
| 87683 | Hexachlorobutadiene | 95 | %Rec | 4/ 6/18 | 1 |
| 74873 | Methane, chloro- | 88 | %Rec | 4/ 6/18 | 1 |
| 67663 | Methane, trichloro- | 88 | %Rec | 4/ 6/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 86 | %Rec | 4/ 6/18 | 1 |
| *1330207 | MP-Xylene | 91 | %Rec | 4/ 6/18 | 1 |
| 91203 | Naphthalene | 93 | %Rec | 4/ 6/18 | 1 |
| 104518 | n-Butylbenzene | 91 | %Rec | 4/ 6/18 | 1 |
| 95476 | o-Xylene | 89 | %Rec | 4/ 6/18 | 1 |
| 135988 | sec-Butylbenzene | 94 | %Rec | 4/ 6/18 | 1 |
| 127184 | Tetrachloroethene | 95 | %Rec | 4/ 6/18 | 1 |
| 108883 | Toluene | 91 | %Rec | 4/ 6/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 87 | %Rec | 4/ 6/18 | 1 |
| 75014 | Vinyl Chloride | 90 | %Rec | 4/ 6/18 | 1 |

**Surrogate Compounds:**

| | | | | | |
|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 103 | %Rec | 4/ 6/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 100 | %Rec | 4/ 6/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | 4/ 6/18 | 1 |
| 460004 | p-Bromofluorobenzene | 100 | %Rec | 4/ 6/18 | 1 |
| 2037265 | Toluene-d8 | 101 | %Rec | 4/ 6/18 | 1 |

**Sample :** K040518LCS2 Lab Control Std#2

**Information :** Lab Control Standard Dup.

**Matrix :** Liquid **Weight Basis :** Unspecified

**Parameter :** VOA

**Prep Method:** 5030C - Purge and Trap

**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 94 | %Rec | | 4/ 5/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 99 | %Rec | | 4/ 5/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 97 | %Rec | | 4/ 5/18 | 1 |
| 75343 | 1,1-Dichloroethane | 104 | %Rec | | 4/ 5/18 | 1 |
| 75354 | 1,1-Dichloroethene | 107 | %Rec | | 4/ 5/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 101 | %Rec | | 4/ 5/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 101 | %Rec | | 4/ 5/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 98 | %Rec | | 4/ 5/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 90 | %Rec | | 4/ 5/18 | 1 |
| 107062 | 1,2-Dichloroethane | 103 | %Rec | | 4/ 5/18 | 1 |
| 78875 | 1,2-Dichloropropane | 103 | %Rec | | 4/ 5/18 | 1 |
| 78933 | 2-Butanone | 102 | %Rec | | 4/ 5/18 | 1 |
| 591786 | 2-Hexanone | 97 | %Rec | | 4/ 5/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 97 | %Rec | | 4/ 5/18 | 1 |
| 67641 | 2-Propanone | 103 | %Rec | | 4/ 5/18 | 1 |
| 79209 | Acetic acid, methyl ester | 100 | %Rec | | 4/ 5/18 | 1 |
| 107131 | Acrylonitrile | 101 | %Rec | | 4/ 5/18 | 1 |
| 71432 | Benzene | 92 | %Rec | | 4/ 5/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 101 | %Rec | | 4/ 5/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 101 | %Rec | | 4/ 5/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 101 | %Rec | | 4/ 5/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 102 | %Rec | | 4/ 5/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 103 | %Rec | | 4/ 5/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 102 | %Rec | | 4/ 5/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 100 | %Rec | | 4/ 5/18 | 1 |
| 108907 | Benzene, chloro- | 103 | %Rec | | 4/ 5/18 | 1 |
| 100425 | Benzene, ethenyl- | 97 | %Rec | | 4/ 5/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 101 | %Rec | | 4/ 5/18 | 1 |
| 98066 | Benzene, tert-butyl- | 100 | %Rec | | 4/ 5/18 | 1 |
| 74975 | Bromochloromethane | 101 | %Rec | | 4/ 5/18 | 1 |
| 75274 | Bromodichloromethane | 90 | %Rec | | 4/ 5/18 | 1 |
| 75252 | Bromoform | 85 | %Rec | | 4/ 5/18 | 1 |
| 74839 | Bromomethane | 73 | %Rec | | 4/ 5/18 | 1 |
| 75150 | Carbon disulfide | 91 | %Rec | | 4/ 5/18 | 1 |
| 56235 | Carbon Tetrachloride | 95 | %Rec | | 4/ 5/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 103 | %Rec | | 4/ 5/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 98 | %Rec | | 4/ 5/18 | 1 |
| 110827 | Cyclohexane | 99 | %Rec | | 4/ 5/18 | 1 |
| 108872 | Cyclohexane, methyl- | 98 | %Rec | | 4/ 5/18 | 1 |
| 124481 | Dibromochloromethane | 94 | %Rec | | 4/ 5/18 | 1 |
| 74953 | Dibromomethane | 96 | %Rec | | 4/ 5/18 | 1 |
| 75092 | Dichloromethane | 102 | %Rec | | 4/ 5/18 | 1 |

**Spiked Compounds (cont.):**

| | | | | | |
|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 100 | %Rec | 4/ 5/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 97 | %Rec | 4/ 5/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 99 | %Rec | 4/ 5/18 | 1 |
| 79016 | Ethene, trichloro- | 102 | %Rec | 4/ 5/18 | 1 |
| 75003 | Ethyl Chloride | 100 | %Rec | 4/ 5/18 | 1 |
| 100414 | Ethylbenzene | 100 | %Rec | 4/ 5/18 | 1 |
| 75694 | Freon 11 | 103 | %Rec | 4/ 5/18 | 1 |
| 76131 | Freon 113 | 98 | %Rec | 4/ 5/18 | 1 |
| 75718 | Freon 12 | 90 | %Rec | 4/ 5/18 | 1 |
| 87683 | Hexachlorobutadiene | 98 | %Rec | 4/ 5/18 | 1 |
| 74873 | Methane, chloro- | 100 | %Rec | 4/ 5/18 | 1 |
| 67663 | Methane, trichloro- | 102 | %Rec | 4/ 5/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 101 | %Rec | 4/ 5/18 | 1 |
| *1330207 | MP-Xylene | 101 | %Rec | 4/ 5/18 | 1 |
| 91203 | Naphthalene | 100 | %Rec | 4/ 5/18 | 1 |
| 104518 | n-Butylbenzene | 96 | %Rec | 4/ 5/18 | 1 |
| 95476 | o-Xylene | 100 | %Rec | 4/ 5/18 | 1 |
| 135988 | sec-Butylbenzene | 103 | %Rec | 4/ 5/18 | 1 |
| 127184 | Tetrachloroethene | 109 | %Rec | 4/ 5/18 | 1 |
| 108883 | Toluene | 102 | %Rec | 4/ 5/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 97 | %Rec | 4/ 5/18 | 1 |
| 75014 | Vinyl Chloride | 102 | %Rec | 4/ 5/18 | 1 |

**Surrogate Compounds:**

| | | | | | |
|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 100 | %Rec | 4/ 5/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 100 | %Rec | 4/ 5/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 99 | %Rec | 4/ 5/18 | 1 |
| 460004 | p-Bromofluorobenzene | 98 | %Rec | 4/ 5/18 | 1 |
| 2037265 | Toluene-d8 | 100 | %Rec | 4/ 5/18 | 1 |

**Sample :** K040618LCS2 Lab Control Std#2

**Information :** Lab Control Standard Dup.

**Matrix :** Liquid

**Parameter :** VOA

**Prep Method:** 5030C - Purge and Trap

**Analysis Method:** 8260C - Volatiles by GC/MS

| Analyte Code | Analyte Name | Result | Unit | Qual. | Analysis Date | Dilution |
|---|---|---|---|---|---|---|
| **Spiked Compounds:** | | | | | | |
| 630206 | 1,1,1,2-Tetrachloroethane | 85 | %Rec | | 4/ 6/18 | 1 |
| 71556 | 1,1,1-Trichloroethane | 83 | %Rec | | 4/ 6/18 | 1 |
| 79005 | 1,1,2-Trichloroethane | 86 | %Rec | | 4/ 6/18 | 1 |
| 75343 | 1,1-Dichloroethane | 87 | %Rec | | 4/ 6/18 | 1 |
| 75354 | 1,1-Dichloroethene | 83 | %Rec | | 4/ 6/18 | 1 |
| 87616 | 1,2,3-Trichlorobenzene | 93 | %Rec | | 4/ 6/18 | 1 |
| 96184 | 1,2,3-Trichloropropane | 93 | %Rec | | 4/ 6/18 | 1 |
| 120821 | 1,2,4-Trichlorobenzene | 90 | %Rec | | 4/ 6/18 | 1 |
| 96128 | 1,2-Dibromo-3-chloropropane | 85 | %Rec | | 4/ 6/18 | 1 |
| 107062 | 1,2-Dichloroethane | 88 | %Rec | | 4/ 6/18 | 1 |
| 78875 | 1,2-Dichloropropane | 92 | %Rec | | 4/ 6/18 | 1 |
| 78933 | 2-Butanone | 100 | %Rec | | 4/ 6/18 | 1 |
| 591786 | 2-Hexanone | 92 | %Rec | | 4/ 6/18 | 1 |
| 108101 | 2-Pentanone, 4-methyl- | 89 | %Rec | | 4/ 6/18 | 1 |
| 67641 | 2-Propanone | 100 | %Rec | | 4/ 6/18 | 1 |
| 79209 | Acetic acid, methyl ester | 90 | %Rec | | 4/ 6/18 | 1 |
| 107131 | Acrylonitrile | 92 | %Rec | | 4/ 6/18 | 1 |
| 71432 | Benzene | 78 | %Rec | | 4/ 6/18 | 1 |
| 98828 | Benzene, (1-methylethyl)- | 86 | %Rec | | 4/ 6/18 | 1 |
| 95636 | Benzene, 1,2,4-trimethyl- | 88 | %Rec | | 4/ 6/18 | 1 |
| 95501 | Benzene, 1,2-dichloro- | 93 | %Rec | | 4/ 6/18 | 1 |
| 108678 | Benzene, 1,3,5-trimethyl- | 88 | %Rec | | 4/ 6/18 | 1 |
| 541731 | Benzene, 1,3-dichloro- | 92 | %Rec | | 4/ 6/18 | 1 |
| 106467 | Benzene, 1,4-dichloro- | 93 | %Rec | | 4/ 6/18 | 1 |
| 99876 | Benzene, 1-methyl-4-(1-methylethyl)- | 85 | %Rec | | 4/ 6/18 | 1 |
| 108907 | Benzene, chloro- | 92 | %Rec | | 4/ 6/18 | 1 |
| 100425 | Benzene, ethenyl- | 87 | %Rec | | 4/ 6/18 | 1 |
| 103651 | Benzene, propyl-, (103651) | 85 | %Rec | | 4/ 6/18 | 1 |
| 98066 | Benzene, tert-butyl- | 85 | %Rec | | 4/ 6/18 | 1 |
| 74975 | Bromochloromethane | 91 | %Rec | | 4/ 6/18 | 1 |
| 75274 | Bromodichloromethane | 83 | %Rec | | 4/ 6/18 | 1 |
| 75252 | Bromoform | 82 | %Rec | | 4/ 6/18 | 1 |
| 74839 | Bromomethane | 59 | %Rec | | 4/ 6/18 | 1 |
| 75150 | Carbon disulfide | 71 | %Rec | | 4/ 6/18 | 1 |
| 56235 | Carbon Tetrachloride | 77 | %Rec | | 4/ 6/18 | 1 |
| 156592 | cis-1,2-Dichloroethene | 87 | %Rec | | 4/ 6/18 | 1 |
| 10061015 | cis-1,3-Dichloropropene | 87 | %Rec | | 4/ 6/18 | 1 |
| 110827 | Cyclohexane | 78 | %Rec | | 4/ 6/18 | 1 |
| 108872 | Cyclohexane, methyl- | 77 | %Rec | | 4/ 6/18 | 1 |
| 124481 | Dibromochloromethane | 86 | %Rec | | 4/ 6/18 | 1 |
| 74953 | Dibromomethane | 92 | %Rec | | 4/ 6/18 | 1 |
| 75092 | Dichloromethane | 86 | %Rec | | 4/ 6/18 | 1 |

**Spiked Compounds (cont.):**

| | | | | | |
|---|---|---|---|---|---|
| 79345 | Ethane, 1,1,2,2-tetrachloro- | 93 | %Rec | 4/ 6/18 | 1 |
| 106934 | Ethane, 1,2-dibromo- | 93 | %Rec | 4/ 6/18 | 1 |
| 156605 | Ethene, 1,2-dichloro-, (E)- | 84 | %Rec | 4/ 6/18 | 1 |
| 79016 | Ethene, trichloro- | 86 | %Rec | 4/ 6/18 | 1 |
| 75003 | Ethyl Chloride | 89 | %Rec | 4/ 6/18 | 1 |
| 100414 | Ethylbenzene | 88 | %Rec | 4/ 6/18 | 1 |
| 75694 | Freon 11 | 81 | %Rec | 4/ 6/18 | 1 |
| 76131 | Freon 113 | 75 | %Rec | 4/ 6/18 | 1 |
| 75718 | Freon 12 | 71 | %Rec | 4/ 6/18 | 1 |
| 87683 | Hexachlorobutadiene | 85 | %Rec | 4/ 6/18 | 1 |
| 74873 | Methane, chloro- | 83 | %Rec | 4/ 6/18 | 1 |
| 67663 | Methane, trichloro- | 87 | %Rec | 4/ 6/18 | 1 |
| 1634044 | Methyl tert butylether (MTBE) | 88 | %Rec | 4/ 6/18 | 1 |
| *1330207 | MP-Xylene | 87 | %Rec | 4/ 6/18 | 1 |
| 91203 | Naphthalene | 91 | %Rec | 4/ 6/18 | 1 |
| 104518 | n-Butylbenzene | 82 | %Rec | 4/ 6/18 | 1 |
| 95476 | o-Xylene | 87 | %Rec | 4/ 6/18 | 1 |
| 135988 | sec-Butylbenzene | 86 | %Rec | 4/ 6/18 | 1 |
| 127184 | Tetrachloroethene | 93 | %Rec | 4/ 6/18 | 1 |
| 108883 | Toluene | 88 | %Rec | 4/ 6/18 | 1 |
| 10061026 | Trans-1,3-Dichloropropene | 87 | %Rec | 4/ 6/18 | 1 |
| 75014 | Vinyl Chloride | 82 | %Rec | 4/ 6/18 | 1 |

**Surrogate Compounds:**

| | | | | | |
|---|---|---|---|---|---|
| 2199691 | 1,2-Dichlorobenzene-d4 | 98 | %Rec | 4/ 6/18 | 1 |
| 17060070 | 1,2-Dichloroethane-d4 | 100 | %Rec | 4/ 6/18 | 1 |
| 540363 | Benzene, 1,4-difluoro- | 100 | %Rec | 4/ 6/18 | 1 |
| 460004 | p-Bromofluorobenzene | 98 | %Rec | 4/ 6/18 | 1 |
| 2037265 | Toluene-d8 | 102 | %Rec | 4/ 6/18 | 1 |